Lochmaddy Ferry Terminal Upgrade Capital Dredge Best Practicable Environmental Option Report

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1 Introduction

This Best Practicable Environmental Option (BPEO) report has been produced to support the dredge and disposal marine licence application under the Marine Works (Scotland) Act 2010 for the capital dredge required as part of the proposed Lochmaddy ferry terminal upgrade.

Lochmaddy harbour is owned by Comhairle nan Eilean Siar (CnES). The upgrade works are being managed on their behalf by Caledonian Maritime Assets Ltd (CMAL) who have commissioned Affric Limited to produce this BPEO on their behalf.

1.1 Reports Aims and Objectives

The purpose of this report is to identify and assess the available options for the disposal of dredged materials, arising from the upgrade of the Lochmaddy ferry terminal.

The objectives are:

- To provide an overview of the required dredging works;
- Describe the proposed areas for which a dredging campaign is required, including an estimated quantity of dredged material likely to be removed;
- Describe the BPEO methodology employed to complete the assessment; and
- To identify and assess options for disposal of dredged material to determine the BPEO for disposal of dredge spoil.

2 Background

A new dual fuel ferry is planned for introduction to the Skye Triangle Ferry Route (Uig (Skye) - Tarbert (Harris) and Uig – Lochmaddy (North Uist)) to replace the current vessel, MV Hebrides. The new vessel has greater pedestrian and vehicle capacity than the current vessel and as such it is larger and has a greater draught.

The existing terminal facilities at Lochmaddy require upgrading to accommodate the new larger vessel. The upgrade includes:

- Dredging to allow the larger ferry to berth and manoeuvre safely;
- Land reclamation to increase the marshalling area;
- Temporary works allowing the ferry service to operate throughout construction works;
- Demolition of the top of the existing pier roundhead to reduce its level to match the adjacent pier deck;
- Pier extension utilising a concrete caisson;
- Concrete repairs and strengthening to the existing concrete pier deck slab, cross beams and columns;
- Fender upgrade to the new and existing pier structure;
- Road lay-out upgrade to improve access to the ferry terminal;
- Carpark extension to increase exiting provision; and
- Upgrade of services to facilitate the new terminal layout, and to provide potable water bunkering and cold ironing of the new vessel.

For further project details please see Volume 2, Chapter 2 of the Lochmaddy Ferry Terminal Upgrade Environmental Impact Assessment Report (EIAR) (Affric Limited, 2019).

2.1 Dredge Areas and Volumes

As shown in Appendix 1 (Drawing 1975-907) there are three areas that need to be dredged:

- Berth dredge area, required to allow the larger vessel to come alongside the pier;
- Manoeuvring area to facilitate safe berthing; and
- A pocket for caisson foundations.

An estimated total of 5,200m^3 of spoil material will arise from the planned dredge. However, to allow for insitu changes, a dredge licence for 8,000m^3 is sought. To be conservative a specific gravity of 2 has been assumed for all dredge material across the three sites Therefore the mass sought by the dredge licence will be 16,000 tonnes.

2.2 Description of Material

2.2.1 Sampling

Sampling was conducted by Aspect Land and Hydrographic Surveys (ALHS) conforming to Marine Scotland Guidance Notes on Pre-Disposal Sampling Guidance (Marine Scotland, 2017a). The Marine Scotland guidance requires, as a minimum, three sample stations in relation to the proposed volume of the dredge (<25,000m^3). As the proposed dredge depth will be more than 1m, core samples were required at each of the sample stations.

In accordance with the guidance, eight vibrocore sample stations were completed across the three proposed dredge areas. Figure 2.2.1 and Table 2.2.1 detail the position of the vibrocore sample stations. Station sampling was completed using vibrocore equipment to achieve core depths up to 2.9m. Four vibrocore samples (VB1-4) were taken on site with their geological features described prior to the top, middle and bottom sections of the samples sent to the laboratory for analysis. At sample station VB3 two samples were taken as the initial samples failed to exceed a depth of 0.45m, the course nature of material, predominantly medium gravel, blocking the core tube and preventing liquification of the sediment. In this report the two samples at VB3 are referred to as VB3-1 and VB3-3. The additional four samples were taken to better understand the seabed geological conditions with the physical conditions described on site, but the samples were not retained for laboratory analysis as they were positioned outwith the proposed dredge locations.

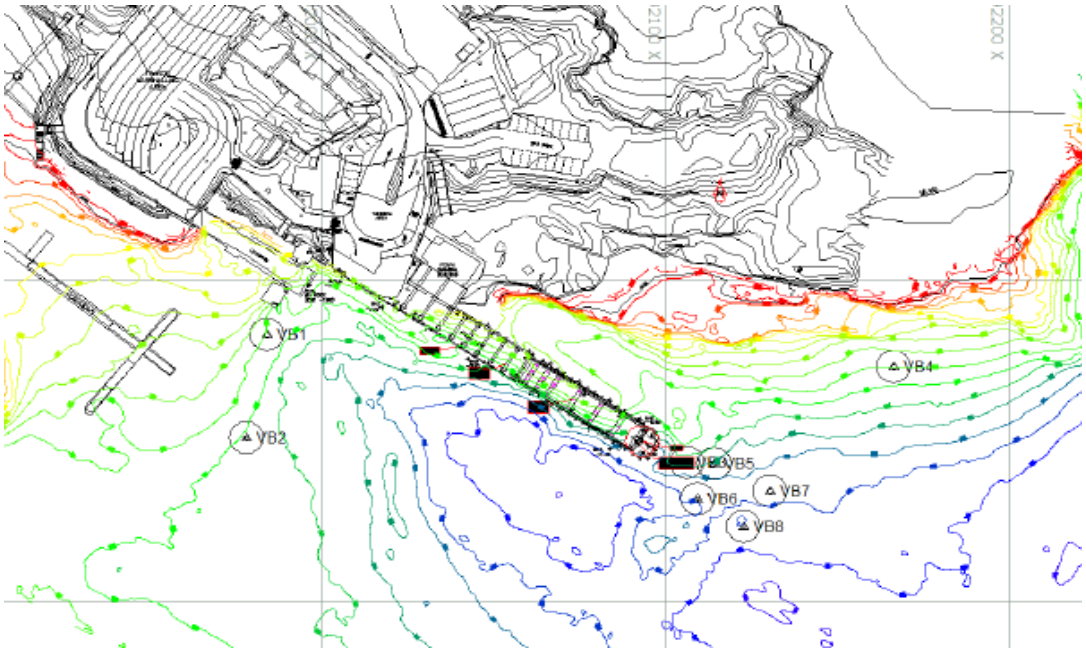

Figure 2.2.1: Vibrocore Sample Locations (ALHS, 2018)

Table 2.2.1: Coordinates of Vibrocore Sample Stations (ALHS, 2018)

Vibrocore Point	Sampled Easting	Sampled Northing	Core Length
VB1_1	91989.7	867980.5	2.14m
VB2_1	91975.9	867949.8	2.85m
VB3_1	92100.8	867945.7	0.45m
VB3_3	92084.7	867946.2	0.30m
VB4_1	92166.1	867967.2	2.10m
VB5_1	92116.8	867939.6	2.90m
VB6_1	92111.7	867933.0	1.70m
VB7_1	92130.5	867934.2	2.55m
VB8_1	92123.5	867925.7	2.10m

2.2.2 Sample Analysis

All vibrocore samples were analysed by the Laboratory SOCOTEC who are accredited to ISO17025. In line with Marine Scotland Guidelines, virbocores VB1-4 had samples taken at approximately 0.5m intervals (top, middle and bottom).

All samples were tested for a suite of chemical parameters analysed against the Action Levels (AL) prescribed by Marine Scotland in the Pre-disposal Sampling Guidance (Marine Scotland, 2017a). Where appropriate sample concentrations were also compared against identified Probable Effect Levels (PELs) and Intermit Sediment Quality Guidelines (ISQG) developed by Environment Canada (CCME, 2002).

2.2.3 Results

The results of the vibrocore sample analysis have been summarised in this section. The full sample results are available in the spreadsheets entitled 'Lochmaddy Ferry Terminal Upgrade - Vibrocore Pre-disposal Sampling Results Form' (SOCOTEC, 2018), which have been supplied

with the dredge licence application. The Aspect survey report has been included as Appendix N.1 of Volume 3 of the EIAR.

2.2.3.1 Particle Size Distribution

Particle size distribution (PSD) analysis identified 57.6% solids of which 60.8% was silt, 24% sand and 15.2% gravel on average across all samples. Geotechnical descriptions of the material from the vibrocores are summarised in Table 2.2.2. In alignment with the PSD results the cores are predominantly silt and mud. Although there is evidence of small-medium gravel and course sand present, it is either below or mixed with silt and mud.

Table 2.2.2: Core Descriptions

Core	Core Section		
	Top	Middle	Bottom
VB1_1	0.0 – 0.5m Green/brown silt & broken shell.	0.5-1.0m Green/brown silt & small amount of broken shell.	1.5-2.14 Green/brown silt & small amount of broken shell.
VB2_1	0.0-0.5m Silt, some organic matter and broken shell. Stiffer past 0.25m and lower shell content	1.0-1.5m Silt with broken shell and small amounts of organic matter. Stiffer with depth.	2.3-2.85m Silt and broken shell
VB3_1	0.0-0.45m Small-medium gravel, coarse sand and abundant broken shell. Medium gravel block at base.		
VB3_2	0.0-0.3m Dark brown silt and medium gravel, fluid mud and broken shell.		
VB4_1	0.0-0.6m Mud, fine sand and broken shell.	0.6-1.1m Silt, mud and fine sand to 0.75m then fine sand, broken shell and silt.	1.6-2.1m Mud, fine sand and broken shell. Small-medium gravel increasing in prevalence with depth.
VB5_1	0-2.9m Green/brown mud, broken shell.		
VB6_1	0-1.7m Green/brown silt, small amount of broken shell.		
VB7_1	0-2.55m Green/brown mud, broken shell.		
VB8_1	0-2.1m Green/brown mud, some broken shell.		

2.2.3.2 Trace Metals and Organotins

Table 2.2.3 shows the sample results with exceedances above AL1 but below AL2 as prescribed by Marine Scotland for metal and organotins. All other parameters analysed from the samples returned results for trace metals and oranotins below the prescribed AL1s.

Copper (Cu) has been identified to exceed AL1 in vibrocore samples taken at VB3, within the caisson dredge pocket area. Concentrations of mercury (Hg) within 0-0.5m depth in sample VB2_1 exceeded AL1 with 31 mg/kg (dry weight). Nickel (Ni) concentrations in all three samples from VB1_1 and VB2_1 at depths of 2.3-2.85m exceeded AL1. No other trace metals or organotin exceeded prescribed action levels. The average concentrations for all measured trace metals and organotin compounds across the dredge area were below AL1. No vibrocore sample contained trace metals or organotin exceeding AL2.

Table 2.2.3: Review of Sample Action Level Exceedances – Metal and Organotin

Sample Point	Sample Depth (m)	Copper (Cu) mg/kg (dry weight)	Mercury (Hg) mg/kg (dry weight)	Nickel (Ni) mg/kg (dry weight)
AL1		30	0.25	30
AL2		300	1.5	150
Sampling Results – Berth Dredge Area				
VB1_1	0-0.5	22.5	<0.015	41.5
VB1_1	0.5-1.0	18.8	<0.015	38.6
VB1_1	1.5-2.14	24.7	<0.015	41.2
VB2_1	0-0.5	20.1	0.31	25.5
VB2_1	1-1.5	14.5	0.15	22.4
VB2_1	2.3-2.85	20.6	<0.015	38
Sample Results – Caisson Dredge Pocket Area				
VB3_1	0-0.45	32.2	0.09	15.6
VB3_3	0-0.3	45	0.05	16.4
Sample Results – Manoeuvring Dredge Area				
VB4_1	0-0.6	29.4	0.19	18
VB4_1	0.6-1.1	9.4	0.02	17.6
VB4_1	1.6-2.1	14.4	<0.015	16.7
Average Metal Concentrations				
Average Across Total Dredge Area		14.4	0.05	15.4

Levels of Nickel (Ni) above AL1 are found in samples VB1_1 and VB2_1 which are adjacent to the pier and linkspan. The elevated levels of Ni likely arise from the sacrificial anodes installed on the marine infrastructure at Lochmaddy. No increased levels of Ni are in in the other dredge areas. This may be due to samples taken away from marine infrastructure.

Environment Canada has identified Probable Effect Levels (PEL) for a range of chemicals to protect aquatic life in the freshwater and marine environment (CCME, 2002). The PEL for Cu is identified as 197 mg/kg (dry weight), for Ni is 42.8 mg/kg (dry weight) and for Mg is 0.486 mg/kg (dry weight). No individual samples or averages across the dredge area exceeded the PEL's.

Having reviewed the results against the prescribed Marine Scotland ALs and the PELs as identified by Environment Canada, the potential dredge material is not predicted to have a negative effect on the marine environment due to the presence of metals or organotins.

2.2.3.3 Polyaromatic Hydrocarbons (PAHs)

A range of Polyaromatic Hydrocarbons (PAH) have been identified that exceed AL1 at all four dredge sample station locations. These can be seen in detail in the 'Lochmaddy Ferry Terminal Upgrade - Vibrocore Pre-disposal Sampling Results Form' (SOCOTEC, 2018). When the results are combined as dry weight averages across the dredge area, 4 PAH's have exceedances of above AL1 as shown in Table 2.2.4.

On the 'Lochmaddy Ferry Terminal Upgrade - Vibrocore Pre-disposal Sampling Results Form' (SOCOTEC, 2018), excel sheet PR Details tab provides the wet weight averages. Only perylene is identified as being above AL1 on that spreadsheet tab. However, the AL are provided for dry weight in the guidance, hence the dry weight averages are utilised in Table 2.2.4

PAHs are formed during the combustion of carbonaceous material at high temperatures and typically occur in complex mixtures and not as individual compounds. The identified PAHs within the dredge areas are present in the chemical composition of coal tar found in old wooden marine vessels and from incomplete combustion of fossil fuels. This corresponds with the history of Loch Maddy and the founding of the fishing village Lochmaddy in 1802 (Undiscovered Scotland, 2019).

Only one sample (VB2_1) located in the berth dredge area contained Total Hydro Carbon (THC) within 0.5m of sediment exceeding AL1 with 107 mg/kg, an exceedance of only 7%, as reported in the Lochmaddy Ferry Terminal Upgrade - Vibrocore Pre-disposal Sampling Results Form (SOCOTEC, 2018). All other samples were well below the AL1's prescribed by Marine Scotland for THC, ranging from 10.8 mg/kg to 73.4 mg/kg, with the AL1 being 100 mg/kg. The average THC concentrations across all three dredges sites were also found to be below AL1.

Table 2.2.4: Average PAH Compared to Marine Scotland AL1

	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(e)pyrene	Benzo(b)Fluoranthene	Benzo(k)Fluoranthene	Benzo(ghi)perylene	Fluorene	Indeno(1,2,3-cd) pyrene	C1-naphthalenes	C1- phenanthrene	C2-naphthalenes	C3- naphthalene	Chrysene	Diben(ah)anthracence	Fluoranthene	Naphthalene	Perylene	Phenanthrene	Pyrene
Marine Scotland AL1 (mg/kg Dry Weight)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.01	0.1	0.1	0.1	0.1	0.1
Average Across Total Dredge Area (mg/kg dry weight)	0.009	0.007	0.024	0.073	0.077	0.065	0.08	0.04	0.059	0.013	0.059	0.032	0.068	0.055	0.037	0.078	0.014	0.119	0.013	0.236	0.081	0.134

Table 2.2.5 shows the average dry weight for PAH's across all the proposed dredge areas against the ISQG and PEL as identified by Environment Canada (CCME, 2002). All PAHs that have PEL assigned are at least 85% below the PEL, thus no effects are predicted on marine life from the presence of these PAHs.

Of those PAH's with no PEL, Perylene has the highest average concentration at 0.236 mg/kg, 236% above the relevant AL1. It is noted that PEL's, where they are available, are on average 6.73 times higher than the AL1 for the relevant compound, it is surmised that if a PEL was derived for Perylene it would be in the region of 0.6mg/kg. Hence it is likely that all PAH's are at levels too low to have a probable effect on the environment.

Table 2.2.5: Average Dry Weight PAH Over Proposed Dredge Area

Dry Weights mg/kg	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(e)pyrene	Benzo(b)Fluoranthene	Benzo(k)Fluoranthene	Benzo(ghi)perylene	Fluorene	Indeno(1,2,3-cd) pyrene	C1-naphthalenes	C1- phenanthrene	C2-naphthalenes	C3- naphthalenes	Chrysene	Diben(ah)anthracence	Fluoranthene	Naphthalene	Perylene	Phenanthrene	Pyrene
ISQG mg/kg dry weight (CCME, 2002)	0.00671	0.00587	0.0469	0.0748	0.0888					0.0212						0.108	0.00622	0.113	0.0346		0.0867	0.153
PEL mg/kg dry weight (CCME, 2002)	0.0889	0.128	0.245	0.693	0.763					0.144						0.846	0.135	1.494	0.391		0.544	1.398
No. of Samples above the PEL	0	0	0	0	0					0						0	0	0	0		0	0
Highest recorded level mg/kg	0.028	0.026	0.106	0.253	0.278	0.231	0.298	0.163	0.205	0.029	0.224	0.065	0.191	0.098	0.097	0.241	0.053	0.378	0.029	0.885	0.188	0.433
Dry Weight Average for all dredge samples	0.009	0.007	0.024	0.073	0.077	0.065	0.08	0.04	0.059	0.013	0.059	0.032	0.068	0.055	0.037	0.078	0.014	0.119	0.013	0.236	0.081	0.134
Dry Weight Average as a percentage of PEL	10.12	5.47	9.8	10.53	10.09					9.03						9.22	10.37	7.97	3.32		14.89	9.59

Studies have shown that PAHs accumulate in species which cannot metabolise them, including algae, molluscs and primitive invertebrates. Bioconcentration is less of an issue for fish and higher invertebrates as they can metabolise PAH (UK Marine SAC Project, 2018). Hence increase PAH levels in shellfish areas can cause concern. A review of the proposed dredge area and the immediate areas adjacent to the proposed dredge disposal site identified the closest shellfish protected area to be approximately 3km by sea from the development footprint and 9km by sea from the dredge disposal site (Marine Scotland, 2018). However, the geographic separation between the development site and shellfish sensitive area make it unlikely that remobilised sediment-bound PAHs compounds could affect the sensitive area.

As previously identified in this section, the material from the proposed dredge would be classed as suitable with regards to trace metals and organotins for the disposal at sea option as outlined in Marine Scotland Guidelines (Marine Scotland, 2017b) and compared to PELs (CCME, 2018). The PAHs identified have been assessed against the AL1 as prescribed by Marine Scotland and the PELs as issued by Environment Canada, and as such no effects are predicted on marine life from the concentrations identified.

The average THC concentrations identified across all the dredge areas falls below the AL1, hence no environmental effects on the marine life are expected.

3 BPEO Method

In identifying the BPEO for this proposed dredge campaign the following methodology has been employed:

- Identification of options available for the disposal of material;
- Screening to eliminate unsuitable options;
- Assessment of remaining options; and
- Comparison of options and identification of the BPEO.

3.1 Options Identification

Options for disposal of the material were identified through discussion with CnES, CMAL and their engineers.

3.2 Screening to Eliminate Unsuitable Options

All options have been screened against minimum criteria which each option had to meet in order to be taken forward for detailed consideration. Any option which failed to meet one or more of the criteria was not taken forward to the detailed assessment. The criteria used are outlined below:

- The proposed option must be suitable for the characteristics of the dredge material;
- It must be technically viable; and
- It must allow for continued operation and development of Lochmaddy ferry terminal.

3.3 Attribute Identification and Scoring

Attributes were scored out of 5 with 1 being the worst performing and 5 being the best. Each score has been designated a colour to aid visual comparison. The attributes are outlined in Appendix 3.

Options meeting the minimum criteria were scored against each of the attributes (Appendix 4) and reasoning for this scoring provided (Appendix 5).

3.4 Comparison of Options and Identification of the BPEO

Following the scoring of the options, a detailed comparison was undertaken to identify the BPEO.

4 Assessment of Options

4.1 Identification of Potions Available

Several options were initially identified for the disposal of the proposed dredge material including both terrestrial and marine-based options. The options identified are outlined below. A "do nothing" scenario is included for consideration.

- Do Nothing;
- Disposal to Landfill;
- Spreading on Agricultural Land;
- Beneficial Re-use;
- Disposal at Sea to an Existing Disposal Site;
- Disposal at Sea to a New Disposal Site; and
- Plough Dredging.

4.2 Screening of Options

Options were initially screened against the minimum criteria as outlined in Section 3.1.2. This initial assessment eliminated 4 of the options as they do not meet one or more of the screening criteria. The reasons why the four options have been discounted are discussed below.

4.2.1 Do Nothing

To not complete dredging would have a significant impact on the proposed upgrade of Lochmaddy ferry terminal. The new larger ferry would not be able to manoeuvre effectively and would likely be subject to operational restrictions including tidal limits. Hence to do nothing would compromise the operations of the ferry service which is a vital link for the islands.

4.2.2 Spreading on Agricultural Land

This option has not been considered further due to the inappropriateness of the material. The high saline content makes the material unsuitable for spreading onto agricultural land without significant further treatment. Salinity is a key environmental limiting factor for the productivity of plant growth and many crops are salt sensitive, making excess salinity a threat to agriculture (Flowers, 2005). The Marine Scotland AL are set with regard to marine sediments, and as such may not be appropriate for consideration of land uses of the material as the pathways to receptors, including humans, are very different. Hence, the sample results were compared against the Dutch Target and Intervention Values (the New Dutch List) (Ministerie van Volkshuisvesting, 2000) for soil, utilised for the assessment of contaminated land. A comparison of the metal's average dry weight of the dredge samples (detailed in Table 4.2) against the New Dutch List identifies that no trace metals are in exceedance of the target levels.

With regard to PAH, the New Dutch List combines 10 PAH's into one value (PAH(sum10)). The ten relevant PAH analysis results for the samples have been combined and averaged, the average PAH(sum10) for the Lochmaddy Ferry Development samples being 0.623mg/kg dry weight which is below the target value of 1mg/kg dry matter.

The salinity issues would prevent the disposal to agricultural land despite the material being clean enough for this use, hence this option has been screened out.

4.2.3 Disposal to Landfill

This option has been discounted as the process of disposing of the dredged material to landfill is not technically feasible for the quantities of dredged material associated with the development. The disposal of material to landfill sites would take up valuable landfill space when space within the UK landfill network is at a premium.

There are several logistical steps associated with the disposal to landfill option that would require completion before removal of the material to a landfill site. Dredged material would need to be landed, dewatered, stored and transported to a disposal site. This process would require CnES to set aside space to process material, space which is not available to them in Lochmaddy. The disposal would also be subject to landfill tax at £88.95 per tonne of material. Based on the estimated dredge amount of 16,000 tones this would equate to £1,423,200 in tax.

Further to the financial impact and lack of infrastructure available to complete the drying process, no suitable landfill site has been identified as being technically feasible for the disposal of material. The landfill site closest to the dredge site, Rueval Landfill Site near Benbecula, has no remaining capacity. The only open landfill site in the Western Isles is Bennadrove on the Isle of Lewis. However, it only has an annual landfill capacity of 50,000 tonnes, with an overall remaining capacity of 58,107 tonnes. The dredge spoil would take up 32% of the annual capacity and 27.5% of the remaining capacity. The use of a landfill on the mainland is impractical due to the logistics associated with moving and dewatering the material. Table 4.2 shows the landfill options in further detail for comparison.

In addition to the financial and logistical implications, the Scottish Government launched a Zero Waste Plan for Scotland in 2010 with a vision for a zero-waste society. The plan has a target to recycle 70% of material and a maximum of 5% to landfill by 2025 for all Scotland's waste (Scottish Government, 2010). The disposal of dredged material to existing landfill sites, therefore, does not align with the Scottish Government Policy where the onus is on reducing the amount of material being sent to a landfill site.

Table 4.2: Landfill Information (SEPA, 2017)

Landfill Site	Distance from Lochmaddy	Operator	Local Authority Area	Description	Estimated % Dredged material as a Percentage of Remaining Landfill Capacity (2017)
Bennadrove L/F Site, Marybank, Isle of Lewis	17km by sea and an additional 106km by road.	Comhairle Nan Eilean Siar	Eilean Siar	Permitted to accept Non- Hazardous Waste Until May 2020. Remaining Capacity as 31 Dec 2017: 58,107 tonnes.	27.5
Duisky Landfill Site, Fort William (Site5) (Mainland)	50km by sea and an additional 219km by road.	Lochiel Logistics LTD	Highland	Permitted to Accept Non-Hazardous Waste. Until December 2040. Remaining Capacity as 31 Dec 2017: 482,000 tonnes.	2.2
Highland Council, Seater L/F, Bower, Caithness. (Mainland)	50km by sea and an additional 354km by road.	The Highland Council	Highland	Permitted to Accept Non- Hazardous Waste Until May 2024. Remaining Capacity as 31 Dec 2017: 192,000 tonnes.	5.4

4.2.4 Plough Dredging

The plough dredging option will only be capable of coming within a certain distance of existing infrastructure. Therefore, this option cannot complete the entire proposed dredge. In addition, the potential receiver sites do not have the capacity to receive all the material from the whole dredge areas. Consequently, this option is not further considered as it is technically unviable.

4.3 Assessment of Feasible Options

Following the screening process, the options taken forward for further analysis are:

- Beneficial Re-use;
- Disposal at Sea to existing Disposal Site; and
- Disposal at Sea to a new Disposal Site.

Each of these options has been further analysed against the attributes identified in Appendix 3. The options scoring is provided in Appendix 4 with the reasoning for attribute scoring provided in Appendix 5. Where referred to, scores are provided in brackets below.

4.3.1 Beneficial Re-use

The reuse of material is near the top of the waste hierarchy and is therefore consistent with the Scottish Governments' policy of Zero Waste Scotland by 2025. For material to be suitable for reuse from a construction perspective, it needs to be both chemically and physically suitable. The lack of contamination present makes the dredge material chemically suitable for reuse in land reclamation. As detailed in Table 2.2.2, the dredge material has a high silt content, silt compacts and settles too much to make it suitable for land reclamation purposes. Samples from VB4_1 identified that there is sand present at depth in part of the dredge area. If it could be extracted, it maybe suitable for land reclamation.

Only a proportion of the dredge material would be suitable for reclamation works. It is estimated that up to 20% of the required infill material (2) could be available from the dredging works. The remainder of the dredge spoil is high in silt content and not suitable for construction use. As such, this only partially aligns with policy (3). It is also unlikely that any other project would require material with such a high silt content. Hence this option will need to be combined with another option e.g. sea disposal.

The costs of implementing two options will be higher than if one option could be implemented due to the potential requirement to mobilise additional vessels and plant (3). The additional mobilisation requirements and material management associated with the dredge spoil may slightly affect the timescales of the dredging works (4).

Assuming the disposal would be to the Stornoway disposal ground, then the distance is 90km, which would score a 2. However, not all the material would be sent for disposal. As such, the score has been increased to a 3 to reflect this.

The re-use of material is standard practice. However, superficial deposits covering the suitable infill material are of a silty mud, making it technically complex to separate the suitable material from the unsuitable material (2). As the process of re-using dredge spoil material is standard practice, the legislative complexities involved are relatively simple with little management required to comply with legislation (4).

To minimise disruption to the ferry service, a design has been developed to allow, as far as practicably possible, normal ferry operation whilst conducting dredging operations. Hence, trivial impacts on harbour operations are expected through this option (4).

Land reclamation works via infilling can pose environmental effects as discussed in the EIAR (Affric Limited, 2019). A requirement to combine the option with one of the dredge disposal proposals will result in short-term effects such as increased sediment loading. The dredge disposal operations may also lead to smothering of benthic flora and fauna at the dredge disposal site. However, as discussed in Section 2.2, the material contains no trace metals, organotins or PHAs at concentrations that may give rise to environmental impacts (4).

4.3.2 Disposal at Sea to a New Disposal Site

A further option has been identified to designate a new disposal site near Lochmaddy. Marine Scotland Guidance - Dredging and Sea Disposal Sites: Guidance on Creating a New Sea Disposal Site (Marine Scotland, 2013) outlines the process for this option. The legislative

process is a complex (1) and costly (2) exercise requiring baseline surveys to be completed and a period of monitoring before a site can be designated. This includes the assessment of the nature of the seabed, understanding the water column, type of disposal site and the biological and ecological effects of the dredged material upon the new site. The requirement for characterisation of the candidate disposal site and Marine Scotland – Licensing Operations Team (MS-LOT) consultation with stakeholders can take up to a year to process, dependent on existing information (Marine Scotland, 2013). Disposal to sea does not fully align with the Scottish Governments' policy of Zero Waste Scotland (2) (Scottish Government, 2010).

As discussed in Section 2.2, the material to be dredged has Cu, Hg and Ni present in concentrations in exceedance of AL1 as set by Marine Scotland (Marine Scotland, 2018). However, the average across the entire dredge area is below AL1. In addition, all trace metals are under the relevant PELs. Under the Pre-disposal Sampling Guidance, this material is suitable for disposal at sea. PAHs have been identified across the dredge area in exceedance of the AL1. However, all PAHs that have PEL assigned are at least 85% below the PEL, thus no effects are predicted on marine life from the presence of these PAHs. Therefore, considering the volume of material and that the material across the dredge is below the prescribed PELs, no effects on marine life are expected, and as such the material is suitable to be disposed of at sea (4).

In addition, the relatively small volume of dredge material does not warrant the effort and lengthy assessment period to identify suitable dredge disposal grounds, hence this option scored (1) under the time attribute. Furthermore, designation of a new dredge disposal site will pose negative environmental impacts such as benthic habitat loss, and localised water quality impacts through dredge disposal operations. To gain the appropriate consents, it would need be demonstrated that the environmental effects are acceptable, hence environmental effects can be assumed to be minimal (3).

Assessment in relation to distance of the new dredge disposal site will depend on the location. However, it can be assumed that it would need to be significantly closer than the Stornoway disposal site (90km) to be attractive to the project. There are local sensitivities and shallow waters in the immediate vicinity of Lochmaddy. Hence a suitable site may be 10km away and, as such, a score of 4 has been given.

While disposal of dredge material at sea is a standard process, the technical complexities in relation to monitoring and administrative tasks discussed above make the option significantly less viable and there is a risk that a suitable site may not be found (2).

In addition, existing operations would need to be managed around the dredging works. However, to minimise disruption to the ferry service, a design has been developed to allow, as far as practicably possible, normal ferry operation whilst conducting dredging operations. Hence, minimal impacts on harbour operations are expected through this option (4).

4.3.3 Disposal at Sea to an Existing Disposal Site

There are numerous open dredge and disposal sites located within Scottish Waters for deposition of dredged material. The closest to the proposed dredge is the Stornoway (HE035)

disposal site. The disposal of dredge spoil at sea to an existing disposal site however does not fully align with the Scottish Governments' policy of Zero Waste Scotland (2) (Scottish Government, 2010).

As discussed in Section 2.2 and 4.3.2, chemical analysis of dredge material identified the material to be appropriate to be disposed of at HE035 (4).

As discussed in the EIAR, dredge disposal operations may lead to smothering of benthic flora and fauna at the dredge disposal site. However, prior use of the disposal site will have already degraded the benthic environment in the location. Therefore, environmental impacts are trivial (4).

HE035 has been identified as the most appropriate disposal site due to its geographical location in relation to the development, although the site is located approximately 90km north-east of the proposed dredge (2). Initial mobilisation of equipment to conduct dredging operations is minimal, but the 180km round trip required to dispose of dredge material at the Stornoway dredge disposal site can negatively impact the timescales required to complete the dredging campaign (4). The long distance to the disposal grounds also increases the project cost, but not significantly as the practice of dredge disposal at sea is standard practice (4).

Dredging operations would be carried out using a Backhoe Dredger (BHD) and/or Trailer Suction Hopper Dredger (TSHD) with integral or separate hoppers, or supported by split hopper barges. This would require up to 21 round trips (assuming a 390m^3 dredging vessel hopper capacity) to dispose of the material at HE035. The disposal of material to sea disposal sites is established industry practice and as such this option scores highly (5) on the technically feasible attribute. Also, as the activity is standard practice, the legislative complexities involved are relatively simple with little management required to comply with legislation (4).

In addition, existing operations would need to be managed around the dredging works. However, to minimise disruption to the ferry service, a design has been developed to allow, as far as practicably possible, normal ferry operation whilst conducting dredging operations. Hence, minimal impacts on harbour operations are expected through this option (4).

4.4 Comparison of Options

The beneficial re-use option scored 29 out of a possible 45. It scored well for environmental effects (4), timescales (4), legislative complexity (4) and the option being a standard practice (4). But it only partially aligns with policy (3) and only a portion of the material is suitable (2) and, due to the location of suitable material below unsuitable material, it is technically challenging (2). The option must be coupled with a further explored option, such as disposal at sea, which will require additional mobilisation of vessels, increasing project costs (3). While the option would reduce the number of round trips to dispose of unsuitable dredge spoil, benefits associated with reduced round trips to the disposal site are only minor as large volumes still require to be transported 90 km to the disposal grounds at Stornoway (3).

Designation of new disposal site scored 23 out of a possible 45 with material suitability (4) and distance (4) scoring highest. However, this option scored poorer in Environmental Impacts (3),

Cost (2), Alignment with Policy (2), Distance (2), Technical Feasibility (2), Timescale (1) and Legislative Complexity (1) attributes.

The disposal at sea to an existing disposal site (Stornoway - HE035) option scored 33 out of a possible 45, the highest scoring option. It scored well, 4 or higher on all but two categories. A score of 2 for Alignment to Policy and Distance attributes was awarded.

5 Conclusion

The pre-disposal sample results have informed this assessment in terms of providing an understanding of both the chemical and physical status of the sediments to be dredged. Due to a high silt content, the majority of the material was deemed unsuitable for reuse. The detailed assessment of the chemical analysis results identified that the material is unlikely to have an effect on the marine environment, and as such, is suitable for marine disposal. Multiple options were considered, a number of which were screened out early in the process. Of those taken forward for full assessment, the options for 'Disposal at Sea to an Existing Disposal Site' namely Stornoway HE035, scored the highest against a range of attributes. Therefore, the BPEO for the management of dredged material is to take it to the Stornoway dredge disposal site HE035 for disposal.

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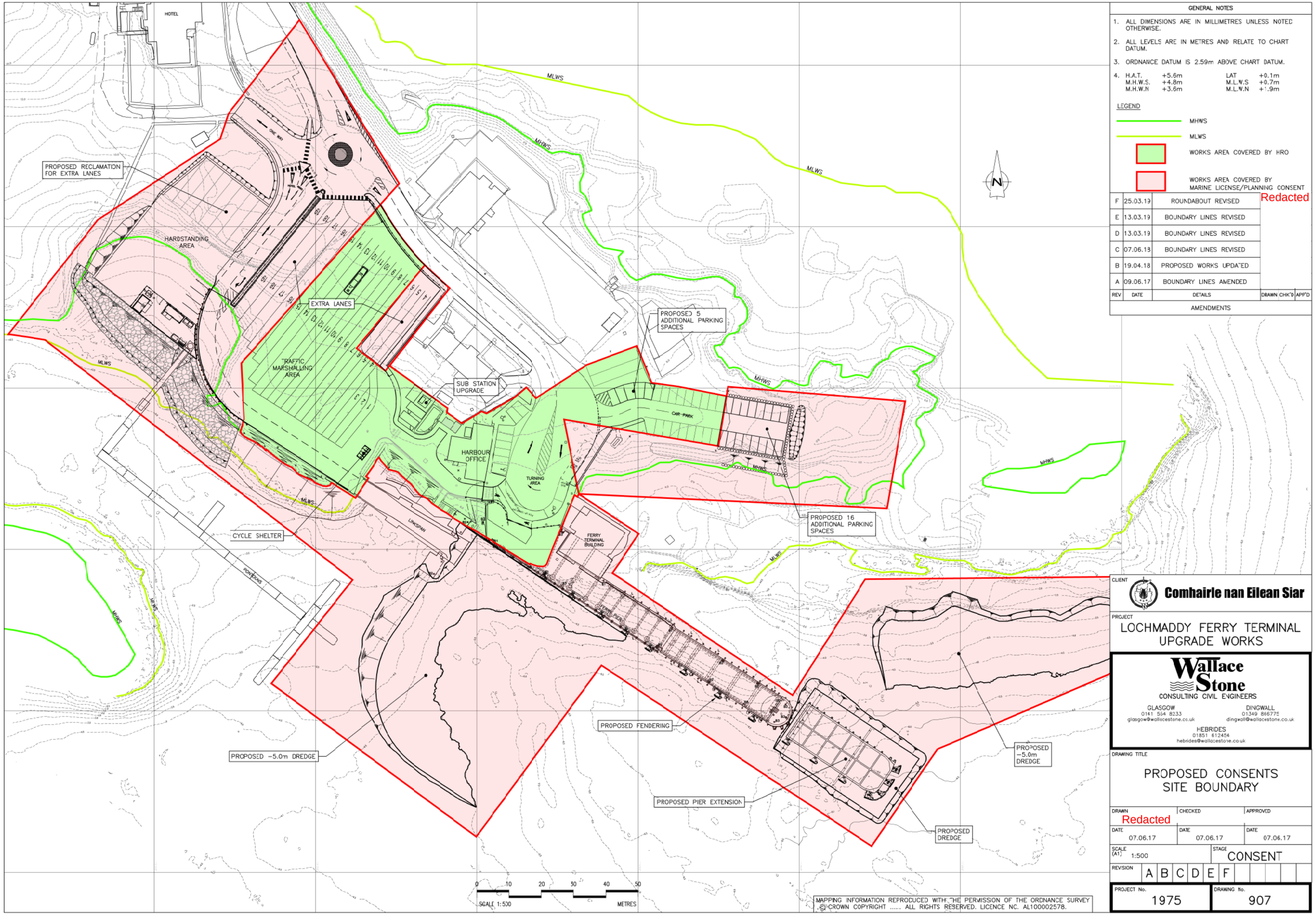
7 Glossary

Acronym	Definition
AL1	Action Level 1
AL2	Action Level 2
BPEO	Best Practicable Environmental Option
CD	Chart Datum
CMAL	Caledonian Maritime Assets Ltd.
CnES	Comhairle nan Eilean Siar
EIAR	Environmental Impact Assessment Report
ISQG	Interim Sediment Quality Guideline
km	kilometres
m	metres
PAH	Polyaromatic Hydrocarbons
PEL	Probable Effect Level
PSD	Particle Size Distribution
SEPA	Scottish Environment Protection Agency
THC	Total Hydro Carbons

Appendix 1: Map of Proposed Dredge Areas



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GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM.
3. ORDNANCE DATUM IS 2.59m ABOVE CHART DATUM.
4. H.A.T. +5.6m LAT +0.1m
   M.H.W.S. +4.8m M.L.W.S +0.7m
   M.H.W.N +3.6m M.L.W.N +1.9m

LEGEND

- MHWS
- MLWS
- WORKS AREA COVERED BY HRO
- WORKS AREA COVERED BY MARINE LICENSE/PLANNING CONSENT

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D
F	25.03.19	ROUNDABOUT REVISED	Redacted		
E	13.03.19	BOUNDARY LINES REVISED			
D	13.03.19	BOUNDARY LINES REVISED			
C	07.06.18	BOUNDARY LINES REVISED			
B	19.04.18	PROPOSED WORKS UPDATED			
A	09.06.17	BOUNDARY LINES AMENDED			

AMENDMENTS

CLIENT
Comhairle nan Eilean Siar

PROJECT
LOCHMADDY FERRY TERMINAL UPGRADE WORKS

Wallace Stone
CONSULTING CIVIL ENGINEERS
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HEBRIDES 01851 612454 hebrides@wallacestone.co.uk

DRAWING TITLE
PROPOSED CONSENTS SITE BOUNDARY

DRAWN	CHECKED	APPROVED
Redacted		
DATE 07.06.17	DATE 07.06.17	DATE 07.06.17

SCALE (A1) 1:500
STAGE CONSENT
REVISION A B C D E F

PROJECT No. 1975
DRAWING No. 907

Appendix 2: Sample Locations and Survey Report

Aspect
Land+Hydrographic Surveys
CHARTERED SURVEYORS

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VIBROCORE & BENTHIC HABITAT SURVEY

LOCHMADDY FERRY TERMINAL, NORTH UIST

APRIL 2018

PROJECT REF: A6555

REV: 00

Client:

Caledonian Maritime Assets Ltd
Municipal Buildings
Fore Street
Port Glasgow
PA14 5EQ

CMAL
Caledonian Maritime Assets Ltd
Stòras Mara Cailleannach Eta

ices Approved Development Partner

Achilles

QAS INTERNATIONAL ISO 9001:2008 REGISTERED FIRM

QAS INTERNATIONAL ISO 14001:2004 REGISTERED FIRM

QAS INTERNATIONAL BS OHSAS 18001:2007 REGISTERED FIRM

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DOCUMENT ISSUE RECORD

DATE	REVISON	COMPILED	CHECKED	NOTES
17/04/2018	00	TAD	CDT	FIRST ISSUE

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1. INTRODUCTION

Aspect Land & Hydrographic Surveys Ltd (herein ALHS) were contracted by Caledonian Maritime Assets Ltd [herein CMAL] to carry out benthic survey and sediment sampling using video transects, grab samples and vibrocores. The Vibrocores will be reported in this document and the Benthic video and grab analysis will be reported under separate cover by APEM Ltd who carried out the analysis on this section of the work.

CMAL is in the process of planning and design for modifications to the existing pier infrastructure at Lochmaddy, North Uist to accommodate the arrival of a new, larger vessel on the route.

There is therefore a requirement to deepen areas around the terminal which necessitates dredging, which will have an impact on the local marine ecological environment.

The vibrocore survey was designed to provide core samples for analysis in order to understand the sediment type sub seabed and also to allow laboratory analysis in order to obtain dredging consent and to inform options on whether the material to be dredged could be used as infill in areas to be reclaimed.

The subtidal benthic ecology survey was undertaken by combined video survey and sediment grab survey. The video survey was used to ground-truth existing geophysical survey work conducted and also to inform the location of the grab sample locations.

2. GEODESY & DATUM

The horizontal datum used throughout the data gathering phase of the survey was OSGB36 (OSTN15). Data has been rendered in OSGB36 Datum, British National Grid.

The vertical datum for all bathymetric data is Chart Datum which at Lochmaddy, North Uist is 2.59m below OD. OSTN15 defines OSGB36 National Grid in conjunction with the National GPS Network.

In this regard OSTN15 can be considered error free (not including any GPS positional errors). The agreement between OSTN15 and the old triangulation network stations (down to 3rd order) is 0.1m rms.

3. SCOPE OF WORKS

The upgrading works require the completion of an EIA and to inform this assessment a benthic survey and a sampling / vibrocore survey, with associated testing and reporting, was necessary.

The vibrocore sampling and testing procedures conformed to Marine Scotland Guidance notes http://www.gov.scot/Topics/marine/Licensing/marine/Applications/predredge
All analysis was completed by a laboratory accredited to the ISO17025 standard for marine sediment analysis, and also engages in inter-comparison analysis exercises such as QUASIMEME. The LOD and sensitivity requirements were met as per those set out in the CSEMP Green Book.
The order of events on site was:

- Vibrocoring
- Benthic Video Transects
- Benthic Grab sampling

Conduct of the Vibrocoring first at Lochmaddy allowed the smooth transition into the second stage work at Tarbert in Harris with minimum personnel and equipment down time on the project.

Vibrocore sampling was to be carried out in the areas depicted in Figure 1 below. Vibrocore locations 1 to 4 were planned initially with 5-8 being added during the deployment in order to provide further detail around the location of the dolphin / round head.

The first four were sample and, described on site with the top, middle and bottom sections sent to the laboratory for analysis. The additional four were described on site and have not been retained.

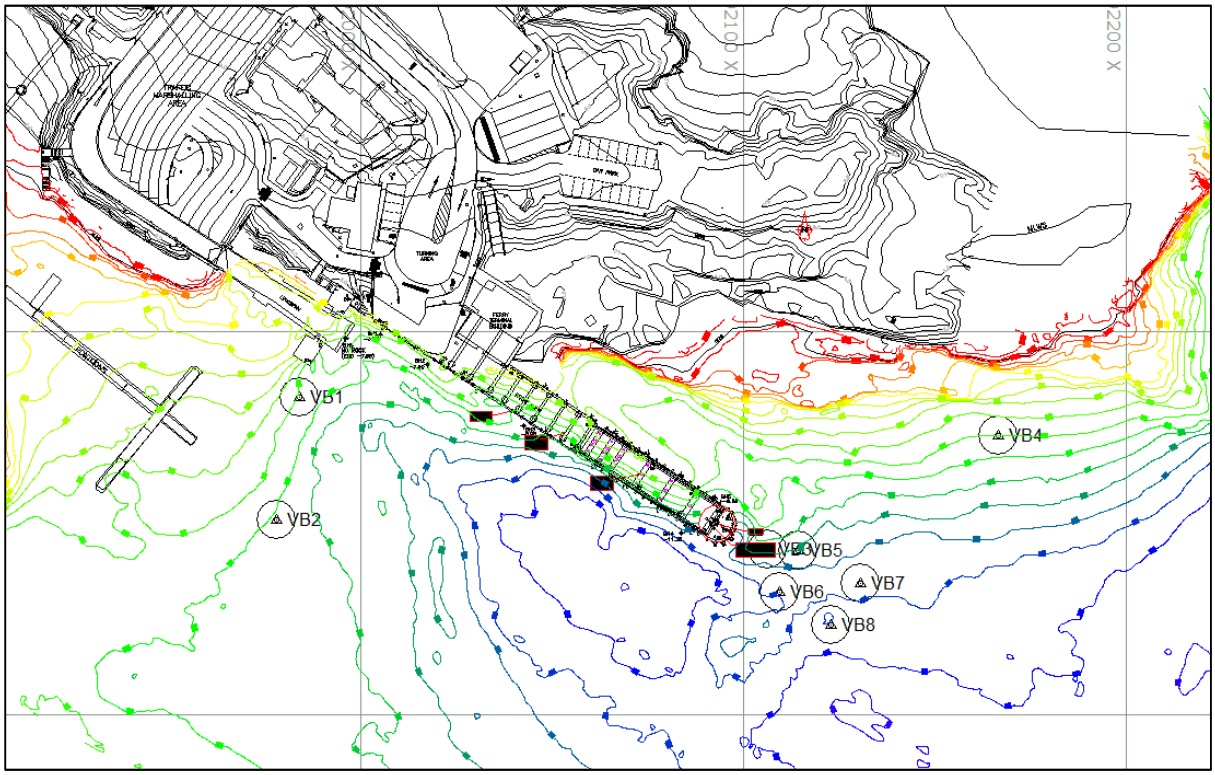


FIGURE 1 - INTENDED VIBROCORE LOCATIONS

All cores were cut to 3m maximum length. One vibrocore sample was retained at each of VB1-4.

4. SEQUENCE OF EVENTS

Works were completed in the following order to maximise productivity and minimise personnel and equipment down time.

DATE	EVENT
4 April 2018	Travel to Lochmaddy, North Uist and mobilise Remote Sensor. Mobilise and test Vibrocore for following day.
5 April 2018	Vibrocore survey VB1-4 and sampling. All Vibrocores sampled and sub samples frozen. Drop down camera mobilisation commenced
6 April 2018	Weather day Camera mobilisation continued. Camera found to be inoperative / STR Engineer ordered replacement camera after investigation with manufacturer. Mobilise Day Grab to allow sampling to be progressed until replacement camera arrived on site
7 April 2018	Grab Sampling and additional vibrocore sampling. Replacement Camera arrived on site. Drop down camera mobilised and tested.
8 April 2018	Video camera survey.

5. CONDUCT OF VIBROCORE SAMPLING

The SDI 4D lightweight vibrocore was used for the work. This system relies on fluidisation of the material immediately around the 76mm diameter aluminium sampling tube in order to advance the core into the seabed rather than overall mass.

The vessel was manoeuvred to each of the locations in turn and anchored fore and aft to avoid swinging during the sampling operation. 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 4 cores distributed around the site. The cores were to be up to 3m in length, from sample points indicated on Figure 1 as VB 1-4. VB 5-8 were added while on site in order to provide more information around the planned location of the new round head.

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. Each sample core VB1-4 was sub sampled for analysis.

Samples were sent to the laboratory for analysis from the top, middle and bottom of each of VB1-4. The remainder of these cores has been retained in case further analysis is required. VB 5-8 were described on site with the depth of penetration being recorded to allow an understanding of both the material type and minimum depth of overburden at each of these locations.

FIGURE 2 - VIBROCORE DEPLOYED ON REMOTE SENSOR

All vibrocore locations were sampled on 5th & 7th April 2018 as follows. Full details are in the Core logs that follow in section 6:

VIBROCORE POINT	SAMPLED EASTING	SAMPLED NORTHING	CORE LENGTH
VB1_1	91989.7	867980.5	2.14m
VB2_1	91975.9	867949.8	2.85m
VB3_1	92100.8	867945.7	0.45m
VB3_3	92084.7	867946.2	0.30m
VB4_1	92166.1	867967.2	2.10m
VB5_1	92116.8	867939.6	2.90m
VB6_1	92111.7	867933.0	1.70m
VB7_1	92130.5	867934.2	2.55m
VB8_1	92123.5	867925.7	2.10m

FIGURE 3 - SDI D-4 VIBROCORER ON DECK

6. SAMPLE ANALYSIS

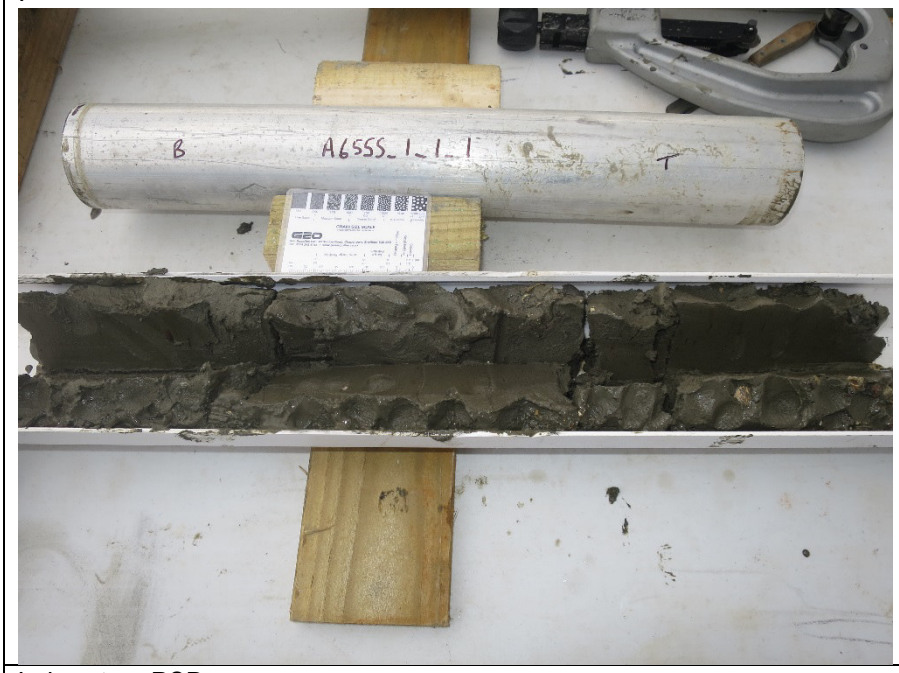
Samples were split and described on site as follows.

Sample ID	1_1	Location ID	A6555
Collection Date / Time	05/04/2018 08:13	Weather	Sunny, little wind
Water Depth	4.5m	Sampler Name	CDT
Easting	91989.7	Northing	867980.5
Latitude (ETRS89)	57° 35' 46.746	Longitude (ETRS89)	7° 9' 26.900

Notes on Sampling

Core length achieved 2.14m

1_1_1
Sub Sample Depth 0.0-0.5m
Green/Brown Silt & broken shell.
2.5Y3/2.
.



Laboratory PSD

Gravel	Sand	Silt
0.3%	16.6%	83.1%

1_1_2
Sub Sample Depth 0.5-1.0m
Green/Brown Silt & small amount of broken shell.
2.5Y3/2.

Laboratory PSD		
Gravel	Sand	Silt
0.3%	13.3%	86.4%

1_1_3
Sub Sample Depth 1.0-1.5m
Retained in pale

1_1_4
Sub Sample Depth 1.5-2.14m
Green/Brown Silt & small amount of broken shell.
2.5Y3/2.

Laboratory PSD		
Gravel	Sand	Silt
0%	14.7%	85.3%

Sample ID	2_1	Location ID	A6555
Collection Date / Time	05/04/2018 10:01	Weather	Sunny, little wind
Water Depth	4.5m	Sampler Name	CDT
Easting	91975.9	Northing	867949.8
Latitude (ETRS89)	57° 35' 45.723	Longitude (ETRS89)	7° 9' 27.588

Notes on Sampling

Core length achieved 2.85m

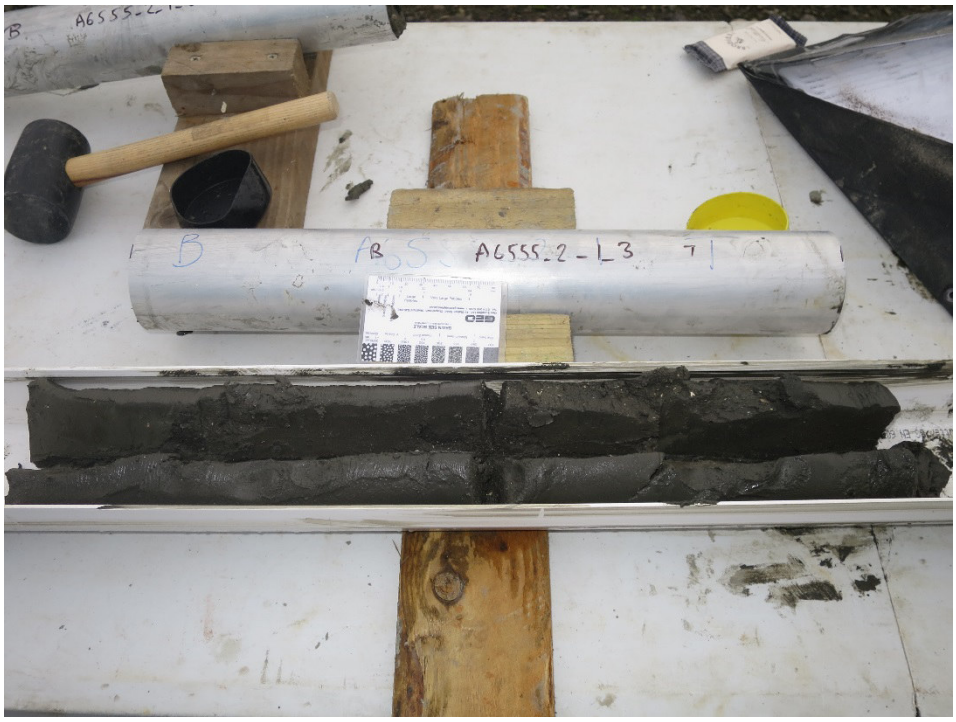
2_1_1
Sub Sample Depth 0.0-0.5m
Silt, some organic matter and broken shell.Stiffer past 0.25m and lower shell content.
5YR3/1.

Laboratory PSD

Gravel	Sand	Silt
4.9%	36.8%	58.3%

2_1_2
Sub Sample Depth 0.5-1.0m
Retained in pale.

2_1_3
Sub Sample Depth 1.0-1.5m
Silt with broken shell and small amounts of organic matter. Stiffer with depth.
5YR3/1.



Laboratory PSD		
Gravel	Sand	Silt
1.7%	26.5%	71.8%

2_1_4
Sub Sample Depth 1.5-2.0m
Retained in pale.

2_1_5
Sub Sample Depth 2.0-2.3m
Retained in pale.

2_1_6
Sub Sample Depth 2.3-2.85m
Silt and broken shell.
2.5Y3/1.

Laboratory PSD		
Gravel	Sand	Silt
0%	10.8%	89.2%

Sample ID	3_1	Location ID	A6555
Collection Date / Time	05/04/2018 10:29	Weather	Sunny, little wind
Water Depth	5.5m	Sampler Name	CDT
Easting	92100.8	Northing	867945.7
Latitude (ETRS89)	57° 35' 45.898	Longitude (ETRS89)	7° 9' 20.077

Notes on Sampling

Core length achieved 0.45m

3_1_1
Sub Sample Depth 0.0-0.45m
small-medium gravel, coarse sand and abundant broken shell. Medium gravel block at base. 10YR3/3.

Multiple attempts in and around this location at the end of the existing pier resulted in little penetration due to the coarse nature of the seabwed and the predominance of medium gravel that blocked the core tube and prevented liquificaiton of the sediment.

Laboratory PSD

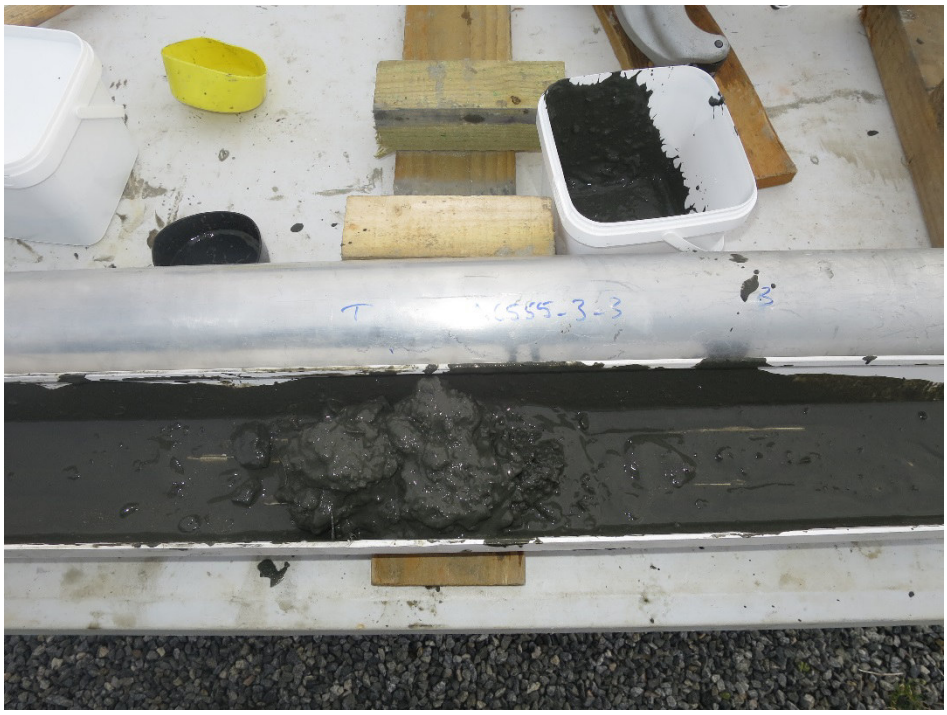
Gravel	Sand	Silt
58.8%	23.4%%	17.8%

Sample ID	3_3	Location ID	A6555
Collection Date / Time	05/04/2018 12:24	Weather	Sunny, little wind
Water Depth	6.2m	Sampler Name	CDT
Easting	92084.7	Northing	867946.2
Latitude (ETRS89)	57° 35' 45.874	Longitude (ETRS89)	7° 9' 21.045

Notes on Sampling

Core length achieved 0.3m

3_3_1
Sub Sample Depth 0.0-0.3m
Dark brown silt and medium gravel, fluid mud and broken shell.



This core also retained at location VB3 to allow sufficient material to allow all sampling analysis to be carried out at this location. The base of the core was vlocked and further penetration prevented by medium gravel.

Laboratory PSD

Gravel	Sand	Silt
58.8%	19.8%	21.4%

Sample ID	4_1	Location ID	A6555
Collection Date / Time	05/04/2018 12:39	Weather	Sunny, little wind
Water Depth	4.5m	Sampler Name	CDT
Easting	92166.1	Northing	867967.2
Latitude (ETRS89)	57° 35' 46.750	Longitude (ETRS89)	7° 9' 16.254

Notes on Sampling

Core length achieved 2.1m

4_1_1
Sub Sample Depth 0.0-0.6m
Mud, fine sand and broken shell.
10YR3/2.

Laboratory PSD		
Gravel	Sand	Silt
7%	37.2%	55.9%

4_1_2
Sub Sample Depth 0.6-1.1m
Silt, mud and fine sand to 0.75m
then fine sand, broken shell and silt.
10YR3/2 to 0.75m then 10YR4/2

Laboratory PSD		
Gravel	Sand	Silt
11.2%	36.2%	52.5%

4_1_3
Sub Sample Depth 1.1-1.6m
Retained in pale.

4_1_4
Sub Sample Depth 1.6-2.1m
Mud, fine sand and broken shell. Small-medium gravel increasing in prevalence with depth
5Y4/1

Laboratory PSD		
Gravel	Sand	Silt
24.5%	28.3%	47.2%

Sample ID	5_1	Location ID	A6555
Collection Date / Time	07/04/2018 14:16	Weather	Clear, slight wind
Water Depth	5.9m	Sampler Name	CDT
Easting	92116.8	Northing	867939.6
Latitude (ETRS89)	57° 35' 45.740	Longitude (ETRS89)	7° 9' 19.090

Notes on Sampling

Core length achieved 2.9m

Green/Brown Mud broken shell

Sample ID	6_1	Location ID	A6555
Collection Date / Time	07/04/2018 14:20	Weather	Clear, slight wind
Water Depth	6.3m	Sampler Name	CDT
Easting	92111.7	Northing	867933.0
Latitude (ETRS89)	57° 35' 45.515	Longitude (ETRS89)	7° 9' 19.365

Notes on Sampling

Core length returned 1.7m

Green/Brown Silt, small amount of broken shell

Sample ID	7_1	Location ID	A6555
Collection Date / Time	07/04/2018 14:41	Weather	Clear, slight wind
Water Depth	6.3m	Sampler Name	CDT
Easting	92134.5	Northing	867933.6
Latitude (ETRS89)	57° 35' 45.600	Longitude (ETRS89)	7° 9' 18.0

Notes on Sampling

Core length achieved 2.55m

Green/Brown Mud, broken shell, shell

Sample ID	8_1	Location ID	A6555
Collection Date / Time	07/04/2018 14:58	Weather	Clear, slight wind
Water Depth	6.5m	Sampler Name	CDT
Easting	92123.5	Northing	867925.7
Latitude (ETRS89)	57° 35' 45.310 N	Longitude (ETRS89)	7° 9' 18.625 W

Notes on Sampling

Core length achieved 2.1m

Green/Brown Mud, some broken shell

The laboratory analysis was carried out by SOCOTEC. Each sub sample detailed in VB1-4 above has been analysed for Particle Size, Metals, WAC and Chemicals. The sample analysis is reported in the standard Marine Scotland format under separate cover that accompanies this report.

The samples have been analysed against the Action Levels quoted by Marine Scotland and are presented in the standard Marine Scotland spreadsheet format:

A6555_Lochmaddy_Pre-disposal Sampling Results Form_MAR00028.xlsx.

Details on the analysis of individual items are also provided in the accompanying laboratory records for each sample.

7. SURVEY VESSEL

ALHS' MCA Cat III survey vessel *Remote Sensor* was mobilised for the survey operations. The ability to achieve rapid mobilisation with this vessel meant that short weather windows could be taken advantage at this time of year when suitable longer weather windows to mobilise a larger vessel are limited.

The shallow draught and high manoeuvrability of *Remote Sensor* made it ideal for operating in the survey area which was both shallow and navigationally constrained. The vessel was transported to Lochmaddy by road and launched at the Marine Harvest slipway.

FIGURE 4 - ALHS' SURVEY VESSEL REMOTE SENSOR

8. SURVEY PERSONNEL

The following personnel were involved in the survey:

NAME	POSITION
Redacted	Project Management / Party Chief / QA Data Release/ Survey Coxswain
Redacted	Hydrographic Surveyor

All staff have marine survey experience, and adhered to Health & Safety instructions, including the wearing of life jackets at all times. All personnel participated in an induction to the vessel and toolbox talks on the conduct of all aspects of the operation prior to commencement of the work.

Annex A
Horizontal & Vertical Positioning System Precision

A6555

Differential GNSS Positioning Precision

	HORIZONTAL ACCURACY
dGPS	±0.5m + 1ppm RMS

Annex B
Standard Disclaimer

A6555

1. All client-supplied data is taken on trust as being accurate and correct, and the subcontractor cannot be held responsible for the quality and accuracy of that data set.

2. Geophysical interpretation of bathymetry and sonar is based on an informed opinion of the supplied data, and is subject to inherent errors out with the control of the interpretational hydrographer or geophysicist, which include but are not limited to GPS positioning errors, navigation busts, data quality, assumed speed velocity sediment profiles in the absence of Geotechnical data, sub bottom profile pulse width, and induced scaling errors therein associated with seismic signature. Seabed geomorphology and sub-seabed geology should be further investigated by visual or intrusive methods.

3. The limits of this survey are defined by the data set; out with the survey limits are not covered at any level by the subcontractor.

4. The data is accurate at the time of data acquisition, the subcontractor cannot be held responsible for environmental changes, and the client by accepting this report accepts that the environment of the seabed is subject to continuous change, that items of debris, hard contacts etc. may move, appear, be relocated or removed, thickness of surficial sediment change out with the knowledge of the subcontractor and they will not be held responsible for such actions at any level.

Annex C
Laboratory Analysis

A6555

TEST REPORT

1252

Report No. EFS/185119 (Ver. 1)

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

Site: MAR00027

The 14 samples described in this report were registered for analysis by SOCOTEC UK Limited on 24-Apr-2018. This report supersedes any versions previously issued by the laboratory.
The analysis was completed by: 09-May-2018

The following tables are contained in this report:

Redacted

Date of Issue: 09-May-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.

			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
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
1901907	A6555 1_1_1	05-Apr-18		1.52	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	8.1	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
1901908	A6555 1_1_2	05-Apr-18		2.64	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	7.7	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
1901909	A6555 1_1_4	05-Apr-18		1.60	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	8.0	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
1901910	A6555 2_1_1	05-Apr-18		4.08	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	7.2	< 0.08	< 0.08	0.09	0.20	0.13	0.16	< 0.08
1901911	A6555 2_1_3	05-Apr-18		2.16	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	7.2	< 0.08	< 0.08	< 0.08	0.17	0.14	0.15	< 0.08
1901912	A6555 2_1_6	05-Apr-18		0.40	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	5.6	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
1901913	A6555 3_1_1	05-Apr-18		5.36	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	3.2	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
1901914	A6555 3_3_1	05-Apr-18		2.00	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	4.0	< 0.08	< 0.08	< 0.08	0.09	< 0.08	0.09	< 0.08
1901915	A6555 4_1_1	05-Apr-18		4.40	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	5.1	0.09	< 0.08	0.22	0.30	0.20	0.26	0.08
1901916	A6555 4_1_2	05-Apr-18		6.72	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	4.9	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
1901917	A6555 4_1_4	05-Apr-18		4.48	< 10.0	< 10.0	< 20.0	< 20.0	< 10.0	< 10.0	<30	3.4	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
1901919	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
1901920	Reference Material (% Recovery)			98	96	97	99	102	99	95	99	98	105	107	104	106	108	95.3	86.1

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Redacted

Redacted

Client Name SOCOTEC UK Limited Bretby (Marine)

Contact Redacted

MAR00027

Sample Analysis

Date Printed	08-May-2018
Report Number	EFS/185119
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
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**
1901907	A6555 1_1_1	05-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
1901908	A6555 1_1_2	05-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
1901909	A6555 1_1_4	05-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
1901910	A6555 2_1_1	05-Apr-18	< 0.08	0.18	< 0.08	< 0.08	0.31	< 0.08	< 0.08	< 0.08	0.14	0.26	< 2.11	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
1901911	A6555 2_1_3	05-Apr-18	< 0.08	0.13	< 0.08	< 0.08	0.18	< 0.08	< 0.08	< 0.08	0.09	0.25	< 1.84	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
1901912	A6555 2_1_6	05-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
1901913	A6555 3_1_1	05-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
1901914	A6555 3_3_1	05-Apr-18	< 0.08	0.09	< 0.08	< 0.08	0.17	< 0.08	< 0.08	< 0.08	0.13	0.14	< 1.52	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
1901915	A6555 4_1_1	05-Apr-18	0.11	0.29	< 0.08	< 0.08	0.68	0.09	0.09	< 0.08	0.66	0.51	< 3.81	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
1901916	A6555 4_1_2	05-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
1901917	A6555 4_1_4	05-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
1901919	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
1901920	Reference Material (% Recovery)		90.0	101	92.6	93.4	101	105	109	106	100	102	101	87	90	84	89	75

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Redacted

Client Name	**SOCOTEC UK Limited Bretby (Marine)**
Contact	Redacted

MAR00027

Sample Analysis

Date Printed	**08-May-2018**
Report Number	**EFS/185119**
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										
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**										
1901907	A6555 1_1_1	05-Apr-18	< 5.00	< 5.00	7.6	86.8	31.8	37.2	3.14										
1901908	A6555 1_1_2	05-Apr-18	< 5.00	< 5.00	7.6	54.6	30.3	35.3	2.62										
1901909	A6555 1_1_4	05-Apr-18	< 5.00	< 5.00	7.6	85.9	30.2	35.5	3.31										
1901910	A6555 2_1_1	05-Apr-18	< 5.00	< 5.00	7.9	46.9	35.5	40.5	2.78										
1901911	A6555 2_1_3	05-Apr-18	< 5.00	< 5.00	8.1	45.5	56.3	61.1	2.08										
1901912	A6555 2_1_6	05-Apr-18	< 5.00	< 5.00	7.9	51.7	23.9	28.2	2.04										
1901913	A6555 3_1_1	05-Apr-18	< 5.00	< 5.00	8.1	24.4	61.0	65.7	1.93										
1901914	A6555 3_3_1	05-Apr-18	< 5.00	< 5.00	8	23.2	29.9	34.8	3.53										
1901915	A6555 4_1_1	05-Apr-18	< 5.00	< 5.00	8	37.6	22.4	27.6	1.67										
1901916	A6555 4_1_2	05-Apr-18	< 5.00	< 5.00	8.1	33.3	17.9	23.4	1.35										
1901917	A6555 4_1_4	05-Apr-18	< 5.00	< 5.00	8.2	26.9	10.5	16.4	0.80										
1901919	QC Blank		<5.00	<5.00			<10	<10	<0.02										
1901920	Reference Material (% Recovery)		80	90	101		92	92	102										

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Redacted

Client Name **SOCOTEC UK Limited Bretby (Marine)**

Contact Redacted

MAR00027

Sample Analysis

Date Printed	**08-May-2018**
Report Number	**EFS/185119**
Table Number	**1**

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.479
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	86.8
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.196
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 1_1_1		s18_5119	CL/1901907	09-May-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)	15.03	3	5	6
N	LOI450	Loss on Ignition (%)	38.8			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.4547	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.266	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	240.9	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<10.30	100		
N	PHSOIL	pH (pH units)	7.6		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	7.28		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	8.1	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	22900	3750					
U	ICPMSW	Arsenic	0.015	0.009	0.03	0.1	0.5	2	25
U	ICPWATVAR	Barium	0.02	<0.01	0.04	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	0.003	0.004	0.006	0.04	0.5	10	70
U	ICPMSW	Copper	0.002	<0.001	0.004	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.499	0.12	0.998	1.71	0.5	10	30
U	ICPMSW	Nickel	0.002	0.003	0.004	0.03	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.001	<0.001	0.002	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	0.028	0.006	0.056	0.09	0.1	0.5	7
U	ICPMSW	Zinc	0.004	0.01	0.008	0.09	4	50	200
U	KONENS	Chloride	9060	1070	18120	21353	800	15000	25000
U	ISEF	Fluoride	0.8	0.6	1.6	6	10	150	500
U	ICPWATVAR	Sulphate as SO4	1180	333	2360	4459	1000	20000	50000
N	WSLM27	Total Dissolved Solids	17800	2920	35600	49040	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	28	27	56	271	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 12457/2

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.200
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	54.6
					Equivalent Weight based on drying at 105°C (kg)	0.090
Site	MAR00027				Volume of water required to carry out 10:1 stage (litres)	0.790
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 1_1_2		s18_5119	CL/1901908	09-May-18		

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)	3.58	3	5	6
N	LOI450	Loss on Ignition (%)	10.5			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.1321	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.077	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	66.7	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<3.00	100		
N	PHSOIL	pH (pH units)	7.6		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	3.61		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except ºº	mg/kg (dry weight)			
U	WSLM3	pH (pH units) ºº	7.7	Calculated data not UKAS Accredited			
U	WSLM2	Conductivity (µs/cm) ºº	7650				
U	ICPMSW	Arsenic	0.004	0.04	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	0.001	0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.292	2.92	0.5	10	30
U	ICPMSW	Nickel	0.001	0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.001	0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.02	4	50	200
U	KONENS	Chloride	2440	24400	800	15000	25000
U	ISEF	Fluoride	0.5	5	10	150	500
U	ICPWATVAR	Sulphate as SO4	720	7200	1000	20000	50000
N	WSLM27	Total Dissolved Solids	5970	59700	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	19	190	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

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.433
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	85.9
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.242
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 1_1_4		s18_5119	CL/1901909	09-May-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)	14.99	3	5	6
N	LOI450	Loss on Ignition (%)	36.2			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.4254	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.245	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	214.2	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<9.65	100		
N	PHSOIL	pH (pH units)	7.6		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	7.25		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	8	8	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	21300	3250					
U	ICPMSW	Arsenic	0.031	0.014	0.062	0.16	0.5	2	25
U	ICPWATVAR	Barium	0.02	<0.01	0.04	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	0.004	0.005	0.008	0.05	0.5	10	70
U	ICPMSW	Copper	0.002	0.001	0.004	0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.099	0.058	0.198	0.63	0.5	10	30
U	ICPMSW	Nickel	0.002	0.002	0.004	0.02	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.001	<0.002	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	0.029	0.005	0.058	0.08	0.1	0.5	7
U	ICPMSW	Zinc	0.003	<0.002	0.006	<0.02	4	50	200
U	KONENS	Chloride	8570	912	17140	19331	800	15000	25000
U	ISEF	Fluoride	0.8	0.6	1.6	6	10	150	500
U	ICPWATVAR	Sulphate as SO4	1110	449	2220	5371	1000	20000	50000
N	WSLM27	Total Dissolved Solids	16600	2540	33200	44147	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	29	22	58	229	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 12457/2

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.173
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	46.9
					Equivalent Weight based on drying at 105°C (kg)	0.090
Site	MAR00027				Volume of water required to carry out 10:1 stage (litres)	0.817
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 2_1_1		s18_5119	CL/1901910	09-May-18		

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)	3.31	3	5	6
N	LOI450	Loss on Ignition (%)	8.6			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.1129	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.063	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	66.9	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<4.12	100		
N	PHSOIL	pH (pH units)	7.9		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	4.85		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ 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	Calculated data not UKAS Accredited			
U	WSLM2	Conductivity (µs/cm) ºº	5950				
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.078	0.78	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.002	0.02	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	<0.02	4	50	200
U	KONENS	Chloride	1860	18600	800	15000	25000
U	ISEF	Fluoride	0.6	6	10	150	500
U	ICPWATVAR	Sulphate as SO4	259	2590	1000	20000	50000
N	WSLM27	Total Dissolved Solids	4640	46400	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	11	110	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

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	SOCOTEC UK Limited Bretby (Marine)				**Leaching Data**	
					Weight of sample (kg)	0.402
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	45.5
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.273
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 2_1_3		s18_5119	CL/1901911	09-May-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)	2.48	3	5	6
N	LOI450	Loss on Ignition (%)	8.6			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.1099	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.063	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	103.3	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<3.52	100		
N	PHSOIL	pH (pH units)	8.1		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	2.57		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	8.2	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	19000	2850					
U	ICPMSW	Arsenic	0.037	0.022	0.074	0.24	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	0.004	0.006	0.008	0.06	0.5	10	70
U	ICPMSW	Copper	0.001	0.002	0.002	0.02	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.248	0.107	0.496	1.26	0.5	10	30
U	ICPMSW	Nickel	0.003	0.004	0.006	0.04	0.4	10	40
U	ICPMSW	Lead	<0.001	0.002	<0.002	<0.02	0.5	10	50
U	ICPMSW	Antimony	0.007	0.007	0.014	0.07	0.06	0.7	5
U	ICPMSW	Selenium	0.025	0.005	0.05	0.08	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.008	0.006	0.07	4	50	200
U	KONENS	Chloride	7450	784	14900	16728	800	15000	25000
U	ISEF	Fluoride	0.9	0.7	1.8	7	10	150	500
U	ICPWATVAR	Sulphate as SO4	1050	580	2100	6427	1000	20000	50000
N	WSLM27	Total Dissolved Solids	14800	2220	29600	38973	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	28	23	56	237	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)	0.459
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	51.7
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.216
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 2_1_6		s18_5119	CL/1901912	09-May-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)	2.67	3	5	6
N	LOI450	Loss on Ignition (%)	7.3			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.1242	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.07	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	49.5	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<2.82	100		
N	PHSOIL	pH (pH units)	7.9		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	0.52		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	7.9	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	23000	3070					
U	ICPMSW	Arsenic	0.041	0.014	0.082	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	0.005	0.006	0.01	0.06	0.5	10	70
U	ICPMSW	Copper	0.002	0.001	0.004	0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.074	0.037	0.148	0.42	0.5	10	30
U	ICPMSW	Nickel	0.003	0.003	0.006	0.03	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.001	<0.001	0.002	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	0.031	0.005	0.062	0.08	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.003	0.006	0.03	4	50	200
U	KONENS	Chloride	9370	831	18740	19695	800	15000	25000
U	ISEF	Fluoride	0.9	0.7	1.8	7	10	150	500
U	ICPWATVAR	Sulphate as SO4	1090	388	2180	4816	1000	20000	50000
N	WSLM27	Total Dissolved Solids	17900	2390	35800	44580	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	27	21	54	218	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)	0.285
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	24.4
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.390
					Fraction of sample above 4 mm %	23.200
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 3_1_1		s18_5119	CL/1901913	09-May-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)	1.99	3	5	6
N	LOI450	Loss on Ignition (%)	3.3			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0793	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.049	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	80.7	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.80	100		
N	PHSOIL	pH (pH units)	8.1		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	5.54		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	8	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	7910	940					
U	ICPMSW	Arsenic	0.007	0.005	0.014	0.05	0.5	2	25
U	ICPWATVAR	Barium	0.03	<0.01	0.06	<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	0.065	0.015	0.13	0.22	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	0.003	0.002	0.006	0.02	0.06	0.7	5
U	ICPMSW	Selenium	0.008	0.002	0.016	0.03	0.1	0.5	7
U	ICPMSW	Zinc	0.005	<0.002	0.01	<0.02	4	50	200
U	KONENS	Chloride	2470	208	4940	5096	800	15000	25000
U	ISEF	Fluoride	0.7	0.4	1.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	441	90	882	1368	1000	20000	50000
N	WSLM27	Total Dissolved Solids	6170	733	12340	14579	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	13	4.5	26	56	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)	0.292
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	23.2
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.383
					Fraction of sample above 4 mm %	65.600
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 3_3_1		s18_5119	CL/1901914	09-May-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)	3.59	3	5	6
N	LOI450	Loss on Ignition (%)	4.1			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.078	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.049	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	38.9	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<2.1	100		
N	PHSOIL	pH (pH units)	8		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	2.03		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	7.9	7.9	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	7490	1220					
U	ICPMSW	Arsenic	0.006	0.003	0.012	0.03	0.5	2	25
U	ICPWATVAR	Barium	0.02	<0.01	0.04	<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	0.07	0.017	0.14	0.24	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	0.002	0.001	0.004	0.01	0.06	0.7	5
U	ICPMSW	Selenium	0.008	<0.001	0.016	<0.02	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	0.006	<0.004	<0.05	4	50	200
U	KONENS	Chloride	2320	284	4640	5555	800	15000	25000
U	ISEF	Fluoride	0.7	0.4	1.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	421	104	842	1463	1000	20000	50000
N	WSLM27	Total Dissolved Solids	5840	948	11680	16003	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	9.5	3.4	19	42	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)	0.363
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	37.6
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.312
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 4_1_1		s18_5119	CL/1901915	09-May-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)	1.88	3	5	6
N	LOI450	Loss on Ignition (%)	5.7			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0961	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.056	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	35.9	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<6.23	100		
N	PHSOIL	pH (pH units)	8		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	4.95		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	7.7	8.1	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	15700	2260					
U	ICPMSW	Arsenic	0.027	0.021	0.054	0.22	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	0.007	0.002	0.06	0.5	10	70
U	ICPMSW	Copper	0.002	0.005	0.004	0.05	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.288	0.072	0.576	1.01	0.5	10	30
U	ICPMSW	Nickel	0.003	0.006	0.006	0.06	0.4	10	40
U	ICPMSW	Lead	<0.001	0.006	<0.002	<0.05	0.5	10	50
U	ICPMSW	Antimony	0.01	0.006	0.02	0.07	0.06	0.7	5
U	ICPMSW	Selenium	0.019	0.002	0.038	0.04	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.021	0.006	0.19	4	50	200
U	KONENS	Chloride	5510	568	11020	12269	800	15000	25000
U	ISEF	Fluoride	1.1	0.7	2.2	8	10	150	500
U	ICPWATVAR	Sulphate as SO4	854	158	1708	2508	1000	20000	50000
N	WSLM27	Total Dissolved Solids	12200	1760	24400	31520	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	27	17	54	183	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)	0.326
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	33.3
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.349
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 4_1_2		s18_5119	CL/1901916	09-May-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)	1.43	3	5	6
N	LOI450	Loss on Ignition (%)	5.2			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.09	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.049	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	26.8	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<2.04	100		
N	PHSOIL	pH (pH units)	8.1		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	7.11		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	7.7	7.9	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	12700	1710					
U	ICPMSW	Arsenic	0.067	0.07	0.134	0.7	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	0.002	<0.001	0.004	<0.01	0.5	10	70
U	ICPMSW	Copper	0.002	<0.001	0.004	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.842	0.166	1.684	2.56	0.5	10	30
U	ICPMSW	Nickel	0.006	0.003	0.012	0.03	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.018	0.007	0.036	0.08	0.06	0.7	5
U	ICPMSW	Selenium	0.014	0.003	0.028	0.04	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.006	0.006	0.06	4	50	200
U	KONENS	Chloride	4300	406	8600	9252	800	15000	25000
U	ISEF	Fluoride	1	0.6	2	7	10	150	500
U	ICPWATVAR	Sulphate as SO4	775	127	1550	2134	1000	20000	50000
N	WSLM27	Total Dissolved Solids	9910	1340	19820	24827	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	57	8.8	114	152	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)	0.326
Contact	Redacted				Moisture content @ 105°C (% of Wet Weight)	26.9
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	MAR00027				Volume of water required to carry out 2:1 stage (litres)	0.349
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
A6555 4_1_4		s18_5119	CL/1901917	09-May-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)	0.77	3	5	6
N	LOI450	Loss on Ignition (%)	3.3			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.0822	6		
U	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.049	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	14.4	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.86	100		
N	PHSOIL	pH (pH units)	8.2		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	4.3		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	7.7	7.8	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	11900	1510					
U	ICPMSW	Arsenic	0.021	0.024	0.042	0.24	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	0.002	0.003	0.004	0.03	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	0.252	0.067	0.504	0.92	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	0.006	0.003	0.012	0.03	0.06	0.7	5
U	ICPMSW	Selenium	0.013	0.001	0.026	0.03	0.1	0.5	7
U	ICPMSW	Zinc	<0.002	0.007	<0.004	<0.06	4	50	200
U	KONENS	Chloride	3960	366	7920	8452	800	15000	25000
U	ISEF	Fluoride	0.9	0.5	1.8	6	10	150	500
U	ICPWATVAR	Sulphate as SO4	871	161	1742	2557	1000	20000	50000
N	WSLM27	Total Dissolved Solids	9280	1180	18560	22600	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	12	6.2	24	70	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.

SOCOTEC UK Ltd Environmental Chemistry
Analytical and Deviating Sample Overview

Customer SOCOTEC UK Limited Bretby (Marine)
Site MAR00027
Report No S185119

Consignment No S74096
Date Logged 24-Apr-2018
In-House Report Due 08-May-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	MethodID	ANC	BTEXHSA		CEN Leachate			CustServ	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	CEN Leac(P)C	Report B >63 µm	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/1901907	A6555 1_1_1	05/04/18		E	E						E		E		E	E	E
CL/1901908	A6555 1_1_2	05/04/18		E	E						E		E		E	E	E
CL/1901909	A6555 1_1_4	05/04/18		E	E						E		E		E	E	E
CL/1901910	A6555 2_1_1	05/04/18		E	E						E		E		E	E	E
CL/1901911	A6555 2_1_3	05/04/18		E	E						E		E		E	E	E
CL/1901912	A6555 2_1_6	05/04/18		E	E						E		E		E	E	E
CL/1901913	A6555 3_1_1	05/04/18		E	E						E		E		E	E	E
CL/1901914	A6555 3_3_1	05/04/18		E	E						E		E		E	E	E
CL/1901915	A6555 4_1_1	05/04/18		E	E						E		E		E	E	E
CL/1901916	A6555 4_1_2	05/04/18		E	E						E		E		E	E	E
CL/1901917	A6555 4_1_4	05/04/18		E	E						E		E		E	E	E
CL/1901918	CRM	D	D	D	D	D	D		D	D	D	D	D		D	D	D
CL/1901919	QC Blank																
CL/1901920	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.

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	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 : MAR00027

Report Number : S18_5119

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1901907	A6555 1_1_1	MARINE SEDIMENTS
CL/1901908	A6555 1_1_2	MARINE SEDIMENTS
CL/1901909	A6555 1_1_4	MARINE SEDIMENTS
CL/1901910	A6555 2_1_1	MARINE SEDIMENTS
CL/1901911	A6555 2_1_3	MARINE SEDIMENTS
CL/1901912	A6555 2_1_6	MARINE SEDIMENTS
CL/1901913	A6555 3_1_1	MARINE SEDIMENTS
CL/1901914	A6555 3_3_1	MARINE SEDIMENTS
CL/1901915	A6555 4_1_1	MARINE SEDIMENTS
CL/1901916	A6555 4_1_2	MARINE SEDIMENTS
CL/1901917	A6555 4_1_4	MARINE SEDIMENTS
CL/1901918	CRM	QUALITY CONTROL SAMPLE
CL/1901919	QC Blank	QUALITY CONTROL SAMPLE
CL/1901920	Reference Material (% Recovery)	QUALITY CONTROL SAMPLE

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	**MAR00028**	
Issue Version	1	
Customer	Aspect Land & Hydrographic Surveys Ltd, Unit 1, Thornhouse Business Centre, Ballot Road, Irvine, Ayrshire, KA12 0HW	
Customer Reference	A6555	
Date Sampled	05-Apr-18	
Date Received	17-Apr-18	
Date Reported	09-May-18	
Condition of samples	Cold	Satisfactory

Redacted

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

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Results contained herewith only apply to the samples tested

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00028
Issue Version 1

Customer Reference A6555

		Units	%	%	%	%	%	% M/M
		Method No	ASC/SOP/303	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*	SOCOTEC Env Chem*
		Limit of Detection	0.2	0.2	N/A	N/A	N/A	0.02
		Accreditation	UKAS	UKAS	N	N	N	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Total Moisture**	**Total Solids**	**Gravel (>2mm)**	**Sand (63-2000 µm)**	**Silt (<63 µm)**	**TOC**
A6555 1-1-1	MAR/00028.001	Sediment	54.4	45.6	0.3	16.6	83.1	3.14
A6555 1-1-2	MAR/00028.002	Sediment	54.7	45.3	0.3	13.3	86.4	2.62
A6555 1-1-4	MAR/00028.003	Sediment	50.4	49.6	0.0	14.7	85.3	3.31
A6555 2-1-1	MAR/00028.004	Sediment	48.7	51.3	4.9	36.8	58.3	2.78
A6555 2-1-3	MAR/00028.005	Sediment	42.0	58.0	1.7	26.5	71.8	2.08
A6555 2-1-6	MAR/00028.006	Sediment	47.3	52.7	0.0	10.8	89.2	2.04
A6555 3-1-1	MAR/00028.007	Sediment	26.5	73.5	58.8	23.4	17.8	1.93
A6555 3-3-1	MAR/00028.008	Sediment	37.5	62.5	58.8	19.8	21.4	3.53
A6555 4-1-1	MAR/00028.009	Sediment	37.1	62.9	7.0	37.2	55.9	1.67
A6555 4-1-2	MAR/00028.010	Sediment	37.5	62.5	11.2	36.2	52.5	1.35
A6555 4-1-4	MAR/00028.011	Sediment	30.4	69.6	24.5	28.3	47.2	0.80
		Reference Material (% Recovery)	N/A	N/A	N/A	N/A	N/A	102
		QC Blank	N/A	N/A	N/A	N/A	N/A	<0.02

* See Report Notes

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Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00028
Issue Version 1

Customer Reference A6555

		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS	UKAS	UKAS	UKAS	N	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Arsenic**	**Cadmium**	**Chromium**	**Copper**	**Mercury**	**Nickel**	**Lead**	**Zinc**
A6555 1-1-1	MAR/00028.001	Sediment	6.6	0.26	47.6	22.5	<0.01	41.5	12.8	69.7
A6555 1-1-2	MAR/00028.002	Sediment	5.9	0.19	45	18.8	<0.01	38.6	12.0	63.7
A6555 1-1-4	MAR/00028.003	Sediment	9.2	0.26	48.9	24.7	<0.01	41.2	14.3	73.0
A6555 2-1-1	MAR/00028.004	Sediment	6.9	0.22	33.0	20.1	0.31	25.5	19.4	61.0
A6555 2-1-3	MAR/00028.005	Sediment	8.2	0.21	31.2	14.5	0.15	22.4	19.4	49.0
A6555 2-1-6	MAR/00028.006	Sediment	9.6	0.17	44.4	20.6	<0.01	38.0	14.3	66.7
A6555 3-1-1	MAR/00028.007	Sediment	4.9	<0.04	20.3	32.2	0.09	15.6	7.1	52.0
A6555 3-3-1	MAR/00028.008	Sediment	3.6	<0.04	20.1	45.0	0.05	16.4	6.7	50.0
A6555 4-1-1	MAR/00028.009	Sediment	6.6	0.19	24.0	29.4	0.19	18.0	16	47.0
A6555 4-1-2	MAR/00028.010	Sediment	6.9	0.09	23.4	9.4	0.02	17.6	6.7	30.0
A6555 4-1-4	MAR/00028.011	Sediment	5.2	<0.04	21.2	14.4	<0.01	16.7	4.0	25.0
Certified Reference Material 2702 (% Recovery)			105	97	99	105	105	101	102	103
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

* See Report Notes

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Test Report ID	MAR00028
Issue Version	1
Customer Reference	A6555

		Units	µg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
A6555 1-1-1	MAR/00028.001	Sediment	<1	<1
A6555 1-1-2	MAR/00028.002	Sediment	<5*	<5*
A6555 1-1-4	MAR/00028.003	Sediment	<5*	<5*
A6555 2-1-1	MAR/00028.004	Sediment	6.4	39
A6555 2-1-3	MAR/00028.005	Sediment	1	<1
A6555 2-1-6	MAR/00028.006	Sediment	<5*	<5
A6555 3-1-1	MAR/00028.007	Sediment	<1	<1
A6555 3-3-1	MAR/00028.008	Sediment	27.7	50.8
A6555 4-1-1	MAR/00028.009	Sediment	1.2	<1
A6555 4-1-2	MAR/00028.010	Sediment	<1	<1
A6555 4-1-4	MAR/00028.011	Sediment	<5*	<5*
Certified Reference Material BCR-646 (% Recovery)			64	72
QC Blank			<1	<1

* See Report Notes

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Test Report ID MAR00028
Issue Version 1

Customer Reference A6555

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
A6555 1-1-1	MAR/00028.001	Sediment	2.2	<1	3.3	3.9	3.0	9.4
A6555 1-1-2	MAR/00028.002	Sediment	2.1	<1	2.4	2.7	2.7	9.0
A6555 1-1-4	MAR/00028.003	Sediment	1.9	<1	1.9	2.9	2.2	7.7
A6555 2-1-1	MAR/00028.004	Sediment	24.2	18.6	50.6	236	278	298
A6555 2-1-3	MAR/00028.005	Sediment	8.9	25.8	106	253	245	209
A6555 2-1-6	MAR/00028.006	Sediment	1.6	<1	2.0	3.6	2.8	8.9
A6555 3-1-1	MAR/00028.007	Sediment	<1	<1	1.1	3.0	3.6	5.6
A6555 3-3-1	MAR/00028.008	Sediment	28.1	2.8	33.8	103	103	115
A6555 4-1-1	MAR/00028.009	Sediment	6.4	8.2	19.7	73.7	85.6	95.7
A6555 4-1-2	MAR/00028.010	Sediment	22.8	10.5	47.3	122	118	122
A6555 4-1-4	MAR/00028.011	Sediment	<1	<1	<1	<1	<1	2.6
Certified Reference Material CRM180013 1941b (% Recovery)			67	95	73	74	62	94
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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Issue Version 1

Customer Reference A6555

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	N	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BEP**	**BENZGHIP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
A6555 1-1-1	MAR/00028.001	Sediment	10.7	9.9	1.4	31.9	33.4	60.0
A6555 1-1-2	MAR/00028.002	Sediment	10.0	8.8	1.0	29.5	32.1	66.7
A6555 1-1-4	MAR/00028.003	Sediment	8.7	7.7	<1	24.8	26.6	59.2
A6555 2-1-1	MAR/00028.004	Sediment	231	205	163	65.3	171	97.6
A6555 2-1-3	MAR/00028.005	Sediment	177	145	113	50.3	191	77.7
A6555 2-1-6	MAR/00028.006	Sediment	9.7	9.2	1.9	27.8	28.2	56.8
A6555 3-1-1	MAR/00028.007	Sediment	4.5	4.9	2.4	5.4	5.4	7.6
A6555 3-3-1	MAR/00028.008	Sediment	82.6	74.8	49.3	26.3	55.3	41.1
A6555 4-1-1	MAR/00028.009	Sediment	74.4	74.0	45.5	43.2	89.7	58.7
A6555 4-1-2	MAR/00028.010	Sediment	98.9	102	60.9	43.2	106	62.7
A6555 4-1-4	MAR/00028.011	Sediment	2.4	2.4	<1	6.7	7.5	11.6
Certified Reference Material CRM180013 1941b (% Recovery)			96	75	88	75	99	113
QC Blank			<1	<1	<1	<1	<1	<1

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Issue Version 1

Customer Reference A6555

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303
		Limit of Detection	1	1	1	1	1	1
		Accreditation	N	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
A6555 1-1-1	MAR/00028.001	Sediment	27.1	11.0	1.5	6.4	5.3	3.3
A6555 1-1-2	MAR/00028.002	Sediment	24.3	11.1	1.2	6.0	5.1	2.9
A6555 1-1-4	MAR/00028.003	Sediment	22.0	9.2	1.1	5.5	4.9	2.4
A6555 2-1-1	MAR/00028.004	Sediment	97.2	235	53.0	287	29.2	224
A6555 2-1-3	MAR/00028.005	Sediment	71.3	241	41.0	370	26.8	148
A6555 2-1-6	MAR/00028.006	Sediment	24.5	9.9	1.4	5.7	4.9	2.8
A6555 3-1-1	MAR/00028.007	Sediment	4.2	4.2	1.1	7.9	1.1	5.3
A6555 3-3-1	MAR/00028.008	Sediment	31.1	118	19.3	249	28.0	80.0
A6555 4-1-1	MAR/00028.009	Sediment	46.4	84.7	16.1	136	12.1	78.0
A6555 4-1-2	MAR/00028.010	Sediment	51.3	128	20.9	238	28.7	103
A6555 4-1-4	MAR/00028.011	Sediment	6.2	2.5	<1	1.5	1.1	1.1
Certified Reference Material CRM180013 1941b (% Recovery)			109	100	119	87	55	80
QC Blank			<1	<1	<1	<1	<1	<1

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		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303	ASC/SOP/303
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
A6555 1-1-1	MAR/00028.001	Sediment	8.0	885	31.9	8.4	32000
A6555 1-1-2	MAR/00028.002	Sediment	8.0	778	25.2	7.3	28600
A6555 1-1-4	MAR/00028.003	Sediment	6.6	508	19.6	6.3	25600
A6555 2-1-1	MAR/00028.004	Sediment	29.0	112	174	397	107000
A6555 2-1-3	MAR/00028.005	Sediment	24.5	71.0	177	433	73400
A6555 2-1-6	MAR/00028.006	Sediment	8.1	129	19.1	6.7	27300
A6555 3-1-1	MAR/00028.007	Sediment	1.8	2.4	5.9	7.0	11300
A6555 3-3-1	MAR/00028.008	Sediment	17.4	38.4	165	232	41600
A6555 4-1-1	MAR/00028.009	Sediment	15.1	30.5	84.9	143	51100
A6555 4-1-2	MAR/00028.010	Sediment	19.8	35.1	188	234	52100
A6555 4-1-4	MAR/00028.011	Sediment	1.6	9.3	5.3	1.8	10800
Certified Reference Material CRM180013 1941b (% Recovery)			65	62	89	78	100
QC Blank			<1	<1	<1	<1	<100

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		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	N	N	N	N	N	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB138**	**PCB153**	**PCB180**
A6555 1-1-1	MAR/00028.001	Sediment	0.37	0.35	0.11	<0.08	<0.08	<0.08	<0.08
A6555 1-1-2	MAR/00028.002	Sediment	0.71	0.67	0.21	<0.08	<0.08	<0.08	<0.08
A6555 1-1-4	MAR/00028.003	Sediment	0.35	0.30	0.10	<0.08	<0.08	<0.08	<0.08
A6555 2-1-1	MAR/00028.004	Sediment	0.48	0.47	0.39	0.26	0.47	0.48	0.20
A6555 2-1-3	MAR/00028.005	Sediment	0.36	0.31	0.11	<0.08	<0.08	<0.08	<0.08
A6555 2-1-6	MAR/00028.006	Sediment	0.21	0.20	<0.08	<0.08	<0.08	<0.08	<0.08
A6555 3-1-1	MAR/00028.007	Sediment	0.30	0.30	0.13	<0.08	<0.08	<0.08	<0.08
A6555 3-3-1	MAR/00028.008	Sediment	0.33	0.31	0.12	0.09	<0.08	<0.08	<0.08
A6555 4-1-1	MAR/00028.009	Sediment	0.35	0.31	0.15	0.13	<0.08	0.13	<0.08
A6555 4-1-2	MAR/00028.010	Sediment	0.37	0.33	0.10	<0.08	<0.08	<0.08	<0.08
A6555 4-1-4	MAR/00028.011	Sediment	0.34	0.31	0.11	<0.08	<0.08	<0.08	<0.08
Certified Reference Material SRM 1941b (% Recovery)			68	88	97	98	114	94	95
QC Blank			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

For full analyte name see method summaries

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		Units	mg/Kg (Dry Weight)	
		Method No	*SUB_02	
		Limit of Detection	0.1	0.1
		Accreditation	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Diuron**	**Irgarol**
A6555 1-1-1	MAR/00028.001	Sediment	< 0.2	< 0.2
A6555 1-1-2	MAR/00028.002	Sediment	< 0.2	< 0.2
A6555 1-1-4	MAR/00028.003	Sediment	< 0.1	< 0.1
A6555 2-1-1	MAR/00028.004	Sediment	< 0.1	< 0.1
A6555 2-1-3	MAR/00028.005	Sediment	< 0.1	< 0.1
A6555 2-1-6	MAR/00028.006	Sediment	< 0.1	< 0.1
A6555 3-1-1	MAR/00028.007	Sediment	< 0.1	< 0.1
A6555 3-3-1	MAR/00028.008	Sediment	< 0.1	< 0.1
A6555 4-1-1	MAR/00028.009	Sediment	< 0.1	< 0.1
A6555 4-1-2	MAR/00028.010	Sediment	< 0.1	< 0.1
A6555 4-1-4	MAR/00028.011	Sediment	< 0.1	< 0.1

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REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
*SUB_01	MAR00028.001-011	Analysis was conducted by an approved subcontracted laboratory.
*SUB_02	MAR00028.001-011	Analysis was conducted by an approved subcontracted laboratory.
SOCOTEC Env Chem*	MAR00028.001-011	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ASC/SOP/301	MAR00028.002, 003, 006, 011	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303	MAR00028.001-011	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene).This should be taken into consideration when utilising the data.

DEVIATING SAMPLE STATEMENT

Devaiation Code	Devation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A

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Test Report ID	MAR00028
Issue Version	1
Customer Reference	A6555

Method	Sample and Fraction Size	Method Summary
Total Solids	Wet Sediment	Calculation (100%-Moisture Content).Moisture content determined by drying a portion of the sample at 105°C to constant weight.
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Wet Sediment	Carbonate removal and sulphurous acid/combustion at 800°C/NDIR.
Metals	Air dried and seived to <63µm	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions

Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorcyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorcyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Diben[ah]anthracene	GHCH	gamma-Hexachlorcyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	PPDDE	p,p'-Dichorodiphenyldicloroethylene
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	PPDDT	p,p'-Dichorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	PPTDE	p,p'-Dichorodiphenyldicloroethane
C1N	C1-naphthalenes	PHENANT	Pyrene		
C1PHEN	C1-phenanthrene	PYRENE	Phenanthrene		

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Appendix 3: Attributes

Attribute	Description	1	2	3	4	5
Alignment with Policy	How complex are the regulator requirements and what risks are posed.	In direct conflict with policy.	Does not fully align with policy.	No policy implications.	In the spirit of policy.	Positively implements policy.
Cost	Financial Cost of the Option	>£2Million	£1M to £2M	£500,000 to £999,000	£100,000 to £499,000	<£100,000
Timescale	Will the timeframe for the option impact on the works schedule for the development? Dredging Scheduled 14/10/19 to 20/12/19 (10 weeks).	Dredge could not be completed within project timescale 2019.	Risk dredge couldn't be started within required timeframe for works schedule	High risk dredge couldn't be completed within required timeframe for works schedule	Risk not all areas could be dredged within required timeframe for works schedule.	Allows dredge to be completed comfortably within required timeframe for works schedule.
Material Suitability	Is the chemical makeup and PSD of material suitable for the option selected?	Not all of the material is acceptable.	Requires significant mitigation to be made suitable.	Acceptable with mitigation.	Acceptable material for option.	Ideal material for option.
Distance	Impact location has on logistics for material movements.	Beyond 120 km	80-120 km	40-80 km	10-40 km	Within 10 km
Technically Feasibility	Is the option within the capabilities of the CMAL to carry out?	Technology not proven.	Complex requirements, but proven technology.	Simple proven technology available.	Practicable with basic management.	Standard practice
Environmental Effects	Potential environmental effects associated with implementing the option.	Very Significant	Significant	Minimal	Trivial	None
Impacts on Harbour Operations	Level of interfere with normal harbour operations.	Very Significant	Significant	Minimal	Trivial	None
Legislative Complexity	How complex are the regulator requirements and what risks are posed.	Significant risk additional permits, licences or consents will not be granted.	Requires significant additional permits, licences or consents.	Requires additional permits, licences or consents.	Minor management required to comply with legislation	Complies with all relevant legislation.

Appendix 4: Options Scoping

Attribute	Beneficial Re-use	Lochmaddy New Disposal Site	Stornoway HE035
Alignment with Policy	3	2	2
Cost	3	2	4
Timescale	4	1	4
Material Suitability	2	4	4
Distance	3	4	2
Technically Feasibility	2	2	5
Environmental Effects	4	3	4
Impacts on Harbour Operations	4	4	4
Legislative Complexity	4	1	4
Total	**29**	**23**	**33**

Appendix 5: Reasoning for Attribute Scoring

Attribute	Beneficial Re-use	Lochmaddy New Disposal Site	Stornoway HE035
Alignment with Policy	Partial alignment with waste hierarchy as only a portion of the dredge spoil can be re-used.	Disposal at sea is low on the waste hierarchy and as such does not align to policy.	
Cost	As the option would require likely combination with one of the options discussed below, such as disposal at sea, project costs may increase due to the potential requirement to mobilise additional vessels.	Costs associated with this option will be significantly higher than disposal at an existing sea disposal site. This is due to the licence requirements to designate a new site as outlined in the Dredging and Sea Disposal Sites: Guidance on Creating a New Sea Disposal Site (Marine Scotland, 2013).	Estimated a lower cost than other options / dredger would complete the disposal operation no further costs associated with the works.
Timescale	The additional mobilisation requirements and material management associated with the dredge spoil may slightly affect the timescales of the dredging works.	Timeframes associated with the application and consenting of a new dredge disposal site can be lengthy and is therefore unlikely to permitted within the required timeframe for the scheduled dredge.	It should be practical to implement this option within the required timeframe. As disposal can be completed quickly during dredging.
Material Suitability	Not all of the dredge spoil material is suitable for re-use as infill material.	Material is acceptable for the option of sea disposal under the Pre-Disposal Guidance issued by Marine Scotland.	
Distance	The partial reuse of dredge material, however, would reduce the volumes required to be transported away from the site for disposal. Although, only 17.5% of dredge material is suitable for re-use, hence, benefits associated with reduced round trips to dispose of unsuitable material are only minor.	It is assumed that the new disposal site would be as close as possible to Lochmaddy, however there are local restrictions so that it is likely to be over 10km away.	Site is within 80-100 km from the ferry terminal development dredge area. This is the closest open site to the proposed works.

Attribute	Beneficial Re-use	Lochmaddy New Disposal Site	Stornoway HE035
Technically Feasibility	The re-use of material is standard practice, however, top superficial deposits covering the suitable infill material are of a silty mud/sand nature, making it technically complex to separate the suitable material from the unsuitable material.	While designation and disposal at a new dredge disposal site is standardised. The technical complexities in relation to monitoring and admirative tasks discussed above make the option technically significantly less viable.	The disposal to sea is an established and well-practised methodology.
Environmental Effects	Requirement to combine the option with one of the dredge disposal proposal will result in short-term effects such as increased sediment loading. The dredge disposal operations may also lead to smothering of benthic flora and fauna at the dredge disposal site. However, the material contains no trace metals, organotins or PHAs at concentrations that may give rise to environmental impacts.	Designation of a new dredge disposal site will pose negative environmental impacts such as benthic habitat loss through dredge disposal operations. Although statutory bodies would not permit a site selection which contains sensitive habitat or species or could lead to significant environmental impacts, hence environmental effects would be minimal.	The disposal to sea at an existing disposal site will have minimal environmental effects, temporary effects on water quality may occur.
Impacts on Harbour Operations	Dredging works are required to ensure safe access for the new vessel and improvements to the existing infrastructure. Existing operations would need to be managed around the dredging works.		
Legislative Complexity	As the process of re-using dredge spoil material is standard practice, the legislative complexities involved are relatively simple with minor management required to comply with legislation.	Designation of new disposal site would require licensing from Marine Scotland in line with the guidance issued on this. Once designated disposal would be permitted under the dredging marine licence.	Disposal to sea would be permitted under the dredging marine licence.

Key

Attribute Score	Colour Code relating to Attribute Score
5	
4	
3	
2	
1	