Uig Harbour Redevelopment

Environmental Impact Assessment (EIA) Report
Volume 2a: Main Report - Chapter 1 to 10
(Project Information and Physical Environment)

The Highland Council

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Glossary and Abbreviations

AWAC	Acoustic Wave and Current Profiler
BGS	British Geological Society
BH	Borehole
BPEO	Best Practicable Environmental Option
CAPWAP	Case Pile Wave Analysis Programme
CAR	Controlled Activities Regulations
CCTV	Closed circuit Television
CDM	Construction, Design and Management
CEMP	Construction Environmental Management Plan
CFL	CalMac Ferries Ltd
CMAL	Caledonian Maritime Assets
COMAH	Control of Major Accident Hazards
CSD	Cutter Suction Dredger
CSM	Concept Site Model
DMRB	Design Manual for Roads and Bridges
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
ECI	European Copper Institute
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
ELD	Environmental Liabilities Directive
EPS	European Protection Species
EQS	Environmental Quality Standards
FRA	Flood Risk Assessment
GHG	Greenhouse Gases
HAT	Highest Astronomical Tide
HCDS	Highland Coastal Development Strategy
HD modelling	Hydrodynamic modelling

HGV	Heavy Goods Vehicle
HRO	Harbour Revision Order
HV	High Voltage
HWLDP	Highland wide Local Development Plan
IEMA	Institute of Environmental Management and Assessment
LAT	Lowest Astronomical Tide
LDP	Local Development Plan
LED	Light emitting diode
LNG	Liquefied Natural Gas
LV	Low Voltage
MAC	maximum allowance concentration
MHWN	Mean High Water Neap
MHWS	Mean High Water Spring
MLWN	Mean Low Water Neap
MLWS	Mean Low Water Spring
MPS	Marine Policy Statement
MSL	Mean Sea Level
MS-LOT	Marine Scotland - Licencing Operations Team
NGR	National Grid Reference
NIEA	Northern Ireland Environment Agency
NMP	National Marine Plan
NPF3	National Planning Framework 3
NRW	National Resources Wales
NTS	Non-Technical Summary
NVZ	Nitrate Vulnerable Zone
OSPAR	Oslo-PARis Convention
PAC	Pre-Application Consultation
PAH	Polyaromatic hydrocarbons
PCB	Polychlorinated biphenyls

PD	Permitted Development
PLP	Property Level Protection (Flooding)
PPE	Personal Protective Equipment
PSD	Particle Size Distribution
PT modelling	Particle Tracking modelling
PVA	Potentially Vulernable Area (Flooding)
QRA	Qualitative Risk Analysis
RCAHMS	Royal Commissiong of Ancient and Historic Monuments, Scotland
SAC	Special Area of Conservation
SCR	Site Characterisation Report (Dredge disposal site)
SEPA	Scottish Environment Protection Agency
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
SVOC	sem-volatile organic carbon
SW modelling	Spectral Wave modelling
SWMP	Site Waste Management Plan
TBT	tributyl tin
THC	The Highland Council
TPH	total petroleum hydrocarbons
TS	Transport Scotland
UKHO	United Kingdom Hydrographic Office
UKTAG	United Kingdom Technical Advisory Group
UNCLOS	United Nation Convention on the Law of the Sea
USEPA	United States Environmental Protection Agency
UWWDT	Urban Waste Water Treatment Directive
VOC	Volatile organic carbon
WFD	Water Framework Directive
WHILP	West Highlands and Islands Local Plan

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1. Introduction

1.1 Introduction

1.1.1 This Environmental Impact Assessment Report (EIA Report) presents the results of the Environmental Impact Assessment (EIA) undertaken by AECOM on behalf of The Highland Council Development and Infrastructure (hereafter referred to as 'the Applicant') for the Uig Harbour Redevelopment (hereafter referred to as 'the Proposed Development'). This report documents the findings of a single, integrated EIA process that has been completed covering all aspects of the Proposed Development and that accompanies the following consent applications:

- Planning Permission from The Highland Council (THC) Planning Department under the Town & Country Planning (Scotland) Act 1997, as amended by the Planning etc. (Scotland) Act 2006 for licensable activities above Mean Low Water Springs (MLWS);
- Marine licences from Marine Scotland Licensing Operations Team (MS-LOT) under the Marine (Scotland) Act 2010 for licensable activities below Mean High Water Springs (MHWS); and
- Harbour Revision Order from Transport Scotland (TS) under the Harbours Act 1964 to vary the Applicant's existing harbour powers.

1.1.2 The EIA seeks to identify and assess the likely significant effects resulting from the construction and operation of the Proposed Development; to ensure that, where possible appropriate mitigation has been incorporated into the project design; and that where necessary additional measures are identified to mitigate any identified significant effects resulting from the Proposed Development.

1.2 The Need for the Proposed Development

1.2.1 Uig Harbour forms part of the 'Skye Triangle' (along with harbours at Tarbert and Lochmaddy), providing lifeline ferry services for communities in the Western Isles; a role highlighted by national and local policy (see below).

1.2.2 Increasing demand and ageing tonnage has led the ferry operator to commission new, larger ferry vessels for a number of its routes. The Skye Triangle has been identified as a priority and the procurement of a new vessel for this route has commenced. The new vessel which will operate from Uig will be one of a new generation dual-fuel vessels currently underconstruction for CMAL, with the capacity to use either Marine Gas Oil (MGS) or Liquified Natural Gas (LNG).

1.2.3 In order to accommodate this new vessel and make provision for LNG fueling facilities a number of upgrades are required to Uig Harbour.

The Need Case, Through National and Local Policy

1.2.4 National and local policy context highlights the crucial role that Scottish ports including Uig play in supporting such lifeline ferry services and remote communities.

1.2.5 The Third National Planning Framework (NPF3) implemented in 2014, identifies the important opportunity for growth in Scotland's coastal and island communities and highlights the crucial role that lifeline ferry services play in reducing the disadvantage of distance for these communities by supporting economic activity and delivering public services.

1.2.6 The National Marine Plan (NMP) published in 2015 (Marine Scotland, 2015), highlights the importance of ferry routes to islands and identifies the statutory powers and duties of harbour authorities for improving and maintaining harbours.

1.2.7 The Proposed West Highland and Islands Local Development Plan (THC, 2017) sets out THC's strategy for Uig. Upgrading the pier and associated ferry infrastructure to accommodate a new ferry vessel is highlighted as a placemaking priority for Uig.

1.2.8 The Climate Change (Scotland) Act 2009 set out ambitious climate change legislation along with annual targets including wide spread policies and proposals to work towards decarbonising Scotland's transport network. The Scottish Government Ferries plan makes specific commitment to deliver emission reductions through *inter alia* 'improved vessel design, hybrid diesel-electric engines and the use of other alternative fuels'.

1.2.9 Further details on the legislative context and planning policy relevant to the Proposed Development are included in **Chapter 4: Legislative & Planning Context**.

1.3 The Proposed Development Site

1.3.1 Uig Harbour is located in Uig Bay on the west coast of the Trotternish Peninsula in the north east of the Isle of Skye. The Pier at Uig Harbour, named King Edward Pier, serves the CalMac ferry route to the isles of Harris and North Uist and is currently used by the existing ferry service, commercial fishermen, boat day trips, etc. The Pier is under the control of Highland Harbours which is run by THC, whilst the ferry service operations are controlled by CalMac Ferries Ltd. (CFL).

1.3.2 The Proposed Development Site, shown in **Figure 1-1** is centred on National Grid Reference (NGR) NG 38693 63530 and covers an area of 0.07 kilometres squared (km^2) and overlaps the intertidal zone stretching from above MHWS for the onshore works to below MLWS for the marine works.

1.3.3 There are no residential properties within the Proposed Development Site boundary; however residential properties are present approximately 40 m to the north, north east and west at their closest point, and also across Uig Bay from the Proposed Development.

1.3.4 The Proposed Development Site will be accessed via the A87 during construction and operation.

1.3.5 As illustrated in **Figure 1-2** the Proposed Development Site is located adjacent to one ecologically designated site; the Inner Hebrides and the Minches Special Area of Conservation (SAC) designated for harbour porpoises is located approximately 1,100 m to the west of the Proposed Development Site. The Ascrib, Isay and Dunvegan SAC, designated for harbour seals, is located approximately 8 km to the west of the Proposed Development Site. The closest terrestrial designated area is

the Trotternish Ridge SAC and Site of Special Scientific Interest (SSSI) located approximately 5.6 km to the east of the Proposed Development Site.

1.4 Introduction to the Proposed Development

1.4.1 The Proposed Development consists of a series of upgrades to the existing infrastructure at Uig Harbour to accommodate the new larger ferry vessel which CFL is seeking to operate from the harbour. The Proposed Development includes:

- Widening of the pier approachway;
- Widening and strengthening of the existing berthing structure and relocation of the existing waiting shelter;
- Installation of a new single lane linkspan with new lifting dolphins and bankseat;
- Upgrade to utilities;
- Capacity for Liquefied Natural Gas (LNG) storage and refueling;
- Dredging at ferry berth and along the widened pier;
- Dredge disposal;
- Increasing the marshalling area by land reclamation (11,000 square metres: m^2);
- Works on the increased marshalling area including the construction of a new ticket office, fishermen's compound and storage area;
- Demolition of the existing ticket office;
- Installation of a new sheltered walkway along the approachway and pier;
- Remedial works to the existing approachway and old pier head.

1.4.2 In order to accommodate the larger vessel, a capital dredge is required at the berthing structure and adjacent to the widened approachway of approximately 31, 800 metres cubed (m^3) in total. It is proposed to dispose of the remaining material at sea, at a new disposal site located in the vicinity of Uig Bay (hereafter refered to as the 'Proposed Sea Disposal Site').

1.4.3 **Chapter 2: Alternatives** and Design Evolution outlines the evolution of the design and a detailed description of the Proposed Development is set out in **Chapter 3: Project Description**.

1.5 The Applicant

1.5.1 The Proposed Development is being brought forward by the Applicant. THC is the harbour authority at Uig and is therefore responsible for delivering redevelopment works to the pier. Officers working on the Proposed Development will not be part of the regulatory planning function.

1.5.2 The Applicant has commissioned AECOM to deliver the design and undertake an EIA for the Proposed Development.

1.6 EIA Screening

1.6.1 The following regulations transpose the requirements of the European EIA Directive (85/337/EEC as amended) into Scottish law:

- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the T&CP EIA Regulations);
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the Marine Works EIA Regulations'); and
- The Harbour Works (Environmental Impact Assessment) Regulations 1999 ('the Harbour Works EIA Regulations')[1].

1.6.2 The T&CP EIA Regulations and Marine Works EIA Regulations transpose the latest amendment of the European EIA Directive (Directive 2014/52/EU). The Harbour Works (EIA) Regulations 1999 refer to Annex I and II of the European EIA Directive (85/337/EEC).

1.6.3 Screening requirements under the above listed Scottish EIA regulations have been considered.

- The Proposed Development does **not** fall within Annex I of the European EIA Directive. Ferry piers are not included within Schedule 1 of either the Marine Works or the T&CP EIA Regulations.

1.6.4 Elements of the Proposed Development do however fall within parameters set out within Annex II of the European EIA Directive and Schedule 2 of the Marine Works and T&CP EIA Regulations as indicated in Table 1-1 below.

Table 1-1 Legislative Requirement for Screening under European and Scottish EIA Legislation

Project Element	Directive 2014/52/EU	Marine Works EIA Regulations	T&CP EIA Regulations	Relevant Thresholds and Criteria
Construction of roads, harbours and port installations, including fishing harbours (projects not included in Annex I)	Annex II 1 (g)	Schedule 2.1 (e)	Schedule 2.1 (e)	All works
Reclamation of land from the sea	Annex II 10 (e)	Schedule 2.10 (g)	Schedule 2.10 (g)	Where the area of works exceeds 1ha
Sludge deposition sites	Annex II 11 (d)	Schedule 2.11 (d)	Schedule 2.11 (d)	Where the area of deposition or storage exceeds 0.5 ha

1.6.5 Whilst EIA is not mandatory for 'Schedule 2 developments' it may be required where the potential for significant environmental effects is identified.

1.6.6 Whilst no formal request for a screening position was submitted to either THC or MS, in view of the nature, size and location of the Proposed Development, it was agreed that a voluntary EIA would be undertaken and the results reported in this EIA Report in accordance with the aforementioned EIA Regulations.

[1] Note: Under the transitional arrangements of the transitionally arrangements of the 'Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017' which came into force on 5th December 2017, projects for which a screening direction has already been issued under the 1999 regulations, may continue to be determined under these regulations.

1.6.7 A formal request for screening was submitted to TS on 21st July 2017 at TS's request, setting out the requirement for an EIA. A Screening Opinion confirming the requirement for an EIA was received from TS on 21st August 2017.

1.7 EIA Scoping

1.7.1 A Scoping Report setting out the proposed scope of the EIA was submitted to TS, Marine Scotland (MS) and THC on 28th September 2017. The Scoping Report is included in **Appendix 1-1**. A Scoping Opinion, was received from MS on 30th November 2017 and a scoping response, was received from THC on 14 h December 2017. These are included in **Appendix 1.2**.

1.7.2 In response to ongoing design development, a process of scoping verification was subsequently completed in respect to specific design changes and the potential for interaction with the receiving environment. The following scope verification briefing notes were issued to both Marine Scotland and THC. The notes themselves are included within **Appendix 1.3** along with responses received.

- Design Adjustments and EIA Scoping (15th March 2018);
- Measurement of Antifouling Biocides in the Marine Environment at Uig Ferry Terminal (16th April 2018); and
- Uig Harbour Development Update – Anticipated Changes to Construction Traffic Levels (26th April 2018).

1.8 Pre-Application Consultation

1.8.1 The Proposed Development falls within the prescribed classes of licensable activities requiring pre-application consultation (PAC) under section 4(b) and 4(e) of the Marine Licensing (Pre-Application Consultation) (Scotland) Regulations 2013.

1.8.2 PAC events were held in Uig, Lochmaddy and Tarbert from 4th-6th September 2017 and subsequently from 26th-28th February 2018 for the marine licence application. A PAC Report provided in **Appendix 1.4** outlines all the comments received during PAC and identifies how these influenced design.

1.8.3 Further information relating to consultations completed as part of the EIA process is set out with **Chapter 5: Summary of Consultation**.

1.9 Habitat Regulations Assessment (HRA) Screening

1.9.1 The Conservation (Natural Habitats, & c.) Regulations 1994 (as amended) require that certain plans which are likely to have a significant effect on a 'Natura 2000' site must be subject to an 'Appropriate Assessment' by the competent consenting authority, in this case Marine Scotland. Given the proximity of the Proposed Development to the Inner Hebrides and the Minches SAC the Applicant has undertaken an assessment of potential effects on marine nature conservation areas as part of the EIA (**Chapter 11**) which provides information relevant to any Appropriate Assessment to be completed by MS.

1.10 The Environmental Impact Assessment (EIA) Report

1.10.1 The EIA Report comprises four volumes:

- Volume 1 Non-Technical Summary;
- Volume 2 a, b and c Main Report;
- Volume 3 Figures and Appendices.

1.10.2 **Volume 1** is the **Non-Technical Summary (NTS)**. The NTS is intended to be readily accessible to the general public and is concise and written in non-technical language providing a description of the Proposed Development, a summary of its potential environmental effects, and proposed mitigation measures.

1.10.3 **Volume 2** contains the **Main Report**. This provides a detailed description of the existing environment, an assessment of the likely significant effects of the Proposed Development, and identifies the mitigation which is incorporated into the design, construction and operation of the Proposed Development, and any additional measures required to mitigate any significant effects identified.

1.10.4 The Main Report is structured around the following chapter headings:

- Chapter 1 Introduction;
- Chapter 2 Alternatives and Design Evolution;
- Chapter 3 Project Description;
- Chapter 4 Legislative & Planning Context;
- Chapter 5 Summary of Consultation;
- Chapter 6 Approach to Environmental Impact Assessment;
- Chapter 7 Marine Physical Environment;
- Chapter 8 Marine Water & Sediment Quality;
- Chapter 9 Flood Risk & Climate Change;
- Chapter 10 Ground Conditions & Contamination;
- Chapter 11 Marine Nature Conservation Areas;
- Chapter 12 Benthic Ecology;
- Chapter 13 Fish & Shellfish Ecology;
- Chapter 14 Marine Mammals;
- Chapter 15 Ornithology;
- Chapter 16 Socio-Economics, Tourism & Public Access;
- Chapter 17 Onshore Noise;
- Chapter 18 Commercial & Recreational Navigation;
- Chapter 19 Commercial Fisheries;
- Chapter 20 Marine Archaeology & Cultural Heritage;
- Chapter 21 Summary of Mitigation; and
- Chapter 22 References.
-

1.10.5 In-combination effects and cumulative effects are considered for each environmental topic, within each technical chapter, based on the cumulative projects identified in Section 6.5.

1.10.6 Certain topics, listed within the applicable EIA regulations have not been included as separate technical chapters. The justification for this is documented within the Scoping documentation as set out within **Appendix 1-1, 1-2** and **1-3** and is summarised in Table 1-2 below:

Table 1-2: Topics Scoped out of EIA

Topic	Justification	References Throughout the EIA Report
Seascape, Landscape and Visual Effects	Works are not considered l kely to result in significant effect as the Project Description is of similar scale to the existing facilities and would be seen as an extension of the existing harbour infrastructure at Uig.	**Appendix 1.1**
Traffic and Transport (onshore)	Evaluation of anticipated traffic numbers as a result of the operation of the Proposed Development was included within the scoping report and indicated a 'worst case' increase of 24% in base traffic on the A87 on the immediate approach to Uig Harbour. Applying establish guidelines as set out within (Highways Agency, 2010) this represents an impact of 'slight' significance which was not considered significant. Consideration was also given to the likely transport and traffic impacts from temporary construction activities, as detailed in **Appendix 1-3**. no significant uplift in overall traffic numbers is anticipated during construction and whilst it is recognised that construction activities will see a daily uplift in HGV numbers, however this will be temporary[2]. LNG will be delivered to Uig by road tanker. Frequency of road tanker delivers is expected to be similar to the current fuel delivery regime. No significant change is anticipated, therefore this has been scoped out of further consideration within the EIA	**Appendix 1.1** and **1.3**
Air Quality	Dust and emissions during construction will be mitigated and controlled through the Construction Environmental Management Plan (CEMP) commitments. No significant effects are anticipated.	**Appendix 1.1**
Greenhouse Gas (GHG) Emissions and Climate Change	Current GHG emissions are dominated by the ferry and local vehicle traffic. The existing ferry timetable will be maintained. Extra vehicles may be expected to use the ferry, with its increase capacity, however this is not expected to result in significant adverse effect. In addition, the new vessel will have the capacity to operate using either LNG or Marine diesel fuel sources. Where the vessel operates using LNG fuel emissions of GHGs including CO_2, NO_x, SO_x and particulates are expected to be substantioally lower than comparable emissions from the vessel it replaces. No significant adverse effect is expected, indeed, it is expected that the LNG fuel use will result in an overall beneficial effect on GHG emissions and climate change contr butions.	Note: Potential climate change effects on sea level and potential flood risk are considered in **Chapter 9: Flood Risk and Climate Change.**

[2]. In order to ensure a robust and conservative assessment, the assessment here has applied a 'worst case scenario' approach where it has been assumed that every crossing of the new ferry is 100% occupied. In contrast ilt is acknowledged that EIA Reports in support of development proposals at Tarbert and Lochmaddy utilise project trip generation numbers, which fall within the 1005 occupancy assumption which has been used here.

Topic	Justification	References Throughout the EIA Report
Major Accidents and Disasters	The following risk were identified at scoping stage: • LNG storage – risk of fire/explosion; • Storm conditions; • Marine Transport collision risk; and • Flood risk and tidal surges.	LNG Storage is discussed in **Chapter 3: Project Description.** Metocean conditions are discussed in **Chapter 7: Marine Physical Environment.** Flood risk is considered within **Chapter 9: Flood Risk and Climate Change.** Collision risk with other vessels is considered within **Chapter 18: Commercial and Recreational Navigation.**
Natural Resources and Waste Management		The approach to Natural Resource and Waste Management is set out in **Chapter 3: Project Description** The potential effects of natural resource usage and waste are addressed in all the relevant technical assessments. Natural Resource Use and Waste Management is considered within the BPEO Assessment in **Appendix 2.2**
Surface Water Drainage	The Scoping opinion requested that the EIA report consider surface water drainage. Waste water should be directed to public sewer. Drainage design parameters have been set to ensure no significant effect.	Drainage design parameters are detailed within **Chapter 3: Project Description.**

1.10.7 **Volume 3** contains the Figures and Appendices relating to the Main Report chapters. The Appendices include detailed technical information such as survey reports and plans which are cross referenced where relevant within **Volume 2** of the EIA Report.

1.11 EIA Project Team

1.11.1 The EIA has been compiled by AECOM on behalf of the Applicant. AECOM is registered with the Institute of Environmental Management & Assessment (IEMA) EIA Quality Mark. The technical chapters and associated appendices of the EIA Report were written by appropriate qualified and experience technical specialists drawn from the AECOM team and also from specialist partner ABPmer. ABPmer is also IEMA EIA Quality Mark registered. Table 1-3 below sets out the different organisations involved in preparing this EIA Report.

Table 1-3 EIA Project Team and Responsibilities

Organisation	Input to the EIA Report
THC - Development and Infrastructure	The Applicant
AECOM	Project design EIA coordination Hydrodynamic modelling Preparation of the NTS Authors of introductory and summary chapters and glossary Authors of the following technical chapters: • Flood Risk & Climate Change; • Ground Conditions & Contamination; • Marine Nature Conservation Areas; • Benthic Ecology; • Fish & Shellfish Ecology; • Marine Mammals; • Ornithology; • Socio-Economics & Public Access; • Terrestrial Noise & Vibration; and • Marine Archaeology & Cultural Heritage.
ABPmer	Authors of the following technical chapters: • Marine Physical Environment; • Marine Water & Sediment Quality; • Commercial & Recreational Navigation; and • Commercial Fisheries. Undertaking the Site Characterisation process for the Proposed Sea Disposal Site.
Partrac	Collecting the local hydrodynamic and meteorological data at Uig to inform the numerical modelling. Collecting the site-specific data (sediment sampling and benthic surveys) to inform the selection and assessment of the Proposed Sea Disposal Site.

1.12 Availability of the EIA Report

1.12.1 This EIA Report has been submitted to THC Planning Department, MS and TS in support of the relevant consenting applications outlined in Section 4.2.

1.12.2 Digital copies of the EIA Report and other reports associated with the EIA are available to view on the link below:

1.12.3 https://www.highland.gov.uk/info/1523/transport_and_streets/832/uig_harbour_redevelopment

1.12.4 A copy of the EIA Report is also available to view at Calmac Ferries Limited, Ferry Terminal Building, Uig Harbour, IV51 9XX.

1.12.5 Any representations to the applications should be submitted to the relevant consenting authority at the addresses set out in Table 1-4 below.

Table 1-4 Contact Details for Submitting Representations to the Different Consenting Applications

Consent	Consenting Authority	Details
Planning Permission	THC Planning Department	https://www.highland.gov.uk/info/161/planning_and_building_standards ePlanning@highland.gov.uk Skye Area Planning and Building Standards Office Tigh Na Sgire Park Lane Portree IV51 8GP
Marine Licences	Marine Scotland Licensing Team	Marine Scotland 375 Victoria Road Aberdeen AB11 9BD [redacted]
Harbour Revision Order	TS	Ports, Shipping, Freight and Canals Branch Aviation, Maritime Freight and Canals Directorate Area 2D North Victoria Quay Edinburgh EH6 6QQ [redacted]

1.12.6 Representations should be dated and should clearly state the name (in block capitals) and full return email or postal address of those making representation. All representations to the consenting authorities listed above will be made available to the public on request, unless individuals request otherwise.

1.12.7 The EIA Report is available for viewing at the following locations:

- Calmac Ferries Limited, Ferry Terminal Building, Uig Harbour, IV51 9XX
- The Highland Council web link https://www.highland.gov.uk/info/1523/transport_and_streets/832/uig_harbour_redevelopment

1.12.8 Electronic copies of all EIA Report documents can be made available at a fee of £5 per CD. A paper copy of the EIA Report NTS can be made available free of charge per copy. To request copies of the EIA documents please contact AECOM Uig Harbour Redevelopment EIA team at the following email address: uigharbour@aecom.com. A paper copy of the EIA report document can be made available for a fee of £100.

1.13 Other Supporting Documentation

1.13.1 In addition to this EIA Report there are other supporting documents which have been submitted to the different consenting authorities as part of the applications. Table 1-5 summarises the supporting documentation which has accompanied the different applications.

Table 1-5 Consenting Applications – Other Supporting Documentation

Document	Description
PAC Report	This Report is a requirement of the marine licence applications as the Proposed Development is considered a licensable activity requiring PAC under the Marine Licensing (Pre-Application Consultation) (Scotland) Regulations 2013. This document summarises the methods of engagement and the outcomes following the feedback from the PAC activities that have been undertaken by the Applicant. The PAC Report is included in **Appendix 1.4.**
Site Characterisation Report	This report is a requirement for the marine licence application for the dredging operations and opening a new sea disposal as outlined in Marine Scotland's Guidance on Creating a New Sea Disposal Site (Marine Scotland, Dredging and Sea Disposal Sites: Guidance on Creating a New Sea Disposal Site, 2013). This report sets out the results of the selection and assessment of the Proposed Sea Disposal Site. The site characterisation process informed the final design and the EIA. The Site Characterisation Report is included in this report at **Appendix 2.3**.
Best Practicable Environmental Option (BPEO) Appraisal	This document is a requirement for the marine licence application for the dredging operations and opening a new sea disposal as outlined in Marine Scotland's Guidance on Creating a New Sea Disposal Site (Marine Scotland, Dredging and Sea Disposal Sites: Guidance on Creating a New Sea Disposal Site, 2013). This assessment looks at the performance of different options against a range of criteria such as environmental impact, technical feasibility and cost, and identifies the option that provides the most environmental benefit or least environmental damage. The BPEO appraisal is included in this report at **Appendix 2.2**.

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2. Alternatives and Design Evolution

2.1 Introduction

2.1.1 This chapter of the EIA Report considers alternatives to the Proposed Development, including describing how the design of the Proposed Development has evolved through the parallel processes of detailed design development and EIA.

2.2 History of existing Uig Harbour Facilities

2.2.1 Uig Harbour forms part of the Skye Triangle (Uig, Lochmaddy and Tarbert) which provides lifeline ferry services to the communities of the Western Isles. The present structure and layout of the pier is a result of incremental development since its initial creation and particularly as a result of the following modernisations:

- 1984-1986 – The berthing structure and roundhead were added to the pre-existing structure and Roll On/Roll Off facilities were provided for Caledonian MacBrayne's MV Hebridean Isles. New fishing berths and landing areas were also provided during this modernisation; and
- 2000 – Construction of new inner berthing dolphin and construction of new outer berthing dolphin were provided for Caledonian MacBrayne's MV Hebrides.

2.2.2 The present berth for ferry vessels is exposed to wind and wave action predominately from a westerly direction. In certain conditions the berth can become untenable particularly when waves refract around the headland.

2.2.3 Increasing demand and ageing tonnage has led the ferry operator to commission new, larger ferry vessels for a number of its routes. The Skye Triangle has been identified by the operator as a priority and the procurement of a new vessel with increased vehicle and pedestrian capacity for this route has commenced. The ferry will be larger than the current ferry vessel and will run as a dual-fuel vessel using both Marine Diesel Oil and LNG.

2.2.4 The current configuration of the Uig Ferry Terminal would impact the optimal operability of the new vessel. Upgrades are therefore required to various infrastructure elements to accommodate the larger vessel and ensure vessel turnaround times are not reduced.

2.3 Alternative 1: 'Do Nothing Scenario

2.3.1 **Figure 2.1** shows the current layout of the ferry terminal. The following concerns relating to the ongoing feasibility of this current layout were identified:

- Whilst the new vessel would geometrically fit the infrastructure and linkspan orientation, the berth still requires dredging works and strengthening works to maintain the structure integrity. Without the dredging works, the compromised water level would result in a tidally effected service;

- Passenger and vehicle marshalling and access facilities were not considered suitable or sufficient for the increased vehicle and passenger numbers expected as a result of the new vessel;
- The current infrastructure does not provide facilities for LNG fuel use;
- Environmental conditions (wave/wind) currently affecting the berth would also be expected to impact the reliable operation of the new vessel.

2.3.2 It was therefore considered that the 'do nothing' scenario would result in unacceptable reductions in the operability and vessel turnaround times of the new vessel. It was therefore concluded that the 'do nothing' scenario would result in unacceptable reduction in reliability of this life line service.

2.4 Alternative 2: 'Do Minimum' Scenario

2.4.1 In 2012 designers were asked to review the current infrastructure and to give consideration to the identification of the 'do minimum' approach required to accommodate a new vessel at Uig. At this stage the design of the new vessel was not known. The 'do minimum approach' identified included the provision of an increased marshalling area requiring land reclamation; a new ticket office; and a passenger walkway to and from the ferry.

2.5 Alternative 3: Uig Harbour Redevelopment Masterplan (2017)

2.5.1 THC, Caledonian Maritime Assets (CMAL) and CFL recognise that the current ferry terminal is at its operational limit with respect particularly to the current vessel turnaround time and vehicle throughput. Consequently AECOM was instructed by THC in January 2017, to complete a masterplanning exercise to develop a masterplan for the upgrade and redevelopment of critical infrastructure at the Uig Ferry Terminal.

2.5.2 A series of design options were considered for each element of infrastructure to be upgraded as part of the masterplanning process. These are discussed further in the Masterplan Summary Report at **Appendix 2.1**.

2.5.3 **Figure 2.2** summarises the key recommendations and masterplan proposals that were identified through this process.

2.6 Alternative 4: Detailed Design Development

Key Environmental Constraints Influencing Detailed Design Development

2.6.1 A series of key environmental constraints have influenced the detailed design of the Proposed Development. These are summarised in Table 2-1 below.

Table 2-1: Environmental Constraints Influencing the Consideration of Alternatives

Constraint	Description
Marine Physical Processes	Coastal modelling was used to inform the consideration, location and dimensions of the circular cell wall berthing structure, the configuration of the marshalling area and ticket office levels. Bathymetric surveys and sediment dispersion modelling informed the selection of the Proposed Sea Disposal Site.
Marine Sediment Quality	A Ground Investigation (GI) carried out from July to October 2017 around the existing pier infrastructure informed the design of the Proposed Development, including: • The number and type of piles required for the infrastructure; • The piling and anticipated dredging method; • The proposed disposal methods for dredged; and • The proposed location of the Proposed Sea Disposal Site. Seabed Sediment sampling in January 2018 informed the selection and assessment of the Proposed Sea Disposal Site. High levels of heavy metals and hydrocarbons in the sediment at the dredge locations are believed to be naturally occurring in the marine sediments (Smith, et al., 2002) (see **Chapter 8: Marine Water and Sediment Quality**) None the less these have limited the potentially suitable disposal options for the dredged material (see **Appendix 2.2: Best Practice Environmental Option (BPEO) Assessment**). The locations considered for the Proposed Sea Disposal Site were limited to Uig Bay and the immediate surrounding area, in order to maximise the potential for similar sediment characteristics at the disposal site as in the dredge pockets.
Benthic Ecology	Benthic ecology also influenced the location of the Proposed Sea Disposal Site. The identification of the Proposed Sea Disposal Site was informed by historic records of Priority Marine Features (PMFs) as well as benthic sampling and surveying carried out as part of the Site Characterisation Process.
Ornithology	The Proposed Sea Disposal Site was selected to be at least 1 km away from a known white-tailed eagle breeding site in the Uig Bay area.
Aquaculture	Current and planned aquaculture in the vicinity of Uig Bay influenced the selection of the Proposed Sea Disposal Site. An operational salmon farm is located immediately to the south west of Uig Bay in Loch Snizort and planning and marine consents have been granted for the operation of another salmon farm within Uig Bay. Discussions with the operator of the fish farms (Grieg Seafood) were undertaken. The Proposed Sea Disposal Site was selected to minimise effects on fish farming operations from dredge disposal activities.
Current Harbour Users	Feedback provided by current harbour users during the PAC events and three additional harbour user and community consultation events provided valuable information to assist with the design. Due to the widening of the approachway harbour users expressed their concerns at the loss of berths, boat steps and the extent of sufficient dredged area. The Harbour user community meetings allowed the Applicant to listen to these concerns and make design considerations that would prevent loss and provide some benefit to the harbour users. Having taken into consideration the harbour users' concerns reinstatement of the boat steps harbour provides a safe access and adequate multi- tidal access points to vessels. Sufficient space for both fishermen's working area and marine furniture has been reinstated. The harbour users will also benefit through the construction of a solid wall berthing structure for the new vessel which would improve the wave climate in and around the fishermen's berth. During the PAC event in September 2017, representatives for local fisheries highlighted that the planned widening of the approachway would encroach on the dredged pocket to the north of the pier which is currently used for mooring vessels. As a result, additional dredging along the approachway has been included within the Proposed Development to ensure that a similar dredged area is available for mooring vessels once the approachway has been widened.

Constraint	Description
Health and Safety	The proposed LNG storage facility location was identified through a risk analysis completed by DNV-GL, to comply with all applicable legislation therefore mitigating risk and concerns for local residents, users and ferry passengers.

Alternative 4a: Dredge Disposal Options

2.6.2 The proposed option for the disposal of dredged material was identified via a Best Practicable Environmental Option (BPEO) assessment and Site Characterisation process.

2.6.3 A BPEO assessment was carried out to assess the disposal options available against a range of criteria including technical feasibility, environmental impact and cost implications. The aim of the BPEO assessment was to identify the option with the most environmental benefit or the least environmental damage. The BPEO assessment is provided in **Appendix 2.2.**

2.6.4 The location of the Proposed Sea Disposal Site was informed by a site characterisation process which was undertaken in parallel to the EIA process and informed by consultations as appropriate. The Site Characterisation Report for the Proposed Sea Disposal Site is provided **in Appendix 2.3.**

Alternative 4b: Berth Widening Options

2.6.5 The proposed option for the solid circular cell sheet piled widening was identified following a masterplan optionneering study and coastal modelling exercise.

2.6.6 A series of alternative options for berth widening were considered through a masterplan optioneering study and informed by coastal modelling. These options comprised.

- Steel anchors drilled down existing raker piles with no widening;
- 8 m pier widening with vertical and raking steel tubular piles and timber wave screen;
- 8 m pier widening with solid pier structure to the existing round head;
- 8 m pier widening with solid pier structure to the extent of the outer dolphin.

2.6.7 Following consultation with the ferry operator CFL it was agreed that neither the steel anchor option nor the open piled structure with timber wave screen option would provide sufficient protection form the environment conditions at the berth, would have the potential to obstruct vessel berthing or provide sufficient laydown space to accommodate. Therefore to provide the best protection from the environment conditions, berthing structure strengthening and widening for the new LNG compound, it was concluded that a solid structure to the extent of the outer dolphin would provide the best engineering solution.

Alternative 4c: Approachway Widening

2.6.8 The proposed option to widen the approachway by 6 m was identified following a masterplan optioneering study.

2.6.9 A series of alternative options were taken into consideration. These options comprised.

- 'Do nothing' approach;
- 3 m approachway widening with walkway shelter; and
- 6 m approachway widening with walkway shelter.

2.6.10 The proposed widening of the full length of the approachway from the marshalling area to the existing pier head allows tanker (LNG and MGO) vehicles to align and improve their manoeuvre onto the linkspan. The proposed widening mitigates the risk of tanker, HGV and bus vehicle conflicts with the boat steps and pedestrians given the constraints of the approachway carriageway, adjacent narrow footway and constrained horizontal alignment of the approachway carriageway. The extension of the approachway width improves capacity, removes delays in vessel turnaround times during vehicle breakdowns that could impact on passenger safety and vessel loading/unloading and ensures the operability of the Ferry Terminal is not reduced with the introduction of the new vessel.

2.6.11 The widening of the approachway mitigates and reduces risks to foot passengers as a result of the current narrow footway, and improves access for mobility impaired and wheelchair users. It also provides the most suitable location for buried new and upgraded services with the least disruption. Without the widening, during the installation of the buried new and upgraded services, pedestrian access along the footway will be restricted resulting in increased risks to pedestrians.

2.6.12 The proposal to widen the approachway by 6 m was welcomed by the harbour users as this provides the safest operational area for passenger transit for both ferry and tour boats and provides a two lane approach allowing for emergency vehicle access during ferry embarking and disembarking which would not have been provided through the do nothing approach and 3 m widening. The widening improvements to the fishing berth were also welcomed by the harbour users along with replacement of existing marine equipment and an improved laydown area and reinstated boat steps.

2.7 Integrated Environmental Mitigation 'by Design'

2.7.1 As outlined above, the Applicant has addressed a range of physical, environmental and technical issues during design of the Proposed Development. The final design was informed by analysis of the environmental baseline, technical constraints, financial viability and consultation; the results of which are set out in the following reports:

- This EIA Report;
- The disposal Site Characterisation Report ;
- The PAC Report; and
- The BPEO assessment to support the dredge sea disposal site application;

2.7.2 In addition to the specific considerations of alternative options described above, best practice design/environmental mitigation has also been embedded where ever possible in the design of the Proposed Development, including:

- Siting of the Proposed Sea Disposal Site;
- Wave climate mitigation on ferry berth;
- Reuse of rock armour material where appropriate;
- Use of pre-cast members;
- Linkspan bankseat will be sheet piled to provide some mitigation from potential waves and wash to the open piled section next to the fisherman's berth;
- The boat steps will be reinstated, with an improved design to give better tidal access points to vessels;
- Local materials will be used where ever possible;
- Consideration will be given to construction period during bird nesting season;
- LED lighting will be used;
- Disruption to local and retail economy will be minimised;
- Linkspan improvements will introduce the use of biodegradable lubricant;
- Use of LNG fuel offers the opportunity to reduce emission levels, including NOx and CO_2 levels when compared to those currently resulting from the use of marine diesel oil fuel on existing vessel;
- Provision of footpath for the completion of 'missing link' to existing nature walk to the pier.

2.7.3 The approach to mitigation is set out in **Chapter 6: Approach to Environmental Impact Assessment**. Where necessary, additional mitigation measures to address specific environmental effects are set out in the technical chapters (**Chapters 7-20**) and summarised in **Chapter 21: Summary of Mitigation**.

3. Project Description

3.1 Introduction

3.1.1 This chapter of the EIA Report provides a description of the Uig Harbour Redevelopment (hereafter referred to as the 'Proposed Development'). The parameters set out within this description have been used to complete the assessment of effects reported in **Chapters 7-20** of this EIA Report.

3.1.2 The physical aspects of the Proposed Development are set out for the construction and operation phases of development. Committed mitigation measures, including environmental management and measures which have been incorporated into the design of the Proposed Development, are also outlined. The construction techniques may be subject to change following appointment of construction contractor however for the purposes of the EIA, it has been assumed that techniques will remain within the design parameters set out here which are considered to represent the realistic 'worst-case scenario'. All mitigation measures identified in this EIA Report are based on the realistic 'worst-case scenario' outlined in this chapter. In the event that alternative methodologies out with this design envelope are used, contractors will be required to demonstrate that their proposed methods will not have a worse residual impact than those set out in this EIA Report.

3.2 The Proposed Development Site

3.2.1 The Proposed Development Site Boundary is shown in **Figure 3.1.** The EIA covers all elements of the Proposed Development within the Proposed Development Site Boundary. In addition, in order to respond to the various individual consent application requirements for different elements of the Proposed Development (as set out in **Chapter 1: Introduction** and **Chapter 4: Legislative & Planning Context**) the Proposed Development Site has been subdivided into several application boundary areas. These are shown on **Figure 3.2** and are referenced where appropriate throughout this EIA Report.

3.2.2 The Proposed Development Site is located immediately to the south of Uig on the west coast of the Trotternish Peninsula on the Isle of Skye. The Proposed Development Site is centred on NGR NG 38693 63530 and covers an area of 0.064 km^2.

3.2.3 The Proposed Development Site stretches from approximately 130 m to the west of MHWS for the onshore works, spans the intertidal zone and extends out to approximately 100 m to the south-east of King Edward Pier. The Proposed Development Site also includes a separate section of approximately 0.125 km^2 covering the proposed disposal site located approximately 2000 m south west of the King Edward Pier.

3.2.4 The section of the Proposed Development Site above MHWS is previously developed land primarily consisting of the existing marshalling area as well as developed land behind the existing ticket office where the temporary construction compound will be located. There are a number of residential properties in the vicinity of Uig Harbour but none within the Proposed Development Site; the closest

dwelling is located approximately 40 m north east of the Proposed Development Site.

3.2.5 The section of the Proposed Development Site below MHWS will cover the existing King Edward Pier infrastructure[3] as well as the seabed and water column in the immediate vicinity of the planned works including the Proposed Sea Disposal Site. King Edward Pier is currently used by a range of harbour users including the existing ferry service, commercial fishermen, aquaculture site operators and boat day trips.

3.2.6 The A87 runs across Skye from the mainland to Uig via Portree. The A87 cuts across the Proposed Development Site to the end of King Edward Pier.

3.2.7 As shown in **Figure 1-2** the Proposed Development Site is located adjacent to the Inner Hebrides and the Minches SAC designated for harbour porpoises. The designated site boundary is located approximately 1100 m to the west of the Proposed Development Site. In addition, the Ascrib, Isay and Dunvegan SAC, designated for harbour seals, is located approximately 8 km to the west of the Proposed Development Site. The closest terrestrial designated area is the Trotternish Ridge SAC and SSSI located approximately 5.6 km to the east of the Proposed Development Site.

3.2.8 Three listed buildings (Uig Church, Uig Free Church and Uig Round Tower) and a scheduled monument (North Cuil Cairn) are located less than 1 km to the east of the Proposed Development Site Boundary. A number of non-designated sites are located within the Proposed Development Site Boundary (King Edward Pier and Memorial, and two un-designated wrecks) and within 1 km of the Proposed Development Site Boundary (an undated fish trap on the Idrigil foreshore).

3.2.9 An operational salmon fish farm is located approximately 1.3 km to the south west of the Proposed Development Site Boundary. Another salmon fish farm is proposed approximately 1 km south and south west of the Proposed Development Site Boundary in Uig Bay; this fish farm has been granted planning permission and a marine licence and is expected to be operational in the near future. It is considered operational for the purpose of undertaking the EIA.

3.3 The Proposed Development

3.3.1 As discussed in **Chapter 1: Introduction**, the Proposed Development consists of a series of upgrades to the existing infrastructure at Uig Harbour to accommodate the new, larger ferry vessel which CFL is seeking to operate from the harbour. Table 3-1 describes the key characteristics of the Proposed Development. The proposed layout is shown in **Figure 3-3**. Indicative visualisations of the Proposed Development are included in **Figures 3.4 a and b** Further details of the different components of the Proposed Development are provided in the sections below.

3.3.2 For the purposes of the EIA, two scenarios for the construction and delivery of the Proposed Development have been considered as set out below.

[3] Which includes the Approachway, Berthing Structure, Linkspan, bankseat & Lifting Dolphins.

Scenario 1: Single Integrated Delivery Programme

3.3.3 Under Scenario 1, all component elements of the Proposed Development as listed in Table 3-1 will be delivered in an integrated and continuous delivery programme.

Scenario 2: Phased Delivery Programme

3.3.4 Under Scenario 2, the construction of the Proposed Development will be split into three phases:

- Phase 1 - Essential Upgrades: this phase will include the work that would allow the safe operation of the service maximising resilience to the environmental conditions and allow effective operation of the service. The activities include the following:
  - Widening of the approachway and repair/maintenance to existing approach;
  - Re-fendering of the approachway with timber fenders;
  - Widening of the berthing structure and installation of new fendering;
  - Installation of a new wave wall on the widened pier;
  - Scour protection to toe of widened berthing structure by rock armour and/or grout filled blanket;
  - Replacement and re-positioning of the linkspan,
  - Bankseat and lifting dolphins;
  - Capital dredging requirement and dredge disposal;
  - Installation of new services (including Lighting, Power, Telecoms, Potable water and drainage);
  - Relocation of the existing waiting shelter.

  For the purposes of the EIA, the potential installation of the LNG fuel facilities has been included in Phase 1.

  Figure 3.5a shows activities to be included in Phase 1.
- Phase 2 – Marshalling Area & Ticket Office: this phase will comprise land reclamation in the intertidal zone to accommodate the new marshalling area, fisherman's compound and; construction of a new Terminal Building **Figure 3.5b** shows activities to be included in Phase 2.
- Phase 3 – Additional Activities: this phase will include the demolition and removal of the old ticket office and will also include the installation of a covered walkway for foot passengers between the new ticket office and the pier, for vessel boarding. **Figure 3.5c.**

Table 3-1 Key Characteristics of the Proposed Development

Component	Existing Infrastructure	Proposed Activity	Description
Approachway widening - fisherman's compound to chicane	Current approachway width: 9.2 m	Widening of the pier to accommodate the approachway	Increase in approachway width: 6 m Final approachway width: 15.2 m Type of piles: Tubular Steel Hollow piles Pile dimensions: 559 mm diameter and 25 mm thick Number of piles: approx. 26 piles
Approachway widening - chicane to end of old pier head	Current approachway width: 10.5 m	Widening of the pier to accommodate the approachway	Increase in approachway width: 6 m Final approachway width: 16.5 m Type of piles: Tubular Steel Hollow piles Pile dimensions: 559 mm diameter and 25 mm thick Number of piles: approx. 56 piles
Berthing Structure	Current berthing structure width: 9.5 m	Widening the existing berthing structure and new fendering	**Widening the existing berthing structure** Increase in width: 16.0 m Final width: 25.5 m 9No. Circular Cells (14.09 m diameter) *Each circular cell has 88 straight web piles.* Type of piles: Straight web piles AS500-12.7. 20 m long, 10 m embedment into sea bed. Total No. of straight web piles: 792 Each circular cell has 5 H piles. Type of piles: 305x305x287 UKC H Pile. Total No. of H piles: 45 Approximately 1400 m^3 of infill material of good quality sand and gravel. Last 2 cells will be infilled with concrete. Concrete slab 550mm thick on top 8No. Arc Cell *Each arc cell has 38 straight web piles.* Type of piles: Straight web piles AS500-12.7. 20 m long 10 m embedment into seabed. Total No. of straight web piles: 304 *Each arc cell has 2 H piles.* Type of Piles: 305x305x287 UKC H Pile.
Berthing Structure (Cont.)			Total No. of H piles: 18 Approximately 700 m^3 if infill material good quality sand and gravel. Last arc will be infilled with concrete Concrete slab 550 mm thick on top Sheet pile connection from circular cell to approachway Type of piles: U section Pu32 Number of piles: 25

Component	Existing Infrastructure	Proposed Activity	Description
			New Fendering Fender Pile dimensions: 762 mm diameter and 25 mm thick Number of fender piles: approx. 9 piles
Linkspan, bankseat & Lifting Dolphins	Current Linkspan & lifting dolphins system: hydraulic lifting system with a pulley system Length: 36.5 m Width: sea-end 10 m and shore end 5.5 m	Replacing and repositioning the linkspan and lifting dolphins	New linkspan, bankseat & lifting dolphins system: double the number of cylinders – direct translational force Length: 36.5 m Width: sea-end 10 m and shore end 5.5 m Repositioning: will be moved north by up to 5 m north and rotated by 5° The Lifting Dolphins will be placed on two 8 m x 8 m x 3 m deep concrete blocks supported by steel tubular piles (vertical and raking). Pile dimensions (vertical and raking): 762 mm diameter and 25 mm thick Number of steel tubular piles: approx. 6 vertical and 4 raker piles The reinforced concrete bankseat (12 m x 4.5 m) will be supported by either steel tubular piles (vertical and raking) or PU32 Arcelor Mittal Sheet Piles. Steel sheet piles: PU32 Arcelor Mittal. Number of sheet piles: approx. 50 piles Or Number of steel tubular piles: approx. 6 vertical and 4 raker piles
Upgrade to utilities		Upgrade to existing potable water, electricity and telecoms supply	
LNG Storage compound area	Currently no LNG gas storage at Uig Harbour.	Accommodating LNG storage area at Uig Harbour	Location: Widened berthing structure (14.5 m)
Dredge Area	Not required for current vessel dimensions.	Dredging the berth (Pocket 1)	Depth: - 5.9 mCD (including 300 mm overdredge) Volume: 29,642 m^3
	Dredged pocket along the existing pier.	Dredging a pocket along the widened pier (Pocket 2)	Depth: 0.7 mCD (including 300 mm overdredge) Volume: 1,150 m^3
Proposed Sea Disposal Site		Dredge Disposal	Location: 2000 m south west of the King Edward Pier Area: 0.125 km^2 Volume (capital dredge): approximately 30,792 m^3 Expected frequency of maintenance dredging: 3-5 years
Marshalling Area	Current marshalling area: 5,300 m^2	Extending the marshalling area by land reclamation	**Marshalling Area** Area of land to be reclaimed: 11,700 m^2 Volume of infilling material: 50,000 m^3 Total marshalling area with increase: 17,000 m^2 Steel H piles will also be installed within the marshalling to provide the foundations for the new ticket office.

Component	Existing Infrastructure	Proposed Activity	Description
			Steel H pile dimensions: ranging from 204 mm x 207mm to 465 mm x 460 mm in section Number of steel H piles: approx. 30 piles
Ticket Office	Located on land and to the back of existing fisherman's compound.	Constructing a new single-story ticket office	Maximum height 9.5 m Maximum width: 16 m Maximum length: 46 m
Fisherman's Compound Area & Storage Building	Located on the Marshalling Area	Constructing of the fisherman's compound area & the storage building	**Fisherman's Compound Area** Type of piles: PU 32 Arcelor Mittal Sheet piles Number of piles: approx. 120 sheet piles **Storage Building** Maximum height: 4 m Maximum width: 11 m Maximum length: 15 m
Existing Ticket Office	Currently located across the A87 from the existing marshalling area	Demolition of existing ticket office	Demolition of existing ticket office and disposal of material in a compliant method to regulations
Passenger transit shelter, along approachway	Not currently provided	Construction of a sheltered walkway along approachway and pier, providing poor weather shelter to foot passengers.	350 m long steel frame wa kway tunnel with reinforced glass panels.

3.3.5 The following sections provide a more detailed description of the different components of the Proposed Development set out in Table 3-1 and the anticipated construction methods.

Approachway

3.3.6 The pier, which supports the approachway, will be widened by 6 m to allow for two traffic lanes to be installed (in case of an emergency) and to facilitate increased storage along the approachway.

3.3.7 The widening of the pier which supports the approachway will consist of the following activities:

- Driving 82 new steel tubular piles (559 mm in diameter) with reinforced concrete pile caps;
- Place precast concrete crosshead units directly on driven steel tubular bearing piles;
- Place precast concrete deck units spanning between the crossheads;
- Using a combination of pre-cast and insitu concrete to construct the deck;
- Repairing existing concrete deck on approachway over open-piled and masonry wall section;
- Removing and replacing the monoblock area and backfill with new concrete slab over the remaining 100 m; and

- Replacing the timber grillage, fenders and steel boat deflectors and boat steps.

3.3.8 The piling will utilise a 100T crane using a 10T Drop Hammer or Vibro Hammer to drive the piles to the required depth. A gate will be driven and formed to place the pile in. The pile will then be driven to the appropriate depth. The pile resistance may be checked by Case Pile Wave Analysis Program (CAPWAP) to ensure the specification is met. This process is repeated for each pile. A temporary platform will be formed to allow the piling to be built end over-end. Following completion of the piling, a reinforcement cage will be placed in the crosshead, and a pre-cast concrete cross head will be placed on the piles. A collar will be welded to the piles to create a shutter. Grout holes set in the crosshead will be filled. An edge beam will be formed and placed, and pre-stressed deck planks will then be placed across the cross head and an insitu slab poured to form a solid structure. Expansion joints will be placed every 20 m.

Berthing Structure

3.3.9 In order to accommodate the new ferry vessel, the existing berthing structure will be widened by an additional 16.0 m to 24 m width as shown in **Figures 3.3 and 3.5a.** The widening of the berthing structure will require the following activities:

- Demolition and relocation of the existing waiting shelter on the pier;
- Removal and replacement of the fenders, fender piles and fender panels;
- Demolition of sections of the existing wave wall and construction of a new wave protection wall along the western side of the widening;
- Driving 9 circular cells (14.09 m in diameter) consisting of AS500-12.7 piles (20 m in length), with reinforced concrete pile cap. Infill material will consist of good quality sand and gravel with last two cells filled with concrete;
- Driving 8 arc cells consisting of AS500-12.7 piles (20 m in length), with reinforced concrete pile cap and precast concrete crossheads. Infill material will consist of good quality sand and gravel with last arc filled with concrete;
- Placing precast concrete deck units spanning between the crossheads;
- Scour protection through rock armour and or grout filled blanket along the toe of the circular cell wall solid wall construction on the western; and
- Construction of the deck and completed berthing structure extension using a combination of precast and insitu concrete.

Linkspan, Bankseat and Lifting Dolphins

3.3.10 The existing linkspan is over 30 years old and the supporting structure has an undefined residual life. In addition, the new vessel is of a different design to the vessel currently operating from the berth, and the existing ramps and passenger gangways are not expected to align perfectly with the existing linkspan. Given the above, the Applicant proposes to install a new linkspan.

3.3.11 The new linkspan will operate in the same way as the existing one however the specification and design will meet current regulation and guidance under CE

Marking, the Provision and Use of Work Equipment Regulations (1998) and BS 7671:2008+A3:2015 Requirements for Electrical Installations.

3.3.12 The linkspan replacement will consist of the following activities:

- Draining and securing the existing cylinder;
- Removing the steel superstructure;
- Cutting the existing piles to 600 mm below the seabed and removing the concrete structure using a heavy lift floating plant (the exact plant is to be confirmed but for the purpose of the EIA the following plant was used as an example: Bonn & Mees, Rotterdam, Matador 400T);
- Driving piles to the required depth;
- Placing a reinforcement cage around the piles;
- Placing the new precast dolphin and bank seat;
- Shear collar added to piles to form shutter;
- Grout filling the structures; and
- Placing the new linkspan on the new supporting structures and associated mechanical and electrical equipment.

3.3.13 The new linkspan will be positioned up to 10 m north of its current position with a 2° rotation. This means that up to 10 m of the existing pier head needs to be demolished where the existing linkspan meets the pier head. The pier will be cut using a diamond core or using hydro demolition.

3.3.14 The replacement of the linkspan will likely result in a linkspan closure for a period of between 6 - 12 weeks.

Public Utilities

3.3.15 The potable water system, electrical supply, telecoms/data lines and street lighting will be upgraded in the Uig Harbour area. New water bunkering units providing approximate 10 m^3 of storage will be placed on the new pier. Ducting will be installed along the pier with termination manholes and junction boxes. Drainage will be laid as required by Sewers for Scotland and the treatment of drainage will be as specified in the Water Environment (Controlled Activities) (Scotland) Regulations 2011. New data lines, power and potable water lines (including firemains) will be incorporated into the widened structure from the appropriate connection point on the foreshore.

3.3.16 Facilities for 'cold ironing' will be provided for the new vessel. Provision will be made for a 'non-firm' connection which will involve installation of two new GRP[4] housed transformers approximately 4x4 m each and High Voltage (HV) and Low Voltage (LV) cabling. Location of transformers will be at the new marshalling area and at the junction of the berthing structure and approachway area. Cables will be laid in ducts located in a service trench under the new approachway widening and berthing structure widening.

[4] Glass Reinforced Polypropylene

Surface Water Drainage and CAR licence requirements

3.3.17 The existing surface water drainage of the marshalling area consists of a network of conventional gully systems, which tie into an existing 750 mm diameter culvert before draining directly into the sea. This culvert will be extended and divert to the main surface water drainage movement, in order to de-conflict with the proposed ticket office foundations. The most suitable route and outfall location for this surface drainage provision will be determine through an optioneering exercise, as part of detailed design based on site constraints.

3.3.18 These works can be carried out under GBR6 of The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (SEPA, 2018) and will not therefore require a CAR license.

3.3.19 It is envisaged that surface water drainage from the Marshalling Area and part of the Approachway will drain through channel drains, pipework and gullies, via oil separator, and tie into the diverted culvert. Surface water from the pier head and outer Approachway will flow via channel drains to a second oil separator located within the pier widening and discharge to the sea.

Liquefied Natural Gas (LNG) Storage

3.3.20 The new ferry vessel will operate on LNG. CFL expect to install and operate on site storage of LNG of less than 100 tonnes, which sits within the lower tier of Control of Major Accident Hazards (COMAH)[5] regulations. Once operational, two bunkering operations are anticipated per week. LNG will be delivered to the storage facility by road tanker.

3.3.21 CFL are committed to ensuring best practice and regulatory requirements are adhered to. As such the LNG installation will adhere to all appropriate regulation and legislation (including, but not limited to, DSEAR 2002, BS EN1473:2007, ISO20519, Dangerous Goods in Harbour Areas Regulations 2016).

3.3.22 The LNG facilities at Uig will be installed on the proposed widened berthing structure and a preliminary Quantitative Risk Analysis (QRA) has been undertaken to assess the feasibility of this location within the Proposed Development. The facilities will include:

- LNG Storage facility (including fuel delivery filling point and control station);
- LNG bunkering facility.

3.3.23 The storage facility will be housed within a concrete bund with appropriate capacity and surrounded by a secure perimeter with gated accesses. It is expected it will contain the following major component;

- Cryogenic storage tank (Type C) with submerged transfer pump.

3.3.24 The storage tank will be connected to a bunker facility by way of a cryogenic pipeline. This pipeline will be housed within a concrete culvert or otherwise. The bunker facility will provide access to the ship's bunker station at all levels of tide by way of a flexible cryogenic hose secured to a gantry arm or crane.

3.3.25 Consideration has been given throughout all stages of design development to the identification and installation of safety measures and instrumentation to ensure the

[5] Control of Major Accidents Hazards (COMAH) Regulations, 2015

risk of accidental events has been minimised, in accordance with all applicable regulation and guidance. Safety measures and instrumentation will include:

- Gas, pressure and fire detection;
- Emergency shut down systems;
- Emergency relief valves;
- Passive and active fire plans;
- Quick closing dry disconnect coupling;
- Dry-breakaway coupling; and
- CCTV.

Dredging Operations

3.3.26 Two areas of seabed will need to be dredged to accommodate the new vessel and resulting changes to the pier infrastructure as shown in **Figures 3.4 and 3.6a**:

- Dredge Pocket 1: The berthing area will be dredged to accommodate the new vessel. A capital dredge will be carried out to minus -5.9 mCD (including 300 mm over dredge) consisting of approximately 29,642 m^3;
- Dredge Pocket 2: A section along the approachway in front of the fisherman's compound will be dredged to provide a fisherman's berth to compensate for the loss of berthing space from the widening of the approachway. This area will be dredged to 0.7 mCD (including 300 mm over dredge) consisting of approximately 1,150 m^3.

3.3.27 The dredging method will be confirmed once the dredging contractor has been appointed. For the purpose of undertaking this EIA, it is has been assumed that a cutter suction dredger (CSD) will be deployed to undertake the dredging required for the Proposed Development. Alternatively a backhoe dredger could be used but given the hard ground conditions on site the CSD method is considered the most likely option. The CSD method is also considered to be the worst-case option of the two and has therefore been used to undertake the assessment.

3.3.28 CSD vessels tend to have a pontoon hull structure without propulsion and are typically anchored (i.e. anchor or spud leg) during dredging operations. The dredged material is drawn up through the cutterhead and suction pipe and discharged in a hopper barge (self-propelled vessel) for transport to the disposal site. Overflowing will not be allowed from the hopper barges during dredging operations. **Photographs 3-1** and **3-2** provide examples of the type of equipment that will be used.

3.3.29 It is not anticipated that drilling or blasting will be required during dredging operations.

Photograph 3-1 Example Hopper and Transportation Barge: Cork Sand (Source: Boskalis 2012)

Dredge Disposal

3.3.30 The total volume of material to be dredged during the initial capital dredge is approximately 30,792 m^3. The Applicant has considered environmental, technical and economic factors for different disposal options in a BPEO Report provided in **Appendix 2.2.**

3.3.31 Given the high concentrations of heavy metals in the sediment at Uig[6], the dredging requirements (capital and future maintenance dredging) and construction programme restrictions, the BPEO identified for dredge disposal consists of opening a new sea disposal site in the Uig Bay area.

3.3.32 The proposed location for the Proposed Sea Disposal Site shown in **Figure 3.3**; is approximately 2 km from Uig Harbour, centred on NGR NG 366 627. A Site Characterisation Report provided in **Appendix 2.3** sets out the process followed in the selection and assessment of the proposed sea disposal site.

3.3.33 The material will be transported to the Proposed Sea Disposal Site by hopper barge as the dredging operations are carried out. Up to two hopper barges could be

[6] Ground investigations carried out for the Proposed Development in 2017/2018, sediment sampling undertaken at the proposed disposal site and previous sediment sampling conducted by the Harbours Manager across Uig Bay in December 2016 all indicated high concentrations of heavy metals in the sediment across Uig Bay. It was noted in discussions with Marine Scotland that these were believed to be naturally occurring concentrations (Smith, et al., 2002). Chapter 8: Marine Water and Sediment Quality of Volume 2: Main Text and Appendix 2.3: Site Characterisation Report in Volume 4: Appendices provide more details on the characteristics of the sediment in Uig Bay.

operating at one time in order for the CSD to continue operating whilst dredged material is being transported to the Proposed Sea Disposal Site. At the Proposed Sea Disposal Site, large valves on the underside of the hopper barges will open, releasing the entire hopper load onto the seabed as a high density core.

Land Reclamation

3.3.34 The marshalling area will be increased by land reclamation to accommodate the higher traffic flows expected associated with the new vessel as well as a new ticket office. Approximately 11,700 m^2 of land will be reclaimed to a level of 8 mCD using approximately 50,000 m^3 of infilling material as shown in **Figure 3.3 and 3.5b**. The reclaimed area will be surrounded by approximately 150 m of rock armour revetment and/or sheet pile wall to a level of 8 mCD.

3.3.35 The land reclamation is expected to include the constructing of a rock armour revetment around the reclamation area and then deposit of infill material using a tipper (e.g. 2no. 40T excavator, 4no. 40T Load Dumpers, 2no. Backhoe Loader 30T). Defined layers will be formed and compacted until the required level is reached. The infilling material will likely consist of inert material sourced from a local quarry in Skye (Sconser or Torrin Quarry).

3.3.36 Approximately 30 steel H piles will likely be required to be installed in the infilled area as foundations for the building structure.

Infrastructure to be installed on the reclaimed land.

3.3.37 Infrastructure to be installed on the increased marshalling area as shown on **Figure 3.3 and 3.5b** will include the following:

- Construction of a new single-story ticket office with a maximum height 9.5 m Maximum width: 16 m Maximum length: 46 m;
- Provision of vehicle and HGV lanes, car parking spaces, 3 bus stops and collection and drop off spaces;
- Drainage infrastructure;
- Relocation of the existing fisherman's compound to the south eastern end of the marshalling area, along the approachway; and
- Provision of a new dry berthing area at the south eastern end of the marshalling area.

3.3.38 Following construction of the new facilities, the current ticket office located across the A87 from the current marshalling area will be demolished.

Demolition of Existing Ticket Office

3.3.39 After construction of the new terminal building the existing ticket office will close. It is expected following the closure that it would then be demolished. At present it is believed that the building roof construction may be asbestos. It is expected that this would be carried out by a specialised demolition company with removal of asbestos panels individually and disposed of at a suitable licensed disposal site to comply with 'The Special Waste Amendment (Scotland) Regulations 2004'. Following removal of the asbestos roof it would be expected that the steel frame structure could be demolished by use of a high reach grab excavator and disposed of by 40T Load Dumpers at a licensed disposal site.

Passenger Walkway

3.3.40 A sheltered walkway, approximately 350 m in length, will be installed along the approachway and pier to the existing waiting shelter location, providing poor weather shelter to foot passengers. This will consist of approximately a 3 m wide by 2.5 m high steel frame tunnel with reinforced glass panels with access points at suitable locations over the full length.

3.4 Construction Phase

Construction Programme & Phasing

Scenario 1 – Single Integrated Delivery Programme

3.4.1 Under Scenario 1, the construction of the Proposed Development is planned to be undertaken over an overall construction period of approximately 24 months subject to award of consents and award of construction contracts. The detailed construction programme is not yet known, and will be confirmed following construction contract(s) award. For the purpose of the EIA the following timescales have been assumed for the construction of the different components of the Proposed Development.

3.4.2 The following activities will be required before construction can commence:

- **Pre-construction investigations**: Further site investigation and preconstruction surveys required to be undertaken in advance of construction and inform detailed design.
- **Formation of a temporary construction compound**: Establishment of all temporary facilities including site offices, welfare facilities, lay down and storage areas and erection of site signage, security fencing or hoarding as required.

3.4.3 The construction of the marshalling area is expected to commence in the early stages of the project and to last approximately 8 months. This will include the construction of the fisherman's compound area. The construction of the ticket office will then follow and will last an additional 8 months.

3.4.4 Once the fisherman's compound has been constructed the widening of the approachway will then be progressed. Subject to contractor preference this is expected to commence at the seaward end of the approachway, working back towards the fisherman's compound. The widening of the approachway is expected to last approximately 6 months.

3.4.5 The widening of the berthing structure is likely to commence at the start of the construction phase and is expected to last approximately 8 months. Upon completion of the berthing structure and approachway widening, works on the linkspan and new lifting dolphins are expected to start. This task is expected to last approximately 6 months.

3.4.6 The LNG tank and bunkering system could also be installed once the works to the berthing structure are complete.

3.4.7 Dredging is an operational requirement for the ferry vessel but is not part of the critical path for other construction activities. The timing of dredging will be subject to receipt of consent for dredging and dredge disposal operations. There is the potential to run the ferry on a restricted schedule during periods of high tide should the new vessel arrive before the dredging can be carried out. The dredging operations are expected to last 4-6 weeks and could take place 6 days a week from 08:00 till 18:00.

3.4.8 It is expected that the demolition of the existing ticket office will take place at the end of the construction phase and will last approximately 2 months.

Scenario 2 – Phased Delivery Programme

3.4.9 Under Scenario 2, the construction of the Proposed Development is expected to require a total of approximately 40 active working months across 3 phases. The detailed construction programme is not yet known, and will be subject to receipt of consents and confirmation of construction contract(s). Uncertainty remains as to the expected timescale for the delivery of the phasing described below. For the purpose of the EIA it has been assumed that the phases will be delivered sequentially without overlap and will reflect the following parameters.

Pre-construction enabling works

3.4.10 The following activities will be required before Phase 1 construction can commence:

- **Pre-construction investigations**: Further site investigation and preconstruction surveys required to be undertaken in advance of construction and inform detailed design.
- **Formation of a temporary construction compound**: Establishment of all temporary facilities including site offices, welfare facilities, lay down and storage areas and erection of site signage, security fencing or hoarding as required.

Phase 1

3.4.11 This phase is expected to be delivered over an 18 month period.

3.4.12 The widening of the approachway, subject to contractor preference, is expected to commence at the seaward end of the approachway, working back towards the fisherman's compound. The widening of the approachway is expected to last approximately 6 months.

3.4.13 The widening of the berthing structure is likely to commence at the start of phase 1 and is expected to last approximately 8 months. Upon completion of the berthing structure and approachway widening, works on the linkspan, bankseat and new lifting dolphins are expected to start. This task is expected to last a further approximately 6 months.

3.4.14 The LNG tank and bunkering system could also be installed once the works to the berthing structure are complete.

3.4.15 Dredging is an operational requirement for the ferry vessel but is not part of the critical path for other construction activities. The timing of dredging will be subject to receipt of consent for dredging and dredge disposal operations. There is the potential to run the ferry on a restricted schedule during periods of high tide should

the new vessel arrive before the dredging can be carried out. The dredging operations are expected to last 4-6 weeks and could take place 6 days a week from 08:00 till 18:00.

Phase 2

3.4.16 This phase is expected to be delivered over a subsequent 18 month period.

3.4.17 The construction of the marshalling area is expected to last approximately 8 months. This will include the construction of the fisherman's compound area. The construction of the ticket office and storage building will then follow and will last an additional 10 months.

Phase 3

3.4.18 This phase is expected to be delivered over a further 6 month period.

3.4.19 It is expected that the demolition of the existing ticket office will last approximately 2 months. It is expected that the construction of the new walkway shelter and approachway and pier lighting will last approximately 5 months.

Contractors

3.4.20 Several contractors will be involved in the construction of the Proposed Development. However, a Principal Contractor will be responsible for managing all the contractors involved and ensuring that all contractors comply with site environmental management requirements.

Temporary Construction Facilities

3.4.21 During the construction period there will be a requirement for a number of temporary construction facilities including:

- Site office including offices and meeting rooms;
- Staff welfare facilities including toilets, kitchen and a mess room;
- Staff accommodation, if required;
- Storage and laydown areas for construction vehicles, plant, equipment and other materials; and
- Appropriately bunded areas to be used for the storage of oils and other fuels.

3.4.22 A construction compound of up to 200 m by 100 m will be located immediately to the west of the existing ticket office, centered on NGR NG 38479 63691, as shown in **Figure 3.3**. This will accommodate the facilities listed above as well as providing sufficient parking for the construction workers, deliveries and visitors.

3.4.23 In order to accommodate the temporary construction compound, two defunct fuel tanks currently located behind the existing ticket office will be removed. Type 1 material will be used to surface the construction compound. This Type 1 material will be left in place after the completion of construction so that this area can be used as additional parking area for the local community.

3.4.24 Areas of the compound which are considered to present an increased pollution risk such as fuelling or oil storage areas will be bunded and site drainage directed towards an isolated holding tank for treatment and disposal.

3.4.25 The exact make up, layout and dimensions of the temporary compound within the specified parameters will be finalised following award of consent and appointment

of the contractors. The construction compound will be managed by the Principal Contractor.

3.4.26 The compound will be contained within a secure fenced compound. Temporary palisade fencing or similar will be located around the compound to provide security. At night and during periods of darkness directional security lighting will be used, where necessary.

Access during Construction

3.4.27 All road traffic will access the Proposed Development Site via the A87 which runs to the end of Prince Edward Pier at Uig Harbour. Large marine plant will likely access the Proposed Development by sea.

Hours of Working

3.4.28 For the purpose of the EIA, construction activities have been assumed to take place between 07:00-19:00 Monday to Friday and 07:00 to 13:00 on Saturdays. There will be no works undertaken on Sundays or Bank Holidays.

Site Environmental Management

3.4.29 During construction, the Principal Contractor will be required to operate under a detailed site-specific Construction Environmental Management Plan (CEMP). The CEMP will be prepared and agreed with Marine Scotland, TS and THC prior to commencement of construction. The CEMP will implement all of the committed mitigation measures identified within this EIA Report as well as any additional mitigation required by planning and licensing conditions.

3.4.30 The CEMP will set out a variety of control measures for managing the potential environmental effects of construction works including control and management of noise, dust, surface water runoff, waste and pollution control. It will draw upon general construction good practice and guidance contained within, but not limited to, the following good practice guidance documents:

- Construction Industry Research and Information Association (CIRIA) Document C692 - Environmental Good Practice on Site (CIRIA, 2010a);
- CIRIA Document C744 – Coastal and Marine Environmental Site Guide (Second Edition) (CIRIA, 2015a);
- CIRIA Document C745 – Coastal and Maritime Environmental Pocket Book (Second Edition) (CIRIA, 2015b);
- CIRIA Document C674 – The Use of Concrete in Maritime Engineering – A Good Practice Guide (CIRIA, 2010b);
- CIRIA Document C518 – Safety in Ports – Ship-to-shore Linkspans and Walkways. A Guide to Procurement, Operation and Maintenance (CIRIA, 1999);
- CIRIA Document C547 – Scoping the Assessment of Sediment Plumes from Dredging (CIRIA, 2000a).

Natural Resource and Waste Management

3.4.31 Two elements of the Proposed Development will require the use of new natural aggregate materials brought to site from elsewhere. These comprise:

- An estimated 18, 200 m^3 of infill material comprising good quality sand and gravel will be required for the circular cell construction of the widened berthing structure;
- 50,000 m^3 of infilling material will be required for the land reclamation to accommodate the extended marshalling yard.

3.4.32 The infill material will likely consist of inert material sourced from a local quarry in Skye (Sconser or Torrin Quarry).

3.4.33 Waste materials will be generated throughout the construction and operation of the Proposed Development. All waste materials will be managed following the principles of the waste hierarchy as set by the European Waste Framework Directive (Directive 2008/98/EC) and as shown below[7].

3.4.34 Waste material will be managed and disposed from the Proposed Development Site in accordance with the relevant legislation (Environmental Protection Act 1990 (as amended), Landfill (Scotland) Regulations 2003 and the Waste Management Licensing (Scotland) Regulations 2011).

Construction Staffing

3.4.35 The number of construction staff present on the Proposed Development Site will vary according to the construction phase and activities being undertaken. Staffing levels will generally decrease as construction is progressed through to the operation phase. During the construction period the Principal Contractor will employ an Environmental Clerk of Works (ECoW) who will be responsible for the preparation and implementation of the CEMP ensuring that mitigation measures identified in this EIA Report are appropriately implemented. The ECoW will be supported by environmental specialists such as ecologists as and when required.

Health & Safety

3.4.36 Health and safety during construction will fall under the Construction (Design and Management) (CDM) Regulations 2015. A Construction Phase Health and Safety Plan will be prepared following award of consent.

3.4.37 Suitable signage will be erected at the entrance to the Proposed Development Site in order to highlight that construction activities are being undertaken and provide

[7] Extract from Scottish Government (2013): Guidance on Applying the Waste Hierarchy.

directions and health and safety information. During the construction phase public access on the Proposed Development Site would be restricted for health and safety purposes.

Site Restoration

3.4.38 At the end of the construction period all temporary facilities will be removed. The disturbed parts of the Proposed Development Site will be reinstated and the excavated/disturbed material that does not have a genuine and suitable identified reuse will be classified as waste material, managed and disposed of in accordance with all relevant legislation and guidance.

3.5 Operational Phase

Operational Lifetime

3.5.1 The Proposed Development has an up to 30-50 year operational lifetime, after which time it is assumed that any required upgrades would be carried out to extend the operational lifetime further given the lifeline ferry services Uig Harbour supports.

Ferry Operations

3.5.2 The Proposed Development has been designed to ensure that normal ferry operations (3-4 departures from Uig per day) can be carried out throughout its anticipated operational lifetime. The current ferry timetable for Uig is provided in **Appendix 3.1.** The ferry timetable is not expected to change when the new ferry vessel is operational.

Maintenance Dredging

3.5.3 It is anticipated that maintenance dredging will be required in the berthing area every 3-5 years, with the anticipated increase in sedimentation rates due to climate change, to ensure safe operation of the ferry service.

3.5.4 Maintenance dredging will likely use one of the following methods which have previously been used for maintenance dredging at Uig Harbour: using a back hoe, grab or plough. Maintenance dredging operations are expected to last approximately 2 weeks. Maintanence dredging activities will be covered by separate marine licence application(s), when required.

4. Legislative and Planning Context

4.1 Introduction

4.1.1 This chapter provides a summary of the legislative and planning policy context which is considered relevant to the construction and operation of the Uig Harbour Redevelopment (hereafter referred to as the 'Proposed Development'). The following sections outline the regulatory framework and consenting requirements for the Proposed Development; highlight the relevant international standards; and describe the national and local policy context.

4.2 Regulatory Framework & Consenting Requirements

Overview of the Consenting Requirements

4.2.1 Under the terms of the Harbour Act 1964, as the Harbour Authority at Uig, the Applicant possesses certain Permitted Development (PD) rights and powers which apply within the Port limits (as deferred under Town and Country Planning (Scotland) Act 1997). However, these PD rights do not apply where potential for significant environmental effects are identified, and consequently the Proposed Development is considered to be 'EIA development'.

4.2.2 In this case the Proposed Development boundary extends beyond the current Port limits operated by the Harbour Authority. In addition potential for significant environmental effects has been identified. Consequently the Proposed Development falls within the requirements of more than one consenting regime and legislative frameworks.

4.2.3 **Table 4-1** below summarises the key consents required for the Proposed Development, the relevant authorities from which the required consents will be sought and the legislation under which each consent would be granted.

Table 4-1 Consenting Requirements for the Proposed Development

Legislation	Consent	Consenting Authority
Harbours Act 1964	Harbour Revision Order (HRO) to vary THC's existing powers under Section 16 of the Harbour Act 1964.	TS
Marine (Scotland) Act 2010	Marine Licences for any licensable activities below MHWS including: • Construction works below MHWS; • Land reclamation; • Dredging and opening a new sea disposal site.	MS-LOT
Town & Country Planning Act 1997 (as amended)	Planning Permission for the New Ticket Office	THC

4.2.4 A number of assessments/supporting documents will need to accompany the different consenting applications as set out in **Table 4-2** below. Further detail on each of these assessments/documents is provided in the sections below.

Table 4-2 Overview of Supporting Regulations/Assessments Required to Accompany each Consent Application

Consent	Authority	EIA	HRA	PAC	WFD	BPEO/Site Character	EPS	Waste	ELD
Marine Licence – Construction (inc. land reclamation)	MS-LOTS	✓	✓	✓	✓		✓		
Marine Licence – Dredging and Sea Disposal	MS-LOTS	✓	✓			✓	✓	✓	✓
Planning Application	THC	✓	✓						
Harbour Revision Order	TS	✓	✓						

Environmental Impact Assessment (EIA)

4.2.5 The European EIA Directive (85/337/EEC) (hereafter referred to as the 'European Directive'), in force since 1985 and most recently amended in 2014 (Directive 2014/52/EU), outlines the range of public and private developments which require EIA. The European Directive is transposed into Scottish legislation under the following regulations relevant to the Proposed Development (hereafter referred to as the 'EIA Regulations'):

- The Harbour Works (Environmental Impact Assessment) Regulations 1999[8];
- Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- Town & Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

4.2.6 The EIA Regulations set out two schedules of development (which are derived from Annex I and II of European Directive 2014/52/EEC):

- **Schedule 1** Development (or **Annex I** of the EIA Directive): EIA is mandatory for developments of a type referred to in Schedule 1. Such developments are considered to be 'EIA development'.
- **Schedule 2** Development (or **Annex II** of the EIA Directive): EIA is not mandatory for developments of a type referred to in Schedule 2. Such developments may be 'EIA development' only where they are considered likely to have significant effects on the environment by virtue of factors such as their nature, size or location.

4.2.7 The screening position adopted by the Proposed Development in respect of these regulations is set out within Section 1.6 of this report.

Habitat Regulations Appraisal

4.2.8 The European Habitats Directive 92/43/EEC governs the conservation of natural habitats and of wild fauna and flora and is transposed into UK law by the

[8] Whilst these regulations are in the process of being updated the existing 1999 regulations remain applicable.

Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). The Habitats Directive requires that certain plans which are likely to have a significant effect on a European protected (Natura 2000) site must be subject to an 'Appropriate Assessment' by the applicable consenting authority. A HRA is undertaken to determine if an Appropriate Assessment is required.

4.2.9 Given the proximity of the Proposed Development to the Inner Hebrides and the Minches SAC the Applicant has undertaken an HRA to provide the relevant information to MS-LOT. This is documented within this EIA Report.

Pre-Application Consultation

4.2.10 The Marine (Scotland) Act 2010 sets out the requirement for Pre-Application Consultation (PAC) for certain types of developments to allow early consultation with local communities, environmental groups and other stakeholders (Marine Scotland, 2014).

4.2.11 The Proposed Development falls within the prescribed classes of licensable activities requiring PAC under section 4(b) and 4(e) of the Marine Licensing (Pre-Application Consultation) (Scotland) Regulations 2013:

- The deposit of any substance or object into the sea or on or under the seabed from a vehicle, vessel, aircraft, marine structure, floating container or a structure on land constructed or adapted wholly or mainly for depositing solids into the sea for the purposes of reclaiming land, where the area being reclaimed from the sea exceeds 10,000 m^2; and
- Alteration or improvement of works (other than for a renewable energy structure) in or over the sea or on or under the seabed where the area of those works, as extended, exceeds 1000 m^2.

4.2.12 In accordance with Marine Scotland's Guidance on Marine Licensable Activities subject to Pre-Application Consultation (2014), a PAC Report provides a summary of the PAC undertaken including but not limited to the following:

- A description of the consultation events carried out;
- A description of the information provided by the prospective applicant at the events;
- Comments received by the prospective applicant at the pre-application events;
- A description of amendments to be made to the marine licence application, where applicable, in response to those comments; and
- An explanation for the approach taken where, despite the prospective applicant receiving relevant comments and objections, no relevant alterations are proposed to be made to the marine licence application.

4.2.13 The PAC Report is provided in **Appendix 1.4.**

4.2.14 The Town and Country Planning (Development Management Procedure) (Scotland) 2008 require early community consultation to be undertaken prior to submission of a planning application for national or major development projects (as defined within the NPF3). The elements of the Proposed Development for which Planning Permission is sought from THC do not represent 'major development' under these terms.

Water Framework Directive

4.2.15 The European Water Framework Directive (WFD) (2000/60/EC) (European Commission, 2000) implemented in 2000, established a new framework for the protection, improvement and sustainable use of rivers, lochs, transitional waters, coastal waters and groundwater across Europe. The main aim of the WFD is for all water bodies to be at good status. The WFD is implemented in Scotland under the Water Environment and Water Services (Scotland) Act 2003.

4.2.16 A WFD assessment should be provided with an application for an activity within a waterbody to assess the impact of the activity on the immediate water body and linked water bodies and whether the activity complies with the River Basin Management Plan (RBMP).

4.2.17 A WFD assessment was undertaken by the Applicant in accordance with 'Clearing the Waters for All' guidance for estuarine and coastal waters to accompany the marine licence applications (Environment Agency, 2017). The WFD assessment is documented with **Chapter 8: Marine Water and Sediment Quality**.

Best Practice Environmental Option (BPEO) Assessment/Site Characterisation for Sea Disposal Site

4.2.18 A marine licence is required from MS-LOT under the Marine Scotland Act (2010) in order to dredge and dispose of dredged material at sea. In addition, where a new disposal site is required, the applicant must undertake a characterisation of the proposed disposal site to inform MS-LOT's licensing decision regarding the acceptability of the proposed site. The marine licence will manage the disposal of dredged material at sea.

4.2.19 Marine Scotland's Guidance on Creating a New Sea Disposal Site (Marine Scotland, Dredging and Sea Disposal Sites: Guidance on Creating a New Sea Disposal Site, 2013) sets out the regulatory requirements for opening a new disposal site in Scottish waters. A range of environmental and social factors must be considered in the selection and assessment of the new disposal site through a Site Characterisation process.

4.2.20 A Site Characterisation process in line with Marine Scotland's guidance and the OSPAR Guidelines for the Management of Dredged Material at Sea (OSPAR Commission, 2014) has been undertaken by the Applicant for the Proposed Sea Disposal Site. The Site Characterisation Report is provided in **Appendix 2.3.**

European Protected Species (EPS) Licence(s)

4.2.21 There may be a subsequent requirement for European Protected Species (EPS) licences under the Conservation (Natural habitats, &c.) Regulations 1994 to cover potential disturbance to cetaceans and potentially basking sharks during construction if any activity is likely to cause disturbance or injury to a EPS. Any requirement for EPS licence(s) are identified within the mitigation sections of the relevant chapters within this EIA Report.

Waste Management

4.2.22 Management of surplus soils or dredging spoil may require an exemption under The Waste Management Licensing (Scotland) Regulations 2011. Any proposed crushing or screening will require a permit under The Pollution Prevention and Control (Scotland) Regulations 2012.

Environmental Liabilities Directive (ELD)

4.2.23 The Environmental Liability (Scotland) Regulations (2009) transpose the requirements of the EU Environmental Liabilities Directive 2004/35/CE into law in Scotland. These regulations apply to ensure responsibility and remediation in the event of an imminent or actual threat of 'environmental damage'. In addition the regulations may also require prevention requirements in some cases. In this instance the requirements of the ELD are of particular stated relevance to the Applicant as potential operators of new dredge disposal site.

Climate Change

4.2.24 The Climate Change (Scotland) Act 2009 set out ambitious climate change legislation along with annual targets including wide-spread policies and proposals to work towards decarbonising Scotland's transport network.

LNG

4.2.25 The LNG storage and bunkering system will be designed in accordance with relevant guidance and regulations (e.g. the COMAH regulations, BS EN1473:2007, and ISO 20519:2017). Consents will be sought from the Scottish Environmental Protection Agency (SEPA) and the Health & Safety Executive (HSE) by CFL as the operator of the LNG storage and bunkering system.

4.3 International Standards

4.3.1 This section outlines the key international legislation and guidance which is considered relevant to the Proposed Development.

OSPAR Convention 1992

4.3.2 The OSPAR Convention, ratified by the EU and the UK in 1992 and which entered into force in 1998, is the main legal instrument for the protection of the marine environment in the North-Atlantic. The OSPAR Convention is split into a series of Annexes covering the following areas:

- Annex I: Prevention and elimination of pollution from land-based sources;
- Annex II: Prevention and elimination of pollution by dumping or incineration;
- Annex III: Prevention and elimination of pollution from offshore sources;
- Annex IV: Assessment of the quality of the marine environment; and
- Annex V: On the protection and conservation of the ecosystems and biological diversity of the maritime area.

4.3.3 Annex II identifies dredge material as a waste material which could be dumped at sea (Article 3.2(a)).

4.3.4 OSPAR Guidelines for the Management of Dredged Material at Sea (Agreement 2014-06) set out best environmental practice for the management of dredge disposal. OSPAR Guidelines focus on selecting the appropriate location for the disposal site and provide action levels for contaminant loads. Marine Scotland has confirmed there guidance on dredge disposal is based on the OSPAR Guidelines.

London Protocol (1996) replacing the London Convention (1972)

4.3.5 The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (hereafter referred to as the 'London Convention') has been in force since 1975. The London Convention's objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter. The London Protocol updated and replaced the London Convention in 1996 and subsequently came into force in 2006.

4.3.6 The London Protocol identifies dredged material as a waste that may be considered suitable for dumping, whilst controlling sources of contamination. However, opportunities to re-use, recycle or treat the material without undue risk to human health or the environmental or disproportionate costs should be considered. The London Protocol also highlights the need to characterize the material to be dumped taking into account the following:

- Origin, total amount, form and average composition;
- Properties: physical, chemical, biochemical and biological;
- Toxicity;
- Persistence: physical, chemical and biological; and
- Accumulation and biotransformation in biological materials or sediments.

4.3.7 The London Protocol requires that all contracting parties develop a national Action List to provide a mechanism to screen wastes, specifically toxic, persistent and bio-accumulative substances from anthropogenic sources. This Action List should specify an upper level and may also identify a lower level to avoid acute or chronic effects on human health or the marine environment.

4.3.8 The London Protocol also sets out the information required to select a disposal site:

- Physical, chemical and biological characteristics of the water-column and the seabed;
- Location of amenities, values and other uses of the sea in the area under consideration;
- Assessment of the constituent fluxes associated with dumping in relation to existing fluxes of substances in the marine environment; and
- Economic and operational feasibility.

4.3.9 The London Protocol also sets out the requirements for assessing and monitoring potential effects.

The European Waste Framework Directive

4.3.10 The European Waste Framework Directive (Directive 2008/98/EC) sets out basic waste management principles and requires that EU Member States implement a waste management hierarchy. The Waste Hierarchy promotes the prevention of waste production where possible, followed by re-use, recycling, recovery and finally disposal if none of the other options are feasible.

4.3.11 In order to demonstrate that sea disposal is the best practicable environmental option (BPEO), a BPEO assessment has been undertaken to accompany the marine licence application for dredging and disposal of dredged material at sea. The results of the BPEO assessment are provided in **Appendix 2.2**.

4.4 National Policy Context

4.4.1 This section sets out the key components of the national policy context which are deemed relevant to the Proposed Development including:

- NPF 3 (2014);
- Scottish Planning Policy (SPP) (2014);
- UK Marine Policy Statement (MPS) 2011;
- NMP (Scotland) (2015); and
- Relevant national guidance documents.

National Planning Framework 3 (NPF3)

4.4.2 Scotland's (NPF3, laid before the Scottish Parliament in June 2014, is the latest version of Scotland's long-term spatial strategy for development. NPF3 sets out what is expected of the planning system over the next 20-30 years and identifies national developments and other strategically important development opportunities.

4.4.3 NPF3 sets out the spatial strategy with the aim of making Scotland:

- A successful, sustainable place;
- A low carbon place;
- A natural, resilient place; and
- A connected place.

4.4.4 NPF3 specifically highlights the important opportunity for growth in Scotland's coastal and island communities and the crucial role that lifeline ferry services play in reducing the disadvantage of distance for these communities by supporting economic activity and delivering public services (paragraph 5.36).

Scottish Planning Policy (SPP)

4.4.5 The SPP last updated in 2014, is a non-statutory policy which outlines how nationally important planning matters should be addressed in order to achieve the vision for Scotland set out in NPF3.

4.4.6 The SPP's policy for promoting rural development in order to make Scotland a 'successful, sustainable place' highlights the importance of an integrated approach

to planning in the coastal environment; taking particularly account of the overlap between marine planning and terrestrial planning in the intertidal zone (paragraph 87). This is of particular relevance to the Proposed Development given the overlap between the three consenting jurisdictions at Uig Harbour as set out in section 4.2 of this chapter.

4.4.7 Also of relevance to the Proposed Development, SPP promotes development that optimizes the use of existing infrastructure in order to make Scotland a 'connected place' (policy for promoting sustainable transport and active travel, paragraph 270).

UK Marine Policy Statement (MPS) 2011

4.4.8 The UK MPS, published in 2011, provides the framework for formulating Marine Plans. The MPS sets out the policy objectives to ensure the sustainable use of marine resources in the UK. The key policies of relevance to the Proposed Development include those relevant to ports and shipping as well as marine dredging and disposal.

- Ports and Shipping: The MPS's policy on ports and shipping highlights the crucial role that Scottish ports play in supporting lifeline ferry services and fragile and remote communities.
- Marine Dredging and Disposal: The policy on marine dredging and disposal acknowledges the role of dredging in the functioning and construction of ports and the potential benefit of targeted disposal of dredged material in helping maintain sedimentary systems. However, the policy highlights the risk of causing environmental and health effects when dredging contaminated sediment which must be considered in the decision making process. The MPS requires that decision making regarding marine dredging and disposal complies with the OSPAR Convention 1992, London Protocol 1996, WFD and other EU Directives.

4.4.9 Applicants are required to demonstrate consideration of internationally agreed hierarchy of waste management options for sea disposal. There is a requirement to consider opportunities to re-use, recycle or treat the waste and demonstrate that this is the BPEO.

National Marine Plan (Scotland) (NMP)

4.4.10 Scotland's NMP published in 2015, sets out the Scottish Government's policies regarding all marine activities in inshore and offshore waters under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009.

4.4.11 Chapter 13 of the NMP addresses shipping, ports, harbours and ferries. This chapter identifies the statutory powers and duties of harbour authorities for improving and maintaining harbours. Harbour developments require aligned support from marine and terrestrial planning authorities.

4.4.12 The NMP highlights the importance of lifeline ferry routes in supporting Scotland's more fragile and remote communities through business, tourism, delivery of goods, and access to schools and healthcare (Transport 3). Development in harbour areas may lead to an increased collision risk and disturbance to harbour users. The rights of innocent passage and freedom of navigation must be respected in accordance with the United Nations Convention on the Law of the Sea (UNCLOS).

4.4.13 The NMP also highlights the goal to mitigate climate change through a reduction of fuel consumption and CO_2 emissions by ferry operators through technological change.

4.4.14 The NMP acknowledges the crucial role that dredging plays in ensuring safe access to and from ports and highlights the importance of disposing of dredged material in appropriate locations. Dredging is considered a licensable activity and therefore requires that its environmental impacts are assessed.

Draft Climate Change Plan (PFF3)

4.4.15 The Draft Climate Change Plan (RPP3) (RPP3, 2017) includes a commitment to Policy Outcome 6: where the "Proportion of ferries in Scottish Government ownership which are low emission has inceased to 30% by 2032". Low emission power-trains considered within CMAL's marine fleet vessel replacement programme including diesel-electric hybrid and LNG fuelling options.

National Guidance Documents

4.4.16 **Table 4-3** below sets out the Marine Scotland guidance documents which were followed when undertaking this EIA and the Site Characterisation.

Table 4-3 National Guidance Documents Relevant to the Proposed Development

Guidance Document	Description
Marine Scotland Guidance for Marine Licence Applicants Version 2 (2015)	This document sets out general guidance to applicants for marine licences under Part 4 of the Marine (Scotland) Act 2010 and Part 4 of the UK Marine and Coastal Access Act 2009. Amongst other things, it provides guidance on the marine licensing process, exempted activities, PAC, EIA and HRA.
Dredging and Sea Disposal Sites: Guidance on Creating a New Disposal Site (2013)	This document sets out Marine Scotland's requirements for applications for dredging and sea disposal licences including the Site Characterisation process.
Marine Scotland Pre-Disposal Sampling Guidance Version 2 (2017)	This document sets out Marine Scotland's sampling and analysis requirements for sea disposal operations to ensure that they are undertaken in accordance with international and national legislation.

4.5 Regional & Local Policy Context

Current Local Policy Context

4.5.1 The local policy context in Skye is governed by the Highland-wide Local Development Plan (HWLDP) 2012 and the West Highland & Island Local Plan (WHILP) 2012. The HWLDP outlines the overall vision for the wider Highlands for 2030 and briefly describes the vision for the different regions of the council area including the West Highlands and Islands. The WHILP provides more detail on this vision and how it can be achieved.

The Highland-wide Local Development Plan (HWLDP) (2012)

4.5.2 The HWLDP 2012 sets out the spatial planning policy implemented by THC to guide development and investment throughout the Highlands. The main aim of the HWLDP is to create 'sustainable communities, balancing population growth, economic development and the safeguarding of the environment across the area, and have built a fairer and healthier Highlands' by 2030.

4.5.3 The following goals set out in the vision for the West Highlands & Islands are relevant to the Proposed Development:

- Being better connected;
- Having more efficient public service provision;
- Having a more diverse economy; and
- Having rationalised but protected lifeline services.

4.5.4 The key policies of the HWLDP relevant to the Proposed Development include:

- Policy 28 Sustainable Design;
- Policy 29 Design Quality and Place-Making;
- Policy 30 Physical Constraints;
- Policy 34 Settlement Development Areas;
- Policy 43 Tourism;
- Policy 49 Coastal Development;

- Policy 50 Aquaculture;
- Policy 54 Mineral Wastes;
- Policy 56 Travel;
- Policy 57 Natural, Built and Cultural Heritage;
- Policy 58 Protected Species;
- Policy 59 Other Important Species;
- Policy 60 Other Important Habitats and Article 10 Features;
- Policy 63 Water Environment;
- Policy 64 Flood Risk;
- Policy 65 Waste Water Treatment;
- Policy 66 Surface Water Drainage;
- Policy 72 Pollution; and
- Policy 77 Public Access.

4.5.5 The Vision and Spatial Strategy for the West Highlands & Islands includes improved ferry connections from Uig (Figure 2 of the HWLDP).

West Highland & Island Local Plan (WHILP) 2012

4.5.6 The West Highlands & Islands Local Plan (WHILP) implemented in 2012 replaced three existing plans including:

- Lochaber Local Plan (adopted 1999);
- Skye and Lochalsh Local Plan (adopted 1999); and
- Badenoch and Strathspey Local Plan (adopted 1997).

4.5.7 The WHILP is split into a main Written Statement, a Proposals Map and a Map Booklet which contains settlement insets of the Proposals Map. The WHILP area has been split into 4 sections:

- Fort William & Ardnamurchan;
- Caol & Mallaig;
- Lochalsh; and
- Eilean a' Cheo (the Skye area).

4.5.8 Chapter 6 of the WHILP sets out the key forecasts, strategy and vision for the Skye and Lochalsh area. The vision for the area is as follows:

- A Competitive and Connected Place;
- A Network of Strong Local Communities; and
- A Heritage Safe in the Hands of Local People.

4.5.9 Inset 131 of the Skye Settlement Booklet sets out the planning objectives for Uig. Uig is identified as a marginal settlement in terms of its size and location. One of the key objectives for Uig is to consolidate its role 'as the principal settlement on the

western flank of the Trotternish peninsula and as a ferry terminal with the tourist traffic and custom it generates'.

Proposed Local Developments Plans

4.5.10 The review process for the HWLDP was started in January 2016 with the production of a Main Issues Report. It was proposed to make the HWLDP a policy-only document with all place-based issues covered in the local area plans. The review of the HWLDP is on hold until the Area LDPs have been further developed.

4.5.11 The Proposed West Highland & Islands Local Development Plan (WHILDP) was approved by THC and was open to consultation from 5th May to 30th June 2017. Although not yet formally approved the content of the Proposed WHILDP is a material consideration in determining planning applications.

4.5.12 The outcomes and policies of the Proposed WHILDP relevant to the Proposed Development include:

- Outcome 1.1 Growing Communities;
- Outcome 1.2 Employment;
- Outcome 1.3 Connectivity & Transport;
- Policy 2 Delivering Development; and
- Policy 3.7 Uig.

4.5.13 Section 3.7 sets out THC's strategy for Uig to promote growth of the settlement. Upgrading the pier and associated ferry infrastructure to accommodate the new ferry vessel is highlighted as a 'place-making' priority for Uig. The Proposed Development is identified as a development opportunity in the Proposed WHILDP and the site has therefore been identified as a development site (UG03 – Uig Harbour).

4.5.14 The Proposed WHILDP also sets out the requirement to 'assess and demonstrate appropriate mitigation measures which ensure avoidance of any adverse effect on the integrity of the Inner Hebrides and the Minches SAC and the Ascrib, Isay and Dunvegan SAC' for any development of Uig Harbour.

4.5.15 Other place-making priorities relevant to the Proposed Development include:

- Maximising the economic benefits from tourism and ferry users at Uig;
- Protecting heritage assets; and
- Redeveloping opportunity sites for tourism, business and housing.

4.5.16 Additional requirements within WHILDP for any development of Uig Harbour include:

- Undertaking a Flood Risk Assessment to inform layout and design;
- Providing a CEMP;
- Demonstrating that there would be no adverse effects on the SACs during construction or operation;
- Conducting a Land Contamination Site Investigation;
- Ensuring high quality siting and design.

Supplementary Planning Guidance Documents

Highland Coastal Development Strategy (HCDS)

4.5.17 The Highland Coastal Development Strategy (HCDS) published in 2010 sets out the strategy for sustainable use and development of the coastal zone within the Highland planning area.

4.5.18 This strategy is implemented through the HWLDP; the Area Local Development Plans; and the Aquaculture Framework. The aims an objectives of this strategy will also be reflected within the future Regional Marine Plans, required under the Marine (Scotland) Act 2010, and currently under development.

4.5.19 The main priority for ports, harbours and marinas is to *maintain the functionality and safe service provision at existing ports, harbour, jetties and slips which are in regular use* (paragraph 5.8.6). The HCDS identifies Uig as a significant ferry terminal for the Western Isles (paragraph 5.8.5).

4.5.20 The key sections of the HCDS relevant to the Proposed Development and this EIA Report include:

- 5.4 Tourism & Recreation;
- 5.5 Fishing and Fish Processing;
- 5.6 Aquaculture;
- 5.10 Nature Conservation; and
- 5.12 Coastal Water Quality and Waste Disposal.

4.6 Conclusion

4.6.1 This review of the national and local policy framework has highlighted the crucial role of lifeline ferry services in the UK.

4.6.2 This EIA and the Site Characterisation will take into consideration all the relevant national and international legislation and guidance on marine infrastructure, dredging and the disposal of dredged material at sea referred to in this chapter.

5. Summary of Consultation

5.1 Introduction

5.1.1 Consultation has been undertaken throughout design development and throughout all stages of preparation of this EIA Report. A range of interested parties have been consulted, including all applicable consent authorities; statutory and non-statutory environmental and other stakeholders; and the local community.

5.1.2 In addition the Proposed Development is considered a marine licensable activity subject to PAC under the Marine (Scotland) Act 2010 and the Marine Licensing (Pre-Application Consultation) (Scotland) Regulations 2013 as outlined in **Chapter 4: Legislative & Planning Context**.

5.1.3 This chapter provides a summary of the stakeholder responses received with relevance to the EIA. In addition, this chapter seeks to identify and acknowledge where particular concerns raised and responses received have influenced the design evolution of the Proposed Development and the scope of the EIA. This chapter also provides a summary of the PAC process carried out by the Applicant.

5.1.4 Additional topic-specific consultation was also carried where relevant by the technical assessment teams as part of the EIA process. Records of topic-specific consultation are provided in the relevant technical chapters.

5.1.5 This chapter is supported by the following appendices:

- **Appendix 1.1**: EIA Scoping Report;
- **Appendix 1.2:** EIA Scoping Opinion; and
- **Appendix 1.4:** PAC Report.

5.2 Consultation with Licencing Authorities, Statutory and Non-Statutory Stakeholders

5.2.1 Consultation with the consenting authorities with jurisdiction over the various parts of the Proposed Development, as well as with statutory and non-statutory stakeholders has been carried out throughout design development and as an ongoing part of the EIA. This has included the following events:

- Pre-application meeting between the Skye Triangle Infrastructure Steering Group Meeting, Marine Scotland and TS on 5th July 2017 to discuss consenting requirements;
- Pre-application discussions with Marine Scotland, THC and TS throughout project development and EIA prior to submission of consenting applications;
- Pre-application meeting with THC Planning Department on 4 September 2017, Portree, Isle of Skye;
- Consultation meeting with representatives from the operator of the Uig Bay and Loch Snizort fish farms (Grieg Seafood) on 20th November 2017;
- Consultation with Community and Harbour Users,
- Consultation with statutory and non-statutory consultees to inform the EIA including EIA Scoping.

5.3 Pre-Application Community Consultation (PAC)

5.3.1 Community consultation and engagement is an important and valuable part of the design process. A range of consultation activities were undertaken in an effort to engage the local community in the emerging design of the Proposed Development. Key PAC activities included:

- Publication of the public notice in [West Highland Free Press and Stornoway Gazette] on 20th July 2017, seven weeks prior to first PAC events;
- First PAC events in Uig, Lochmaddy and Tarbert from 4th - 6th September 2017 to consult with local communities on the upgrades required to the three piers in order to accommodate the new vessel;
- Publication of the public notice in West Highland Free Press; Stornoway Gazette; Hebrides news; and the Press and Journal on 15th February 2018; and
- Second PAC events in Uig, Lochmaddy and Tarbert from 26th – 28th February 2018.

Pre-Application Consultation Events

5.3.2 An integrated set of PAC events were held for the Skye Triangle harbour redevelopment works at Uig, Lochmaddy and Tarbert. All the consultation events provided information on the proposals for all three harbours. The information was displayed on display boards; a pre-recorded power point presentation was continuously available to view; and members of the design teams and environmental teams for the three developments were present at the following events:

- First PAC events:
  - 16:00 - 19:00 on 4th September 2017 at the Uig Community Centre, Uig, Skye;
  - 16:00 - 19:00 on 5th September 2017 at the Harris Hotel, Tarbert, Harris; and
  - 16:00 - 19:00 on 6th September 2017 at Lochmaddy Village Hall, North Uist.
- Second PAC events:
  - 16:00 – 19:00 on 26th February 2018 at the Uig Community Centre, Uig, Skye;
  - 16:00 - 19:00 on 27th February 2018 at the Harris Hotel, Tarbert, Harris; and
  - 16:00 - 19:00 on 28th February 2018 at Lochmaddy Village Hall, North Uist.

5.3.3 A detailed description of these events and feedback received during these events is provided in PAC Report at **Appendix 1.4**.

Consultation with Community and Harbour Users with Local Communities

5.3.4 The Applicant organised consultation meetings with Uig Harbour Users, Community Council and Community Trust on three separate occasions. The consultation gave community and harbour users the opportunity to discuss the Proposed Development works and provide feedback to the Applicant through the Uig Community Trust to address any concerns that they may have had with the Proposed Development. The Applicant and design team were present at the following event:

- 2nd October 2017 at the Uig Community Centre, Uig, Skye;
- 26th October 2017 at the Uig Community Centre, Uig, Skye; and

- 17th January 2018 at the Uig Community Centre, Uig, Skye.

5.4 Consultations to Inform the EIA

Consultees to the EIA Process

5.4.1 Consultation has been undertaken with the organisations and groups listed in **Table 5-1** below, during the EIA process.

Table 5-1 EIA Process Consultees

Consultee	Response Received?
Marine Scotland (MS)	✓
TS	✓
THC	✓
Scottish Environment Protection Agency (SEPA)	✓
Scottish Natural Heritage (SNH)	✓
Historic Environment Scotland (HES)	✓
The Maritime and Coastguard Agency	✓
The Northern Lighthouse Board	✓
The Royal Yachting Associated	✓
Defence Infrastructure Organisation	✓
Whale and Dolphin Conservation	✓
The Crown Estate	
Royal Society for the Protection of Birds (RSPB)	
HSE	
Marine Scotland Fisheries Office - Stornoway	
Marine Scotland Planning and Policy	
Fisheries Management Scotland	
British Shipping	
UK Chamber of Shipping	
Marine Safety Forum	
Scottish Fishermen's Federation	
Scottish Wildlife Trust	
Caledonian Maritime Assets Limited	
Hebridean Whale and Dolphin Trust	
Inshore Fisheries Group	
Community Councils	

Consultation on the Content and Approach of the EIA

5.4.2 The project's position with respect to EIA Screening and Scoping obligations under the EIA regulations is discussed in Section 1.6 and Section 1.7 of this report.

5.4.3 Consultation responses received during the EIA Screening and Scoping stages are summarised in **Appendix 5.1** along with an indication of how and where these comments have been address within the EIA Report.

5.4.4 The description of any additional consultation conducted to further inform specialist assessments can be found within the appropriate technical chapters.

6. Approach to Environmental Impact Assessment

6.1 Introduction

6.1.1 This chapter sets out the general approach to EIA for the Uig Harbour Redevelopment (the 'Proposed Development'). It explains how the EIA addresses the requirements of the relevant EIA regulations, best practice, and describes the method used to assess environmental and social impacts.

6.1.2 EIA has been required for certain developments since the implementation in the UK of the European Council Directive on Environmental Assessment (EC Directive 85/337/EEC). The European Directive was implemented in the UK in 1988 and has subsequently been amended by Directives 97/11/EC, 2003/35/EC, 2011/92/EU and most recently 2014/52/EU.

6.1.3 In Scotland, the European Directive as it applies to the Proposed Development is implemented by the following EIA regulations:

- Town & Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 - for applications for planning permission under the Town & Country Planning (Scotland) Act 1997;
- Marine Works (Environmental Impact Assessment) Regulations 2017 - for applications for marine licences under the Marine (Scotland) Act 2010; and
- Harbour Works (Environmental Impact Assessment) Regulations 1999 – for a HRO under the Harbours Act 1964.

6.1.4 As set out in **Chapter 4: Legislative & Planning Context**, the Proposed Development falls under Schedule 2 of the various Scottish EIA Regulations and Annex II of the European Directive. An EIA is not mandatory for 'Schedule 2 developments', but may be required depending on the potential for significant environmental effects as a result of factors such as the size, nature, or location of the development. In view of the nature and size of the Proposed Development an EIA has been undertaken in accordance with the relevant EIA Regulations listed above and in accordance with current best practice guidance This EIA Report has been prepared to present the findings.

6.1.5 Technical guidance on the assessment procedures is provided within good industry practice guidance relevant to each technical discipline and these documents are identified within the relevant technical chapters of this Report.

6.1.6 In addition, a key aims of EIA is to integrate environmental considerations into the design process. An iterative approach has therefore been taken to developing the design of the Proposed Development, incorporating consideration of environmental constraints, predicted effects, and opportunities for mitigation (i.e. measures to avoid, reduce or offset significant adverse effects). By embedding EIA into the design process the likely significant adverse environmental impacts of the Proposed Development were identified and many impacts avoided or minimised by appropriate siting of the infrastructure. Mitigation measures to avoid, reduce, or offset adverse environmental effects or maximise environmental benefits have been

incorporated into the design process including the construction and operation phases.

6.2 Overview of the EIA Process

6.2.1 The main steps which have been followed in producing this Report are described below and summarised in Figure 6.1.

- Step 1. Establishment of environmental baseline: Baseline surveys or desktop searches have been undertaken in order to identify and describe the existing conditions or environmental character of the area potentially affected by the Proposed Development.
- Step 2. Identification of predicted environmental effects: Consideration has been given to the possible interactions between the Proposed Development and existing as well as future site conditions.
- Step 3. Initial assessment of environmental effects: The identified interactions or effects have been assessed using stated criteria based on accepted guidance and good practice.
- Step 4. Identification of mitigation measures: Design recommendations have been made and mitigation measures identified in order to avoid, reduce or offset adverse effects and enhance beneficial effects. The effectiveness of mitigation has been assessed through repeating Step 3.
- Step 5. Assessment of significance of residual environmental effects: The significance of environmental effects based on the final design has been assessed in line with relevant guidance taking account of committed mitigation measures.
- Step 6. Reporting in the EIA Report: The assessment process and its results are reported in this Report. The results are presented as residual impacts, those impacts remaining following mitigation.

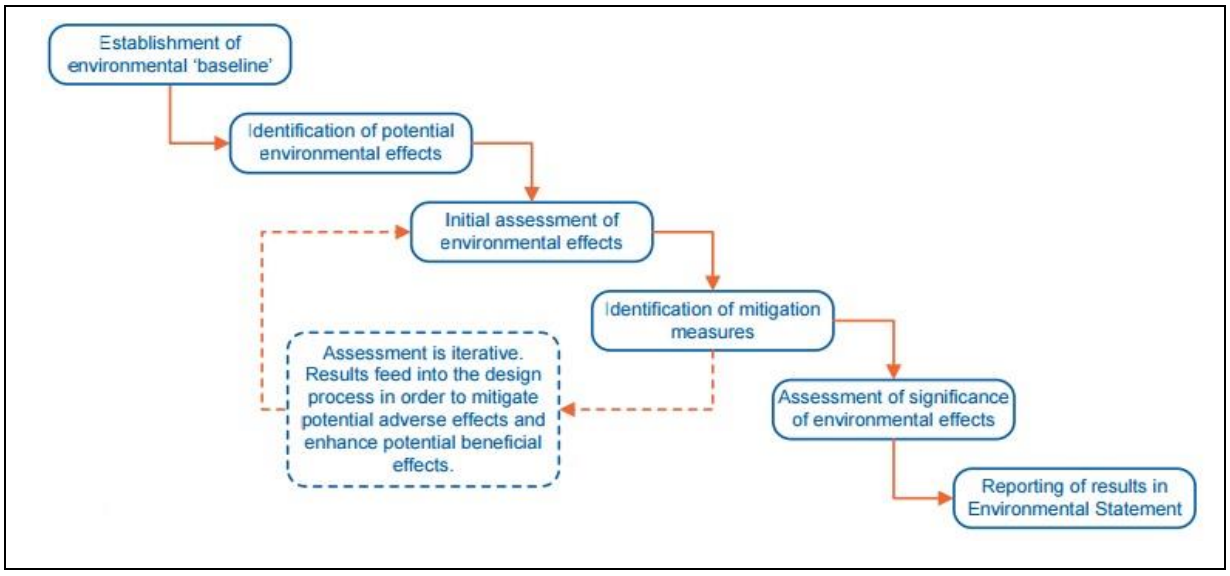

Figure 6-1 EIA Process Flowchart

6.3 The EIA Report

6.3.1 Under Regulation 6 of the EIA Regulations, an application for consent for a project deemed to be 'EIA development' must be accompanied by an EIA report. Table 6-1 below sets out the minimum requirements of an EIA report under Regulation 6(2) and Schedule 4 of the EIA Regulations.

Table 6-1 Information Required for Inclusion in EIA Reports under Schedule 4 of the EIA Regulations and Where it is Located Within this Report

Information Required	Location within this EIA Report
(a) a description of the works comprising information on the site, design, size and other relevant features of the works;	EIA Report **Chapter 3: Project Description**
(b) a description of the likely significant effects of the works on the environment;	EIA Report **Chapters 7- 20**
(c) a description of the features of the works and any measures envisaged in order to avoid, prevent or reduce and, if poss ble, offset likely significant adverse effects on the environment;	EIA Report **Chapters 7-20**
(d) 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;	EIA Report **Chapter 2: Alternatives & Evolution of Design**
(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and	EIA Report **Volume 1: NTS**
(f) any other information specified in schedule 4 relevant to the specific characteristics of the works or of the types of works in question and to the environmental features likely to be affected.	Through the EIA Report

6.3.2 Schedule 4 of the EIA Regulations sets out the information for inclusion in the EIA Report.

6.4 EIA Methodology

6.4.1 The following section describes the general approach to the assessment of effects. This draws on the guidance contained within 'A Handbook on Environmental Impact Assessment' (SNH and HES, 2018) and the Guidelines for Environmental Impact Assessment (IEMA, 2004 and 2006).

6.4.2 The approach provides a consistent basis for all specialist topic areas with some variation in the sensitivity and magnitude categories, and in the descriptions of assessment criteria. For each topic the assessment of significance will generally be informed by the sensitivity of the existing (or baseline) environmental conditions and the magnitude of any predicted change to existing conditions which occurs as a result of the Proposed Development.

6.4.3 Note: Some technical chapters apply some variations to this general approach to adhere with industry-standard guidelines, specific to their technical subject area.

Sensitivity or Importance of Receptors

6.4.4 The sensitivity of the baseline conditions is assessed according to the relative importance of existing environmental features, or susceptibility of these receptors to change. Criteria for the determination of sensitivity or of importance or value of receptors are established based on approved guidance, legislation, statutory designation and/or professional judgment.

6.4.5 Table 6-2 provides general definitions of the sensitivity criteria used within the EIA Report. In each specialist chapter of the EIA Report sensitivity criteria will be explained with reference to that particular discipline and may therefore differ from those shown below.

Table 6-2 Approach to EIA - Criteria Used to Define the Sensitivity or Value of Receptors

Sensitivity or Value Criteria	Definition
High	The receptor has little or no capacity to absorb change without fundamentally altering its present character, is of high environmental value, or of international or national importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.
Negligible	The receptor is resistant to change and is of little environmental value.

Magnitude of Effect

6.4.6 The magnitude of potential effects on environmental baseline conditions is identified through consideration of the Proposed Development taking into account the scale or degree of change from the existing situation as a result of the effect; the duration and reversibility of the effect as well as consideration of relevant legislative or policy standards or guidelines.

6.4.7 Table 6-3 provides general definitions of the magnitude criteria used in the EIA. In each of the technical chapters of the EIA Report, magnitude criteria are defined with reference to that particular discipline, and therefore may differ from those shown below.

Table 6-3 Approach to EIA - Criteria Used to Define the Magnitude of Effects

Magnitude Criteria	Description
High	Total loss or major alteration to key elements/features of the baseline conditions such that post development character/composition of baseline condition will be fundamentally changed.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed.
Low	Minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation.

Magnitude Criteria	Description
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation.

Significance of Effects

6.4.8 A combination of the magnitude of the effect and the sensitivity or value of the receiving environment guides the assessment of the 'significance of effect'. The standard approach to the assessment of significance is outlined in Table 6-4. It should be noted that this general approach is a framework and professional judgement is also applied to the assessment of significance. In each of the technical chapters of the EIA Report, significance criteria are defined with reference to that particular discipline, and therefore may differ from those shown below.

Table 6-4 Approach to EIA - Assessing Significance of Effect

Magnitude of Effect	Sensitivity of Receptor			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Neglig ble	Negligible	Negligible

6.4.9 Effects arising from the Proposed Development will be reported using a seven-point scale:

- Major Adverse;
- Moderate Adverse;
- Minor Adverse;
- Negligible;
- Minor Beneficial;
- Moderate Beneficial; and
- Major Beneficial.

6.4.10 For the purpose of this EIA, any effect predicted to be 'Negligible' or 'Minor' is considered to be 'Not Significant'. Effects assessed as 'Moderate' or 'Major' are considered to be 'Significant'.

6.4.11 Some technical chapters have stipulated specific assessment criteria, which differs from the general approach described above. However all chapters state whether or not a predicted effect is considered 'Significant' or 'Not Significant'. Any variation from this general approach has been summarised in the relevant EIA Report technical chapter.

6.5 Types of Effect

Predicted and Residual Effects

6.5.1 'Predicted effects' are defined as any effects that may occur as a result of the Proposed Development, prior to consideration of mitigation measures. The significance of 'predicted effects' takes into account design ('committed') mitigation. 'Residual effects' then take into account both design and any project specific additional mitigation that has been identified to counteract a significant effect.

Construction Effects and Operational Effects

6.5.2 Effects associated with the construction phase are typically, although not exclusively short-term in nature and may occur directly as a result of the construction of the Proposed Development and/or may also include any effects resulting from other temporary works such as construction compounds and laydown areas.

6.5.3 Operational effects are those long-term effects that would occur as a result of the Proposed Development such as the land take associated with permanent physical infrastructure as well as effects which occur as a result of its operation.

Indirect or Secondary Effects

6.5.4 For the purposes of the EIA, the predicted effects of the Proposed Development are considered in terms of effects on each discrete environmental topic area. However, the inter-relationship between topic areas such as water quality and ecology means effects cannot always be considered in isolation since changes affecting one factor may often have secondary implications for other areas.

6.5.5 For example, if one effect of the Proposed Development is to alter water quality, fish and shellfish and subsequently commercial fisheries may be affected as a secondary effect. Under some circumstances, it is possible for the secondary or indirect effects to be more significant than the changes that triggered them. Where there is the potential for secondary or indirect effects this is highlighted and assessed in the EIA Report.

Cumulative and In-Combination Effects

6.5.6 Likely cumulative and in-combination effects on specific resources or receptors are described, where relevant, in the technical chapters of this EIA Report. Cumulative effects may occur where environmental and social receptors are affected by other schemes in addition to the Proposed Development, for example. This is where two effects could combine to result in a potential cumulative effect which is significant (or more significant).

6.5.7 THC's Planning Portal was reviewed to identify all planning applications for development within 5 km of the Proposed Development Site boundary submitted in the last 5 years. There are no other applications within the Proposed Development Site. A number of small-scale developments (construction, demolition or change of use of buildings) were identified within the search area but these are not anticipated to result in likely significant effects in combination with the Proposed Development given the nature and scale of the works; these have therefore being scoped out of the cumulative assessment. Planning applications were submitted in 2013 for two mini hydro schemes approximately 2.5 km to the east of the Proposed Development

Site but these have already been constructed and have therefore also been scoped out of the cumulative assessment.

6.5.8 The list of other current and planned developments to be included in the cumulative impact assessment has been compiled in Table 6-5 from known planning applications and from information held by THC. The locations of these other developments and the Proposed Development are shown on **Figure 6.1**

Table 6-5 Overview of Current and Planned Development in the Surrounding Area included in the Cumulative Assessment

Development	Design	Distance from Site	Status
Loch Snizort Fish Farm	Salmon Fish Farm (10 x 120 m circumference cages)	Approximately 1.3 km	Approved and Operational
Rubha Riadhain Uig Bay Fish Farm	Salmon Fish Farm (8 x 120 m circumference cages)	Approximately 1 km	Approved, not yet operational

6.6 Level of Design Information/Parameters for Assessment

6.6.1 It is acknowledged that the Proposed Development as constructed may differ in some design details from the parameters that have been assessed and reported in this EIA Report. Although any such changes that do occur are likely to be minor and relate to specific details of the Proposed Development throughout the preparation of this EIA, a balance has therefore been sought between, provision of sufficient details to undertake a robust assessment, and on the other hand, avoiding specification of the design to a point that restricts the scope for cost effective design and innovation offered by future contractors.

6.6.2 The environmental impacts that are reported in this EIA Report and the level of mitigation described set the minimum standard that will be achieved by the final Proposed Development. Although considered to be unlikely, should the details of the final Proposed Development differ from those assumed in this EIA Report, it will be necessary for the Proposed Development designers to consider the environmental impacts of those changes and ensure that they would not be materially worse than those identified in the EIA Report after mitigation.

6.7 Assumptions & Limitations

6.7.1 The EIA process aims to assist good decision-making based on information about the potential environmental effects of the Proposed Development. However, there will be some uncertainty as to the exact scale and nature of the environmental effects. This uncertainty arises because of the level of detail and information about the project available at the time the assessment was undertaken and/or due to the limitations of the prediction process itself. Where assumptions have been made, these are set out in each specialist chapter of this EIA Report.

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7. Marine Physical Environment

7.1 Introduction

7.1.1 This chapter of the EIA Report provides an assessment of the potential effects of the Proposed Development on hydrodynamic, wave and sedimentary character across Uig Bay and the wider area.

7.1.2 **Chapter 3: Project Description** of the EIA report provides a detailed description of the works required to implement the Proposed Development.

7.1.3 When considering the 'Source > Pathway > Receptor' model, it should be noted that the physical processes topic is often concerned with pathways that have the potential to affect a specific receptor, rather than being concerned with the receptor itself. For example, impacts on physical processes may result in effects on pathways that subsequently impact receptors considered within **Chapter 8: Marine Water and Sediment Quality** and **Chapter 12: Benthic Ecology**.

7.2 Legislative Context

7.2.1 No specific legislation has been identified in relation to potential impacts on the Marine Physical Environment. However, where changes to the Marine Physical Environment are anticipated to occur which could lead to effects on other receptors (e.g. marine ecological features), relevant legislative context has been provided in the respective chapter(s).

7.3 Assessment Methodology & Data Sources

7.3.1 The approach to the EIA studies relating to the Marine Physical Environment follows an evidence-based approach. Firstly, the (existing) baseline physical characteristics have been described, through collation and analysis of a range of datasets and reports. The description of the baseline character allows any predicted effects, arising from the Proposed Development, to be placed into the context of the existing conditions, along with any natural variability evident in the physical environment.

7.3.2 The data sources used to inform the assessment of effects on the marine physical environment include:

- Project survey data, including bathymetry, sediment grab sampling and borehole logs;
- Numerical modelling studies and associated data sources, such as Acoustic Wave and Current Profiler (AWAC) field data (AECOM Ltd, 2018a);
- Information within the HCDS (THC, 2010); and
- Regional mapping of seabed geology (BGS, 1988).

7.3.3 A range of sediment samples were collected to support the baseline understanding of sediment type and quality. Seven surface sediment samples (A – G) were collected using a van veen grab from locations around Uig Bay in December 2016.

7.3.4 Sediments from two rotary boreholes alongside the existing jetty (BH01: 0.0 m, 0.5-2.0 m and 2.0-3.5 m; DS01: 0.3 m, 1.5 m and 3.0 m) and one location sampled by divers adjacent to the existing southern-most dolphin (DS02: 0.1 m, 0.5 m and 0.8 m), thus within the proposed dredge area, were collected in mid-2017. A further twelve surface sediment samples (GS1 – GS12) were collected using a van veen grab from the initial disposal site search area to the west of Uig Bay. All samples were tested for sediment composition to determine particle size distribution (PSD), with the exception of the diver-collected samples from Dredge Pocket 1 (DS02).

7.3.5 Following the collation and analysis of the baseline data sources, the potential effects of the Proposed Development have been assessed using a set of bespoke numerical modelling tools. The modelling studies are described in detail in the EIA Modelling Report (AECOM Ltd, 2018a) and are summarised below:

- Hydrodynamic (HD) modelling to simulate water surface elevations and current flows across the study area;
- Spectral wave (SW) modelling to simulate the wave climate across Uig Bay and the approaches; and
- Sediment dispersion modelling, using Particle Tracking (PT) modelling, to assess the fate of suspended material from dredging and disposal operations.

7.3.6 The modelling studies (AECOM Ltd, 2018a) were completed in June/July 2018. Ongoing design development and further consideration of ferry operating requirements has since resulted in amendments to the Proposed Development configuration on which the modelling output was based (referred to as the October 2018 configuration). Variations between the June/July 2018 and October 2018 configurations are limited to the end (southern section) of the pier structure where the last 2 cells and arcs of the solid structure are now 'mirrored', with the final cell now encasing the outer dolphin. The October 2018 configuration also includes an additional 2,800 m^3 of dredge sediment volume around the end of the pier (resulting in an extension to Dredge Pocket 1).

7.3.7 The additional dredge volume represents an extra 10.4% of the previously modelled dredging volume (which was 26, 842 m^3) in Dredge Pocket 1. Due to the volume increase, the duration of dredge operations and period of suspended sediments are expected to be longer. However, considering the relatively small proportion of the volume increase, the AECOM coastal processes modelling team consider the changes are unlikely to result in substantively different patterns of sediment dispersion characteristics, when compared to the AECOM Ltd (2018) modelling outputs. Notwithstanding this, predicted suspended sediment concentrations and sediment deposition depths could be slightly higher and/or persist for slightly longer, than the existing modelling outputs, as a reflection of the overall increased volume of deposition.

7.3.8 The proposed dredge depth at Dredge Pocket 1 is unchanged between the June/July and October 2018 configurations, although a slightly larger dredge pocket is now proposed. The orientation of the final two cells at the end of the pier has been adjusted, now aligning towards the south-east rather than south-west. AECOM coastal processes modelling team understand the change in the hydrodynamic and wave conditions as a result of the proposed design changes will

likely be small and thus it is considered that the previous flood risk analysis remains valid.

7.3.9 Overall, the AECOM coastal processes modelling team consider that the existing modelling outputs remain sufficiently representative of the likely effects that could be expected from the Proposed Development. Therefore, no remodelling work has been undertaken as a result of the changes brought forward in the October 2018 configuration, and the subsequent assessment of effects on the Physical Environment is based on the outputs from the June/July modelling study (AECOM Ltd, 2018a).

7.3.10 The following sections of this chapter describe the baseline Marine Physical Environment, the predicted effects arising from the construction and operation phases of the Proposed Development and the cumulative effects arising from relevant other schemes, as identified within the planning system (see **Chapter 6: Approach to EIA**).

Assessment Methodology

7.3.11 The predicted effects arising from the construction and operation phases of the Proposed Development have been assessed using the impact assessment methodology as set out within **Chapter 6** of this report.

7.4 Baseline Conditions

Overview

7.4.1 Uig Harbour is located within Uig Bay, a sheltered inlet on the west coast of the Trotternish Peninsula, Isle of Skye. Along its western boundary, Uig Bay opens onto the larger embayment of Loch Snizort, which in turn opens (to the north-west) into The Minches (see Figure 1-1). The Minches are protected along the western and north-western extent by the Western Isles; thus, the Western Isles also provide shelter to Loch Snizort and Uig Bay from the direct approach of Atlantic swell waves.

Coastal Characterisation

7.4.2 The Isle of Skye (including Uig Bay), forms part of the wider Highland coastline, which is the longest coastline of any local authority area in the whole of the UK (THC, 2010). Stretching for some 3,600 km, the Highland coastline, including its islands, represents around 27% of Scotland's total coastline. The Highland coast is mainly described as an upland, glaciated coast with generally varying topography across each of its easterly-, northerly- and westerly-facing coastlines. The west coast, which includes the Isle of Skye and Uig Bay, is highly indented by many sea lochs and rugged headlands, and is described as 'fjordic' in character – a coastal type that is found in relatively few parts of the world (THC, 2010).

7.4.3 The majority of the coastline around the Uig Bay area is classified as 'Undeveloped' within the Coastal Development Strategy (THC, 2010). Outside of the Bay itself, along the western coastline of the Trotternish Peninsula, the coast is classified as 'Isolated'.

Uig Bay and Approaches

7.4.4 Across Uig Bay and the Approaches across Loch Snizort, the physical form of the tidal basin is defined by the underlying geology. The following sections describe a range of physical baseline characteristics within the wider study area.

Geological Overview

7.4.5 The form of Uig Bay has been defined primarily from geological evolution, human intervention and interaction with the existing physical processes, resulting in the existing form of the Bay. The seabed configuration across the wider study area has been formed during the Quarternary glacial and interglacial periods. The broad underlying geology of the area is undifferentiated, indicating that clear delineations in rock type are not defined.

7.4.6 High-level mapping of underlying Quarternary geology, available from British Geological Survey (BGS) maps (BGS, 1988), indicates that the wider regions, across Loch Snizort, primarily comprise of a combination of pebbly clay, muddy sand and gravelly sand, with cobbles.

Bathymetry

7.4.7 Across the wider study area, depths within in The Little Minch, at the entrance to Loch Snizort, descend to around 160 m below sea level. Within Loch Snizort, depths remain relatively deep, at up to 80 m, shallowing to around 50 to 60 m at the entrance to Uig Bay.

7.4.8 As defined from UK Hydrographic Office (UKHO) Admiralty Chart 2533 (‘Anchorages on the West Coast of Skye’) and described in the Uig Pier Upgrading Study (THC, 1998) the bathymetry within Uig Bay gradually shallows from around 60 m depth at the entrance to the Bay to around 5 m depth at the existing Harbour berth (alongside King Edward Pier).

7.4.9 The available bathymetry data, as interpolated onto the numerical modelling mesh (AECOM Ltd, 2018a), is shown in Figure 7-1. This shows the variation in bed elevation across the study area, with the generally deep water through the approaches of Loch Snizort, and the relatively shallow depths across the inner parts of Uig Bay.

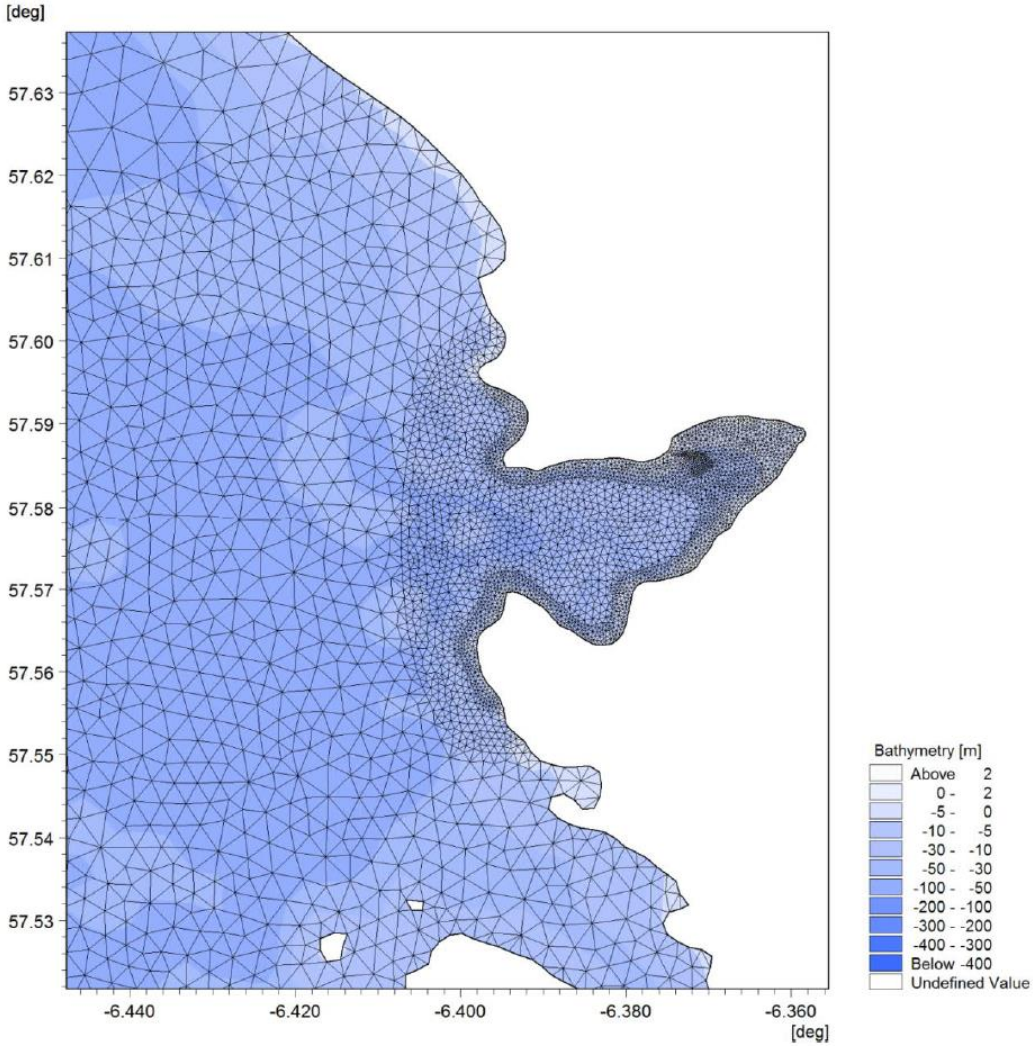


Figure 7-1 Numerical Modelling Mesh and Bathymetry in Uig Bay and Loch Snizort Seabed Sediments

7.4.10 High-level sediment mapping (BGS, 1988) indicates that the wider regions, across Loch Snizort, primarily comprise a mixture of muddy and sandy seabed sediment. At the entrance to Uig Bay, the high-level mapping identifies the bed to predominantly comprise sandy mud.

7.4.11 Table 7-1 and Table 7-2 present the PSD from sediment samples collected around Uig Bay in 2016 and borehole/trial pit samples at the dredge sites in 2017, respectively. Sample locations from 2016 survey are shown in **Figure 7-2.** Sample locations from the 2017 survey are shown in **Figure 7-3**. Results suggest that surficial sediments are predominantly comprised of silt and sand material, particularly in considering Sample G from within Dredge Pocket 1 and samples collected adjacent to Dredge Pocket 2 (BH09 and TP03). However, sediments obtained from below the surface (i.e. boreholes/trial pits) indicate an increased proportion of coarser material (sand and gravel) with reduced contributions from fines, particularly within Dredge Pocket 1.

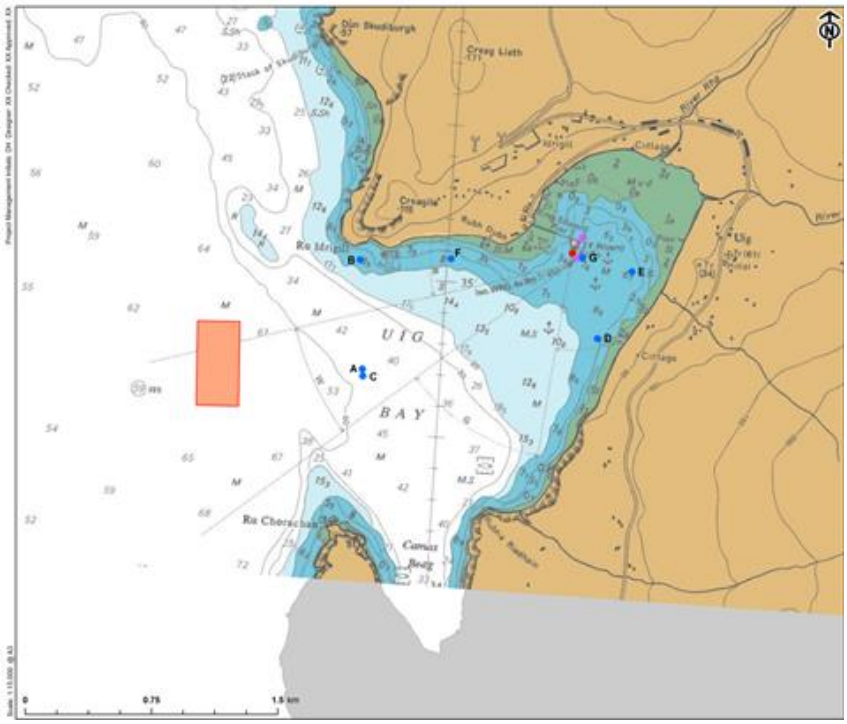


Figure 7-2 Location of surface sediment samples collected around Uig Bay in 2016 (NorthWest Marine, 2016)

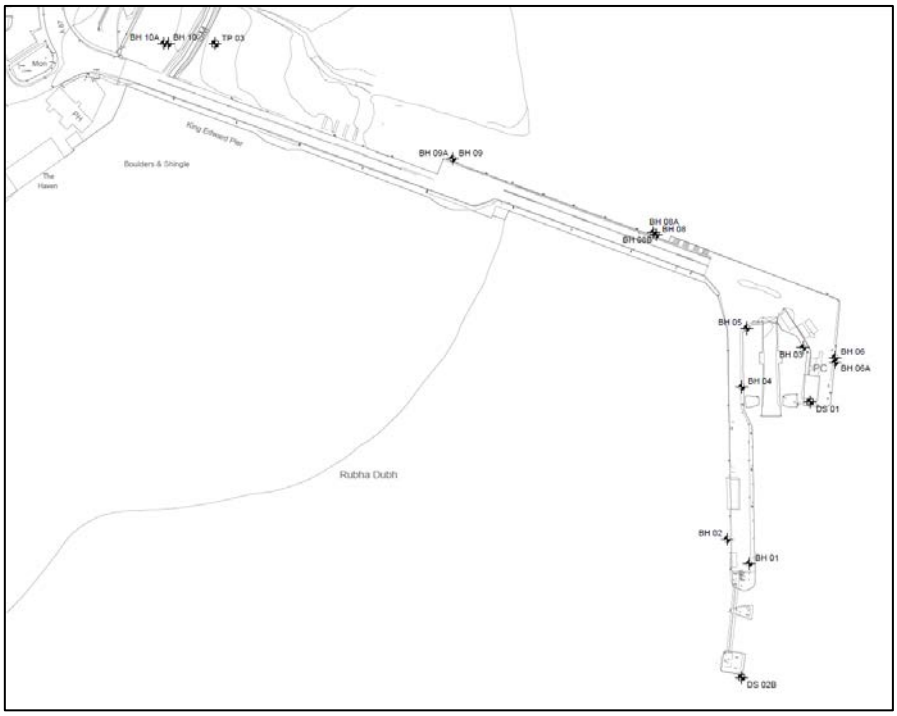


Figure 7-3 Location of boreholes and trial pits sampled at Uig Harbour in 2017 (Holequest Ltd, 2017).

Table 7-1 Particle Size Distribution (PSD) of Surface Sediment Samples Collected Around Uig Bay in 2016

Sample	Particle Size Distribution (%)			Sample Description
	Silt (<63 µm)	Sand (>63 µm-<2 mm)	Gravel (>2 mm)	
A	69	30	1	Grey slightly gravelly very sandy very silty clayey PEAT. Von Post Classification - H9.
B	5	89	6	Grey slightly gravelly slightly clayey slightly silty fine to coarse SAND with shell fragments. Gravel is fine to medium.
C	68	31	1	Brown slightly gravelly very sandy very silty clayey PEAT. Gravel is fine. Von Post Classification - H10
D	11	80	9	Grey slightly silty slightly clayey slightly gravelly fine to coarse SAND. Gravel is fine to coarse.
E	35	64	1	Brown/grey slightly gravelly very sandy very silty slightly clayey PEAT. Gravel is fine. Von Post Classification - H9.
F	41	52	7	Brown slightly gravelly very silty fine to coarse SAND with shell fragments and pockets of organic matter. Gravel is fine.
G	37	63	0	Brown/grey slightly clayey very sandy PEAT. Von Post Classification - H10.

Table 7-2 PSD of Boreholes, Trial Pits and Diver Collected Samples at Uig Harbour in 2017

Sample	Bed Level (m ACD)	Depth of Sample		Particle Size Fraction (%)			Sample Description
		Below Bed Level (m)	Relative to Datum (m ACD)	Silt (<63 µm)	Sand (>63 µm – <2 mm)	Gravel (>2 mm)	
BH01	-4.4	1.3	-5.7	9	56	35	Medium dense to dense dark grey to black and white slightly silty very gravelly fine to coarse SAND that includes much shells and shell debris.
		4.3	-8.7	4	49	47	Dense dark grey to black and white silty fine to coarse SAND and fine to coarse rounded to angular GRAVEL with occasional cobbles and boulders that includes much shells and shell debris.
BH02	-3.46	0.5	-3.96	5	61	34	Loose becoming very dense with depth light grey to black and white silty fine to coarse SAND and fine to coarse rounded to sub angular GRAVEL that includes varying proportions of shells and shell debris.
		3.5	-6.96	7	38	55	
BH06A	-2.47	0.5	-2.97	6	38	56	Above 0.5 m - Dark grey to black and white slightly silty gravelly fine to coarse organic SAND, 50-75% sand constitutes shells and shelly debris with occasional rusty metallic fragments. Below 0.5 m - Very loose dark grey to black and white silty very sandy fine to coarse rounded to angular GRAVEL that includes many shells and shell debris, occasional cobbles, rusty metallic fragments and rare slate.
		1.5	-3.97	2	28	70	Dense to very dense becoming medium dense towards base dark grey locally speckled white silty very sandy fine to coarse rounded to sub angular GRAVEL predominantly of basalt.
		5.4	-7.87	9	32	59	Dense to very dense dark grey to black silty to very silty very sandy fine to coarse rounded to sub angular GRAVEL that includes some fine shell debris, occasional cobbles and boulders
DS01	-2.25	1.5-3.0	-5.25	8	69	23	Loose to medium dense grey silty very gravelly fine to coarse SAND with some boulders that includes much shelly debris and possible silt lenses.

Sample	Bed Level (m ACD)	Depth of Sample		Particle Size Fraction (%)			Sample Description
		Below Bed Level (m)	Relative to Datum (m ACD)	Silt (<63 µm)	Sand (>63 µm – <2 mm)	Gravel (>2 mm)	
		3.0-4.5	-6.75	9	62	29	Dark grey very clayey very gravelly fine to coarse SAND with occasional boulders (possibly slightly organic).
DS02	N/A	0.1	N/A	-	-	-	Dark grey silty slightly gravelly fine to coarse sand. Sand consists of approximately 35% shell debris. Gravel is fine to medium and angular.
		0.5	N/A	-	-	-	Grey silty fine to medium sand. Sand consists of approximately 20% shell debris.
		0.8	N/A	-	-	-	Dark grey silty slightly gravelly fine to coarse sand. Sand consists of approximately 35% shell debris. Gravel is medium to coarse and angular.
BH09	-1.51	0.9	-2.41	19	74	7	Black silty gravelly fine to medium organic sand that includes shells, wood, metal and plastic. Very loose dark grey to black silty gravelly fine to coarse organic SAND with occasional cobbles and much shell debris.
		7.4	-8.91	84	8	8	Firm to stiff grey and dark grey slightly sandy slightly gravelly silty locally very silty CLAY with lenses (generally <20 mm thick) of silty fine sand and silty partings; with occasional shell fragments between 6.4-10.0 m.
TP03	3.15 m	0.8	2.35	80	19	1	Very loose dark grey mottled black silty to very silty gravelly fine to coarse SAND that includes some shells and shell debris. Firm to stiff locally soft slightly sandy silty CLAY with occasional lenses (<100 mm thick) and pockets (up to approx. 500 mm diameter) of black silty fine to medium Sand, occasional cobbles and boulders and rare fine shell debris. Includes thin beds of very silty clay (generally <250 mm thick). Becoming slightly gravelly at approx. 1.8 m.
		3.0	0.15	96	3	1	

7.4.12 PSD results from twelve surface sediments collected within the disposal site search area to the west of Uig Bay in 2018, from which the Proposed Sea Disposal Site was selected, are presented in Table 7-3. The sample locations are shown in **Figure 7-4**. With the exception of GS9 (41.7% sand) and GS12 (38.0% sand), all samples indicated more than 80% of the sediment was silt/clay and none of the samples included gravel fractions (>2 mm). The difference in the physical nature of the sediments in GS9 and GS12 were also evident in a lower percentage of total organic carbon (1.0 and 1.6% respectively, compared to around 2.0% across all other samples), as would be predicted from the greater average particle size. GS2 was collected from within the Proposed Sea Disposal Site and comprised a very high silt fraction (93.7%).

7.4.13 Based on a review of PSD results from sediment samples collected within and immediately adjacent to Dredge Pockets 1 and 2, an estimation of dredged material composition was calculated as set out within Table 7-4. The composition of Dredge Pocket 1 was assumed to be predominantly sand (57%), while relatively increased fine material (silt and clay) was estimated for Dredge Pocket 2 (61%).

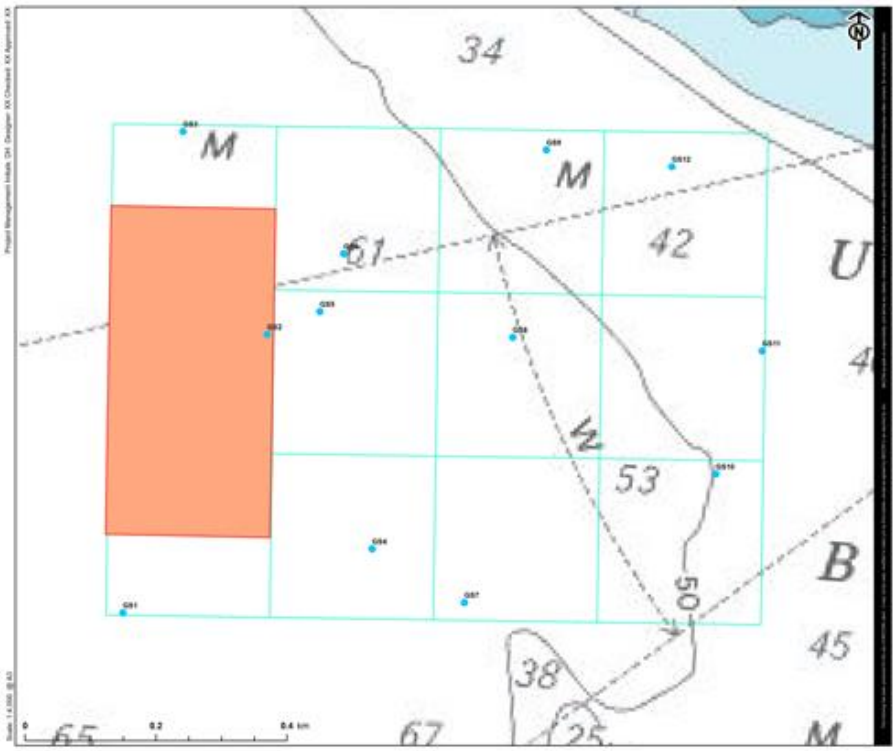


Figure 7-4 Location of Surface Sediment Samples Collected within the Disposal Site Search Area in 2018

Table 7-3 PSD of Surface Sediment Samples Collected from Grab Samples in the Disposal Site Search Area in 2018.

Sample	Particle Size Fraction (%)			Sample Description
	Silt (<63 µm)	Sand (>63 µm-<2 mm)	Gravel (>2 mm)	
GS1	94.6	5.41	0.0	Colour - Brown; Texture - Wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS2	93.7	6.32	0.0	Colour - Brown; Texture - Wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS3	93.1	6.86	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS4	91.5	8.53	0.0	Colour - Brown; Texture - Wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS5	88.9	11.2	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS6	86.8	13.2	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS7	90.2	9.79	0.0	Colour - Brown; Texture - Very wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS8	83.6	16.4	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS9	58.3	41.7	0.0	Colour - Brown; Texture - Very Wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS10	92.1	7.88	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS11	87.8	12.2	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None
GS12	62.0	38.0	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None

Table 7-4: Dredge Composition and Settling Rates

Parameter	Units	Particle Size Fraction	Dredge Pocket 1	Dredge Pocket 2
Dry Density	kg/m³	-	1,660	1,610
Content	%	Gravel	25	9
		Sand	57	30
		Silt	15	53
		Clay	3	8
	m³	Gravel	7,411	103
		Sand	16,896	345
		Silt	4,446	610
		Clay	889	92
		Total	29,642	1,150
D50	mm	Gravel	-	-
		Sand	0.50	0.15
		Silt	0.02	0.02
		Clay	0.001	0.001
Settling Velocity	cm/s	Gravel	-	-
		Sand	7.0	1.5
		Silt	0.04	0.04
		Clay	0.0005	0.0005

Source: (AECOM Ltd, 2018a)

Hydrodynamic Regime

7.4.14 Hydrodynamic conditions within Uig Bay are defined as the behaviour of the bulk water movements, and influenced by the combined action of tidal and non-tidal forces, such as meteorological conditions (e.g. winds, surge and storm events). The baseline hydrodynamic regime has been characterised in terms of:

- Water levels;
- Tidal currents; and
- Waves and winds.

7.4.15 The baseline scenario is defined by the existing coastal process characteristics, with the associated inherent natural variability, over both spatial and temporal scales. The sediment transport pathways (and the associated local and regional morphology of the wider Uig Bay area), are controlled by the combined influence of hydrodynamic and wave conditions.

Water Levels

7.4.16 Tidal information for Uig Bay is presented in Table 7-5, which indicates the area experiences a mean spring tidal range of 4.6 m and a mean neap range of 1.6 m. As a result of the tidal range, Uig Bay is described as 'macrotidal' (defined by a spring range between 4 and 6 m).

Table 7-5 Tidal Information for Loch Snizort (Uig Bay)

Tidal State	m ACD	m AOD
Highest Astronomical Tide (HAT)	6.2	3.5
Mean High Water Spring (MHWS)	5.3	2.6
Mean High Water Neap (MHWN)	3.5	0.8
Mean Sea Level (MSL)	3.03	0.33
Meal Low Water Neap (MLWN)	1.9	-0.8
Mean Low Water Spring (MLWS)	0.7	-2
Lowest Astronomical Tide (LAT)	0.1	-2.6

Source: (UKHO, 2018)

7.4.17 Results from the baseline numerical modelling studies (AECOM Ltd, 2018a) reveal that tidal water levels across Uig Bay, and close to the entrance at Loch Snizort, show no evidence of variation in either elevation or phasing, across both spring and neap tidal periods. In this way, the tidal propagation across Uig Bay can be considered as a standing wave, rather than a progressive wave. This is noteworthy as the extent of any effects on the hydrodynamic regime, arising as a result of the Proposed Development at Uig, might be expected to differ under standing or progressive wave conditions.

Tidal Currents

7.4.18 Tidal currents across the study area vary both temporally and spatially, particularly when comparing flow speeds across the deeper regions of the Approaches through Loch Snizort, with those over the shallower, inner regions of Uig Bay. The existing tidal flow regime has been modelled and calibrated against measured data from an AWAC device deployed at the entrance to Uig Bay during September and October 2017 (AECOM Ltd, 2018a). The model calibration exercise notes that the model performance is improved when including the influence of non-tidal (wind and wave) forcing, indicating that these processes exert an important influence on the flow regime across the study area.

7.4.19 At the entrance to Uig Bay (in proximity to the Ru Choracan headland, on the southern side of the entrance), the AWAC device (deployed over a 20-day period, and in 19 m water depth) recorded a maximum depth-averaged flow speed of 0.2 m/s, and a mean depth-averaged flow speed of 0.07 m/s. Furthermore, flow speeds towards the surface tend to be slightly stronger than those towards the bed, likely due to the greater influence of surface winds higher in the water column.

Waves and Winds

7.4.20 Wave modelling carried out for the Uig Pier Upgrading Study (THC, 1998)indicates that the wave climate within Uig Bay is a combination of swell waves (which diffract and refract around the entrance headlands to Loch Snizort and Uig Bay), and locally generated wind waves (which build over the longer fetch lengths associated with westerly and south-westerly approaches to the Bay). The same study identified that the 1 in 1-year significant wave height (H_s) at the existing Uig Harbour pier was up to approximately 1 m, associated with an approach direction (to the entrance to Uig Bay) of 305°N (and with an offshore direction between 286°N and 315°N). Waves approaching the Bay from other approach directions were found to be smaller.

Future Baseline (Climate Change)

7.4.21 With regards to a future baseline, climate change is considered likely to influence future sea level (UKCP09) For Uig Bay, the future sea level rise predictions, based on the present UKCP09 Guidance, and assuming a Medium Emissions scenario, are provided in Table 7-6.

Table 7-6 Sea-level Rise Predictions from 2018 (in metres) for Uig Bay

Year	5%ile	50%ile	95%ile
2018	0.00	0.00	0.00
2025	0.01	0.02	0.03
2050	0.03	0.10	0.16
2100	0.09	0.30	0.51

Source: (UKCP09)

7.5 Predicted Effects

7.5.1 The significance of the predicted effects on the Marine Physical Environment has been informed by a conceptual understanding of the study area and numerical modelling (AECOM Ltd, 2018a)[9]. Hydrodynamics, waves and sediments have all been modelled to determine the magnitude of effects arising from the Proposed Development, including the following key impact pathways as a result of the construction phase of the Proposed Development:

- Changes in Suspended Sediment Concentration (SSC) during the dredge and construction works;
- Changes in SSC due to the deposit of dredge arisings at the Proposed Sea Disposal Site; and
- Change in substrate type through the re-deposition of suspended sediments and placement of materials at the Proposed Sea Disposal Site.

[9] As noted in Section 7.3, the modelling outputs from AECOM Ltd (2018) were based on the June/July 2018 configuration of the Proposed Development, although these are considered representative of the design for which consent is requested.

7.5.2 In addition, the following impact pathway has been assessed as a result of the operational phase of the Proposed Development:

- Changes in local hydrodynamic regime and wave conditions (and associated downstream effects on sediment transport pathways).

7.5.3 The numerical modelling has been underpinned by a conceptual understanding of the study area along with the collection of site-specific data.

Construction

Changes in Suspended Sediment Concentration (SSC) During the Dredge and Construction Works

7.5.4 The assessment of suspended sediment as a result of the dredge and construction works has been informed by bespoke numerical modelling studies (AECOM Ltd, 2018a). These studies have used the Project Design details, alongside the PSD information obtained from the grab sampling and borehole logs (summarised above), to assess the input of bed material, into the water column, during the dredging activities associated with Dredge Pockets 1 and 2 as shown in Figure 7-3.

7.5.5 The modelling assessments have considered a range of tidal and wind forcing conditions, to predict the fate of the material suspended during the dredging activities. In total, 12 model scenarios (runs) were assessed, covering a range of seasonal (winter, summer, intermediate) conditions and a range of input wind speeds and directions. A summary of these 12 scenarios is provided in Table 7-7. It should be noted that the data used included storm events. The dredge and the disposal of dredge arisings have been modelled together to represent the full proposed construction sequence, and assess any cumulative effects that might arise from both activities.

7.5.6 The model scenarios were designed to cover the entire duration of the construction phase, allowing the construction activities (dredging and disposal) to complete followed by a period of time for suspended material to advect across the study area and settle to the bed. The extended model runs also allowed for material to be resuspended, once settled, should forcing conditions exceed the mobility threshold.

Table 7-7 Modelled Assessment Scenarios for Dredge and Disposal Activities

Model Scenario	Months	Particle Release Time and Date	End Time and Date of Operation	End Date of Scenario	Max Wind Speed (Direction)	Date and Time of Maximum Wind Condition
1	Jan to Feb	10/01/09 00:00	12/01/09 19:40	25/01/09	28.1 m/s (236°N)	18/01/09 00:00
2		01/02/09 00:00	03/02/09 19:40	15/02/09	16.3 m/s (029°N)	18/01/09 00:00
3		22/01/09 00:00	24/01/09 19:40	06/01/09	17.8 m/s (165°N)	29/01/09 15:00
4		12/02/09 00:00	14/02/09 19:40	27/02/09	14.6 m/s (272°N)	25/02/09 21:00
5	Mar to Apr	10/03/09 00:00	12/03/09 19:40	15/03/09	14.2 m/s (290°N)	14/03/09 12:00
6		03/04/09 00:00	05/04/09 19:40	18/04/09	14.0 m/s (166°N)	09/04/09 21:00

Model Scenario	Months	Particle Release Time and Date	End Time and Date of Operation	End Date of Scenario	Max Wind Speed (Direction)	Date and Time of Maximum Wind Condition
7	Jul to Aug	20/03/09 00:00	22/03/09 19:40	06/04/09	19.4 m/s (296°N)	26/03/09 15:00
8		12/04/09 00:00	14/04/09 19:40	27/04/09	13.3 m/s (176°N)	26/04/09 15:00
9		10/07/09 00:00	12/07/09 19:40	25/07/09	12.3 m/s (216°N)	20/07/09 15:00
10		03/08/09 00:00	05/08/09 19:40	18/08/09	14.1 m/s (198°N)	15/08/09 18:00
11		22/07/09 00:00	24/07/09 19:40	06/08/09	13.2 m/s (166°N)	05/08/09 09:00
12		12/08/09 00:00	14/08/09 19:40	27/8/09	15.0 m/s (185°N)	23/08/09 15:00

7.5.7 When considering the material put into suspension by the dredging activity (noting the fate of material during dredge disposal is covered in the subsequent section of this chapter), the greatest extent and magnitude of effect is predicted from model Scenario 1. Noting that the dredge activity inputs to the model are the same for each scenario, the variation in extent and magnitude of effect is primarily driven by the changes in the wind forcing conditions. Model scenario 1 includes a strong wind input (peak wind speed of 28.1 m/s), approaching from the dominant 240°N direction. A series of modelled SSC locations for this model scenario, and for a range of time periods following the commencement of dredging activity, is shown in Figure 7-5. The dates considered have been chosen as this incorporates the full duration of modelled dredging and disposal activity, as well as a notable storm event on day 8.

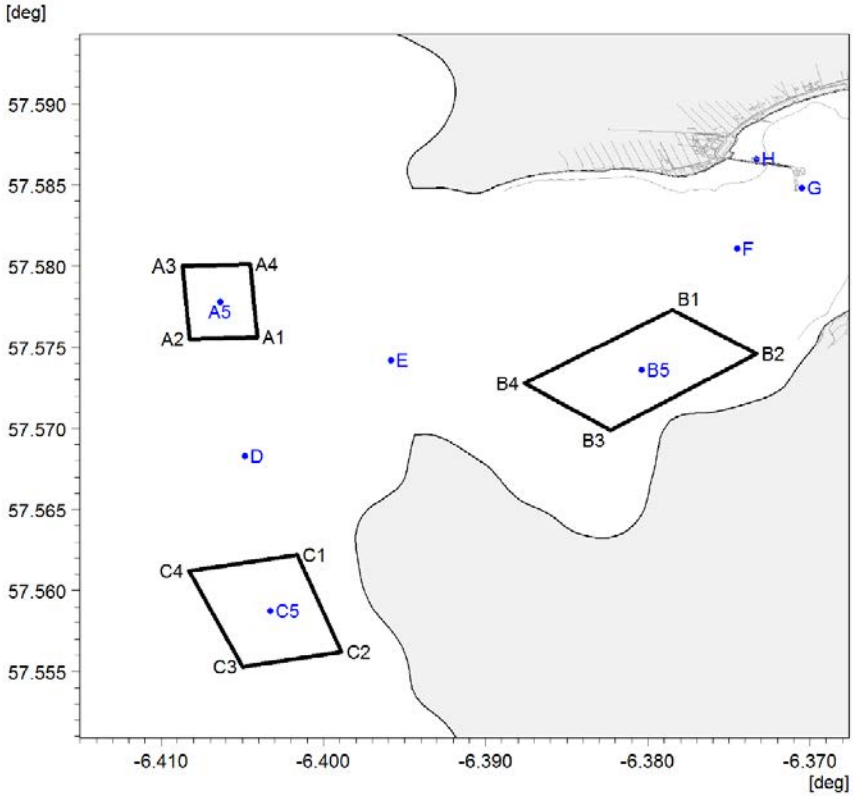


Figure 7-5 Locations of Modelled SSC Extraction Points

7.5.8 From the modelled output shown in Figure 7-6 below, the initial release is shown locally to King Edward Pier, followed by a subsequent release at the Proposed Sea Disposal Site at the entrance to Uig Bay (example from top right pane, showing SSC after half a day following the initial release). After 2-days (centre-right pane), the plume from the dredge is shown extending south-west, towards the entrance to the Bay, with predicted increases in surface SSC of up to 20 mg/l. Following cessation of dredging activity after approximately 2.8 days, the increased levels of SSC drop to background levels, before the large storm event (on 18/1/09, 8-days after the initial release), results in settled material being resuspended (bottom-left pane). Under this large storm event, increases to SSC of up to 50-100 mg/l are predicted, before the material settles back to the bed once the storm conditions have abated. By the end of the model run period (15 days after initial release, bottom-right pane), levels of SSC have reduced to background levels.

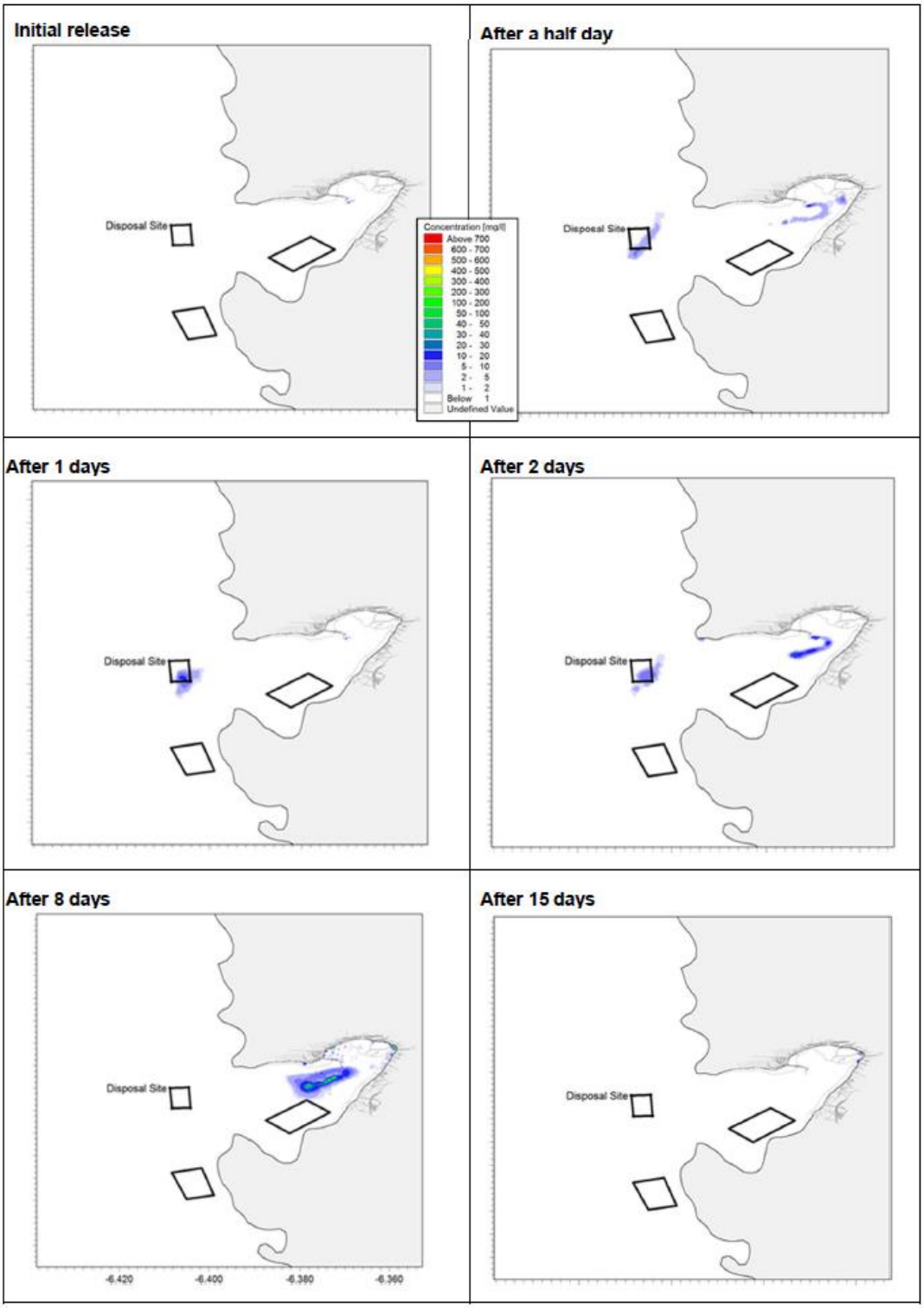


Figure 7-6 Development of Sediment Plume (at Surface) during Model Scenario 1

7.5.9 Maximum depth-averaged SSC values, from each of the 12 model scenarios, and at a selected number of locations across the study area, have been derived from the model output. The extraction locations are provided in Figure 7-5, with the maximum modelled depth-averaged SSC values shown in Table 7-8.Table 7-8 Maximum Modelled Depth-averaged SSC from all 12 Scenarios

Table 7-8 Maximum Modelled Depth-averaged SSC from all 12 Scenarios

Location	Maximum depth-averaged SSC (mg/l)	Location	Maximum depth-averaged SSC (mg/l)
A1	6.6	C1	1.1
A2	24.1	C2	1.4
A3	10.8	C3	0.1
A4	10.4	C4	0.1
A5	121.0	C5	0.5
B1	6.2	D	9.3
B2	0.9	F	414.0
B3	1.3	E	3.0
B4	1.3	G	5,030.0
B5	0.8	H	7,634.0

7.5.10 From the results shown in Table 7-8, the highest maximum increases in depth-averaged SSC were reported at Dredge Pocket 1 (G; 5,030 mg/l) and Dredge Pocket 2 (H; 7,634 mg/l) due to dredging activity. It is recognised that larger increases were captured during the model scenarios (Dredge Pocket 1: 18,920 mg/l; Dredge Pocket 2: 62,707 mg/l), but these would be very short-lived, highly localised increases at the point of interaction between the seabed and the dredge equipment, which would significantly reduce (order of magnitude) within a matter of minutes.

7.5.11 At sites further away from the Proposed Development, location F shows a maximum increase of 414 mg/l, associated with the resuspension of settled material under the large storm condition modelled in Scenario 1. To the south of Uig Bay, in the vicinity of the Uig Bay finfish farm (locations B1 to B5), predicted maximum increases to SSC are low (less than 2 mg/l across much of the site), with a slightly larger increase of 6.2 mg/l predicted at the point closest to the Proposed Development. It is further noted that these maximum SSC values are only predicted to occur over short timescales (minutes to hours), before dropping to background levels. Overall, it is considered that levels of change in SSC due to the dredge and construction works will be minimal and short-term (with subsequent maintenance dredging expected to be for substantially lower volumes and much more intermittent; approximately 2 weeks activity every 3 to 5 years).

7.5.12 The existing berths at King Edward Pier are already dredged to maintain vessel access requirements; therefore, the area around the Proposed Development already experiences intermittent increases in SSC as a result of dredge arisings. This leads to an assessed sensitivity of low for this impact pathway. The impact pathway is present during the construction phase only, and then for only the period

of time when dredging activity is underway, leading to a low magnitude of effect, and an assessed significance of negligible.

Changes in SSC due to the Deposit of Dredge Arisings at the Proposed New Disposal Site

7.5.13 As with the assessment of the fate of material from the proposed dredging activities (discussed above), the associated dredge disposal activity has also been assessed, using the same numerical modelling tools. Once again, the dredge and the disposal of dredge arisings have been modelled together to represent the full proposed construction sequence, and assess any cumulative effects that might arise from both activities. The assessed model scenarios are as listed in Table 7-7.

7.5.14 Given the significantly greater water depths at the Proposed Sea Disposal Site (as compared to those encountered at the dredge locations at Uig Harbour), the influence of the varying wind forcing conditions exerts less of an effect on the fate of SSC from the disposal activity. In this way, the predicted effects from each model run scenario tend to be relatively similar to each other. By way of an example, the development of the surface SSC plume at the Proposed Sea Disposal Site, from model run Scenario 12 is shown in **Figure 7-7**, for comparison against the equivalent plots from Scenario 1 as shown in **Figure 7-6.**

7.5.15 From the assessment results, the greatest increase in SSC is shown at the modelled disposal location (in this case, material is deposited in the centre of the proposed new disposal site; A5), with an extent of effect limited to within approximately 500 m from the boundaries of the Proposed Sea Disposal Site. From Figure 7-7, it can be seen that predicted increases to surface SSC are around 50 to 100 mg/l at the instant of release, dropping to around 20 to 30 mg/l as the plume starts to disperse and material settles through the water column.

7.5.16 With regards to maximum increases in depth-averaged SSC, values from Table 7-8 show increases of up to 121 mg/l at the disposal location (A5), dropping to around 10 to 20 mg/l at the outer extents of the Proposed Sea Disposal Site. Increases further afield, at locations D and E, are shown to be less than 10 mg/l, whilst at the Loch Snizort East finfish farm (locations C1 to C5), predicted maximum increases to SSC are shown to be less than 2 mg/l.

7.5.17 The Proposed Sea Disposal Site is not currently licenced for disposal of material, meaning that this activity will be newly introduced, should a licence be granted. This leads to an assessed sensitivity of medium for this impact pathway. However, it should be noted that predicted increases in SSC are small scale, particularly compared to the Dredge Pockets, and these will be short-lived. The impact pathway, as assessed, is present during the construction phase only (with subsequent disposal of maintenance dredge material expected to be for substantially lower volumes, and much more intermittent), and then for only the period of time when dredging/disposal activity is underway. This leads to a low magnitude of effect and an assessed significance of minor adverse.

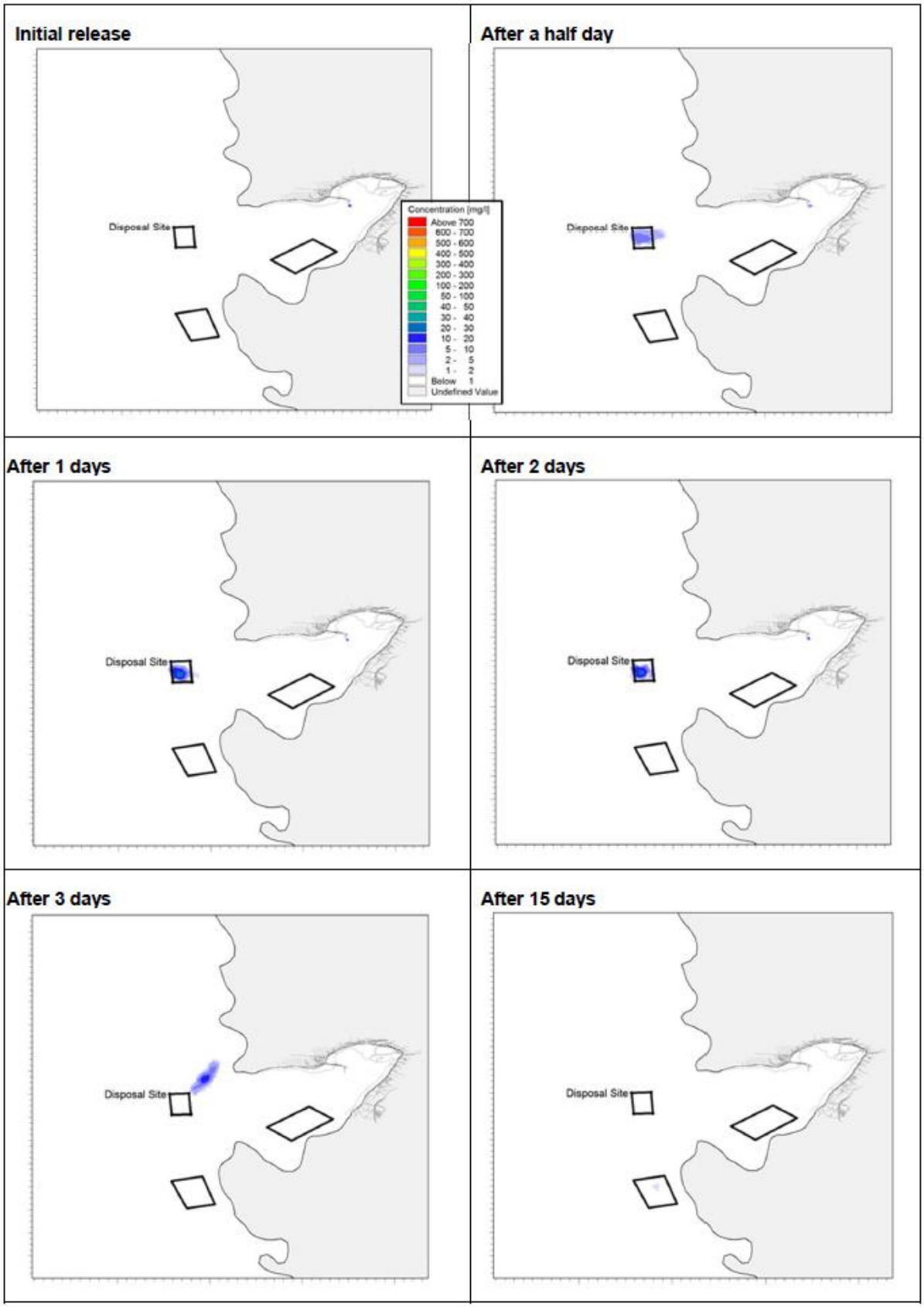


Figure 7-7 Development of Sediment Plume (at Surface) During Model Scenario 12

Change in Substrate Type Through the Re-deposition of Suspended Sediments and Placement of Materials at the Proposed Sea Disposal Site

7.5.18 The overall composition of dredge material from Dredge Pockets 1 and 2 is predominantly sand and gravel (24, 755 m^3 and 80% of the total volume; as set out within Table 7-4. In contrast, the grab sample collected from within the Proposed Sea Disposal Site (GS2) comprised a very high silt fraction (93.7%). Furthermore, samples collected from around Uig Bay and the disposal site search area also indicate a high composition of fine material in surface sediments in the area as set out within Table 7-1 and Table 7-3.

7.5.19 Coarse dredged material deposited at the Proposed Sea Disposal Site will likely settle to the bed relatively quickly (minutes), depositing on top of the existing muddy habitat in the immediate vicinity of the release point (see previous impact pathways for the fate of fine material). Therefore, the (surface) sediment type at the Proposed Sea Disposal Site is anticipated to change from fine (silt and clay) to coarse (sand and gravel).

7.5.20 The spatial extent of the Proposed Sea Disposal Site has been determined based on the requirements of the Proposed Development, while minimising the area of seabed disturbance through disposal activity. A change in substrate type is anticipated through the disposal activity. This impact pathway has not been assessed for a significance of effects on the Marine Physical Environment, but is considered further in terms of changes in habitat type, and influences on associated species, in **Chapter 12: Benthic Ecology**.

Operation

7.5.21 The 'as built' scheme has been assessed using the numerical modelling tools (AECOM Ltd, 2018a). This assessment scenario represents the operational stage of the Proposed Development, and includes the marine infrastructure on the new pier, and the seabed deepening within the identified dredge pockets. Predicted effects from the operational phase of the Proposed Development are described in the following sections.

Changes in Local Hydrodynamic Regime and Wave Conditions

7.5.22 The operational phase modelling has assessed the potential effect of the Proposed Development on the hydrodynamic (water levels and current flow) and wave climate. The predicted change to the elevations of high water (HW) and low water (LW) are provided in **Figure 7-8.** This shows the modelled changes to the elevations of HW and LW under a 1 in 1-year wind condition (from the dominant 240°N approach direction). In general, predicted changes at both HW and LW are negligible (<±0.01 m) across the majority of Uig Bay. At HW elevation, the greatest predicted change is confined to the seaward-facing side of the pier structure, where increases in water level of up to 0.05 m are predicted. Elsewhere, predicted changes of up to ±0.02 m are predicted in proximity to the pier, and along sections of the Uig Bay coastline.

7.5.23 Predicted changes in elevation are slightly higher under LW conditions. Here, the modelled change shows an increase in water level of up to 0.08 m along the seaward-facing section of the pier. Alongside the reclamation site, a reduction in

LW elevation of up to 0.07 m is predicted, whilst further reductions of up to 0.04 m are observed across parts of the inner Bay.

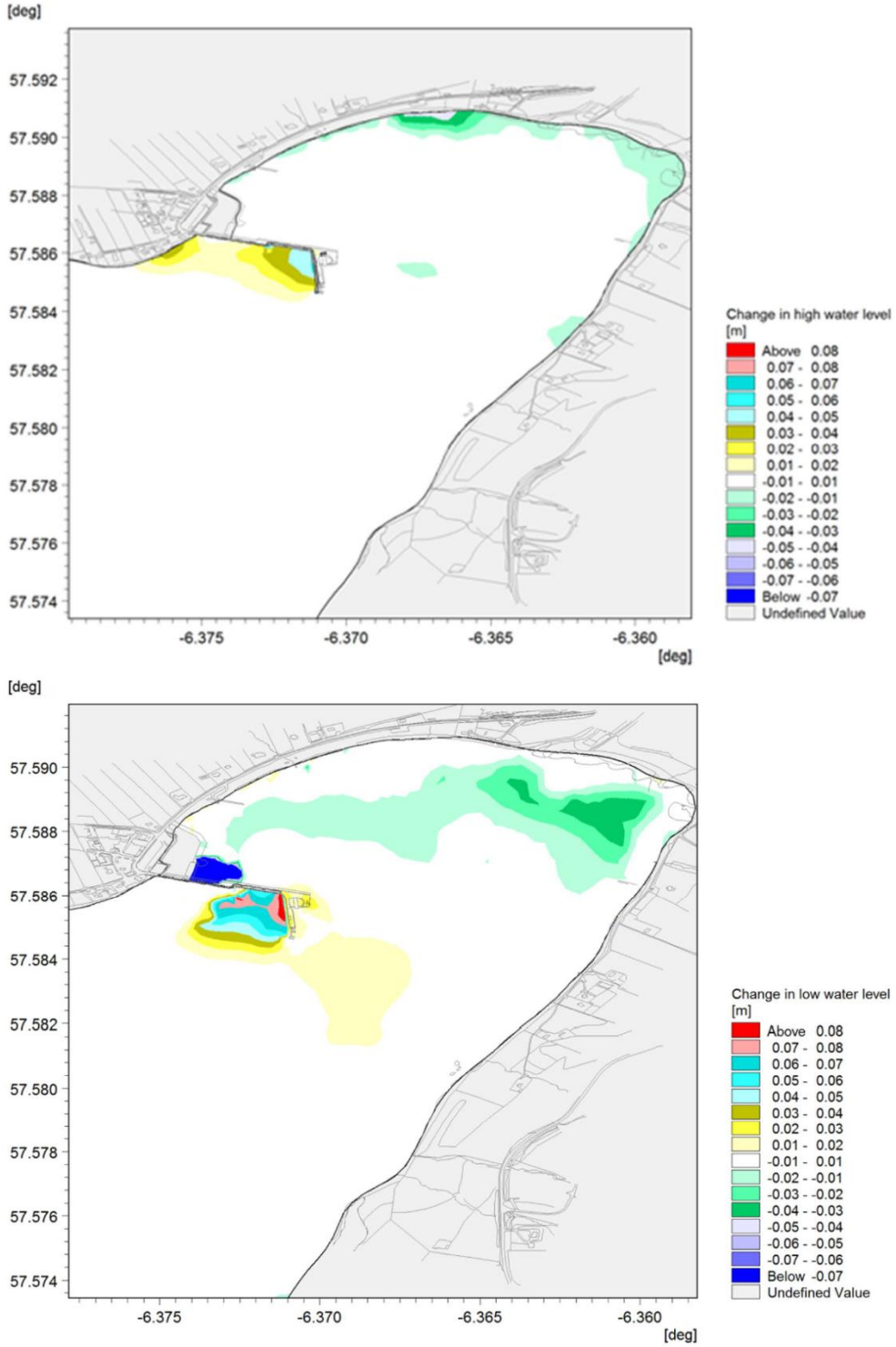


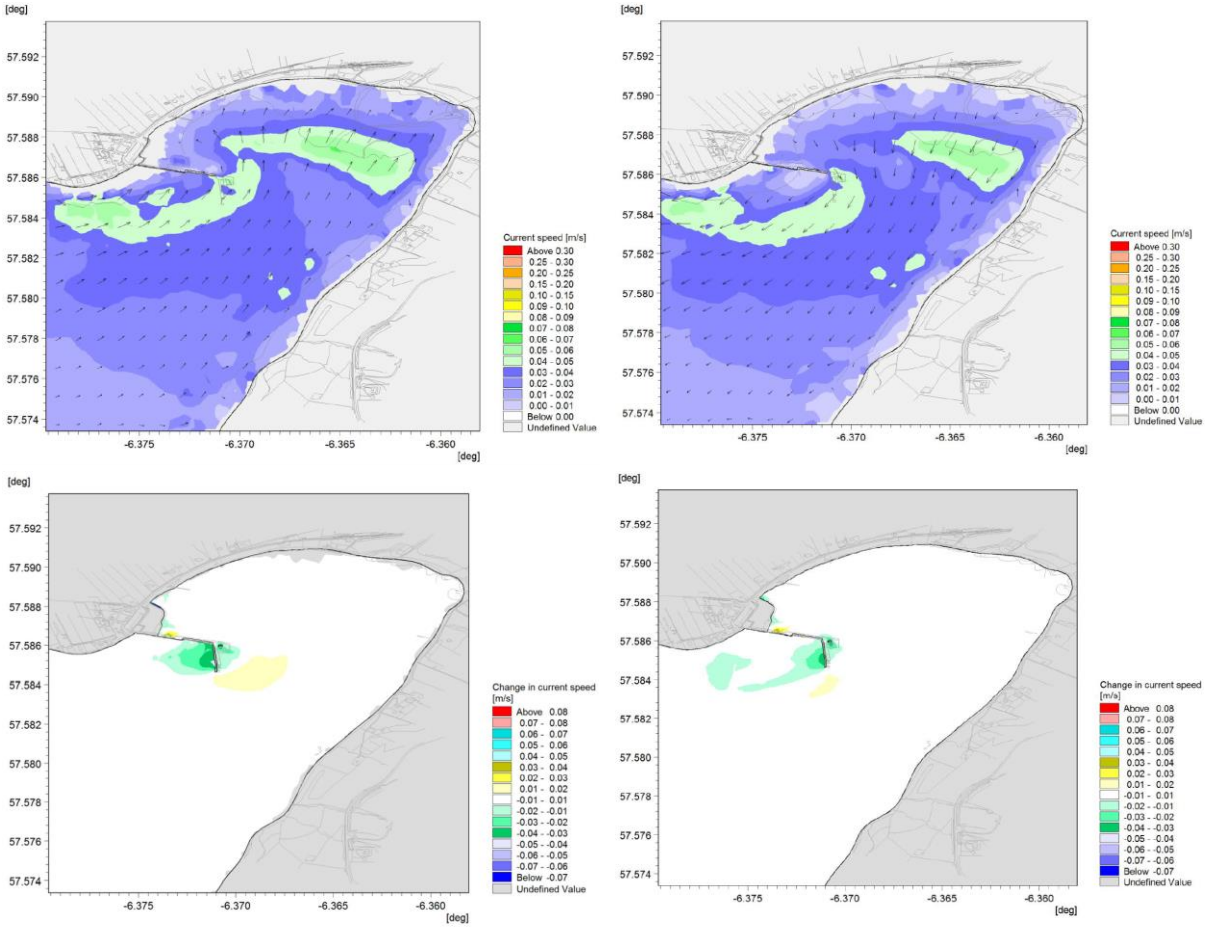
Figure 7-8 Predicted Water Level Change for 1 in 1-Year (240°N) Wind Condition: HW (top) and LW (Bottom)

7.5.24 The modelled effect of the operational phase, on peak flood and ebb tidal current flow is shown in **Figure 7-9**, whilst the equivalent predicted effect, when including a 1 in 1 year wind condition (from the dominant 240°N approach direction), is shown in **Figure 7-10**.

7.5.25 Under 'tide-only' conditions, the flow speeds are shown to be relatively low, with peak flows of around 0.05 to 0.06 m/s across parts of the inner bay. Following the assessment of the operational phase of the Proposed Development, the predicted

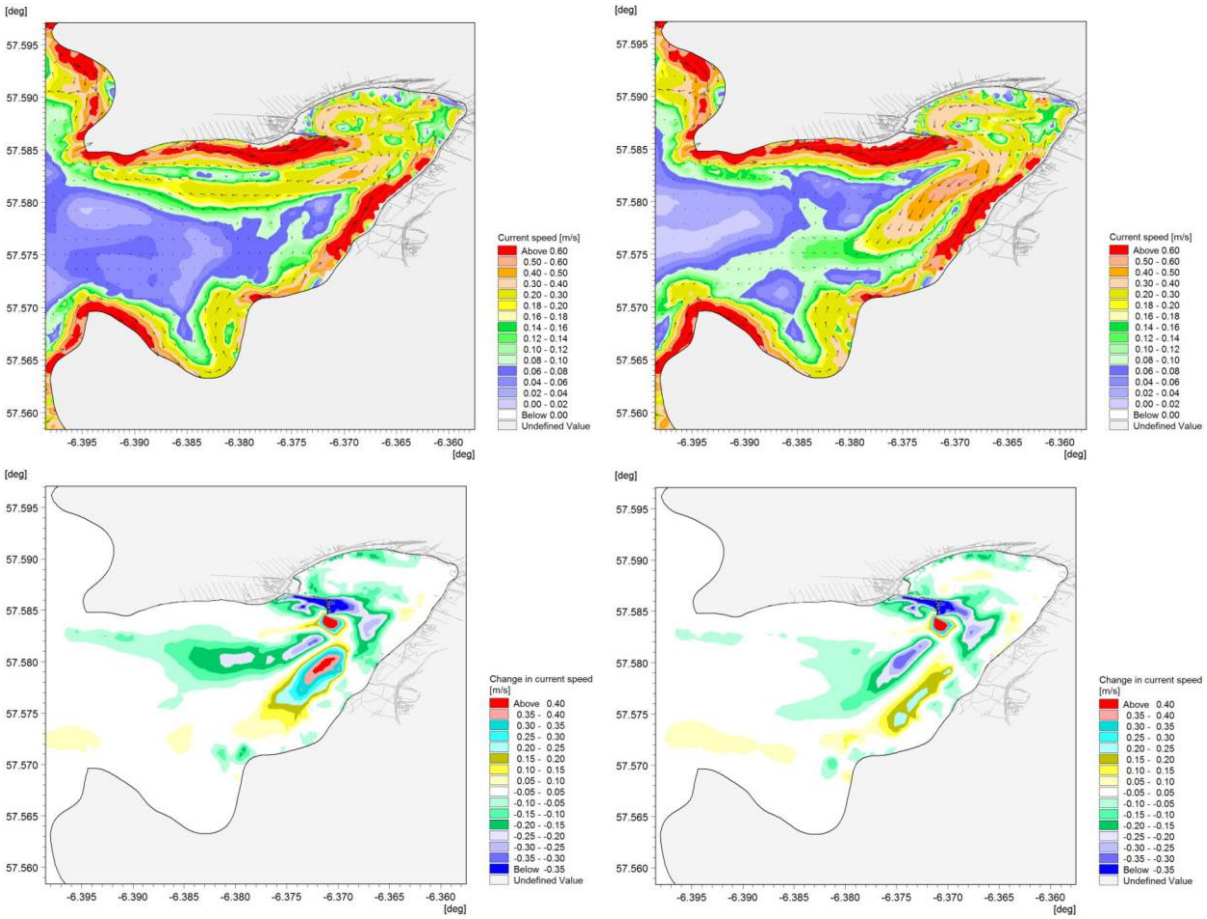
changes to peak flow speeds are greatest in closest proximity to the new pier structures. Towards the outer extents of the Proposed Development, peak flow speeds are predicted to reduce by up to 0.04 m/s (or around 60% of baseline flows). In and around the new reclamation (alongside the pier), flows here are predicted to increase by around 0.04 m/s (an increase of around 200% of baseline flows.

7.5.26 When a 1 in 1 year (240°N) wind condition is included on the tidal forcing, the baseline (existing) flows are shown to markedly increase. Under 'tide+wind' conditions, the flow speeds are shown to be higher than under tide-only forcing, with peak flows of up to 0.6 m/s along the coastal margins of the inner bay and in proximity to the existing pier structure. Following the assessment of the operational phase of the Proposed Development, the predicted changes to peak flow speeds are, again, greatest in closest proximity to the new pier structures. Towards the outer extents of the Proposed Development, peak flow speeds are predicted to increase by up to 0.4 m/s (an increase of around 60% on baseline flows). Along the northern face of the new pier development, flows are predicted to decrease by around 0.4 m/s (a decrease of around 60% on baseline flows).



Source: AECOM (2018)

Figure 7-9 Modelled Baseline (Top) and Predicted Change (Bottom) for Tide-only Current Speed: Peak Flood (Left) and Peak Ebb (Right)

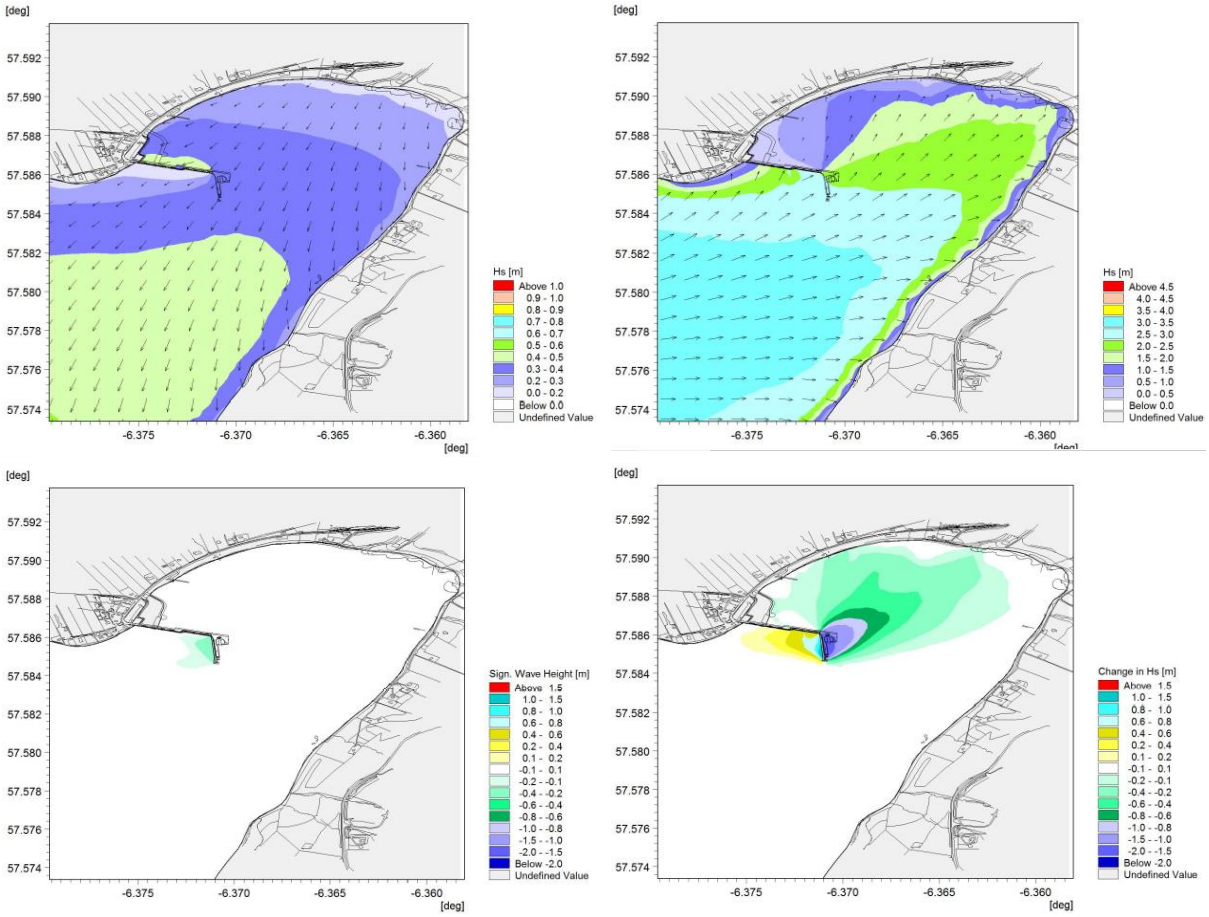


Source: AECOM (2018)

Figure 7-10 Modelled Baseline (Top) and Predicted Change (Bottom) Current Speed for 1 in 1-Year (240°N) Wind Condition: Peak Flood (Left) and Peak Ebb (Right)

7.5.27 An example of the predicted effect of the Proposed Development on the local wave climate is shown in **Figure 7-11**, for a 1 in 1-year event, and for two wave approach directions (30°N and 240°N). The effect of the Proposed Development on these assessed wave events shows a small reduction in significant wave height immediately in the lee of the new pier structure, when considering waves approaching from 30°N. This relates to the sheltering effect of the Proposed Development, lowering wave heights by around 0.3 m (or around 30% of baseline values).

7.5.28 The more energetic wave events approaching from 240°N are affected to a relatively larger degree by the Proposed Development. Sheltering of waves in the lee of the new pier structure results in a predicted lowering of significant wave height by up to 2 m (approximately 60 to 80% reduction on baseline values). The predicted extent of effect is also greater, extending across much of the northern part of Uig Bay.



Source: AECOM (2018)

Figure 7-11 Modelled Baseline (Top) and Predicted Change (Bottom) for 1 in 1-Year Significant Wave Height (H_s): 30°N (Left) and 240°N (Right) Wave Approach Direction

7.5.29 The Proposed Development also results in some predicted increases to significant wave height, under the 240°N approach direction. These waves, when reaching the new pier structure, show increases to H_s of up to 1.5 m immediately fronting the structure (an increase of around 60 to 80% on baseline values). This predicted increase is likely to be a result of wave reflection off the new pier structure. The extent of the predicted increase is limited to the area in front of the new pier structure (facing the wave approach direction of 240°N), and associated increases to wave height at the adjacent coastline at Uig are not predicted.

7.5.30 The Proposed Development results in predicted changes to the existing hydrodynamic and wave climate across parts of Uig Bay. The coastline adjacent to the new pier structures is already influenced by the existing pier, and will remain sensitive to any additional changes as a result of the Proposed development. This leads to an assessed sensitivity of medium, for this impact pathway. The greatest effects tend to be limited in extent to the immediate vicinity of the new pier structures, reducing in magnitude with distance from the pier. Across the wider bay, the predicted magnitude of effect is expected to be relatively low, when compared to existing conditions. This leads to a low magnitude of effect, and an assessed significance of minor adverse.

7.6 Mitigation & Monitoring

7.6.1 The significance of effects on the Marine Physical Environment associated with the Proposed Development has been assessed as negligible to minor adverse. Therefore, mitigation is not considered necessary to reduce the level of impact further, both during the construction and operation phases. The considerations made in this chapter have informed potential impacts on other receptors (e.g. marine ecology) for which relevant mitigation is suggested, where appropriate.

7.7 Residual Effects

7.7.1 As highlighted above, no mitigation has been identified to reduce potential impacts of the Proposed Development on the Marine Physical Environment, particularly as all impact pathways have been assessed as negligible to minor adverse. Therefore, there is no change to assessed significance of effects.

7.8 Cumulative Effects

7.8.1 There have been two projects identified that may present cumulative effects with the Proposed Development, namely:

- Loch Snizort East finfish farm; and
- Rubha Riadhain (Uig Bay) finfish farm.

7.8.2 The Proposed Development is unlikely to result in a significant cumulative effect in association with these two projects given the predicted maximum increases to SSC at the finfish farm locations (less than 2 mg/l across much of the Uig Bay finfish farm, with a slightly larger increase of 6.2 mg/l predicted at the point closest to the Proposed Development; less than 2 mg/l at the Loch Snizort East finfish farm). Uig Harbour is remote and no other dredging activity, or similar levels of seabed disturbance, are anticipated to result in material effects to the Physical Marine Environment, while the nearest existing disposal sites are located approximately 40 km to the west of the Proposed Development (Lochmaddy (HE030) and Leverburgh (HE033); both are currently closed (ABPmer, 2018).

7.9 Summary & Conclusion

7.9.1 The Proposed Development could have an impact upon the Marine Physical Environment in the vicinity of the proposed works through changes in SSC's and the hydrodynamic regime (waves/currents). However, numerical modelling suggests any increases in SSC during dredging and disposal activities will be short-term, rapidly returning to background levels following cessation of the works. The highest increased SSCs are predicted to occur at the Dredge Pockets and the point of release at the Proposed Sea Disposal Site, reducing rapidly with distance from source. Similarly, the extent of effects associated with the operational phase of the Proposed Development at Uig Harbour will be small scale and in the immediate vicinity of the new pier structures.

7.9.2 Impacts on physical processes may result in effects on pathways that subsequently affect other receptors, and these have been considered further in the respective chapters.

Table 7-9: Summary of Impact Assessment on the Marine Physical Environment

Description of receptor and effect	Sensitivity or value of receptor	Magnitude of effect	Predicted effects	Mitigation and monitoring	Residual effect and significance
Changes in SSC during the dredge and construction works	Low	Low	Negligible (not significant)	NA	Negligible (not significant)
Changes in SSC due to the deposit of dredge arisings at the proposed new disposal site	Medium	Low	Minor Adverse (not significant)	NA	Minor Adverse (not significant)
Change in substrate type through the re-deposition of suspended sediments and placement of materials at the proposed new disposal site	Considered further in Chapter 12: Benthic Ecology.	-	-	-	-
Changes in local hydrodynamic regime and wave conditions	Medium	Low	Minor Adverse (not significant)	NA	Minor Adverse (not significant)

8. Marine Water & Sediment Quality

8.1 Introduction

8.1.1 This section of the EIA Report provides an assessment of the potential effects of the Proposed Development on Marine Water and Sediment Quality in the vicinity of Uig Harbour.

8.1.2 Marine water and Sediment Quality is considered a receptor in its own right, but it also influences and is influenced by other receptors including **Chapter 7: Marine Physical Environment**, **Chapters 11 to 15** covering marine ecology; **Chapter 19: Commercial Fisheries** and **Chapter 18: Commercial and Recreational Navigation**.

8.2 Legislative Context

8.2.1 Many standards for Marine Water and Sediment Quality are regulated at European Union (EU) level through a range of environmental directives. The most relevant to the Proposed Development comprise:

- The Water Framework Directive (WFD; 2000/60/EC);
- The Priority Substances Directive (2008/105/EC and 2013/39/EU):
- The Shellfish Waters Directive (2006/113/EC; now subsumed within the WFD);
- The revised Bathing Water Directive (2006/7/EC);
- The Nitrates Directive (91/676/EEC); and
- The Urban Waste Water Treatment Directive (UWWTD; 91/271/EEC) (DEFRA, 2012).

8.2.2 In addition, dredged material is classed as a waste material once removed from the seabed and is strictly controlled as it enters the waste stream. Beneficial use and disposal of dredged material at sea are controlled under the London Convention 1972, the London Protocol 1996, the Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') and the revised EU Waste Framework Directive (2008/98/EC). Any identified locations for use and/or disposal of dredged material also need to take account of the UK MPS (HM Government, 2011).

8.2.3 Further information on the above legislation and supporting policy is given in **Appendix 4.1.**

8.3 Assessment Methodology & Data Sources

Desk Study

8.3.1 For the purposes of this chapter, the study area comprised the extent of Uig Bay and the extent of fine sediment transported from disposal operations to the Proposed Sea Disposal Site in the outer Uig Bay. To determine a Marine Water and Sediment Quality baseline for the area, the following publically available data sources have been used as part of a desk-based review:

- SEPA's Water Classification Hub[10];
- SEPA's Bathing Waters website[11];
- Shellfish Water Protected Area maps[12], as defined under the Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013;
- Food Standards Scotland fish and shellfish classification reports[13];
- Sensitive Areas under the UWWTD[14]; and
- Surface water Nitrate Vulnerable Zone (NVZ) designated areas[15].

8.3.2 In addition, a data request was submitted to the SEPA in November 2017. However, SEPA confirmed it 'does not hold any recent water and sediment quality data in the vicinity of Uig Harbour on the Isle of Skye' (General/Data Enquiry; Ref: 0076457).

8.3.3 Water quality data was provided by Grieg Seafood from the Ru Chorachan (Loch Snizort East) finfish farm, including dissolved oxygen concentration and water temperature collected between April and December 2017. The fish farm is located adjacent to a section of coast which runs between Ru Chorachan, the headland which forms the south side of the entrance to Uig Bay, and Poll na h-Eelaidh, the small inlet which lies 2 km to the south.

8.3.4 As highlighted in **Chapter 7: Marine Physical Environment**, sediment samples were collected from around Uig Bay in 2016; the two Dredge Pockets at Uig Harbour in 2017; and the disposal site search area in 2018. Data from these sampling programmes has been used to support the sediment type baseline (see **Figure 7-2**, **Figure 7-3** and **Figure 7-4**). These samples were also analysed for contaminant concentrations, including metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), tributyltin (TBT), polychlorinated biphenyls (PCBs; ICES 7 congeners) and polycyclic aromatic hydrocarbons (PAHs; United States Environmental Protection Agency (USEPA) Suite of 16). It should also be noted that PSD of the two rotary borehole samples (see Table 7-2) was from different borehole depths compared to contaminant analysis[16].

8.3.5 A Disposal Site Characterisation Report (ABPmer, 2018) (**Appendix 2.3**) was prepared separately to support identification of Proposed Sea Disposal Site as part of the Proposed Development, including reference to pre-disposal sampling guidance published by (Marine Scotland, 2017). Following identification of the Proposed Sea Disposal Site a series of numerical modelling scenarios were undertaken to assess the potential effects of the planned disposal of material, specifically dispersion of fine material in the wider area (AECOM Ltd, 2018a).

8.3.6 This is discussed further in **Chapter 7: Marine Physical Environment**, including consideration of increased SSCs.

[10] https://www.sepa.org.uk/data-visualisation/water-classification-hub (Accessed August 2018).
[11] https://apps.sepa.org.uk/bathingwaters (Accessed August 2018).
[12] http://www.gov.scot/Topics/Environment/Water/15561/ShellfishWaters/LocationMaps (Accessed August 2018).
[13] http://www.foodstandards.gov.scot/business-and-industry/industry-specific-advice/fish-and-shellfish (Accessed August 2018).
[14] http://www.gov.scot/Topics/Environment/Water/15561/UWWTDSensitiveAreas (Accessed August 2018).
[15] http://www.gov.scot/Topics/farmingrural/Agriculture/Environment/NVZintro (Accessed August 2018).
[16] (BH01: 1.3 m, 4.3 m, 5.8 m, 13.3 m and 16.3 m; DS01: 1.5-3.0 m, 3.0-4.5 m, 4.5-6.0 m, 6.0-7.5 m, 9.0-10.5 m, 16.5-18.0 m, 24.0-25.5 m and 31.5-33.0 m)

Assessment Methodology

8.3.7 The predicted effects arising from the construction and operation phases of the Proposed Development have been assessed using the impact assessment methodology as set out within **Chapter 6** of this report.

8.4 Baseline Conditions

Water Quality

8.4.1 The Proposed Development is located within the Loch Snizort Shellfish Water Protected Area[17]. However, the nearest shellfish production areas are Loch Eishort (Common mussels), Loch Harport Inner Cockles (Common cockles) and Loch Harport: Inner (Pacific oysters), located greater than 25 km to the south and south-west of the Proposed Development[18].

8.4.2 The Loch Snizort East finfish farm is an active site operated by Grieg Seafood located between Ru Chorachan, the headland which forms the south side of the entrance to Uig Bay, and Poll na h-Eelaidh, the small inlet which lies 2 km to the south (CAR Licence CAR/L/1132960/V2). The lease area for the Loch Snizort East finfish farm is approximately 3 km from the Dredge Pockets at Uig Harbour and 1.5 km from the proposed new disposal site in the outer Uig Bay. Sgeir Mhor (Salmon) Ltd has been granted a CAR Licence (CAR/L/1002918/V2) for a finfish farm along the southern margin of Uig Bay (site referred to as 'Uig Bay'). The site has previously been used for salmon farming, albeit it has not been operational since 2004. The lease area for the Uig Bay finfish site is around 1 km to the south-west of the Dredge Pockets and just over 1 km to the south-east of the Proposed Sea Disposal Site. Consultation with Grieg Seafood indicated a clear preference for the project to avoid placement of the Proposed Sea Disposal Site within 1 km of the finfish farms where possible.

8.4.3 Dissolved oxygen and water temperature data from the Ru Chorachan (Loch Snizort East) finfish farm, collected between April and December 2017, are shown in **Figure 8-1** and **Figure 8-2,** respectively. Mean monthly dissolved oxygen concentrations ranged 8.9 mg/l in December to 12.6 mg/l in May. The overall mean dissolved oxygen concentration was 10.9 mg/l, although it should be noted that this does not include data from January to March. Mean water temperature increased in the summer months to 13.9 °C in August, with the lowest mean water temperature in April at 8.5 °C; however, as above, this does not include data from January to March.

8.4.4 The closest designated bathing waters to the Proposed Development are Sand Beach and Gairloch Beach, both classified as 'excellent' during the 2017/2018 bathing season[19]. However, these bathing waters are located approximately 40 km to the east on the Scottish mainland and, therefore, are considered too distant to be impacted by the Proposed Development at Uig.

http://www.gov.scot/Resource/0043/00439198.pdf (Accessed August 2018).

[18] http://www.foodstandards.gov.scot/downloads/Final_2018-19_Annual_Classification_Document.pdf (Accessed August 2018).

[19] http://apps.sepa.org.uk/BathingWaters/Classifications.aspx (Accessed August 2018).

8.4.5 There are no surface water NVZs, designated under the Nitrates Directive, within 50 km of the Proposed Development at Uig[20]. Similarly, there are no designations under the UWWTD located in the vicinity of the Proposed Development. The nearest designated area is the Loch Kishorn, North West 'Sensitive Area (Shellfish Waters)' which is greater than 40 km to the south-east of Uig[21].

8.4.6 Table 8-1 provides a summary of the Loch Snizort coastal water body (ID: 200141), including current water body status (overall, ecological and chemical), within which the Proposed Development at Uig is located. The Loch Snizort coastal water body is currently classified as being at overall good status, based on good ecological status (chemical status not assessed). The overall, ecological and chemical status is determined by the 'one-out, all-out principle, whereby the poorest individual parameter's classification defines the assessment level. Therefore, if any parameter is assessed as less than good (e.g. moderate), then the status for that water body is reported at that level. An overall good status confirms that each individual parameter measured within this coastal water body is currently achieving (at least) the standard required to report good status.

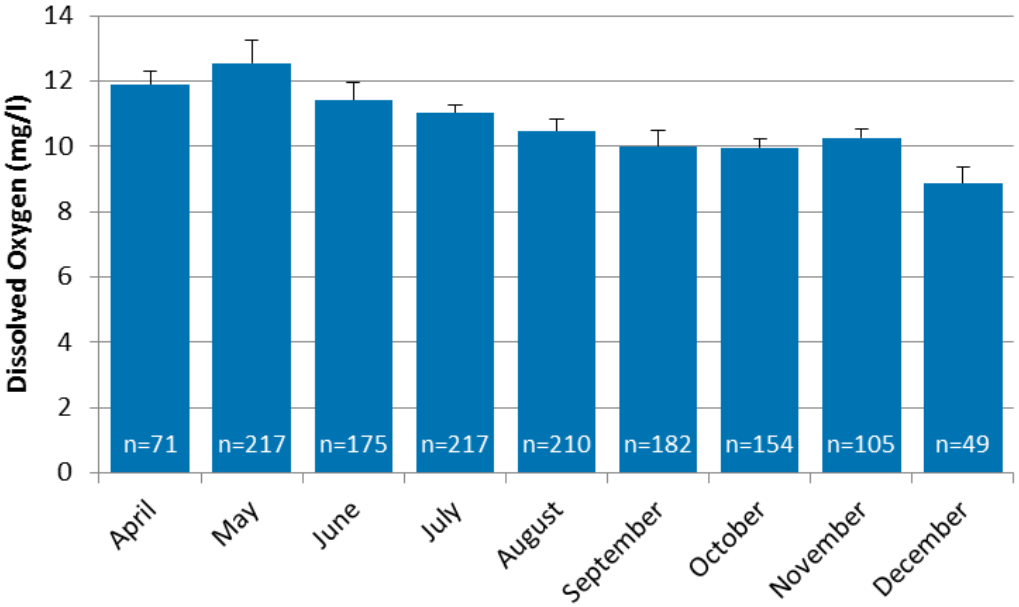


Figure 8-1 Dissolved Oxygen Concentration (mg/l) at the Ru Chorachan (Loch Snizort East) Finfish Farm between April and December 2017

http://www.gov.scot/Topics/farmingrural/Agriculture/Environment/NVZintro (Accessed August 2018).
[21] http://www.gov.scot/Resource/0049/00492214.png (Accessed August 2018).

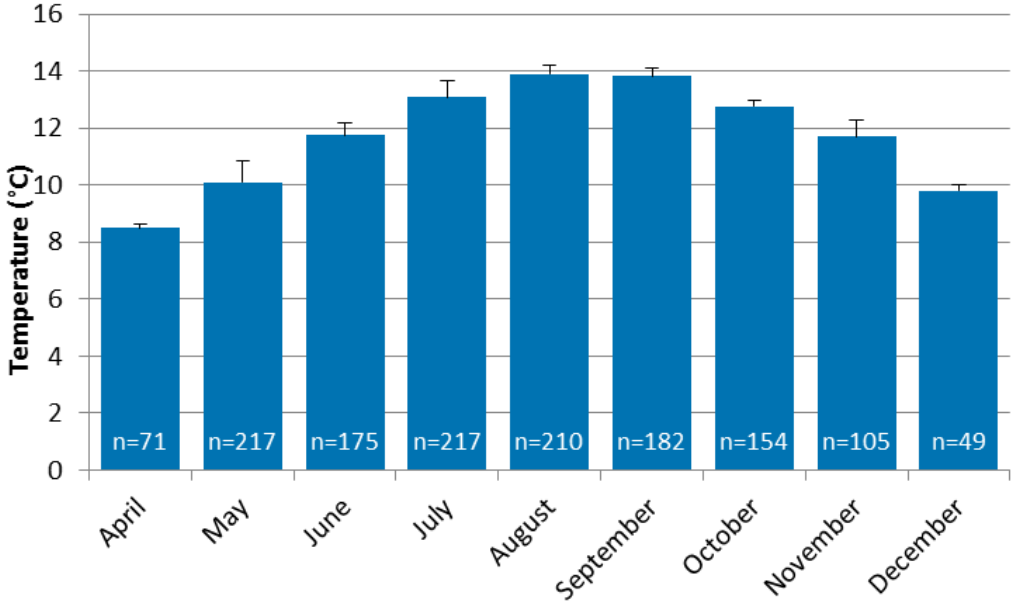


Figure 8-2 Water Temperature (°C) at the Ru Chorachan (Loch Snizort East) Finfish Farm between April and December 2017

Table 8-1 Loch Snizort Coastal Water Body Summary

Parameter	Description
Water Body Name	Loch Snizort
Water Body ID	200141
Water Body Type	Coastal
Water Body Area	120.3 km^2
Hydro morphological Designation	None
Protected Area Designations	Shellfish Water, Natura 2000 (Habitats and/or Birds Directive)
Overall Status	Good
Ecological Status	Good
Chemical Status	Not assessed

Sediment Quality

Composition

8.4.7 Full PSD results from surface samples collected around Uig Bay in 2016, borehole/trial pit samples from the two Dredge Pockets in 2017 and surface samples from the disposal site search area in 2018 are provided in **Chapter 7: Marine Physical Environment** in Table 7-1, Table 7-2 and Table 7-3, respectively. In summary, results suggest that surficial sediments are predominantly comprised of silt and sand material throughout Uig Bay (including the Dredge Pockets and the Proposed Sea Disposal Site), while sediments obtained from below the surface indicate an increased proportion of coarse material at depth (sand and gravel) with reduced contributions from fines. In terms of anticipated dredge material, the composition of Dredge Pocket 1 was assumed to be predominantly sand (57%),

while relatively increased fine material (silt and clay) was estimated for Dredge Pocket 2 (61%).

Contaminants

8.4.8 Unlike water quality, there are no formal quantitative environmental quality standards (EQS) in the UK for the concentration of contaminants in sediments, although the WFD has introduced optional standards for a small number of priority and priority hazardous substances Marine Scotland (Marine Scotland, 2017) provides a series of Action Levels to assist in the assessment of dredged material (and its suitability for disposal to sea, assuming this is considered appropriate under the waste hierarchy). In general, contaminant levels in dredged material below Action Level 1 (AL1) are likely to be acceptable for disposal at sea, although it may require monitoring conditions if the dredge is large in scale or in a sensitive area. In contrast, dredged material with contaminant levels above Action Level 2 (AL2) is generally considered unsuitable for disposal at sea (Marine Scotland, 2017).

8.4.9 Table 8-2 provides contaminant concentrations in surface sediment samples collected from around Uig Bay (Samples A–G). Metal and TBT concentrations were typically below AL1, with the exception of chromium and nickel which were well above AL1 in all samples and above AL2 in four samples (B, D, E and G). The highest concentration of chromium (740 mg/kg dry weight) was recorded in Sample E to the east of King Edward Pier, while the highest concentration of nickel (530 mg/kg dry weight) was recorded in Sample B adjacent to Ru Idrigill headland in the north-west of Uig Bay. Copper and zinc concentrations were also found to be above AL1 (but below AL2) in several samples, while the concentration of PCBs and PAHs were consistently below AL1 in all samples. Of particular relevance to Dredge Pocket 1 of the Proposed Development at Uig Harbour, chromium (460 mg/kg dry weight) and nickel (150 mg/kg dry weight) concentrations were above AL2 in Sample G.

Table 8-2 Sediment quality of surface samples collected from around Uig Bay in 2016

Determinand	Units	AL1	AL2	A	B	C	D	E	F	G
Arsenic	mg/kg	20	70	9.2	9.2	8.1	8.6	10	8.5	9.7
Cadmium	mg/kg	0.4	4	0.2	0.1	0.2	0.1	0.3	<0.1	0.3
Chromium	mg/kg	50	370	310	530	250	710	740	110	460
Copper	mg/kg	30	300	230	36	30	32	71	19	53
Lead	mg/kg	50	400	27	7.4	26	11	13	3.7	16
Nickel	mg/kg	30	150	110	530	93	350	230	68	150
Zinc	mg/kg	130	600	200	100	83	91	130	42	99
Mercury	mg/kg	0.25	1.5	0.05	<0.01	0.05	0.02	0.03	<0.01	0.04
TBT	µg/kg	100	500	<10	<10	<10	<10	<10	<10	<10
PCB #28	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #52	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Determinand	Units	AL1	AL2	A	B	C	D	E	F	G
PCB #101	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #118	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #153	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #138	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #180	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	µg/kg	100	-	<2	<2	<2	<2	<2	<2	<2
Acenaphthylene	µg/kg	100	-	<2	<2	<2	<2	<2	<2	2
Acenaphthene	µg/kg	100	-	<2	<2	<2	<2	<2	<2	<2
Fluorene	µg/kg	100	-	<2	<2	<2	<2	<2	<2	<2
Phenanthrene	µg/kg	100	-	<2	<2	<2	<2	7	<2	15
Anthracene	µg/kg	100	-	<2	<2	<2	<2	3	<2	4
Fluoranthene	µg/kg	100	-	3	<2	<2	2	28	<2	36
Pyrene	µg/kg	100	-	2	<2	<2	<2	25	<2	32
Benzo(a)anthracene	µg/kg	100	-	<2	<2	<2	<2	16	<2	15
Chrysene	µg/kg	100	-	3	<2	<2	<2	13	<2	13
Benzo(b/k)fluoranthene	µg/kg	100	-	6	3	<2	2	27	<2	29
Benzo(a)pyrene	µg/kg	100	-	3	<2	<2	<2	15	<2	17
Indeno(123-cd)pyrene	µg/kg	100	-	3	<2	<2	<2	8	<2	9
D benzo(ah)anthracene	µg/kg	10	-	2	<2	<2	<2	3	<2	2
Benzo(ghi)perylene	µg/kg	100	-	4	<2	<2	<2	15	<2	19

8.4.10

8.4.11 Table 8-3 provides a summary of contaminant concentration in borehole/diver-collected samples from within Dredge Pocket 1 (BH01, DS01 and DS02). The concentration of metals and TBT were below AL1, with the exception of chromium, copper and nickel. As with the surface samples collected around Uig Bay (see

8.4.12 Table 8-2), chromium and nickel were consistently above AL1, with several samples above AL2 suggesting high levels of contamination for these two metals. The highest concentrations for chromium and nickel were 490 mg/kg dry weight (DS02; 0.8 m) and 260 mg/kg dry weight (DS01; 1.5 m), respectively. Copper concentrations were typically above AL1, but well below AL2. PCBs and PAHs were below AL1 apart from one sample (DS01; 1.5 m) whereby several PAHs were above AL1 (there are no AL2 values for PAHs). There were no clear spatial trends with regards to sediment contamination. Chromium concentrations were slightly lower in BH01 compared to DS01 and DS02, although nickel concentrations were also found to be above AL2 in BH01. There were also no clear trends in levels of contamination with depth with elevated concentrations in the relatively surficial samples collected at DS02 (<1 m) and those at greater depths in BH01 and DS01 (up to 3.5 m).

8.4.13 It is possible that historically contaminated sediments from Uig Harbour have gradually migrated along the northern shore of Uig Bay, perhaps through wave and/or tidal action. Nevertheless, it is also possible that the source of sediment contamination is natural, potentially due to the leaching of geological material (Smith, et al., 2002). During the teleconference on 07 December 2017, Marine Scotland noted that sediment contamination levels in the harbour are quite high and, therefore, a proposed new disposal site would need to have similar contamination levels to the dredged material. Furthermore, Greig Seafood (finfish farm operator) requested that the Proposed Sea Disposal Site was located more than 1 km from the existing and planned finfish farms in the area.

Table 8-3 Sediment Quality of Boreholes and Diver Collected Samples from Dredge Pocket 1 in 2017

Determinand	Units	AL1	AL2	BH01 (0.0m)	BH01 (0.5-2.0m)	BH01 (2.0-3.5m)	DS01 (0.3m)	DS01 (1.5m)	DS01 (3.0m)	DS02 (0.1m)	DS02 (0.5m)	DS02 (0.8m)
Arsenic	mg/kg	20	70	7.3	7.2	8.8	8.1	6.4	7	7.3	9	6.5
Cadmium	mg/kg	0.4	4	<0.1	<0.1	<0.1	0.2	0.2	0.2	0.3	0.3	0.3
Chromium	mg/kg	50	370	100	220	120	310	460	330	380	410	490
Copper	mg/kg	30	300	38	42	58	97	43	62	41	25	37
Lead	mg/kg	50	400	3.8	4.6	2.5	7.6	4	3.8	6.4	3.5	4.8
Nickel	mg/kg	30	150	140	240	210	210	260	250	220	190	230
Zinc	mg/kg	130	600	77	96	78	120	100	110	100	77	100
Mercury	mg/kg	0.25	1.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.35	<0.05	<0.05
TBT	µg/kg	100	500	<10	20	<10	<10	<10	<10	<10	<10	<10
PCB #28	µg/kg	20	180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #52	µg/kg	20	180	<0.05	<0.05	<0.05	0.39	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #101	µg/kg	20	180	<0.05	<0.05	<0.05	0.91	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #118	µg/kg	20	180	<0.05	<0.05	<0.05	0.74	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #153	µg/kg	20	180	<0.05	<0.05	<0.05	0.54	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #138	µg/kg	20	180	<0.05	<0.05	<0.05	0.73	<0.05	<0.05	<0.05	<0.05	<0.05
PCB #180	µg/kg	20	180	<0.05	<0.05	<0.05	0.22	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	µg/kg	100	-	<2	<2	<2	<2	3	<2	24	6	11
Acenaphthylene	µg/kg	100	-	<2	<2	<2	5	34	4	<2	<2	<2
Acenaphthene	µg/kg	100	-	<2	<2	<2	2	7	<2	3	<2	3
Fluorene	µg/kg	100	-	<2	<2	<2	<2	7	8	2	<2	2
Phenanthrene	µg/kg	100	-	3	2	<2	21	98	28	15	<2	<2
Anthracene	µg/kg	100	-	<2	<2	<2	11	37	8	6	<2	<2
Fluoranthene	µg/kg	100	-	9	6	<2	67	340	25	56	<2	<2

Determinand	Units	AL1	AL2	BH01 (0.0m)	BH01 (0.5-2.0m)	BH01 (2.0-3.5m)	DS01 (0.3m)	DS01 (1.5m)	DS01 (3.0m)	DS02 (0.1m)	DS02 (0.5m)	DS02 (0.8m)
Pyrene	µg/kg	100	-	11	6	<2	62	310	19	48	<2	<2
Benzo(a)anthracene	µg/kg	100	-	6	5	<2	32	150	8	33	<2	<2
Chrysene	µg/kg	100	-	5	3	<2	29	130	8	33	<2	<2
Benzo(b/k)fluoranthene	µg/kg	100	-	10	9	<2	65	280	12	47	2	<2
Benzo(a)pyrene	µg/kg	100	-	6	4	6	36	160	7	22	<2	<2
Indeno(123-cd)pyrene	µg/kg	100	-	4	3	<2	22	88	4	11	<2	<2
D benzo(ah)anthracene	µg/kg	10	-	<2	<2	<2	6	20	<2	5	<2	<2
Benzo(ghi)perylene	µg/kg	100	-	5	3	<2	26	110	4	9	<2	<2

8.4.14

8.4.15

8.4.16

8.4.17 Table 8-4 provides contaminant concentrations from 12 surface sediment samples collected from the disposal site search area. The concentration of metals and TBT were below AL1, with the exception of chromium, copper and nickel. Chromium and nickel concentrations were consistently above AL1, with GS9 and GS12 above AL2. The highest concentrations for chromium (528 mg/kg dry weight) and nickel (189 mg/kg dry weight) were both from GS9. Copper concentrations were typically below AL1, except for GS10 which was marginally above AL1 (32.4 mg/kg dry weight; well below AL2). The concentration of PCBs was consistently below AL1 in all samples collected from the disposal site search area. The concentration of PAHs was also typically below AL1, with the exception of benzo(b+j)fluoranthene (GS3) and dibenzo(ah)anthracene (GS1, GS3 and GS12) which were slightly above AL1 (there is currently no AL2 for PAHs).

Table 8-4 Sediment Quality of Surface Samples Collected from the Disposal Site Search Area in 2018

Determinand	Units	AL1	AL2	GS1	GS2	GS3	GS4	GS5	GS6	GS7	GS8	GS9	GS10	GS11	GS12
Arsenic	mg/kg	20	70	8.66	8.1	8.11	7.89	8.08	8.98	9.16	7.92	9.72	10.6	8.69	8.79
Cadmium	mg/kg	0.4	4	0.12	0.13	0.11	0.11	0.11	0.12	0.14	0.13	0.12	0.14	0.1	0.1
Chromium	mg/kg	50	370	117	145	145	139	203	175	172	231	528	287	282	415
Copper	mg/kg	30	300	21	22.7	21.3	22.2	22.2	22.5	22	24.1	25.7	32.4	26.7	26.8
Lead	mg/kg	50	400	32.9	31.1	29.2	29.1	26.9	28	28.3	25.4	19.7	31.5	22.1	20.9
Nickel	mg/kg	30	150	52.9	60.7	59.7	59.5	73.3	68.2	68.6	91	189	106	105	158
Zinc	mg/kg	130	600	109	108	104	107	99.7	104	105	100	94.8	124	93	92.8
Mercury	mg/kg	0.25	1.5	0.08	0.07	0.07	0.08	0.07	0.07	0.07	0.06	0.04	0.06	0.05	0.05
TBT	µg/kg	100	500	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
PCB #28	µg/kg	20	180	0.76	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PCB #52	µg/kg	20	180	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
PCB #101	µg/kg	20	180	0.62	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
PCB #118	µg/kg	20	180	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
PCB #153	µg/kg	20	180	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
PCB #138	µg/kg	20	180	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
PCB #180	µg/kg	20	180	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	µg/kg	100	-	17.80	10.2	24.9	6.47	14.60	10.00	15.60	12.80	7.85	12.1	9.44	12.90
Acenaphthylene	µg/kg	100	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Acenaphthene	µg/kg	100	-	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7
Fluorene	µg/kg	100	-	7.85	<1.7	9.93	<1.7	5.65	<1.7	5.89	4.47	<1.7	4.50	<1.7	5.48

Determinand	Units	AL1	AL2	GS1	GS2	GS3	GS4	GS5	GS6	GS7	GS8	GS9	GS10	GS11	GS12
Phenanthrene	µg/kg	100	-	23.30	9.73	34.20	6.47	15.80	9.78	19.50	13.80	9.34	12.10	9.66	19.80
Anthracene	µg/kg	100	-	4.39	<2.5	5.08	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	5.28
Fluoranthene	µg/kg	100	-	21.20	7.47	33.00	9.35	14.10	8.41	18.80	13.00	8.04	10.80	8.12	27.60
Pyrene	µg/kg	100	-	14.30	5.21	24.20	5.99	10.40	6.14	14.30	10.20	6.91	9.89	7.69	25.60
Benzo(a)anthracene	µg/kg	100	-	11.80	<1.6	18.20	<1.6	6.83	3.87	9.06	6.17	4.67	6.30	<1.6	16.60
Chrysene	µg/kg	100	-	7.97	<1.7	12.00	<1.7	4.71	<1.7	6.34	4.47	3.36	4.05	<1.7	11.00
Benzo(b+j)fluoranthene	µg/kg	100	-	69.5	20.8	130	12.5	46.9	18.6	49.6	43.4	33.4	42.9	18.9	82
Benzo(k)fluoranthene	µg/kg	100	-	28.6	7.7	67.6	5.27	16.7	6.14	17.2	18.7	13.1	18.2	7.47	39.5
Benzo(a)pyrene	µg/kg	100	-	35.6	10.4	66.5	5.51	22.4	8.64	24.9	22.3	16.8	22.3	7.9	41.9
Indeno(123-cd)pyrene	µg/kg	100	-	43.9	11.5	85.2	5.51	24.5	9.55	24.7	23.4	21.1	25.2	11.9	51.5
Dibenzo(ah)anthracene	µg/kg	10	-	12.7	<1.6	22.4	<1.6	7.3	<1.6	<1.6	6.6	5.61	6.52	3.73	13.9
Benzo(ghi)perylene	µg/kg	100	-	44.1	12.7	87	6.47	28.7	10.5	28.8	24.3	21.7	27.4	14.1	48.9
Total hydrocarbons	mg/kg	100	-	1.36	2.39	1.80	2.26	2.04	1.03	3.10	2.39	3.14	1.91	1.25	1.91

8.4.18 In summary, sediment quality is poor around Uig Bay with concentrations of chromium and nickel above AL2 at several locations, including the two Dredge Pockets and the Proposed Sea Disposal Site.

8.5 Predicted Effects

Construction

8.5.1 This section details the key significant impact pathways for the construction phase of the Proposed Development. The key impact pathways relating to Marine Water and Sediment Quality are:

- Potential changes to dissolved oxygen in the water column;
- Potential changes to levels of contaminants in the water column;
- Potential impacts from redistribution of sediment-bound chemical contaminants; and
- Effects on water quality due to accidental spillages during construction.

8.5.2 Potential changes to SSCs in the vicinity of the Dredge Pockets and the Proposed Sea Disposal Site have been assessed in **Chapter 7: Marine Physical Environment** as negligible and minor adverse, respectively, and have not been considered further here.

8.5.3 The potential implications of changes in Marine Water and Sediment Quality on nature conservation designated sites, marine habitats/species and relevant human uses are assessed in their respective chapters including **Chapter 11: Marine Nature Conservation Areas**; **Chapter 12: Benthic Ecology**; **Chapter 13: Fish and Shellfish Ecology**; **Chapter 14: Marine Mammals**; **Chapter 15: Ornithology**; and **Chapter 19: Commercial Fisheries.**.

Potential Changes to Dissolved Oxygen in the Water Column

8.5.4 The increase in chemical and biological oxygen demand associated with elevated SSCs in the water column can have the potential to reduce dissolved oxygen concentrations (LaSalle, 1990). This effect is primarily associated with organic rich material, such as peat or alluvium. However, the combined material at the Dredge Pockets is considered to be predominantly coarse sediment (80% sand and gravel) and, therefore, the potential effects on dissolved oxygen are likely to be minimal. Dissolved oxygen levels are relatively high in the vicinity of Uig Bay (>8 mg/l; based on data provided by Greig Seafood from the Loch Snizort East finfish farm, as show in **Figure 8-1** and it is considered unlikely that the short-term increases in SSC would significantly reduce these levels.

8.5.5 While increases in SSC are anticipated as a result of dredging and disposal activities at the Dredge Pockets and the Proposed Sea Disposal Site, these will be localised and short-term, returning to background levels within approximately 1-day following cessation of the proposed works (AECOM Ltd, 2018a); also **Chapter 7: Marine Physical Environment**. Sensitivity to changes in dissolved oxygen is considered to be medium to high, particularly given the importance of water quality conditions to the nearby finfish farms. However, the magnitude of effects is considered negligible, resulting in an overall significance of negligible to minor adverse.

Potential Changes to Levels of Contaminants in the Water Column

8.5.6 Dredging activity at Uig Harbour and the disposal of dredge arisings to the Proposed Sea Disposal Site have the potential to disturb, re-distribute and release contaminated sediments into the water column. Concentrations of chromium and nickel in sediment samples collected throughout Uig Bay, including samples from Dredge Pocket 1 and the Proposed Sea Disposal Site, suggest levels are consistently above AL2. In addition, elevated concentrations of copper (above AL1, but below AL2) have been recorded in several samples as shown in Table 8-2, Table 8-3 and Table 8-4

8.5.7 It is possible to estimate in-water pollutant concentrations as a result of the Proposed Development based on a number of assumptions. Based on the model outputs (AECOM Ltd, 2018a) the maximum incremental SSCs at Dredge Pocket 1, Dredge Pocket 2 and the Proposed Sea Disposal Site are 18,920 mg/l, 62,707 mg/l and 1,239 mg/l, respectively (also see **Chapter 7: Marine Physical Environment**). However, contaminants are predominantly associated with fine material (silt and clay) and, therefore, only these fractions have been used to consider the maximum increased SSCs for the purpose of contaminant calculations. This results in maximum increased SSCs of 3,406 mg/l at Dredge Pocket 1 (18% silt and clay), 38,251 mg/l at Dredge Pocket 2 (61% silt and clay) and 1,239 mg/l at the Proposed Sea Disposal Site (increase assumed to be 100% silt and clay).

8.5.8 It should also be noted that such maximum increases in SSC are likely to very short-lived (in the order of seconds) during dredging activity and on release of material at the Proposed Sea Disposal Site, thus providing a conservative assumption. Using the maximum concentration of chromium (490 mg/kg; DS02 – 0.8 m), copper (97 mg/kg; DS01 – 0.3 m) and nickel (260 mg/kg; DS01 – 1.5 m) at Dredge Pocket 1 (also used for Dredge Pocket 2), it is possible to estimate the maximum increase in sediment-bound concentrations of these three contaminants[22]. However, it should be recognised that these contaminants are typically hydrophobic (remaining attached to sediment surfaces), with only a small fraction becoming dissolved in the water column and thus more readily bioavailable (and potentially toxic).

8.5.9 To determine the maximum dissolved fraction of metals released into the water column, it is necessary to consider the relative potential for each contaminant to change from one phase to another (i.e. contaminant adsorbed to sediment surfaces to dissolved in the water), referred to as the partition coefficient. Partition coefficients describe the ratio between the freely dissolved concentration in water and another environmental phase (e.g. sediment-bound) at equilibrium. Due to the variability in environmental conditions, a wide range of partition coefficients are reported in the literature. In each case, the lower end of any range has been used to provide a conservative approach. It should be noted that environmental conditions (such as salinity) can influence the desorption rates of contaminants from suspended sediments into the water column and, therefore, the partition coefficient values used here are indicative only and subject to uncertainty.

[22] Concentrations of chromium and nickel in sediments were consistently above AL2, while concentrations of copper were frequently above AL1.

8.5.10 The sediment-water partition coefficient (K_{sed}) for nickel (a priority substance) has been sourced from the nickel EQS dossier (2,138 l/kg), prepared by the Sub-Group on Review of the Priority Substances List (2011) under Working Group E of the Common Implementation Strategy for the WFD (SGRPSL, 2011). The dossier was used to inform the EQS for nickel, as reported in the Scotland River Basin District (Standards) Amendment Directions 2015. The K_{sed} for chromium has been based on the risk assessment report prepared for five chromium compounds (European Commission, 2005). The lower estimate cited in previous analysis of saltwater (marine) samples for chromium (VI) has been used (940 l/kg; (Wang, Griscom, & Fisher, 1997)[23]. It is recognised that the European Commission (2005) report infers a potentially lower K_{sed} for chromium (VI), although this includes freshwater sample analysis which is not applicable here given the locality of the Proposed Development. With regards to copper, the UK Technical Advisory Group (UKTAG) proposed a saltwater EQS based on information presented in the European Union (EU) risk assessment report which reviewed copper partitioning coefficients in the literature ((European Copper Institute (ECI), June 2008); (UKTAG, 2012)). The ECI report collated copper partition coefficients (K_{sed}) in European surface waters, including brackish, estuarine and marine waters, of which the lowest value was reported from the Weser Estuary in Germany (4,074 l/kg; (Turner, Milward, Schuchardt, Schrimer, & Prange, 1992)).

8.5.11 The relevant partition coefficients are used to determine the proportion of sediment-bound contaminants raised into suspension which could become dissolved in the water column. This dissolved concentration can then be compared to respective EQS values to evaluate whether an adverse effect to biota could arise due to the proposed dredging and disposal activity. Due to the temporary nature of the proposed dredging and disposal activities, short-term EQS values, referred to as the maximum allowable concentration (MAC), are reported where possible. However, in cases where this information is not available, the annual average (AA) EQS is presented.

8.5.12 As shown in Table 8-5**,** the maximum possible increased dissolved phase concentrations for copper and nickel are below the available EQS, suggesting that the potential for the Proposed Development, including both dredging and disposal activity, to impact water quality from these contaminants in sediments is minimal. Nickel is the only contaminant (of the three assessed here) for which a MAC is available and this concentration is unlikely to be exceeded. With regards to chromium, the AA is exceeded under the maximum increased SSC at the two Dredge Pockets; however, this represents a long-term EQS and the 95 percentile (%tile) for chromium is not exceeded (i.e. concentrations must remain below this level for 95% of the time, annually). Furthermore, any increases in dissolved contaminant concentration would be highly localised and significantly reduced in the wider area through dilution. Given the short-term nature of the proposed works and conservative assumptions regarding maximum increased SSCs, it is considered highly unlikely that dredging activity will result in the EQS for chromium being exceeded.

[23] The EQS for chromium in transitional and marine waters is only applicable to chromium (VI), although samples collected from around Uig Bay were analysed for total dissolved chromium.

8.5.13 While the potential change in dissolved contaminant concentrations due to dredging and disposal activities suggests small increases may occur in isolation, these would ideally be considered in addition to background levels. As highlighted in Section 8.3, SEPA confirmed it 'does not hold any recent water and sediment quality data in the vicinity of Uig Harbour on the Isle of Skye' (General/Data Enquiry; Ref:0076457) and dissolved contaminant concentrations in Uig Bay have not been obtained as part of this project. However, once again, the increased concentrations will be localised, short-lived and unlikely to exceed the respective EQS, both in terms of AA (chromium, copper and nickel) and MAC (nickel only).

8.5.14 The sensitivity of the receptor, specifically changes to levels of contaminants in the water column, is considered medium, given the existing high levels of sediment contamination present throughout Uig Bay and anticipated capacity to absorb change without significantly altering its present character. Based on the estimated short-term increase in dissolved concentrations of chromium, copper and nickel due to dredging and disposal activities, for which the respective EQS values are not exceeded, the magnitude of effects is considered to be low. Therefore, the overall significance of the Proposed Development for this impact pathway is assessed as minor adverse.

Table 8-5 Potential Increased (Dissolved) Concentrations of Chromium, Copper and Nickel in the Water Column

Determinand	Location	Maximum Total Sediment Conc. (mg/kg)	Maximum Increased SSC Conc. (Silt and Clay) (mg/l)	Maximum Suspended Conc. (µg/l)	Partition Coefficient		Maximum Dissolved Conc. (µg/l)	EQS for Transitional and Coastal Waters (µg/l)
					Log l/kg	l/kg		
Chromium	Dredge Pocket 1	490	3,406 (18%)	1669	3.0	940	1.78	0.6 (AA); 32 (95%tile)
	Dredge Pocket 2		38,251 (61%)	18,743			19.9	
	Proposed Sea Disposal Site		1,239 (100%)	607			0.65	
Copper	Dredge Pocket 1	97	3,406 (18%)	330	3.6	4,074	0.08	3.76 (AA)*
	Dredge Pocket 2		38,251 (61%)	3,710			0.91	
	Proposed Sea Disposal Site		1,239 (100%)	120			0.03	
Nickel	Dredge Pocket 1	260	3,406 (18%)	885	3.3	2,138	0.41	8.6 (AA); 34 (MAC)
	Dredge Pocket 2		38,251 (61%)	9,945			4.65	
	Proposed Sea Disposal Site		1,239 (100%)	322			0.15	

*EQS – Environmental Quality Standard (as described in Scotland River Basin District (Standards) Directions 2014 and Scotland River Basin District (Standards) Amendment Directions 2015) (Scottish Government, 2015) ; AA – Annual Average; MAC – Maximum Allowable Concentration; %tile - Percentile. * The EQS for copper is based on a concentration of dissolved organic carbon less than (or equal to) 1 mg/l in transitional and coastal waters, thus providing a conservative approach.*

Potential Impacts from Redistribution of Sediment-bound Chemical Contaminants

8.5.15 Sediment quality at the Proposed Sea Disposal Site is similar compared to the Dredge Pockets at Uig Harbour and around Uig Bay as set out within Table 8-2, Table 8-3 and Table 8-4. Contaminant concentrations are consistently above AL2 for chromium and nickel, which is typically considered unacceptable for disposal at sea (Marine Scotland, 2017). However, given the consistently elevated concentrations of nickel and chromium in sediments around Uig Bay (which are potentially naturally occurring), depositing contaminated dredge arising at the Proposed Sea Disposal Site is not analogous to the introduction of contaminated material to a non-contaminated environment.

8.5.16 It should also be noted that sediment-bound contaminants are typically associated with fine material (silt and clay), while approximately 80% of the total dredge arisings will be coarse material (sand and gravel; Table 7-4). Therefore, only a small proportion (less than 20%; 6,037 m^3) of the sediments disturbed during dredging and disposal activities will contribute to the redistribution of contaminants in the vicinity of Uig Harbour and the Proposed Sea Disposal Site. This represents a relatively small volume of material redistributed within the Bay for which contaminant levels (chromium and nickel) are already high.

8.5.17 Given concentrations of chromium and nickel are consistently above AL2 at the Dredge Pockets, a threshold for which disposal at sea is typically considered inappropriate (Marine Scotland, 2017), the sensitivity of the receptor is considered to be high. However, the magnitude of effects is considered negligible given the small quantities of contaminants to be redistributed and the similar sediment quality characteristics observed throughout Uig Bay. Therefore, the significance of effects has been assessed as minor adverse and, therefore, there is no need for monitoring/additional mitigation.

Effects on Water Quality due to Accidental Spillages During Construction

8.5.18 Any construction accident has the potential to lead to a spillage of cargo or fuel oil from the plant(s) involved. These types of accident are the ones most likely to lead to large scale oil spills; however, they are also relatively rare events. There will always be an element of risk from accidents and spillages/leaks in a construction operation (e.g. oil, fuel and lubricants from machinery) which could result in the contamination of the adjacent sediments and water. Should pollution occur from runoff, stored material or accidental spillages, the adverse effect on water resources and their associated ecology could be significant, the scale of which will depend on the nature and magnitude of the pollution incident.

8.5.19 The implications of a pollution incident are highly dependent on both the nature of the substance accidentally released and the species/habitats that would be affected. Spillages into the water have the potential to adversely affect the marine environment (for a limited period) and, therefore, the sensitivity of effects is considered to be medium. This is likely to alter the baseline conditions in the area

and, depending on the substance entering the water; this could materially change baseline conditions giving a medium magnitude of effects. This results in an assessed significance of effects of moderate adverse.

Operation

8.5.20 In general, the operational phase of the Proposed Development will be very similar to the current baseline conditions. Any increases in SSCs will return to background levels within 1-day following cessation of dredging and disposal activity, while redistribution of contaminated sediments through dredging activity and disposal of dredge arisings at the Proposed Sea Disposal Site will result in negligible change.

8.5.21 It is anticipated that maintenance dredging will be required at the Dredge Pockets every 3 to 5 years, with operations expected to last approximately 2 weeks and dredge arisings disposed to the Proposed Sea Disposal Site. The impact pathways associated with maintenance dredging are likely to be the same as the capital (construction) works assessed here. However, the comparative scale of effects is expected to be much reduced during maintenance dredging and, therefore, no further assessment is made.

8.6 Mitigation & Monitoring

Construction

8.6.1 The disposal of the dredge arising will be evenly distributed around the Proposed Sea Disposal Site. The coarser material (sand and gravel) will likely fall straight to the bed in the immediate vicinity of the Proposed Sea Disposal Site, while fine material (silt and clay) will remain in suspension for extended periods and deposit in the wider area (see **Chapter 7: Marine Physical Environment**). It should be noted that over spilling of dredge arisings loaded to barge will not be undertaken and the Proposed Development will not involve the intentional release of substances (e.g. fuel oil, chemicals).

8.6.2 The operation of machinery will be undertaken in accordance with standard good practice measures, including good pre-construction planning, site practices and adherence to relevant guidance for pollution prevention. For instance, Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA) and SEPA produced Guidance for Pollution Prevention 5 (Works and maintenance in or near water: GPP 5) which includes a range of mitigation measures that could be used to help avoid the potential for significant adverse impacts in the marine environment (NRW, NIEA and SEPA, 2018).

8.6.3 The contractor will ensure that suitable bunding and storage facilities are employed to prevent the release of fuel oils, lubricating fluids associated with the plant and equipment into controlled waters. In addition, oil and fuel storage facilities, if needed, will be sited on a safe and level platform and will conform to best practice regarding oil storage. Appropriate safety precautions will be followed during refuelling activities to minimise the risk of an oil spill.

8.6.4 The risk of vessel collisions and potential mitigation during the Proposed Development are discussed in **Chapter 18: Commercial and Recreational Navigation**.

Operation

8.6.5 As highlighted above, the scale of effects during maintenance dredging is expected to be much reduced compared to the proposed capital works. The same mitigation measures would be employed as suggested for the construction phase.

8.7 Residual Effects

Construction

8.7.1 Through application of the mitigation identified above, it has been determined that the risk of accidental spillages during the construction phase will be reduced to negligible. All other impact pathways identified for the Marine Water and Sediment Quality receptor are considered to remain (negligible to) minor adverse.

Permanent

8.7.2 Given the reduced scale of effects anticipated during operation (e.g. maintenance dredging) of the Proposed Development compared to the construction phase, the application of the mitigation are assumed will result in the same changes to residual effects as noted above. There are unlikely to be significant permanent changes to the Marine Water and Sediment Quality baseline as a result of the Proposed Development.

8.8 Cumulative Effects

8.8.1 There have been two projects identified that may present cumulative effects with the Proposed Development, namely:

- Loch Snizort East finfish farm; and
- Rubha Riadhain (Uig Bay) finfish farm.

8.8.2 These projects are considered unlikely to result in notable adverse effects on Marine Water and Sediment Quality and thus would not lead to a significant cumulative effect. The introduction of fish feed may cause minor, short-term and localised increases in nutrient concentrations (dosing is controlled), but this will not lead to an in-combination effect with the Proposed Development (no disturbance or redistribution of contaminated sediments). Instead, these facilities require good water quality conditions to support commercial operations and the potential effects of the Proposed Development on nearby aquaculture installations are described in **Chapter 19: Commercial Fisheries**.

8.9 Summary & Conclusion

8.9.1 The Proposed Development could have the potential to impact upon Marine Water and Sediment Quality in the vicinity of the works, although sediment quality throughout Uig Bay is already poor. The disturbance and redistribution of small quantities of contaminated sediments around the Bay will not alter the current baseline, with levels of contamination at the two Dredge Pockets similar to the surface sediments of the Proposed Sea Disposal Site.

8.9.2 The disposal of dredge arisings at the Proposed Sea Disposal Site will result in localised and short-term increases in the concentration of chromium, copper and nickel (contaminants in notably high concentrations in the sediments around Uig Bay) dissolved in the water column which remain below the respective EQS. Reductions in dissolved oxygen concentration, as a result of increased SSCs, will be short-term and localised to the Dredge Pockets and the Proposed Sea Disposal Site. The application of appropriate mitigation will reduce the risk of accidental spillages into the marine environment.

8.9.3 In considering the potential effects of the Proposed Development on Marine Water and Sediment Quality, as well as other relevant receptors (e.g. Marine Nature Conservation Areas – set out in **Chapter 11**; Benthic Ecology – **Chapter 12**; Fish and Shellfish Ecology – **Chapter 13**), it is considered unlikely to result in a deterioration in WFD status of the Loch Snizort coastal water body, or prevent this water body from achieving its WFD objectives in the future.

Table 8-6: Summary of Environmental Impacts on Marine Water and Sediment Quality

Description of receptor and effect	Sensitivity or value of receptor	Magnitude of effect	Predicted effects	Mitigation and monitoring	Residual effect and significance
Potential changes to dissolved oxygen in the water column	Medium to High	Negligible	Negligible to Minor Adverse (not significant)	NA	Negligible to Minor Adverse (not significant)
Potential changes to levels of contaminants in the water column	Medium	Low	Minor Adverse (not significant)	NA	Minor Adverse (not significant)
Potential impacts from redistr bution of sediment-bound chemical contaminants	High	Negligible	Minor Adverse (not significant)	NA	Minor Adverse (not significant)
Effects on water quality due to accidental spillages during construction	Medium	Medium	Moderate Adverse	Operation of machinery undertaken in accordance with standard best practice measures; suitable bunding and storage facilities.	Negligible (not significant)

9. Flood Risk and Climate Change

9.1 Introduction

9.1.1 This chapter of the EIA Report provides an assessment of the potential effect on flood risk from the Proposed Development. This chapter is informed by the 'Uig Harbour Redevelopment Flood Risk & Climate Change Technical Note' (AECOM Ltd, 2018b) (**Appendix 9.1**) which has also been submitted in support of the associated planning and marine licence applications. **Chapter 3: Project Description** of this EIA Report provides a detailed description of the works required to implement the Proposed Development.

9.2 Legislative Context

9.2.1 A number of specific regulations have been enacted to implement the statutory European and national legislation into UK law - these regulations include:

- EU Directive 2000/60/EC (WFD), transposed into the Water Environment and Water Services Act (Scotland) 2003 ('the WEWS Act');
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) in respect of discharges to surface or groundwater ('the CAR Regulations'); and,
- Flood Risk Management (Scotland) Act 2009 and the Flood Risk Management (Flood Protection Schemes, Potentially Vulnerable Areas and Local Plan Districts) (Scotland) Regulations 2010 ('the Flood Risk Management Act').

9.2.2 This legislation aims to protect and enhance the status of aquatic ecosystems, prevent further deterioration to such ecosystems, promote sustainable use of available water resources, and contribute to the mitigation of floods and droughts.

9.2.3 Further information on the above legislation and supporting policy is given in **Appendix 4.1**.

9.3 Assessment Methodology & Data Sources

Desk Study

9.3.1 Data from various sources regarding flooding has been reviewed, including:

- SEPA online Flood Risk Management maps[24] ;
- AECOM Flood Risk Technical Note (**Appendix 9.1**);
- Correspondence with THC Coastal Team and SEPA Flood Risk Team.

9.3.2 A desktop study of the hydrological features associated with the Proposed Development has been undertaken. The significant water features included in this

[24] SEPA. (2015). Online Flood Risk Management maps. http://map.sepa.org.uk/floodmap/map.htm.

assessment are therefore assessed to be Uig Bay and a small culverted watercourse.

9.3.3 The AECOM Flood Risk technical note in **Appendix 9.1** outlines the work undertaken to assess the impact of the Proposed Development on flood risk from wave overtopping through MIKE21 Spectral Wave Modelling to assess the wind-generated waves in front of jetty and defence structures, using extreme water levels, wind statistics, and joint probability analysis.

Assessment Method

9.3.4 The assessment of potential effects on flood risk has been carried out with reference to the guidance and techniques presented within the 'Design Manual for Roads and Bridges' (DMRB), Volume 11, Section 3, Part 10 'Road Drainage and the Water Environment' (Highways Agency, 2009).

9.3.5 The DMRB methodology takes into account the importance or sensitivity of receptors and the magnitude of predicted impacts on flood risk. Importance/sensitivity is based on the value of the feature or resource, whilst the magnitude of a potential impact is estimated based on the degree of effect and is independent of the importance of the feature.

9.3.6 The predicted effects arising from the construction and operation phases of the Proposed Development have been assessed using the impact assessment methodology as set out within **Chapter 6** of this report.

Summary of Consultation

9.3.7 A Scoping Report was issued for comment in September 2017 and comments have since been received. The comments relevant to the water environment are outlined in Table 9-1 below and specific responses provided. Scoping responses are included in **Appendix 1.2.**

Table 9-1 Scoping Responses Relating to Flood Risk

Organisation	Comment	AECOM Response
Marine Scotland	Flood risk and climate change is scoped into the EIA process. The EIA Report should demonstrate that the issue of coastal flooding has been addressed through modelling of wind and wave climate, extreme water levels, hydrodynamic modelling, wave transformation modelling, joint probability of waves and water levels and wave overtopping. This should also take into account the updated Coastal Flood Boundary levels for Scotland which will be available by the end of 2017, and updated climate change predictions available in Spring 2018. An appropriate level of technical detail and mitigation measures should then be identified if necessary.	The assessment within this chapter is based on the information provided within the supporting Technical Note. This technical note outlines the work undertaken to assess the impact of the Proposed Development on flood risk from wave overtopping through MIKE21 Spectral Wave Modelling to assess the wind-generated waves in front of jetty and defence structures, using extreme water levels, wind statistics, and joint probability analysis.
SEPA letter 3 August 2017. Ref PCS/154240 – Uig	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.	This will be agreed with THC as part of the detailed design process, although it is anticipated that attenuation of runoff would not be required given the nature of the site. It is unl kely that SuDS will be used here given the site constraints.
	All of the proposed sites lie within the medium l kelihood (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 as these proposals are for upgrades to the existing terminals we would consider these as being a water compatible use, and have to be located within the functional floodplain for operational reasons.	This information has been used to inform the assessment.
	All new development, including development on reclaimed land, should be above the estimated 1 in 200 year flood level for the area, 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 the use of water resistant materials and forms of construction as appropriate.	Detailed in Section 9.6 Mitigation and Monitoring within this chapter.
	We would recommend a minimum 600mm freeboard is added to the Coastal Flood Boundary (CFB) levels to allow for modelling uncertainties.	Modelling approach is outlined in the associated Flood Risk Technical Note and freeboard is included in Section 9.6 Mitigation and Monitoring.

9.4 Baseline Conditions

9.4.1 The baseline flood risk conditions relevant to the assessment are outlined in the following sections.

9.4.2 Loch Snizort is a sea loch located on the north coast of the Isle of Skye with freshwater input from the River Hinnisdal, Loch Greshornish, the River Snizort through Loch Snizort Beag and a number of small tributaries. Uig Bay is located on the eastern side of Loch Snizort and is fed by the River Rha and the River Conon.

9.4.3 A small burn flows from the north-west above the pier; is culverted at two locations below the local road and flows across fields until it is culverted from behind the

properties surrounding the pier to its outflow at the sea adjacent to the current reclaimed area. These watercourses are shown on **Figure 9-1**.

9.4.4 Local geology is dominated by intrusive and extrusive igneous rocks overlain by raised beach or other marine deposits with some covering of glacial till.

9.4.5 Uig Ferry Terminal and pier are exposed to wind waves propagating from the Little Minch into Uig Bay due to diffraction and refraction, and also waves generated locally by winds.

Tidal Flooding

9.4.6 SEPA's Flood Risk Management maps[25] indicate that the Proposed Development, particularly the existing pier and the reclaimed area are located within a 'Potentially Vulnerable Area' (PVA) for coastal flooding and are likely to be at risk of flooding from the sea in low, medium and high probability flood events.

9.4.7 The Proposed Development falls within the 'Isle of Skye Coastal Catchment' as defined by SEPA and THC as part of the Flood Risk Management (Scotland) 2009 assessment, and is assessed within the Highland & Argyll Local Plan District (2016) as the Uig, Isle of Skye PVA 1/11 (THC, 2016).

9.4.8 Information regarding any historic flooding events at Uig was requested from SEPA and THC. One flood incident in 2005 was identified, but no details were provided.

9.4.9 Additional information regarding this 2005 flood event was sought from the CFL Port Manager, Donald Beaton (pers. Comms. 19th February 2018), along with any further information relevant to flood risk at the Proposed Developoment Site. The following additional details were provided:

- The wall along the pier was likely constructed in the 1960s, to protect people walking along the pier. It may have been modified since that time and it regularly overtops; and
- The pier regularly overtops and sea water can come close to buildings near the shore but does not regularly cause property flooding; and
- The 2005 storm was a large event over an extended period (more than 24 hours); with very high winds, storm surge and high tides. Extensive erosion and damage occurred around the Bay. The Bakur Bar (formerly the Pub at the Pier), located immediately adjacent to the landward end of the pier, the marshalling area and car park were all flooded.

9.4.10 In addition to the Bakur bar, the adjacent Uig Pottery was also flooded during the 2005 flood event.

Extreme High Water Levels

9.4.11 The highest extreme water level, estimated from the Coastal Flood Boundary conditions dataset, is 4.15 m Above Ordnance Datum (AOD) (based on a 1 in 1,000 year event in current climate conditions). The water level for the 1 in 200 year event is 3.99 m AOD.

9.4.12 Topographic survey data in the vicinity of the harbour indicate ground floor levels at the Bakur Bar are approximately 4.3 m AOD (although the exact threshold level is not known). The floor level in the entrance to the existing CFL building is

[25] http://map.sepa.org.uk/floodmap/map.htm

approximately 5.25 m AOD. This indicates that these buildings are unlikely to be flooded based on extreme water levels.

9.4.13 The lowest level of the car park immediately in front of the marshalling area is 4 m AOD, as is the approachway and pier at the lowest points. The fisherman's compound at the eastern corner is approximately 3.51 m AOD and the trunk Road (A855), at the lowest point at the pier end, is approximately 4.2 m AOD. Therefore some flooding of the fisherman's compound is expected from extreme sea levels only. The height of the wall running along the approachway to protect pedestrians is around 4.3 m AOD for much of its length, which would prevent inundation of the pier directly from extreme sea levels (see **Photograph 9-1**).

Photograph 9-1 Wall Protecting Pedestrians Along the Pier

Wave Overtopping

Coastal modelling undertaken by (AECOM Ltd, 2018a) has indicated that wave overtopping occurs from the 1 in 1 year flood event on the south side of the pier. From the 1 in 2 year event, wave overtopping is also shown to occur on the north side of the pier.

9.4.14 Table 9-2 Cross Section Details for the Existing Ferry below provides modelled wave crest levels measured in metres above ordnance datum, (m AOD) as well as metres above chart datum (m CD).

9.4.15 The cross sections referred to in Table 9-2 are shown in **Figure 9-2** below.

Table 9-2 Cross Section Details for the Existing Ferry Terminal

Cross Sections	North	South 1	South 2	South 3
Crest Level (m AOD)	4.15	5.54	4.30	5.54
Crest Level (m, CD)	6.85	8.24	7.00	8.24
Bed level at toe (m, ODN)	0.80	2.20	2.20	-2.00
Slope	1/2	vertical wall	vertical wall	vertical wall

Figure 9-2 Cross sections for the Existing Ferry Terminal

9.4.16 The existing wall along the approachway provides protection to pedestrians from waves, although it is regularly overtopped.

Fluvial Flooding

9.4.17 The Proposed Development is outside the identified areas of fluvial flooding indicated on the SEPA online flood risk maps. The nearest area of fluvial flooding indicated on the SEPA mapping is from the River Rha, which outflows to the coast more than 1 km to the east of the Proposed Development.

9.4.18 There is a small, culverted burn which outflows to the sea adjacent to the current marshalling area (see **Photograph 9-2**). No flooding has been recorded from this watercourse and it does not feature on SEPA online flood risk maps.

9.4.19 A Closed Circuit Television (CCTV) survey indicates that the culvert is generally in reasonable condition although with some structural deterioration in the central section. Capacity of the culvert is expected to be sufficient to convey the predicted flows in the burn with its current dimensions. This culvert also takes surface water drainage from the Marshalling area and nearby roads, as well as the existing ticket office building (to be demolished). To the east of this culvert outfall, there is an outfall from the Scottish Water septic tank. Further details are available in **Appendix 9.2.**

Photograph 9-2 Culvert Overflow of Small Watercourse

Pluvial Flooding

9.4.20 The Proposed Development is out with any identified areas of pluvial flooding according to the SEPA online flood risk maps. No pluvial flooding is shown on the northern side of Uig Bay (within at least 1.5 km of the Proposed Development).

Flooding from Drainage Networks

9.4.21 There are no known records of flooding from artificial drainage systems in the vicinity of the Proposed Development. All surface water currently drains to the sea via the two culverts described in 9.4.19.

Groundwater Flooding

9.4.22 There are no known records of groundwater flooding and it is not likely in this location due to the steep slope and freedom of drainage to the coast.

9.5 Evaluation of Sensitivity

Flood Risk Receptors

9.5.1 The receptors that would be affected by flooding (tidal, fluvial and drainage) are outlined below and Table 9-3 summarises the assessment of their sensitivity. SEPA 'Flood Risk and Land Use Vulnerability Guidance' (SEPA, 2018) was referred to for this assessment.

- **Residential Properties** - A number of residential properties and caravan parks along the coastline to the west of the Pier may be impacted by existing wave overtopping conditions that occurs in the vicinity of the pier due to their proximity to the coastline and relatively flat topography. These receptors would be vulnerable to any adverse change in flood risk that could be caused by the Proposed Development. The implications of this would be financial loss and emotional distress to residents. SEPA guidance indicates that these types of properties are classified as Category 2 – highly vulnerable uses, with regard to flood risk. The sensitivity of these receptors is therefore assessed as high*;*
- **Commercial Properties** – A range of business are located in the vicinity of the pier. These receptors would be vulnerable to any adverse change in flood risk that could be

caused by the Proposed Development. The implications of this would be financial loss and emotional distress to owners, as well as loss of revenue to the local economy where businesses may be closed for periods of time. SEPA guidance indicates that these types of properties are classified as Category 3 – least vulnerable uses with regard to flood risk. Therefore the sensitivity of these receptors is assessed as ***Medium***;

- **Proposed ticket office** – A new ticket office is proposed to be located on the proposed extended reclaimed area. Flooding of this building would cause disruption to ferry users and staff and would incur financial cost to CFL, the ferry operator. However, due its requirement to be located in a certain location, the sensitivity is assessed to be low;
- **Ferry users/public and ferry/pier workers** – Construction workers, visitors to the pier, ferry users, and those who regularly work there may be sensitive to flood risk and potential changes in overtopping as a result of the Proposed Development. Use of the pier may be restricted during severe weather; however, customers and staff may be exposed to some adverse conditions. There is a potential health and safety risk to pier users during adverse weather from a change in overtopping related to the Proposed Development. SEPA guidance indicates that the pier is classified as Category 6 - Water Compatible Uses with regard to flood risk. Due to the balance of vulnerable users and the water compatible land use, the sensitivity of these receptors is assessed to be medium;
- **Construction equipment and site compounds** – The location of construction equipment on site and the use of a site compound close to the pier may be necessary but changes to flood risk during construction could cause damage to equipment and pollution incidents through flooding of stockpiles and fuel stores. However, equipment left in flood prone areas would be replaceable and is likely to be able to withstand some flooding. The sensitivity of these receptors is therefore assessed to be low; and
- **Open ground** - Gardens and croft land close to the pier could be affected by changes in flood risk and overtopping. However, this type of land use comes under SEPA's Category 6 - Water Compatible Uses and therefore has a low vulnerability to changes in flood risk. The sensitivity of these receptors is therefore assessed to be low.

Table 9-3 Sensitivity of Flood Risk Receptors

Receptor	Features	Overall Sensitivity
Residential Properties	Health and wellbeing implications of flooding, and financial cost.	High
Commercial Properties	Financial cost, local economy and tourism, distress to owners.	Medium
Proposed ticket office	Financial cost, disruption to ferry users and staff	Low
Ferry/Pier Workers and Users	Health and safety risk but low vulnerability land use.	Medium
Construction equipment and site compounds	Financial cost of damage to construction equipment along with potential pollution incidents	Low
Open ground	Damage to open ground is unlikely to have a significant effect.	Low

Climate Change

9.5.2 In order to consider climate change for the 100 year (2118) epoch, the

present day extreme water levels were factored with the UK Climate Projections (UKCP09) 95th percentile medium and high emission scenario (including surge) sea level rise projections (Table 9-4).

Table 9-4 Extreme Water levels at Uig Bay

Return Period (year)	Extreme Sea Levels (m, AOD)		
	Present Day (2018)	Future (2118) Medium Emission	Future (2118) High Emission
1	3.37	4.04	4.23
2	3.46	4.14	4.33
10	3.67	4.36	4.55
20	3.76	4.44	4.63
50	3.87	4.56	4.75
100	3.94	4.63	4.82
200	3.99	4.69	4.88
1000	4.15	4.86	5.05

9.6 Avoidance Measures/Mitigation 'by design'

9.6.1 The floor level of the proposed new ticket office building has been designed above the 1:200 year flood level, with climate change allowance.

9.7 Predicted Effects

9.7.1 Two construction scenarios have been proposed (outlined in **Chapter 3** of this EIA Report); a single continuous phase of work (Scenario 1), and a staged approach (Scenario 2). The assessment of the effect of the Proposed Development on flood risk has been undertaken using a worst case scenario which is taken to be all activities that could affect flood risk being undertaken at the same time, i.e. Scenario 1.

Construction

9.7.2 The predicted effect of construction activities on flood risk is discussed below and summarised in Table 9-5.

Changes to Existing Coastal Structures and Defences Affecting Flood Risk at Neighbouring Land and/or Property

9.7.3 Some low lying areas of the coastal land are predicted to flood in the existing situation.

9.7.4 There is no planned removal of any structure that would be likely to affect flood risk to the neighbouring land and properties. Some protection is currently offered by the coastal facing walls of the Uig Pottery and Bakur Bar, a small wall between the pub and the pier structure and rock armour in front of the current marshalling area and car park. Therefore, construction is likely to have a negligible effect on tidal flood risk to open ground and residential and commercial properties in the vicinity of the

pier, which leads to a Significance of Effect of minor adverse (not significant) for residential properties and negligible (not significant) for commercial properties and open land.

Changes to Existing Coastal Structures and Defences Affecting Flood Risk to Pier Users and Construction Equipment

9.7.5 Construction activities and modifications to the coastal structures and defences, and specifically the existing wave wall and the rock armour) could lead to a temporary change in flood risk to the pier as sections of the existing pier wall will be demolished and new sections constructed. This may lead to temporary localised exposure of the pier users and construction equipment to waves to a greater extent than they currently experience during adverse weather. Therefore, construction is likely to have a medium effect on tidal flood risk to ferry/pier workers and users, and construction equipment, which leads to a Significance of Effect of moderate adverse (significant) for pier users and minor adverse (not significant) for construction equipment.

Risk of Coastal Flooding Affecting New Building(s) Associated with the Proposed Development

9.7.6 There could be a risk of flooding to the new ticket office to be constructed on extended reclaimed land and the CFL storage building adjacent to the fisherman's compound. Wave overtopping of the pier is known to occur and this could affect the area where the buildings are to be constructed. However, wave modelling has shown that with the Proposed Development in place, the marshalling area (where the building will be located) is less exposed to wave overtopping due to an increased crest level at the front of the reclaimed land. Therefore there is assessed to be a negligible risk of tidal flooding to the proposed ticket office during construction, which leads to a Significance of Effect of negligible (not significant) for the proposed ticket office.

Changes to Existing Watercourse Culvert Beneath the Existing Marshalling Area Affecting Upstream Flooding Risk

9.7.7 Flood risk from the small watercourse adjacent to the marshalling area may be affected by the land reclamation. It is likely that the existing culvert will be extended further to sea and should the capacity of the temporary pipe be less than the existing, this could cause some backing up of flow in the culvert. However, the AECOM Culvert Extension Technical Note (**Appendix 9.2**) indicates that extension of the culvert is not expected to result in backing up of flow, leading to increased flood risk. Therefore there is assessed to be a negligible risk of fluvial flooding to the proposed ticket office, which leads to a Significance of Effect of minor adverse (not significant) for residential properties and negligible (not significant) for the proposed ticket office, commercial properties, construction equipment and site compounds and open land.

Changes to Surface Water Drainage Affect Runoff Rates

9.7.8 Surface water runoff is unlikely to be affected by construction as ground levels will generally be the same as currently and there are no barriers that would impede surface water flow proposed. Therefore there is assessed to be a negligible risk of

pluvial flooding to the proposed ticket office, which leads to a Significance of Effect of minor adverse (not significant) for residential properties and negligible (not significant) for the ferry/pier workers and users, proposed ticket office, commercial properties, construction equipment and site compounds, and open land.

Table 9-5 Predicted Effect on Flood Risk (Construction)

Flood Source	Receptor	Sensitivity of Relevant Receptor	Magnitude of Effect	Significance of Effect
Tidal	Residential properties	High	Negligible	Minor Adverse (not significant
	Commercial properties	Medium	Negligible	Negligible (not significant)
	Proposed ticket office and CFL storage building	Low	Direct, short-term (during adverse weather), temporary effect Low	Negligible (not significant)
	Ferry/Pier workers and users	Medium	Direct, short-term (during adverse weather), temporary effect Medium	Moderate Adverse (significant)
	Construction equipment	Low	Direct, short-term (during adverse weather), temporary effect Medium	Minor Adverse (not significant
	Open land	Low	Negligible	Negligible (not significant)
Fluvial	Residential properties	High	Negligible	Minor Adverse (not significant
	Commercial properties	Medium	Negligible	Negligible (not significant)
	Proposed ticket office	Low	Negligible	Negligible (not significant)
	Construction equipment and site compounds	Low	Negligible	Negligible (not significant)
	Open land	Low	Negligible	Negligible (not significant)
Drainage	Residential properties	High	Negligible	Minor Adverse (not significant)
	Commercial properties	Medium	Negligible	Negligible (not significant)
	Proposed ticket office	Low	Negligible	Negligible (not significant)
	Ferry/Pier workers and users	Medium	Negligible	Negligible (not significant)
	Construction equipment and site compounds	Low	Negligible	Negligible (not significant)
	Open land	Low	Negligible	Negligible (not significant)

Operation

9.7.9 The predicted effect of the completed Proposed Development on flood risk is discussed below and summarised in

9.7.10 Table 9-6.

9.7.11 Following completion of the pier improvement works, the following changes to flood risk in the vicinity are anticipated.

Increase in Crest Level at Reclaimed and Extended Marshalling Area.

9.7.12 The reclaimed and extended marshalling area will be protected by an increase of 0.65 m in the crest level (4.8mAOD), when compared to current levels. Wave overtopping discharges should therefore be significantly reduced following completion of the Proposed Development. Therefore there is assessed to be a negligible risk of tidal flooding to the proposed ticket office and CFL storage building, which leads to a Significance of Effect of negligible (not significant) for the proposed ticket office.

Increase in Overtopping Discharge Close to the Coastline (Sections South 1, 2 and 3) affecting neighbouring land and/or property

9.7.13 Modelling completed as part of this assessment and reported in **Appendix 9.1**, indicates that incoming waves could be expected to be reflected from the solid pier structure of the Proposed Development. Modelled increases in overtopping discharge at Sections 1 and 2, the end of the pier near the Bakur Bar are relatively small. Modelling indicates more significant increasing wave heights could be expected at Section 3, the approachway (Sections 1, 2 and 3 as shown in **Figure 9.2**).

9.7.14 An increase (up to 9% for an extreme event) in wave heights resulting in wave overtopping of the existing defences at Sections 1 and 2 (in the vicinity of Bakur Bar and Uig pottery) is predicted as a result of the solid nature of the proposed pier structure. Due to the gently sloping topography behind the coastline, an increase in overtopping is unlikely to cause a significant change in flood extent or depth in the vicinity. Therefore the predicted increase as a result of the Proposed Development over and above the baseline condition is assessed to be of low magnitude. It is however acknowledged that the baseline condition already includes circumstances in which wave overtopping causes flooding of immediately adjacent properties, particularly the Bakur Bar and Uig Pottery. Consequently whilst impact as a result of the Proposed Development is considered of minor significance, there remains the potential for an overtopping event in this location to cause damage to properties. This potential will not be improved by the Proposed Development.

9.7.15 The potential effect at sections 1 and 2 in the vicinity of Bakur Bar, Uig Pottery and adjacent residential properties has been assessed to be a minor risk of increased tidal flooding to residential and commercial properties as a result of the Proposed Development. Taking account of residential and business receptor sensitivity as discussed in section 9.5 above, without mitigation, an effect of up to moderate adverse significant for residential properties is anticipated. An effect of minor adverse significant is anticipated for commercial properties and negligible (not significant) for open land. Proposed mitigation is discussed further in section 9.8.

9.7.16 Wave modelling has shown that with the Proposed Development in place, there is potential for increase wave overtopping of the approachway (Section 3 in **Figure 9.2**). This could impact ferry/pier workers and users due to exposure to increased overtopping discharges on the pier. The waiting shelter is proposed to be relocated;

however this is unlikely to change the flood risk to ferry/pier users using this shelter. The use of the new ferry in more adverse weather than the current vessel may result in increased frequency of exposure of workers and users to adverse conditions including wave overtopping with a resultant effect on pier user health and welbeing. This has been assessed as a medium risk of tidal flooding to ferry/pier workers and users, which leads to a Significance of Effect of moderate adverse (significant) for ferry/pier workers and users.

Changes to Existing Watercourse Culvert Beneath the Existing Marshalling Area Affecting Upstream Flooding Risk

9.7.17 Flood risk from the small watercourse adjacent to the marshalling area may be affected if the culvert is extended to accommodate the wider reclaimed area. It is likely that the existing culvert will be extended further to sea and should the capacity of the culvert extension be less than the existing, this could cause some backing up of flow in the culvert. However, the AECOM Culvert Extension Technical Note (**Appendix 9.2**) indicates that extension of the culvert would not result in backing up of flow, leading to increased flood risk. Therefore there is assessed to be a negligible risk of fluvial flooding to the residential and commercial properties, which leads to a Significance of Effect of minor adverse (not significant) for residential properties and negligible (not significant) for commercial properties and open land.

Changes to Surface Water Drainage Affect Runoff Rates

9.7.18 Surface water runoff is unlikely to be affected by the Proposed Development as it is planned to design the drainage system to accept up to a 1 in 30 year flood event, and any event larger than this will drain directly to the sea (as all surface water drainage currently does). The proposal is for roof drainage from the new ticket office to be drained to the existing Scottish Water septic tank outfall (and not the existing surface water drainage), which would provide a betterment to the existing arrangement. Therefore there is assessed to be a negligible risk of pluvial flooding to the residential and commercial properties, and ferry/pier workers and users, which leads to a Significance of Effect of minor adverse (not significant) for residential properties, negligible (not significant) for commercial properties, open land and ferry/pier workers and users.

Table 9-6 Predicted effect on flood risk (Operation)

Flood Source	Receptor	Importance of Relevant Receptor	Magnitude of Effect	Significance of Effect
Tidal	Residential properties	High	Direct, short-term (during adverse weather), permanent effect **Low**	Moderate Adverse (significant)
	Commercial properties	Medium	Direct, short –term (during adverse weather), permanent effect **Low**	Minor Adverse (not significant)
	Proposed ticket office and CFL storage building	Low	Direct, short –term (during adverse weather), permanent effect **Low**	Negligible (not significant)
	Ferry/Pier workers and users	Medium	Direct, short –term (during adverse weather), permanent effect Medium	Moderate Adverse (significant)
	Open land	Low	**Negligible**	**Negligible (not significant)**
Fluvial	Residential properties	High	Negligible	Minor Adverse (not significant)
	Commercial properties	Medium	**Negligible**	Negligible (not significant)
	Open land	Low	**Negligible**	**Negligible (not significant)**
Drainage	Residential properties	High	Negligible	Minor Adverse (not significant)
	Commercial properties	Medium	**Negligible**	Negligible (not significant)
	Ferry/Pier workers and users	Medium	Negligible	Negligible (not significant)
	Open land	Low	**Negligible**	**Negligible (not significant)**

9.8 Mitigation & Monitoring

Construction

9.8.1

9.8.2 Table 9-7 below summarises recommended flood risk mitigation measures which will be implemented during construction of the Proposed Development.

Table 9-7 Construction Stage Mitigation Measures

Issue	Mitigation Proposed
Exposure of pier users to waves following demolition of wave protection wall sections	Temporary barriers to protect users from waves. Warning signs to deter people from using the pier in adverse weather conditions. Flood and weather warnings will be monitored to alert construction workers.
Surface water drainage during construction	Construction drainage arrangements will be agreed with SEPA, THC and Scottish Water and will be detailed in the CEMP, prior to construction commencing..
Flooding of construction equipment and site compound	Construction laydown area, site offices and site compound should be located away from the harbour area, on higher ground. A Flood Risk Management Plan/will be prodced prior to construction commencing. The FRMP will include: • A 24 hour availability and ability to mobilise staff in the event of a flood warning; • The removal of all plant, machinery and material capable of being mobilised in a flood for the duration of any holiday close down period; • Details of the evacuation and site closedown procedures Including arrangements for removing any potentially hazardous material and anything capable of becoming entrained in floodwaters, from the temporary works areas.

Operation

9.8.3 Table 9-8 below summarises recommended flood risk mitigation measures which will be implemented during operation of the Proposed Development

Table 9-8 Operation Stage Mitigation Measures

Issue	Mitigation Proposed
Exposure of pier users to waves due to greater operating potential of new ferry in adverse weather and increased overtopping of the approachway caused by the larger pier structure.	The detailed design of the covered walkway to be installed for the operational phase will protect pier users against all conditions in which the ferry is able to operate.
Residential and commercial properties at continued risk of flooding from wave overtopping	Whilst a small change in wave overtopping risk has been identified at cross sections 1 and 2 (Near the Bakur Bar) this represents only a minor change from the baseline condition. It is however acknowledged that the baseline condition already includes an existing risk of wave overtopping.
Flood risk to proposed ticket office building and CFL storage building	Building will be constructed with floor levels above the 1 in 200 year flood event. Use of water resistant materials and forms of construction as appropriate. 600 mm freeboard to be provided above Coastal Flood Boundary levels.
Surface water drainage during operation	The drainage system will be designed to accept up to a 1 in 30 year flood event, and any event larger than this will drain directly to the sea.

9.9 Residual Effects

Construction

9.9.1 No significant residual effects as a result of the construction of the Proposed Development are anticipated once the above mitigation measures be implemented.

Operation

9.9.2 A small change in wave overtopping risk has been identified at cross sections 1 and 2 (Near the Bakur Bar). This does not represent a significant change from the baseline condition. It is however acknowledged that the baseline condition already includes an existing risk of wave overtopping. Whilst the identified and existing risk of flooding from wave overtopping is not attributable to the Proposed Development The Applicant will non the less carryout further consultation with the affected properties to explore what, if any, opportunity exists for the Proposed Development to voluntarily contribute towards an improvement to the baseline condition.

9.9.3 Effects associated with wave overtopping of the approachway during adverse conditions can be mitigated through the installation of appropriate warning signage, and the suspension of access to the pier/ferry services in extreme adverse weather conditions.

9.10 Cumulative Effects

9.10.1 There are no other identified development proposals within Uig Bay with the potential to affect coastal process and resultant flooding issues.

9.11 Summary & Conclusion

9.11.1 During construction there is potential for increased risk to pier users through removal of sections of the existing wave wall for rebuilding. This can be mitigated through the use of temporary barriers, warning signs and monitoring of flood and weather warnings.

9.11.2 The new ferry is expected to be able to operate under more adverse conditions than the current vessel and therefore it is likely that pier and ferry workers and users will be exposed to harsher conditions than at present. The Proposed Development is also predicted to increase wave overtopping of the pier and approachway and therefore there may be an increased risk to users from wave overtopping. Warning signs should be used to deter people from using the pier in dangerous conditions.

9.11.3 The completed Proposed Development is predicted to result in a relatively small increase in wave overtopping affecting properties adjacent to the pier. Whilst this represents a minor change relative to the baseline condition it is acknowledged that the baseline condition already includes a risk of wave overtopping. Whilst the identified and existing risk of flooding from wave overtopping is not attributable to the Proposed Development The Applicant will non the less carryout further consultation with the affected properties to explore what, if any, opportunity exists for the Proposed Development to voluntarily contribute towards an improvement to the baseline condition..

Table 9-9 Summary of Flood Risk Assessment

Description of receptor and effect	Sensitivity or value of receptor	Magnitude of effect	Predicted effects	Mitigation and monitoring	Residual effect and significance
Tidal flood risk to residential properties during construction	High	Negligible	Minor Adverse (not significant)	NA	Minor Adverse (not significant)
Tidal flood risk to commercial properties during construction	Medium	Negligible	Negligible	NA	Negligible (not significant)
Tidal flood risk to proposed ticket office during construction	Low	Low	Negligible	NA	Negligible (not significant)
Ferry/Pier workers and users affected by exposure to waves during construction as sections of wave wall are removed	Medium	Medium	Moderate Adverse (significant)	Temporary barriers and warning signs should be used. Flood and weather alerts to be reviewed for construction workers.	Minor Adverse (not significant)
Tidal flood risk to construction equipment and site compound during construction	Low	Medium	Minor Adverse (not significant)	NA	Minor Adverse (not significant)
Tidal flood risk to open land during construction	Low	Negligible	Negligible	NA	Negligible (not significant)
Fluvial flood risk to residential properties during construction	High	Negligible	Minor Adverse (not significant)	NA	Minor Adverse (not significant)
Fluvial flood risk to commercial properties during construction	Medium	Negligible	Negligible	NA	Negligible (not significant)
Fluvial flood risk to construction equipment and site compound during construction	Low	Negligible	Negligible	NA	Negligible (not significant)
Fluvial flood risk to open land during construction	Low	Negligible	Negligible	NA	Negligible (not significant)
Drainage flood risk to residential properties during construction	High	Negligible	Negligible	Drainage arrangements to be agreed and outlined in CEMP.	Negligible (not significant)
Drainage flood risk to commercial properties during construction	Medium	Negligible	Negligible	Drainage arrangements to be agreed and outlined in CEMP.	Negligible (not significant)
Drainage flood risk to ferry/Pier workers and users during construction	Medium	Negligible	Negligible	Drainage arrangements to be agreed and outlined in CEMP.	Negligible (not significant)

Description of receptor and effect	Sensitivity or value of receptor	Magnitude of effect	Predicted effects	Mitigation and monitoring	Residual effect and significance
Drainage flood risk to construction equipment and site compound during construction	Low	Negligible	Negligible	Drainage arrangements to be agreed and outlined in CEMP.	Negligible (not significant)
Drainage flood risk to open land during construction	Low	Negligible	Negligible	Drainage arrangements to be agreed and outlined in CEMP.	Negligible (not significant)
Residential properties as risk of wave overtopping during operation.	High	Minor	Moderate Adverse (significant)	Investigate potential to increase coastal defences on the south side of the pier and use of PLP.	Minor Adverse (significant)
Commercial properties may experience increased damage and/or a greater number of properties may be affected by increased wave overtopping during operation	Medium	Minor	Minor Adverse (significant)	Investigate potential to increase coastal defences on the south side of the pier and use of PLP.	Minor Adverse (not significant)
Tidal flood risk to proposed ticket office during operation	Low	Low	Negligible	Building to be designed with floor level above 1 in 200 year tide level and with 600 mm freeboard on these levels. Use water resistant materials as appropriate.	Negligible (not significant)
Exposure of pier users to waves due to greater operating potential of new ferry in adverse weather and increased overtopping caused by the larger pier structure	Medium	Medium	Moderate Adverse (significant)	Warning signs should be used.	Minor Adverse (not significant)
Tidal flood risk to open land during operation	Low	Negligible	Negligible	NA	Negligible (not significant)
Fluvial flood risk to residential properties during operation	High	Negligible	Minor Adverse (not significant)	NA	Minor Adverse (not significant)
Fluvial flood risk to commercial properties during operation	Medium	Negligible	Negligible	NA	Negligible (not significant)
Fluvial flood risk to open land during operation	Low	Negligible	Negligible	NA	Negligible (not significant)

Description of receptor and effect	Sensitivity or value of receptor	Magnitude of effect	Predicted effects	Mitigation and monitoring	Residual effect and significance
Drainage flood risk to residential properties during operation	High	Negligible	Negligible	NA	Negligible (not significant)
Drainage flood risk to commercial properties during operation	Medium	Negligible	Negligible	NA	Negligible (not significant)
Drainage flood risk to ferry/Pier workers and users	Medium	Negligible	Negligible	NA	Negligible (not significant)
Drainage flood risk to open land during operation	Low	Negligible	Negligible	NA	Negligible (not significant)

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10. Ground Conditions, Contamination and Waste

10.1 Introduction

10.1.1 This chapter of the EIA Report provides an assessment of the potential effects of the Proposed Development on the near surface geology, shallow groundwater, ground conditions and potential existing contamination (hereafter 'the ground conditions').

10.1.2 **Chapter 3: Project Description** of this EIA Report provides a detailed description of the works required to implement the Proposed Development.

10.1.3 Consideration of effects associated with potentially contaminated soils and groundwater is made in the context of existing baseline site conditions, the proposed construction works and operation of the Proposed Development. The need for mitigation measures is addressed and residual effects identified. It should be noted that this assessment only considers the effects on terrestrial areas of the Proposed Development (i.e. the current marshalling area, the existing terminal building/ticket office and the proposed area of the site compound).

10.1.4 This chapter is supported by the following, which will be available upon request:

- Groundsure Report, dated 30 October 2017 (Ref: GS-4425386);
- Uig Harbour Redevelopment - Ground Investigation Factual Report, prepared by Holequest Limited, November 2017 (Ref: THC/UHRGI/1117/FACT); and
- Uig Ferry Terminal Redevelopment, Ground Investigation Interpretative Report, January 2017 (Ref: ED12257_R001_V0.2).

10.2 Legislative Context

10.2.1 This assessment has been undertaken within the context of the following relevant legislation, planning policies and guidance documents:

- Contaminated Land (Scotland) Regulations 2000, No.178;
- Contaminated Land (Scotland) Regulations 2005, No. 658;
- Planning Advice Note (PAN) 33: Development of Contaminated Land (Scottish Executive, 2000);
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). A Practical Guide. Version 8.2 (SEPA, 2018);
- Control of Substances Hazardous to Health (COSHH) Regulations 2002;
- Construction, Design and Management (CDM) Regulations 2015;
- Environment Protection Act. Part 2A 1990;
- The Environment Act 1995;
- The Town and Country Planning Act (Scotland) 1997 as amended by The Planning etc. (Scotland) Act 2006;
- Scottish Government (2015) Water Environment and Water Services (Scotland) Act 2003 (Modification of Part 1) Regulations 2015;
- European Union (EU) (2000) Directive 2000/60/EC – Establishing a Framework for Community Action in the Field of Water Quality;

- PAN 51: Planning, Environmental Protection and Regulation (Scottish Executive, 2006);
- Model Procedures for the Management of Contaminated Land. Contaminated Land Report 11 (Environment Agency, 2004);
- British Standard (BS) 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice (British Standards Institute, 2017);
- Contaminated Land Exposure Assessment (CLEA) Science Report (2009) Updated Technical Background to the CLEA Model (SC050021/SR3);
- Remedial Targets Methodology. Hydrogeological Risk Assessment for Land Contamination (Environment Agency, 2006);
- Control of Water Pollution from Construction Sites – Guide to Good Practice SP156. (CIRIA, 2002);
- Control of Pollution from Construction Sites C532 (CIRIA, 2001a);
- Environmental Good Practices – Working on Site C503. (CIRIA, 2000b);
- Environmental Good Practice on Site C741, 4th Edition (CIRIA, 2015c);
- Position Statement WAT-PS-10-01. Assigning Groundwater Assessment Criteria for Pollutant Inputs (SEPA, 2011a);
- Water Pollution Arising from Land Containing Chemical Contaminants, 2nd edition (SEPA, 2012); and
- Land Remediation and Waste Management Guidelines (SEPA, 2009).

10.2.2 Further information on the above legislation and policy is given in **Appendix 4.1**.

10.3 Assessment Methodology & Data Sources

Desk Study

10.3.1 A Desk study, which included an evaluation of a variety of data sources, was carried out. The key information sources referenced to as part of the desk study included the following:

- Consideration of previous land use including the study of historical site maps covering both the Proposed Development Site itself and the surrounding area (Groundsure, Various);
- Review of regulatory information presented in a Groundsure Report (Groundsure, 2018) for the Proposed Development;
- Scottish Natural Heritage (SNH) – Information on SSSI locations and ecological issues within the Proposed Development Site;
- The Royal Commission of the Ancient and Historical Monuments of Scotland (RCAHMS) – Information on ancient monuments and historical aerial photography; and
- A factual site investigation report describing intrusive investigation work undertaken within the Proposed Development Site (Holequest Ltd, 2017).

10.3.2 This information has been used to formulate a Conceptual Site Model (CSM) to allow an assessment of potential environmental risks.

Assessment Method

10.3.3 The following is a description of the methodology used to assess potential contaminated land impacts associated with the Proposed Development. Baseline conditions were first established taking into account any known history or conditions at the Proposed Development Site. Potential receptors were then identified and their relative sensitivity evaluated. The Proposed Development was then considered in detail, with respect to construction phase activities. Any ground contamination or soil quality related impacts that are considered likely to result have been described and, where possible, quantified.

10.3.4 The impacts or risks associated with contaminated land have generally been assessed by means of a hazard-pathway-receptor model (the Pollutant Linkage), where the following definitions apply:

- Hazard = source of contamination;
- Receptor = the entity that is vulnerable to harm from the hazard;
- Pathway = the means by which the hazard can come into contact with the receptor

10.3.5 This assessment considers both the potential impacts of the mobilisation of existing contaminants as a result of the Proposed Development; and the potential for the Proposed Development to effect land quality and receptors both on site and adjacent to the Proposed Development Site. The assessment also considers the potential for the Proposed Development to impact upon any geological/geomorphologic features.

10.3.6 The effects of impacts on the identified receptors have then been predicted and the relative significance of those effects assessed.

Impact Assessment and Significance Criteria

Contamination Sources

10.3.7 Land contamination sources can be described qualitatively according to the categories shown in Table 10-1. This is a qualitative judgement, but has been developed in line with accepted methodology for Phase 1 Desk studies and Part 2A contamination studies.

Table 10-1 Descriptive Scale for Different Sources of Land Contamination

Qualitative Description of Source (Hazard)	Previous Land Uses
Low	Greenfield site, or previous or on-going activities with low potential to cause contamination (*e.g.* residential, retail or offices) OR site investigation data indicating no significant contamination.
Medium	Previous or on-going activities with some potential to cause moderate contamination (*e.g.* railways, collieries, scrap yards) OR site investigation data indicating limited contamination.
High	Previous or on-going activity on or near to site with high potential to cause land contamination (*e.g.* gasworks, chemical works, landfills) OR site investigation data including widespread or severe contamination.

Receptor Sensitivity

10.3.8 Using information gathered during the desk-based study, the presence and relative sensitivity of receptors at risk from potential land contamination and risks to geological/ geomorphologic features have been evaluated by consideration of the following factors:

- Surrounding land uses, based on mapping and site visits and consideration of the occupants of adjacent sites;
- Proposed end-use, based on the nature of the Proposed Development;
- Type of construction operations anticipated as part of the Proposed Development;
- Surrounding sites of nature conservation importance;
- Underlying groundwater;
- Surrounding sites and/or areas of geological/geomorphologic importance; and
- Geology, hydrogeology and hydrology of the Proposed Development Site and its surrounding area.

10.3.9 The sensitivity of potential receptors or geological features that could be affected by the Proposed Development is described qualitatively according to the categories presented in Table 10-2, developed in line with accepted methodology for Phase 1 desk studies and Part 2A contamination studies.

Table 10-2 Description Scale for Sensitivity of Receptors to Land Contamination

Qualitative Description	Receptor Sensitivity		
	Low	Medium	High
End users (operational workers/visitors)	'Hard' end use (e.g. industrial, car parking).	Landscaping or open space.	Residential, allotments play areas.
Surrounding land uses	Industrial area.	Open space or commercial area.	Residential area.
Construction workers	Minimal disturbance of ground.	Limited earthworks.	Extensive earthworks and demolition of buildings.
Ecological sites	No sites of significant ecological value close by.	Locally designated ecological sites.	Nationally or internationally designated ecological sites.
Built environment	Not applicable.	Buildings, including services and foundations.	Nationally or internationally designated sites of historic value or other sensitivity.
Geology/ geomorphology	Areas of superficial geology or geomorphologic features with no special significance.	Other areas of potential mineral resources. Exposed geological features of local importance or educational value.	Nationally or internationally designated geological sites. Regionally Important Geological Site (RIGS). Mineral reserve allocated on Local Minerals Plan

Qualitative Description	Receptor Sensitivity		
	Low	Medium	High
Groundwater	Non aquifer. Low quality resource. No abstraction within 1 km.	Moderately Permeable Aquifer. Abstraction point within 1 km. Ground Protection Zone (GPZ) within 1 km of the site.	Highly Permeable Aquifer. High quality resource. Abstraction point within 250 m. GPZ on site.

Prediction of Potential Impacts

10.3.10 If a hazard has been identified and potentially sensitive receptors are present, then the likely impacts associated with the Proposed Development can be predicted by considering the pathways by which the hazard may affect the receptors. Table 10-3 indicates the most likely potential impacts that may occur in relation to the Proposed Development Site for different categories of receptor.

10.3.11 The potential impacts are identified based on the existing use and predicted construction and operational stages of the Proposed Development.

Table 10-3 Summary of Most Likely Sources of Potential Land Contamination that may Affect Sensitive Receptors

End users (Operational Workers / Visitors)	Surrounding Land Uses	Construction Workers	Sensitive Water Resources	Ecological Sites	Built Environment
Direct or indirect ingestion of contaminated soil (operation)	Inhalation or deposition of wind-borne dust (construction)	Direct or indirect ingestion of contaminated soil (construction)	Existing and/ or new pollutant pathways (construction)	Phytotoxic impacts on plants (operation)	Chemical attack of buried concrete structures (operation)
Concentration of flammable or asphyxiating in-ground gases in enclosed spaces (operation)	Migration of contamination in sub-surface strata (including gases) (construction)	Concentration of flammable or asphyxiating gases in confined spaces (construction)	Generation of liquid and/or mobile contaminants (operation)	Toxic impacts on fauna (operation and/or construction)	Concentration of flammable/ explosive gases in confined spaces. Permeation of water supply pipelines (operation)
Inhalation of harmful in-ground vapours/ dusts indoors and outdoors (operation)		Inhalation of asbestos during groundworks (construction)		Indirect impacts *via* contamination of water resources (operation and/or construction)	

10.3.12 The magnitude of a potential impact is described wherever possible by using the terms defined in Table 10.4.

Table 10-4 Descriptive Scale for Different Sources of Land Contamination

Magnitude of Impact	Examples of Typical Impacts
High	Loss of exposed designated geological feature. Very high risk of exposure of a sensitive receptor to potentially harmful levels of confirmed contamination via a confirmed pathway.
Medium	Quarrying of rock for imported fill, or substantial changes to underlying soils/geology due to excavation. Proven source – pathway – receptor pollutant linkage identified with elevated level of contamination recorded/or potential to be present.
Low	Superficial disturbance to geology; changes in geomorphology. Identified source – pathway – receptor pollutant linkage identified but contamination likely to be low risk.
Negligible	Changes to made ground deposits. No source – pathway – receptor pollutant linkage identified.

Significance of Effects

10.3.13 For each of the potential impacts identified, an assessment has been made of the likely level of the significance of effects.

10.3.14 Where geologically important features are present, then their importance (sensitivity) has been determined (see Table 10-2) and the magnitude of the potential impact of the Proposed Development qualitatively identified (see Table 10-4).

10.3.15 Where potential for significant effects has been identified, measures have been proposed to mitigate the risks from the hazards. However, good site practices will be applied whether there is the potential for significant effects, or not. The assessment is undertaken on the assumption these will be implemented, as set out in the Development Design and Impact Avoidance section below. The generic categories of mitigation are outlined in Table 10-5.

Table 10-5 Generic Categories of Mitigation for Land Contamination

Category of Mitigation	Description of Mitigation Measure
Remedial works	Remedial work may be required to allow the development to proceed. The scope and nature of any remedial work is l kely to be highly dependent on the results of investigations and subsequent risk assessment.
Design changes	Significant effects can be reduced by changes in design e.g. protective measures to prevent build-up of flammable gases, or modification of layouts to ensure that sensitive end uses are sited away from l kely areas of contamination. Relocation of built features away from geologically important features.
Protective measures during construction	Many of the potentially significant effects on the construction workforce can be mitigated by the use of appropriate protective equipment, such as gloves and respiratory protection, and effective dust suppression techniques.
Environmental management	Environmental management may be required to prevent construction work and future operations from giving rise to land contamination.

10.3.16 An assessment of the significance of effects has been undertaken through documentary research of the site history, geology, hydrogeology and hydrology, and review of a commercially available regulatory database.

10.3.17 The likely significance of effects on identified receptors has then been assessed using the standard assessment matrix set out in Table 10-6, in conjunction with professional judgement of site-specific factors that may be of relevance. Importance/sensitivity terminology is based on accepted methodology for Phase 1 desk studies and Part 2A contamination studies, and therefore does not include for a 'negligible' importance or sensitivity.

Table 10-6: Classification of Effects from Land Contamination: Assessing Significance of Efect

Impact Magnitude	Sensitivity of Receptor		
	High	Medium	Low
High	Major	Major	Moderate
Medium	Major	Moderate	Minor
Low	Moderate	Minor	Negligible
Negligible	Minor	Negligible	Negligible

10.3.18 For the purposes of this assessment, negligible and minor effects are not considered to be significant, while moderate and major effects are assessed to be significant.

Limitations

10.3.19 The assessment presented above has been undertaken based on information and reports prepared by others that were available at the time of assessment.

10.3.20 The ground investigation undertaken by Holequest in 2017 was undertaken to provide information on the ground conditions for the Proposed Development. The majority of the intrusive investigation was undertaken in sub tidal and intertidal areas associated with the Proposed Development. Limited investigation works were undertaken in terrestrial areas of the Proposed Development Site and were confined to two boreholes advanced within the area of the current marshalling area. No investigation work has been undertaken within terrestrial parts of the wider Proposed Development Site e.g. in the vicinity of the existing ticket office. Two soil samples have been collected from the surface of the intertidal area and scheduled for chemical analysis. No contamination testing has been undertaken in samples collected from intrusive locations advanced within the terrestrial part of the Proposed Development Site. As such, there remains a potential risk that contaminated materials may be present within localised areas of the Proposed Development Site, particularly in the vicinity of the defunct tanks situated to the rear of the existing ticket office and in the vicinity of Uig Filling Station located adjacent to the eastern site boundary.

10.3.21 It should also be noted that ground investigation carries inherent limitation in that the density of exploratory holes is relatively low in comparison to the area of the Proposed Development Site, and as such, areas of unforeseen ground conditions

and potentially contaminated materials may be encountered within localised areas across the Proposed Development Site not directly investigated.

10.3.22 It is assumed that effective measures will be put in place prior to construction to control/mitigate potential pollution incidents, from sources such as accidental leaks or fuel spills from construction plant and machinery. It is also necessary to ensure that any material being imported onto the Propsed Development Site does not contain contaminated materials.

Summary of Consultation

10.3.23 A Scoping Report was issued for comment in September 2017 and comments have since been received. No comments in relation to ground conditions were included in the responses received. Scoping responses are included in **Appendix 1.2.**

10.4 Baseline Conditions

10.4.1 This section describes the baseline conditions of the Proposed Development Site.

Site Location

10.4.2 The Proposed Development Site is located within the small town of Uig, which is located in the northern part of the Isle of Skye. The Proposed Development Site is currently occupied by Uig Harbour and the King Edward Pier. The Ordnance Survey Grid Reference of the approximate centre of the site is NG 385 635.

Geology

10.4.3 Information regarding the geological conditions at the Proposed Development Site was obtained from the BGS Geoindex website (BGS, 2017) and Groundsure Report (Groundsure, 2018). Underlying bedrock is recorded to comprise igneous rock of the Little Minch Sill-Complex. These rocks are reported to comprise basalt and microgabbro and were formed in the Palaeogene Period.

10.4.4 Natural superficial deposits beneath terrestrial parts of the Proposed Development Site are recorded to comprise raised beach deposits consisting of sand and gravel. Shoreface and beach deposits (also comprising sand and gravel) are indicated to be located within intertidal foreshore areas and to extend beneath part of the existing pier. An area of glacial till (boulder clay) is shown to be present in an area of higher ground located to the north. The thickness of the superficial deposits beneath the Proposed Development Site is not indicated.

10.4.5 Site investigation works were completed within the Proposed Development Site between July – October 2017 (Holequest Ltd, 2017). It is noted that the site investigation works primarily focussed on intertidal foreshore and subtidal areas. Only two shallow boreholes (BH10 and BH10A) were advanced within the terrestrial part of the Proposed Development Site. These boreholes were advanced within the area of the marshalling area and located in proximity to the pier. Ground conditions encountered in these locations were found to comprise a thin layer of tarmac overlying made ground deposits described as grey/reddish brown sandy fine to coarse gravel with cobbles and occasional boulders to a maximum depth of 1.65 m below ground level (bgl). Both positions were terminated on boulders. The remaining intrusive positions encountered natural superficial deposits to depths of

up to 36.5 m bgl. These deposits comprised granular strata (varying from sands through to gravels) with varying cobble and boulder content that was frequently noted to contain much shell and shelly debris, immediately underlying the seabed. This initial sequence was found to generally overlay glacial units to the final depths of the boreholes, that generally comprised from slightly sandy/slightly gravelly Clay through to clayey/very clayey sandy fine to coarse Gravel with varying cobble and boulder content. Localised deposits of Cobbles/Boulders, Gravel, Clay, Silt and Sand in variable proportions were also encountered in lenses/beds and pockets within these glacial units. Bedrock was not encountered during the site investigation.

10.4.6 Although not identified on published geological maps, it is considered that further made ground deposits are likely to be located within developed areas of terrestrial parts of the Proposed Development Site including the marshalling area, the A87 road and the area of the existing ticket office/ferry terminal building.

Mining

10.4.7 Reference to the Groundsure report for the Proposed Development Site and the Coal Authority Interactive Map (Coal Authority, 2016) indicates that there are no mining records within 500 m of the Proposed Development Site. Additionally, the BGS database of non-coal mine plans (BGS, 2017) has no record of any non-coal mining within the vicinity of the Proposed Development Site. As such, the risks to the Proposed Development Site from mining are considered to be low.

Quarrying

10.4.8 Reference to the Groundsure report for the Proposed Development Site indicates that igneous and metamorphic rock was formerly extracted from a pit known as ‘Idrigil’ located approximately 400 m to the north. Given that extraction works are no longer undertaken at this pit, it is considered that the risk to the Proposed Development Site is low.

Hydrogeology

Aquifer Classification

10.4.9 Guidance published by SEPA (SEPA, 2011a) indicates that groundwater in all bedrock aquifers requires protection as a future groundwater resource (irrespective of productivity) while groundwater within the superficial deposits also requires protection if it is capable of providing 10 m^3/day. However, if a superficial aquifer directly overlies bedrock, it would be considered part of the same groundwater body as the bedrock aquifer and would also require protection (irrespective of productivity). Groundwater resource potential within the superficial deposits can be discounted only if either sand or gravel is not encountered or, if encountered, would not be capable of sustaining a yield of 10 m^3/day.

10.4.10 The BGS has produced maps of aquifer productivity for groundwater bodies in bedrock and extensive superficial deposits throughout Scotland, together with supporting technical documentation (BGS & SEPA, 2004) & (BGS, 2015). The term ‘aquifer productivity’ is used to describe the potential of an aquifer (bedrock or superficial) to sustain various levels of borehole supply. High and very high productivity aquifers have the potential to be considered a source of public supply

or for industry. Low productivity formations are considered suitable for single homes or small groups of homes. Other less extensive superficial aquifers have not been mapped due to their inherent variability. The presence of more localised aquifers should be assessed on a site-specific basis. However, SEPA considers that low permeability deposits of clay and silt are unlikely to meet their definition of a body of groundwater (SEPA, 2011a).

10.4.11 The raised beach deposits recorded beneath terrestrial parts of the Proposed Development Site are likely to be assigned a low to moderate productivity rating (0.1 - 10 l/s). The underlying igneous rock of the Little Minch Sill-Complex is considered to be an aquifer of very low productivity with groundwater flow likely to be predominantly via fractures.

10.4.12 Groundwater flow directions within aquifer units in the drift deposits are likely to be influenced by the local topography. On this basis, it is considered that groundwater will likely flow towards the south-east towards Uig Bay and Loch Snizort.

10.4.13 A hydraulic connection between groundwater below the Proposed Development Site and surface waters is not known but is considered to be likely. It is considered that groundwater located beneath terrestrial parts of the Proposed Development Site will be influenced by the tide.

Groundwater Vulnerability

10.4.14 Groundwater vulnerability is dependent upon the nature of groundwater flow within the target groundwater body (fracture or granular) and the thickness and hydraulic conductivity of the overlying superficial deposits. The BGS groundwater vulnerability map and accompanying report (O'Dochartaigh, Doce, Rutter, & MacDonald, 2011) has been consulted. Given the anticipated thickness of superficial deposits (raised beach deposits) beneath the Proposed Development Site, it is considered to have a vulnerability classification of 4. A vulnerability classification of 4 indicates that the groundwater within the shallow bedrock aquifer would be vulnerable to those pollutants not readily adsorbed or transformed.

10.4.15 Groundwater bodies are classified by SEPA under the WFD, whereby water bodies in Scotland are given a classification of High, Good, Moderate, Poor or Bad. SEPA's online database (SEPA, 2011b) reports that the groundwater beneath the Proposed Development Site forms part of the wider Isle of Skye bedrock and localised sand and gravel aquifer. The water within this aquifer was classified as having an overall status of Good with High confidence in 2008. The groundwater body is also recorded to be in a Drinking Water Protection Zone.

10.4.16 The BGS borehole database (GeoIndex) does not indicate the presence of any groundwater wells within 1 km of the Proposed Development Site.

Hydrology

10.4.17 The closest water body to the Proposed Development Site is Uig Bay, which opens into Loch Snizort and The Little Minch (a stretch of water located between the Inner and Outer Hebrides). A small unnamed watercourse also appears to flow beneath the Proposed Development Site. The watercourse is indicated to run in an open channel at its origin in an area of high ground located to the north-west of the Proposed Development Site. The watercourse appears to be culverted beneath a road that runs beside the terminal facility and adjacent to the proposed contractor

compound area before it discharges to Uig Bay adjacent to the current marshalling area. The discharge point is not clear from OS mapping but it may be beneath the current marshalling area.

10.4.18 SEPA has implemented a monitoring scheme and classification system to meet the requirements of the WFD, whereby water bodies in Scotland are given a classification of High, Good, Moderate, Poor or Bad.

10.4.19 A search on SEPA's online database (SEPA, 2011b) was conducted regarding water quality in the vicinity of the Proposed Development Site. Loch Snizort/Uig Bay has been classified as having an overall status of Good with High confidence in 2008 with an overall ecological status of 'Good' and an overall chemical status of 'Pass'. Water quality information in relation to the unnamed watercourse flowing through the Proposed Development Site was not available.

Soil Quality

10.4.20 With reference to the Soil Survey of Scotland, 1:250,000 Soil Map for Scotland (Scottish Government, 2018) there is one surface soil unit present beneath the Proposed Development Site. Soil types have specific drainage and nutrient characteristics and will reflect the character of the underlying rocks, as well as being heavily influenced by prevailing climatic and topographic conditions.

10.4.21 The surface soil indicated to be present comprises mineral gley, a soil that is described as being periodically or permanently waterlogged. These soils are considered to be low productivity soils of lesser agricultural importance.

Site History

10.4.22 The following account of the historical development of the Proposed Development Site is based upon an examination of available current and historical Ordnance Survey maps dated between 1878 and 2014, presented within the Groundsure Report (Groundsure, 2018) and a newspaper article published by the Stornoway Gazette (Skye Diatomite: A Lost Industry, 5th March 2008).

Table 10-7 Site Use History

Date	Proposed Development Site Conditions	Surrounding Area Conditions
1878 (1:2,500 / 1:10,560)	The majority of the Proposed Development Site is shown to mainly comprise intertidal beach areas (Rhuda Dubh) and open water (Uig Bay). The north-western part (i.e. part of the current marshalling area and the existing terminal building and the proposed contractor compound area) is shown to be located within an area comprising agricultural land. A path/track is shown to cross through the Proposed Development Site following the line of the coast. The end of a road linking the path to nearby farm buildings is shown to be located in the northern part of the Proposed Development Site. A 'well' is shown to be located in the western part of the Proposed Development Site. An unnamed watercourse is shown to flow through the Proposed Development Site from north-west to south-east and discharging into Uig Bay.	The area surrounding the Proposed Development Site is largely undeveloped. Areas to the south-east are shown to comprise open water (Uig Bay), while the area to the north-west comprises agricultural land. Several unmarked buildings (presumed agricultural) are shown to be located in close proximity to the Proposed Development Site. A 'boat pier' is shown to be located approximately 150m north of the Proposed Development Site. A line of numerous unmarked buildings and associated wells are shown to be located in an area of high ground situated approximately 350 m north-west of the Proposed Development Site. Several 'quarries' and 'gravel pits' are shown to be present approximately 500 – 750 m north of the Proposed Development Site.
1901 / 1903 (1:2,500 / 1:10,560)	A 'pier' is shown to have been constructed on site.	The 'boat pier' is now labelled as 'old'.
1963 / 1965 (1:2,500, 1:10,560)	The pier is labelled as 'King Edward Pier'. Slight modifications to the pier are noted to have occurred. The A856 road is shown to have been constructed and passes through the north-western part of the Proposed Development Site. A large unmarked building is shown to have been constructed in the north-western part of the Proposed Development Site. It is understood that this building was a 'factory' constructed in circa 1956, which was used to dry and process diatomite (chalk) excavated from Loch Cuithir approximately 40 km east of Uig. It is reported that drying activities ceased in circa 1960. This are of the Proposed Development Site was later developed as the current ferry terminal building, although the exact date is unknown. The watercourse that flows through the Proposed Development Site is shown to have been culverted beneath the A856 road.	Significant development is shown to have occurred immediately to the west of the Proposed Development Site. Several unmarked buildings, presumed to be commercial in nature, are shown to have been constructed. A small unmarked building is also shown to have been developed immediately to the north of the terminal building. This is noted to comprise a petrol filling station. The quarries and gravel pits located to the north-east of the Proposed Development Site are no longer labelled.

Date	Proposed Development Site Conditions	Surrounding Area Conditions
1981 (1:2,500)	Two large 'tanks' are shown to be present behind the existing terminal building. Some road widening work is noted to have taken place in the western part of the Proposed Development Site. This is associated with off-site development.	Development work is noted to have occurred immediately to the west of the Proposed Development Site. Some commercial buildings are noted to have been removed/replaced and alterations to the road layout are noted. A car park associated with the ferry terminal building is shown to be located adjacent to the Proposed Development Site's western boundary. The watercourse is shown to be culverted beneath the new car park. A 'public convenience' building is shown to have been constructed in between the ferry terminal building and the proposed contractor's compound.
1992 (1:2,500)	Development of the area located between the ferry terminal and pier (marshalling area) appears to have been undertaken and is shown to be covered with hardstanding. It is considered that some land reclamation/stabilisation work may have been undertaken. Some modifications to the end of the pier structure are noted to have occurred.	Further minor development is noted to have occurred in areas located to the west of the Proposed Development Site and to the north of the ferry terminal building.
1995 (1:2,500)	No significant changes noted.	No significant changes noted.
2002 (1:10,000)	No significant changes noted. The pier is labelled as 'Ferry (vehicular).	The quarries located to the north-east of the Proposed Development Site are shown as disused A 'caravan and camping site' is shown to have been developed approximately 250 m west of the Proposed Development Site.
2010 / 2014 (1:10,000)	No significant changes noted.	No significant changes noted.
Present Day	It is noted that the road passing through the Proposed Development Site is called the A87.	Uig Filling Station is noted to be located immediately to the north of the ferry terminal building. Isle of Skye Brewing, Uig Pottery and several restaurants are located immediately to the west of the Proposed Development Site.

10.5 Contaminated Land Risk Assessment

10.5.1 The approach adopted to the assessment of risk associated with land contamination is in line with the Scottish Government's approach outlined in PAN 33 Development of Contaminated Land (Scottish Executive, 2000). The Government considers that the most appropriate approach is a 'suitable for use' one in which risks to human health and the wider environment are assessed within the context of the current or proposed use of the land in question. The methodology adopted is described in detail in Environment Agency Report CLR11: Model Procedures for the

Management of Land Contamination (Environment Agency, 2004) and relies on the development of a site specific CSM consisting of three components:

- A source of contamination, for example due to historical site operations;
- A pathway, a route by which receptors can become exposed to contaminants. Examples include vapour inhalation, soil ingestion and groundwater migration;
- A receptor, a target that may be exposed to contaminants via the identified pathways. Examples include human occupiers/users of the site, the water environment, property or ecosystems.

10.5.2 For a potential risk to either environmental and/or human receptors to exist, a plausible pollutant linkage involving each of these components must exist. If one of the components is absent then a pollutant linkage, and thereby potentially unacceptable risk, is also unlikely to exist. Where all three components are or maybe present, a potentially complete pollutant linkage can be considered to exist. This does not automatically imply the presence of unacceptable risk but further investigation of the potential pollutant linkages is required.

10.5.3 A preliminary CSM has been developed to establish an understanding of complete and/or potentially complete pollutant linkages that may be present within the Proposed Development Site.

Potential Sources of Contamination

10.5.4 Potential sources of contamination have been identified from historic and current activities undertaken within the Proposed Development Site and include:

- The current and former use of the Proposed Development Site as an operational harbour/ferry terminal.
- The former use of the Proposed Development Site as a ‘factory’ associated with the drying and processing of diatomite.
- Made ground deposits associated with any reclamation works that may have occurred at the Proposed Development site and within areas that have been developed including the marshalling area, the A87 road and the current ferry terminal building.
- The current and historical presence of two large above ground storage tanks located behind the existing terminal building.

10.5.5 Potential sources of contamination have also been identified within the immediate surrounding area. These include:

- The Uig Filling Station located adjacent to the current ferry terminal building.
- The Isle of Skye Brewing Company located approximately 70 m west of the Proposed Development Site.
- Made ground associated with historic and current development that has occurred within the vicinity of the Proposed Development Site.

Ground Investigation

10.5.6 Made ground materials were encountered in two locations advanced within the marshalling area during site investigation works completed by Holequest in 2017

(BH10 and BH10A). The remainder of the intrusive positions were advanced within intertidal or subtidal areas associated with the pier. Environmental laboratory analysis was undertaken on two surface samples collected from two trial pits (TP2 and TP4), advanced within the intertidal area. These samples were submitted for analysis of heavy metals, asbestos, polyaromatic hydrocarbons (PAH), volatile organic carbon (VOC), semi volatile organic carbon (SVOC) and speciated total petroleum hydrocarbons (TPH). Wardell Armstrong utilised the chemical data obtained to complete a human health risk assessment. The concentrations of contaminants were compared against tier 1 screening values that were considered to be protective of a commercial end use. From this assessment it was determined that concentrations of contaminants were reported to be either below laboratory detection limits or the tier 1 screening values. Wardell Armstrong subsequently considered that the risk to human health (members of the public or site workers) from natural soils was very low / negligible. A water environment risk assessment has not been undertaken.

10.5.7 No groundwater or surface water samples were collected from the Proposed Development Site as part of the site investigation work. In addition, no environmental laboratory testing of soil samples collected from positions advanced within terrestrial areas of the Proposed Development Site has been undertaken. As such, the contamination status of the made ground materials present within the Proposed Development Site, groundwater underlying the site and surface water receptors located on/in the vicinity of the site is unknown.

Potential Receptors

10.5.8 The following potential receptors have been identified, relative to the proposed development, which could be adversely affected by any contamination that may be present in the Proposed Development Site:

Table 10-8 Potential Receptors to Land Contamination

Receptor Type	Receptor Criteria
Human Health	Current and future users and visitors; Future construction and/or maintenance workers (potential risk assumed to be mitigated with PPE and other measures); Off-site workers and visitors.
The Water Environment	Shallow groundwater within the underlying made ground and shallow superficial deposits; Groundwater within the underlying bedrock; Surface water – Uig Bay and the unnamed watercourse that is culverted beneath the Proposed Development Site.
Construction Materials	In future developments, including concrete foundations and services; Risk to buildings/underground voids (e.g. service trenches) from ground gas.
Vegetation	In any potential areas of future landscaping.

Potential Pathways

10.5.9 Potential pathways have been identified, which could link the potential sources with the potential receptors. These pathways are discussed by receptor type below in consideration of the Proposed Development.

Table 10-9 Potential Pathways for Land Contamination

Receptor Type	Potential Pathway
Human Health	On site construction and/or maintenance workers by direct contact with contaminated soil and/or groundwater, inhalation of vapours/ground gas, windblown dust and ingestion. Current and future workers and visitors by direct contact with contaminated soil and/or groundwater, inhalation of vapours/ground gas, windblown dust and ingestion
The Water Environment	Shallow groundwater within the underlying made ground and superficial deposits by leaching and migration of contaminants via shallow deposits. Groundwater within the underlying bedrock by leaching and migration through the natural superficial deposits. Surface water by leaching and lateral migration of contaminants via shallow deposits and service runs. Surface water by migration of contaminants via groundwater
Construction Materials	Building materials by direct contact with contaminated materials; Migration, accumulation and explosion of flammable gases
Vegetation	Uptake via roots

Qualitative Assessment of Source-Pathway-Receptor Linkages

10.5.10 A qualitative risk assessment has been carried out using the available desk based information and data obtained from the site investigation work. An assessment of the potential risk exposure has been developed from an assessment of the probability (likelihood) that a potential hazard will be realised, when compared to the severity of the consequence of such a realisation. The following exposure assessment is presented in Table 10-10 below.

Table 10-10: Pollutant linkage assessment matrix

		Severity			
	Likelihood	Severe	Medium	Mild	Minor
Probability (Likelihood)	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

10.5.11 The risk rankings used in Table 10-10 above are based in CIRIA C552 (Contaminated Land Risk Assessment - A Guide to Good Practice) (CIRIA, 2001b) suggested categories. The definitions for all categories are:

10.5.12 High Risk

- Site probably or certainly not suitable for use and environmental setting.
- Contaminants probably or certainly present and very likely to have unacceptable impact on key targets
- Urgent: Urgent action needed or Non-urgent: Action may be needed in the medium term.
- Further investigations are likely to be needed.

Moderate Risk

- Site considered suitable for use and environmental setting.
- Contaminants may be present but unlikely to have unacceptable impact on key targets.
- Further investigations are unlikely to be needed whilst site remains in present use or otherwise remains undisturbed.

Low/Very Low Risk

- Site considered suitable for use and environmental setting.
- Contaminants may be present but very unlikely to have an unacceptable impact on key targets.
- Further work is considered unnecessary.

10.5.13 The purpose of the pollutant linkage assessment is to determine which of the source-pathway-receptor relationships are potentially complete and therefore likely to pose a significant risk to identified receptors.

10.5.14 A summary of the contaminated land risk assessment is provided in Table 10-11.

Table 10-11 CSM/Risk Assessment Summary

Potential Contaminant Sources	Receptor	Pathways to Receptor	Baseline Conditions		Construction Phase		Comments	Operational Phase	
			Severity / Likelihood	Risk Category	Severity / Likelihood	Risk Category		Severity / Likelihood	Risk Category
On Site Current and former use of the site as a harbour/ferry terminal; Former use of the site as a diatomite 'factory'; Made ground deposits associated with current and historic development on site; and Presence of two above ground storage tanks.	Construction & maintenance workers	Direct contact, ingestion and inhalation	-	-	Medium / Low L kelihood	Moderate / Low	Limited site investigation works undertaken within terrestrial areas of the Proposed Development Site indicate that made ground material is l kely to be present. No environmental laboratory analysis of soil samples collected from terrestrial areas has been undertaken as part of the site investigation work. As a result, the contamination status of the soil material is considered to be unknown, although gross contamination is not reported to have been encountered.	Medium / Unl kely	Low
Off-Site The current presence of Uig Filling Station; The current presence of the Isle of Skye Brewing Company; and							Chemical analysis of two surface soil samples collected from the intertidal zone indicates that concentrations of contaminants are below laboratory detection limits and below tier 1 screening values based upon a commercial end use.		

Potential Contaminant Sources	Receptor	Pathways to Receptor	Baseline Conditions		Construction Phase		Comments	Operational Phase	
			Severity / Likelihood	Risk Category	Severity / Likelihood	Risk Category		Severity / Likelihood	Risk Category
Historical development within the vicinity of the proposed development area.							Should elevated concentrations of contaminants be present in made ground materials it is considered that short exposure times will apply and it is assumed that workers will adopt normal standards of site safety i.e. appropriate PPE and levels of hygiene.		
	Visitors / Members of the public.	Direct contact, ingestion and inhalation	Medium / Unlikely	Moderate / Low	Medium / Unl kely	Low	Limited site investigation works undertaken within terrestrial areas of the Proposed Development Site indicate that made ground material is l kely to be present.	Medium / Unl kely	Low
							No environmental laboratory analysis of soil samples collected from terrestrial areas has been undertaken as part of the site investigation work. As a result, the contamination status of the soil material is considered to be unknown, although gross contamination is not reported to have been encountered. Chemical analysis of two surface soil samples collected from the intertidal zone indicates that concentrations of contaminants are below laboratory detection limits and below tier 1 screening values based upon a commercial end use. Should elevated concentrations of contaminants be present in made ground materials it is considered that very short exposure times will apply during construction with assumed dust control measures employed.		

Potential Contaminant Sources	Receptor	Pathways to Receptor	Baseline Conditions		Construction Phase		Comments	Operational Phase	
			Severity / Likelihood	Risk Category	Severity / Likelihood	Risk Category		Severity / Likelihood	Risk Category
							It is also considered that the Proposed Development will remove/provide a barrier to contamination that may be present through the presence of buildings/areas of hardstanding and the importation of fill material.		
	Building materials and services	Direct contact, permeation of plastic pipes	Medium / Unlikely	Low	Medium / Unl kely	Low	Limited site investigation works undertaken within terrestrial areas of Proposed Development Site indicate that made ground material is likely to be present. No environmental laboratory analysis of soil samples collected from terrestrial areas has been undertaken as part of the site investigation work. As a result, the contamination status of the soil material is considered to be unknown, although gross contamination is not reported to have been encountered. It is considered that appropriate investigation and sampling is undertaken to characterise ground contamination to inform the design of building foundations / service runs and mitigate potential risks.	Medium / Unl kely	Low

Potential Contaminant Sources	Receptor	Pathways to Receptor	Baseline Conditions		Construction Phase		Comments	Operational Phase	
			Severity / Likelihood	Risk Category	Severity / Likelihood	Risk Category		Severity / Likelihood	Risk Category
	Vegetation	Uptake from root systems	Minor / Low Likelihood	Very Low	-	-	Limited site investigation works undertaken within terrestrial areas of the Proposed Development Site indicate that made ground material is l kely to be present. No environmental laboratory analysis of soil samples collected from terrestrial areas has been undertaken as part of the site investigation work. As a result, the contamination status of the soil material is considered to be unknown, although gross contamination is not reported to have been encountered. No vegetation distress has been recorded however. If any areas of landscaping are proposed to be advanced within the Proposed Development, it is considered that imported clean top soil will likely be incorporated into these areas.	Minor / Low L kelihood	Very Low

Potential Contaminant Sources	Receptor	Pathways to Receptor	Baseline Conditions		Construction Phase		Comments	Operational Phase	
			Severity / Likelihood	Risk Category	Severity / Likelihood	Risk Category		Severity / Likelihood	Risk Category
	Shallow / perched groundwater	Migration of leachable contaminants through permeable strata.	Medium / Likely	Moderate	Medium / L kely	Moderate	Soil and groundwater samples collected from terrestrial parts of the Proposed Development Site were not submitted for chemical analysis during the 2017 site investigation. As such, the contamination status of soil and groundwater beneath the Proposed Development Site is unknown. Terrestrial parts of the site are reported to be underlain by granular made ground deposits over relatively permeable raised beach deposits (sand and gravel). It is considered that these ground conditions may allow contamination in shallow soils to migrate to the underlying groundwater. It is recommended that appropriate investigation and sampling is undertaken within terrestrial areas of the Proposed Development Site, specifically targeting potential sources of contaminations, in order to characterise soil and groundwater conditions. It is considered that the Proposed Development may help to mitigate potential risks by removing and/or covering the made ground deposits and reducing water infiltration to underlying groundwater.	Medium / Unl kely	Low

Potential Contaminant Sources	Receptor	Pathways to Receptor	Baseline Conditions		Construction Phase		Comments	Operational Phase	
			Severity / Likelihood	Risk Category	Severity / Likelihood	Risk Category		Severity / Likelihood	Risk Category
	Deep bedrock aquifer (Little Minch Sill-Complex)	Vertical migration through permeable deposits.	Medium / Low Likelihood	Moderate / Low	Medium / Low L kelihood	Moderate / Low	Soil and groundwater samples collected from terrestrial parts of the Proposed Development Site were not submitted for chemical analysis during the 2017 site investigation. As such, the contamination status of soil and groundwater beneath the Proposed Development Site is unknown. Terrestrial parts of the Proposed Development Site are reported to be underlain by granular made ground deposits over relatively permeable raised beach deposits (sand and gravel. It is considered that these ground conditions may allow contamination in shallow soils to migrate to the underlying groundwater. It is recommended that appropriate investigation and sampling is undertaken within terrestrial areas of the development area, specifically targeting potential sources of contaminations, in order to characterise soil and groundwater conditions. It is considered that the Proposed Development may help to mitigate potential risks by removing and/or covering the made ground deposits and reducing water infiltration to underlying groundwater.	Medium / Unl kely	Low

Potential Contaminant Sources	Receptor	Pathways to Receptor	Baseline Conditions		Construction Phase		Comments	Operational Phase	
			Severity / Likelihood	Risk Category	Severity / Likelihood	Risk Category		Severity / Likelihood	Risk Category
	Surface water (Uig Bay and culverted surface watercourse)	Leachate and groundwater movement to surface water	Medium / Likely	Moderate	Medium / L kely	Moderate	Soil and groundwater samples collected from terrestrial parts of the Proposed Development Site were not submitted for chemical analysis during the 2017 site investigation. As such, the contamination status of soil and groundwater beneath the Proposed Development Site is unknown. Should contamination be present, it is considered poss ble that it may enter the unnamed watercourse flowing through the Proposed Development Site and Uig Bay. It is considered that the Proposed Development may help to mitigate potential risks by removing and/or covering the made ground deposits, reducing water infiltration to underlying groundwater and capturing surface water runoff through an appropriate drainage systems. It is also considered that high dilution may assist with reducing contaminant concentrations should they enter surface water receptors (e.g. Uig Bay).	Mild / Low	Low

10.6 Avoidance Measures / Mitigation 'by design'

10.6.1 Necessary measures to ensure compliance of the construction works with environmental legislation will be embedded within a CEMP.

10.7 Predicted Effects

10.7.1 Two construction scenarios have been proposed (outlined in **Chapter 3** of this EIA Report): a single continuous phase of work (Scenario 1), and a staged approach (Scenario 2). The assessment of the effect of the Proposed Development on Geology and Soils has been undertaken using a worst case scenario which is taken to be all activities that could affect geology and soils being undertaken at the same time, i.e. Scenario 1.

Construction

Contamination

10.7.2 Given the developed nature of the Proposed Development Site and its current use, and in the absence of any data to suggest otherwise, it is considered that soil and groundwater contamination may potentially be encountered during site construction works. Contamination sources arising from terrestrial construction activities, which could have a potential effect on soil and groundwater, comprise the following:

- The discovery of soils exhibiting visual and olfactory evidence of contamination (if any) during groundworks and the potential disturbance of residual soil contamination through construction activities such as the removal of existing site drainage;
- Contamination arising from spillages associated with vehicles and construction materials;
- Airborne contamination arising from potentially contaminated dust;
- Removal of any waste materials and/or contaminated soil (if any); and
- Introduction of contaminated materials during infilling activities, particularly within areas of the Proposed Development Site that are to be reclaimed.

Geotechnical

10.7.3 The geotechnical impacts associated with the construction of the Proposed Development will be limited to the following:

- Loss/disturbance of soils (particularly topsoil) during earthworks and groundworks;
- Potential changes to ground profile resulting in slope/ground stability issues during construction/operation; and
- Soil erosion from exposed ground due to increased surface water runoff.

Operation

10.7.4 Potential effects of the Proposed Development on Geology and Soils that require impact assessment during the operation phase are anticipated to include the following:

- Waste generated on site affecting site users and groundwater.
- Leak of mineral oils from electrical transformer proposed to be located on-shore.

10.8 Mitigation & Monitoring

Construction

Pre-construction Site Investigation and Contamination Analysis

10.8.1 Further site investigation work will be undertaken where necessary prior to commencement of the construction works.. It is likely that these works will specifically target the potential sources of contamination identified at the Proposed Development Site including; the above ground storage tanks, the area of the former diatomite 'factory' and areas of the site located in proximity to Uig Filling Station, which is situated adjacent to the Proposed Development Site's northern boundary.

Construction Environmental Management

10.8.2 A CEMP will be developed prior to commencement of construction works. The CEMP will ensure that construction activities take place in accordance with all relevant legislation for the protection of surface and groundwater, codes of good practice including works on or near water, such as GPPs prepared by SEPA, NRW and NIEA.

10.8.3 If present, localised soil and groundwater contamination may pose a potential health risk to the construction workers as a result of exposure during earthworks. During construction of the Proposed Development the contractor(s) will be required to minimise adverse land contamination effects on sensitive receptors by implementing good operational practices (e.g. the use of PPE, such as dust masks, if necessary and suitable surface water drainage control).

10.8.4 With regards to earthworks, the contractor(s) will ensure that all material is suitable for its proposed use and will not result in an increase in contamination-related risks on identified receptors.

10.8.5 The contractor(s) will be required to implement pollution control measures to deal with any contaminated land if encountered during the construction works. These measures will include, as a minimum, the following:

- All workers will be required to wear PPE as applicable;
- Should any potentially contaminated ground, including isolated 'hotspots' of contamination (e.g. visual/olfactory evidence of contamination, buried drums etc.), be encountered during construction, the contractor(s) will be required to investigate the area and then assess whether there is a need for containment or disposal of the material. The contractor(s) will also be required to assess whether any additional health and safety measures are required. Any such investigations will be required to be undertaken in consultation with SEPA and other appropriate consultees. To further minimise the risks of contaminants being mobilised and contaminating other soils or the water environment, construction workers will be briefed as to the possibility of the presence of such materials;
- In the event that contamination is identified during construction works, appropriate remediation measures will be taken to protect construction workers, future site users, water resources, structures and services;
- The contractor(s) will be required to place arisings and temporary stockpiles away from watercourses and drainage systems, whilst surface water will be directed away from stockpiles to prevent erosion;

- Earthworks design will attempt to balance any cut/fill operations to minimise requirement for off-site disposal of excess arisings or the import of fill;
- The risk to surface water and groundwater from runoff from any contaminated stockpiles (if present) during construction works will be further reduced by implementing suitable measures including sealing stockpiles to prevent rainwater infiltration. Alternatively bunding and/or temporary drainage systems will be put in place, designed in line with current good practice, following appropriate guidelines and obtaining all relevant licences including discharge consents;
- Any fuels or chemicals used during construction will be stored in bunded areas with an impermeable base in accordance with SEPA guidelines, thereby limiting the potential for migration of contaminants into groundwater following leaks/spillages;
- Any waters removed from excavations by dewatering (if applicable) will be discharged appropriately, subject to the relevant licences being obtained;
- The construction activities will result in generation of waste materials that, if not used or recycled, will require off-site disposal to landfill, with associated indirect negative impacts on the soils and geology of the landfill area. Such wastes will be predominantly domestic in nature associated with the construction personnel, with limited industrial and construction wastes. In order to minimize the impact, waste will be segregated on site and where possible, retained on site and re-used or re-cycled. Landfill sites identified for receipt of any residual waste will be appropriately licensed to receive the particular waste; and
- The contractor(s) will implement a dust suppression/management system in order to control the potential risk from airborne contamination migrating off-site to adjacent sites, as required.

10.8.6 Foundations and services will be designed and constructed to prevent the creation of pathways for the migration of contaminants and will be constructed of materials that are suitable for the ground conditions and designed use, for example water supply pipes will be designed in accordance with current good practice and applicable guidance to ensure pipes are protected from potential impacts associated with any contamination.

10.8.7 Areas of hardstanding (such as roads and the marshalling area) will reduce the migration of potential contaminants arising from on site activities into the soils and waters below the Proposed Development Site.

10.8.8 Construction activities are indicated to include piling which has the potential to have a residual effect on ground conditions at the Proposed Development Site. Piling design and construction works will be completed following a risk assessment completed in accordance with the Environment Agency's Guidance on Pollution Prevention in Piling (Westcott, Lean, & Cunningham, 2001).

10.8.9 A Site Waste Management Plan (SWMP) for the Proposed Development Site will be developed; detailing how all materials generated at the Proposed Development Site both in ground and for the development, will be dealt with. The SWMP will also set targets to recover construction wastes generated, including excavated material, subject to suitability.

10.8.10 Implementation of these measures will mitigate the potential impact of ground disturbance on surface (soils), groundwater and surface water quality.

Operation

10.8.11 The operational compoents of the Proposed Development within terrestrial parts of the Porposed Development Site will comprise: a ticket office/terminal building along with a small storage buildings and marshalling area, which will be used by vehicles prior to boarding the ferry. The area temporarily used as a construction compound is intended to be restored following completion of the construction works and to be made available for use as a car park for the local community. Activities undertaken at the Proposed Development Site during operational phase are not considered to result in modification to the CSM and therefore the potential significance of the current ground conditions.

10.8.12 Appropriate protection measures will be incorporated into the design of the electrical transformer that is proposed to be constructed on-shore in order to mitigate against the potential for saltwater corrosion and minimise the risk of potential leaks/loss of containment.

10.8.13 Appropriate waste storage facilities will be incorporated into the Proposed Development.

10.9 Residual Effects

10.9.1 Based on the information as detailed herein, the construction and operational activities proposed at the Development Site have the potential to generate a number of land contamination related adverse impacts on identified receptors if appropriate impacts avoidance measures as detailed in Section 10.6 are not implemented.

10.9.2 Overall, the implementation of the measures set out in Section 10.8 will reduce the identified impacts to Negligible.

10.9.3 A summary of significant effects (before mitigation) is given in Table 10-12 below. All effects are considered to be not significant following the implementation of appropriate mitigation detailed in Section 10.6 and 10.8.

10.10 Cumulative Effects

10.10.1 There are no other identified development proposals within Uig Bay with the potential to affect geology and soils.

10.11 Summary & Conclusion

10.11.1 No significant impacts to soil and groundwater are expected through the construction and operational phases of the Proposed Development provided that standard mitigation measures are applied as discussed previously. As a result the residual impact is predicted to be negligible.

Table 10-12 Land Contamination Assessment Summary and Residual Effects

Summary description of the identified impact	Sensitivity of Receptor	Impact Magnitude	Significance and Nature of Effect	Additional Mitigation	Residual Impact Magnitude	Residual Significance and Nature of Effect
Construction						
Impact to construction workers from contaminated soils if encountered during construction earthworks	High	Low	Moderate adverse (significant)	Appropriate mitigation measures to be identified based on results of the site investigation that will be taken on terrestrial parts of the Proposed Development Site prior to commencement of construction works. From this, additional engineering controls and PPE may be required.	Negligible	Not significant
Impact to off-site receptors and land from potentially contaminated dusts generated during construction works	Moderate	Low	Minor adverse (not significant)	Adoption of suitable mitigation measures including implementing a dust suppression/management system in order to control the potential risk from airborne contamination	Negligible	Not significant
Risks to underlying groundwater and neighbouring land from oil spills/leaks and runoff during construction works.	Moderate	Medium	Moderate adverse (significant)	Adoption of suitable mitigation measures including storage in bunded areas with an impermeable base in accordance with SEPA guidelines	Negligible	Not significant
Reduction in water quality from potential contamination from historic and current land uses, impact on the quality of surface waters (e.g. culverted burn and Uig Bay) during construction	High	Low	Minor adverse (Not significant)	Potential risks to the water environment are anticipated to be low; however, this will be confirmed by undertaking a site investigation to assess the condition of underlying soil and groundwater. Contingency procedures to be included in the CEMP and on the basis of piling risk assessment.	Negligible	Not significant
Risk to underlying soils and groundwater from generation of waste material during construction works	Moderate	Medium	Moderate adverse (significant)	Adoption of suitable mitigation measures. Waste will be segregated on site and where poss ble, retained on site and re-used or re-cycled. Landfill sites identified for receipt of any residual waste will be appropriately licensed to receive the particular waste	Negligible	Not significant

Summary description of the identified impact	Sensitivity of Receptor	Impact Magnitude	Significance and Nature of Effect	Additional Mitigation	Residual Impact Magnitude	Residual Significance and Nature of Effect
Operation						
Risk to underlying soils and groundwater from generation of waste material during operation of the Proposed Development.	Moderate	Low	Minor adverse (not significant)	Adoption of suitable mitigation measures. Appropriate waste storage facilities will be incorporated into the Proposed Development.	Negligible	Not significant