2. Evolution of Design and Alternatives

2.1 Masterplan Summary Report

2.2 Best Practicable Environmental Option (BPEO) Report for Dredge Disposal

2.3 Dredge Disposal Site Characterisation Report

2.1 Masterplan Summary Report

Uig Harbour Redevelopment

Masterplan Summary Report

The Highland Council

Project number: 60536743
60536743-DOC-00-0000-C-1019

24 August 2017

Quality information

Prepared by	Checked by	Approved by
[redacted]		

Revision History

Revision	Revision date	Details	Authorized	Name	Position
A	28-Aug-2017	First Issue	[redacted]	[redacted]	[redacted]
B	29-Aug-2017	Final	[redacted]	[redacted]	[redacted]
C	31-Aug-2017	Final	[redacted]	[redacted]	[redacted]
D	31-Aug-2017	Final	[redacted]	[redacted]	[redacted]

Distribution List

# Hard Copies	PDF Required	Association / Company Name
0	Yes	[redacted] / The Highland Council

Prepared for:

The Highland Council
Diriebught Depot
94 Diriebught Road
Inverness
IV2 3QN

Prepared by:

[redacted]

AECOM Limited
7th Floor
Aurora
120 Bothwell Street
Glasgow
G2 7JS
UK

T: +44 141 248 0300
aecom.com

Table of Contents

Figures

Tables

1. Introduction

Uig Harbour forms one part of the Uig, Tarbert, Lochmaddy triangle, providing lifeline ferry services to the communities of the Western Isles. Increasing demand and tonnage has led CMAL to commission new, larger ferry vessels for a number of its routes. The Triangle has been identified by CMAL as a priority and the procurement of a new vessel for this route has commenced

The new vessel (802) will be owned by CMAL and operated by CalMac Ferry Limited (CFL). The ferry will be a dual fuel vessel running on Marine Diesel Oil and Liquefied Natural Gas (LNG). As part of the overall programme LNG will be delivered and bunkered at Uig. The design and implementation of the LNG service and infrastructure will be the responsibility of CFL. The details of LNG are currently being developed by the ship owners (CMAL) and CFL.

The present berth for vessels using the Roll On/Roll Off facility is exposed to wind and wave action predominately from the west direction. In certain conditions the berth can become untenable particularly when waves refract around the headland. The present structure and layout of the pier is a result of the following modernisations:

- 1984-1986 - Berthing structure and roundhead were added and Roll On/roll Off facilities provided for Caledonian MacBrayne's MV Hebrides Isles. New fishing berths and landing areas were provided during this modernisation;
- 2000 – Construction of new Inner berthing dolphin and construction of new Outer berthing dolphin.

The provision of a new vessel with increased vehicle and pedestrian capacity will have significant impact on the existing operability of Uig Ferry Terminal. The current Ferry Terminal was constructed in 1986 and it is recognised by THC/ CMAL/CFL that the facility is at its operational limit for the vessel turnaround time and the consequential vehicle throughput for the current vessel.

This report considers the following mitigation options for the following critical infrastructure elements of Uig Ferry Terminal to ensure that for the larger vessel, larger vehicle and passenger carrying capacity, the current operability and vessel turnaround times are not reduced. Refer to Appendix A for current layout 60536743-SKE-00-0000-1120.

1. Berthing Structure.
2. Marshalling Area including new Ticket Office.
3. Approachway Structure.
4. Fisherman's Compound.
5. Dredging.
6. Linkspan.
7. Passenger Access System/Gangway

The six key elements considered in assessing the mitigation measures options are as follows:

- The new vessel will geometrically fit the infrastructure and linkspan orientation but requires dredging works and strengthening of the current berthing facility to maintain the structural integrity. Without dredging the compromised water level will introduce a tidally effected service;
- Maintaining current Ferry Terminal operability for increased vessel vehicle and passenger numbers;
- Infrastructure not suitable for current vessel including footprint requirements for Passenger Access Gangway and LNG footprint requirements on the berthing structure;
- Infrastructure not suitable for additional passengers and vehicle requiring widening of the Approachway, increased footprint of Marshalling area and larger ticket office;
- Health and safety concerns of passengers traversing near mooring bollards on the berthing structure and the current Approachway footway not wide enough to allow passengers to pass without encroaching onto the road.
- Environmental conditions (wave/wind) affecting the berth, which impact on the reliability of the vessel.

The impacts of the 'Do Nothing' option for the larger vessel and larger vehicle and passenger carrying capacity will mean that the current operability and vessel turnaround times will be both reduced, together with the

increased impact of the existing environmental conditions on the new vessel, would result in a reduction on a reliability of the existing infrastructure to maintain vessel timetables. The key impacts are detailed below:

- Geometrical vessel fit will still require berth dredging and fendering strengthening if the structural integrity of the berthing structure and the vessel timetable is to be maintained;
- The increased deadweight/displacement and windage of the new vessel will impact on berthing, bunkering and offloading of passengers, vehicles and freight.
- The impact of not improving pedestrian and vehicle provision and capacity will mean that the vessel may have to operate by limiting its carrying capacity (vehicle and passenger) to the capacity of the existing Ferry Terminal infrastructure including Marshalling Area footprint;
- Reputational risk of bringing into service a larger vessel which cannot run at full capacity because the infrastructure is not suitable and the number of lost days of vessel sailings is increased due to the increased berthing and mooring requirements of the new vessel.

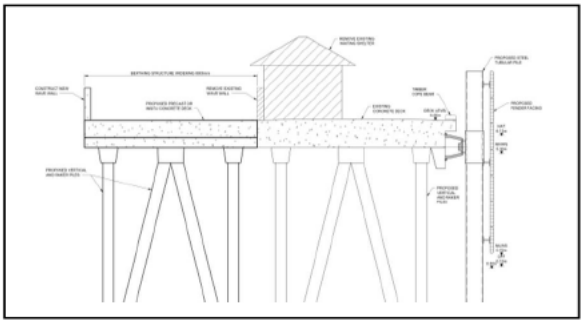
2. Preferred Option

2.1 Summary and Recommendations

The following is a summary of the recommendations and an overall cost estimate contained in this document for the following critical infrastructure for the upgrade of Uig Ferry Terminal. Refer to Appendix A for Block plan sheet no. 60525699-SKE-20-0000-C-1145.

2.1.1 Pier Strengthening Summary

Option 2, Widening of the existing berthing structure by introduction of additional 8m width of new pier does solve the issue of maintaining the structural integrity. The recommendation is that this is the preferred masterplan option because this option does adequately address the following issues which could have affected the operability of Uig Ferry Terminal for the new vessel:



- Berthing structure width increased means that there is no longer a health and safety issue with movement of passengers within the bollard rope snap back zone;
- Berthing structure width increased means it may be possible to introduce in future phases of the work mechanically operated Passenger Access System (PAS);
- The increased pier width means that the sterilised footprint area required for the vessel gangways will not have a detrimental effect on mooring operations and pedestrian access.
- The increased pier width means that LNG bunkering footprint (as yet undefined) required will not have a detrimental effect on berthing and mooring operations and pedestrian access;
- Covered pedestrian access can be introduced along the back face of the widened pier structure further reducing pedestrian exposure to environmental conditions.
- Would allow for the opportunity of a covered walkway to the waiting room and gangway.

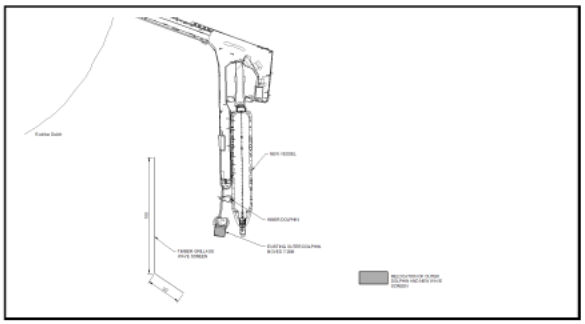
Justification

Alternative Option 1 was considered which included strengthening of the existing berthing structure by introduction of tension anchors into the front face raking piles and does solve the issue of maintaining the structural integrity of the existing berthing structure due to the increased horizontal fender reaction. The recommendation is that this Option was not taken forward as a preferred masterplan option because this option does not address the following issues with the potential to reduce the operability of Uig Ferry Terminal for the new vessel:

- Berthing structure width not increased means the problem still exists with movement of passengers safely to the vessel within the bollard rope snap back zone;
- Berthing structure width not increased means it is not possible to introduce mechanically operated Passenger Access System (PAS) because of restricted space;
- There is a large window for the range of vessels gangways and this will require an area that will sterilise that area of the berthing structure for mooring operations and pedestrian access. Existing waiting shelter will become redundant;
- Will require a larger pier waiting room for the increased number of passengers;
- LNG bunkering footprint (as yet undefined) will be required and this will require a large area on the berthing structure that will sterilise that area of the berthing structure for berthing and mooring operations and pedestrian access.
- Would not allow for the opportunity of a covered walkway to the waiting room and gangway.

2.1.2 Potential Pier Berthing Improvements Work Required after Arrival of New Vessel

Option No.7



Construction of wave screen and repositioning of the outer dolphin.

The recommendation is that Option 7 is not required for the arrival of the new vessel and will not therefore prevent the new vessel from berthing and mooring at Uig Ferry Terminal. It should be noted that CFL believe that without improvements to mitigate the effects of wave, wind and swell at the existing pier, the increase in vessel length and windage is likely to result in a reduced level of service compared to the existing level of service. The following further studies will be required to be carried out to assess the necessity for these additional pier upgrade works.

- Vessel simulation study;
- Wave/coastal modelling study;
- Daily records from the skippers of the new vessel on environmental conditions (wind, wave and current) at the berth;
- Daily records from the skippers on issues encountered during berthing manoeuvres and while moored at the berth.

Justification

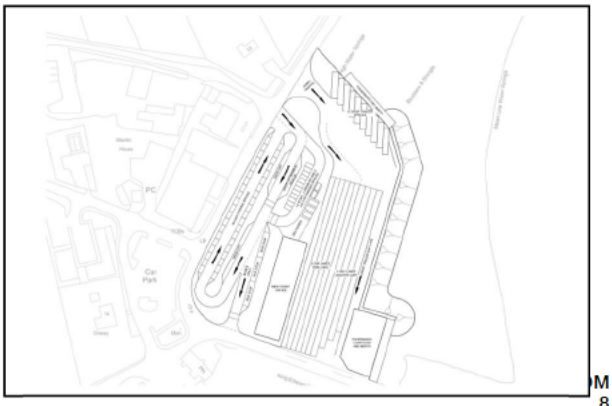
Alternative Options 3-6 were also considered providing engineered solutions for solid pier extension beyond the existing outer berthing dolphin with the potential to reduce impact on the new vessel due to swell. If the above additional studies conclude that there is the necessity for additional pier upgrade works to maintain the operational requirements of the ferry terminal berth then Option 7 is the preferred option for the reasons detailed below. :

- The wave screen detailed in Option 7 has the potential to provide a greater reduction of wave and swell effects than Options 3-6;
- Option 7 is the most cost effective construction option;
- Option 7 has the potential to limit any potential ferry terminal closure requirements;
- Option 7 has the potential to limit any temporary works and temporary berthing piles.

Consideration was also given to the alternative east/west orientation of the berthing structure. It was noted that the previous modelling study concluded that the proposed orientation in the East/West direction was not considered to be operationally feasible by the prospective users of the berth. CFL were re-consulted on the issue and confirmed that the east/west orientation would provide no improvement to the berthing operations.

2.1.3 Marshalling Area Summary

Three options were considered for the layout and structural details for the new marshalling area. All three options provided suitable engineering solutions however Option No. 1 was the preferred option to meet the requirements of THC/CMAL/CFL for the following reasons.



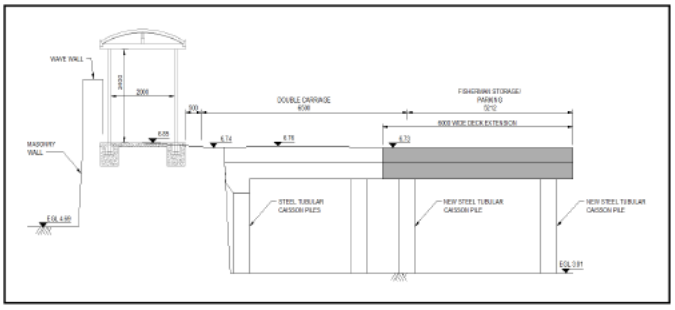
- Marshalling area footprint for new vessel increased lane width will not have a

detrimental effect on Uig Ferry Terminal operability.

- Allows a smoother flow of traffic through the marshalling area improving turnaround time.
- Fisherman's compound located closer to the existing fisherman's working area on the approachway structure.
- Provides largest number of additional parking spaces.

2.1.4 Approachway Summary

Option No. 2 extending the approachway structure width by 6.0m is the preferred option for the following reasons.



- Extension of the approachway width will ensure that the vessel turnaround times required for the new vessel will be achieved and the operability of the Ferry Terminal is not reduced with the introduction of the new vessel. The increased width will cater for the potential of LNG and increased traffic and will eliminate issues associated with a vehicle breakdown that could impact on passenger safety and vessel loading/unloading
- Reduces any delays in vessel turnaround times due to broken down vehicles on the approachway;
- The new vessel has increased capacity for pedestrians which are anticipated to grow, this option allows for an enhancement to existing substandard pedestrian access which places pedestrians onto the road and in conflict with vehicular traffic.
- It allows for an enclosed protective walkway from the terminal building for the length of the approachway as a minimum. However this could terminate immediately adjacent to the gangway access point - either into a waiting room or simply to hold passengers inside the walkway itself if pier strengthening option 2 is constructed. This would provide the optimum passenger journey in terms of safety and experience from the terminal building to the vessel and avoids exposing foot passengers to the elements on what can be a significantly exposed pier at times;
- The 2m wide protective walkway allows for two way movement of pedestrians (including prams and wheelchairs). This means that the health and safety risk to passengers is alleviated as passengers can pass each other on the footpath without needing to step onto the roadway;

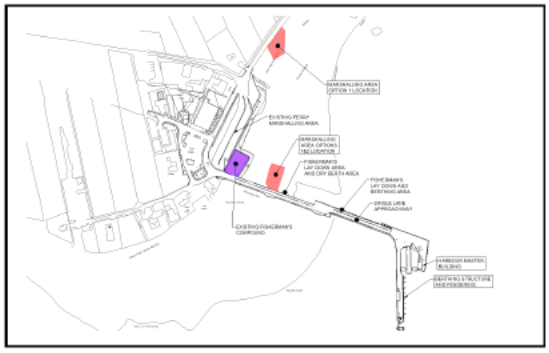
  The 6m berth extension ensures that there is no loss of laydown area/working space on the fisherman's berth.

Justification

Option No.1 for a 3m wide approachway extension was not taken forward as the preferred option because this 3m extension would only allow for the provision of the passenger shelter to meet passenger safe access along the approachway and health and safety requirements while still maintaining single vehicle movement along the approachway. The 3m wide extension does not fully address the potential of LNG and increased traffic and in addition a vehicle breakdown could potentially have a severe impact.

2.1.5 Fisherman's Compound Summary

Three options were considered for the new location of the Fisherman's Compound. All three options provided suitable engineering solutions however Option 1 is the preferred location for the re-establishment of the fisherman's compound which maintains close accessibility for the fishermen and reduces the likelihood of conflicts with other harbour and ferry users.



2.1.6 Linkspan Summary

The existing linkspan at Uig was installed in 1986 and therefore can be considered to be at the end of its serviceable life without major structural overhaul/refurbishment. It is recommended that a replacement single lane linkspan is installed at Uig which will include construction of new bankseat and lifting dolphins.

Option No. 3 New Linkspan is the preferred option for the following reasons:-

- This option proposes to replace the existing linkspan with a new Linkspan replacement that would be procured as part of the project;
- All M&E equipment would be replaced;
- The existing lifting dolphins and bankseat will be likely be replaced;
- The new linkspan would be compliant with PUWER, BS7671, PUWER and current regulation with a CE Mark;
- Commissioned and assessed by qualified body required;
- Alternative load path provided and enhanced safety features;
- Estimate 1-2 month outage;

Justification

Option No. 1 was not recommended. This was the Do Nothing option and had the following disadvantages:

- No improvement;
- Compliance to BS7671 and PUWER needs to be assessed;
- No works to civil structures so life of structures may not provide 30year design life;
- There is no alternative load path and automation;
- Bow in for 802 could be constrained;
- Structure was installed in the mid 1980's so may need major refurbishment or replacement in near future.

Option No. 2 was not recommended. This was the Like for Like replacement option and had the following disadvantages:

- No improvement;
- Compliance to BS7671 and PUWER needs to be understood;
- No works to civil structures so life of structures may be reduced to less than that of the steel;
- There is no alternative load path and automation;
- Bow in for 801/802 could be constrained.

Option No. 4 was not recommended. This was the Double Lane Linkspan option and had the following disadvantages:

- Significant outage of the linkspan;
- No geometrical improvement;

- Requires significant more investment;
- More complex machinery;
- Temporary relocation of harbourmaster office;
- Temporary loss of come fishing berth and ice plant relocation.

2.1.7 Passenger Access Summary

Further detail can be found in the Passenger Access report as appended in appendix D of the masterplan.

Option No. 2 Gangway and Full Covered Walkway is our preferred option;

- Provides a safe and sheltered access from the terminal building 300m away from the vessel;
- Familiarity to operation for staff;
- Can provide a waiting area when required prior to loading of ferry;
- Improves the passenger experience.

Justification

Option No. 1 was not recommended. This was the Do Nothing option and had the following disadvantages:

- Does not meet compliance with regulation and standards;
- Passengers, during busy period will migrate onto the carriageway;
- No improvement;
- Passengers are exposed to the elements approaching the pier,

Option No. 3 was not recommended. This was the full Electro Mechanical Passenger Boarding Bridge option and had the following disadvantages:

- Significant cost;
- Highly complicated system;
- PBB require regular maintenance;
- Significant cost of maintenance;
- Difficult to manage as these are very specialist;
- Breakdowns can cause significant difficulty for the port;
- Operators will have very little time in tying up the vessel and operating the PBB;
- Structure can be an eyesore to the local community;
- PBB would sterilise significant space on the pier

2.1.8 Dredging Summary

Consideration has been given to dredge depths in respect of 802, the Isle of Lewis and the Loch Seaforth.

The capital dredge volume taking account of the dredge depth and vessel manoeuvring areas, as agreed with CFL, equates to some 12,229cu.m.

A dredge cost allowance of £444,500 for 802 has been established. This cost assumes that disposal of dredge arisings will be by incorporation within the land reclamation area or by sea disposal. Should programming requirements dictate dredging in advance of such disposal consent – then disposal will be to an approved sea location or to landfill – these options will add significantly to the cost and will only be considered if the timing of vessel delivery and the impact on service is deemed to justify such additional costs.

2.1.9 Miscellaneous Summary

The upgrade of Uig Ferry terminal will include the following infrastructure improvements;

- Ticket Office

- Survey and Investigations
- Old Ticket Office Demolition
- Harbour Order Revision
- Lighting
- Utilities
- Consenting and Licensing
- EIA
- Power upgrade

2.2 Preferred Option Cost

The total cost for the redevelopment works at Uig Ferry terminal is £26,502,195.

3. Programme and Required Outages

3.1 Programme Key Dates

Stage	Start	Finish
HRO	13/07/2017	26/10/2018
Marine License	13/07/2017	18/07/2018
Detail Design	02/08/2017	23/02/2018
Construction	19/07/2018	04/09/2019

Table 1. Programme Schedule

The construction end date shown above does not allow for construction of option 7's wave screen. This will be determined with monitoring of the new vessel once in service.

The above programme dates are for guidance. Construction works start date is dependent on consent approval for Marine License, Planning and HRO and no clear timescales are given for consents approval and are likely to be subject to change. The construction start and end date is approximate however these cannot dictate the method that would be used by the contractor.

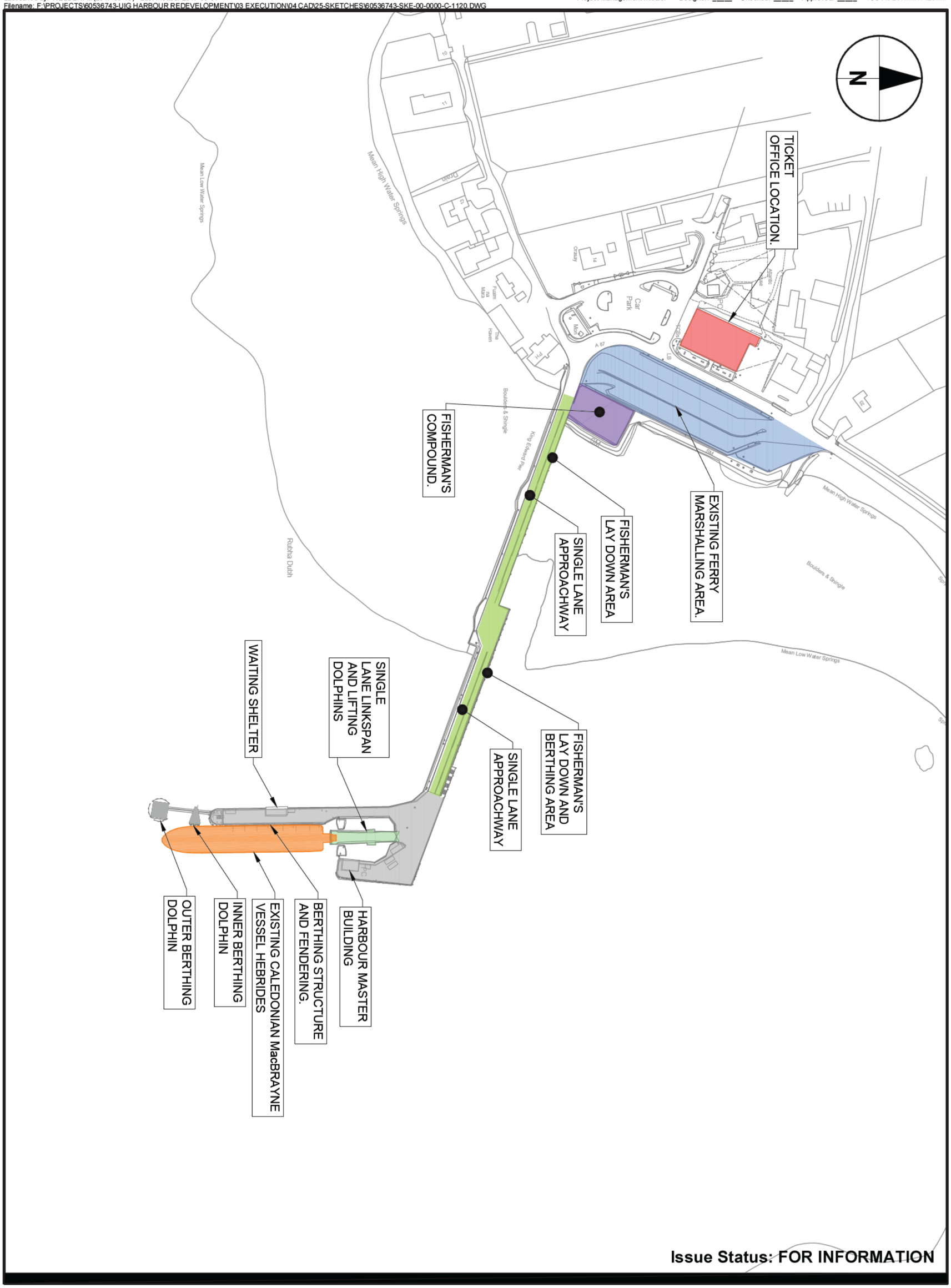
3.2 Required Outages

Based on the dates provided in the above table, a proposed outage would be required for the delivery of the vehicle linkspan. An estimation of 5 weeks has been allowed.

Appendix A - Masterplan Block Plan Drawings

Last saved by: WEBBERPM(2017-05-18) Last Plotted: 2017-08-31
Filename: F:\PROJECTS\60536743-UIG HARBOUR REDEVELOPMENT\03 EXECUTION\04 CAD\25-SKETCHES\60536743-SKE-00-0000-C-1120.DWG

Project Management Initials: Designer: ____ Checked: ____ Approved: ____ ISO A3 297mm x 420mm



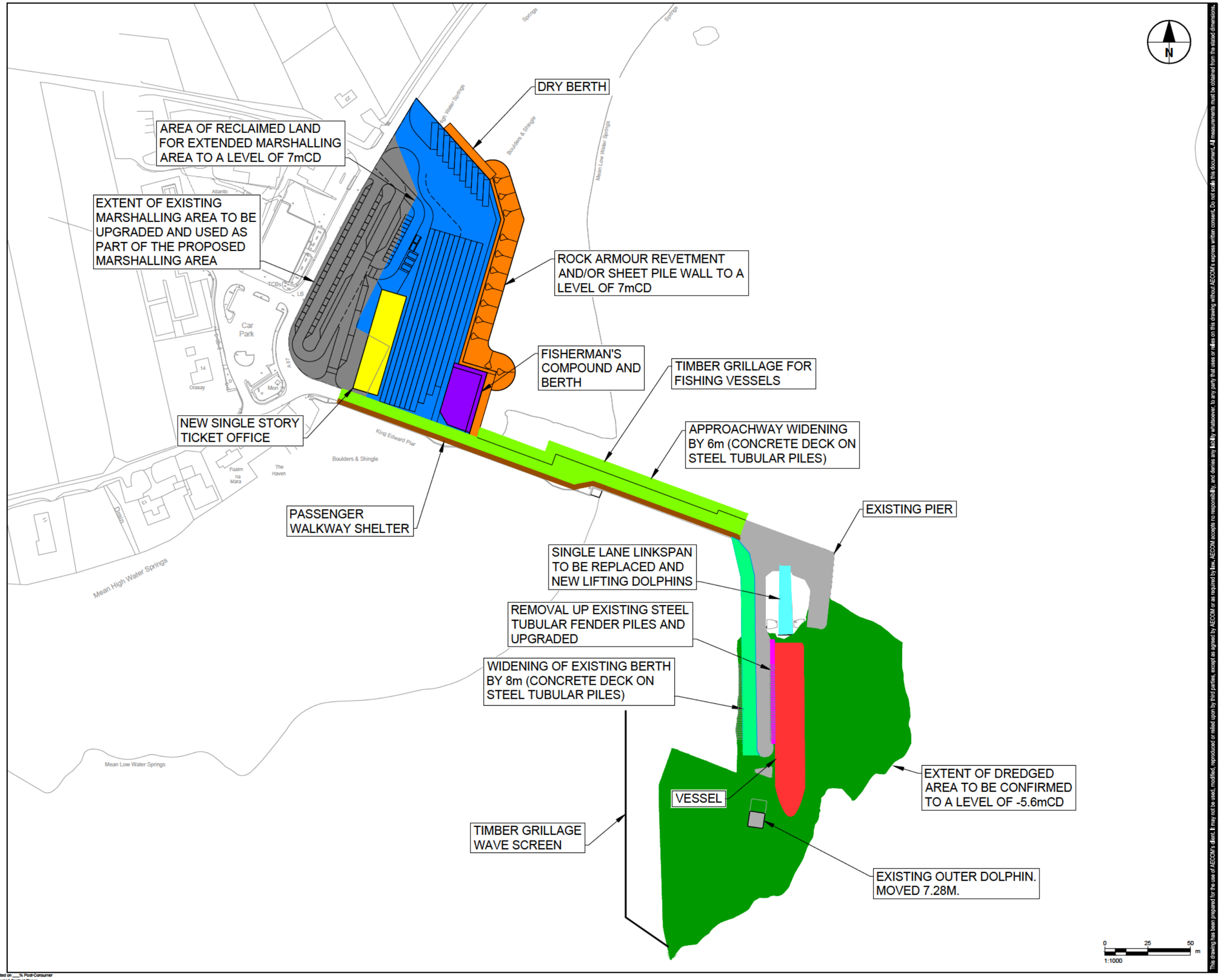
UIG HARBOUR REDEVLOPMENT

CURRENT LAYOUT

AECOM

THE HIGHLAND COUNCIL, UIG, ISLE OF SKYE
Project No.: 60536743 Date: 27-MAR-2017

Figure: 60536743-SKE-00-0000-1120



Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Last saved by: WEBBERPM(2017-08-21) Last Plotted: 2017-08-31
Filename: P:\UKGLG1-V1BTF\PORTS AND MARINE\PROJECTS\60536743-UIG HARBOUR REDEVELOPMENT\03 EXECUTION\04 CAD\25-SKETCHES\60536743-SKE-00-0000-C-1145.DWG

Printed on ___% Post-Consumer Recycled Content Paper

AECOM

PROJECT

UIG HARBOUR REDEVELOPMENT

CLIENT

THE HIGHLAND COUNCIL

GLENURQUHART ROAD, INVERNESS, IV3 5NX
01349 886 606 tel

CONSULTANT

AECOM
7th FLOOR, AURORA,
120 BOTHWELL STREET
GLASGOW, G2 7JS
0141 248 0300 tel
www.aecom.com

NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED. DO NOT SCALE.
2. ALL LEVELS IN METRES AND REDUCED TO CHART DATUM UNLESS OTHERWISE NOTED.

ISSUE/REVISION

I/R	DATE	DESCRIPTION
C	2017-08-22	FOR INFORMATION
B	2017-07-26	FOR INFORMATION
A	2017-06-06	DRAFT

KEY PLAN

PROJECT NUMBER

60536743

SHEET TITLE

PREFERRED OPTION
BLOCK PLAN

SHEET NUMBER

60525699-SKE-20-0000-C-1145

2.2 Best Practicable Environmental Option (BPEO) Report for Dredge Disposal

Uig Harbour Redevelopment

Best Practicable Environmental Option (BPEO) Assessment

The Highland Council

Project number: 60536743
UHRD-ACM-ZZ-GE-RP-EN-00011

24 August 2018

Quality information

Prepared by	Checked by	Verified by	Approved by
[redacted]	[redacted]	[redacted]	[redacted]

Revision History

Revision	Revision date	Details	Authorized	Name	Position
P01	12th Feb 2019	For Information	[redacted]		
P02	21st Feb 2019	For Information	[redacted]		

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

The Highland Council
Glenurquhart Road,
Inverness,
IV3 5NX

Prepared by:

[redacted]

AECOM Infrastructure & Environment UK Limited
7th Floor, Aurora
120 Bothwell Street
Glasgow G2 7JS
United Kingdom

T: +44 141 248 0300
aecom.com

Table of Contents

Figures

Tables

1. Introduction

1.1 Introduction to this Report

1.1.1 This report presents the results of the Best Practicable Environmental Option (BPEO) assessment prepared by AECOM on behalf of The Highland Council (hereafter referred to as the 'Applicant') for the dredging and dredge disposal associated with the Uig Harbour Redevelopment (hereafter referred to as the 'Proposed Development'). This report accompanies a marine licence application to Marine Scotland (MS) for capital dredging and opening a new sea disposal site in the vicinity of Uig Bay for the disposal of the dredged material.

1.1.2 The purpose of the BPEO assessment is to identify the disposal option that provides the most environmental benefit or least environmental damage. This assessment considers the alternative options available against a range of criteria including technical feasibility, environmental impact and cost.

1.2 Background to the Proposed Development

1.2.1 Uig Harbour is located in Uig Bay in the north east of the Isle of Skye. It forms part of the 'Skye Triangle' (along with Tarbert and Lochmaddy), providing lifeline ferry services for communities in the Western Isles. The Pier at Uig Harbour, named King Edward Pier, serves the CalMac ferry route to the isles of Harris and North Uist. The Pier is under the control of Highland Harbours which is run by the Applicant, whilst the ferry service operations are controlled by CalMac Ferries Ltd. (CFL).

1.2.2 Increasing demand and aging 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 for this route has commenced. A number of upgrades are required to Uig Harbour to accommodate the new, larger vessel, including a capital dredge at the berth and along the approach way. Maintenance dredges will also be required in the future.

1.3 Environmental Impact Assessment

1.3.1 In view of the nature, size and location of the Proposed Development, an Environmental Impact Assessment (EIA) has been carried out by AECOM to assess the onshore and offshore elements of the Proposed Development. The EIA Report will be submitted as part of the marine licence application together with this BPEO assessment.

1.4 Other Supporting Information

1.4.1 The following supporting information will also accompany the application:

- Site Characterisation Report;
- Environmental Impact Assessment Report
- Pre-Application Consultation Report;

1.5 Structure of the Report

1.5.1 This report has the following structure:

1. Introduction
2. Dredging Requirements
3. Available Disposal Options
4. Assessment of the Disposal Options
5. Identification of the BPEO

2. Dredging Requirements

2.1 Dredging

2.1.1 Uig Harbour was last dredged in 2015. This was classed as a 'maintenance dredge to ensure that the operation of the harbour is maintained'. The volume of dredge was less than 5000m^3 and therefore was deemed acceptable by Marine Scotland for beach nourishment.

2.1.2 The proposed 'Capital Dredge' is required due to the increased draft of the proposed new vessel of 0.5m depth and to increase resilience of the route for use by a range of vessels (up to and including the draft depth of the MV Isle of Lewis). The proposed dredge volume would be 30,792m^3. This volume would provide sufficient depth for the harbour for all intended vessels provided by CFL to serve Uig. Following the Capital Dredge, maintenance dredging will be required to maintain the depth in the navigable areas. The anticipated maintenance dredging will be undertaken at 5 yearly intervals.

2.2 Dredge Sediment characteristics

2.2.1 The material to be dredged was sampled and analysed. This was undertaken during the ground investigation undertaken by Holequest Ltd and included in document No. THC/UHRG1/1117/FACT (attached in Appendix A) and the sampling undertaken by Aspect Surveys (attached in Appendix B). The finding from the ground investigation identified that the material contains elevated levels of some metals as discussed further below.

2.2.2 Geo-chemical testing was undertaken on nine samples from the superficial deposits at three locations in order to determine the suitability for disposal of any dredged material at sea:

- BH DS01 at 0.3m, 1.5m and 3.0m BSBL.
- DS02 (seabed sample) at 0.1m, 0.5m and 0.8m BSBL.
- BH1 at 0.0m, 0.5m and 2.0m BSBL.

2.2.3 The results are compared to the Marine Scotland Action Levels, as published in the Pre-Disposal Sampling Guidance Version 1 (2017). This comparison can be observed in Table 1, reproduced below.

Table 1: Summary of Pre Disposal Sampling Test

Contaminant	Action Level 1 (mg/kg dry weight)	Action Level 2 (mg/kg dry weight)	Maximum recorded concentration (mg/kg)	Number of exceedances (AL1-AL2)
Arsenic	20	70	9	0-0
Cadmium	0.4	4	0.3	0-0
Chromium	50	370	490	9-4
Copper	30	300	97	8-0
Mercury	0.25	1.5	0.35	1-0
Nickel	30	150	260	9-8
Lead	50	400	7.6	0-0
Zinc	130	600	120	0-0
Tributyl tin	0.1	0.5	22	1-1
Polychlorinated Biphenyls	0.02	0.18	0.0092	0-0

2.2.4 The exact location of areas to be dredged remains unconfirmed. The samples taken from the existing pier should therefore be used for a preliminary assessment only, with further sampling required at a future date once the dredge area is defined.

2.2.5 There are recorded concentrations of five substances which exceed the relevant Action Level 1 (AL1) concentrations. Three of these substances also exceed the Action Level 2 (AL2) concentrations. Three Chromium concentrations above the AL2 threshold value were recorded in the 3 samples from the 'Seabed' sampling location (DS02) and the one in the 1.5m BSBL sample at the BH DS1 location. Elevated Nickel concentrations above the AL2 threshold were observed in samples from all three locations. The 1.5m sample from BH DS1 exceed the AL1 concentrations of 8 PAH's, concentrations over double the action level are recorded for Dibenzo(ah)anthracene, Furoanthene and Pyrene. The PAH (total) value for this sample is well below the AL1 concentration.

2.2.6 For the Post glacial Deposits in the Foreshore Area

2.2.6.1 The trial pits encountered very soft / very loose material at the surface, underlain by variable deposits of sands, gravels, silts and clays including shell debris and organic material. Borehole BH07 encountered possibly organic clay, dense to very dense sand and gravel and gravel overlying stiff to very stiff clay. Most of the CPTs were terminated at shallow depth due to obstructions, however they also encountered variable deposits of variable consistencies.

2.2.6.2 Laboratory classification testing of the organic silt indicates that recorded moisture contents range from 24% to 50%. The finer fraction recovered from the more cohesive materials generally classifies as silts (occasionally clays) of high plasticity (plasticity index ranging from 17 to 33, average 23). Particle size distribution analysis indicates the material to be slightly clayey to clayey slightly sandy slightly gravelly silt.

2.2.7 Glacial Till Deposits in the Pier Area

2.2.7.1 The superficial deposits around the existing pier comprised variable deposits of sands, gravels, silts and clays down to depths of between 6.4m and 9.6m below seabed level. Below this were generally stiff to very stiff (locally firm) clay with bands of sand and /or gravel, with cobbles and boulders, proved to a to maximum depth of 36.5m below seabed level (-40.94m CD).

2.2.7.2 Laboratory classification testing indicates that recorded moisture contents range from 10% to 32%. The finer fraction recovered from the more cohesive materials generally classifies as clays of low to intermediate plasticity (plasticity index ranging from 7 to 35, average 18). Particle size distribution analysis indicated the glacial till materials to contain varying proportions of finer and coarser materials but to primarily comprise silty / clayey slightly sandy GRAVEL or slightly sandy slightly gravelly to gravelly CLAY (based also on the classification tests).

3. Available Disposal Options

3.1 Overview

3.1.1 A range of disposal options have been considered in this BPEO assessment including the following and detailed in the following sections:

Option 1 – Land Reclamation on Site

Option 2 – Construction Material Offsite

Option 3 – Beach Recharge

Option 4 – Sea Disposal at Existing Disposal Site

Option 5 – Sea Disposal at New Sea Disposal Site

Option 6 – Landfill

3.2 Option 1 – Land Reclamation on Site

3.2.1 The Proposed Development includes the expansion of the current marshalling area by land reclamation. A proportion of the dredged material could be used as infilling material for the land reclamation, if appropriately prepared to a suitable specification. To reuse the material, further working of the material would be required. The material would first be landed from the dredger. The dredged arisings must then be placed onshore and moved to an appropriate space to be dried and classified, then additional material added to ensure the dredge material is compliant with specification for infill and/or treatment for contamination then relocated to be deposited in the reclaim.

3.2.2 Transportation of the material to a space for drying out would generate an increase in traffic for moving the 30,792m^3 of dredging. If the assumption is they were moved by 40t trucks and is adopted, this would generate circa 1,400 vehicle movements for moving to the processing site and additional 1,400 movements to the reclaim area. This would total approximately 2,800 vehicle movements.

3.3 Option 2 – Construction Material Offsite

3.3.1 Dredged material can be suitable for use as construction material offsite. Given the high content of certain metals identified in the ground investigation and sampling undertaken in 2017 of the sediment in Uig (see section 2.2), the material would require treatment prior to further use as a construction material. The material would have to be landed and transported to an appropriate site for treatment, then transported to a storage site and finally further transported to the site for its specific use. This option is similar to option 1 except it moves the process to a remote site from this locality (potentially - Duisky Landfill Site, Kinlocheil, near Fort William - 137 miles away from Uig by road). The potential triple or quadruple handing of the material and processing would create significant cost.

3.4 Option 3 – Beach Recharge

3.4.1 Should there be a requirement for beach recharge this option considered whether the dredged material could be used for this purpose. This would require Marine Scotland's approval and could only be suitable for small amounts (<5000m^3). The methodology would require; sampling of the proposed recharge area to consider the suitability of the receiving material, and then monitoring of the area identified for disposal and its adjacent parts for sediment transportation and 'drift' for a period before and after recharge of a minimum of 2 years. It is understood that the existing foreshore has a relatively low amenity to the local community and is tidally flooded. A detailed methodology for undertaking this work was not identified at this stage as it was considered that the time required to undertake an assessment and associated monitoring is not compatible with the project programme and costs.

3.5 Option 4 – Sea Disposal at an Existing Disposal Site

3.5.1 There is an existing disposal site at Loch Broom adjacent to Ullapool Harbour as shown in Figure 1. It is understood the site was used for the disposal of dredged material for Ullapool Harbour Redevelopment in 2015. The distance to the site from Uig is approximately 75 nautical miles. This distance would mean that the dredging operation would require additional time as the hopper for the dredger would need to travel to the disposal site. Additional hoppers would be required.

3.5.2 The disposal site at Ullapool would need to be tested and assessed for chemical suitability and compatibility with the known characteristics, including high metal content, of the dredge material expected from Uig Bay. The consideration of cost/programme impact due to the distance and the mobilisation of additional equipment and timescale would extend the programme due to travel time to the disposal site, it is estimated this would add 2-4 weeks to the dredging activity programme. Cost associated with this task would increase by 100-200% when compared to disposal at a new local site to Uig.

3.5.3

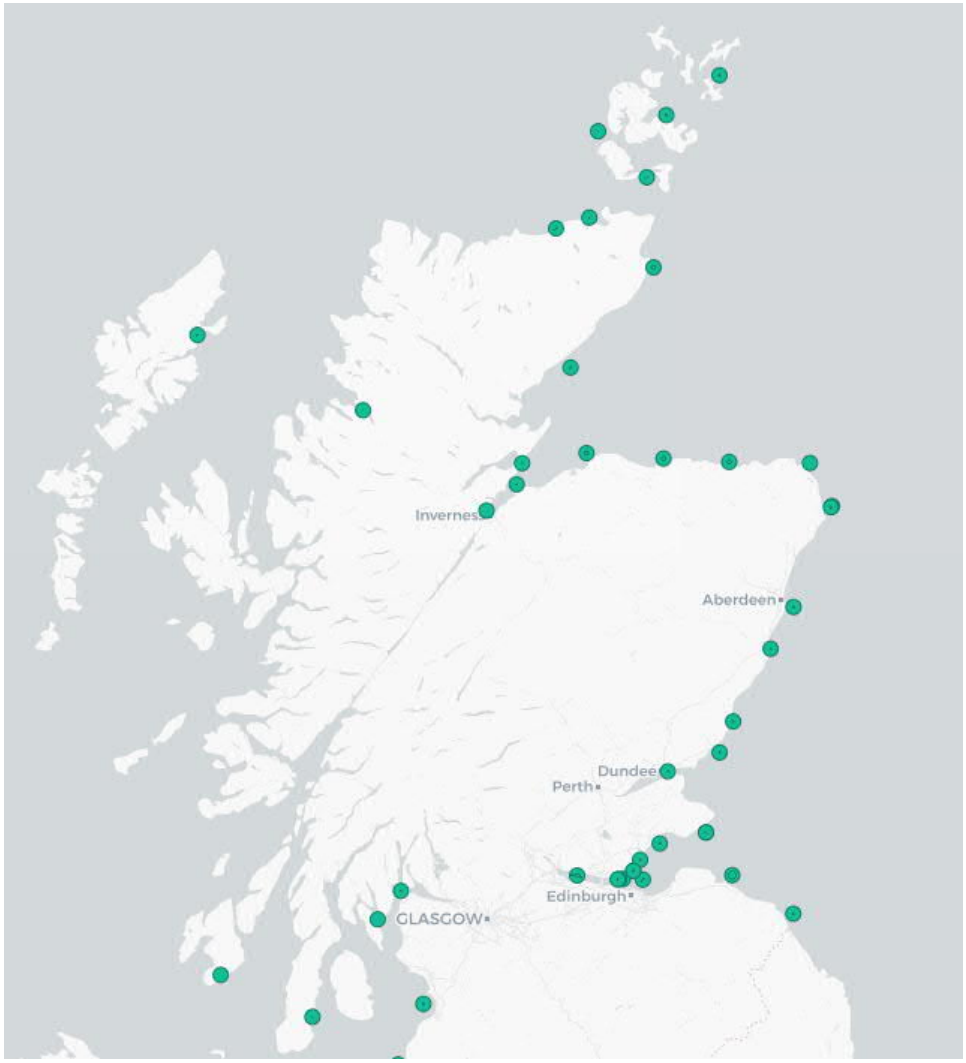


Figure 1. Existing, open, marine disposal sites (source – Extract from Marine Scotland Maps NMPI)

3.6 Option 5 – Sea Disposal at a New Disposal Site

3.6.1 Given the significant distance to existing sea disposal sites, this BPEO assessment also considered the potential of opening a new disposal site within Uig Bay. This option offers an opportunity for efficient materials handling as dredge material will be collected straight into the barge hopper and disposed of without any additional processing.

The high metal content expected within the dredge sediments is likely to be at least partially, as a result of naturally occurring geological process 'BGS, Information on Land Quality in Scotland, R&D Technical Report P293'. These characteristics are therefore likely to be relatively widespread within Uig Bay. Disposing of dredged materials locally, would

therefore minimise the risk of distributing contamination to areas which are currently unaffected.

3.6.2 A Site Characterisation Study including a survey programme to identify physical, chemical and biological characteristics of an agreed search area within Uig Bay would be required in order to identify a suitable disposal site. Appropriate disposal licencing would then be required to be agreed with Marine Scotland.

3.7 Option 6 – Landfill

3.7.1 The dredged material would be landed and transported by road to Duisky Landfill Site, Kinlocheil, near Fort William. This site was identified but has not been confirmed to be suitable to accept the waste. The cost associated with road transport of the dredge arisings would be in excess of £2.5m with the considered volume for road transport. Space on land would be required to process the material for road transport. The material would need to be landed and dried prior to transport.

4. Assessment of Disposal Options

4.1 Summary of Available Options

4.1.1 As part of the assessment, an indicative high-level cost of each option along with consideration of the practicalities of physically undertaking of each option was considered in developing the BPEO. The chemical composition of the dredged arising considered is summarised in section 2.2 of this report and is provided from the ground investigation undertaken by Holequest Ltd in document No. THC/UHRG1/1117/FACT. The results of the sampling testing are included in Appendix A with further dredge sampling which was also undertaken by Aspect Surveys and results are included in Appendix B.

4.2 Option 1 – Land Reclamation on Site

Strategic Considerations

4.2.1 The handling of the dredge material onshore will present specific operational challenges, as the material will be saturated, difficult to handle (till dried) and will have an odour issue dependent upon wind direction and amount of organic bed material recovered. The dredged material would need to be; landed, transported, classified, separated, treated/improved, tested and then transported to the reclamation.

4.2.2 As part of the ground investigation, testing was undertaken to find the composition of the samples, the material was found to contain concentrations of certain metals specifically, chromium and nickel which are believed to be naturally occurring. The level of chromium and nickel in some samples exceeded the level 2 actions used by Marine Scotland for Dredged Material Assessment. Liaison with Marine Scotland and the Applicant regarding the possibility of reuse of the material took place. Marine Scotland's Malcolm Rose indicated that the observed high levels of metals in the area are likely naturally occurring. This is acknowledged in 'BGS, Information on Land Quality in Scotland, R&D Technical Report P293'

Environmental Considerations

4.2.3 The odour from the dredged material (see below) may cause discomfort to those in proximity of the site compound, which is proposed to be adjacent to the existing terminal building, local businesses and residential property.

The landing of the dredged material could impact on the existing harbour activity which would include the Harbour and ferry operation, as well as the local community. The estimated dredge volume of circa 30,792m^3 would require approximately 1,400 vehicle movements on the pier for tippers to take it to the compound, this additional traffic could be expected to have a detrimental effect on the local community and road, road users, with increase noise, emissions and road safety.

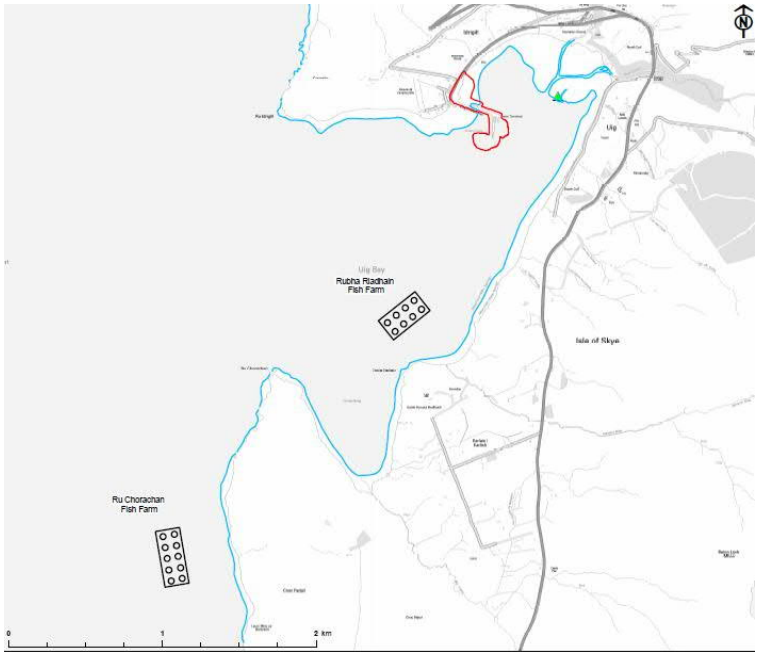


Figure 2. Location of fish farms in relation to proposed development

Aesthetically, the storage of dredged arisings on land, initially in the form of a slurry then once processed, arisings will be in a dried form, would be visually intrusive. In addition arisings may result in potential odour issues particularly when in slurry form. In dried form, dust may also be a problem.

Available mitigation options for the above would be to install hoarding and covers as appropriate. Management of the run-off from the drying process would require additional surface drainage management. Traffic management measures would also be adopted to manage the additional traffic, but limited measures could be used to reduce the impact of this option on odour and handling.

During the drying process airborne dust would require standard dust suppression measures for the arisings.

Cost Considerations

4.2.4 The cost for handling the dredge material, classification, treatment and reuse would be £1.5 this considers that 50% of the material would be unsuitable for the reclaim material and this would need to be transported to landfill and disposed. The cost considerations are for the practical undertaking of the work.

4.3 Option 2 – Construction Material Offsite

Strategic Considerations

4.3.1 As discussed within Option 1, the handling of the dredge material onshore will present specific challenges, as the material will be saturated, difficult to handle until it has been dried and may present an odour issue; dependent upon wind direction and amount of organic bed material recovered. The dredged material would need to be; landed, transported, classified, separated, treated/improved, tested and then transported to the reclamation. The licensing for 'disposal' on land would need acceptance from SEPA.

4.3.2 As part of the ground investigation, testing was undertaken to find the composition of the samples, the material was found to contain naturally occurring high metals. The level of chromium and Nickel in some samples exceeded the level 2 actions levels used by Marine Scotland for Dredged Material Assessment. Treatment of the material would be required to ensure all levels are below Action Level 1. Currently the samples also show elevated levels of copper that exceed the Level 1 actions level used by Marine Scotland for Dredged Material Assessment. Landfill tax and waste management certification would be required to ensure proper processing and disposal.

Environmental Considerations

4.3.3 The handling of the dredged material would increase the risk to health and safety, with the increased traffic cause by the movement of the material, potential dust from drying and processing and also the work of processing the arisings. The material would be transported by road to a site for processing and treat the dredging to remove or reduce the levels of the metals in the soil so it can be used in alternative locations and organic matter, also specific processing for the purpose of the reuse of the material. The risks to the public in this option are reduced when compared to option 1 however, the whole process would occur at the nearest landfill site which, is approximately 137 miles away.

4.3.4 The material once treated could be suitable for a different application but the transportation of the material will again be required to the location where it is required. The distance the material would have to travel and the processing that would be required may be is impractical.

Cost Considerations

4.3.5 The key cost would be the transportation of the sediment. It is estimated from experience and consideration of the transport costs and distance to the landfill site that the cost of this option would be in excess of £2m. The cost considerations are for the practical undertaking of the work.

4.4 Option 3 – Beach Recharge

Strategic Considerations

4.4.1 The dredging could be dispersed from the hopper at high tide on the foreshore using a splitter hopper adjacent to the works to the north and east of the proposed marshalling area. This would minimise any requirement for road transport. At low tide tracked "back actor' excavator could be used to spread the arisings to form the beach nourishment, a deposition depth of of 600mm has been assumed, which would require significant foreshore area to disperse the material.

4.4.2 The potential was identified for sediment movement from beach recharge location(s) back towards the dredge area around the berth as a result of natural coastal processes, which may lead to the requirement for a more frequent maintenance dredging regime.

4.4.3 This option would require beach monitoring pre- and post- disposal in order to understand natural beach recharge rates and existing rates of coastal weathering etc. No monitoring has been undertaken to date. The period of monitoring may vary but would likely include two years of monitoring pre-disposal and 1 year after disposal. These fall outwith the timescales of the project for the pre-disposal surveys.

4.4.4 Dredge disposal licence(s) would be required from Marine Scotland for this option.

4.4.5 Disposal in the beach location would also increase the siltation rate of the fisherman's berth.

Environmental Considerations

4.4.6 Beach recharge was initially considered as a viable option where the dredge volume was <5000m^3. However as the volume of dredge material now expected is significantly more than 5000m^3 following our original consultation with Marine Scotland (5th July 2017) acknowledged concern that should the dredge volume be >5000m^3 they would have difficulty in them accepting the volume. From our discussion large volumes of beach re-charge in this area was not acceptable.

4.4.7 Noise generated as a result of vehicle movements and from sediment handling machinery on the foreshore would impact the local community. It has also been assumed that this option does not offer sufficient capacity for the disposal of the full volume of dredge sediment expected. As a result the remainder of dredge materials would also require disposal through one of the other method options discussed above also therefore incurring additional environmental effects associated with this additional disposal method.

Cost Considerations

4.4.8 The cost associated with this option would be comparable with disposal at a new sea disposal site. It is considered possible that disposal of up to approximately 5000m^3 could be accommodated by this option in Uig Bay. As a result other forms of disposal would be also required.

4.4.9 For this exercise it is assumed that some may be used if suitable in the backfill of the infill are of 50% of the total dredged volume and the remaining is taken to landfill. This is estimated from experience and the above considerations to be £1.2m. The cost considerations are for the practical undertaking of the work.

4.5 Option 4 – Sea Disposal at Existing Disposal Site

Strategic Considerations

4.5.1 The existing disposal site closest to Uig is at Loch Broom at Ullapool. This is approximately 75 nautical miles away from the dredging area. Using a site at this distance from the Proposed Development would increase the cost and time required, meaning additional hoppers, tugs and equipment would likely be required. This option would also require further assessment of the characteristics of the existing disposal site at Ullapool to establish its suitability to accept dredge sediments from Uig. An assessment of the suitability of the site would be required prior to disposal and a licence from Marine Scotland for disposal at the site.

Dredge disposal at the existing site at Ullapool would require significant transit times for the dredge hopper(s) between Uig and Ullapool. As a result the capital dredge programme could be expected to be subject to greater influence by weather conditions than other options under consideration.

Environmental Considerations

4.5.2 The disposal site in Loch Broom at Ullapool lies within the Wester Ross Marine Protected Area (MPA) designated for burrowed mud and circalittoral muddy sand communities. All three species of seapen found in Scottish coastal waters are present within this MPA, including substantial numbers of the nationally scare tall seapen (Marine Scotland et al 2014)[1]. Whilst this disposal site is listed as an open site, It is considered that disposal of the quantity of dredge materials to be generated by the Proposed Development could result in significant effects on the benthic habitats for which this MPA is designated.

4.5.3 The distance between Uig and the disposal site at Ullapool would also result in higher vessel emissions when compared to more local disposal options, with result effects on air quality.

Cost Considerations

4.5.4 The cost associated would be approximately £1m. This is estimated considering the distance the disposal site is from Uig bay, the extended time for dredging required with extra equipment and risk of weather delays is more prominent as the duration of the dredge would possibly extended. The cost considerations are for the practical undertaking of the work.

[1] Marine Scotland, JNCC, SNH and The Scottish Government (2014): Wester Ross Marine Protected Area: Amazing marine biodiversity in a glacial landscape.

4.6 Option 5 – Sea Disposal at New Sea Disposal Site within Uig Bay.

Strategic Considerations

4.6.1 This option offers the opportunity for efficient materials handling, when compared with other options and could therefore be expected to have the least impact on the receiving environment in terms of operational impact and handling.

4.6.2 A marine disposal licence will need to be obtained. The marine licence application will be required to include an assessment of the proposed site for suitability for the dredge disposal. Licence determination is expected to take up to 16 weeks, although it has been acknowledged in discussion with Marine Scotland that application consideration timescale may be extended as a reflection of the potential complexity of the application.

4.6.3 In obtaining a licence for a new sea disposal site for dredge arisings in close proximity to the Proposed Development, this would streamline and minimise subsequent potential effects as a result of future maintenance dredging.

Environmental Considerations

4.6.4 Consideration of potential for sediment dispersion impacts affecting the two identified fish farms in Uig would need further assessment. This option has minimal impact on public health. The elevated metal content in the samples would need to be assessed with the sampling from the disposal site. It is assumed at this stage the material is suitable when considering the proximity to the dredge site.

A benthic survey and assessment would need to be undertaken to understand the characteristics of existing benthic communities within Uig Bay and to ensure any effects as a result of sediment deposition could be minimised.

Cost Considerations

4.6.5 The cost associated with the dredging and disposal at the new site and disposal at Sea is estimated at £550k. The cost considerations are for the practical undertaking of the work.

4.7 Option 6 – Landfill

Strategic Considerations

4.7.1 The considerations associated with disposing of dredged deposits to landfill are similar to those discussed in Option 1 and 2. The transportation is a key consideration and the cost of landfill tax would be substantial.

4.7.2 Due to the substantial cost associated with this option (as discussed below) and duration of programme required to transport this volume by road and the associated time requirements of having to land the arising and dry the material prior to transport. This option should be dismissed. The landfill site at Lochaber and the one identified above at Duisk are a significant distance by road. The cost associated with moving the dredging and processing at Uig was considered unfeasible.

Environmental Considerations

4.7.3 As discussed above the handing of the dredged arisings and traffic movements, noise, air quality and amenity disturbance would discount this option.

Cost Considerations

4.7.4 The key cost would be the transportation of the sediment and a desktop exercise was undertaken to ascertain the most practicable landfill that could be used to treat, store and re-use the material and concluded it would be the Duisky Landfill Site, Kinlocheil, near Fort William, approximately 137 miles away from the site. This would incur a significant cost, in excess of circa £2.5m more than disposal at a new disposal site. The cost considerations are for the practical undertaking of the work.

5. Waste Hierarchy

1. **Prevention** this is not possible as without dredging the 'lifeline' ferry service to Tarbert and Lochmaddy could not operate regularly.

2. **Re-use** of the material is discussed in this BPEO assessment, but it is not considered feasible as a result of the chemical composition of the sediments, and the required handling and processing of material that will be highly saturated. The high metal content, fine material as the level of preparation of the dredged material would be subject to thorough de-watering makes it unsuitable for re-use.

3. **Recycling** of the dredging has been assessed as part of the BPEO but is not suitable due to the makeup of the dredged material in the geotechnical report and water content. The following options are discussed:

    a. Beach Recharge

    b. Reclaim

    c. Landfill and

    d. Construction Material

    All options were found unsuitable, predominantly due to the characteristics of the dredged material.

4. **Other Recovery** the limited use of the material and the significant cost of processing/remediation would not be viable.

5. **Disposal** for both onshore and offshore application have been assessed as part of the BPEO. The distance of the nearest landfill site would not be feasible due to the practical, economic and environmental cost associated with disposal to land.

6. Identification of the BPEO

6.1 BPEO Scoring Matrix

6.1.1 In considering the options, the key benefits and disadvantages of each option have been considered and an indicative scoring of Low/Moderate/High impact allocated as described below:

- **Cost** – This is an assessment from the cost estimates associated with each option. The options are compared with each other where high is the highest and the low present the lowest assumed cost.
- **Logistical difficulty** – This considers the handling and the movement of the arisings. The distance and number of times the arising are transferred and handles was considered. High is the most distance and times the material is transferred and handled.
- **Environmental impact** – this is an overall consideration for the natural environment that the option would have for the lifecycle of the options. The greater the impact this would be classed as high, when compared against all the other options.
- **Public Health Risk** – this considers the interaction of the options with human health. High describes the high risk to human public health when compared against the other options.
- **Duration** - is the estimated time to undertake the option. High is for high duration of the options
- **Technical Difficulty** – This considers the practical possibility of delivering these options within the context of the project This looks at the need for space and time to undertake the option and compares them against each other.

Table 2: A summary of the Assessment of the Best Practical Environmental Option

Options	Cost	Logistical Difficulty	Environmental Impact	Public Health risk	Duration	Technical Difficulty
1. Reuse for Land Reclamation	Moderate	Moderate	Low	High	High	High
2. Reuse for Offsite	High	High	Low	Moderate	Moderate	High
3. Beach Recharge	Low	Moderate	Moderate	Low	Moderate	High
4.Sea Disposal at Existing Site	Moderate	Low	High	Low	Low	Moderate
5. Sea disposal at New Site	Low	Low	Moderate	Low	Low	Low
6.Landfill	Very High	Moderate	Low	Low	Moderate	High

6.2 Discussion

6.2.1 The strategic considerations highlighted that the need for handling and transport of the dredged arisings is a key consideration particularly in consideration of onshore disposal options due to the volume of material required to be moved by road transport. The Need to process the arising on land is considered impractical either as a result of the extensive site space that would be required if processed locally, or as a result of the distance for the material to be transported for offsite disposal options. The effort to move the material would increase vehicular traffic increasing the risk to Health and Safety of the local community and road safety.

6.2.2 The assumed dredge method for the capital dredge is cutter suction dredging, which would place the arisings on a hopper. The subsequent landing of this material for processing with significant vehicular movements, as proposed in Option 1 would be both technically impractical and disruptive for the local community. The visual intrusion of storage, odour from drying, noise from moving vehicles, dust from arisings and the need to store this material with limited space mean this was discounted at an early stage. Uig is a small town and its connection made by the Lifeline ferry service to Tarbert and Lochmaddy makes it a tourist and visitor area and the operation to land the arisings would not be advantageous to the local community or visitors/tourists

6.2.3 A similar range of environmental considerations exist for Option 2, with the exception of the significant vehicular movements created as a result of landing the arising. The distance to the Duisk site would also increase the level of vehicle activity and the time required to dispose of dredge materials. .

6.2.4 The high metal content in samples collected limits the reuse of the material away from the locality of the works. Beach nourishment with dredged material has been undertaken in the past but the volume of such previous works was low and this option was considered likely to have a significant impact on the foreshore unsuitable for the volume of dredge arisings to be generated here. The long terms effects of beach recharge are difficult to measure but it is considered likely that the material would increase the siltation rate of the vessel berth area along the approachway used by the fisherman and commercial vessels directly adjacent to the area of disposal.

6.2.5 Beach recharge posed significant challenge with consenting due to the significant volume for the works. The volume of dredging would have meant a significant area of the foreshore would require to be used to spread the arisings to minimise impact. When this proposal was discussed with Marine Scotland it was noted that Marine Scotland would likely object to this approach due to the large volume discussed. Further consideration was the morphological and sedimentation process in the bay would likely increase the need for dredging of the harbour as the material ‘drifts’ and is transported onto the berths by swell, wave and current.

6.2.6 Due to the location of Uig, transportation both by road and sea to the existing disposal sites (both on and offshore) are significant for a project of this scale, increasing cost of the dredging and disposal part of this project, which would bring to question the viability of the project.

6.2.7 The need to keep the material local and minimise transportation provided the assessment with two meaningful options (3 & 5) Beach Recharge or New Disposal Site.

6.2.8 Option 3: Beach recharge was considered unlikely to offer sufficient capacity to accommodate the volume of dredge materials expected to be generated as a result of the Proposed Development.

6.2.9 The disposal at a new sea disposal site in proximity to Uig Bay would have impact on the sub-tidal habitats within Loch Snizort and Uig Bay which were mapped as part of the 1988 Skye Sealochs Marine Nature Conservation Review (MNCR) (JNCC, 2001). These include the habitats 'Seapens and burrowing mega fauna in circalittoral soft mud' and 'Kelp and red seaweed on sublittoral sediments'. 'Northern seafan and sponge communities' and 'Maerl beds' have also been previously recorded close to the Ascrib Islands. Whilst the burrowing megafauna in this biotope including seapens can tolerate smothering by fine sediments of up to approximately 30 cm depth, the sediment for disposal and quantity and depth of disposal required could be expected to result in localised habitat loss.

6.2.10 Careful consideration would need to be taken in identifying a specific site for a new disposal site, in order to minimise impact on local benthic communities. Notwithstanding this potential effect, it was considered that the particular characteristics of the local geology, including the naturally occurring elevated metal content expected within the dredge materials, should be most compatible for disposal in the local area, where the receiving environment could be expected to be similar. The minimal handling of sea disposal at the new disposal site is a most favourable as the arisings are neither landed or travelled a significant distance for disposal.

6.2.11 Option 5: Sea disposal in a new disposal location within the local area was identified as the BPEO to be taken forward to further investigation.

Appendix A Holequest Ltd Geotechnical Sampling and Testing Extract

4:0 LABORATORY TESTING

A programme of laboratory testing, agreed with AECOM, was undertaken at the UKAS Accredited laboratories of PSL Ltd on behalf of Messrs Holequest Limited. The tests where appropriate were undertaken in accordance with British Standard 1377 "Methods of Tests for Soils for Civil Engineering Purposes" or as indicated otherwise. The various tests undertaken are as follows:-

1) **NATURAL MOISTURE CONTENT**
2) **PARTICLE SIZE DISTRIBUTION BY WET SIEVE**
3) **PARTICLE SIZE DISTRIBUTION BY SEDIMENTATION (PIPETTE)**
4) **LIQUID & PLASTIC LIMITS**
5) **CONSOLIDATED DRAINED SHEARBOX**
6) **CONSOLIDATED UNDRAINED TRIAXIAL WITH MEASUREMENT OF POREWATER PRESSURE (MULTISATGE)**
7) **ONE DIMENSIONAL CONSOLIDATION**

A programme of laboratory testing for contaminants, agreed with AECOM, was undertaken at the UKAS / MCERTS accredited laboratory of Scientific Analysis Laboratories Ltd, on behalf of Messrs Holequest Limited. The soil and water samples were tested for one or more of the following:-

1) **BRE SD1 SUITE**
2) **MARINE SCOTLAND SUITE**
3) **WASTE ACCEPTANCE CRITERIA (UNKNOWN)**
4) **ARSENIC**
5) **BORON (WATER SOLUBLE)**
6) **CADMIUM**
7) **CHROMIUM (TOTAL)**
8) **COPPER**
9) **CYANIDE (TOTAL)**
10) **LEAD**
11) **MERCURY**
12) **NICKEL**
13) **pH**
14) **SELEMIUM**
15) **SULPHATE (ACID SOLUBLE AND 2:1 EXTRACT)**
16) **ZINC**
17) **ORGANIC MATTER CONTENT**
18) **PAH (EPA 16)**
19) **SVOC**
20) **VOC**
21) **TPH (ALIPHATIC / AROMATIC SPLIT)**
22) **ASBESTOS ID**

The Geotechnical and Environmental Laboratory Test Results are summarised in Appendix IV.

Prepared By:-

[redacted]

[redacted]

for HOLEQUEST LTD **Dated:- November 2017**

Approved By:-

[redacted]

[redacted]

for HOLEQUEST LTD **Dated:- November 2017**

&©ajb

APPENDIX IV

Laboratory Testing

ii) Environmental Testing

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 669675-2

Date of Report: 08-Aug-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference: 17/035
Customer Purchase Order: 17155
Customer Site Reference: UIG, Skye
Date Job Received at Concept: 19-Jul-2017
Date Analysis Started: 21-Jul-2017
Date Analysis Completed: 08-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

Report checked and authorised by : [redacted]

Issued by : [redacted]

[redacted]

Concept Reference: 669675
Project Site: UIG, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment
Metals Matrix Spike

				Concept Reference	**669675 005**
				Customer Sample Reference	**Matrix Spike**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**	
As Recovery	T750	AR	1	%	**100**
Cd Recovery	T750	AR	1	%	**100**
Cr Recovery	T750	AR	1	%	**100**
Cu Recovery	T750	AR	1	%	**90**
Ni Recovery	T750	AR	1	%	**100**
Pb Recovery	T750	AR	1	%	**100**
Zn Recovery	T750	AR	1	%	**100**

Concept Reference: 669675
Project Site: UIG, Skye
Customer Reference: 17/035

Soil Analysed as Soil
PAH Matrix Spike

Concept Reference	**669675 004**
Customer Sample Reference	**Matrix Spike**
Date Sampled	**20-JUL-2017**

Determinand	Method	Test Sample	LOD	Units	
Naphthalene Recovery	T429	AR	1	%	**92**
Acenaphthene Recovery	T429	AR	1	%	**97**
Phenanthrene Recovery	T429	AR	1	%	**93**
Chrysene Recovery	T429	AR	1	%	**95**
Benzo(a)Pyrene Recovery	T429	AR	1	%	**99**

Concept Reference: 669675
Project Site: UIG, Skye
Customer Reference: 17/035

Soil Analysed as Soil
PCB Matrix Spike

Concept Reference	**669675 004**
Customer Sample Reference	**Matrix Spike**
Date Sampled	**20-JUL-2017**

Determinand	Method	Test Sample	LOD	Units	
PCB BZ#28 Recovery	T434	AR	1	%	**84**
PCB BZ#52 Recovery	T434	AR	1	%	**94**
PCB BZ#101 Recovery	T434	AR	1	%	**86**
PCB BZ#118 Recovery	T434	AR	1	%	**90**
PCB BZ#153 Recovery	T434	AR	1	%	**86**
PCB BZ#138 Recovery	T434	AR	1	%	**92**
PCB BZ#180 Recovery	T434	AR	1	%	**92**

Concept Reference: 669675
Project Site: UIG, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment
Marine Scotland Suite

				Concept Reference	**669675 001**	**669675 002**	**669675 003**
				Customer Sample Reference	**Seabed 0.1m**	**Seabed 0.5m**	**Seabed 0.8m**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Arsenic	T740	AR	0.5	mg/kg	**7.3**	**9.0**	**6.5**
Cadmium	T740	AR	0.1	mg/kg	**0.3**	**0.3**	**0.3**
Chromium	T740	AR	0.5	mg/kg	**380**	**410**	**490**
Copper	T740	AR	0.5	mg/kg	**41**	**25**	**37**
Lead	T740	AR	0.5	mg/kg	**6.4**	**3.5**	**4.8**
Nickel	T740	AR	0.5	mg/kg	**220**	**190**	**230**
Zinc	T740	AR	1.0	mg/kg	**100**	**77**	**100**
Mercury	T355	AR	0.05	mg/kg	(13) **0.35**	(13) <0.05	(13) <0.05
Moisture	T2	AR	0.1	%	**20**	**21**	**15**
PCB (Total Tri-Hepta)	T16	AR	0.05	µg/kg	(2) <0.50	<0.05	<0.05
Tributyl tin	T16	AR	0.01	mg/kg	<0.01	<0.01	<0.01
PCB EC7 (Sum)	T85	AR	0.35	µg/kg	<0.35	<0.35	<0.35

Concept Reference: 669675
Project Site: UIG, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment

Poly-Chlorinated Biphenyls (ICES 7)

				Concept Reference	**669675 001**	**669675 002**	**669675 003**
				Customer Sample Reference	**Seabed 0.1m**	**Seabed 0.5m**	**Seabed 0.8m**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
PCB BZ#28	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#52	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#101	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#118	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#153	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#138	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#180	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05

Concept Reference: 669675
Project Site: UIG, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment
Total and Speciated USEPA16 PAH

				Concept Reference	**669675 001**	**669675 002**	**669675 003**
				Customer Sample Reference	**Seabed 0.1m**	**Seabed 0.5m**	**Seabed 0.8m**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T1	AR	2	µg/kg	**24**	**6**	**11**
Acenaphthylene	T1	AR	2	µg/kg	<2	<2	<2
Acenaphthene	T1	AR	2	µg/kg	**3**	<2	**3**
Fluorene	T1	AR	2	µg/kg	**2**	<2	**2**
Phenanthrene	T1	AR	2	µg/kg	**15**	<2	<2
Anthracene	T1	AR	2	µg/kg	**6**	<2	<2
Fluoranthene	T1	AR	2	µg/kg	**56**	<2	<2
Pyrene	T1	AR	2	µg/kg	**48**	<2	<2
Benzo(a)Anthracene	T1	AR	2	µg/kg	**33**	<2	<2
Chrysene	T1	AR	2	µg/kg	**33**	<2	<2
Benzo(b/k)Fluoranthene	T1	AR	2	µg/kg	**47**	**2**	<2
Benzo(a)Pyrene	T1	AR	2	µg/kg	**22**	<2	<2
Indeno(123-cd)Pyrene	T1	AR	2	µg/kg	**11**	<2	<2
Dibenzo(ah)Anthracene	T1	AR	2	µg/kg	**5**	<2	<2
Benzo(ghi)Perylene	T1	AR	2	µg/kg	**9**	<2	<2
PAH(total)	T1	AR	2	µg/kg	**310**	**8**	**16**

Index to symbols used in 669675-2

Value	Description
AR	As Received
2	LOD Raised Due to Matrix Interference
13	Results have been blank corrected.
N	Analysis is not UKAS accredited

Notes

The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T85	Calc
T740	ICP/MS (HF)
T16	GC/MS
T429	GC/MS (Recovery)
T1	GC/MS (HR)
T355	CVAFS
T750	ICP/MS (Recovery)
T2	Grav
T434	GC/MS (HR) (Recovery)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
PCB BZ#28 Recovery	T434	AR	1	%	N	004
PCB BZ#52 Recovery	T434	AR	1	%	N	004
PCB BZ#101 Recovery	T434	AR	1	%	N	004
PCB BZ#118 Recovery	T434	AR	1	%	N	004
PCB BZ#153 Recovery	T434	AR	1	%	N	004
PCB BZ#138 Recovery	T434	AR	1	%	N	004
PCB BZ#180 Recovery	T434	AR	1	%	N	004
Naphthalene Recovery	T429	AR	1	%	N	004
Acenaphthene Recovery	T429	AR	1	%	N	004
Phenanthrene Recovery	T429	AR	1	%	N	004
Chrysene Recovery	T429	AR	1	%	N	004
Benzo(a)Pyrene Recovery	T429	AR	1	%	N	004
Arsenic	T740	AR	0.5	mg/kg	N	001-003
Cadmium	T740	AR	0.1	mg/kg	N	001-003
Chromium	T740	AR	0.5	mg/kg	N	001-003
Copper	T740	AR	0.5	mg/kg	N	001-003
Lead	T740	AR	0.5	mg/kg	N	001-003
Nickel	T740	AR	0.5	mg/kg	N	001-003
Zinc	T740	AR	1.0	mg/kg	N	001-003
Mercury	T355	AR	0.05	mg/kg	N	001-003
Moisture	T2	AR	0.1	%	N	001-003
PCB (Total Tri-Hepta)	T16	AR	0.05	µg/kg	N	001-003
Tributyl tin	T16	AR	0.01	mg/kg	N	001-003
PCB EC7 (Sum)	T85	AR	0.35	µg/kg	N	001-003
PCB BZ#28	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#52	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#101	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#118	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#153	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#138	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#180	T1	AR	0.05	µg/kg	N	001-003
Naphthalene	T1	AR	2	µg/kg	N	001-003
Acenaphthylene	T1	AR	2	µg/kg	N	001-003
Acenaphthene	T1	AR	2	µg/kg	N	001-003
Fluorene	T1	AR	2	µg/kg	N	001-003
Phenanthrene	T1	AR	2	µg/kg	N	001-003
Anthracene	T1	AR	2	µg/kg	N	001-003
Fluoranthene	T1	AR	2	µg/kg	N	001-003
Pyrene	T1	AR	2	µg/kg	N	001-003

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Benzo(a)Anthracene	T1	AR	2	µg/kg	N	001-003
Chrysene	T1	AR	2	µg/kg	N	001-003
Benzo(b/k)Fluoranthene	T1	AR	2	µg/kg	N	001-003
Benzo(a)Pyrene	T1	AR	2	µg/kg	N	001-003
Indeno(123-cd)Pyrene	T1	AR	2	µg/kg	N	001-003
Dibenzo(ah)Anthracene	T1	AR	2	µg/kg	N	001-003
Benzo(ghi)Perylene	T1	AR	2	µg/kg	N	001-003
PAH(total)	T1	AR	2	µg/kg	N	001-003
As Recovery	T750	AR	1	%	N	005
Cd Recovery	T750	AR	1	%	N	005
Cr Recovery	T750	AR	1	%	N	005
Cu Recovery	T750	AR	1	%	N	005
Ni Recovery	T750	AR	1	%	N	005
Pb Recovery	T750	AR	1	%	N	005
Zn Recovery	T750	AR	1	%	N	005

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 675775-1

Date of Report: 23-Aug-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference:
Date Job Received at Concept: 25-Jul-2017
Date Analysis Started: 16-Aug-2017
Date Analysis Completed: 22-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by : [redacted]

Issued by : [redacted]

[redacted]

Concept Reference: 675775
Customer Reference:

Soil Analysed as Soil
CWG

Concept Reference	**675775 003**	**675775 008**
Customer Sample Reference	**TP02 0.0M**	**TP04 0.0M**
Date Sampled	**20-JUL-2017**	**21-JUL-2017**

Determinand	Method	Test Sample	LOD	Units		
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	<10
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	<1	<1
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	<1	<1
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	<1	<1
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	(13) <1	<1
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	<10	<10
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	<1	<1
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	<1	<1
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	<1	<1
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	<1	<1

Concept Reference: 675775
Customer Reference:

Soil Analysed as Soil
Suite Requested

Concept Reference	**675775 003**	**675775 008**
Customer Sample Reference	**TP02 0.0M**	**TP04 0.0M**
Date Sampled	**20-JUL-2017**	**21-JUL-2017**

Determinand	Method	Test Sample	LOD	Units		
Arsenic	T82	A40	2	mg/kg	**7**	**8**
Cadmium	T82	A40	1	mg/kg	<1	<1
Chromium	T82	A40	1	mg/kg	**52**	**71**
Copper	T82	A40	1	mg/kg	**55**	**43**
Lead	T82	A40	3	mg/kg	**10**	**19**
Mercury	T82	A40	1	mg/kg	<1	<1
Nickel	T82	A40	1	mg/kg	**140**	**170**
Selenium	T82	A40	3	mg/kg	<3	<3
Zinc	T82	A40	1	mg/kg	**95**	**130**
pH	T7	A40			**8.2**	**7.7**
Asbestos ID	T27	AR			N.D.	N.D.
Organic Matter	T2	A40	0.1	%	**1.9**	**3.8**

Concept Reference: 675775
Customer Reference:

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (EK)

					Concept Reference	675775 003	675775 008
					Customer Sample Reference	TP02 0.0M	TP04 0.0M
					Date Sampled	20-JUL-2017	21-JUL-2017
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T149	AR	0.01	mg/kg		**0.01**	**0.01**
Acenaphthylene	T149	AR	0.01	mg/kg		**0.01**	<0.01
Acenaphthene	T149	AR	0.01	mg/kg		<0.01	<0.01
Fluorene	T149	AR	0.01	mg/kg		<0.01	<0.01
Phenanthrene	T149	AR	0.01	mg/kg		**0.01**	<0.01
Anthracene	T149	AR	0.01	mg/kg		**0.01**	<0.01
Fluoranthene	T149	AR	0.01	mg/kg		**0.04**	**0.01**
Pyrene	T149	AR	0.01	mg/kg		**0.04**	**0.01**
Benzo(a)Anthracene	T149	AR	0.01	mg/kg		(13) **0.02**	(13) <0.01
Chrysene	T149	AR	0.01	mg/kg		**0.02**	**0.01**
Benzo(b)fluoranthene	T149	AR	0.01	mg/kg		**0.04**	**0.01**
Benzo(k)fluoranthene	T149	AR	0.01	mg/kg		**0.02**	<0.01
Benzo(a)Pyrene	T149	AR	0.01	mg/kg		**0.03**	**0.01**
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg		**0.02**	**0.01**
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg		**0.01**	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg		**0.03**	**0.01**
PAH(total)	T149	AR	0.01	mg/kg		**0.31**	**0.08**

Concept Reference: 675775

Customer Reference:

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)(EK)

					Concept Reference	675775 003	675775 008	675775 011
					Customer Sample Reference	TP02 0.0M	TP04 0.0M	SVOC BLANK
					Date Sampled	20-JUL-2017	21-JUL-2017	15-AUG-2017
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Phenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2-Chlorophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
1,3-Dichlorobenzene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
1,4-Dichlorobenzene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
1,2-Dichlorobenzene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2-methyl phenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
3/4-Methylphenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Hexachloroethane	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Nitrobenzene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Isophorone	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2,4-Dimethylphenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2,4-Dichlorophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Naphthalene	T16	AR	0.1	mg/kg		**0.2**	<0.1	<0.1
4-Chloroaniline	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Hexachlorobutadiene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2-Methylnaphthalene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2-Chloronaphthalene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2-Nitroaniline	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Dimethyl phthalate	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2,6-Dinitrotoluene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg		**0.2**	<0.1	<0.1
3-Nitroaniline	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Dibenzofuran	T16	AR	0.1	mg/kg		**0.1**	<0.1	<0.1
2,4-Dinitrotoluene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2,4-Dinitrophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
2-Nitrophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Diethyl phthalate	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg		**0.2**	<0.1	<0.1
4-Chlorophenyl phenylether	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
4-Nitroaniline	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Azobenzene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
4-Bromophenyl phenylether	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Hexachlorobenzene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Pentachlorophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg		**0.9**	**0.1**	<0.1
Anthracene	T16	AR	0.1	mg/kg		**0.3**	<0.1	<0.1
Carbazole	T16	AR	0.1	mg/kg		**0.3**	<0.1	<0.1
Di-n-butylphthalate	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg		**1.1**	**0.2**	<0.1
Pyrene	T16	AR	0.1	mg/kg		**0.9**	**0.2**	<0.1
Butyl benzylphthalate	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg		**0.5**	<0.1	<0.1
4-Nitrophenol	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Chrysene	T16	AR	0.1	mg/kg		**0.5**	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Di-n-octylphthalate	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Benzo(b/k)Fluoranthene	T16	AR	0.1	mg/kg		**0.8**	**0.1**	<0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg		**0.5**	<0.1	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg		**0.2**	<0.1	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg		<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg		**0.3**	<0.1	<0.1

Concept Reference: 675775

Customer Reference:

Soil Analysed as Soil

Volatile Organic Compounds (USEPA 624)

					Concept Reference	675775 003	675775 008
					Customer Sample Reference	TP02 0.0M	TP04 0.0M
					Date Sampled	20-JUL-2017	21-JUL-2017
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Dichlorodifluoromethane	T54	AR	5	µg/kg		<5	<5
Chloromethane	T54	AR	5	µg/kg		<5	<5
Vinyl chloride	T54	AR	5	µg/kg		<5	<5
Bromomethane	T54	AR	5	µg/kg		<5	<5
Chloroethane	T54	AR	5	µg/kg		<5	<5
Trichlorofluoromethane	T54	AR	5	µg/kg		<5	<5
1,1-Dichloroethylene	T54	AR	5	µg/kg		<5	<5
Dichloromethane	T54	AR	50	µg/kg		<50	<50
Trans-1,2-Dichloroethene	T54	AR	5	µg/kg		<5	<5
1,1-Dichloroethane	T54	AR	5	µg/kg		<5	<5
Cis-1,2-Dichloroethylene	T54	AR	5	µg/kg		<5	<5
2,2-Dichloropropane	T54	AR	5	µg/kg		<5	<5
Chloroform	T54	AR	5	µg/kg		<5	<5
Bromochloromethane	T54	AR	5	µg/kg		<5	<5
1,1,1-Trichloroethane	T54	AR	5	µg/kg		<5	<5
1,1-Dichloropropene	T54	AR	5	µg/kg		<5	<5
Carbon tetrachloride	T54	AR	5	µg/kg		<5	<5
1,2-Dichloroethane	T54	AR	5	µg/kg		<5	<5
Benzene	T54	AR	1	µg/kg		(13) <1	(13) <1
1,2-Dichloropropane	T54	AR	5	µg/kg		<5	<5
1,1,2-Trichloroethylene	T54	AR	5	µg/kg		<5	<5
Bromodichloromethane	T54	AR	5	µg/kg		<5	<5
Dibromomethane	T54	AR	5	µg/kg		<5	<5
Cis-1,3-Dichloropropene	T54	AR	5	µg/kg		<5	<5
Toluene	T54	AR	1	µg/kg		<1	<1
Trans-1,3-Dichloropropene	T54	AR	5	µg/kg		<5	<5
1,1,2-Trichloroethane	T54	AR	5	µg/kg		<5	<5
1,3-Dichloropropane	T54	AR	5	µg/kg		<5	<5
Tetrachloroethene	T54	AR	5	µg/kg		<5	<5
Chlorodibromomethane	T54	AR	5	µg/kg		<5	<5
1,2-dibromoethane	T54	AR	5	µg/kg		<5	<5
Chlorobenzene	T54	AR	5	µg/kg		<5	<5
1,1,1,2-Tetrachloroethane	T54	AR	5	µg/kg		<5	<5
EthylBenzene	T54	AR	1	µg/kg		<1	<1
M/P Xylene	T54	AR	1	µg/kg		<1	<1
O Xylene	T54	AR	1	µg/kg		<1	<1
Styrene	T54	AR	5	µg/kg		<5	<5
Bromoform	T54	AR	5	µg/kg		<5	<5
Isopropyl benzene	T54	AR	5	µg/kg		<5	<5
1,1,2,2-Tetrachloroethane	T54	AR	5	µg/kg		<5	<5
1,2,3-Trichloropropane	T54	AR	5	µg/kg		<5	<5
n-Propylbenzene	T54	AR	5	µg/kg		<5	<5
Bromobenzene	T54	AR	5	µg/kg		<5	<5
1,3,5-Trimethylbenzene	T54	AR	5	µg/kg		<5	<5
T-Butylbenzene	T54	AR	5	µg/kg		<5	<5
1,2,4-Trimethylbenzene	T54	AR	5	µg/kg		<5	<5
S-Butylbenzene	T54	AR	5	µg/kg		<5	<5
p-Isopropyltoluene	T54	AR	5	µg/kg		<5	<5
2-Chlorotoluene	T54	AR	5	µg/kg		<5	<5
4-Chlorotoluene	T54	AR	5	µg/kg		<5	<5
1,3-Dichlorobenzene	T54	AR	5	µg/kg		<5	<5
1,4-Dichlorobenzene	T54	AR	5	µg/kg		<5	<5
1,2-Dichlorobenzene	T54	AR	5	µg/kg		<5	<5

Index to symbols used in 675775-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
N.D.	Not Detected
13	Results have been blank corrected.
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

SVOC, PAH and VOC - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T7	Probe
T8	GC/FID
T149	GC/MS (SIR)
T27	PLM
T54	GC/MS (Headspace)
T2	Grav
T82	ICP/OES (Sim)
T16	GC/MS

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Phenol	T16	AR	0.1	mg/kg	U	003,008,011
Bis (2-chloroethyl) ether	T16	AR	0.1	mg/kg	U	003,008,011
2-Chlorophenol	T16	AR	0.1	mg/kg	U	003,008,011
1,3-Dichlorobenzene	T16	AR	0.1	mg/kg	U	003,008,011
1,4-Dichlorobenzene	T16	AR	0.1	mg/kg	U	003,008,011
1,2-Dichlorobenzene	T16	AR	0.1	mg/kg	U	003,008,011
Bis (2-chloroisopropyl) ether	T16	AR	0.1	mg/kg	U	003,008,011
2-methyl phenol	T16	AR	0.1	mg/kg	U	003,008,011
3/4-Methylphenol	T16	AR	0.1	mg/kg	U	003,008,011
Hexachloroethane	T16	AR	0.1	mg/kg	U	003,008,011
Nitrobenzene	T16	AR	0.1	mg/kg	U	003,008,011
Isophorone	T16	AR	0.1	mg/kg	U	003,008,011
2,4-Dimethylphenol	T16	AR	0.1	mg/kg	U	003,008,011
Bis (2-chloroethoxy) methane	T16	AR	0.1	mg/kg	U	003,008,011
2,4-Dichlorophenol	T16	AR	0.1	mg/kg	U	003,008,011
1,2,4-Trichlorobenzene	T16	AR	0.1	mg/kg	U	003,008,011
Naphthalene	T16	AR	0.1	mg/kg	U	003,008,011
4-Chloroaniline	T16	AR	0.1	mg/kg	U	003,008,011
Hexachlorobutadiene	T16	AR	0.1	mg/kg	U	003,008,011
4-Chloro-3-methylphenol	T16	AR	0.1	mg/kg	U	003,008,011
2-Methylnaphthalene	T16	AR	0.1	mg/kg	U	003,008,011
Hexachlorocyclopentadiene	T16	AR	0.1	mg/kg	U	003,008,011
2,4,6-Trichlorophenol	T16	AR	0.1	mg/kg	U	003,008,011
2,4,5-Trichlorophenol	T16	AR	0.1	mg/kg	U	003,008,011
2-Chloronaphthalene	T16	AR	0.1	mg/kg	U	003,008,011
2-Nitroaniline	T16	AR	0.1	mg/kg	U	003,008,011
Dimethyl phthalate	T16	AR	0.1	mg/kg	U	003,008,011
2,6-Dinitrotoluene	T16	AR	0.1	mg/kg	U	003,008,011
Acenaphthylene	T16	AR	0.1	mg/kg	U	003,008,011
Acenaphthene	T16	AR	0.1	mg/kg	U	003,008,011
3-Nitroaniline	T16	AR	0.1	mg/kg	U	003,008,011
Dibenzofuran	T16	AR	0.1	mg/kg	U	003,008,011
2,4-Dinitrophenol	T16	AR	0.1	mg/kg	N	003,008,011
2,4-Dinitrotoluene	T16	AR	0.1	mg/kg	U	003,008,011
2-Nitrophenol	T16	AR	0.1	mg/kg	U	003,008,011
Diethyl phthalate	T16	AR	0.1	mg/kg	U	003,008,011
Fluorene	T16	AR	0.1	mg/kg	U	003,008,011

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
4-Chlorophenyl phenylether	T16	AR	0.1	mg/kg	U	003,008,011
4-Nitroaniline	T16	AR	0.1	mg/kg	U	003,008,011
Azobenzene	T16	AR	0.1	mg/kg	U	003,008,011
4-Bromophenyl phenylether	T16	AR	0.1	mg/kg	U	003,008,011
Hexachlorobenzene	T16	AR	0.1	mg/kg	U	003,008,011
Pentachlorophenol	T16	AR	0.1	mg/kg	U	003,008,011
Phenanthrene	T16	AR	0.1	mg/kg	U	003,008,011
Anthracene	T16	AR	0.1	mg/kg	U	003,008,011
Carbazole	T16	AR	0.1	mg/kg	U	003,008,011
Di-n-butylphthalate	T16	AR	0.1	mg/kg	U	003,008,011
Fluoranthene	T16	AR	0.1	mg/kg	U	003,008,011
Pyrene	T16	AR	0.1	mg/kg	U	003,008,011
Butyl benzylphthalate	T16	AR	0.1	mg/kg	U	003,008,011
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	U	003,008,011
4-Nitrophenol	T16	AR	0.1	mg/kg	N	003,008,011
Chrysene	T16	AR	0.1	mg/kg	U	003,008,011
Bis (2-ethylhexyl)phthalate	T16	AR	0.1	mg/kg	U	003,008,011
Di-n-octylphthalate	T16	AR	0.1	mg/kg	U	003,008,011
Benzo(b/k)Fluoranthene	T16	AR	0.1	mg/kg	U	003,008,011
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	U	003,008,011
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	U	003,008,011
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	U	003,008,011
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	U	003,008,011
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	N	003,008
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	N	003,008
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	N	003,008
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	N	003,008
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	N	003,008
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	N	003,008
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	N	003,008
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	N	003,008
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	N	003,008
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	N	003,008
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	N	003,008
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	N	003,008
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	N	003,008
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	N	003,008
Naphthalene	T149	AR	0.01	mg/kg	U	003,008
Acenaphthylene	T149	AR	0.01	mg/kg	U	003,008
Acenaphthene	T149	AR	0.01	mg/kg	U	003,008
Fluorene	T149	AR	0.01	mg/kg	U	003,008
Phenanthrene	T149	AR	0.01	mg/kg	U	003,008
Anthracene	T149	AR	0.01	mg/kg	U	003,008
Fluoranthene	T149	AR	0.01	mg/kg	U	003,008
Pyrene	T149	AR	0.01	mg/kg	U	003,008
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	U	003,008
Chrysene	T149	AR	0.01	mg/kg	U	003,008
Benzo(b)fluoranthene	T149	AR	0.01	mg/kg	U	003,008
Benzo(k)fluoranthene	T149	AR	0.01	mg/kg	U	003,008
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	U	003,008
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	U	003,008
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	U	003,008
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	U	003,008
PAH(total)	T149	AR	0.01	mg/kg	U	003,008
Arsenic	T82	A40	2	mg/kg	U	003,008
Cadmium	T82	A40	1	mg/kg	U	003,008
Chromium	T82	A40	1	mg/kg	U	003,008
Copper	T82	A40	1	mg/kg	U	003,008
Lead	T82	A40	3	mg/kg	U	003,008
Mercury	T82	A40	1	mg/kg	U	003,008
Nickel	T82	A40	1	mg/kg	U	003,008
Selenium	T82	A40	3	mg/kg	U	003,008
Zinc	T82	A40	1	mg/kg	U	003,008
pH	T7	A40			U	003,008
Asbestos ID	T27	AR			SU	003,008
Organic Matter	T2	A40	0.1	%	N	003,008
Dichlorodifluoromethane	T54	AR	5	µg/kg	U	003,008
Chloromethane	T54	AR	5	µg/kg	U	003,008
Vinyl chloride	T54	AR	5	µg/kg	U	003,008
Bromomethane	T54	AR	5	µg/kg	U	003,008

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Chloroethane	T54	AR	5	µg/kg	U	003,008
Trichlorofluoromethane	T54	AR	5	µg/kg	U	003,008
1,1-Dichloroethylene	T54	AR	5	µg/kg	U	003,008
Dichloromethane	T54	AR	50	µg/kg	N	003,008
Trans-1,2-Dichloroethene	T54	AR	5	µg/kg	U	003,008
1,1-Dichloroethane	T54	AR	5	µg/kg	U	003,008
Cis-1,2-Dichloroethylene	T54	AR	5	µg/kg	U	003,008
2,2-Dichloropropane	T54	AR	5	µg/kg	U	003,008
Chloroform	T54	AR	5	µg/kg	U	003,008
Bromochloromethane	T54	AR	5	µg/kg	U	003,008
1,1,1-Trichloroethane	T54	AR	5	µg/kg	U	003,008
1,1-Dichloropropene	T54	AR	5	µg/kg	U	003,008
Carbon tetrachloride	T54	AR	5	µg/kg	U	003,008
1,2-Dichloroethane	T54	AR	5	µg/kg	U	003,008
Benzene	T54	AR	1	µg/kg	U	003,008
1,2-Dichloropropane	T54	AR	5	µg/kg	U	003,008
1,1,2-Trichloroethylene	T54	AR	5	µg/kg	U	003,008
Bromodichloromethane	T54	AR	5	µg/kg	U	003,008
Dibromomethane	T54	AR	5	µg/kg	U	003,008
Cis-1,3-Dichloropropene	T54	AR	5	µg/kg	U	003,008
Toluene	T54	AR	1	µg/kg	U	003,008
Trans-1,3-Dichloropropene	T54	AR	5	µg/kg	U	003,008
1,1,2-Trichloroethane	T54	AR	5	µg/kg	U	003,008
1,3-Dichloropropane	T54	AR	5	µg/kg	U	003,008
Tetrachloroethene	T54	AR	5	µg/kg	U	003,008
Chlorodibromomethane	T54	AR	5	µg/kg	U	003,008
1,2-dibromoethane	T54	AR	5	µg/kg	U	003,008
Chlorobenzene	T54	AR	5	µg/kg	U	003,008
1,1,1,2-Tetrachloroethane	T54	AR	5	µg/kg	U	003,008
EthylBenzene	T54	AR	1	µg/kg	U	003,008
M/P Xylene	T54	AR	1	µg/kg	U	003,008
O Xylene	T54	AR	1	µg/kg	U	003,008
Styrene	T54	AR	5	µg/kg	U	003,008
Bromoform	T54	AR	5	µg/kg	U	003,008
Isopropyl benzene	T54	AR	5	µg/kg	U	003,008
1,1,2,2-Tetrachloroethane	T54	AR	5	µg/kg	U	003,008
1,2,3-Trichloropropane	T54	AR	5	µg/kg	U	003,008
n-Propylbenzene	T54	AR	5	µg/kg	U	003,008
Bromobenzene	T54	AR	5	µg/kg	U	003,008
1,3,5-Trimethylbenzene	T54	AR	5	µg/kg	U	003,008
T-Butylbenzene	T54	AR	5	µg/kg	U	003,008
1,2,4-Trimethylbenzene	T54	AR	5	µg/kg	U	003,008
S-Butylbenzene	T54	AR	5	µg/kg	U	003,008
p-Isopropyltoluene	T54	AR	5	µg/kg	U	003,008
2-Chlorotoluene	T54	AR	5	µg/kg	U	003,008
4-Chlorotoluene	T54	AR	5	µg/kg	U	003,008
1,3-Dichlorobenzene	T54	AR	5	µg/kg	U	003,008
1,4-Dichlorobenzene	T54	AR	5	µg/kg	U	003,008
1,2-Dichlorobenzene	T54	AR	5	µg/kg	U	003,008

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 675785-1

Date of Report: 23-Aug-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference:
Date Job Received at Concept: 25-Jul-2017
Date Analysis Started: 16-Aug-2017
Date Analysis Completed: 22-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by : [redacted]

Issued by : [redacted]

[redacted]

Waste Acceptance Criteria

Customer Sample Reference : TP01 0.0M
SAL Sample Reference : 675785 001
Test Portion Mass (g) : 175
Date Sampled : Deviating

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
TPH C10-C40 (sum)	Calc	1	mg/kg	N	(100) <10	500.0		
BTEX (Sum)	Calc	0.0040	mg/kg	U	(13) <0.0040	6.0		
PCB EC7 (Sum)	Calc	0.00035	mg/kg	U	<0.030	1.0		
Total Organic Carbon	OX/IR	0.1	%	N	1.7	3.0	5.0	6.0
pH	Probe			U	8.2		>6.0	
Loss on Ignition	Grav	0.1	%	N	6.2			10.0

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.024	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0021	mg/kg	N	0.21	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.54	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.04	1.0	5.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	2.0	50.0	100.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0031	mg/kg	N	<0.0031	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.0021	mg/kg	N	<0.0021	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.052	mg/kg	N	0.48	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.045	0.4	10.0	40.0
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0052	mg/kg	N	0.0056	0.1	0.5	7.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.021	mg/kg	N	0.14	4.0	50.0	200.0
Chloride	Calc / Discrete Analyser	10	mg/kg	N	23000	800.0	**15000.0**	25000.0
Fluoride	Calc / Discrete Analyser	0.52	mg/kg	N	9.1	10.0	150.0	500.0
Sulphate	Calc / Discrete Analyser	5.2	mg/kg	N	1400	**1000.0**	20000.0	50000.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	290	500.0	800.0	1000.0
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	1.0		
Total Dissolved Solids	Calc	100	mg/kg	N	46000	**4000.0**	60000.0	100000.0

From: Criteria set by European Council Decision 2003/33/EC(2) pursuant to Directive 1999/31/EC(3) and implemented in Scotland by The Landfill (Scotland) Regulations 2003
The 2:1 moisture extract was not produced because the moisture content of the sample was greater than 200%. Therefore, the exact application of the two-step leaching test is precluded on technical grounds (ref: Section 5.2.4 BS EN 12457-3:2002). Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)
Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Waste Acceptance Criteria

Customer Sample Reference : TP03 1.0M
SAL Sample Reference : 675785 002
Test Portion Mass (g) : 175
Date Sampled : Deviating

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
TPH C10-C40 (sum)	Calc	1	mg/kg	N	<1	500.0		
BTEX (Sum)	Calc	0.0040	mg/kg	U	(13) 0.020	6.0		
PCB EC7 (Sum)	Calc	0.00035	mg/kg	U	<0.030	1.0		
Total Organic Carbon	OX/IR	0.1	%	N	1.5	3.0	5.0	6.0
pH	Probe			U	8.8		>6.0	
Loss on Ignition	Grav	0.1	%	N	3.0			10.0

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.043	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.11	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.04	1.0	5.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	2.0	50.0	100.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	<0.0020	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.050	mg/kg	N	<0.050	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.020	0.1	0.5	7.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	<0.020	4.0	50.0	200.0
Chloride	Calc / Discrete Analyser	10	mg/kg	N	25	800.0	15000.0	25000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	0.50	10.0	150.0	500.0
Sulphate	Calc / Discrete Analyser	5.0	mg/kg	N	180	1000.0	20000.0	50000.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	16	500.0	800.0	1000.0
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	1.0		
Total Dissolved Solids	Calc	100	mg/kg	N	880	4000.0	60000.0	100000.0

From: Criteria set by European Council Decision 2003/33/EC(2) pursuant to Directive 1999/31/EC(3) and implemented in Scotland by The Landfill (Scotland) Regulations 2003
Note:- Sample failed to produce sufficient eluate within the specified time after vacuum filtration for 1 hour and centrifugation for 30 minutes. Therefore, the exact application of the two-step leaching test is precluded on technical grounds. (ref: Section 5.2.4 BS EN 12457-3:2002) Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)
Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Index to symbols used in 675785-1

Value	Description
AR	As Received
2:1	Leachate to BS EN 12457-3 (2:1)
8:1	Leachate to BS EN 12457-3 (8:1)
A40	Assisted dried < 40C
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

GC/MS Headspace - LOD raised as samples diluted due to poor internal standard recovery.
PAH soil - These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.
The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 676021-1

Date of Report: 24-Aug-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: Mr Craig Rodger

Customer Job Reference: 17/035
Customer Site Reference: UIG Harbour Redevelopment
Date Job Received at Concept: 15-Aug-2017
Date Analysis Started: 16-Aug-2017
Date Analysis Completed: 22-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by : [redacted]

Issued by : [redacted]

[redacted]

Concept Reference: 676021
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**676021 009**	**676021 010**
				Customer Sample Reference	**BH6A 0.00M**	**BH6A 0.50M**
				Date Sampled	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Organic Matter	T2	A40	0.1	%	**3.0**	**3.2**

Concept Reference: 676021
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Soil Suite

				Concept Reference	**676021 001**	**676021 002**	**676021 003**	**676021 004**	**676021 005**
				Customer Sample Reference	**BH1 0.00M**	**BH1 5.80M**	**BH1 10.30M**	**BH8A 1.00M**	**BH8A 5.30M**
				Date Sampled	**Deviating**	**Deviating**	**Deviating**	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Leach Prep (2:1)	T2	AR			Extracted	Extracted	Extracted	Extracted	Extracted
pH	T7	A40			**8.9**	**9.0**	**8.6**	**9.1**	**8.1**
(Acid Soluble) SO4	T192	AR	0.01	%	**0.16**	**0.14**	**0.26**	**0.16**	**0.53**
Sulphur (total)	T6	A40	0.01	%	**0.09**	**0.19**	**0.34**	**0.14**	**1.7**

Concept Reference: 676021
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Soil Suite

				Concept Reference	**676021 006**	**676021 007**	**676021 008**	**676021 009**
				Customer Sample Reference	**BH9 0.90M**	**BH9 3.80M**	**BH9 9.10M**	**BH6A 0.00M**
				Date Sampled	**Deviating**	**Deviating**	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Leach Prep (2:1)	T2	AR			Extracted	Extracted	Extracted	Extracted
pH	T7	A40			**8.9**	**7.9**	**8.1**	**9.3**
(Acid Soluble) SO4	T192	AR	0.01	%	**0.17**	**0.76**	**0.37**	**0.35**
Sulphur (total)	T6	A40	0.01	%	**0.18**	**1.7**	**0.48**	**0.77**

Concept Reference: 676021
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Leachate 2:1 Analysed as Water
Suite A

				Concept Reference	**676021 001**	**676021 002**	**676021 003**	**676021 004**	**676021 005**
				Customer Sample Reference	**BH1 0.00M**	**BH1 5.80M**	**BH1 10.30M**	**BH8A 1.00M**	**BH8A 5.30M**
				Date Sampled	**Deviating**	**Deviating**	**Deviating**	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	<0.05	<0.05	**0.43**	<0.05	**1.5**
Chloride	T686	2:1	1	mg/l	**920**	**1100**	**2400**	**1300**	**2200**
Magnesium	T82	2:1	1	mg/l	**24**	**35**	**210**	**28**	**170**
Nitrate	T686	2:1	0.5	mg/l	<0.5	<0.5	<0.5	<0.5	**1.7**
Dissolved SO4(Total)	T285	2:1	10	mg/l	**491**	**379**	**844**	**374**	**1397**

Concept Reference: 676021
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Leachate 2:1 Analysed as Water
Suite A

				Concept Reference	**676021 006**	**676021 007**	**676021 008**	**676021 009**
				Customer Sample Reference	**BH9 0.90M**	**BH9 3.80M**	**BH9 9.10M**	**BH6A 0.00M**
				Date Sampled	**Deviating**	**Deviating**	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	<0.05	**3.2**	**2.2**	**2.1**
Chloride	T686	2:1	1	mg/l	**2100**	**1900**	**570**	**2300**
Magnesium	T82	2:1	1	mg/l	**44**	**160**	**220**	**5**
Nitrate	T686	2:1	0.5	mg/l	<0.5	<0.5	<0.5	<0.5
Dissolved SO4(Total)	T285	2:1	10	mg/l	**646**	**1900**	**1199**	**381**

Index to symbols used in 676021-1

Value	Description
AR	As Received
2:1	Leachate 2:1
A40	Assisted dried < 40C
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T7	Probe
T2	Grav
T686	Discrete Analyser
T6	ICP/OES
T82	ICP/OES (Sim)
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T285	ICP/OES (SIM) (Filtered)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Organic Matter	T2	A40	0.1	%	N	009-010
Leach Prep (2:1)	T2	AR			N	001-009
pH	T7	A40			U	001-009
(Acid Soluble) SO4	T192	AR	0.01	%	N	001-009
Sulphur (total)	T6	A40	0.01	%	N	001-009
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	U	001-009
Chloride	T686	2:1	1	mg/l	U	001-009
Magnesium	T82	2:1	1	mg/l	N	001-009
Nitrate	T686	2:1	0.5	mg/l	U	001-009
Dissolved SO4(Total)	T285	2:1	10	mg/l	N	001-009

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: Supplement to previous report number 677646-2

Date of Report: 18-Apr-2018

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference: 17/035
Customer Purchase Order: 17244
Customer Site Reference: UIG Harbour Redevelopment, Skye
Date Job Received at Concept: 22-Aug-2017
Date Analysis Started: 24-Aug-2017
Date Analysis Completed: 05-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

Report checked and authorised by : [redacted]

Issued by : [redacted]

Concept Reference: 677646
Project Site: UIG Harbour Redevelopment, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment
Metals Matrix Spike

				Concept Reference	**677646 001**	**677646 002**	**677646 003**
				Customer Sample Reference	**BH1 0.00M**	**BH1 0.50-2.00M**	**BH1 2.00-3.50M**
				Date Sampled	**18-AUG-2017**	**18-AUG-2017**	**18-AUG-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
As Recovery	T750	AR	1	%	**100**	**100**	**100**
Cd Recovery	T750	AR	1	%	**100**	**100**	**100**
Cr Recovery	T750	AR	1	%	**100**	**100**	**100**
Cu Recovery	T750	AR	1	%	**100**	**100**	**100**
Ni Recovery	T750	AR	1	%	**100**	**100**	**100**
Pb Recovery	T750	AR	1	%	**100**	**100**	**100**
Zn Recovery	T750	AR	1	%	**100**	**100**	**100**

Concept Reference: 677646
Project Site: UIG Harbour Redevelopment, Skye
Customer Reference: 17/035

Soil Analysed as Soil
PAH Matrix Spike

Concept Reference	**677646 005**
Customer Sample Reference	**Matrix Spikes**
Date Sampled	**18-AUG-2017**

Determinand	Method	Test Sample	LOD	Units	
Naphthalene Recovery	T429	AR	1	%	**100**
Acenaphthene Recovery	T429	AR	1	%	**100**
Phenanthrene Recovery	T429	AR	1	%	**100**
Chrysene Recovery	T429	AR	1	%	**99**
Benzo(a)Pyrene Recovery	T429	AR	1	%	**90**

Concept Reference: 677646
Project Site: UIG Harbour Redevelopment, Skye
Customer Reference: 17/035

Soil Analysed as Soil
PCB Matrix Spike

Concept Reference	**677646 005**
Customer Sample Reference	**Matrix Spikes**
Date Sampled	**18-AUG-2017**

Determinand	Method	Test Sample	LOD	Units	
PCB BZ#28 Recovery	T434	AR	1	%	**98**
PCB BZ#52 Recovery	T434	AR	1	%	**98**
PCB BZ#101 Recovery	T434	AR	1	%	**92**
PCB BZ#118 Recovery	T434	AR	1	%	**94**
PCB BZ#153 Recovery	T434	AR	1	%	**100**
PCB BZ#138 Recovery	T434	AR	1	%	**96**
PCB BZ#180 Recovery	T434	AR	1	%	**100**

Concept Reference: 677646
Project Site: UIG Harbour Redevelopment, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment
Marine Scotland Suite

				Concept Reference	**677646 001**	**677646 002**	**677646 003**
				Customer Sample Reference	**BH1 0.00M**	**BH1 0.50-2.00M**	**BH1 2.00-3.50M**
				Date Sampled	**18-AUG-2017**	**18-AUG-2017**	**18-AUG-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Arsenic	T740	AR	0.5	mg/kg	**7.3**	**7.2**	**8.8**
Cadmium	T740	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Chromium	T740	AR	0.5	mg/kg	**100**	**220**	**120**
Copper	T740	AR	0.5	mg/kg	**38**	**42**	**58**
Lead	T740	AR	0.5	mg/kg	**3.8**	**4.6**	**2.5**
Mercury	T355	AR	0.05	mg/kg	(13) <0.05	(13) <0.05	(13) <0.05
Moisture	T2	AR	0.1	%	**26**	**17**	**6.9**
Nickel	T740	AR	0.5	mg/kg	**140**	**240**	**210**
PCB EC7 (Sum)	T85	AR	0.35	µg/kg	<0.35	<0.35	<0.35
PCB (Total Tri-Hepta)	T16	AR	0.05	µg/kg	<0.05	<0.05	<0.05
Tributyl tin	T16	AR	0.01	mg/kg	<0.01	**0.02**	<0.01
Zinc	T740	AR	1.0	mg/kg	**77**	**96**	**78**

Concept Reference: 677646
Project Site: UIG Harbour Redevelopment, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment
Poly-Chlorinated Biphenyls (ICES 7)

				Concept Reference	**677646 001**	**677646 002**	**677646 003**
				Customer Sample Reference	**BH1 0.00M**	**BH1 0.50-2.00M**	**BH1 2.00-3.50M**
				Date Sampled	**18-AUG-2017**	**18-AUG-2017**	**18-AUG-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
PCB BZ#28	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#52	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#101	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#118	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#153	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#138	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#180	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05

Concept Reference: 677646
Project Site: UIG Harbour Redevelopment, Skye
Customer Reference: 17/035

Sediment Analysed as Sediment
Total and Speciated USEPA16 PAH

				Concept Reference	**677646 001**	**677646 002**	**677646 003**
				Customer Sample Reference	**BH1 0.00M**	**BH1 0.50-2.00M**	**BH1 2.00-3.50M**
				Date Sampled	**18-AUG-2017**	**18-AUG-2017**	**18-AUG-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T1	AR	2	µg/kg	(13) <2	(13) <2	(13) <2
Acenaphthylene	T1	AR	2	µg/kg	<2	<2	<2
Acenaphthene	T1	AR	2	µg/kg	<2	<2	<2
Fluorene	T1	AR	2	µg/kg	<2	<2	<2
Phenanthrene	T1	AR	2	µg/kg	**(13) 3**	**(13) 2**	(13) <2
Anthracene	T1	AR	2	µg/kg	<2	<2	<2
Fluoranthene	T1	AR	2	µg/kg	**(13) 9**	**(13) 6**	(13) <2
Pyrene	T1	AR	2	µg/kg	**(13) 11**	**(13) 6**	(13) <2
Benzo(a)Anthracene	T1	AR	2	µg/kg	**(13) 6**	**(13) 5**	(13) <2
Chrysene	T1	AR	2	µg/kg	**(13) 5**	**(13) 3**	(13) <2
Benzo(b/k)Fluoranthene	T1	AR	2	µg/kg	**10**	**9**	<2
Benzo(a)Pyrene	T1	AR	2	µg/kg	**6**	**4**	**6**
Indeno(123-cd)Pyrene	T1	AR	2	µg/kg	**4**	**3**	<2
Dibenzo(ah)Anthracene	T1	AR	2	µg/kg	<2	<2	<2
Benzo(ghi)Perylene	T1	AR	2	µg/kg	**5**	**3**	<2
PAH(total)	T1	AR	2	µg/kg	**59**	**41**	**6**

Index to symbols used in Supplement to previous report number 677646-2

Value	Description
AR	As Received
13	Results have been blank corrected.
N	Analysis is not UKAS accredited

Notes

Supplemental report issued in order to amend sample 002 Tributyl tin result due to laboratory transcription error.

Method Index

Value	Description
T434	GC/MS (HR) (Recovery)
T1	GC/MS (HR)
T429	GC/MS (Recovery)
T16	GC/MS
T355	CVAFS
T2	Grav
T740	ICP/MS (HF)
T750	ICP/MS (Recovery)
T85	Calc

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
As Recovery	T750	AR	1	%	N	001-003
Cd Recovery	T750	AR	1	%	N	001-003
Cr Recovery	T750	AR	1	%	N	001-003
Cu Recovery	T750	AR	1	%	N	001-003
Ni Recovery	T750	AR	1	%	N	001-003
Pb Recovery	T750	AR	1	%	N	001-003
Zn Recovery	T750	AR	1	%	N	001-003
Naphthalene Recovery	T429	AR	1	%	N	005
Acenaphthene Recovery	T429	AR	1	%	N	005
Phenanthrene Recovery	T429	AR	1	%	N	005
Chrysene Recovery	T429	AR	1	%	N	005
Benzo(a)Pyrene Recovery	T429	AR	1	%	N	005
PCB BZ#28 Recovery	T434	AR	1	%	N	005
PCB BZ#52 Recovery	T434	AR	1	%	N	005
PCB BZ#101 Recovery	T434	AR	1	%	N	005
PCB BZ#118 Recovery	T434	AR	1	%	N	005
PCB BZ#153 Recovery	T434	AR	1	%	N	005
PCB BZ#138 Recovery	T434	AR	1	%	N	005
PCB BZ#180 Recovery	T434	AR	1	%	N	005
Arsenic	T740	AR	0.5	mg/kg	N	001-003
Cadmium	T740	AR	0.1	mg/kg	N	001-003
Chromium	T740	AR	0.5	mg/kg	N	001-003
Copper	T740	AR	0.5	mg/kg	N	001-003
Lead	T740	AR	0.5	mg/kg	N	001-003
Mercury	T355	AR	0.05	mg/kg	N	001-003
Moisture	T2	AR	0.1	%	N	001-003
Nickel	T740	AR	0.5	mg/kg	N	001-003
PCB EC7 (Sum)	T85	AR	0.35	µg/kg	N	001-003
PCB (Total Tri-Hepta)	T16	AR	0.05	µg/kg	N	001-003
Tributyl tin	T16	AR	0.01	mg/kg	N	001-003
Zinc	T740	AR	1.0	mg/kg	N	001-003
PCB BZ#28	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#52	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#101	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#118	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#153	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#138	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#180	T1	AR	0.05	µg/kg	N	001-003
Naphthalene	T1	AR	2	µg/kg	N	001-003
Acenaphthylene	T1	AR	2	µg/kg	N	001-003

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Acenaphthene	T1	AR	2	µg/kg	N	001-003
Fluorene	T1	AR	2	µg/kg	N	001-003
Phenanthrene	T1	AR	2	µg/kg	N	001-003
Anthracene	T1	AR	2	µg/kg	N	001-003
Fluoranthene	T1	AR	2	µg/kg	N	001-003
Pyrene	T1	AR	2	µg/kg	N	001-003
Benzo(a)Anthracene	T1	AR	2	µg/kg	N	001-003
Chrysene	T1	AR	2	µg/kg	N	001-003
Benzo(b/k)Fluoranthene	T1	AR	2	µg/kg	N	001-003
Benzo(a)Pyrene	T1	AR	2	µg/kg	N	001-003
Indeno(123-cd)Pyrene	T1	AR	2	µg/kg	N	001-003
Dibenzo(ah)Anthracene	T1	AR	2	µg/kg	N	001-003
Benzo(ghi)Perylene	T1	AR	2	µg/kg	N	001-003
PAH(total)	T1	AR	2	µg/kg	N	001-003

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 681125-2

Date of Report: 20-Sep-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference: 17/035
Customer Purchase Order: 17257
Customer Site Reference: UIG Harbour Redevelopment
Date Job Received at Concept: 07-Sep-2017
Date Analysis Started: 08-Sep-2017
Date Analysis Completed: 20-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by : [redacted]

Issued by : [redacted]

Concept Reference: 681125
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Soil Suite

Concept Reference	**681125 001**
Customer Sample Reference	**BH2 @0.0**
Date Sampled	**18-AUG-2017**

Determinand	Method	Test Sample	LOD	Units	
Leach Prep (2:1)	T2	AR			Extracted
pH	T7	A40			**8.1**
(Acid Soluble) SO4	T192	AR	0.01	%	**0.17**
Sulphur (total)	T6	A40	0.01	%	**0.18**

Concept Reference: 681125
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Leachate 2:1 Analysed as Water
Suite A

Concept Reference	**681125 001**
Customer Sample Reference	**BH2 @0.0**
Date Sampled	**18-AUG-2017**

Determinand	Method	Test Sample	LOD	Units	
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	**1.2**
Chloride	T686	2:1	1	mg/l	**2300**
Magnesium	T82	2:1	1	mg/l	**68**
Nitrate	T686	2:1	0.5	mg/l	<0.5
Dissolved SO4(Total)	T285	2:1	10	mg/l	**494**

Index to symbols used in 681125-2

Value	Description
A40	Assisted dried < 40C
2:1	Leachate 2:1
AR	As Received
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T7	Probe
T2	Grav
T82	ICP/OES (Sim)
T686	Discrete Analyser
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T6	ICP/OES
T285	ICP/OES (SIM) (Filtered)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Leach Prep (2:1)	T2	AR			N	001
pH	T7	A40			U	001
(Acid Soluble) SO4	T192	AR	0.01	%	N	001
Sulphur (total)	T6	A40	0.01	%	N	001
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	U	001
Chloride	T686	2:1	1	mg/l	U	001
Magnesium	T82	2:1	1	mg/l	N	001
Nitrate	T686	2:1	0.5	mg/l	U	001
Dissolved SO4(Total)	T285	2:1	10	mg/l	N	001

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 681797-1

Date of Report: 20-Sep-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference: 17/035
Customer Purchase Order: 17266
Customer Site Reference: Uig Harbour, Redevelopment
Date Job Received at Concept: 11-Sep-2017
Date Analysis Started: 12-Sep-2017
Date Analysis Completed: 20-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by : [redacted]

Issued by : [redacted]

[redacted]

Concept Reference: 681797
Project Site: Uig Harbour, Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Soil Suite

				Concept Reference	**681797 001**	**681797 002**
				Customer Sample Reference	**BH6A 7.50m**	**BH2 6.50m**
				Date Sampled	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Leach Prep (2:1)	T2	AR			Extracted	Extracted
pH	T7	A40			**8.5**	**9.0**
(Acid Soluble) SO4	T192	AR	0.01	%	**0.25**	**0.17**
Sulphur (total)	T6	A40	0.01	%	**0.55**	**0.54**

Concept Reference: 681797
Project Site: Uig Harbour, Redevelopment
Customer Reference: 17/035

Leachate 2:1 Analysed as Water
Suite A

				Concept Reference	**681797 001**	**681797 002**
				Customer Sample Reference	**BH6A 7.50m**	**BH2 6.50m**
				Date Sampled	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	**0.16**	**0.46**
Chloride	T686	2:1	1	mg/l	**1900**	**1700**
Magnesium	T82	2:1	1	mg/l	**49**	**32**
Nitrate	T686	2:1	0.5	mg/l	<0.5	<0.5
Dissolved SO4(Total)	T285	2:1	10	mg/l	**549**	**436**

Index to symbols used in 681797-1

Value	Description
A40	Assisted dried < 40C
2:1	Leachate 2:1
AR	As Received
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T2	Grav
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T7	Probe
T6	ICP/OES
T285	ICP/OES (SIM) (Filtered)
T82	ICP/OES (Sim)
T686	Discrete Analyser

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Leach Prep (2:1)	T2	AR			N	001-002
pH	T7	A40			U	001-002
(Acid Soluble) SO4	T192	AR	0.01	%	N	001-002
Sulphur (total)	T6	A40	0.01	%	N	001-002
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	U	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Chloride	T686	2:1	1	mg/l	U	001-002
Magnesium	T82	2:1	1	mg/l	N	001-002
Nitrate	T686	2:1	0.5	mg/l	U	001-002
Dissolved SO4(Total)	T285	2:1	10	mg/l	N	001-002

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 683576-1

Date of Report: 28-Sep-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference: 17/035
Customer Purchase Order: 17285
Customer Site Reference: UIG Harbour Redevelopment
Date Job Received at Concept: 19-Sep-2017
Date Analysis Started: 20-Sep-2017
Date Analysis Completed: 28-Sep-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by : [redacted]

Issued by : [redacted]

Concept Reference: 683576
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**683576 001**	**683576 004**	**683576 005**
				Customer Sample Reference	**BH3 4.50m**	**BH4 5.0m**	**BH5 4.5m**
				Date Sampled	**Deviating**	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Organic Matter	T2	A40	0.1	%	**2.6**	**5.0**	**7.6**

Concept Reference: 683576
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Soil Suite

				Concept Reference	**683576 002**	**683576 003**
				Customer Sample Reference	**BH3 7.50m**	**BH4 0.0m**
				Date Sampled	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Leach Prep (2:1)	T2	AR			Extracted	Extracted
pH	T7	A40			**9.9**	**9.2**
(Acid Soluble) SO4	T192	AR	0.01	%	**0.06**	**0.12**
Sulphur (total)	T6	A40	0.01	%	**1.0**	**0.27**

Concept Reference: 683576
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Leachate 2:1 Analysed as Water
Suite A

				Concept Reference	**683576 002**	**683576 003**
				Customer Sample Reference	**BH3 7.50m**	**BH4 0.0m**
				Date Sampled	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	**0.23**	<0.05
Chloride	T686	2:1	1	mg/l	**180**	**580**
Magnesium	T82	2:1	1	mg/l	<1	**4**
Nitrate	T686	2:1	0.5	mg/l	<0.5	<0.5
Dissolved SO4(Total)	T285	2:1	10	mg/l	**159**	**245**

Index to symbols used in 683576-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
2:1	Leachate 2:1
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T7	Probe
T285	ICP/OES (SIM) (Filtered)
T686	Discrete Analyser

T192	HCl Extraction/ICP/OES (TRL 447 T2)
T82	ICP/OES (Sim)
T2	Grav
T6	ICP/OES

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Organic Matter	T2	A40	0.1	%	N	001,004-005
Leach Prep (2:1)	T2	AR			N	002-003
pH	T7	A40			U	002-003
(Acid Soluble) SO4	T192	AR	0.01	%	N	002-003
Sulphur (total)	T6	A40	0.01	%	N	002-003
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	U	002-003
Chloride	T686	2:1	1	mg/l	U	002-003
Magnesium	T82	2:1	1	mg/l	N	002-003
Nitrate	T686	2:1	0.5	mg/l	U	002-003
Dissolved SO4(Total)	T285	2:1	10	mg/l	N	002-003

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 687648-2

Date of Report: 20-Oct-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference: 17/035
Customer Purchase Order: 17336
Customer Site Reference: UIG Harbour Redevelopment
Date Job Received at Concept: 06-Oct-2017
Date Analysis Started: 06-Oct-2017
Date Analysis Completed: 20-Oct-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

Report checked and authorised by : [redacted]

Issued by : [redacted]

[redacted]

Concept Reference: 687648
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Sediment Analysed as Sediment
Marine Scotland Suite

		Concept Reference	687648 001	687648 002	687648 003
		Customer Sample Reference	BH DS1 0.3m	BH DS1 1.50m	BH DS1 3.0m
Determinand	**Method**	**Test Sample** / **LOD** / **Units**			
Arsenic	T740	AR 0.5 mg/kg	**8.1**	**6.4**	**7.0**
Cadmium	T740	AR 0.1 mg/kg	**0.2**	**0.2**	**0.2**
Chromium	T740	AR 0.5 mg/kg	**310**	**460**	**330**
Copper	T740	AR 0.5 mg/kg	**97**	**43**	**62**
Lead	T740	AR 0.5 mg/kg	**7.6**	**4.0**	**3.8**
Nickel	T740	AR 0.5 mg/kg	**210**	**260**	**250**
Zinc	T740	AR 1.0 mg/kg	**120**	**100**	**110**
Mercury	T355	AR 0.05 mg/kg	(13) <0.05	(13) <0.05	(13) <0.05
Moisture	T2	AR 0.1 %	**14**	**12**	**11**
PCB EC7 (Sum)	T85	AR 0.35 µg/kg	**3.53**	<0.35	<0.35
PCB (Total Tri-Hepta)	T16	AR 0.05 µg/kg	**9.2**	<0.05	<0.05
Tributyl tin	T16	AR 0.01 mg/kg	<0.01	<0.01	<0.01

Concept Reference: 687648
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Sediment Analysed as Sediment
Poly-Chlorinated Biphenyls (ICES 7)

		Concept Reference	687648 001	687648 002	687648 003
		Customer Sample Reference	BH DS1 0.3m	BH DS1 1.50m	BH DS1 3.0m
Determinand	**Method**	**Test Sample** / **LOD** / **Units**			
PCB BZ#28	T1	AR 0.05 µg/kg	<0.05	<0.05	<0.05
PCB BZ#52	T1	AR 0.05 µg/kg	**0.39**	<0.05	<0.05
PCB BZ#101	T1	AR 0.05 µg/kg	**0.91**	<0.05	<0.05
PCB BZ#118	T1	AR 0.05 µg/kg	**0.74**	<0.05	<0.05
PCB BZ#153	T1	AR 0.05 µg/kg	**0.54**	<0.05	<0.05
PCB BZ#138	T1	AR 0.05 µg/kg	**0.73**	<0.05	<0.05
PCB BZ#180	T1	AR 0.05 µg/kg	**0.22**	<0.05	<0.05

Concept Reference: 687648
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Sediment Analysed as Sediment
Total and Speciated USEPA16 PAH

		Concept Reference	687648 001	687648 002	687648 003
		Customer Sample Reference	BH DS1 0.3m	BH DS1 1.50m	BH DS1 3.0m
Determinand	**Method**	**Test Sample** / **LOD** / **Units**			
Naphthalene	T1	AR 2 µg/kg	(13) <2	**(13) 3**	(13) <2
Acenaphthylene	T1	AR 2 µg/kg	**5**	**34**	**4**
Acenaphthene	T1	AR 2 µg/kg	**2**	**7**	<2
Fluorene	T1	AR 2 µg/kg	<2	**7**	**8**
Phenanthrene	T1	AR 2 µg/kg	**(13) 21**	**(13) 98**	**(13) 28**
Anthracene	T1	AR 2 µg/kg	**11**	**37**	**8**
Fluoranthene	T1	AR 2 µg/kg	**67**	**340**	**25**
Pyrene	T1	AR 2 µg/kg	**62**	**310**	**19**
Benzo(a)Anthracene	T1	AR 2 µg/kg	**(13) 32**	**(13) 150**	**(13) 8**
Chrysene	T1	AR 2 µg/kg	**29**	**130**	**8**
Benzo(b/k)Fluoranthene	T1	AR 2 µg/kg	**65**	**280**	**12**
Benzo(a)Pyrene	T1	AR 2 µg/kg	**36**	**160**	**7**
Indeno(123-cd)Pyrene	T1	AR 2 µg/kg	**22**	**88**	**4**
Dibenzo(ah)Anthracene	T1	AR 2 µg/kg	**6**	**20**	<2
Benzo(ghi)Perylene	T1	AR 2 µg/kg	**26**	**110**	**4**
PAH(total)	T1	AR 2 µg/kg	**380**	**1800**	**140**

Index to symbols used in 687648-2

Value	Description
AR	As Received
13	Results have been blank corrected.
N	Analysis is not UKAS accredited

Notes

PCB and ICP/MS analysis was carried out at Concept Life Sciences Manchester.
The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T16	GC/MS
T85	Calc
T355	CVAFS
T2	Grav
T1	GC/MS (HR)
T740	ICP/MS (HF)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T740	AR	0.5	mg/kg	N	001-003
Cadmium	T740	AR	0.1	mg/kg	N	001-003
Chromium	T740	AR	0.5	mg/kg	N	001-003
Copper	T740	AR	0.5	mg/kg	N	001-003
Lead	T740	AR	0.5	mg/kg	N	001-003
Nickel	T740	AR	0.5	mg/kg	N	001-003
Zinc	T740	AR	1.0	mg/kg	N	001-003
Mercury	T355	AR	0.05	mg/kg	N	001-003
Moisture	T2	AR	0.1	%	N	001-003
PCB EC7 (Sum)	T85	AR	0.35	µg/kg	N	001-003
PCB (Total Tri-Hepta)	T16	AR	0.05	µg/kg	N	001-003
Tributyl tin	T16	AR	0.01	mg/kg	N	001-003
PCB BZ#28	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#52	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#101	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#118	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#153	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#138	T1	AR	0.05	µg/kg	N	001-003
PCB BZ#180	T1	AR	0.05	µg/kg	N	001-003
Naphthalene	T1	AR	2	µg/kg	N	001-003
Acenaphthylene	T1	AR	2	µg/kg	N	001-003
Acenaphthene	T1	AR	2	µg/kg	N	001-003
Fluorene	T1	AR	2	µg/kg	N	001-003
Phenanthrene	T1	AR	2	µg/kg	N	001-003
Anthracene	T1	AR	2	µg/kg	N	001-003
Fluoranthene	T1	AR	2	µg/kg	N	001-003
Pyrene	T1	AR	2	µg/kg	N	001-003
Benzo(a)Anthracene	T1	AR	2	µg/kg	N	001-003
Chrysene	T1	AR	2	µg/kg	N	001-003
Benzo(b/k)Fluoranthene	T1	AR	2	µg/kg	N	001-003
Benzo(a)Pyrene	T1	AR	2	µg/kg	N	001-003
Indeno(123-cd)Pyrene	T1	AR	2	µg/kg	N	001-003
Dibenzo(ah)Anthracene	T1	AR	2	µg/kg	N	001-003
Benzo(ghi)Perylene	T1	AR	2	µg/kg	N	001-003
PAH(total)	T1	AR	2	µg/kg	N	001-003

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

16 Langlands Place
Kelvin South Business Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 689661-1

Date of Report: 23-Oct-2017

Customer: Holequest
Winston Road
Galashiels
TD1 2DA

Customer Contact: [redacted]

Customer Job Reference: 17/035
Customer Purchase Order: 17354
Customer Site Reference: UIG Harbour Redevelopment
Date Job Received at Concept: 14-Oct-2017
Date Analysis Started: 17-Oct-2017
Date Analysis Completed: 23-Oct-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked and authorised by : [redacted]

Issued by : [redacted]

Concept Reference: 689661
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**689661 001**	**689661 002**	**689661 005**	**689661 006**	**689661 008**
				Customer Sample Reference	**BH DS1 0.00-1.50M**	**BH DS1 4.50-6.00M**	**BH7 0.00-1.00M**	**BH7 1.00-2.50M**	**TP3 0.80M**
				Date Sampled	**Deviating**	**Deviating**	**Deviating**	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Organic Matter	T2	A40	0.1	%	**1.4**	**3.7**	**3.1**	**2.6**	**3.1**

Concept Reference: 689661
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**689661 009**	
				Customer Sample Reference	**TP3 3.00M**	
				Date Sampled	**Deviating**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Organic Matter	T2	A40	0.1	%	**3.0**	

Concept Reference: 689661
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Soil Suite

				Concept Reference	**689661 001**	**689661 002**	**689661 003**	**689661 004**	**689661 005**
				Customer Sample Reference	**BH DS1 0.00-1.50M**	**BH DS1 4.50-6.00M**	**BH DS1 6.00-7.50M**	**BH DS1 7.50-9.00M**	**BH7 0.00-1.00M**
				Date Sampled	**Deviating**	**Deviating**	**Deviating**	**Deviating**	**Deviating**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
pH	T7	A40			**9.2**	**8.4**	**9.5**	**8.9**	**8.3**
(Acid Soluble) SO4	T192	AR	0.01	%	**0.11**	**0.33**	**0.07**	**0.17**	**0.43**
Sulphur (total)	T6	A40	0.01	%	**0.08**	**1.2**	**0.11**	**0.31**	**0.81**

Concept Reference: 689661
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Soil Analysed as Soil
Soil Suite

				Concept Reference	**689661 007**	
				Customer Sample Reference	**BH7 8.50-10.00M**	
				Date Sampled	**Deviating**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
pH	T7	A40			**9.6**	
(Acid Soluble) SO4	T192	AR	0.01	%	**0.13**	
Sulphur (total)	T6	A40	0.01	%	**0.91**	

Concept Reference: 689661
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Leachate 2:1 Analysed as Water
Suite A

		Concept Reference	689661 001	689661 002	689661 003	689661 004	689661 005
		Customer Sample Reference	BH DS1 0.00-1.50M	BH DS1 4.50-6.00M	BH DS1 6.00-7.50M	BH DS1 7.50-9.00M	BH7 0.00-1.00M
		Date Sampled	Deviating	Deviating	Deviating	Deviating	Deviating
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	<0.05	**0.10**	**0.54**	**1.0**	<0.05
Chloride	T686	2:1	1	mg/l	**580**	**1700**	**340**	**1100**	**120**
Magnesium	T82	2:1	1	mg/l	**10**	**81**	**2**	**29**	**86**
Nitrate	T686	2:1	0.5	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved SO4(Total)	T285	2:1	10	mg/l	**305**	**1964**	**280**	**505**	**1922**

Concept Reference: 689661
Project Site: UIG Harbour Redevelopment
Customer Reference: 17/035

Leachate 2:1 Analysed as Water
Suite A

		Concept Reference	689661 007
		Customer Sample Reference	BH7 8.50-10.00M
		Date Sampled	Deviating
Determinand	**Method**	**Test Sample**	**LOD**	**Units**	
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	<0.05
Chloride	T686	2:1	1	mg/l	**29**
Magnesium	T82	2:1	1	mg/l	<1
Nitrate	T686	2:1	0.5	mg/l	<0.5
Dissolved SO4(Total)	T285	2:1	10	mg/l	**547**

Index to symbols used in 689661-1

Value	Description
A40	Assisted dried < 40C
2:1	Leachate 2:1
AR	As Received
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

The date of sampling has not been provided and therefore the time from sampling to analysis is unknown. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T2	Grav
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T7	Probe
T686	Discrete Analyser
T6	ICP/OES
T285	ICP/OES (SIM) (Filtered)
T82	ICP/OES (Sim)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Organic Matter	T2	A40	0.1	%	N	001-002,005-006,008-009
pH	T7	A40			U	001-005,007
(Acid Soluble) SO4	T192	AR	0.01	%	N	001-005,007
Sulphur (total)	T6	A40	0.01	%	N	001-005,007

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Ammonia expressed as NH4	T686	2:1	0.05	mg/l	U	001-005,007
Chloride	T686	2:1	1	mg/l	U	001-005,007
Magnesium	T82	2:1	1	mg/l	N	001-005,007
Nitrate	T686	2:1	0.5	mg/l	U	001-005,007
Dissolved SO4(Total)	T285	2:1	10	mg/l	N	001-005,007

Appendix B Aspect Survey Vibro-Core Sampling and Testing Extract

5. CONDUCT OF VIBROCORE SAMPLING

The vibrocore apparatus used was a lightweight SDI Vibecore 4D system with 76mm aluminium extruded pipe being used to recover the core. The system does not rely on overall mass but the vibrational frequency of the equipment and liquefaction of surrounding sediments to enable effective penetration. It is therefore reliant on the moisture content in the sediment.

The portability and simplicity of this equipment facilitates rapid deployment at an alternate location should the previous location provide a poor return.

The aim was to collect 3 cores in total across the site, of up to 3m in length, from sample points indicated on Figure 1.

The vessel was manoeuvred to each of the locations in turn and secured to the existing pier in order to avoid swinging during the sampling operation.

All vibrocore locations were sampled on 2nd & 3rd April 2018 at the following locations:

VIBROCORE POINT	SAMPLED EASTING	SAMPLED NORTHING	CORE LENGTH
VB3_3	138657.3	863558.7	2.1m
VB4_1	138778.8	863341.6	1.0m
VB5_2	138711.6	863549.2	1.4m

6. EQUIPMENT USED FOR SAMPLING

A Speciality Devices Incorporated D-4 vibrocorer was used for all samples. A 76mm diameter, 3m long core was fitted for all sample attempts and each core tube was constructed of aluminium.

The sediment was pushed out of the core tube prior to sampling the cores and then sampled with care being taken not to sample material that had come into contact with the sample tube wall.

FIGURE 2 - SDI D-4 VIBROCORER AND CORE ON DECK OF JOHANNA G

7. SAMPLE ANALYSIS

The laboratory analysis was carried out by SOCOTEC. The intention was that all vibrocore samples would be sub sampled at 0.5m intervals at the top middle and bottom of the length of the core and each sub sample analysed for Particle Size, Metals, WAC and Booster Biocides. The lab reporting is rendered with this report under separate cover:

A6542_Uig_Pre-disposal Sampling Results Form_MAR00025.xlsx

TEST REPORT

1252

Report No. EFS/184704 (Ver. 1)

SOCOTEC UK Limited Bretby (Marine)
Derwent House
Bretby Business Park
Ashby Road
Burton Upon Trent
Staffordshire
DE15 0YZ

Site: MAR00025

The 11 samples described in this report were registered for analysis by SOCOTEC UK Limited on 11-Apr-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 30-Apr-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

On behalf of
SOCOTEC UK Lim [redacted]
[redacted]
Operations Director
Energy & Waste Services

Date of Issue: 30-Apr-2018

Tests marked '^' have been subcontracted to another laboratory.
Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.
SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

Where individual results are flagged see report notes for status.

			Units :	Mol/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Method Codes :	ANC	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	LOI(%MM)	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS
			Method Reporting Limits :	0.04	10	10	20	20	10	10	30	0.2	0.08	0.08	0.08	0.08	0.08	0.08	0.08
			UKAS Accredited :	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LAB ID Number CL/	Client Sample Description	Sample Date		Acid Neut. Capacity	Benzene	Ethyl Benzene	m/p Xylenes	MTBE	o Xylene	Toluene	Xylenes	L.O.I. % @ 450C	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene
1900261	A6542 - 4_1_1	02-Apr-18		10.32	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	3.7	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §
1900262	A6542 - 4_1_2	02-Apr-18		6.16	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	3.9	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §
1900263	A6542 - 4_1_3	02-Apr-18		2.44	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	3.6	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §
1900264	A6542 - 3_3_1	03-Apr-18		1.76	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	11.0	< 0.08 §	< 0.08 §	< 0.08 §	0.15 §	0.17 §	0.18 §	0.10 §
1900265	A6542 - 3_3_2	03-Apr-18		1.24	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	8.1	< 0.08 §	< 0.08 §	0.12 §	0.36 §	0.37 §	0.39 §	0.19 §
1900266	A6542 - 3_3_3	03-Apr-18		4.68	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	3.3	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §
1900267	A6542 - 5_2_1	03-Apr-18		4.32	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	9.1	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §
1900268	A6542 - 5_2_2	03-Apr-18		4.00	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	7.3	< 0.08 §	< 0.08 §	< 0.08 §	0.85 §	0.87 §	1.28 §	0.36 §
1900269	A6542 - 5_2_3	03-Apr-18		4.00	< 10.0 §	< 10.0* §	< 20.0* §	< 20.0 §	< 10.0 §	< 10.0 §	<30 §	4.0	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §
1900271	QC Blank			<0.04	<10 §	<10 §	<20 §	<20 §	<10 §	<10 §	<30 §		< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §
1900272	Reference Material (% Recovery)			97	95 §	88 §	88 §	98 §	90 §	87 §	89 §	102	98 §	100 §	94 §	95 §	96 §	88 §	77 §

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name SOCOTEC UK Limited Bretby (Marine)

Contact [redacted]

Sample Analysis

MAR00025

Date Printed	27-Apr-2018
Report Number	EFS/184704
Table Number	1

Units :			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Method Codes :			PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PAHMSUS	PCBECD	PCBECD	PCBECD	PCBECD	PCBECD
Method Reporting Limits :			0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	1.28	5	5	5	5	5
UKAS Accredited :			Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**Benzo(k)fluoranthene**	**Chrysene**	**Coronene**	**Dibenzo(ah)anthracene**	**Fluoranthene**	**Fluorene**	**Indeno(123-cd)pyrene**	**Naphthalene**	**Phenanthrene**	**Pyrene**	**Total PAH (Sum of USEPA 16)**	**PCB 101**	**PCB 118**	**PCB 138**	**PCB 153**	**PCB 180**
1900261	A6542 - 4_1_1	02-Apr-18	< 0.08 §	< 0.08 §	< 0.08	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	1.28 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900262	A6542 - 4_1_2	02-Apr-18	< 0.08 §	< 0.08 §	< 0.08	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	1.28 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900263	A6542 - 4_1_3	02-Apr-18	< 0.08 §	< 0.08 §	< 0.08	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	1.28 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900264	A6542 - 3_3_1	03-Apr-18	< 0.08 §	0.13 §	< 0.08	< 0.08 §	0.27 §	< 0.08 §	< 0.08 §	< 0.08 §	0.15 §	0.42 §	2.22 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900265	A6542 - 3_3_2	03-Apr-18	0.18 §	0.29 §	< 0.08	< 0.08 §	0.62 §	< 0.08 §	0.20 §	< 0.08 §	0.29 §	0.59 §	4 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900266	A6542 - 3_3_3	03-Apr-18	< 0.08 §	< 0.08 §	< 0.08	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	1.28 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900267	A6542 - 5_2_1	03-Apr-18	< 0.08 §	< 0.08 §	< 0.08	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	1.28 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900268	A6542 - 5_2_2	03-Apr-18	0.60 §	1.54 §	0.09	0.08 §	0.97 §	< 0.08 §	0.39 §	< 0.08 §	0.11 §	1.00 §	8.45 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900269	A6542 - 5_2_3	03-Apr-18	< 0.08 §	< 0.08 §	< 0.08	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	1.28 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §	< 5.00 §
1900271	QC Blank		< 0.08 §	< 0.08 §	< 0.08	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 0.08 §	< 1.28 §	<5.00 §	<5.00 §	<5.00 §	<5.00 §	<5.00 §
1900272	Reference Material (% Recovery)		86 §	97 §	89	81 §	92 §	91 §	87 §	99 §	93 §	93 §	91 §	89 §	92 §	88 §	92 §	79 §

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name SOCOTEC UK Limited Bretby (Marine)

Contact [redacted]

Sample Analysis

MAR00025

Date Printed	**27-Apr-2018**
Report Number	**EFS/184704**
Table Number	**1**

Where individual results are flagged see report notes for status.

Units :			µg/kg	µg/kg	pH Units	%	mg/kg	mg/kg	% M/M									
Method Codes :			PCBECD	PCBECD	PHSOIL	TMSS	TPHFIDUS	TPHFIDUS	WSLM59									
Method Reporting Limits :			5	5		0.1	10	10	0.02									
UKAS Accredited :			Yes	Yes	Yes	Yes	Yes	Yes	Yes									
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**PCB 28**	**PCB 52**	**pH units (AR)**	**Tot.Moisture @ 105C**	**TPH Band (>C10-C40)**	**TPH by GCFID (AR)**	**Total Organic Carbon**									
1900261	A6542 - 4_1_1	02-Apr-18	< 5.00 §	< 5.00 §	8.6 §	25.3 §	21.3 §	22.5 §	0.54 §									
1900262	A6542 - 4_1_2	02-Apr-18	< 5.00 §	< 5.00 §	8.6 §	24.5 §	10.6 §	12.0 §	0.42 §									
1900263	A6542 - 4_1_3	02-Apr-18	< 5.00 §	< 5.00 §	8.9 §	19.8 §	< 10.0 §	< 10.0 §	0.30 §									
1900264	A6542 - 3_3_1	03-Apr-18	< 5.00 §	< 5.00 §	7.9 §	57.5 §	1510 §	1510 §	3.53 §									
1900265	A6542 - 3_3_2	03-Apr-18	< 5.00 §	< 5.00 §	8.4 §	51.5 §	629 §	630 §	2.61 §									
1900266	A6542 - 3_3_3	03-Apr-18	< 5.00 §	< 5.00 §	9 §	22.0 §	13.4 §	14.6 §	0.39 §									
1900267	A6542 - 5_2_1	03-Apr-18	65.1 §	< 5.00 §	8.4 §	40.6 §	126 §	127 §	2.11 §									
1900268	A6542 - 5_2_2	03-Apr-18	< 5.00 §	< 5.00 §	8.2 §	34.8 §	174 §	175 §	1.63 §									
1900269	A6542 - 5_2_3	03-Apr-18	< 5.00 §	< 5.00 §	8.8 §	29.6 §	10.6 §	12.0 §	0.74 §									
1900271	QC Blank		<5.00 §	<5.00 §			<10 §	<10 §	<0.02 §									
1900272	Reference Material (% Recovery)		82 §	93 §	98 §		93 §	93 §	112 §									

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name SOCOTEC UK Limited Bretby (Marine)

Contact [redacted]

Sample Analysis

MAR00025

Date Printed	**27-Apr-2018**
Report Number	**EFS/184704**
Table Number	**1**

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.292
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	25.3
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.383
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 4_1_1		s18_4704	CL/1900261	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	0.542§	3	5	6
N	LOI450	Loss on Ignition (%)	3.7			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0802	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.049	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	28.51§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.82	100		
N	PHSOIL	pH (pH units)	8.6 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	10.36		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except °°		mg/kg (dry weight)				
U	WSLM3	pH (pH units) °°	7.5	8.9	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) °°	9590	2650					
U	ICPMSW	Arsenic	0.008	0.003	0.016	0.04	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	0.002	<0.002	<0.02	0.5	10	70
U	ICPMSW	Copper	0.003	0.002	0.006	0.02	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.101	0.163	0.202	1.55	0.5	10	30
U	ICPMSW	Nickel	0.002	0.001	0.004	0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.003	0.003	0.006	0.03	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.003	<0.002	<0.03	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.002	<0.004	<0.02	4	50	200
U	KONENS	Chloride	2910	661	5820	9609	800	15000	25000
U	ISEF	Fluoride	1	1.3	2	13	10	150	500
U	ICPWATVAR	Sulphate as SO4	590	183	1180	2373	1000	20000	50000
N	WSLM27	Total Dissolved Solids	7480	2060	14960	27827	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	8.6	16	17.2	150	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.341
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	24.5
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.334
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 4_1_2		s18_4704	CL/1900262	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	0.426§	3	5	6
N	LOI450	Loss on Ignition (%)	4			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0796	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.049	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	14.04§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.80	100		
N	PHSOIL	pH (pH units)	8.6 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	6.25		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except oo		mg/kg (dry weight)				
U	WSLM3	pH (pH units) oo	7.6	7.8	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) oo	11400	1330					
U	ICPMSW	Arsenic	0.009	0.019	0.018	0.18	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.001	<0.002	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.274	0.038	0.548	0.69	0.5	10	30
U	ICPMSW	Nickel	0.003	<0.001	0.006	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.005	0.003	0.01	0.03	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.001	<0.002	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.005	<0.002	0.01	<0.02	4	50	200
U	KONENS	Chloride	3660	308	7320	7549	800	15000	25000
U	ISEF	Fluoride	1.1	0.7	2.2	8	10	150	500
U	ICPWATVAR	Sulphate as SO4	691	109	1382	1866	1000	20000	50000
N	WSLM27	Total Dissolved Solids	8900	1040	17800	20880	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	7.1	2.7	14.2	33	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.271
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	19.8
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.404
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 4_1_3		s18_4704	CL/1900263	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	0.301§	3	5	6
N	LOI450	Loss on Ignition (%)	3.6			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0745	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.042	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<12.47§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.70	100		
N	PHSOIL	pH (pH units)	8.9 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	2.45		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except oo		mg/kg (dry weight)				
U	WSLM3	pH (pH units) oo	8.1	8.7	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) oo	7620	992					
U	ICPMSW	Arsenic	0.022	0.031	0.044	0.3	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	0.001	<0.002	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.039	0.01	0.078	0.14	0.5	10	30
U	ICPMSW	Nickel	0.003	0.001	0.006	0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.005	0.004	0.01	0.04	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.001	<0.002	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.002	<0.004	<0.02	4	50	200
U	KONENS	Chloride	2320	217	4640	4974	800	15000	25000
U	ISEF	Fluoride	1.1	0.6	2.2	7	10	150	500
U	ICPWATVAR	Sulphate as SO4	394	127	788	1626	1000	20000	50000
N	WSLM27	Total Dissolved Solids	5940	774	11880	14628	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	3.9	1.9	7.8	22	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.417
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	57.5
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.258
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 3_3_1		s18_4704	CL/1900264	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	3.745§	3	5	6
N	LOI450	Loss on Ignition (%)	11.7			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.1415	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.084	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	3550§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<5.4	100		
N	PHSOIL	pH (pH units)	7.9 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	1.87		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except oo		mg/kg (dry weight)				
U	WSLM3	pH (pH units) oo	8.7	8.6	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) oo	7270	2970					
U	ICPMSW	Arsenic	0.081	0.004	0.162	0.14	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	0.001	<0.002	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.138	0.059	0.276	0.7	0.5	10	30
U	ICPMSW	Nickel	0.008	<0.001	0.016	<0.02	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.009	0.003	0.018	0.04	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.003	<0.002	<0.03	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.002	<0.004	<0.02	4	50	200
U	KONENS	Chloride	2300	774	4600	9775	800	15000	25000
U	ISEF	Fluoride	1.8	1.4	3.6	15	10	150	500
U	ICPWATVAR	Sulphate as SO4	926	134	1852	2396	1000	20000	50000
N	WSLM27	Total Dissolved Solids	5670	2310	11340	27580	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	6.8	16	13.6	148	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.278
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	51.5
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.397
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 3_3_2		s18_4704	CL/1900265	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	3.263§	3	5	6
N	LOI450	Loss on Ignition (%)	10.1			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.1238	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.07	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	1300§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<8.41	100		
N	PHSOIL	pH (pH units)	8.4 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	1.55		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except oo		mg/kg (dry weight)				
U	WSLM3	pH (pH units) oo	8.4	9.2	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) oo	9040	1530					
U	ICPMSW	Arsenic	0.004	0.005	0.008	0.05	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	0.004	<0.002	<0.04	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.18	0.08	0.36	0.93	0.5	10	30
U	ICPMSW	Nickel	<0.001	0.003	<0.002	<0.03	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.004	0.004	0.008	0.04	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.001	<0.002	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	0.003	<0.004	<0.03	4	50	200
U	KONENS	Chloride	2880	363	5760	6986	800	15000	25000
U	ISEF	Fluoride	1.4	0.8	2.8	9	10	150	500
U	ICPWATVAR	Sulphate as SO4	242	352	484	3373	1000	20000	50000
N	WSLM27	Total Dissolved Solids	7050	1200	14100	19800	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	0.06	<0.1	<0.6	1		
N	WSLM13	Dissolved Organic Carbon	15	4.3	30	57	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.288
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	22.0
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.387
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 3_3_3		s18_4704	CL/1900266	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	0.400§	3	5	6
N	LOI450	Loss on Ignition (%)	3.4			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0764	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.042	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	17.18§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.74	100		
N	PHSOIL	pH (pH units)	9 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	4.81		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except oo		mg/kg (dry weight)				
U	WSLM3	pH (pH units) oo	8	9.4	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) oo	22300	1200					
U	ICPMSW	Arsenic	0.018	0.155	0.036	1.37	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	0.001	<0.002	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.064	0.036	0.128	0.4	0.5	10	30
U	ICPMSW	Nickel	<0.001	0.011	<0.002	<0.1	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	0.004	<0.002	<0.04	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.002	<0.002	<0.02	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.002	<0.004	<0.02	4	50	200
U	KONENS	Chloride	8150	249	16300	13025	800	15000	25000
U	ISEF	Fluoride	1.1	1	2.2	10	10	150	500
U	ICPWATVAR	Sulphate as SO4	528	246	1056	2836	1000	20000	50000
N	WSLM27	Total Dissolved Solids	17400	935	34800	31303	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	11	5.4	22	61	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.441
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	40.6
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.234
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 5_2_1		s18_4704	CL/1900267	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	2.182§	3	5	6
N	LOI450	Loss on Ignition (%)	9.4			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.1014	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.1576	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	212§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<2.29	100		
N	PHSOIL	pH (pH units)	8.4 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	4.47		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except oo		mg/kg (dry weight)				
U	WSLM3	pH (pH units) oo	8.1	8	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) oo	22200	1230					
U	ICPMSW	Arsenic	0.011	0.013	0.022	0.13	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	0.003	<0.002	<0.03	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.359	0.015	0.718	0.61	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.001	<0.002	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.001	0.002	0.002	0.02	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.001	<0.002	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.002	<0.004	<0.02	4	50	200
U	KONENS	Chloride	8350	274	16700	13508	800	15000	25000
U	ISEF	Fluoride	0.9	0.7	1.8	7	10	150	500
U	ICPWATVAR	Sulphate as SO4	499	89	998	1437	1000	20000	50000
N	WSLM27	Total Dissolved Solids	17300	959	34600	31378	4000	60000	100000
U	SFAPI	Phenol Index	0.16	<0.05	0.32	<0.6	1		
N	WSLM13	Dissolved Organic Carbon	17	3.5	34	53	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.381
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	34.8
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.294
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 5_2_2		s18_4704	CL/1900268	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	1.648§	3	5	6
N	LOI450	Loss on Ignition (%)	7.4			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0919	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.056	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	267§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	13.1	100		
N	PHSOIL	pH (pH units)	8.2 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	4.04		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except °°		mg/kg (dry weight)				
U	WSLM3	pH (pH units) °°	7.9	8.7	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) °°	17300	2380					
U	ICPMSW	Arsenic	0.018	0.007	0.036	0.08	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.001	<0.002	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.206	0.106	0.412	1.19	0.5	10	30
U	ICPMSW	Nickel	<0.001	0.003	<0.002	<0.03	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.004	0.005	0.008	0.05	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.002	<0.002	<0.02	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.002	<0.004	<0.02	4	50	200
U	KONENS	Chloride	6150	602	12300	13417	800	15000	25000
U	ISEF	Fluoride	1.1	1.4	2.2	14	10	150	500
U	ICPWATVAR	Sulphate as SO4	815	320	1630	3860	1000	20000	50000
N	WSLM27	Total Dissolved Solids	13500	1860	27000	34120	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	8	9.9	16	96	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.317
Contact	[redacted]				Moisture content @ 105°C (% of Wet Weight)	29.6
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00025				Volume of water required to carry out 2:1 stage (litres)	0.358
					Fraction of sample above 4 mm %	
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	
A6542 - 5_2_3		s18_4704	CL/1900269	30-Apr-18	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	0.755§	3	5	6
N	LOI450	Loss on Ignition (%)	4.1			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0856	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.049	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	15.06§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.93	100		
N	PHSOIL	pH (pH units)	8.8 §		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	4.08		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except oo		mg/kg (dry weight)				
U	WSLM3	pH (pH units) oo	8.6	9.1	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) oo	11100	1630					
U	ICPMSW	Arsenic	0.181	0.174	0.362	1.75	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.01	<0.02	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	0.003	<0.002	<0.03	0.5	10	70
U	ICPMSW	Copper	<0.001	0.006	<0.002	<0.05	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.522	0.183	1.044	2.28	0.5	10	30
U	ICPMSW	Nickel	0.006	0.027	0.012	0.24	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.045	0.018	0.09	0.22	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	0.005	<0.002	<0.04	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.002	<0.004	<0.02	4	50	200
U	KONENS	Chloride	3540	378	7080	7996	800	15000	25000
U	ISEF	Fluoride	0.8	0.7	1.6	7	10	150	500
U	ICPWATVAR	Sulphate as SO4	724	916	1448	8904	1000	20000	50000
N	WSLM27	Total Dissolved Solids	8640	1270	17280	22527	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	12	12	24	120	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.

Analytical and Deviating Sample Overview

Customer SOCOTEC UK Limited Bretby (Marine)
Site MAR00025
Report No S184704

Consignment No S73786
Date Logged 11-Apr-2018
In-House Report Due 25-Apr-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	Sampled	MethodID	ANC	BTEXHSA		CEN Leach/Hot		CustServ	ICPMSS								LOI(%MM)	PAHMSUS	PCBECD	PHSOIL	TMSS	TPHFIDUS		WSLM59
			Sampled	Acid Neut. Capacity	BTEX-HSA + MTBE analysis	MTBE (µg/kg)	CEN Leac(P)1	CEN Leac(P)2	Report B >63 µm	Copper (MS) Sediment	Arsenic (MS) Sediments	Cadmium (MS) Sediments	Chromium (MS) Sediments	Lead (MS) Sediments	Mercury (MS) Low Level Sediments	Nickel (MS) Sediments	Zinc (MS) Sediments	L.O.I. % @ 450C	PAH (17) by GCMS	PCB-7 Congeners Analysis	pH units (AR)	Tot.Moisture @ 105C	TPH Band (>C10-C40)	TPH by GCFID (AR)	Total Organic Carbon
					✓	✓				✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
CL/1900261	A6542 - 4_1_1	02/04/18																							
CL/1900262	A6542 - 4_1_2	02/04/18																							
CL/1900263	A6542 - 4_1_3	02/04/18																							
CL/1900264	A6542 - 3_3_1	03/04/18																							
CL/1900265	A6542 - 3_3_2	03/04/18																							
CL/1900266	A6542 - 3_3_3	03/04/18																							
CL/1900267	A6542 - 5_2_1	03/04/18																							
CL/1900268	A6542 - 5_2_2	03/04/18																							
CL/1900269	A6542 - 5_2_3	03/04/18																							
CL/1900271	QC Blank																								
CL/1900272	Reference Material (% Recovery)																								

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key

A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time

Requested Analysis Key

	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted - **Note: due date may vary**

Where individual results are flagged see report notes for status.

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Report Number : EFS/184704

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
BTEXHSA	CL1900261 TO CL1900269	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation from the affected analytes (Ethylbenzene, M/P xylenes) . These circumstances should be taken into consideration when utilising the data”

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ANC	Oven Dried @ < 35°C	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Soil	BTEXHSA	As Received	Determination of Benzene, Toluene, Ethyl benzene and Xylenes (BTEX) by Headspace GCFID
Soil	ICPMSS	Oven Dried @ < 35°C	Determination of Metals in Marine Sediments and Soil samples by aqua regia digestion followed by ICPMS detection
Soil	LOI(%MM)	Oven Dried @ < 35°C	Determination of loss on ignition for soil samples at specified temperature by gravimetry
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	PCBECD	As Received	Determination of Polychlorinated Biphenyl (PCB) congeners/aroclors by hexane/acetone extraction followed by GCECD detection
Soil	PHSOIL	As Received	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.
Soil	TMSS	As Received	Determination of the Total Moisture content at 105ºC by loss on oven drying gravimetric analysis (% based upon wet weight)
Soil	TPHFIDUS	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection.
Soil	WSLM59	Oven Dried @ < 35°C	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS
Water	ICPWATVAR	As Received	Direct determination of Metals and Sulphate in water samples using ICPOES
Water	ISEF	As Received	Determination of Fluoride in water samples by Ion Selective Electrode (ISE)
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	SFAPI	As Received	Segmented flow analysis with colorimetric detection
Water	WSLM13	As Received	Instrumental analysis using acid/persulphate digestion and non-dispersive IR detection
Water	WSLM2	As Received	Determination of the Electrical Conductivity (µS/cm) by electrical conductivity probe.
Water	WSLM27	As Received	Gravimetric Determination
Water	WSLM3	As Received	Determination of the pH of water samples by pH probe

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l
Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile **TR** Denotes Tremolite
CR Denotes Crocidolite **AC** Denotes Actinolite
AM Denotes Amosite **AN** Denotes Anthophylite
NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols. This may have resulted in deterioration of the sample(s) during transit to the laboratory. Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined **N.Det** Not detected
N.F No Flow
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result
§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : SOCOTEC UK Limited Bretby (Marine)

Site : MAR00025

Report Number : S18_4704

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1900261	A6542 - 4_1_1	MARINE SEDIMENTS
CL/1900262	A6542 - 4_1_2	MARINE SEDIMENTS
CL/1900263	A6542 - 4_1_3	MARINE SEDIMENTS
CL/1900264	A6542 - 3_3_1	MARINE SEDIMENTS
CL/1900265	A6542 - 3_3_2	MARINE SEDIMENTS
CL/1900266	A6542 - 3_3_3	MARINE SEDIMENTS
CL/1900267	A6542 - 5_2_1	MARINE SEDIMENTS
CL/1900268	A6542 - 5_2_2	MARINE SEDIMENTS
CL/1900269	A6542 - 5_2_3	MARINE SEDIMENTS
CL/1900271	QC Blank	QUALITY CONTROL SAMPLE
CL/1900272	Reference Material (% Recovery)	QUALITY CONTROL SAMPLE

aecom.com

2.3 Dredge Disposal Site Characterisation Report

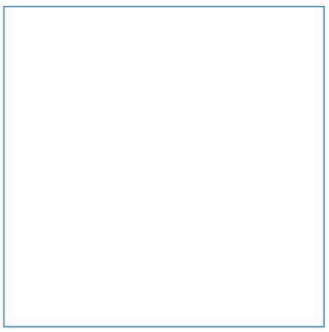
The Highland Council

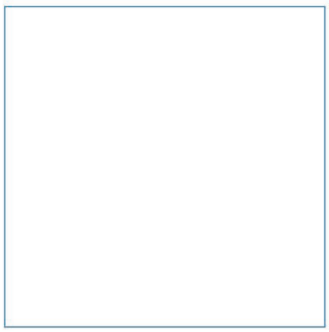
Uig Harbour Redevelopment

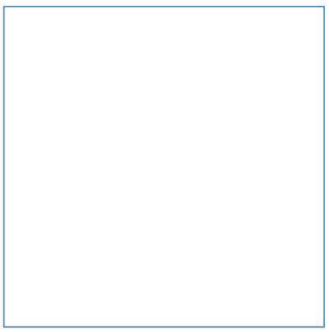
Disposal site characterisation report

February 2019







Innovative Thinking - Sustainable Solutions

ABP mer

Page intentionally left blank

Uig Harbour Redevelopment

Disposal site characterisation report

February 2019

Source: AECOM

Document Information

Document History and Authorisation		
Title	Uig Harbour Redevelopment	
	Disposal site characterisation report	
Commissioned by	The Highland Council	
Issue date	February 2019	
Document ref	R.3000	
Project no	R/4548/1	
Date	**Version**	**Revision Details**
02/08/2018	1	Issued for client review
23/08/2018	2	Issued for client review
03/09/2018	3	Issued for client review
08/11/2018	4	Issued for client use
27/02/2019	5	Issued for client use

Prepared (PM)	Approved (QM)	Authorised (PD)
[redacted]	[redacted]	[redacted]

Suggested Citation

ABPmer, (2019). Uig Harbour Redevelopment, Disposal site characterisation report, ABPmer Report No. R.3000. A report produced by ABPmer for The Highland Council, February 2019.

Contributing Authors

[redacted]

Notice

ABPmer
Quayside Suite, Medina Chambers, Town Quay, Southampton, Hampshire SO14 2AQ
T: +44 (0) 2380 711844 W: http://www.abpmer.co.uk/

Non-Technical Summary

Uig Harbour is located in Uig Bay in the northeast of the Isle of Skye. It forms part of the 'Skye Triangle' (along with Tarbert and Lochmaddy), providing lifeline ferry services for communities in the Western Isles. The Pier at Uig Harbour, named King Edward Pier, serves the Caledonian MacBrayne (CalMac) ferry route to the Isles of Harris and North Uist. The Pier is under the control of Highland Harbours which is run by The Highland Council (THC), whilst the ferry service operations are controlled by CalMac Ferries Ltd. Increasing demand and aging tonnage has led the ferry operator to commission new, larger ferry vessels for a number of its routes, including the 'Skye Triangle'. THC is required to undertake redevelopment works (referred to as the 'Proposed Development') to Uig Harbour to accommodate a new vessel commissioned for this route. The Proposed Development includes dredging activity to support the works and to deepen the berth to accommodate the new vessel. Given the requirement to dispose of dredged material, this Disposal Site Characterisation Report has been prepared.

The estimated total capital dredge (and thus disposal) volume for the Proposed Development is 27,992 m^3, split between Dredge Pocket 1 (26,842 m^3) and Dredge Pocket 2 (1,150 m^3). Sediment samples were collected from around Uig Bay and the two Dredge Pockets to characterise the dredge material and surrounding area. The composition of Dredge Pocket 1 was found to be predominantly sand (57%), while relatively increased fine material (silt and clay) was estimated for Dredge Pocket 2 (61%). Sediment quality is poor around Uig Bay, with concentrations of chromium and nickel above Action Level 2 at several locations, including the Dredge Pockets (considered most likely to be naturally occurring). Based on these findings and the requirements of the Proposed Development, a waste hierarchy assessment concluded that the Best Practical Environmental Option for the dredge material would be disposal at sea.

A site selection process was undertaken, including reviewing the potential to dispose of dredged material at an existing marine disposal site. However, given the distance to the nearest existing marine disposal site (approximately 40 km from Uig Harbour) and the high concentrations of chromium and nickel in sediments, use of an existing marine disposal site was not considered viable. Considerations were then made to identify a suitable new disposal site from within an initial disposal site search area in the west of Uig Bay. Marine Scotland agreed that the proposed disposal site search area was sensible, noting that sediments at the final disposal site would need to have similar concentrations of chromium and nickel to the dredged material.

Following the disposal site selection process, a proposed new disposal site has been identified within the disposal site search area (Figure NTS-1). It is located approximately 2 km to the west of Uig Harbour covering an area of approximately 250 m x 500 m (0.125 km^2). This sub-section of the disposal site search area was selected as the most suitable location for the proposed new disposal site for the following key reasons:

- Water depths (approximately 60 m) provide increased retentive properties of deposits which reach the seabed;
- Very low flow speeds throughout Uig Bay, particularly apparent in deeper areas, indicating the proposed new disposal site would provide retentive properties for disposed sediment;
- Distance from the Dredge Pockets at Uig Harbour (approximately 2 km) reduces the potential for any fine sediment plume generated during dredging and disposal operations to combine;
- Distance greater than 1 km from any known White-tailed eagle nest (*Haliaeetus albicilla*; confidential information provided by the Highland Raptor Study Group); and
- Distance greater than 1 km from Uig Bay and Loch Snizort East finfish farms.

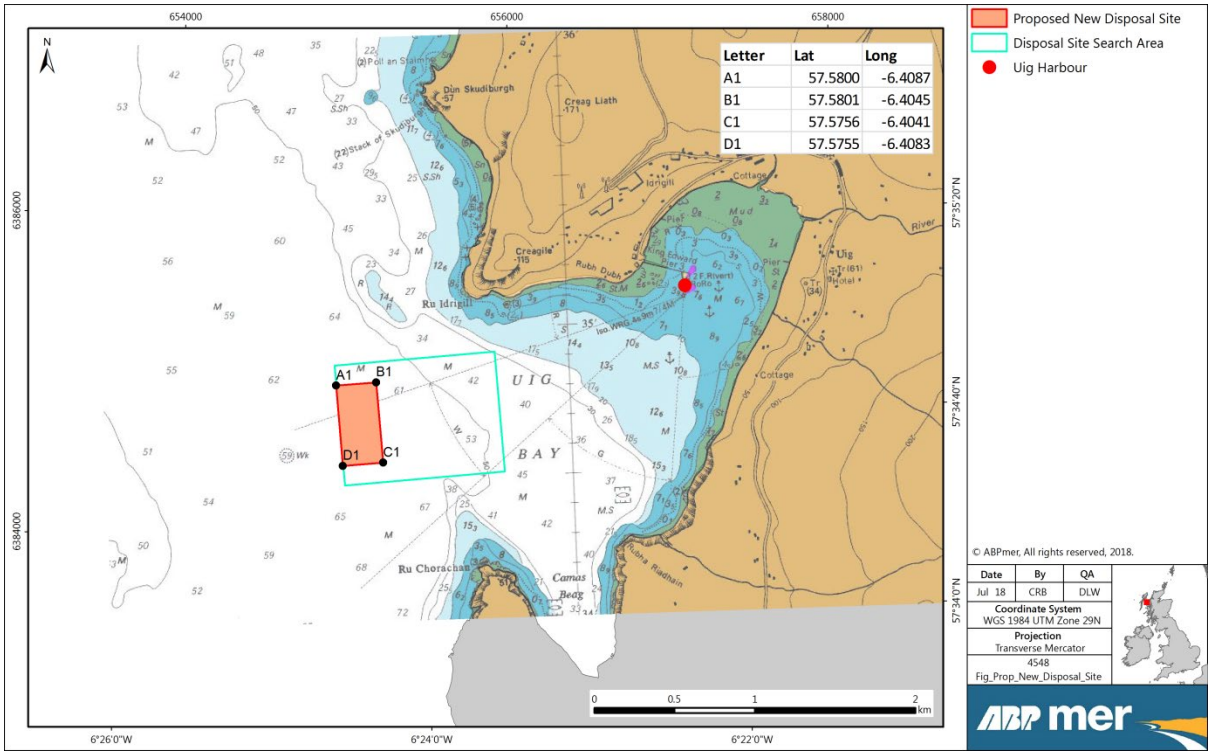


Figure NTS1. Location of the proposed new disposal site including coordinates (WGS84; decimal degrees)

In identifying the proposed new disposal site, a number of key considerations were made regarding potential effects on the physical, chemical, biological and human environment and other sea users/ infrastructure. This was supported by numerical modelling (AECOM, 2018) to determine the fate of the fine material following disposal, including consideration of the nearby finfish farms, and potential changes to the wave regime, flows and sediment transport. This process was undertaken to evaluate the acceptability of a proposed new disposal site to support dredging activity for the Proposed Development.

The designation of the proposed new disposal site in the outer Uig Bay is anticipated to result in minimal effects to the physical, chemical, biological and human environment. While some further project-specific assessment will be required as part of the Proposed Development, such as a Habitats Regulations Assessment (HRA), it is concluded that the proposed new disposal site is a suitable location for the deposit of dredged material from Uig Harbour.

Contents

Tables

Figures

1 Introduction

1.1 Project background

Uig Harbour is located in Uig Bay in the northeast of the Isle of Skye (Figure 1). It forms part of the 'Skye Triangle' (along with Tarbert and Lochmaddy), providing lifeline ferry services for communities in the Western Isles. The Pier at Uig Harbour, named King Edward Pier, serves the Caledonian MacBrayne (CalMac) ferry route to the Isles of Harris and North Uist. The Pier is under the control of Highland Harbours which is run by The Highland Council (THC), whilst the ferry service operations are controlled by CalMac Ferries Ltd.

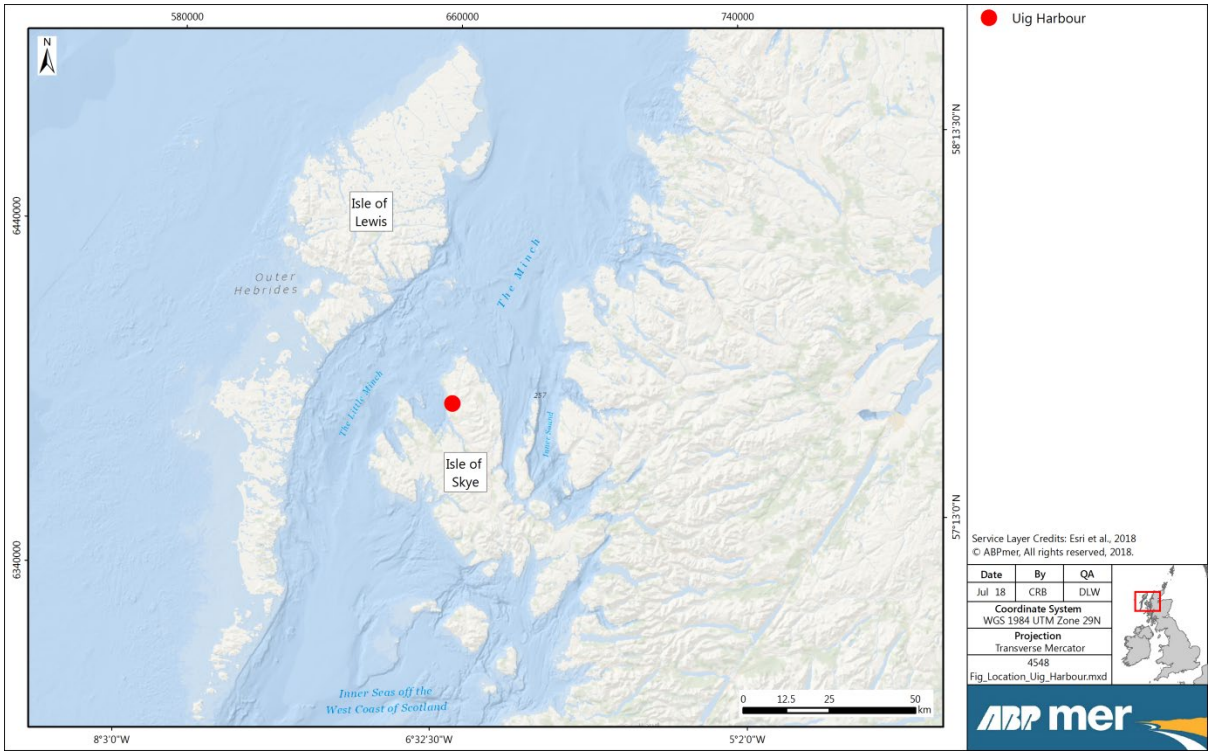


Figure 1. Location of Uig Harbour

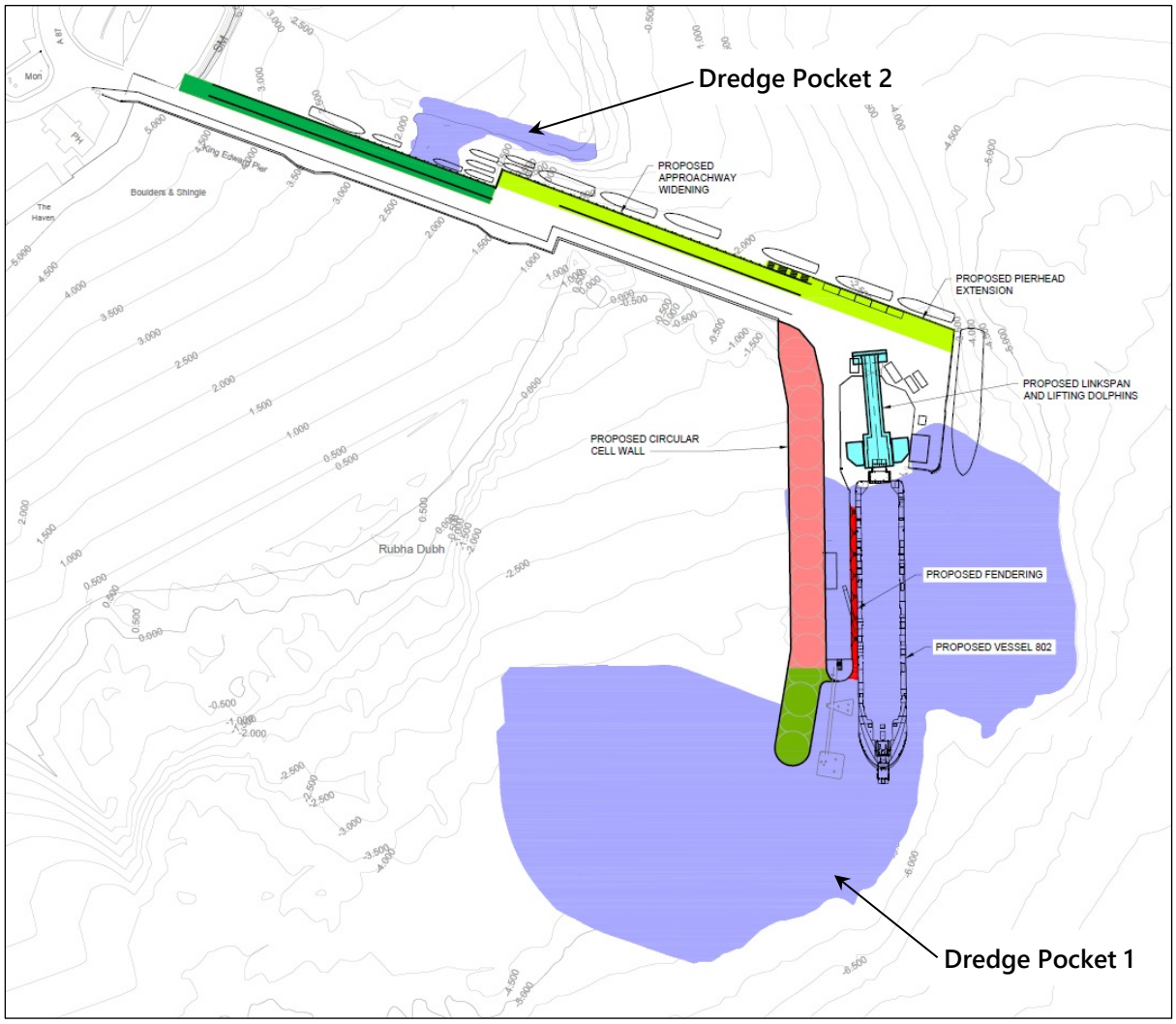
Increasing demand and aging tonnage has led the ferry operator to commission new, larger ferry vessels for a number of its routes. The 'Skye Triangle' has been identified by the operator as a priority and the procurement of a new vessel for this route has commenced. THC (hereafter also referred to as the 'Applicant') is required to undertake redevelopment works (hereafter referred to as the 'Proposed Development') to Uig Harbour to accommodate the new vessel which has been commissioned.

The Proposed Development includes dredging activity and the subsequent disposal of dredged material to support the works and to deepen the berth to accommodate the new vessel. The following two areas of seabed (referred to as 'Dredge Pockets') will need to be dredged to accommodate the new vessel and resulting changes to the pier infrastructure (see Figure 2):

- **Dredge Pocket 1**: The berthing area will be dredged to accommodate the new vessel. A capital dredge will be carried out to -5.9 m above chart datum (ACD) (including 300 mm over dredge) consisting of approximately 26,842 m^3;

- **Dredge Pocket 2**: A section along the approach way 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 approach way. This area will be dredged to 0.7 m ACD (including 300 mm over dredge) consisting of approximately 1,150 m^3.

Therefore, the estimated total capital dredge volume for the Proposed Development is 27,992 m^3. The dredging method will be confirmed once the dredging contractor has been appointed. However, at this stage and for the purpose of preparing this disposal site characterisation report, it has been assumed that a cutter suction dredger (CSD) will be deployed to undertake the dredging required for the Proposed Development. It is also anticipated that maintenance dredging will be required every 3-5 years to ensure safe operation of the ferry service. Maintenance dredging will likely use backhoe, grab and/or plough methods which have previously been used at Uig Harbour.



Source: AECOM

Figure 2. Proposed Development at Uig Harbour including location of Dredge Pockets

This report has been prepared to characterise a new disposal site to support dredging requirements of the Proposed Development and future maintenance dredging at Uig Harbour. Figure 3 summarises the overall process followed. This includes characterisation of the dredge (waste) material to be disposed, consideration of options against the principles of the waste hierarchy, selection of a new disposal site based on a range of criteria, characterisation of the proposed new disposal site and assessment of potential effects of disposal at this location.

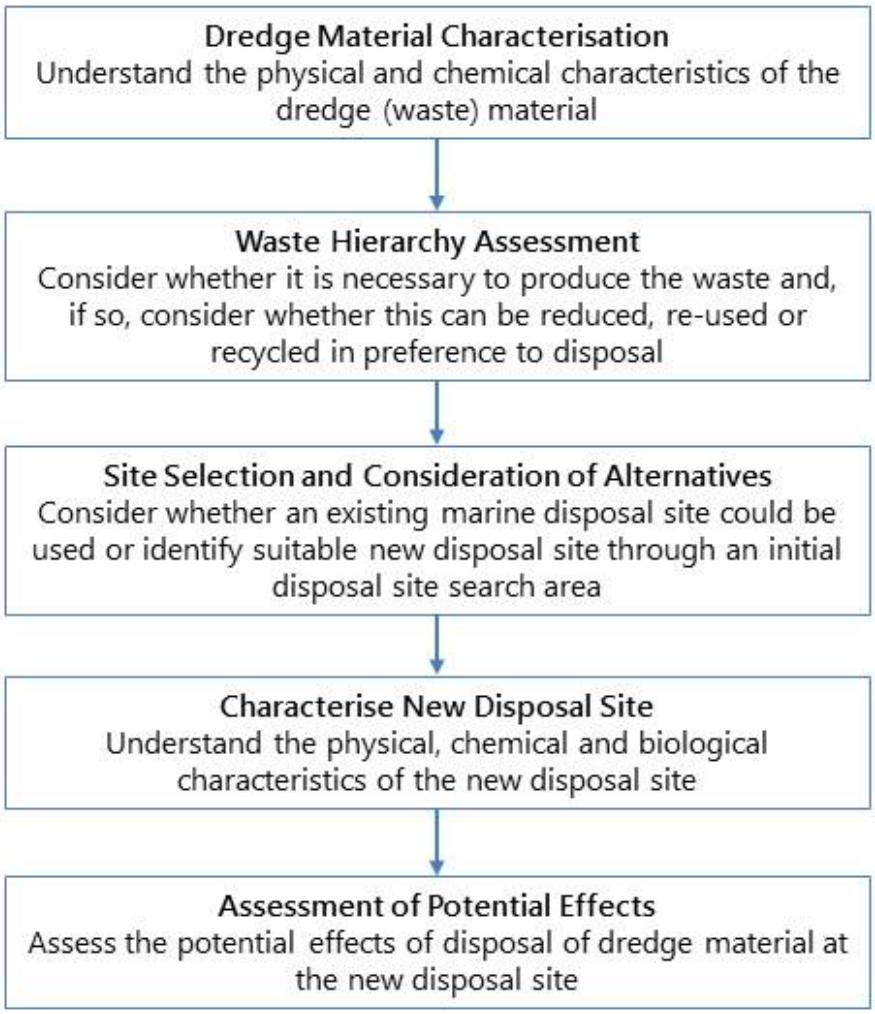


Figure 3. Summary of disposal site characterisation process

1.2 Report structure

This disposal site characterisation report has been structured as follows:

Section 2: **Regulatory Framework** - Reviews the key legislation and policy regarding dredging and disposal activity in the marine environment;

Section 3: **Dredge (Waste) Material Characteristics** - Describes the physical and chemical characteristics of the material to be dredged;

Section 4: **Waste Hierarchy Assessment** - Provides an audit of considerations for the dredged material against the principles of the waste hierarchy;

Section 5: **Site Selection Process and Consideration of Alternatives** - Identifies key criteria for the selection of a suitable disposal site and provides a review of alternatives;

Section 6: **Proposed New Disposal Site** - Describes a proposed new disposal site within Uig Bay, including the key considerations used to determine the location; and

Section 7: **Assessment of Potential Effects** - Evaluates the acceptability of a proposed new disposal site to support dredging activity for the Proposed Development.

2 Regulatory Framework

This section introduces key legislation and policy regarding dredging and disposal activity in the marine environment, how these have been taken into account in preparing this disposal site characterisation report and, specifically, the management of waste material generated.

2.1 UK Marine Policy Statement

The UK Marine Policy Statement (MPS) (HM Government, 2011) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It was adopted for the purposes of Section 44 of the Marine and Coastal Access Act 2009 to facilitate and support the formulation of Marine Plans, ensuring the sustainable use of marine resources in line with the following high level marine objectives:

- Promote sustainable economic development;
- Enable the UK's move towards a low-carbon economy, in order to mitigate the causes of climate change and ocean acidification and adapt to their effects;
- Ensure a sustainable marine environment which promotes healthy, functioning marine ecosystems and protects marine habitats, species and our heritage assets; and
- Contribute to the societal benefits of the marine area, including the sustainable use of marine resources to address local social and economic issues.

The MPS recognises that most marine dredging and disposal is for the purposes of navigation and existing and future port development, while it can also allow specific construction activities to be taken forward. Appropriately targeted disposal of dredged sediment can have an ancillary benefit in maintaining sedimentary systems and, where the sediment is constituted appropriately, can have social and economic benefit in providing material for alternative uses such as construction, beach nourishment or saltmarsh restoration (HM Government, 2011).

The primary environmental considerations associated with dredging and disposal activity include:

- Potential risk to fish and other marine life from the release of sediments, chemical pollution and morphological changes including burial of seabed flora and fauna;
- Hydrological effects;
- Interference with other marine activities;
- Increases in turbidity;
- Increases in marine noise;
- Possible adverse effects for designated nature conservation areas;
- Potential destruction or destabilisation of known or unknown heritage assets; and
- Potential adverse impacts to the natural sedimentary systems.

The MPS states that applications to dispose of wastes must demonstrate that appropriate consideration has been given to the internationally agreed hierarchy of waste management options for sea disposal. Wastes should not be accepted for disposal where appropriate opportunities exist to re-use, recycle or treat the waste without undue risks to either human health or the environment, or disproportionate costs. The decision maker should give appropriate consideration to alternative uses of the sediment (HM Government, 2011). A waste hierarchy assessment for the Proposed Development at Uig Harbour, considering options for waste management of the associated dredge arisings from King Edward Pier and requirement for a new marine disposal site, is provided in Section 4.

2.2 Scotland's National Marine Plan

In accordance with the Marine and Coastal Access Act 2009 and based on the high level objectives for marine planning outlined in the MPS (HM Government, 2011), Scotland's National Marine Plan was published by the Scottish Government in March 2015. It covers both Scottish inshore waters out to 12 nautical miles and Scottish offshore waters from 12 to 200 nautical miles.

Scotland's National Marine Plan (Scottish Government, 2015a) highlights that safeguarding the viability of routes used by shipping, ensuring safety of navigation and encouraging development of Scottish ports and harbours are essential for the continuation and growth of economic prosperity provided by ports and harbours and the variety of sectors they support. As part of these considerations, dredging is recognised as an essential activity to maintain existing shipping channels, establish safe approaches to new ports or open up routes to old ports. Dredged material may be disposed of at licensed marine disposal sites or used for alternative purposes such as land reclamation or coastal nourishment, if suitable, to minimise seabed disposal. Licensed disposal areas may change, typically as a result of disuse, monitoring information or the need for sites in additional locations. The consideration of both dredged navigation channels and disposal sites in marine planning and decision making is important to support safe access to ports and the disposal of dredged material in appropriate locations (Scottish Government, 2015a).

While Scotland's National Marine Plan highlights the requirements for dredging and disposal to support port development and navigational safety, it also highlights a number of key issues. Dredging to maintain navigation channels can cause loss or damage to habitats and species and exposure of buried archaeological remains. Dredging requirements may increase if ship size increases and deeper and wider navigation channels are required. Dredging, and the disposal of dredged material, may impact on other sea users on a temporary basis, and dredged areas and disposal sites may not be compatible with other specific uses. Dredging is a licensable activity and, therefore, the potential environmental impacts are assessed through licensing procedures (Scottish Government, 2015a).

2.3 London Convention and London Protocol

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, commonly referred to as the London Convention, came into force in 1975 and is one of the first global conventions to protect the marine environment from human activities. Contracting Parties shall individually and collectively promote the effective control of all sources of pollution of the marine environment and take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea. The term 'dumping' is defined to include any deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea.

The 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, commonly referred to as the London Protocol and which entered into force in 2006, was agreed to modernise and supersede the London Convention. Under the London Protocol, the dumping of any wastes or other matter is prohibited, except those referenced in Annex 1 which includes dredged material. Nevertheless, the dumping of wastes or other matter listed in Annex 1 shall require a permit and Contracting Parties shall adopt administrative or legislative measures to ensure that issuance of permits and permit conditions comply with provisions of Annex 2 (e.g. waste prevention audit, consideration of waste management options and monitoring).

2.4 OSPAR Convention

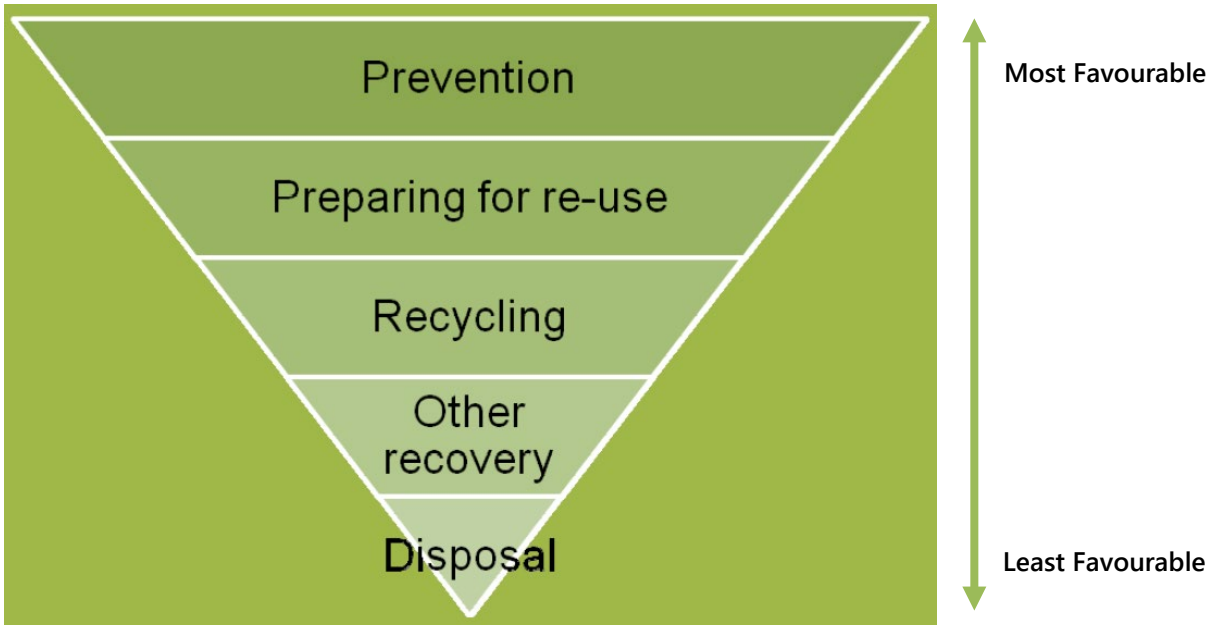
The Convention for the Protection of the Marine Environment of the North-East Atlantic, commonly referred to as the OSPAR Convention, was adopted in 1992 and entered into force in 1998. The OSPAR Convention replaced both the Oslo Convention (adopted in 1972) and the Paris Convention (adopted in 1974), with the intention of providing a comprehensive and simplified approach to addressing all sources of pollution which might affect the maritime area, and all matters relating to the protection of the marine environment.

Similar to the London Protocol, Contracting Parties of the OSPAR Convention shall take, individually and jointly, all possible steps to prevent and eliminate pollution by dumping or incineration of wastes or other matter except for those wastes or other matter listed in Article 3 (paragraphs 2 and 3) of Annex II which includes dredged material. The OSPAR Commission is the forum through which Contracting Parties cooperate, drawing up and adopting criteria, guidelines and procedures relating to the dumping of wastes or other matter listed, with a view to preventing and eliminating pollution.

2.5 Waste Framework Directive

The Waste Framework Directive (75/442/EEC) was originally adopted in 1975, followed by substantial amendment in 1991 (91/156/EEC) and a codified version in 2006 (2006/12/EC). The revised Waste Framework Directive (2008/98/EC) repealed earlier versions, providing a general framework of waste management requirements and sets the basic waste management definitions for the European Union (EU). It lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use. It defines 'waste' as any substance or object which the holder discards or intends or is required to discard.

Article 4 of the revised Waste Framework Directive sets out five steps for dealing with waste, ranked according to environmental impact, commonly referred to as the 'waste hierarchy' (see Figure 4 and Table 1).



Source: Adapted from Department for Environment, Food and Rural Affairs (Defra), 2011

Figure 4. Waste hierarchy

Prevention, which offers the best outcomes for the environment, is at the top of the priority order, followed by preparing for re-use, recycling, other recovery and disposal, in descending order of environmental preference.

Table 1. Stages of the waste hierarchy

Stage	Name (Article 4)	Definition (Article 3)
1	Prevention	Measures taken before a substance, material or product has become waste, that reduce: (a) The quantity of waste, including through the re-use of products or the extension of the life span of products; (b) The adverse impacts of the generated waste on the environment and human health; or (c) The content of harmful substances in materials and products.
2	Preparing for re-use	Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
3	Recycling	Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.
4	Other recovery (e.g. energy recovery)	Any operation, the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations.
5	Disposal	Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations.

For any dredging project, the *in situ* characteristics of the material (physical and chemical) and the method and frequency of dredging (and any subsequent processing) determines its characteristics for consent through the waste hierarchy assessment. This understanding is central for consideration of management options for dealing with dredged material with respect to the waste hierarchy assessment. A Marine Licence is required for the use/disposal of dredged material below mean high water springs (MHWS). An applicant must take account of the waste hierarchy and consider alternative means of disposal of dredged material before applying for a licence to dispose of dredged material at sea (HM Government, 2011).

Where prevention of the dredging is not possible, then the volume to be dredged should be minimised, then options for re-use of the material, recycling and other methods of recovery must be considered in the first instance. In the context of re-use and recycling of dredge material this could include, for example:

- Engineering uses, such as:
  - Aggregate for the construction industry;
  - Land creation and improvement;
  - Beach nourishment;
  - Construction of offshore berms;
  - Capping material; and
  - Temporary disposal at sea (e.g. in an aggregate site) for future re-use.

- Agriculture and product uses:
  - Aquaculture; and
  - Construction material.
- Environmental enhancement:
  - Intertidal feeding/creation, e.g. islands for birds, mudflat and saltmarsh creation, fisheries habitat and wetland restoration.
- Post treatment of the dredge material to change its character prior to determining a potential use, for example:
  - Dewatering to create consolidated sediments;
  - Separation basins; to separate sediments into different size classes for different uses;
  - Soil manufacturing; and
  - Physico-chemical treatments of contaminated sediments.

Following such treatments, it might be possible to use the material, for example, as top soil or bricks etc. Should no practical and cost-effective solutions be identified, finally options for the disposal of the dredged material are considered. These include:

- Marine disposal in licenced deposit sites; and
- Land-based disposal in terrestrial landfill.

2.6 Habitats Directive

Article 3 of the Habitats Directive (92/43/EEC, as amended) requires the establishment of a European network of important high-quality conservation sites known as Special Areas of Conservation (SACs) that will contribute to conserving habitat and species identified in Annexes I and II of the Directive. The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds). When assessing applications, the Competent Authority will consider if the project is likely to have a significant effect on a designated European site (including SACs). Therefore, consideration must be made as to whether the Proposed Development, which includes dredging and disposal activities, could have a significant impact on the notified features of any directly overlapping or nearby designated European sites.

2.7 Water Framework Directive

The Water Framework Directive (2000/60/EC) establishes a framework for the management and protection of Europe's water resources. The overall objective of the Water Framework Directive is to achieve "good ecological and good chemical status" in all inland and coastal waters. The initial deadline to meet this objective was 2015; however, in cases where it was not possible to do so due to disproportionate expense, natural conditions or technical feasibility, the deadline to achieve "good ecological and good chemical status" has been extended (currently working towards revised objectives for 2021).

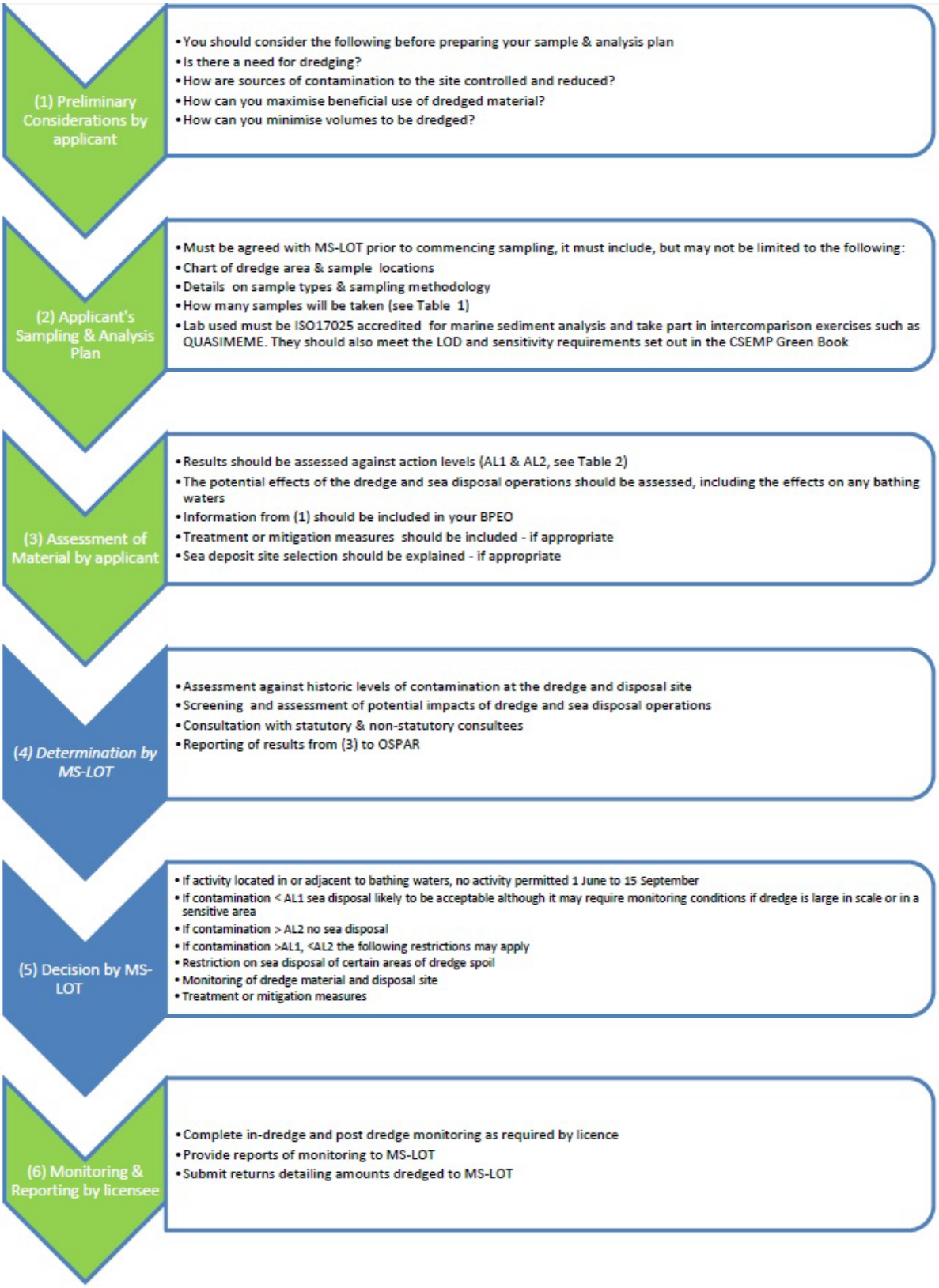
A water body is a discrete unit of water of similar characteristics. Scottish Ministers and the Scottish Environment Protection Agency (SEPA) are the competent authorities for implementation of the Water Framework Directive within the Scotland River Basin District, including transitional (i.e. estuarine) and coastal waters to one nautical mile. Determining if a water body has reached good ecological status requires the consideration of biological, hydromorphological and physico-chemical quality elements, while chemical status is determined against a list of priority (hazardous) substances.

EU Member States must ensure that new schemes, including dredging and disposal activities, do not adversely impact upon the status of aquatic ecosystems, and that historical modifications that are already impacting it are addressed.

2.8 Guidance documents

Guidelines for the management of dredged material at sea have been prepared by the OSPAR Commission (2014). The guidelines are designed to assist Contracting Parties of the OSPAR Convention in the management of dredged material in ways that will prevent and eliminate pollution in accordance with Annex II, and protect marine species and habitats in the OSPAR maritime area in accordance with Annex V. This includes sampling recommendations for dredge material management, including an indication of the number of separate sampling stations required to obtain representative results, and the selection and characterisation of a site for sea deposits.

In addition, pre-disposal sampling guidance has been published by Marine Scotland (2017). It sets out the stages both the applicant and Marine Scotland's Licensing Operations Team (MS-LOT) must go through to determine a marine licence application for sea disposal activities. This includes a process map identifying preliminary considerations regarding the 'need' to dredge and potential beneficial uses, sampling and analysis planning, assessment criteria for sediment quality, the marine licence determination process and subsequent monitoring requirements (see Figure 5).



Source: Marine Scotland, 2017

Figure 5. Process map of pre-disposal sampling stages

3 Dredge (Waste) Material Characteristics

This section describes previous dredging and disposal activity at Uig Harbour, followed by a summary of sample collection and available data to characterise the dredge (waste) material at King Edward Pier.

3.1 Previous dredging and disposal activity

In 2015, a Marine Licence (05459/15/0) was granted by Marine Scotland to THC for the deposit of dredged material from King Edward Pier as part of beach nourishment works in Uig Bay. The Marine Licence was valid between 20 March and 22 June 2015, permitting up to 1,000 m^3 of dredge material to be deposited (bottom dumping) at both South Cuil Beach and Idrigill Beach (thus a total of 2,000 m^3). No additional details regarding historic maintenance dredging works, or disposal activity, at Uig Harbour are available.

3.2 Sample collection and available data

The characteristics of the dredged material from the Proposed Development are required to inform the waste hierarchy assessment and to support identification of a suitable (new) disposal site. It is assumed that CSD will be deployed to undertake the dredging required for the Proposed Development. 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). Overflowing will not be allowed from the hopper barges during proposed dredging operations. It should be noted that dredging of sediment using CSD can result in significant changes to the character of the material, specifically cohesion due to the rotating cutterhead.

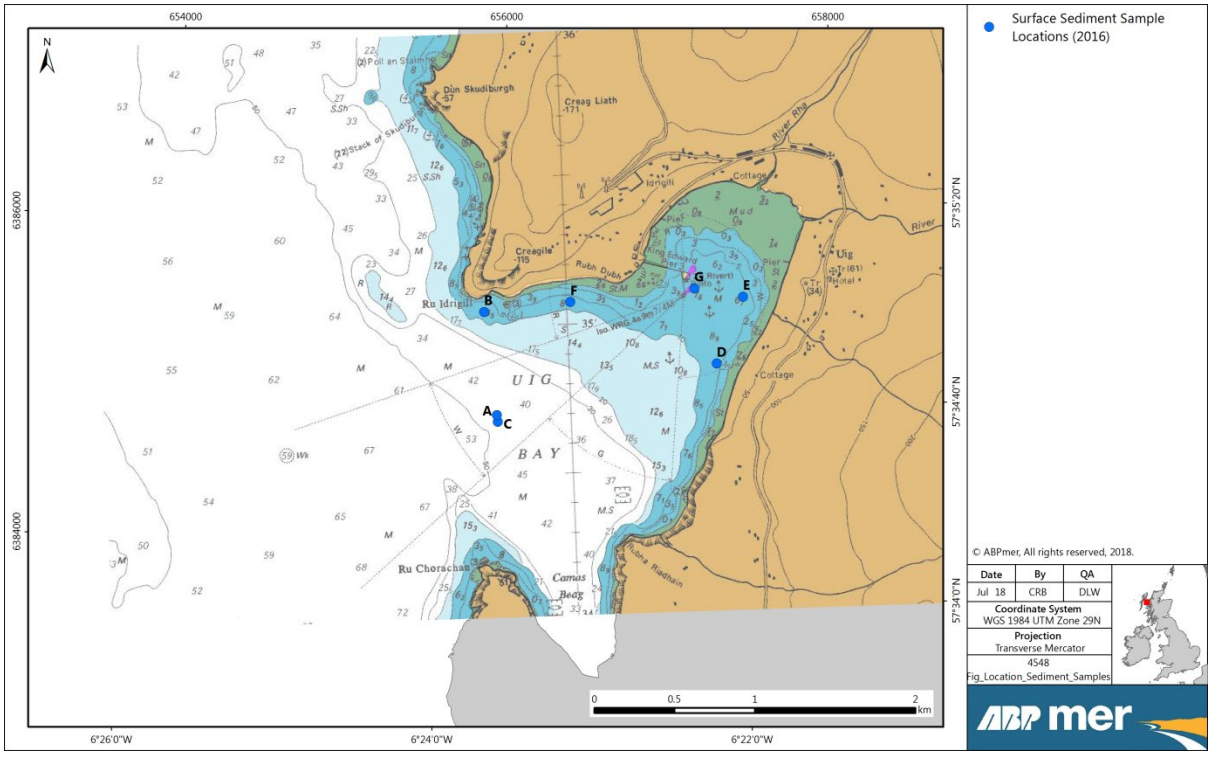
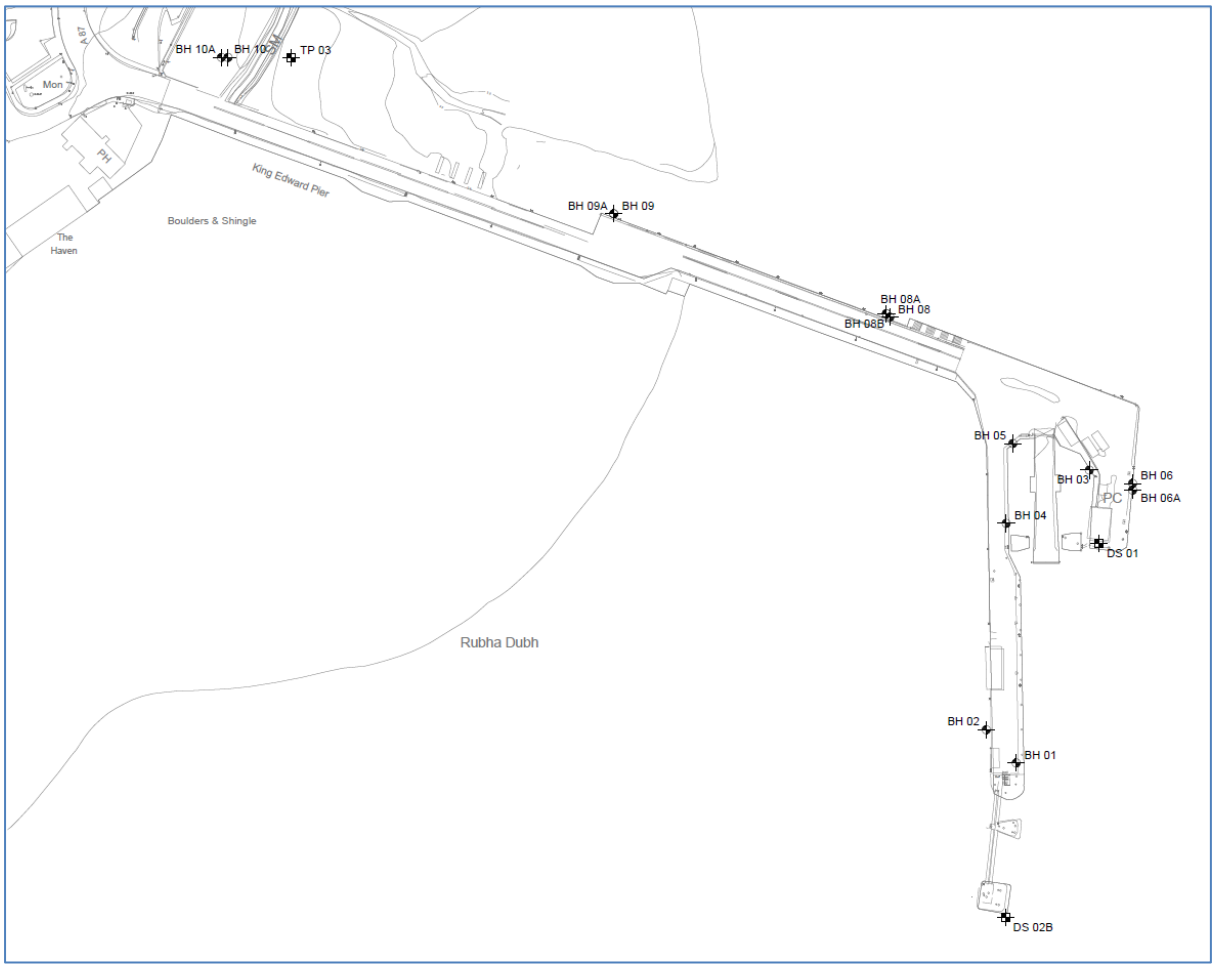


Figure 6. Location of surface sediment samples collected around Uig Bay in 2016

In December 2016, surface sediment samples were collected using a Van Veen grab at seven locations (A-G) around Uig Bay (Figure 6). This included one surface sediment sample from within Dredge Pocket 1 (G; also refer to Section 1.1 and Figure 2 for a summary of the Proposed Development).

Between July and October 2017, sediment samples were collected at depth via rotary boreholes (BH01, BH02, BH06A, BH09 and DS01) located within or immediately adjacent to Dredge Pockets 1 and 2. In July 2017, diver-collected samples were obtained from the southern-most dolphin (DS02) within Dredge Pocket 1, while a trial pit adjacent to Dredge Pocket 2 (TP03) was also sampled (see Figure 7). Based on the analysis of these sediment samples, the physical and chemical characteristics of the material to be dredged are described in the following sections.



Source: AECOM

Figure 7. Location of boreholes, trial pits and diver-collected samples along King Edward Pier

3.2.1 Physical characteristics

The physical characteristics of the dredged material are described from particle size analysis (PSA) of sediment samples, with the exception of the diver-collected samples (DS02) where only a stratum description is provided. Table 2 and Table 3 present PSA results from surface sediment samples around Uig Bay and borehole/trial pit samples, respectively. 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 at Dredge Pocket 1.

Table 2. PSA of surface sediment samples collected around Uig Bay

Sample	Particle Size Fraction (%)			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.
For location of sediment samples, refer to Figure 6.				

Table 3. PSA of boreholes, trial pits and diver collected samples at the dredge site

Sample	Bed Level (m ACD)	Depth of Sample		Particle Size Fraction (%)			GI Report Stratum 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 subangular 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 subangular 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 subangular 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.
		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.

Sample	Bed Level (m ACD)	Depth of Sample		Particle Size Fraction (%)			GI Report Stratum Description
		Below Bed Level (m)	Relative to Datum (m ACD)	Silt (<63 µm)	Sand (>63 µm-<2 mm)	Gravel (>2 mm)	
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	

m ACD Metres Above Chart Datum;
N/A Not Available.
For location of sediment samples, refer to Figure 7.

Based on a review of PSA results from sediment samples collected within and immediately adjacent to Dredge Pockets 1 and 2, an estimation of dredged material composition was calculated (Table 4). The composition of Dredge Pocket 1 was assumed to be predominantly sand (57%) and gravel (25%), while relatively increased fine material (silt and clay) was estimated for Dredge Pocket 2 (61%).

Table 4. Dredged composition and settling rates

Parameter	Units	Particle Size Fraction	Dredge Pocket	
			1	2
Dry Density	kg/m^3	-	1,660	1,610
Content	%	Gravel	25	9
		Sand	57	30
		Silt	15	53
		Clay	3	8
	m^3	Gravel	6,711	103
		Sand	15,300	345
		Silt	4,831	702
		Clay	805	92
		Total	26,842	1,150
D_{50}	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

Note: D_{50} - diameter of the particle that 50% of a sample's mass is smaller than and 50% of a sample's mass is larger than. D_{50} and settling velocity for gravel not reported as this fraction is assumed to fall straight to the bed.

3.2.2 Chemical characteristics

Sediment samples collected from around Uig Bay (A-G) and within Dredge Pocket 1 (BH01, DS01 and DS02)[1] were analysed for concentrations of the following chemical determinands (dry weight):

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc);
- Tributyltin (TBT);
- Polychlorinated biphenyls (PCBs) (ICES 7 congeners: 028, 052, 101, 118, 153, 138, 180); and
- Polycyclic aromatic hydrocarbons (PAHs) (United States Environmental Protection Agency (USEPA) suite of 16: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(123-cd)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene).

[1] It should be noted that PSA results from the two rotary boreholes (i.e. BH01 and DS01) were obtained from samples at different depths compared to chemical analysis. Sediment samples collected from BH02, BH06A, BH09 and TP03 were not analysed for chemical determinands. Samples from around Uig Bay (A-G) were collected from the surface.

Unlike water quality, there are no formal quantitative environmental quality standards (EQS) in the UK for the concentration of chemicals in sediments, although the Water Framework Directive (2000/60/EC) has introduced optional standards for a small number of priority and priority hazardous substances. 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, concentrations of chemicals 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 concentrations above Action Level 2 (AL2) is generally considered unsuitable for disposal at sea. Dredged material with concentrations between AL1 and AL2 requires further consideration before a decision can be made. This could potentially include a restriction on sea disposal of certain areas of dredge spoil, monitoring of the dredge material and disposal site and specific treatment or mitigation measures (Marine Scotland, 2017).

To provide a wider context to sediment quality in the surrounding area, Table 5 provides chemical concentrations in surface sediment samples collected from around Uig Bay (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. 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 northwest 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 for 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 6 provides a summary of chemical concentrations 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 (i.e. samples A-G), chromium and nickel were consistently above AL1, with several samples above AL2. 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 quality. 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 chemical concentrations 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).

In summary, sediment quality is poor around Uig Bay with concentrations of chromium and nickel above AL2 at several locations, including the dredge site of the Proposed Development at Uig Harbour.

Table 5. Concentration of chemical determinands in surface sediment samples collected around Uig Bay

Determinand	Unit	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
Tributyltin (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
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
Benz(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
Dibenzo(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
Key	Below AL1									
	Above AL1 (Below AL2)									
	Above AL2									

Note: Surface sediment samples. AL1 - Action Level 1; AL2 - Action Level 2.

Table 6. Concentration of chemical determinands in borehole samples collected within Dredge Pocket 1 of the Proposed Development

Determinand	Unit	AL1	AL2	BH01			DS01			DS02		
				0.0 m	0.5-2.0 m	2.0-3.5 m	0.3 m	1.5 m	3.0 m	0.1 m	0.5 m	0.8 m
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
Tributyltin (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
Pyrene	µg/kg	100	-	11	6	<2	62	310	19	48	<2	<2
Benz(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
Dibenzo(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
Key	Below AL1											
	Above AL1 (Below AL2)											
	Above AL2											

Note: Samples depths provided. Bed level for BH01: -4.4 m above chart datum (ACD); DS01: -2.25 m ACD. Bed level for DS02 unknown (diver-collected). AL1 - Action Level 1; AL2 - Action Level 2.

4 Waste Hierarchy Assessment

As described in Section 2.5, the waste hierarchy ranks waste management options according to the best environmental practice. This section discusses the Best Practicable Environmental Option (BPEO) assessment, carried out by AECOM, with respect to the management of dredge arisings from the Proposed Development, documenting the considerations made to ensure the waste hierarchy is adopted where possible.

4.1 Prevention

Prevention is not possible as without dredging the lifeline 'Skye Triangle' ferry service to Tarbert and Lochmaddy could not operate regularly.

4.2 Prepare for re-use

Re-use of the dredge material is not considered feasible due to the chemical composition of the sediment and high water content (percentage of total solids could be less than 50%). This makes it unsuitable for re-use due to the high metal content (particularly chromium and nickel) and fine material, as the level of preparation of the dredged material would be subject to thorough de-watering.

4.3 Recycle

Recycling of the dredge material has been assessed as part of the BPEO assessment, but it is not considered suitable due to the high proportion of fine particles and water content. The following options were considered:

- Beach recharge;
- Reclaim
- Landfill; and
- Construction material.

All of the above options were found unsuitable, predominantly due to the characteristics of the dredged material.

4.4 Other recovery

The limited use of the dredge material and the significant cost of processing/remediation would not be viable with regards to other recovery.

4.5 Disposal

Disposal for both onshore and offshore application have been assessed as part of the BPEO. The distance of the nearest landfill site would not be feasible due to the practical, economic and environmental cost associated with disposal to land. Therefore, sea disposal was identified as the BPEO regarding the waste hierarchy of dredge material from the Proposed Development.

5 Site Selection Process and Consideration of Alternatives

Based on the waste hierarchy assessment as discussed in Section 4, this section describes the site selection process to support the disposal of dredged material as part of the Proposed Development. Firstly, this includes the potential to dispose of dredged material at an existing marine disposal site (Section 5.1), followed by considerations to identify a suitable new disposal site from within an initial disposal site search area (Section 5.2).

5.1 Existing marine disposal sites

There are several existing marine disposal sites in the wider area surrounding the Isle of Skye, as described in Table 7. This includes disposal sites which are open (in use), disused (not used for at least five years) or closed (not used for at least ten years or specifically closed) based on data presented on Marine Scotland's National Marine Plan interactive (NMPi) map[2]. The two nearest existing disposal sites are both closed, namely Loch Maddy (HE030) and Leverburgh (HE033) located approximately 40 km to the west of the Proposed Development. The nearest open disposal sites are located at Stornoway (HE035) and Ullapool (Loch Broom; HE050), approximately 65 km to the north and 80 km to the northeast of the Proposed Development, respectively (see Figure 8).

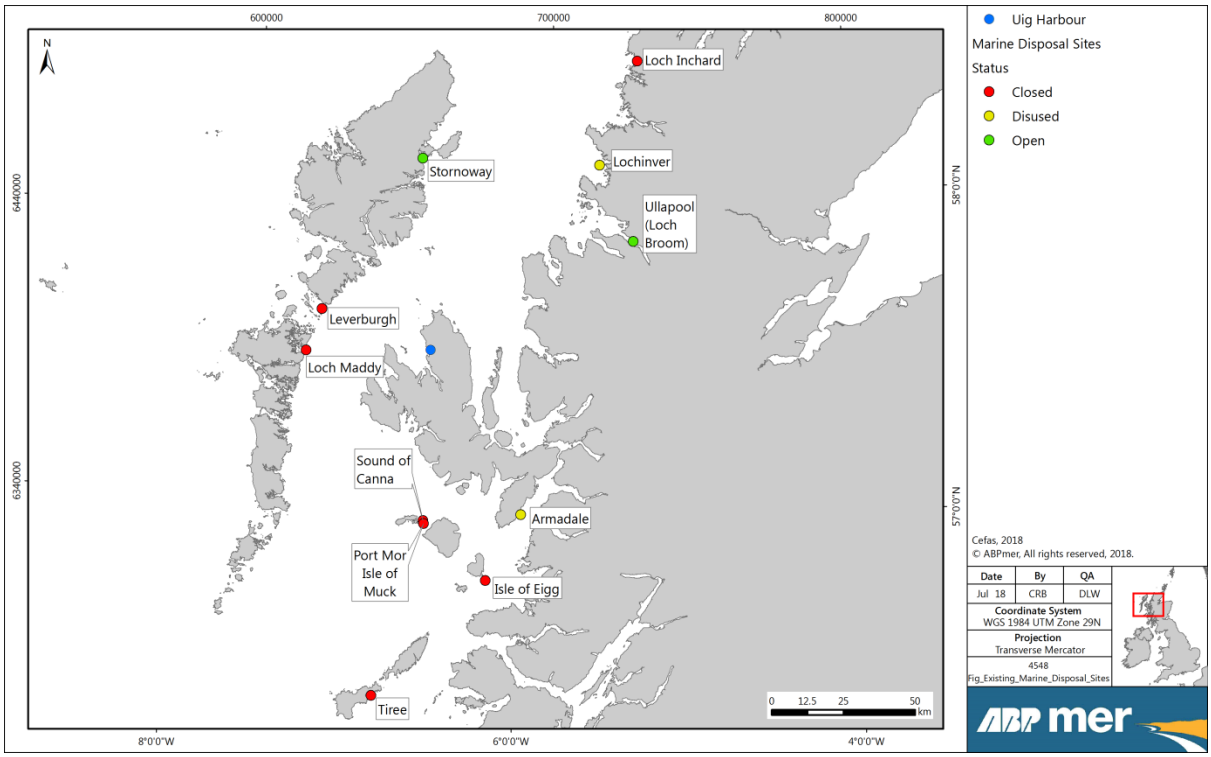


Figure 8. Existing marine disposal sites and current status

The existing disposal sites identified in Table 7 are considered too distant to be economically viable for the disposal of dredged material from the Proposed Development and the two closest disposal sites have not received disposal material in over 20 years.

[2] https://marinescotland.atkinsgeospatial.com/nmpi (Accessed June 2018). Data presented from 2015, but Marine Scotland confirmed "there has been no update to the disposal site data" (General enquiry email; 12/06/18).

Table 7. Existing open, closed and disused marine disposal sites in the wider area

Existing Disposal Site			Approximate Distance from Uig Harbour (km)		Year	Volume Disposed		Dredge Type
Name	ID	Status	Straight Line	By Sea		Wet Tonnes	Dry Tonnes	
Loch Maddy	HE030	Closed	40	40	1985	6,483	-	Capital
Leverburgh	HE033	Closed	40	40	1996	2,275	1,820	Capital
					1997	20,755	16,604	Capital
Sound of Canna	HE025	Closed	60	90	2000	21,784	17,427	Capital
					2001	13,466	10,772	Capital
Port Mor Isle of Muck	HE080	Closed	60	90	2003	1,662	831	Maintenance
Stornoway	HE035	Open	65	70	1993	19,714	9,857	Maintenance
					1995	55,305	44,244	Capital
					2002	37,590	18,796	Maintenance
					2003	4,772	2,382	Maintenance
					2012	28,113	22,490	Capital
Armadale	HE070	Disused	65	120	2004	21,151	10,573	Maintenance
Ullapool (Loch Broom)	HE050	Open	80	95	2003	10,115	5,058	Maintenance
					2006	4,130	2,065	Maintenance
					2007	4,130	2,065	Maintenance
					2014	820	410	Capital
Isle of Eigg	HE020	Closed	80	120	2000	12,956	10,365	Capital
					2001	20,170	16,136	Capital
					2003	92,176	46,088	Maintenance
Lochinver	HE040	Disused	85	95	1990	30,000	24,000	Capital
					1991	28,500	22,800	Capital
					2004	385	192	Maintenance
Tiree	MA080	Closed	120	140	1991	5,300	4,240	Capital
Loch Inchard	HE060	Closed	125	130	1987	40,833	38,793	Capital
					1988	81,667	77,587	Capital
					1997	34,314	27,451	Capital

Source: Marine Scotland MAPS NMPi (National Marine Plan interactive) interactive tool; Centre for Environment, Fisheries and Aquaculture Science (Cefas) Disposal at Sea (DAS) database

It is also uncertain whether these existing disposal sites would be suited to accept the dredged material from Uig Harbour based on sediment type, as well as the known concentrations of chromium and nickel within the sediments (see Table 5 and Table 6). Therefore, it is considered impracticable, both economically and environmentally, to pursue the use of an existing disposal site as part of the Proposed Development and a new disposal site is required to be designated.

5.2 Disposal site search area

The site selection process used to identify a proposed new disposal site initially focussed in on a pre-defined search area, as discussed with Marine Scotland during a teleconference on 07 December 2017. The teleconference was used to discuss the reasoning behind the location of the disposal site search area and to agree a sampling plan to characterise the whole area, from which a sub-section would be selected for a proposed new disposal site. Coordinates for the disposal site search area are provided in Table 8, covering an area of approximately 1,000 m x 750 m in the west of Uig Bay (Figure 9).

Table 8. Disposal site search area coordinates

Point	Coordinates (WGS84; Decimal Degrees)	
	Latitude (N)	Longitude (W)
A	57.5811	-6.4088
B	57.5816	-6.3921
C	57.5748	-6.3915
D	57.5744	-6.4082

In summary, the disposal site search area was chosen given the deeper waters (up to 60 m depth) further out in the Bay, to avoid the nearby finfish farms (Uig Bay and Loch Snizort East) and to prevent any suspended sediment plumes from disposal and dredging operations to combine. A further consideration was made with regards to White-tailed eagle (*Haliaeetus albicilla*), specifically pairs breeding/nesting in the vicinity of Uig Bay. The location of the disposal site search area ensures any proposed new disposal site would be greater than 1 km from any known White-tailed eagle nest (confidential information provided by the Highland Raptor Study Group). Conversely, disposal in shallower waters within the inner Uig Bay area would likely result in greater re-distribution of sediment as a result of wave action. Marine Scotland agreed during the teleconference that the proposed disposal site search area was sensible, noting that the final disposal site would need to have similar sediment quality to the dredged areas at Uig Harbour. Given the concentrations reported in sediment samples collected from around Uig Bay in 2016 (see Table 5 and Table 6), this was considered feasible within the disposal site search area.

To characterise the disposal site search area, supplementing data collected from around Uig Bay and at the dredge site, additional surveys were undertaken in February 2018. The disposal site search area was set out in a 3 x 4 grid of 250 m x 250 m boxes (12 in total). The survey design included grab sampling to determine sediment type (i.e. PSA), benthic infauna and concentrations of chemical determinands, as well as the collection of drop-down video (DDV) footage using a remotely operated vehicle (ROV) to characterise epifaunal/infaunal benthic habitats and to establish the presence of any priority marine features (PMF). The sampling locations from these surveys, based on the 12 grid cells, are shown in Figure 10.

The grab sampling involved the collection of 12 randomly selected surface sediment samples within the disposal site search area (one sample per grid; methodology suggested by Marine Scotland during teleconference). Samples were collected with a 0.1 m^2 Day grab sampler, with two samples collected

per station to allow for the measurement of physical (PSA and total organic carbon), chemical and biological (faunal analysis) variables. Coordinates for the grab samples are provided in Table 9.

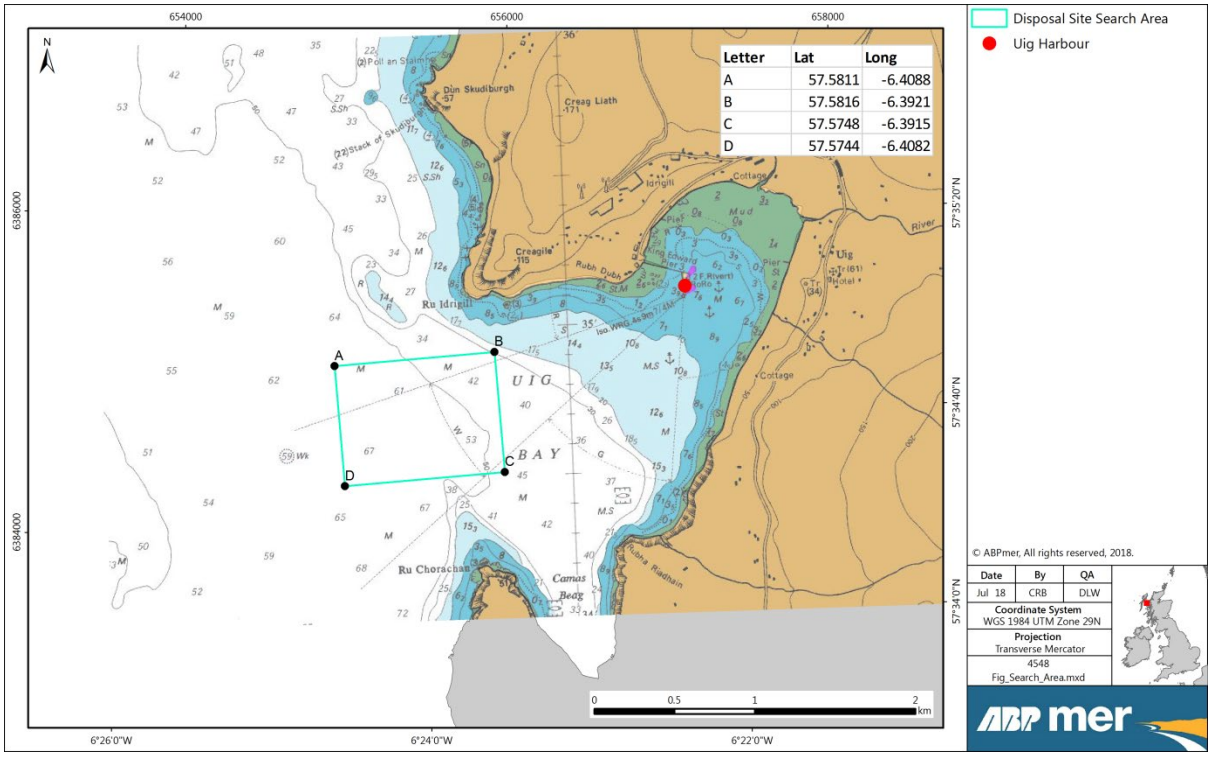


Figure 9. Location of the disposal site search area

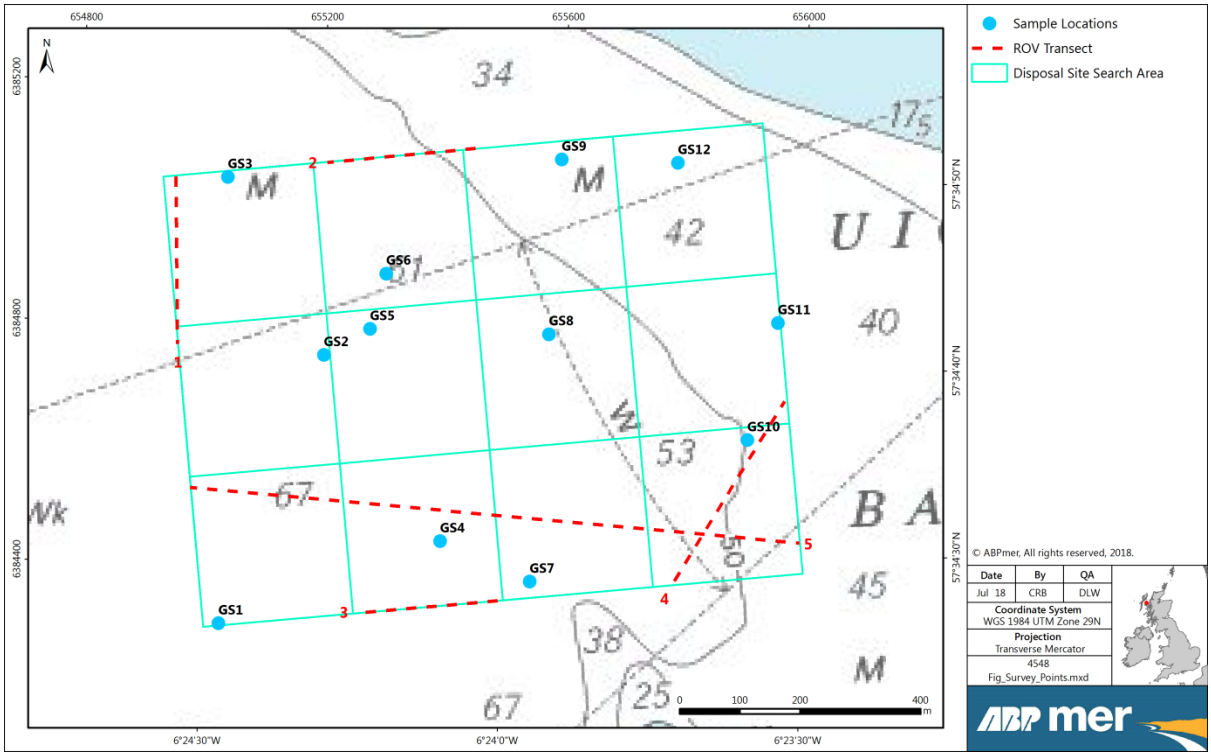


Figure 10. Location of grab sampling points and ROV transects within the disposal site search area

Table 9. Grab sample coordinates

Grab Sample	Coordinates (WGS84; Decimal Degrees)	
	Latitude	Longitude
GS1	57.5744	-6.4077
GS2	57.5784	-6.4045
GS3	57.5811	-6.4070
GS4	57.5755	-6.4015
GS5	57.5787	-6.4032
GS6	57.5795	-6.4027
GS7	57.5749	-6.3990
GS8	57.5786	-6.3983
GS9	57.5811	-6.3977
GS10	57.5769	-6.3929
GS11	57.5786	-6.3919
GS12	57.5810	-6.3945

Video footage and stills were collected using an ROV along five seabed transects within the disposal site search area. Whilst the equipment did not enable a time stamp on the resultant footage, still images were taken at regular intervals to provide a series of 'quadrats' along each transect. Additional stills were taken on an *ad hoc* basis to capture features of special interest, particularly seapens and evidence of burrowing megafauna. The data were analysed to record species present and to assign biotopes (UK Marine Habitat Classification/EUNIS). Particular attention was given to the identification of any PMF habitats. This specifically included 'Seapens and burrowing megafauna in circalittoral fine mud' as this has previously been observed within the Bay and wider area, and any evidence of the rare biotope '*Brissopsis lyrifera* and *Amphiura chiajei* in circalittoral mud' which has been observed at the site of the Loch Snizort East finfish farm to the south of the disposal site search area. Start and finish coordinates for the ROV transects are provided in Table 10.

Table 10. ROV transect start and end coordinates

Remotely Operated Vehicle (ROV) Transect	Coordinates (WGS84; Decimal Degrees)			
	Start		Finish	
	Latitude	Longitude	Latitude	Longitude
1	57.578620	-6.4085675	57.58111	-6.40843
2	57.581236	-6.4042131	57.58136	-6.40004
3	57.574512	-6.4038680	57.57462	-6.39981
4	57.574746	-6.3951075	57.57742	-6.39178
5	57.575302	-6.3915252	57.57648	-6.40837

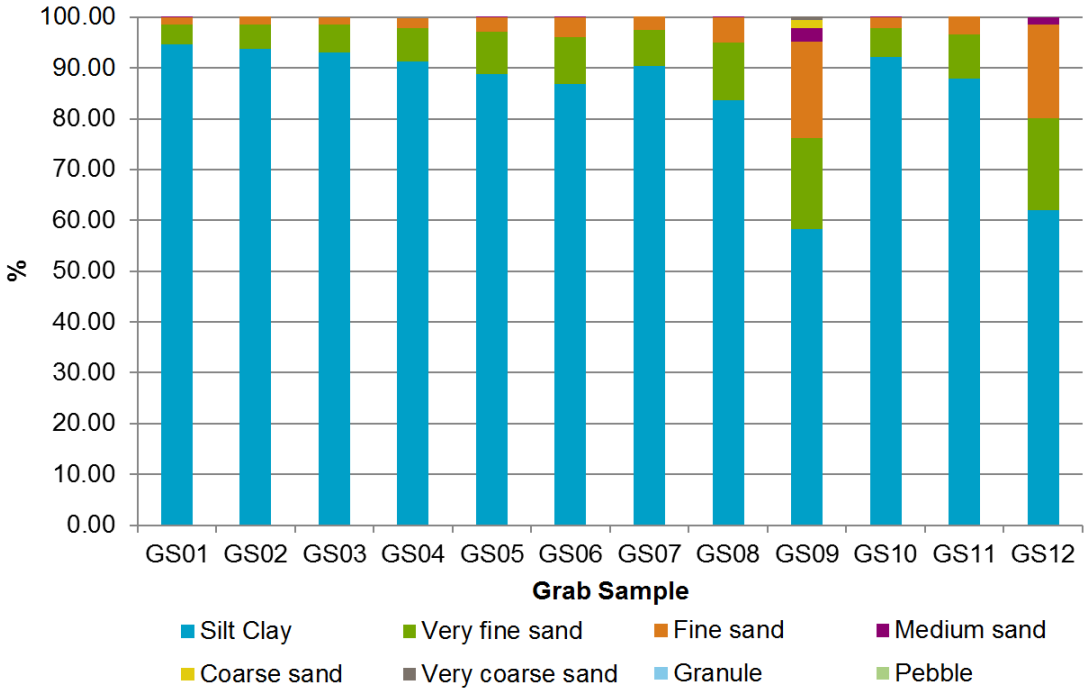
The following sections describe the physical, chemical and biological characteristics of the disposal site search area, as well as known human uses and other sea users of the area, based on available data and the additional surveys undertaken.

5.2.1 Physical characteristics

The bathymetry in the outer sections of Uig Bay indicates water depths of greater than 30 m, with sections within the disposal site search area as deep as 60 m towards the western margin. Such depths suggest any disposed material which reaches the seabed is unlikely to be affected by wave action and, therefore, the disposal site search area is likely to be retentive in nature (i.e. material will remain *in situ* once deposited). It was noted that increased water depths could also result in the sediment plume/finer material being suspended in the water column for extended periods prior to settling. Therefore,

dispersion modelling has been carried out to determine the fate of material disposed (see Section 7). Very low flow speeds are observed throughout Uig Bay, particularly apparent in deeper areas, which would suggest selection of a new disposal site throughout the disposal site search area would largely provide retentive properties for disposed sediment.

Dredged material would ideally be disposed of at a site with similar sediment type (i.e. like-for-like) to minimise changes in seabed habitat. The sediment type from Sample G indicated fairly coarse mud material in the surficial layer of Dredge Pocket 1, broadly comparable to Samples A and C located to the east of the disposal site search area as well as other locations around Uig Bay (see Table 2 and Figure 6). However, the sediment types recorded at depth in rotary borehole samples (BH01, BH02, BH06A, BH09 and DS01), diver-collected samples (DS02) and trial pits (TP03), all located within or immediately adjacent to Dredge Pockets 1 and 2 of the Proposed Development, indicated coarser material (sand, gravel and shell debris; see Table 3 and Figure 7). An estimation of dredged material composition is provided in Table 4. A large disposal site search area was selected to maximise the potential for locating an area with sediments that were compatible with the sediments of the dredge pockets. PSA results from sediments collected within the disposal site search area are shown in Figure 11 (Wentworth sediment class) and size fractions are presented in Table 11.



Source: AECOM, 2018a

Figure 11. Particle size distribution (%) of sediments collected from grab samples in the disposal site search area

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. 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 stations), as would be predicted from the greater average particle size.

In summary, sediment composition in grab samples collected from the disposal site search area (Table 11) were similar to surface samples collected from around Uig Bay in 2016 (Table 2). However, it is noted that coarser material (predominantly sand) is found below the surface at the dredge sites, differing from the muddy sediment type observed at the surface throughout the disposal site search

area. It is acknowledged that samples collected from GS9 and GS12 indicated relatively increased sand content compared to the rest of the disposal site search area, although these samples still comprised greater than 58% silt material. While the increased sand fraction at locations GS9 and GS12 (to the northeast of the disposal site search area) are potentially more similar to the dredged material, the surface sediment composition remains fundamentally different and the deposition of dredge material from Uig Harbour at any location within the disposal site search area will effectively result in a change in substrate type (as would be the case throughout Uig Bay). Therefore, surface sediment type around the disposal site search area does not present a key differentiator with regards to physical characteristics.

Table 11. PSA of surface sediment samples collected from grab samples in the disposal site search area

Grab Sample	Particle Size Fraction (%)			Sample Comments (Visual Inspection)	Folk 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	Mud
GS2	93.7	6.32	0.0	Colour - Brown; Texture - Wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Mud
GS3	93.1	6.86	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Mud
GS4	91.5	8.53	0.0	Colour - Brown; Texture - Wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Mud
GS5	88.9	11.2	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Sandy Mud
GS6	86.8	13.2	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Sandy Mud
GS7	90.2	9.79	0.0	Colour - Brown; Texture - Very wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Mud
GS8	83.6	16.4	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Sandy Mud
GS9	58.3	41.7	0.0	Colour - Brown; Texture - Very Wet Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Sandy Mud
GS10	92.1	7.88	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Mud
GS11	87.8	12.2	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Sandy Mud
GS12	62.0	38.0	0.0	Colour - Brown; Texture - Sludge; Odour - None; Biota - None; Anthropogenic Inputs - None	Sandy Mud

5.2.2 Chemical characteristics

As described in Table 5 and Table 6, sediments within Uig Bay and at the dredge site indicate high concentrations of certain chemical determinands, particularly chromium and nickel. The Harbours Manager for THC has suggested there is no history of metal works or other similar anthropogenic activities in the Uig Bay area (i.e. human activities which could have caused the high levels of chromium and nickel to occur). Therefore, it is considered most likely that the high chromium and nickel concentrations observed in sediments throughout Uig Bay are naturally occurring, potentially due to the leaching of geological material. This would potentially explain the high concentrations found throughout Uig Bay, including both shallow and deeper water locations.

During the teleconference on 07 December 2017, Marine Scotland noted that concentrations of chromium and nickel in the harbour are high and, therefore, sediments at any proposed new disposal site would need to have similar levels to the dredged areas. It was considered likely that concentrations of chromium and nickel within the disposal site search area would be similar to those reported around Uig Bay and at the dredge site, particularly given Samples A and C were collected within the eastern section of the disposal site search area.

Table 12 provides concentrations of chemical determinands from 12 surface sediment samples collected from the disposal site search area (see Figure 10 for locations). 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 dibenz(ah)anthracene (GS1, GS3 and GS12) which were slightly above AL1 (there is currently no AL2 for PAHs).

The concentrations of chemical determinands in grab samples collected from the disposal site search area were similar to samples collected from around Uig Bay in 2016 (Table 5) and the dredge sites at Uig Harbour in 2017 (Table 6). Therefore, based on the range of sites sampled throughout the disposal site search area, it is considered that the entirety of disposal site search area would present a suitable new disposal site with regards to chemical characteristics due to the consistently high concentrations of chromium and nickel.

Table 12. Concentration of chemical determinands in surface sediment samples collected from grab samples in the disposal site search area

Determiand	Unit	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
Tributyltin (TBT)	µg/kg	100	500	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
PCB #28	µg/kg	20	180	1.4	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
PCB #52	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 #101	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 #118	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 #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
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
Dibenz(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
Key	Below AL1														
	Above AL1 (Below AL2)														
	Above AL2														

Note: Surface sediment samples. AL1 - Action Level 1; AL2 - Action Level 2.

5.2.3 Biological characteristics

The Inner Hebrides and the Minches candidate Special Area of Conservation (cSAC) is located immediately adjacent to Uig Bay (boundary between the Ru Idrigill and Ru Chorachan headlands) (Figure 12). Therefore, the majority of the disposal site search area overlaps with this designated site. The site is designated for Harbour porpoise (*Phocoena phocoena*) and considered to be "one of the best areas in the United Kingdom" for this mobile species[3]. However, for context, the size of the disposal site search area (0.75 km^2) is less than 0.01% of the spatial extent of the Inner Hebrides and the Minches cSAC (13,802 km^2).

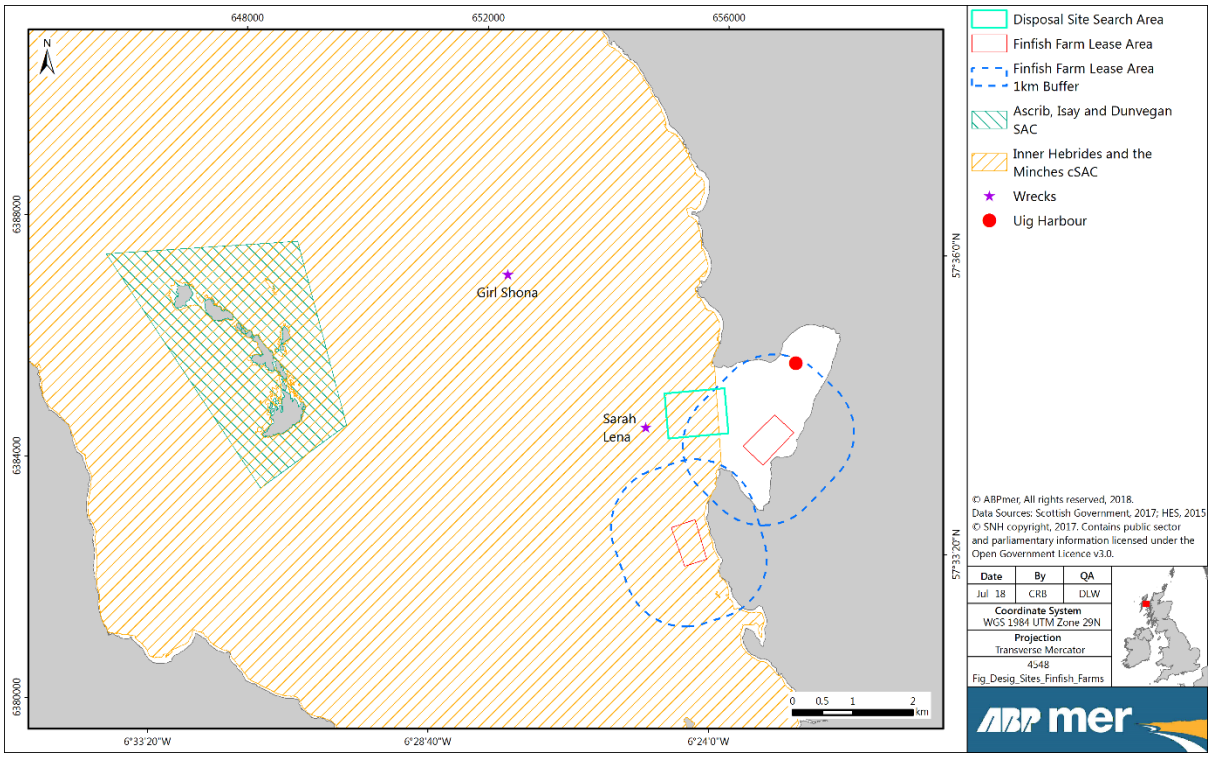


Figure 12. Nature conservation designated sites, finfish farms and known wrecks

The Ascrib Islands component of the Ascrib, Isay and Dunvegan Special Area of Conservation (SAC), designated for Harbour seal (*Phoca vitulina*), is located approximately 5 km to the west of the disposal site search area (Figure 12). This complex of skerries, islets, undisturbed mainland shores and offshore islands in north-west Skye consistently supports a breeding colony of Harbour seals. The site represents one of the larger discrete colonies of common (harbour) seals in the UK, holding around 2% of the UK population. While the disposal site search area does not directly overlap with this designated site, it is likely that this species will migrate and forage within Uig Bay.

The EMODnet MESH Atlantic data records indicate 'Seapens and burrowing megafauna in circalittoral fine mud' (A5.361) within the disposal site search area, while '*Laminaria saccharina* and red seaweeds on infralittoral sediments' (A5.521) has been reported in relatively close proximity; however, the latter biotope would not be expected to occur at the depths within the disposal site search area. As highlighted on Marine Scotland's NMPi, seapens and burrowing megafauna in circalittoral fine mud is extensively distributed throughout the sea lochs of the west coast, Hebrides and voes of Shetland, occurring at depths of between 10-100 m.

[3] http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0030393.pdf (Accessed June 2018).

Table 13 presents the mean infauna abundance results from the grab samples collected from the disposal site search area (see Figure 10 for locations). A total of 54 taxa (not all organisms could be identified to species level) were recorded from the 12 grab samples. The average abundance of infauna was 223.9 individuals per m^2. Samples were dominated, both in terms of species and number of animals, by polychaetes with 28 taxa (52% of species) and an average abundance of 145 polychaetes per m^2 (63% of animals). Mollusca were also an important component of the benthic community with 14 species and an average abundance of 66.7 individuals per m^2 found in the disposal site search area. Crustaceans, echinoderms and other groups were also present but in much lower diversity and abundance.

Table 13. Number of species and average abundance of macrofaunal phyla in grab samples from the disposal site search area

Taxon Group	Number of Species	Mean Abundance (Individuals/m^2)
Polychaeta	28	145
Crustacea	4	4.2
Mollusca	14	66.7
Echinodermata	4	10
Nemertea	1	0.8
Phoronida	1	1.7
Sipuncula	1	0.8
Cnidaria	1	0.1
Total	**54**	**223.9**

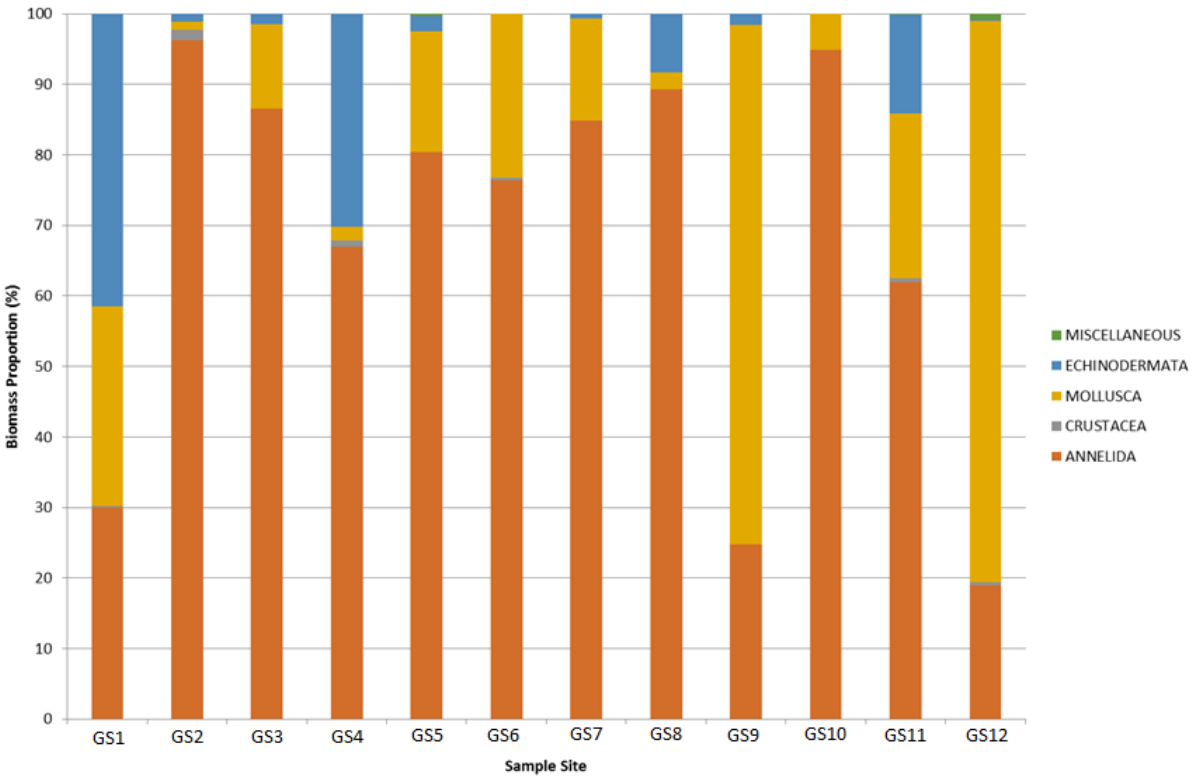
The polychaetes were dominated by the catworm, *Nephtys incisa*, which accounted for almost half of all worms present. This was also the only infaunal species found in all grab samples. Bivalves were the most important component of the mollusca diversity, with eight bivalve species recorded. Abundance, however, was split between bivalves and gastropods, predominantly the bivalve genera *Abra* and *Nucula* and the gastropod snail *Cylichna cylindracea*. This small gastropod snail was the only other species that was found to be widespread (recorded in 10 of the 12 grab samples). Only eight species were recorded in 50% or more of the grab samples; the polychaetes *Abyssoninoe hibernica*, *Magelona minuta* and *Nephtys incisa*; the bivalves *Abra nitida*, *Nucula nitidosa* and *Chaetoderma nitidulum*; the gastropod snail *Cylichna cylindracea*; and the brittle star *Amphiura chiajei*.

With the exception of GS1, GS9 and GS12, polychaetes accounted for the highest proportion of faunal biomass (>60%; Figure 13) in grab samples. For GS1, biomass was dominated by echinoderms (a relatively low number of large bodied individuals) and for GS9 and GS12 molluscs accounted for the majority of the biomass (>70%).

Sediments dominated by mud (silt/clay) were widely observed along the ROV transects with fine mud and many burrow holes recorded. The dominance of infaunal polychaete worms and bivalve molluscs in the grab samples is typical of the fauna found in muddy sediments in marine waters. The dominant fauna, as identified by both the infaunal grab sampling and the epifaunal ROV footage, were polychaete worms, bivalves and gastropod molluscs with burrowing megafauna such as *Nephrops norvegicus*, the burrowing shrimp *Maera loveni* and two species of seapen.

The benthic habitat in the disposal site search area is dominated by burrowed muds, including the biotope 'Seapens and burrowing megafauna in circalittoral fine mud' (SS.SMu.CFiMu.SpnMeg). There were very regular sightings of two species of seapen (*Virgularia* mirabilis and *Pennatula phosphorea*), highly abundant burrows and mounds on the seabed and the positive identification of several individuals of *Nephrops norvegicus*. This biotope is a PMF in Scottish waters, though it is recognised as

having a common and widespread distribution. Therefore, the consistent burrowed muds habitat type throughout the disposal site search area does not present a key differentiator with regards to biological characteristics in selecting a suitable new disposal site.



Source: AECOM, 2018a

Figure 13. Proportion of benthic biomass by major faunal groups in grab samples from the disposal site search area

5.2.4 Human environment and other sea users

The disposal site search area is located within the Loch Snizort Shellfish Water Protected Area. However, there are currently no classified shellfish production areas in the vicinity of the Proposed Development or within the wider Loch Snizort Shellfish Water Protected Area. The Loch Snizort Beag (Kensaleyre and Tote) production area for Common cockles (*Cerastroderma edule*) was declassified in 2011.

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. A Controlled Activities Regulations (CAR) Licence has also been granted to Sgeir Mhor (Salmon) Ltd for a finfish farm along the southern margin of Uig Bay, a site previously used for salmon farming albeit has not been operational since 2004.

The lease area for the Loch Snizort East finfish farm is approximately 1.3 km from the boundary of the disposal site search area, while the lease area for the finfish farm in Uig Bay is largely within 1 km of the southeast section of the disposal site search area (see Figure 12). It was requested by Grieg Seafood to avoid placement of a new disposal site within 1 km of the finfish farms where possible. Given sections to the east of the disposal site search area are within 1 km of the Uig Bay finfish farm lease area, locating the new disposal site in the west of the disposal site search area would support the request from Grieg Seafood to maintain a distance of at least 1 km from the nearby finfish farms.

There is a known wreck to the west of Uig Bay, located immediately west of the disposal site search area boundary ("*Sarah Lena*"; motor fishing vessel), while another wreck is situated further northwest of the disposal site search area ("*Girl Shona*"; motor fishing vessel) (Figure 12). No other marine archaeological features or marine infrastructure, such as cables or pipelines, have been identified within the disposal site search area or immediate vicinity.

The identification of a proposed new disposal site within the disposal site search area is considered unlikely to present a significant constriction to vessel movements. It is also understood that there is relatively limited fishing activity within Uig Bay which would be influenced by disposal of dredge material within the disposal site search area, although Uig Harbour is an important landing port.

In summary, the key differentiator with regards to the human environment and other sea users would suggest locating the new disposal site in the west of the disposal site search area to maintain a requested distance of at least 1 km from the Uig Bay and Loch Snizort East finfish farms.

6 Proposed New Disposal Site

Following the disposal site selection process and consideration of existing marine disposal sites as described in Section 5, a new disposal site is proposed within the disposal site search area (Figure 14). It is located approximately 2 km to the west of Uig Harbour centred on Grid Reference NG 36686 62746, with extent coordinates provided in Table 14. The area is approximately 250 m x 500 m (0.125 km^2), completely overlapping grid 2 and partially overlapping grids 1 and 3 of the disposal site search area. The size of the proposed new disposal site in the outer Uig Bay is consistent with existing disposal site dimensions in the vicinity of the Isle of Skye and wider area, as identified in Table 7.

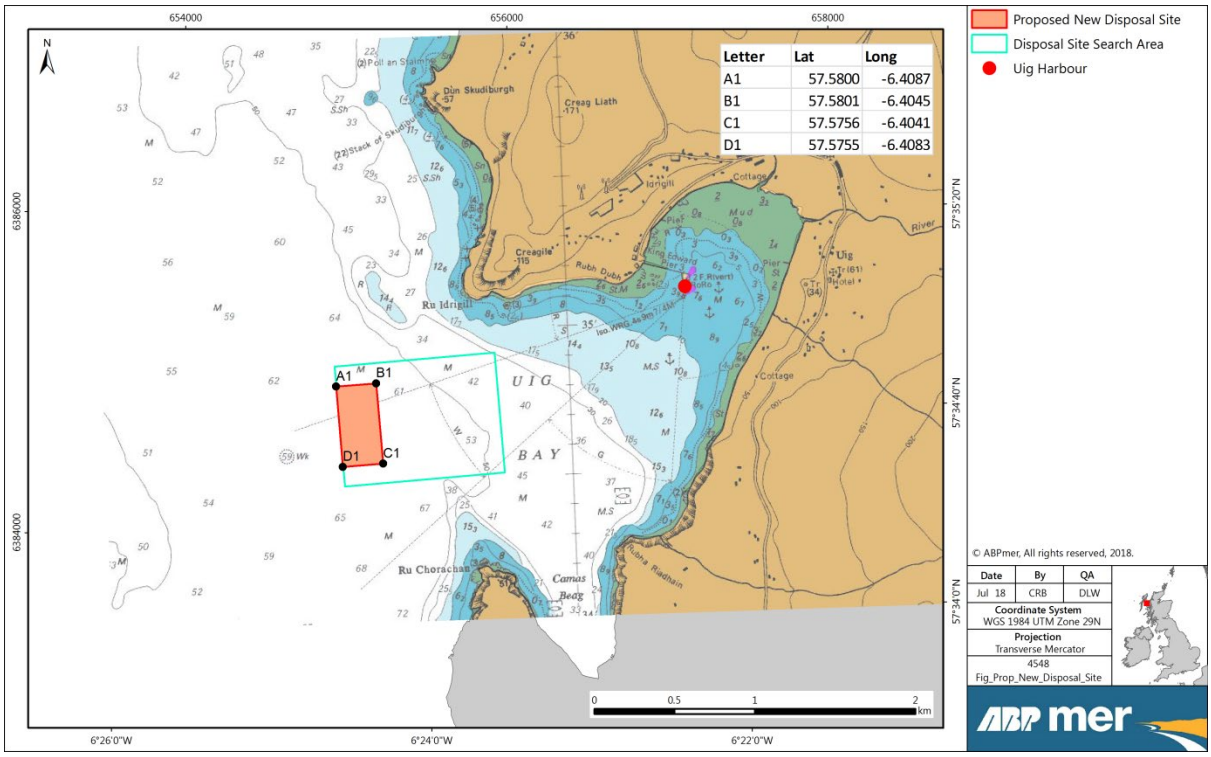


Figure 14. Location of the proposed new disposal site

This sub-section of the disposal site search area has been selected as the most suitable location for the proposed new disposal site for the following key reasons:

- Water depths (approximately 60 m) provide increased retentive properties of deposits which reach the seabed;
- Very low flow speeds throughout Uig Bay, particularly apparent in deeper areas, indicating the proposed new disposal site would provide retentive properties for disposed sediment;
- Distance from the dredge sites at Uig Harbour (approximately 2 km) reduces the potential for any fine sediment plumes generated during dredging and disposal operations to combine;
- Distance greater than 1 km from any known White-tailed eagle nest (*Haliaeetus albicilla*; confidential information provided by the Highland Raptor Study Group); and
- Distance greater than 1 km from Uig Bay and Loch Snizort finfish farms as requested by Grieg Seafood.

Table 14. Proposed new disposal site coordinates

Point	Coordinates (WGS84; Decimal Degrees)	
	Latitude (N)	Longitude (W)
A1	57.5800	-6.4087
B1	57.5801	-6.4045
C1	57.5756	-6.4041
D1	57.5755	-6.4083

Other site selection factors discussed in Section 5.2, whereby no apparent differentiator was identified around the disposal site search area, remain applicable to the proposed new disposal site. This includes the following reasons:

- The surface sediment composition is fundamentally different to the dredged material throughout the disposal site search area (as is the case in surface sediments throughout Uig Bay) and, therefore, the deposition of dredge material from Uig Harbour at any location within the disposal site search area will effectively result in a change in substrate type;
- Similarly, the benthic habitat in the disposal site search area is dominated by burrowed muds, including the PMF biotope 'Seapens and burrowing megafauna in circalittoral fine mud' (SS.SMu.CFiMu.SpnMeg) and thus disturbance/smothering of this habitat is unavoidable;
- The concentration of chemical determinands in sediments, particularly chromium and nickel, were consistently high throughout the disposal site search area, including the proposed new disposal site;
- While a small section in the east of disposal site search area does not overlap the Inner Hebrides and the Minches cSAC (Figure 12), it is designated for Harbour porpoise (*Phocoena phocoena*) and thus does not realistically present an opportunity to avoid potential effects given this is a mobile feature which will likely migrate and forage within Uig Bay;
- Equally, the Ascrib Islands component of the Ascrib, Isay and Dunvegan SAC, designated for Harbour seal (*Phoca vitulina*), is located around 5 km to the west of the proposed new disposal site, but this mobile feature will likely migrate and forage within Uig Bay;
- The nearest known wreck is located immediately west of the disposal site search area boundary ("*Sarah Lena*"; motor fishing vessel) and thus the proposed new disposal site does not overlap this feature (Figure 12);
- No other marine archaeological features or marine infrastructure, such as cables or pipelines, have been identified within the disposal site search area or immediate vicinity; and
- The location is considered unlikely to present a significant constriction to vessel movements, while there is relatively limited fishing activity within Uig Bay.

An assessment of potential effects of disposal activity at the proposed new disposal site is provided in Section 7.

7 Assessment of Potential Effects

In identifying the proposed new disposal site (Figure 14), a number of key considerations were made regarding potential effects on the environment and other sea users/infrastructure. Such considerations were similar but more refined compared to the initial identification of the disposal site search area. Table 15 describes the potential effects on the physical, chemical, biological and human environment, providing rationales regarding the need for further assessment. Those effects which were considered to require further assessment are discussed in the following sections.

Table 15. Potential effects as a result of disposal at the proposed new disposal site

Group	Potential Effect	Requires Assessment?	Rationale
Physical Environment	Increases in suspended sediment concentration (SSCs)	Yes	The disposal of fine (silt/mud) material could lead to increased SSCs in the vicinity of the proposed new disposal site. Therefore, numerical modelling has been undertaken to determine the fate of the fine material following disposal.
	Changes to coastal processes	Yes	The disposal of material to the seabed and dispersion of fine material could influence the nearby coastal processes. Therefore, further consideration is required regarding potential changes to the wave regime, flows and sediment transport.
Chemical Environment	Changes to water and sediment quality	Yes	The introduction of sediment-bound chemicals from the dredge sites could lead to a reduction in water and sediment quality at the proposed new disposal site.
	Deterioration in water body status under the Water Framework Directive	Yes	Activities in the marine environment which could have an effect on a water body should be considered against the objectives of the Water Framework Directive.
	Changes in water quality through accidental chemical/fuel spillages	No	Accidental spillages are a risk for all activities involving vessels and equipment/machinery in the marine environment. However, it is assumed that good practice will be followed to minimise the risk of accidents occurring. Disposal activity at the proposed new disposal site will only include the release of dredge material; it will not involve purposeful releases of chemicals or fuel.
Biological Environment	Change in benthic habitat type and extent including Priority Marine Features (PMFs) and smothering	Yes	Given the anticipated change in sediment type at the surface (from soft mud to coarse material) and the identification of PMF habitat at the proposed new disposal site, further consideration is required regarding the change in habitat and impact to species assemblage.

Group	Potential Effect	Requires Assessment?	Rationale
	Disturbance to features of nature conservation designated sites	Yes	The proposed new disposal site overlaps the Inner Hebrides and the Minches cSAC. Therefore, further consideration is required regarding potential impacts to designated features.
	Disturbance to nesting White-tailed eagles and other terrestrial ecology receptors	No	The location of the proposed new disposal site is greater than 1 km from any known White-tailed eagle nest (confidential information provided by the Highland Raptor Study Group). Therefore, further assessment to consider the potential impacts on this species is not required. No other terrestrial ecology receptors are likely to be disturbed by disposal (activity) at the proposed new disposal site.
	Introduction of invasive non-native species (INNS)	No	The origin of the dredge material is relatively local to the proposed new disposal site (i.e. Uig Harbour). While the change in sediment type will alter the seabed habitat type, it is considered unlikely that disposal of this material will result in the introduction of INNS.
Human Environment	Impacts to finfish farms and through changes in water quality	Yes	As described above, there is a potential for increased SSCs through the introduction of fine material at the proposed new disposal site. This could have a significant impact on the operation of nearby finfish farms should the material be transported towards them.
	Loss of commercial and recreational fishing grounds	No	While it is acknowledged that Uig Harbour is an important landing port, it is understood that there is relatively limited fishing activity within Uig Bay and the proposed new disposal site. Therefore, it anticipated that there would be minimal impact to commercial and recreational fisheries from disposal of dredge material at the proposed new disposal site.
	Impacts to Shellfish Water Protected Areas through changes in water quality	No	The proposed new disposal site is located within the Loch Snizort Shellfish Water Protected Area. However, there are currently no classified shellfish production areas in the vicinity of the Proposed Development or within the wider Loch Snizort Shellfish Water Protected Area.
	Disturbance to known marine archaeological features or existing infrastructure	No	There is a known wreck to the west of Uig Bay, located immediately west of the proposed new disposal site ("*Sarah Lena*"; motor fishing vessel). The disposal of dredged material at this site is considered unlikely to significantly impact this wreck, or another wreck situated further northwest of the proposed new disposal site ("*Girl Shona*"; motor fishing vessel).

Group	Potential Effect	Requires Assessment?	Rationale
			No other marine archaeological features or marine infrastructure, such as cables or pipelines, have been identified in the immediate vicinity of the proposed new disposal site.
	Potential increased risk of vessel collision	No	There is sufficient navigable water available in Uig Bay for vessels to use alternative approaches to the harbour during disposal operations. Furthermore, the proposed disposal operations are short-term and unlikely to have any significant impact on navigation assuming local notices to mariners are published by the Harbour Authority and made available to all vessels. Coordination of planned dredging and disposal activities with ferry operations would also help to minimise disruption to services. Following cessation of disposal activity, the proposed new disposal site will not present a hazard to navigation given the location and depth of water. It is also noted that provision of a new disposal site is essential to support the Proposed Development at Uig Harbour, providing improved transport links to the area. An assessment of potential impacts to commercial and recreational navigation will be prepared to support the Proposed Development, considering both the dredging activity and disposal to the proposed new disposal site.

7.1 Physical environment

7.1.1 Increases in suspended sediment concentration (SSC)

Following on from the identification of the proposed new disposal site (as discussed in the preceding Sections of this report), a series of numerical modelling scenarios were undertaken to assess the potential effects of the planned disposal of material and verify the selection of this location. In addition to informing this site characterisation study, the modelling undertaken forms part of the wider environmental impact assessment (EIA) process, in support of the Proposed Development at Uig Harbour. Full details of the modelling approach/inputs, including the rationale for modelling the selected scenarios, are provided in AECOM (2018b). The wider modelling tasks include assessment of effects from the Harbour redevelopment (e.g. installation of new infrastructure, dredging works etc.); for the purposes of the present report, the following sections summarise the modelling undertaken in relation to the disposal of material at the identified disposal site.

Model approach

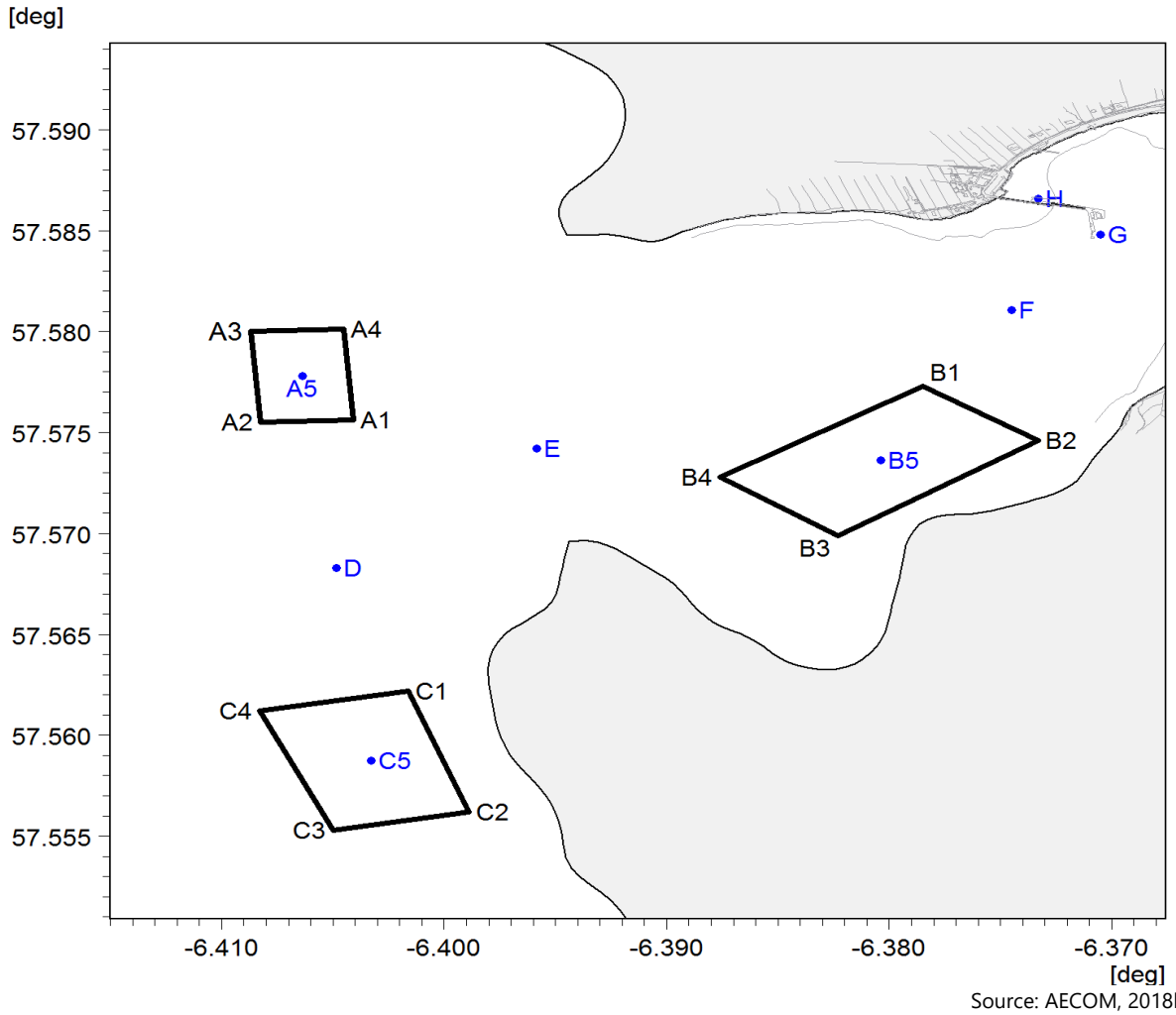
Sediment dispersion modelling was undertaken using the DHI MIKE21 PT (Particle Tracking) module, to simulate the fate of dredged sediment suspended through the disposal process. The calibrated hydrodynamic model (set up for the Uig Harbour EIA studies; AECOM, 2018b) was used to drive the PT module with a description of water levels and flow speeds across the study area. The flow regime was seeded with particles with defined characteristics (e.g. size, density, settling velocity etc.), which were then tracked as they became entrained within the water column.

Model input parameters were defined, relating to:

- Dredge/disposal programme - method of dredging, the dredge volume, the hopper capacity and the transit time from the dredge pocket(s) to the disposal site;
- Sediment characteristics - as informed by the analysis of grab samples and boreholes collected over the proposed dredge pockets; and
- Environmental forcing conditions - applying a range of tidal and wind input conditions (informed by hindcast wind data provided by the Met Office) to provide a representative set of forcing conditions, covering a six-month period and including stormy winter conditions and calmer summer conditions.

Model results

A series of 12 representative forcing conditions were used to define the suite of modelled scenarios. These included a range of wind speeds and directions, and spring and neap tidal conditions. Construction operations for the Uig Harbour redevelopment, including both dredge and disposal activities, were then modelled to assess the subsequent effect on the fate of suspended material. The modelled increase in SSC was extracted, for each model scenario, and for a series of locations across the study area (Figure 15).



Source: AECOM, 2018b

Figure 15. Extraction points from particle tracking (PT) module

The defined extraction locations were chosen to provide information on predicted SSC increases at specific areas of interest. These points included Dredge Pocket 1 (Point G), Dredge Pocket 2 (Point H), the proposed new disposal site (Points A1-A5) and the two finfish farms within the study area (Points B1-B5 and C1-C5), along with selected locations across the inner and outer regions of Uig Bay (Points D, E and F).

The maximum predicted increase in SSC, at each of these points, and from any of the 12 model scenarios, is presented in Table 16.

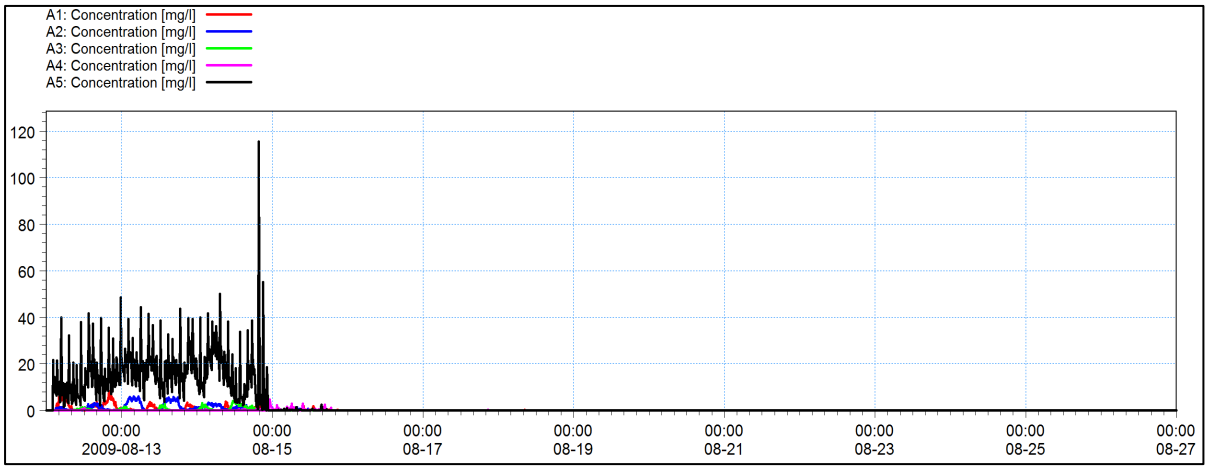
Table 16. Maximum increase in SSC for all 12 model scenarios

Point	Increase in Suspended Sediment Concentration (SSC) (mg/l)		
	Surface	Bed	Depth-averaged
A1	32.7	5.3	6.6
A2	39.7	31.4	24.1
A3	24.0	12.4	10.8
A4	19.4	10.0	10.4
A5	191.0	1,239.0	212.0
B1	2.5	51.6	6.2
B2	1.8	0.8	0.9
B3	6.1	2.7	1.3
B4	3.9	3.9	1.3
B5	2.0	1.7	0.8
C1	4.9	0.3	1.1
C2	3.6	3.2	1.4
C3	1.9	0.3	0.1
C4	1.1	0.6	0.1
C5	3.9	0.2	0.5
D	9.0	16.8	9.3
E	90.0	1,971.0	414.0
F	8.3	7.3	3.0
G	1,347.0	18,920.0	5,030.0
H	62,707.0	62,634.0	7,634.0

As noted above, the results of the model scenarios include the full set of dredge and disposal operations associated with the proposed Uig Harbour redevelopment. As a consequence, the results presented in Table 16 include effects from both the dredge and the disposal of material. In this way, the high SSC values predicted at Points G and H will be as a result of the dredging, as will extraction Points F, B1 and B2 (in the vicinity of the dredge). Meanwhile, the SSC values at the proposed new disposal site (Points A1-A5), the Loch Snizort East finfish farm (Points C1-C5) and sites in between (Points D and E) are considered to result from the disposal operations. For the remaining points (B3, B4 and B5), modelled SSC values are likely to be a combination of the dredge and/or the disposal operations, depending on the forcing conditions applied, and the resultant effect on the fate of suspended material.

The results of the modelling tasks showed high concentrations of material at the dredge sites, and also at the proposed new disposal site (particularly near the bed, as deposited material settles through the water column). At other locations where the disposal activity exerts an influence, only Point E shows evidence of notably elevated SSCs (maximum depth-averaged concentration of 414 mg/l). However, these elevated SSCs are likely to be short-lived, returning to background levels around 1 day following cessation of dredging and disposal activity.

The results presented in Table 16 show the maximum predicted SSC over the full set of model scenarios. Each model scenario covers approximately a 15-day period, and the values presented in Table 16 do not indicate how long these concentrations persist for. To assess this, timeseries of SSC for the extraction points have been plotted. Figure 16 shows an example timeseries output for the various points around the proposed new disposal site. The plot shows the results from model Scenario 12 (covering a relatively calm time period over summer months), although it is noted that maximum SSC values at the disposal site do not exhibit much variation across model scenarios.



Source: AECOM, 2018b

Figure 16. Timeseries of SSC increase at the proposed new disposal site for model scenario 12

The timeseries plot shows that the modelled surface SSC at the proposed new disposal site is elevated for the duration of the disposal operations, but then, following cessation of disposal (19:40 on 14/08/09; Figure 16), very small increases are predicted for up to a further 1-day period, before SSC values return to their baseline levels (i.e. no further increase is predicted). This might be expected, since the large depths and low tidal flows over the disposal site, limit the ability of the forcing conditions to disturb material deposited on the bed.

The temporal development of the disposal plume has also been extracted, with Figure 17 showing an example output for model Scenario 12. The plume development shows increases in surface SSC of up to approximately 30-40 mg/l during disposals within the proposed new disposal site (central panes in Figure 17). Shortly after the modelled disposals (lower left pane), the SSC plume is shown extending up to approximately 700 m to the northeast from the disposal location, with concentrations of up to 10-20 mg/l. A similar pattern is predicted to continue for the duration of the disposal activity (in the modelled scenario, the disposal period lasts just over 2.5 days), following which increases in SSC are predicted to drop quickly (within a day) to negligible levels (e.g. Figure 16; lower right pane of Figure 17).

The direction of the plume development is shown to be influenced by the meteorological forcing applied to the model (as the currents across the study area are controlled by a combination of tidal and wind forcing). Figure 17 shows the maximum predicted increase in depth-averaged SSC, throughout each of the 12 model scenarios. It should be noted here that these plots show maximum SSC, irrespective of timestep (i.e. maximum values in one location will not necessarily coincide with the timing of maximum concentrations in another). In this way, these plots do not show a single snapshot of predicted SSC, rather they refer to an aggregated maximum concentration over the full 15-day period covered by each model scenario. It is further noted that these plots also include the effects of the Uig Harbour redevelopment dredge, alongside the associated disposal activity. In each case, the boundary between the effects of the dredge and those of the disposal are generally well defined.

The maximum predicted SSC plots in Figure 18 reveal the variation in predicted plume dispersion under the representative range of meteorological forcing conditions. For each scenario, the greatest increases in SSC are constrained to the extent of the proposed new disposal site. Increases in depth-averaged SSC of up to 400 mg/l are predicted at the point of disposal, with increases up to 50 mg/l predicted to be constrained to within approximately 250 m of the disposal location. Outside of the proposed new disposal site, increases in SSC of less than 10 mg/l are predicted to extend up to approximately 800 m from the disposal location (model Scenario 2), with lower increases of less than 5 mg/l predicted to extend up to approximately 4.5 km (model Scenario 12).

With specific regard to the identified finfish farm receptors, only model Scenario 3 shows any resultant effect on depth-averaged SSC, with increases of up to 2 mg/l predicted to reach the southwestern edge of the finfish farm inside Uig Bay. By contrast, depth-averaged SSC at the outer finfish farm (within Loch Snizort East), is not predicted to be affected by the disposal at the proposed new site.

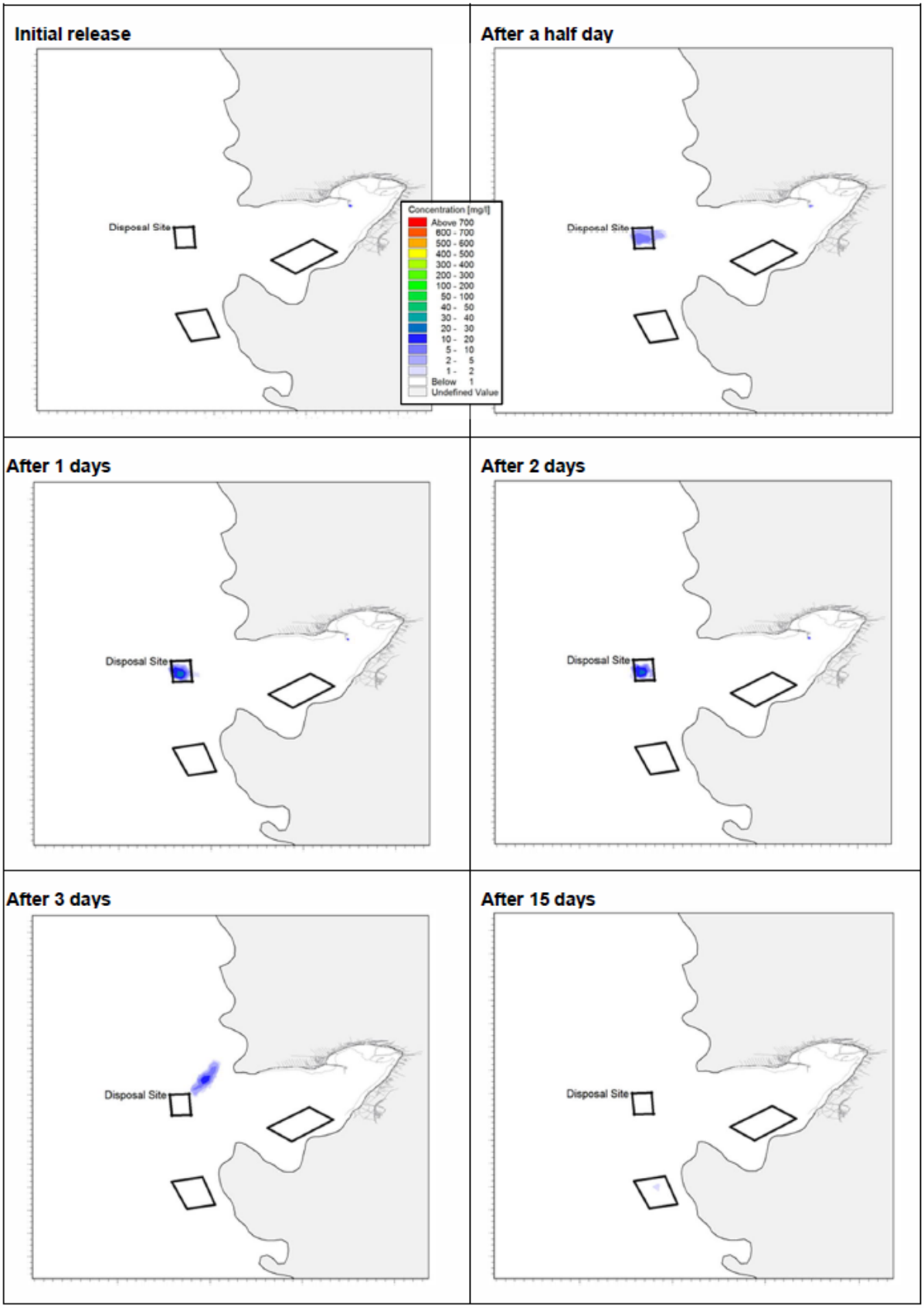
Summary

The potential effects of the proposed new disposal site within the approaches to Uig Bay, on SSC, have been assessed using numerical modelling. A total of 12 model scenarios were undertaken, covering a range of representative meteorological forcing conditions across the study area. The results show predicted increases to SSC above background levels, showing maximum magnitude and extent of effect from the disposal activity associated with the proposed Uig Harbour redevelopment.

The results of this study, in relation to the disposal activity, are summarised below:

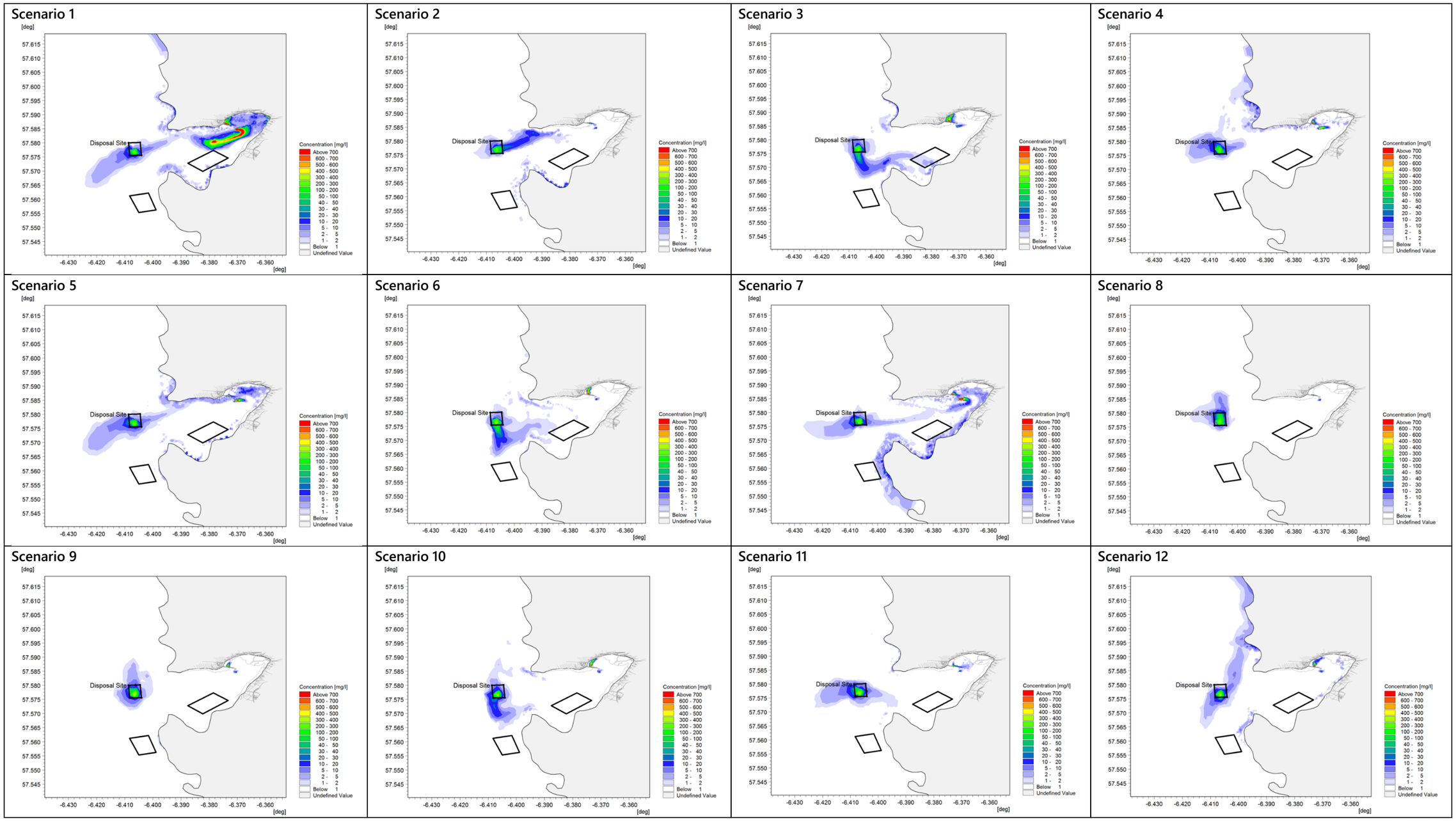
- Increases in depth averaged SSC of up to 212 mg/l are predicted (Table 16) at the proposed new disposal site, for the duration of the disposal activity;
- Following cessation of disposal operations, predicted increases in SSC rapidly reduce such that after 1-day following the final disposal, concentrations across the proposed new disposal site will have returned to background levels (Figure 16);
- In general, the increases in SSC associated with the disposal activity, and those associated with the proposed dredge for the Uig Harbour redevelopment, remain separate, showing little evidence of significant cumulative effects;
- Increases in SSC, from the disposal of between 50 and 400 mg/l are constrained to within approximately 250 m of the proposed new disposal site boundary. Increases of up to 10 mg/l are predicted to extend up to 800 m from the proposed new disposal site, whilst increases of up to 5 mg/l can extend up to 4.5 km from the site (dependent on meteorological forcing conditions) (Figure 18);
- The disposal operation can result in slight increases in SSC extending to the finfish farm within Uig Bay, but the predicted increases are relatively small (less than 2 mg/l), are expected to last for a short period of time (less than a day) and are only predicted for one of the 12 model scenarios; and
- Depth-averaged SSC at the Loch Snizort East finfish farm is not predicted to be increased as a result of the assessed disposal operations.

Overall, while the disposal activity will result in an initial large increase in SSC at the proposed new disposal site, concentrations will return to background levels within 1-day following the final release. There will also be small increases in SSC as indicated in model outputs from points around Uig Bay and, once again, these increases will be short term.



Source: AECOM, 2018b

Figure 17. Development of sediment plume for model scenario 12



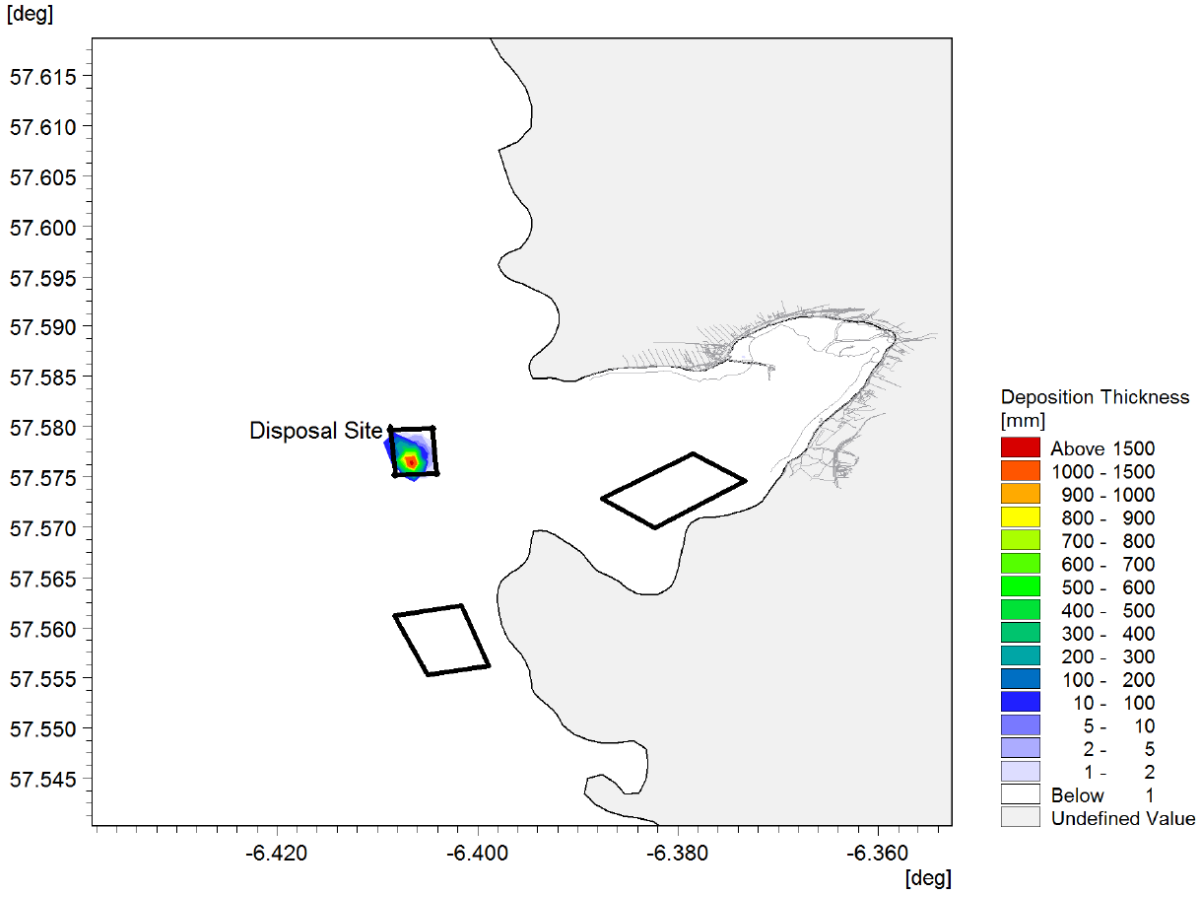
Source: AECOM, 2018b

Figure 18. Maximum depth-averaged SSC increase for all model scenarios (1 to 12)

7.1.2 Changes to coastal processes

The selection of the proposed new disposal site in the west of the disposal site search area means water depths as great as 60 m have been incorporated. Such depths suggest any material which reaches the bed will not be affected by wave action at the surface and, coupled with low flow speeds across the region, therefore, supports retentive properties of the site (i.e. once the material reaches the bed, it is expected to remain in this location).

As described in Table 4, the composition of dredge arisings to support the Proposed Development at Uig Harbour is predominantly sand (15,645 m^3) and gravel (6,814 m^3), equating to approximately 80% of the total volume across Dredge Pockets 1 and 2, combined. It is anticipated that this coarse material will settle to the bed relatively quickly (in a matter of minutes) and in close proximity to the release point from the barge. Model outputs suggest the maximum deposition thickness at the proposed new disposal site will be up to 2.0 m above the bed. This has been estimated based on all dredge material being disposed from the same point at the centre of the proposed new disposal site (see Figure 19; AECOM, 2018b). However, this is considered a relatively conservative assumption, with disposal operations likely to distribute the material equally across the proposed new disposal site. Furthermore, seabed deposition within the model remained unconsolidated and, in reality, recent sediment accretions will tend to compress into thinner layers, de-watering the sediment, increasing the sediment density and reducing the deposition thickness. Therefore, it is likely that the maximum deposition thickness at the proposed disposal site will be much less than 2.0 m above the bed.



Source: AECOM, 2018b

Figure 19. Area of accretion and deposition thickness at the proposed new disposal site

Flow speeds are low around Uig Bay, with peak depth averaged flows less than 0.1 m/s throughout the disposal site search area (model data covering a mean spring tide, with a 1-in-1 year wind condition applied from the west). It is anticipated that small-scale, highly localised changes in flow patterns will occur at the bed in the immediate vicinity of the newly deposited material within the proposed new disposal site. However, as a result of the large water depths at the site, once this material reaches the bed, it will not have a significant influence on coastal processes through changes in wave regime or flows at the surface and around the wider Uig Bay, even assuming the conservative worst case deposition thickness described above.

A comparatively small quantity of fine material will be released at the disposal site, some of which will remain in suspension before slowly settling to the bed. It is noted that water depths at the proposed new disposal site, and around Uig Bay, are likely to extend the duration the fine material remains in suspension (as it will take longer to settle over greater depths; estimated settling rates for different sediment types are described in Table 4). However, this material will be locally sourced (i.e. Dredge Pockets 1 and 2) and, therefore, ensures the material stays within the same sediment cell/budget. Given the total volume of silt/clay to be disposed (5,533 m^3), this quantity is unlikely to have a significant influence on coastal processes through accretion around the Bay. As shown from the model outputs described in Section 7.1.1, SSCs will be reduced to background levels within 1-day following cessation of dredging/disposal activity. It is considered unlikely that disposal operations will result in significant levels of accretion at particular locations around Uig Bay, and would be no different to natural sediment disturbance through storm events.

In summary, any effect on coastal processes as a result of disposal to the proposed new disposal site is likely to be highly localised and small scale. In considering the wider disposal site search area, the proposed new disposal site incorporates the area furthest from the coast in the deepest section of water and, therefore, minimises the potential for interactions with coastal processes.

7.2 Chemical environment

7.2.1 Changes to water and sediment quality

Sediment quality at the proposed new disposal site is relatively similar compared to the dredge site at Uig Harbour and around Uig Bay (see Table 5, Table 6 and Table 12). It is acknowledged that concentrations in the northeast of the disposal site search area were higher for chromium and nickel (above AL2), while concentrations were consistently above AL1 within the proposed new disposal site for these metals. However, given the consistently elevated concentrations of nickel and chromium in sediments around Uig Bay (considered most likely to be naturally occurring; see Section 5.2.2), depositing dredge arising from Uig Harbour at the proposed new disposal site is not analogous to the introduction of contaminated material to a pristine environment. It is therefore considered prudent to dispose of the dredged material within the Uig Bay area rather than transfer the material elsewhere (e.g. an existing marine disposal site). Selection of the proposed new disposal site also considered the location of the Uig Bay finfish farm (potentially sensitive to high concentrations of chromium and nickel in the water column) which would be within 1 km if situated to the northeast of the disposal site search area.

As described in Section 7.1.1, increased SSCs will be observed in the immediate vicinity of the proposed new disposal site and are expected to return to background levels within 1-day of disposal operations ceasing. It is unlikely that the proposed disposal activity will result in significant reductions in dissolved oxygen levels which are naturally high in the area. There is potential for increased concentrations of chromium and nickel to be observed in the water column during disposal operations (i.e. change/partition from sediment-bound to dissolved). However, given the short-term nature of

increased SSCs and quantity of water in the receiving environment (large dilution), changes to water quality are anticipated to be minimal and dissolved concentrations of chromium and nickel would quickly return to background levels.

The closest designated bathing waters to the proposed new disposal site are Sand Beach and Gairloch Beach, located approximately 40 km to the east on the Scottish mainland. Similarly, there are no surface water nitrate vulnerable zones (NVZs) within 50 km of the proposed new disposal site, or nearby sensitive areas designated under the Urban Waste Water Treatment Directive (91/271/EEC; Department for Environment, Food and Rural Affairs (Defra), 2012).

Overall, any changes to water and sediment quality through disposal of dredge material from Uig Harbour at the proposed new disposal site are anticipated to be minimal and short term.

7.2.2 Deterioration in water body status under the Water Framework Directive

The proposed new disposal site is located within the Loch Snizort coastal water body (Figure 20) in the Scotland river basin district which is reported in the Scotland River Basin Management Plan (RBMP; Scottish Government, 2015b).

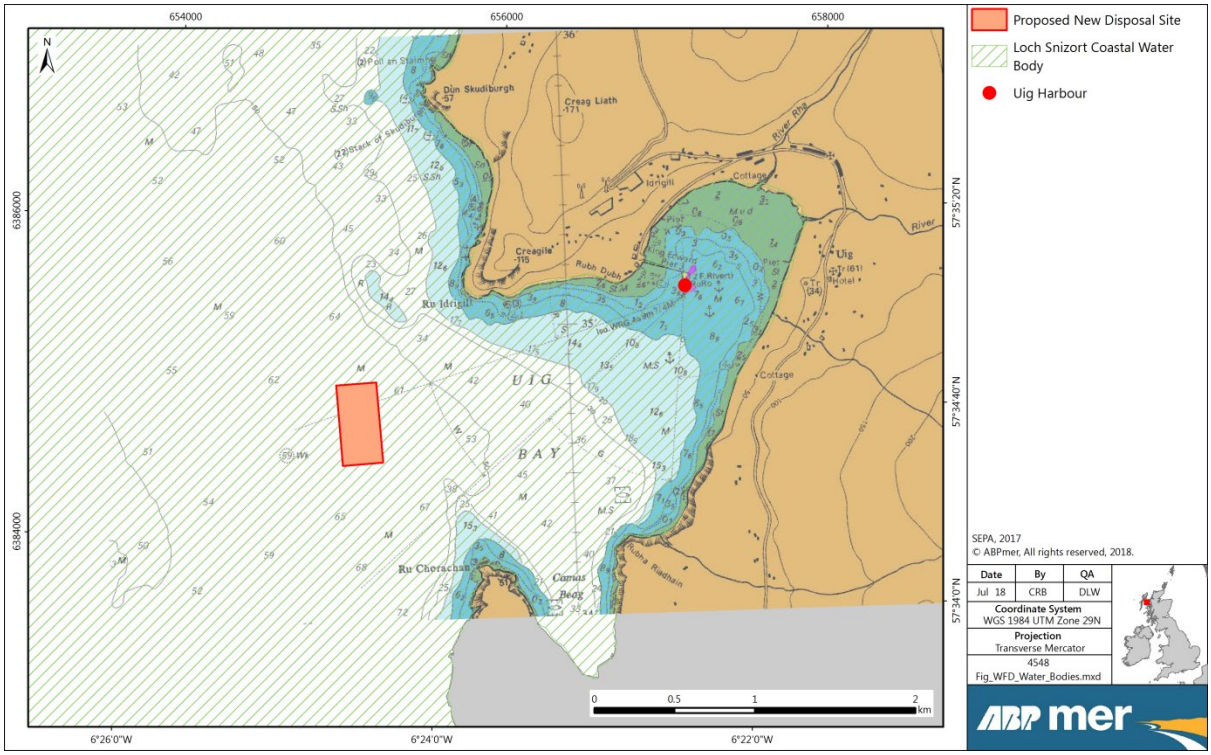


Figure 20. Water Framework Directive water bodies in the vicinity of the proposed new disposal site

Table 17 provides a summary of the Loch Snizort coastal water body (ID: 200141), including current water body status (overall, ecological and chemical). 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.

Table 17. 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
Hydromorphological Designation	None
Protected Area Designations	Shellfish Water Protected Area, Natura 2000 (Habitats and/or Birds Directive)
Overall Status (2016)	Good
Ecological Status (2016)	Good
Chemical Status (2016)	Not assessed

There will be no discernible changes in hydromorphology through the disposal of material at the proposed new disposal site (see Section 7.1.2), chemical concentrations in dredged sediments to be disposed are similar to those found at the proposed new disposal site and any changes in water quality are anticipated to be minimal and short-term in nature (see Section 7.2.1). There will be a change in benthic habitat type at the proposed new disposal site through the placement of coarser material (currently burrowed muds; discussed further in Section 7.3.1); however, this is considered minimal in the scale of such habitat available in the wider area. The benthic habitat in the disposal site search area is dominated by burrowed muds, including the PMF biotope 'Seapens and burrowing megafauna in circalittoral fine mud' (SS.SMu.CFiMu.SpnMeg) and thus disturbance/smothering of this habitat is unavoidable. As noted in Section 5.2.3, this PMF is extensively distributed throughout the sea lochs of the west coast, Hebrides and voes of Shetland, occurring at depths of between 10-100 m. Given the location of the proposed new disposal site, it is considered unlikely to result in a barrier to fish movement or significantly disturb mobile features of overlapping/nearby nature conservation designated sites (see Figure 12; discussed further in Section 7.3.2).

In summary, the introduction of the proposed new disposal site in the outer Uig Bay is considered unlikely to result in a deterioration in status, or prevent further improvements, of the Loch Snizort coastal water body (already at good status). Nevertheless, a Water Framework Directive compliance assessment will be required to support the Proposed Development at Uig Harbour, including consideration of both dredging and disposal activities.

7.3 Biological environment

7.3.1 Change in benthic habitat type and extent including Priority Marine Features (PMFs)

The benthic habitat was classified following analysis of both ROV footage and grab sample data (fauna and particle size). The identified seabed habitat throughout the disposal site search area, including the proposed new disposal site, was muddy sediment assigned to the PMF biotope 'Seapens and burrowing megafauna in circalittoral fine mud' (SS.SMu.CFiMu.SpnMeg). Introduction of coarse sediment from the dredge site at Uig Harbour will lead to a change in seabed habitat type from soft muds to coarse gravels and sands.

Smothering of existing seabed habitats is inevitable, although the location of any new disposal site would ideally avoid PMF habitats and provide like-for-like sediment type to minimise changes in benthic habitat. However, it is considered improbable that like-for-like coarse sediment habitats would be located in a suitable location near to the Proposed Development. This is based on a range of samples

collected around Uig Bay in 2016 (see Table 2) and the consistent burrowed mud habitat recorded within the disposal site search area.

As noted in Section 7.1.2, model outputs suggest the maximum deposition thickness within the proposed new disposal site will be up to 2.0 m above the bed. Such changes would result in mortality of seapens and, therefore, lead to a change in habitat. However, it should be noted that this presents a worst-case scenario should all dredged material be released from the same location (centre of the proposed new disposal site). It is likely that material will be deposited evenly around the proposed new disposal site, reducing the deposition thickness and smothering to levels which seapens may be more tolerant. Furthermore, while the PMF habitat will be sensitive to the introduction of dredged material, it is assumed to be widespread in the area as demonstrated throughout the disposal site search area and northwest coast of Scotland[4]. The spatial extent of the proposed new disposal site has been determined based on the requirements of the Proposed Development, while minimising the area of seabed disturbance through disposal activity.

7.3.2 Disturbance to features of Nature Conservation Designated Sites

The proposed new disposal site directly overlaps the Inner Hebrides and the Minches cSAC (Figure 12), designated for the mobile feature Harbour porpoise (*Phocoena phocoena*). Also, the Ascrib Islands component of the Ascrib, Isay and Dunvegan SAC, designated for Harbour seal (*Phoca vitulina*), is located approximately 5 km to the west of the proposed new disposal site (Figure 12).

It is unlikely that Harbour porpoise or Harbour seals would be significantly affected by disposal of dredge material due to the short-term duration of the activity, the mobile nature of these features to avoid the temporary disturbance and the size of the proposed new disposal site (0.125 km^2) compared to the designated sites. The spatial extent of the Inner Hebrides and the Minches cSAC is 13,802 km^2, with the proposed new disposal site overlapping less than 0.001% of this area. While the Ascrib, Isay and Dunvegan SAC is only 25.8 km^2 split over three components, it is more distant from the proposed new disposal site (i.e. no direct overlap) and still only equates to less than 0.5% of this total area. Noise levels are unlikely to present a significant barrier to movement for these species given the current level of vessel movements in the area. Also, loss of available foraging areas is considered to be minimal. Nevertheless, a Habitats Regulations Assessment (HRA) will be required to assess the potential impacts of the Proposed Development at Uig Harbour, including consideration of both dredging and disposal activities on these designated sites.

7.4 Human environment

7.4.1 Impacts to finfish farms and through changes in water quality

Flow directions are typically orientated north-south in the west sections of Uig Bay, and east-west within the Bay. Therefore, placement of the proposed new disposal site towards the west of the disposal site search area means increased SSCs will be directed (primarily) away from sensitive finfish farms in the area. As described in Section 7.1.1, increased SSCs will occur as a result of disposal operations, but these will be short term in nature and largely confined to the proposed new disposal site. Only model Scenario 3 showed any resultant effect on depth-averaged SSC, with increases of up to 2 mg/l predicted to reach the southwestern edge of the finfish farm inside Uig Bay. By contrast, depth-averaged SSC at the outer finfish farm (within Loch Snizort East) is not predicted to be affected by disposal activity at the proposed new site.

[4] http://jncc.defra.gov.uk/marine/biotopes/biotope.aspx?biotope=JNCCMNCR00001218 (Accessed August 2018).

Therefore, in summary, with regards to impacts on nearby finfish farms through changes in water quality, disposal at the proposed new disposal site will potentially result in slight increases in SSC at the finfish farm within Uig Bay. However, the predicted increases are small and are expected to be short-term (less than 1-day). Depth-averaged SSC at the Loch Snizort East finfish farm (outside of Uig Bay) is not predicted to be increased as a result of the assessed disposal operations.

7.5 Conclusion

The designation of a proposed new disposal site in the outer Uig Bay, required to support a Proposed Development at Uig Harbour, is anticipated to result in minimal effects to the physical, chemical, biological and human environment. In conclusion, while some further project-specific assessment will be required as part of the Proposed Development (e.g. HRA and Water Framework Directive compliance assessment), it is considered a suitable location for the disposal of material from Uig Harbour.

8 References

AECOM. (2018a). Uig Harbour Redevelopment. Sediment Disposal Site Seabed Survey Report. Report prepared for The Highland Council. Project number: 60536743. 27 March 2018.

AECOM. (2018b). Uig Harbour Redevelopment: EIA Modelling. Report prepared for The Highland Council. UHRD-ACM-ZZ-GE-RP-MT-0000X. 16 July 2018.

Centre for Environment, Fisheries and Aquaculture Science (Cefas) Disposal at Sea (DAS) database: https://www.cefas.co.uk/cefas-data-hub/

Department for Environment, Food and Rural Affairs (Defra). (2011). Guidance on applying the Waste Hierarchy. June 2011.

Department for Environment, Food and Rural Affairs (Defra). (2012). Waste water treatment in the United Kingdom - 2012: Implementation of the European Union Urban Waste Water Treatment Directive - 91/271/EEC.

HM Government. (2011). UK Marine Policy Statement. HM Government, Northern Ireland Executive, Scottish Government, Welsh Assembly Government. March 2011 London: The Stationery Office. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf (Accessed August 2018).

JNCC NATURA 2000 - Standard Data Form: http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0030393.pdf

JNCC Habitat – Biotope Classification: SS.SMu.CFiMu.SpnMeg - Seapens and burrowing megafauna in circalittoral fine mud: http://jncc.defra.gov.uk/marine/biotopes/biotope.aspx?biotope=JNCCMNCR00001218 (Accessed August 2018).

Marine Scotland. (2017). Pre-disposal Sampling Guidance Version 2 - November 2017. Available online at: https://www.gov.scot/Resource/0052/00528031.pdf (Accessed August 2018).

Marine Scotland - MAPS - National Marine Plan Interactive tool: https://marinescotland.atkinsgeospatial.com/nmpi

OSPAR Commission. (2014). OSPAR Guidelines for the Management of Dredged Material at Sea. (Agreement 2014-06).

Scottish Government. (2015a). Scotland's National Marine Plan. A Single Framework for Managing Our Seas. Marine Scotland. The Scottish Government, Edinburgh 2015. Available online at: http://www.gov.scot/Resource/0047/00475466.pdf (Accessed August 2018).

Scottish Government. (2015b). The river basin management plan for the Scotland river basin district: 2015-2027. 21 December 2015. Available online at: https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf (Accessed August 2018).

9 Abbreviations

ACD	Above Chart Datum
AL1	Action Level 1
AL2	Action Level 2
BPEO	Best Practicable Environmental Option
CalMac	Caledonian MacBrayne
CAR	Controlled Activities Regulations
Cefas	Centre for Environment, Fisheries and Aquaculture Science
cSAC	candidate Special Area of Conservation
CSD	Cutter Suction Dredger
CSEMP	Clean Safe Seas Environmental Monitoring Programme
D_{50}	Diameter value of particles (an intercept 50% of the cumulative mass)
DAS	Disposal at Sea
DDV	Drop-Down Video
Defra	Department for Environment, Food and Rural Affairs
DHI	Danish Hydraulic Institute
EC	European Commission
EEC	European Economic Community
EIA	Environmental Impact Assessment
EMODnet	European marine Observation and Data Network
EQS	Environmental Quality Standards
EU	European Union
EUNIS	European Nature Information System
HM	Her Majesty's
HRA	Habitats Regulations Assessment
ICES 7	International Council for the Exploration of the Sea - Determination of PCBs (CB28, 52, 101, 118, 138, 153, and 180) in sediment and biota
ID	Identity
JNCC	Joint Nature Conservation Committee
MESH Atlantic	Mapping European Seabed Habitats - Atlantic Area (Northern Component)
MHWS	Mean High Water Springs
MPS	Marine Policy Statement
MS-LOT	Marine Scotland Licensing Operations Team
N/A	Not Applicable
NMPi	National Marine Plan interactive
NVZ	Nitrate Vulnerable Zones
OSPAR	Convention for the Protection of the Marine Environment of the NE Atlantic (Oslo/Paris)
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PMF	Priority Marine Features
PSA	Particle Size Analysis
PT	Particle Tracking
RBMP	River Basin Management Plan
ROV	Remotely Operated Vehicle
SAC	Special Areas of Conservation
SEPA	Scottish Environment Protection Agency
SSC	Suspended Sediment Concentrations
TBT	Tributyltin
THC	The Highland Council

UK	United Kingdom
USEPA	United States Environmental Protection Agency
WGS84	World Geodetic System 1984

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Contact Us

ABPmer

Quayside Suite,
Medina Chambers
Town Quay, Southampton
SO14 2AQ

T +44 (0) 23 8071 1840
F +44 (0) 23 8071 1841
E enquiries@abpmer.co.uk

www.abpmer.co.uk