MARINE HARVEST (SCOTLAND) LTD
KYLEAKIN FEED MILL PIER

CAPITAL DREDGING WORKS

BEST PRACTICABLE ENVIRONMENTAL OPTION ASSESSMENT FOR DISPOSAL OF DREDGED MATERIAL

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Contents

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1. INTRODUCTION

1.1 Background

Wallace Stone LLP has been commissioned by Marine Harvest (Scotland) Ltd to undertake a Best Practicable Environmental Option (BPEO) Assessment in support of a dredging and disposal application to the Scottish Government under the Marine Scotland Act (2010) and the Marine & Coastal Access Act (2009).

The proposed dredging works are Capital Dredging Works and comprise the removal of existing natural seabed materials to achieve required depth at a proposed pier at a former quarry site near Kyleakin, Isle of Skye.

Material arising from the Capital Dredging Works will require to be removed for re-use or disposal elsewhere. This BPEO assessment will consider the nature of the materials to be dredged, the history of dredging in the area, and the options available for re-use or disposal, and clearly identify the BPEO to meet the requirements of Part 4 Section 27(2) of the Marine (Scotland) Act 2010.

The site location and the extent and depths of the proposed Dredging Works are shown on Drawing No. 1849-108. A copy of the drawing is enclosed in Appendix A to this report.

1.2 Survey Information

Detailed bathymetric surveys of the seabed in the area of the proposed dredge were carried out in August 2015 and March 2016, and the Proposed Dredge Layout drawing included in Appendix A shows the results of those surveys. On the basis of the surveys and the proposed dredge geometry it is estimated that the Works will involve the removal of 190,000m^3 of natural seabed material (in-situ volume).

1.3 Nature of Materials to be Dredged

Vibrocore and grab samples have been taken from the area of the proposed dredge, during investigation operations in July 2016, at the locations shown on Drawing No. 1849-108 (Appendix A). Results of laboratory testing of samples from these investigations are presented in Appendix B.

The materials recovered from the proposed dredge area primarily comprised a mixture of sands and gravels, as reported in the sampling test report appended to this document (Appendix B).

The sediment samples have been analysed for a suite of chemical parameters and screened against Marine Scotland Action Levels 1 and 2 in order to identify any contamination that may be present. Tests confirmed very low contamination levels, with only minor exceedances of AL1 reporting levels for Chromium, Copper and Nickel on a handful of samples, and no exceedances of AL2 levels.

1.4 Anticipated Nature of Dredging Operations

The proposed dredging work will be carried out by a combination of backhoe dredger with separate hopper barge and self-propelled trailer suction dredger with integral hopper. For the volume and nature of material to be removed, the most effective method of excavation is considered to be by trailer suction hopper dredger (TSHD). However, seabed sampling identified that some of the area to be dredged has a layer of cobbles and small boulders overlying the principal deposits of sand and gravel, and this material requires to be removed before suction dredging to prevent damage to the trailer suction head. Removal of cobbles and boulders by backhoe dredger to a separate hopper barge is considered the most effective method of excavation of this material. The services of suitable dredging vessels will be secured by means of competitive tender, along with the tender for construction of the associated proposed pier. A suitable THSD vessel to undertake the Works is likely to have an integral hopper of 1,000-5,000m³ capacity to receive dredged spoil, with hydraulically operated bottom doors and with pump system available for shore discharge. The supporting backhoe dredger will be mounted on a spud-leg pontoon, and will require a reach in excess of 12m. It is anticipated that the proposed dredging works would be completed in 8-12 weeks. It is anticipated that the work will be scheduled to follow the installation of the piled walls forming the new pier. Dredging before these walls are complete is not possible as it would result in collapse of the existing pier.

1.5 Previous Related Operations

No previous capital or maintenance dredging operations have been identified at this site. The existing pier at the site was used for at least 40 years for the loading of sands and gravels from the (now disused) quarry immediately behind it.

1.6 Scope of this Report

This report reviews each of the available disposal options for dredged material arising from the proposed Capital Dredging operation. Those options which are not considered practicable are rejected and the reasons for doing so are explained.

Those options that are considered practicable are then examined in more detail and assessed against the following considerations: -

- Strategic
- Environmental
- Cost

The report then compares the practicable disposal options and draws a conclusion on the BPEO.

1.7 Structure of this Report

The remainder of this report is structured as follows: -

Section 2 describes each of the available disposal options identified and rejects those which are not considered practicable.

Section 3 discusses and assesses in the detail the aspects considered for each practicable disposal option.

Section 4 presents a summary of the findings of the study.

Section 5 concludes by identifying the BPEO for disposal of dredged material from the proposed dredge.

2. AVAILABLE DISPOSAL OPTIONS

2.1 Introduction

This section of the report discusses identified potential disposal options for the dredge arisings from the proposed dredge area. Where an option is considered impracticable, the reason is given and the option is discounted from further consideration. Those options which are considered to be practicable are taken forward for assessment in **Section 3** of the report, against Strategic, Environmental and Cost considerations.

2.2 Disposal Options

The following potential disposal options for the dredged materials have been identified for further consideration:-

1. Disposal to Landfill
2. Use as a Construction Material (onshore)
3. Use as a Marine Reclamation Fill
4. Use in Beach Nourishment
5. Use as Scour Protection (cobbles/small boulders)
6. Disposal to Sea

2.3 Option 1 - Disposal to Landfill

Dredged material is occasionally disposed of to landfill. Volumes disposed of in this manner are typically small due to the limited and decreasing availability of valuable landfill space.

The volume of material to be dredged for the scheme under consideration is approaching 200,000m^3. No landfill site has been identified that is able to accommodate such a large volume of material.

This option is therefore discounted as impracticable.

2.4 Option 2 - Use as a Construction Material (onshore)

The dredged material is primarily a mixture of sand and gravel making it suitable for use either as a construction fill, or as a concrete aggregate after appropriate washing and grading. The site under the control of the Client has sufficient space available for bringing ashore of dredged material, and for dewatering, handling, stockpiling and treatment as necessary thereafter.

This option is considered to be practicable and is therefore carried forwards to the next section for assessment.

2.5 Option 3 - Use in Marine Reclamation Works

The material from the proposed dredge is deemed to be suitable as a marine reclamation fill. A limited area of infilling below Mean High Water Springs (MHWS) level is proposed at the site, to the west of the pier. Additionally, small areas of fill are proposed to the east of the pier, around the new slipway. The total volume of material required for these areas of fill is estimated at around 50,000m^3.

This option for disposal is considered to be practicable and is therefore carried forwards to the next section for assessment.

2.6 Option 4 - Beach Nourishment

Although material from the dredge may be considered suitable for beach nourishment at sites with similar shore deposits, there is no current requirement in the area for beach replenishment work.

This option for disposal is therefore discounted as impracticable.

2.7 Option 5 – Use as Scour Protection

Design studies have identified the need for scour protection to inshore dredged slopes to maintain long term stability. A layer of cobbles and small boulders overlying seabed sands and gravels was identified in some areas during the site investigation, and this material will require to be removed by backhoe dredging prior to the use of the trailer suction dredger, to prevent interference with suction and pump ashore equipment. Cobbles and boulders recovered through dredging would be suitable for re-use as scour protection of dredged slopes. There is sufficient space onshore to allow landing and sorting of the cobble material before its re-use. It is anticipated that a volume of approximately 10,000m3 of material containing cobbles could be landed for sorting before re-use, to generate around 7,000m^3 of material for scour protection, with the balance being used as fill in the land based or marine works.

This option for disposal is considered to be practicable and is therefore carried forwards to the next section for assessment.

2.8 Option 6 - Disposal to Sea

Testing of samples of the material for dredging has shown it to be suitable for sea disposal, with generally very low contamination levels, and only minor exceedances of AL1 reporting levels for Chromium, Copper and Nickel on a handful of samples.

This option for disposal is considered to be practicable and is therefore carried forwards to the next section for assessment.

3. ASSESSMENT OF PRACTICABLE DISPOSAL OPTIONS

3.1 Introduction

This section of the report considers the strategic, environmental and cost implications associated with each of the disposal options judged to be practicable in Section 2.

In the previous section, Options 1 (Landfill) and 4 (Beach Nourishment) were discounted as impracticable. The following considerations relate to Option 2 (Construction Material onshore); Option 3 (Marine Reclamation); Option 5 (Scour Protection) and Option 6 (Sea Disposal).

3.2 Option 2 – Construction Use of Material (onshore)

3.2.1 Strategic Considerations

Operational Aspects

The sand and gravel material being removed by dredging is a part of the same mineral deposits seen onshore, and is essentially the same aggregate material as was excavated from the quarry site over its operating history, suitable for use as a construction fill or as concrete aggregate. The material therefore represents an asset with a significant monetary value.

After excavation, the Trailer Suction Dredger can mix dredged sands and gravels with seawater and pump it ashore via a floating pipeline running to a designated storage area for dewatering and stockpiling. Dewatering would be carried out by gravity, with material thereafter levelled off or moved into an adjacent stockpile area (as necessary), using conventional land based earth moving plant. Water drained from the material would be passed through a series of water boxes and a stilling pond to remove any suspended solids before discharging to sea. A drawing showing the notional layout of pump-ashore location, stockpile area and pumping water discharge arrangement is enclosed as Appendix C. It is anticipated that as much as possible of the stockpiled material will be used in the current works, with the remainder held for use in future works. As the site is an old quarry formed from the same material as that to be dredged, and the material is inert aggregate, no issue with storage of dredged material is foreseen.

Availability of Suitable Sites

As discussed above and as shown in the Drawing in Appendix C a suitable site for pumping ashore, dewatering and storage of the dredged sands and gravels has been identified.

Public and Local Acceptability

The pump ashore and stockpiling operation is considered to be a very low impact option for dredge disposal in respect of public and local acceptability. All operations will be kept within the site boundaries, and the nature of the dredged material being brought ashore will match that of the deposits already on the site. The site is an existing commercial quarry site, and it is not considered that the disposal operation will make any significant difference to the impact of the construction works as a whole. Noise for the pump ashore activity will be no greater than that for operation of the dredger. Noise for the stockpiling activity will be no greater than that for other excavating plant working on the site. Visual impact will be minimal relative to the other works being carried out on the site. Dust generation is not an issue as the material will be wet throughout the handling process. This disposal method avoids the need for transport off site, so no transport impact is created. Overall the proposal is considered to have negligible visual, noise or transport impact on the public.

Legislative Implications

SEPA have confirmed in consultation that temporary stockpiling of material on the site, above MHWS and for subsequent construction use, will not fall within their definition of Waste under the relevant Regulations.

Other Third Party Considerations

Handling of the dredge material, and construction of the temporary stockpile, are expected to be addressed in the Construction Environmental Management Plan (CEMP) to be prepared by the Contractor ultimately employed to carry out the Works.

3.2.2 Environmental Considerations

Safety Implications

The material is to be pumped directly to the de-watering and stockpile area, which is part of the construction site. Plant handling the material onshore will be conventional earthmoving machinery. Safety of operations will be controlled under the Health & Safety plan for the site as a whole.

Public Health Implications

The material is wet inert aggregate, handled within the centre of the construction site, and public health risks associated with the operation are assessed as low.

Pollution/Contamination Implications

The material is wet inert aggregate. Chemical analysis has confirmed that the material does not contain any significant level of contamination. The site of deposition is a marine quarry site of similar aggregate deposits to the material being dredged. Water drained from the material will be local seawater, and will be returned to sea after passing through a series of weir boxes and a settlement ponds designed to remove any suspended solids.

General Ecological Implications

The disposal of the dredged material ashore will not directly impact on the adjacent Lochs Duich, Long & Alsh Marine Protected Area (MPA) and Special Area of Conservation (SAC). To prevent any indirect impact, suspended solids in water discharging to sea from the material after it has been pumped ashore will be controlled by settlement ponds and weirs on the discharge route, and the discharge point will be over 400 m from the boundary of the MPA, such that there is no impact on water quality on or over the flame shell beds within the Protected Area.

Interference with other Legitimate Activities

The option for disposal on land keeps the disposal operations within the immediate boundaries of the site, and therefore causes no interference with other legitimate activities in the surrounding area.

3.2.3 Cost Considerations

Using the same basis as that used for other disposal options, the cost of dredging and pump ashore to a temporary stockpile of approx. 130,000m^3 of dredged material (excludes cobbles and marine fill covered under Options 3 & 5), is estimated at £1.040m. The value of the stockpiled material for construction use once stockpiled, before processing, is estimated at £0.52m, bringing the net total cost of dredging, pump ashore and re-use as construction material to £0.52m.

3.3 Option 3 – Use in Marine Reclamation Works

3.3.1 Strategic Considerations

Operational Aspects

An area of marine fill or reclamation is required as a part of the construction works, on the shore immediately west of the proposed pier. The dredged material will be suitable for construction of the core of this reclaimed area, thereafter to be protected against erosion by layers of rock armour. The volume of material required for this area is approximately 50,000m^3. The material may either be brought ashore with the dredged cobble and boulder material detailed in Section 3.4 below, or taken from the stockpile of material pumped ashore as detailed in Section 3.2 above.

Availability of Suitable Sites
The locations available for marine reclamation as part of the proposed works are at the west and east reclamation areas, the quayside/laydown area and infilling of the concrete caissons forming the outer pier. These are shown on Drawing No. 1849/111 enclosed in Appendix C.

Public and Local Acceptability
The use of dredged material for reclamation is considered to be a very low impact option for dredge disposal in respect of public and local acceptability. All operations will be kept within the site boundaries, and the nature of the dredged material being brought ashore will match that of the deposits already on the shore.

Legislative Implications
Any proposal for use of the material as a reclamation fill below MHWS will require to be included in the Marine Works Licence Application for the Pier Construction Works, and in any negotiation of construction permission and seabed lease with the The Crown Estate if the work extends over seabed under their ownership.

Other Third Party Considerations
No other third party considerations or impacts have been identified for this operation.

3.3.2 Environmental Considerations

Safety Implications
The proposed reclamation area is part of the proposed pier construction site. Plant handling the material onshore will be conventional earthmoving machinery. Safety of operations will be controlled under the Construction Phase Health & Safety Plan for the site as a whole.

Public Health Implications
The material is wet inert aggregate, handled within a clearly defined construction site, and public health risks associated with the operation are assessed as low.

Pollution/Contamination Implications
The material is inert aggregate. Chemical analysis has confirmed that the material does not contain any significant level of contamination. The site of deposition is a marine quarry site of similar aggregate deposits to the material being dredged. The material will have been dewatered before use in the reclamation. Pollution or contamination risks associated with the disposal of the material as described are assessed as very low.

General Ecological Implications

The use of the dredged material as a reclamation fill on the shore adjacent to the pier will not impact on the adjacent Lochs Duich, Long & Alsh Marine Protected Area or SAC either directly or indirectly.

Interference with other Legitimate Activities

The use of the dredged material as a reclamation fill on the shore adjacent to the pier will not cause any interference to other legitimate activities in the surrounding area.

3.3.3 Cost Considerations

Using the same basis as that used for other disposal options, the net cost of dredging, pump ashore and use of the material as marine reclamation fill vs the cost of import of fill for the same purpose is £0.2m

3.4 Option 5 – Use as Scour Protection

3.4.1 Strategic Considerations

Operational Aspects

As described in Section 2, a surface layer of cobbles and small boulders on part of the dredge area will require to be removed by backhoe dredger and hopper barge prior to the use of the trailer suction dredger. After sorting, this material is suitable for re-use as scour protection to dredged slopes. There is sufficient space onshore to allow landing and sorting of the cobble material before its re-use.

The anticipated volume of cobble material is 7,000m^3. Any smaller material sorted from the cobbles would be added to the stockpile for on land re-use (Option 2) or to the marine reclamation fill (Option 3).

Availability of Suitable Sites

It is envisaged that the cobble material would be unloaded from the hopper barge by an excavator working from the new pier, and thereafter sorted and stored for re-use either in the marine reclamation area, or in an area adjacent to the proposed Slipway.

Public and Local Acceptability

The landing of cobble material at the site, and re-use thereafter as scour protection to dredged slopes below water is considered to be a very low impact option in respect of public and local acceptability. All operations will be kept within the site boundaries, and the nature of the dredged material being brought ashore will match that of deposits already in the area above and below water.

Legislative Implications

Any proposal for use of the material as a scour protection fill below MHWS will require to be included in the Marine Works Licence

Application for the Pier Construction Works, and in any negotiation of construction permission and seabed lease with the The Crown Estate.

Other Third Party Considerations

No other third party considerations or impacts have been identified for this operation.

3.4.2 Environmental Considerations

Safety Implications

The proposed landing, sorting and scour protection areas are part of the proposed pier construction site. Plant handling the material onshore will be conventional earthmoving machinery. Plant handling material offshore will be conventional backhoe dredger. Safety of these operations will be controlled under the Construction Phase Health & Safety Plan for the site as a whole.

Public Health Implications

The material is wet inert aggregate, handled within a clearly defined construction site, and public health risks associated with the operation are assessed as low.

Pollution/Contamination Implications

The material is inert stone and aggregate. Chemical analysis has confirmed that the material does not contain any significant level of contamination. The site of landing and subsequent re-deposition are of similar deposits to the material being dredged. No pollution or contamination issues are considered to arise from the landing or re-use of this material at the site.

General Ecological Implications

It is not considered that the use of the dredged material as scour protection to inshore dredged slopes will have any ecological impact on the adjacent Lochs Duich, Long & Alsh MPA or SAC, either directly or indirectly.

Interference with other Legitimate Activities

The use of the dredged material as scour protection will not cause any interference to other legitimate activities in the surrounding area.

3.4.3 Cost Considerations

Using the same basis as that used for other disposal options, the cost of dredging and sorting of approximately 10,000m³ of dredged material as scour protection is estimated at £0.2m. The saving in cost of the construction works through use of the dredged material as scour protection, vs the cost of using imported rock, is estimated at £0.4m. The net cost of use of the dredged material as scour protection is therefore estimated at a saving of £0.2m.

3.5 Option 6 – Disposal at Sea

3.5.1 Strategic Considerations

Operational Aspects

Disposal at sea of the dredged material would involve its transport by disposal barge or by the Trailer Suction Hopper Dredger's integral hopper, from the site of the dredge to a licensed marine disposal ground. Four historic licensed disposal sites have been identified in the area surrounding the Works, at Armadale, Eigg/Rum, Ullapool and Stornoway.

Further enquiries have established that the site at Armadale has little remaining capacity and the site at Eigg/Rum is closed, whilst the sites at Ullapool and at Stornoway remain open and could accommodate the dredge volume. The site at Ullapool is a round trip of approximately 120 nautical miles from the Works, whilst the site at Stornoway is a round trip of approximately 140 nautical miles. Disposal to sites at such distance from the site will result in downtime from dredging of at least 50% per 24 hour working day, doubling the time taken to complete the dredging work. To achieve better productivity it would be necessary to deploy two dredgers for the Works, but availability of suitable plant to suit the construction programme for the pier is more likely to then become an issue.

Availability of Suitable Sites

As noted in the section above, licensed disposal sites capable of accommodating the proposed volume of dredged material are available at Ullapool and Stornoway. The volume for disposal is, however, large enough to have a significant impact on the remaining capacity of these sites, and it would clearly be desirable to find an alternative use for the material if this is possible.

Public and Local Acceptability

The disposal of the dredged material to one of the two available disposal grounds is considered to be a generally acceptable option in respect of local public opinion, but may be regarded as somewhat less acceptable by the public local to either of the two disposal grounds.

Legislative Implications

Under the provisions of the Marine (Scotland) Act 2010, a dredging and disposal licence is required for sea disposal of the dredged material. The Act also requires the provision of a BPEO for disposal to MS-LOT, for their acceptance. The proposed dredge area will require to be included in any negotiation of seabed lease with The Crown Estate.

Other Third Party Considerations

No regulatory objections to sea disposal are anticipated in the event that this Option is selected as the BPEO for disposal of dredge arisings. No other third party considerations or impacts have been identified for this Option.

3.5.2 Environmental Considerations

Safety Implications
Disposal at sea would have negligible implications for safety providing that normal navigational and maritime procedures are observed.

Public Health Implications
The material is wet inert aggregate, handled within a clearly defined construction site, and public health risks associated with the operation are assessed as low.

Pollution/Contamination Implications
There are no known threats to public health associated with disposal at sea of the anticipated dredge material in a licensed disposal area.

General Ecological Implications
There are no specific ecological implications identified for sea disposal to the disposal grounds at Ullapool or Stornoway. The Eigg/Rum site lies within the Small Isles MPA, but is already closed to further use, as noted above. As noted under "Availability of Suitable Sites", the deposition of the relatively large volume of material from the proposed dredge would reduce the future capacity of either potential disposal ground to take material from other dredges where the material might be less suitable for re-use.

Interference with other Legitimate Activities
As dredging and disposal operations are proposed to be carried out in a single relatively short campaign, any disturbance to other vessels at either of the two potential disposal grounds is expected to be temporary and short lived.

Amenity/Aesthetic Implications
No amenity or aesthetic implications have been identified for the sea disposal option. The short term presence of one or two dredging vessels moving daily between the Inner Sound and the North Minch is not deemed to have any significant adverse visual or aesthetic impact.

3.5.3 Cost Considerations

Using the same basis as that used for other disposal options and taking account of the travel distance to potential disposal sites, the cost of dredging and sea disposal of approximately 190,000m³ of dredged material is estimated at £1.5m

4. Review of Practicable Disposal Options

4.1 Options Considered

Six options have been considered for the disposal of the material arising from the capital dredging works at the proposed Kyleakin Feed Mill Pier.

The options of disposal to landfill and beach nourishment have been discounted as impracticable.

The remaining options, being:- Use as construction material onshore, Use in Marine Reclamation; Use as Scour Protection, and Sea Disposal, have been further reviewed in detail, as summarized below.

4.2. Summary of Assessment Results

The results of the Assessment of Practicable Options for Disposal of Dredged Material are presented in the table below.

Disposal Option	**2.Land Based Use**	**3.Marine Reclamation**	**5.Scour Protection**	**6. Sea Disposal**
Volume (m^3)	130,000	50,000	10,000	190,000
1.Strategic Acceptability				
Operational Acceptability	High	High	High	Medium
Capacity	High	High	High	Medium
Legislational Acceptability	High	High	High	High
Public & Local Acceptability	High	High	High	Med-High
2. Environmental Impact				
Health & Safety Impact	Low	Low	Low	Low
Public Health Impact	Low	Low	Low	Low
Pollution Risk	Low	Low	Low	Low
Ecological Impact	Low	Low	Low	Low
3. Total Net Comparative Cost	£0.52m	£0.2m	-£0.2m	£1.5m
(Total Options 2+3+5)	£0.52m			£1.5m

From review of the assessment results above, it can be seen that disposal of the approx. 190,000m^3 of dredged material by a combination of pumping ashore for future construction use, sorting of cobbles for use as inshore scour protection, and use in marine reclamation adjacent to the proposed pier offers the best practicable option in terms of the criteria of Strategic Acceptability, Environmental Impact and net Cost.

5. Identification of BPEO

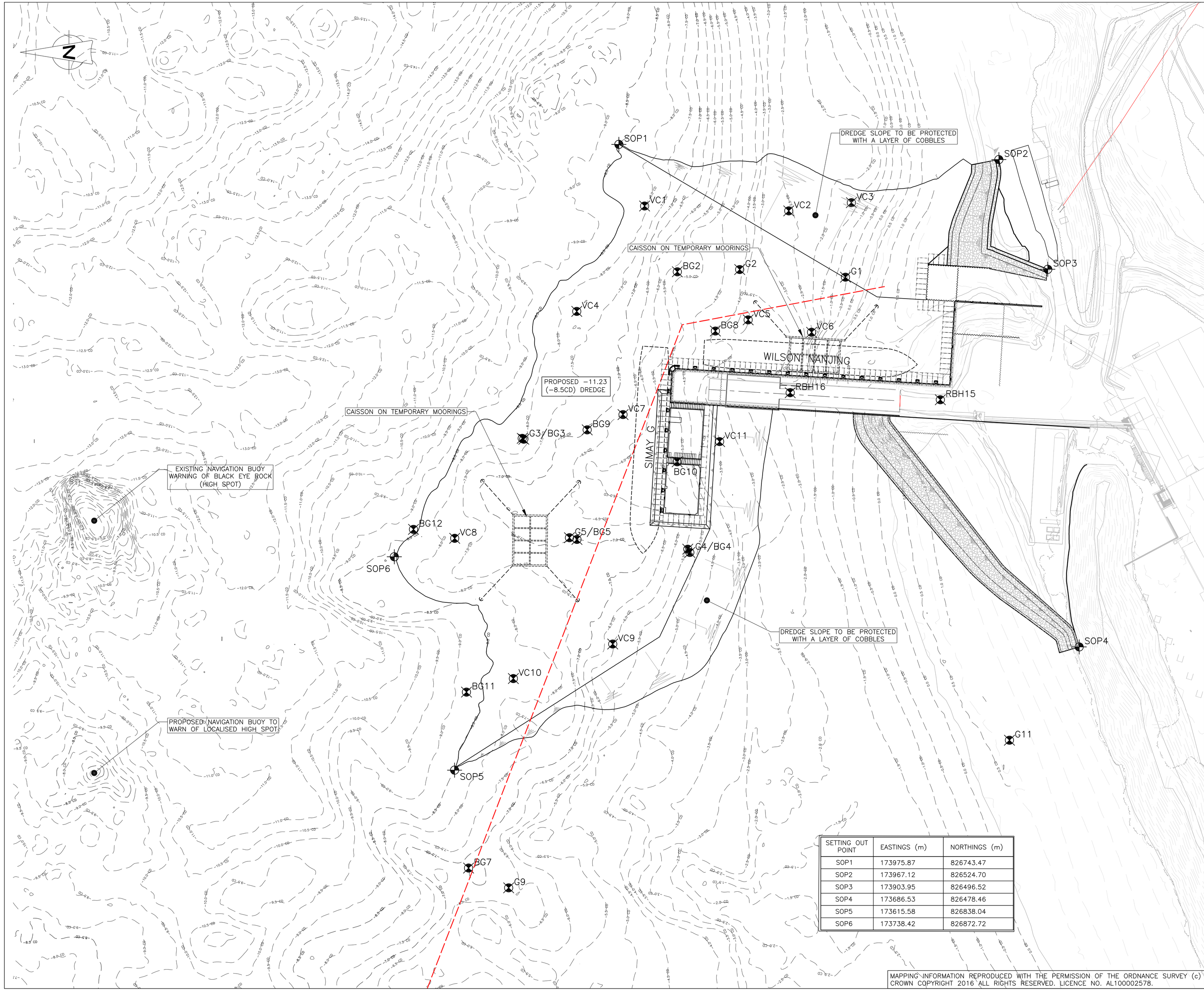
It is considered that the Best Practicable Environmental Option for disposal of material from the capital dredging works at the proposed Kyleakin Feed Mill Pier is by a combination of:-

(a) pumping ashore (above MHWS) of the bulk of the dredged material, which will be excavated by Trailer Suction Hopper Dredger, to a land based temporary stockpile for use thereafter as construction fill or aggregate, and,
(b) bringing ashore by barge of cobbles and boulders removed from the upper surface of the dredge area by backhoe dredger, for use thereafter as scour protection to dredged side slopes, and,
(c) infilling of an area of inter-tidal marine reclamation adjacent to the proposed pier using sands and gravels arising incidentally from operation (b) above, supplemented as necessary by material arising from operation (a).

This BPEO is considered to be acceptable under the terms of the Marine (Scotland) Act 2010.

Appendix A

Dredge Location Plan & Drawing
(including sampling locations)



SETTING OUT POINT	EASTINGS (m)	NORTHINGS (m)
SOP1	173975.87	826743.47
SOP2	173967.12	826524.70
SOP3	173903.95	826496.52
SOP4	173686.53	826478.46
SOP5	173615.58	826838.04
SOP6	173738.42	826872.72

GENERAL NOTES

1. ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM UNLESS NOTED OTHERWISE.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. CHART DATUM IS 2.73m BELOW ORDNANCE DATUM.
4. MHWS +2.57 +5.3 CD
   MLWS −2.13 +0.6 CD

LEGEND

—— —— −7.0 CD —— —— SEABED CONTOUR

NUMBER OF SAMPLES REQUIRED FOR PRE−DREDGE ANALYSIS (BASED ON A VOLUME OF UP TO 250,000m³ DREDGED [MARINE SCOTLAND GUIDANCE]) 10 NO.

VC − VIBROCORE SAMPLE (11NO.)
G − GRAB SAMPLE (11NO.)
BG − BENTHIC GRAB SAMPLE (12NO.)

REF. NO.	EASTING (m)	NORTHING (m)	LATITUDE(N) (D)	(M)	(S)	LONGITUDE(W) (D)	(M)	(S)
VC1	173940.38	826728.64	57	16	30.275	5	45	5.813
VC2	173937.58	826645.65	57	16	27.592	5	45	5.707
VC3	173942.3	826609.6	57	16	26.437	5	45	5.307
VC4	173879.7	826767.7	57	16	31.428	5	45	9.556
VC5	173874.83	826669.03	57	16	28.235	5	45	9.522
VC6	173867.69	826632.52	57	16	27.044	5	45	9.827
VC7	173820.3	826741.07	57	16	30.462	5	45	13.007
VC8	173749.05	826837.97	57	16	33.462	5	45	17.571
VC9	173688.18	826747	57	16	30.418	5	45	20.898
VC10	173668.3	826804.2	57	16	32.229	5	45	22.270
VC11	173804.73	826685.46	57	16	28.640	5	45	13.752
G1	173899.4	826613	57	16	26.471	5	45	7.874
G2	173903.8	826704.6	57	16	29.434	5	45	7.913
G3	173806.1	826798.2	57	16	32.281	5	45	14.041
G4	173740.9	826702.6	57	16	29.080	5	45	17.611
G5	173749.4	826771.9	57	16	31.331	5	45	17.333
G6	174081.6	826716.6	57	16	30.138	5	45	57.361
G7	174085.8	826673.9	57	16	28.768	5	44	56.970
G8	NO SAMPLE	NO SAMPLE	–	–	–	–	–	–
G9	173547.8	826806.9	57	16	32.101	5	45	29.458
G10	NO SAMPLE	NO SAMPLE	–	–	–	–	–	–
G11	173632.8	826518.6	57	16	22.949	5	45	23.445
BG1	NO SAMPLE	NO SAMPLE	–	–	–	–	–	–
BG2	173902.5	826709.8	57	16	29.600	5	45	8.008
BG3	173806.6	826799.1	57	16	32.311	5	45	14.015
BG4	173742.8	826703.8	57	16	29.122	5	45	17.502
BG5	173748.4	826767.6	57	16	31.190	5	45	17.378
BG6	NO SAMPLE	NO SAMPLE	–	–	–	–	–	–
BG7	173559.2	826830	57	16	32.867	5	45	28.855
BG8	173868.4	826687.9	57	16	28.832	5	45	9.967
BG9	173811.5	826761.7	57	16	31.112	5	45	13.600
BG10	173793.1	826709.9	57	16	29.408	5	45	14.525
BG11	173660.5	826831.2	57	16	33.086	5	45	22.824
BG12	173754.2	826861.7	57	16	34.237	5	45	17.342

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D
G	17.11.16	DREDGE AREA REVISED, LAYOUT UPDATED, SOP'S ADDED	LS	TR	TR
F	08.09.16	PIER LAYOUT REVISED	LS	TR	TR
E	19.08.16	ROCK CONTOURS REMOVED	JHG	TR	TR
D	17.08.16	AS SAMPLED	JHG	TR	TR
C	28.07.16	RECLAMATION AREA ADDED	ADS	TR	TR

AMENDMENTS

CLIENT

marineharvest

PROJECT

KYLEAKIN FEED MILL
MARINE WORKS

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DRAWING TITLE

PROPOSED PIER DREDGING AND APPROACH SEABED FEATURES

DRAWN	CHECKED	APPROVED
ADS	TR	TR
DATE: MAY 2016	DATE: MAY 2016	DATE: MAY 2016

SCALE (A1) 1:1000

STAGE: CONSENTS

REVISION: A B C D E F G

PROJECT No. 1849

DRAWING No. 108

Appendix B

Analytical Report on Vibrocore Samples

Aspect
Land + Hydrographic Surveys
CHARTERED SURVEYORS

TEL: 01294 313 399 • WEB: WWW.ASPECTSURVEYS.COM

KYLE AKIN GEOTECHNICAL SURVEY

ISLE OF SKYE

AUGUST 2016

PROJECT REF: A5981

REV: 01

Client:

Wallace Stone LLP
Royal Bank Buildings
High Street
DINGWALL
IV15 9HA

WALLACE STONE

ices Approved Development Partner

Achilles

QAS INTERNATIONAL ISO 9001:2008 REGISTERED FIRM

QAS INTERNATIONAL ISO 14001:2004 REGISTERED FIRM

QAS INTERNATIONAL BS OHSAS 18001:2007 REGISTERED FIRM

CONTENTS

FIGURES

TABLES

Revision No.	Date	Issue / Revision	Compiled	Approved
00	05/08/2016	Original	KEM	CDT
01	3/10/2016	Rev 1	KEM	CDT

1. Introduction

Aspect Land & Hydrographic Surveys Ltd (herein ALHS) were contracted by Wallace Stone LLP on behalf of Marine Harvest to carry out sediment sampling using vibrocore and surface grab techniques to support assessment of options for a Feed Mill development and associated infrastructure.

2. Scope of Works

The sampling was to be carried out in the areas depicted in Figure 1 below.

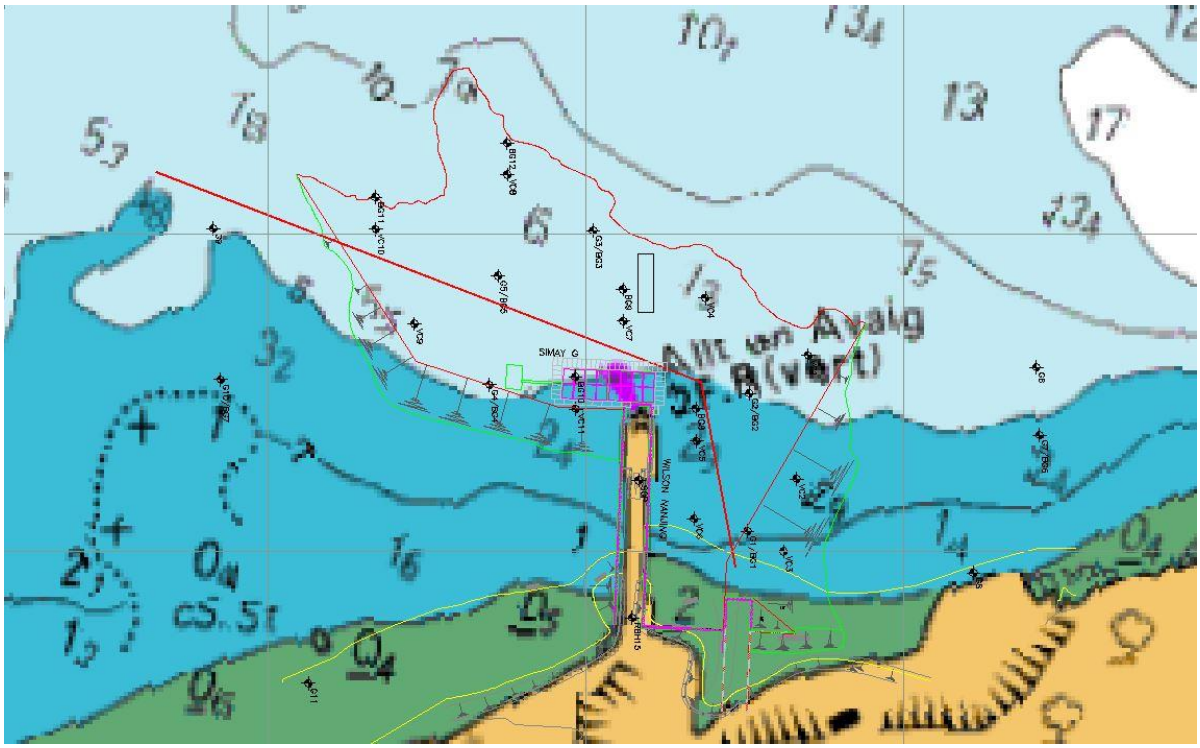


FIGURE 1 – KYLE AKIN VIBRACORE AND GRAB LOCATIONS

One vibrocore sample was retained from each sample location. A minimum of 3 attempts were made at each location. The aim was to obtain 3 sub samples where the core was returned longer than 1.5m and 2 sub samples where the core length was <1.5m in length. Where it was not possible to obtain a sample by vibrocore additional grab samples were obtained to allow sufficient analysis to be undertaken.

3. Sequence of Events

TABLE 1 - SEQUENCE OF EVENTS

DATE	EVENT
5 July 2016	Vigilance transits from TROON to Kyle Akin
6 July 2016	Vigilance Arrives Kyle Akin
11 July 2016	Mobilise Vibrocore equipment and Day Grab
12 July 2016	Vibrocore and Grab sampling
13 July 2016	Vibrocore and Grab sampling
14 July 2016	Grab Sampling
15 July 2016	De Mobilise and Transfer Samples to laboratory for analysis

4. Conduct of Sampling

Within all areas the aim was to obtain a minimum core depth of 1.5m wherever possible. This was to allow the cores to be split into 3 separate sections of at least 0.5m and a sample for analysis to be obtained from each of these sections.

The vessel was manoeuvred to each of the locations in turn and anchored fore and aft to avoid swinging during the sampling operation.

FIGURE 2 – CONDUCTING A CORE AT VC6

Vibrocore locations 2, 3 and 6 were sampled on 12July 2016 and all remaining vibrocore and grab samples for the PSD, metals and chemicals analysis were carried out on 13 and 14 July 2016.

It was found that the seabed in much of the area particularly offshore was dominated by a surface layer of cobbles which made a number of the vibrocores impossible to recover a sample. This was particularly the case at Vibrocore locations 4, 8 & 10 and Grab location 10 where no core or grab was possible and. Where no sample was recovered the vessel was manoeuvred around the area around the instructed sample location to attempt to find a location where the vibrocore could penetrate through the surface layer of cobbles or gravel. Failing this resulting in a sample being returned repeated grab sampling attempts were made. In these cases the grab sampling only returned cobbles as detailed below. Grab location 10 did not even return cobbles suggesting that this location may be outcropping rock.

TABLE 2 - VIBRACORE LOCATIONS

Sample Location	Date / Time	Easting	Northing	Remarks
VC1	13/7/16 1556	173940.38	826728.64	0.84m core
VC2	12/7/16 1143	173937.58	826645.65	1.0m core
VC3	12/7/16 1341	173942.3	826609.6	0.93m core
VC4	13/7/16 1420	173879.7	826767.7	Grab
VC5	13/7/16 1659	173874.83	826669.03	1.14m core
VC6	12/7/16 1443	173867.69	826632.52	1.5m core
VC7	13/7/16 1136	173820.30	826741.07	0.25m core
VC8	13/7/16 1127	173749.05	826837.97	Grab
VC9	13/7/16 0827	173688.18	826747.00	0.43m core
VC10	13/7/16 0946	173668.3	826804.2	Grab
VC11	13/7/16 1332	173804.73	826685.46	0.25m core
G1	14/7/16 1415	173899.4	826613.0	Grab
G2	14/7/16 1152	173903.8	826704.6	Grab
G3	14/7/16 1014	173806.1	826798.2	Grab
G4	14/7/16 1254	173740.9	826702.6	Grab
G5	14/7/16 0937	173749.4	826771.9	Grab
G6	14/7/16 1334	174081.6	826716.6	Grab
G7	14/7/16 1348	174085.8	826673.9	Grab
G8	Armour Stone / Cobbles - no sample			
G9	14/7/16 0802	173547.8	826806.9	Grab
G10	No Sample / Weed only returned from grab			
G11	14/7/16 1436	173632.8	826518.6	Grab

5. Equipment Used for Coring

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

As the sediment was too dense to push out of the core tube prior to sampling the cores were cut into sections of equal length prior to removal from the core tube and sampling. The cores were then split longitudinally prior to being sampled with care being taken not to sample material that had come into direct contact with the sample tube wall or close to where the tube had been cut.

FIGURE 3 - SDI D-4 VIBROCORER ON DECK

6. Sample Analysis

The laboratory analysis was carried out by Environmental Scientifics Group (ESG) in Burton on Trent. The intention was that all vibrocore samples would be sub sampled at 0.5m intervals of the length of the core and each sub sample analysed for Particle Size, Metals and Chemicals. In addition, after the sampling had been undertaken and the samples dispatched to the lab a request was made to expand the analysis with the addition of leachate analysis. In communication with the laboratory this was able to be accommodated within the samples already taken.

Sample Location	Sample Achieved	Analysis Ordered	Sediment Descriptor
VC1	0.84m core	2 sub samples for PSD, Metals, Chemicals & Leachate	1 – Fine to Coarse Sand 2 – Sandy Silt
VC2	1.0m core	2 sub samples for PSD, Metals, Chemicals & Leachate	1 - Fine to Coarse Sand 2 – Fine Sand
VC3	0.93m core	2 sub samples for PSD, Metals, Chemicals & Leachate	1 – Fine to Coarse Sand 2 – Fine Sand
VC4	No core-Grab	Grab sampled for PSD, Metals, Chemicals & Leachate	Gravelly, Sandy Pebbles
VC5	1.14m Core	2 sub samples for PSD, Metals, Chemicals & Leachate	1 – Silty Sand 2 – Silty Sand
VC6	1.5m core	3 sub samples for PSD, Metals, Chemicals & Leachate	1 – Clayey, Silty Sand 2 – Silty Sand 3 – Silty Sand
VC7	0.25m core	Sampled for PSD, Metals, Chemicals & Leachate	Sandy Pebbles
VC8	No core - Grab	Grab Sampled for PSD, Metals, Chemicals & Leachate - Cobbles, Gravel & sand	1 – Gravel & Cobbles
VC9	0.43m core	Sampled for PSD, Metals, Chemicals & Leachate	Silty, Sandy Pebbles
VC10	No core - Grab	Grab Sampled for PSD, Metals, Chemicals & Leachate - Cobbles, Gravel & sand	Sandy, Gravelly Pebbles
VC11	0.25 core	Sampled for PSD, Metals, Chemicals & Leachate	Sandy, Gravelly Pebbles
G1	Grab	PSD	Pebbles
G2	Grab	PSD	Sandy Pebbles
G3	Grab	PSD	Sandy Pebbles
G4	Grab	Sampled for PSD, Metals, Chemicals & Leachate	Gravelly Sand
G5	Grab	PSD	Sandy Pebbles
G6	Grab	PSD	Sandy Pebbles

Sample Location	Sample Achieved	Analysis Ordered	Sediment Descriptor
G7	Grab	Sampled for PSD, Metals, Chemicals & Leachate	Sandy Pebbles
G8	No Sample	Armour Stone / made ground	No sample
G9	Grab	PSD	Sandy Pebbles
G10	No Sample	N/A	
G11	Grab	Sampled for PSD, Metals, Chemicals & Leachate	Medium to Coarse Sand

TABLE 3 – VIBRACORE SAMPLE ANALYSIS

The samples have been analysed against the Action Levels quoted by Marine Scotland, listed in Figure 4. When the detected levels in samples were above action levels, they were highlighted red in the summary tables.

Table 2 – Sediment QC criteria for trace metal (mg/kg) and TBT (µg/kg) concentrations

Quality Criteria	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	TBT
33% AL1	6.6	0.1	16.5	9.9	0.1	9.9	16.5	42.9	33.3
Precision (%)	25	25	25	25	25	25	25	25	25
LOD	1.0	0.05	0.2	0.1	0.05	0.2	0.2	2.0	10.0

Table 3 – Sediment QC criteria for chlorinated biphenyl (µg/kg) concentrations

Quality Criteria	CB28	CB52	CB101	CB118	CB153	CB138	CB180	ICES7 CB	TOTAL CB
33% AL1	0.47	0.47	0.47	0.47	0.47	0.47	0.47	3.30	6.80
Precision (%)	25	25	25	25	25	25	25	25	25
LOD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	1.4

Table 4 - Sediment QC criteria for polycyclic aromatic hydrocarbon (µg/kg) concentrations

Quality Criteria	Naphthalene	Phenanthrene	Anthracene
33% AL1	33.3	33.3	33.3
Precision (%)	25	25	25
LOD	2.0	2.0	2.0
Quality Criteria	**Fluoranthene**	**Pyrene**	**Benz[a]anthracene**
33% AL1	33.3	33.3	33.3
Precision (%)	25	25	25
LOD	2.0	2.0	2.0
Quality Criteria	**Benzofluoranthenes**	**Benzo[a]pyrene**	**Indenopyrene**
33% AL1	33.3	33.3	33.3
Precision (%)	25	25	25
LOD	2.0	2.0	2.0
Quality Criteria	**Benzoperylene**	**Acenaphthylene**	**Acenaphthene**
33% AL1	33.3	33.3	33.3
Precision (%)	25	25	25
LOD	2.0	2.0	2.0
Quality Criteria	**Fluorene**	**Dibenz[a,h]anthracene**	**Chrysene**
33% AL1	33.3	3.3	33.3
Precision (%)	25	25	25
LOD	2.0	0.5	2.0

Please note that these detection limits are to be used as a guide. Where these detection limits cannot be met, please contact the Marine Scotland Licensing Operations Team (MS-LOT) for approval before undertaking testing: ms.marinelicensing@scotland.gsi.gov.uk. Detection limits **must be below** Revised Action Level 1 (Appendix 2) in order to gain approval.

FIGURE 4 - MARINE SCOTLAND ACTION LEVELS TAKEN FROM GUIDANCE ON SAMPLING AND ANALYSIS OF SEDIMENT

Detail on the analysis of individual items is provided in the accompanying lab records for each sample.

A summary of the analysis of each sub sample is contained in the tables below. Data is organised in order of Table 3, under sample name.

It should be noted that the limits of detection for PCB were above the quoted 0.47 but below Revised Action Level 1 as specified in Appendix 2 of the guidance document. PCB are reported in comparison to RAL1 of 20µg/Kg.

TABLE 4 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC1-2-1

Sample ID: VC1-2-1				
METALS	Action Level 1 (mg/Kg)	VC1-2-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC1-2-1 (mg/Kg)
Arsenic	20	1.9	70	1.9
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	57.3	370	57.3
Copper	30	14.5	300	14.5
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	19.6	150	19.6
Lead	50	17	400	17
Zinc	130	33.9	600	33.9
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC1-2-1 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 5 – DETECTED LEVELS IN VC1-2-1 LEACHATE

Sample ID: VC1-2-1		
	Units	VC1-2-1
pH	pH Units	7.6
Conductivity	uS/cm	5820
Chloride	mg/l	1890
Fluoride	mg/l	1.1
Total Sulphur (Dissolved)	mg/l	324
Barium (Dissolved)	mg/l	0.13
Nickel (Dissolved)	mg/l	0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.011
Lead (Dissolved)	mg/l	0.003
Zinc (Dissolved)	mg/l	0.032
Arsenic (Dissolved)	mg/l	0.004
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.009
Molybdenum (Dissolved)	mg/l	0.035
Antimony as Sb (Dissolved)	mg/l	0.004
Ammoniacal Nitrogen	mg/l	13.8
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4400
Aluminium (Dissolved)	mg/l	0.04
Ammonia (Free)	mg/l	0.2
Dissolved Organic Carbon	mg/l	2.9

POLYAROMATIC HYDROCARBONS	VC1-2-1 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	0.017
Fluorene	<0.010
Phenanthrene	0.012
Anthracene	<0.010
Fluoranthene	0.036
Pyrene	0.028
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.223

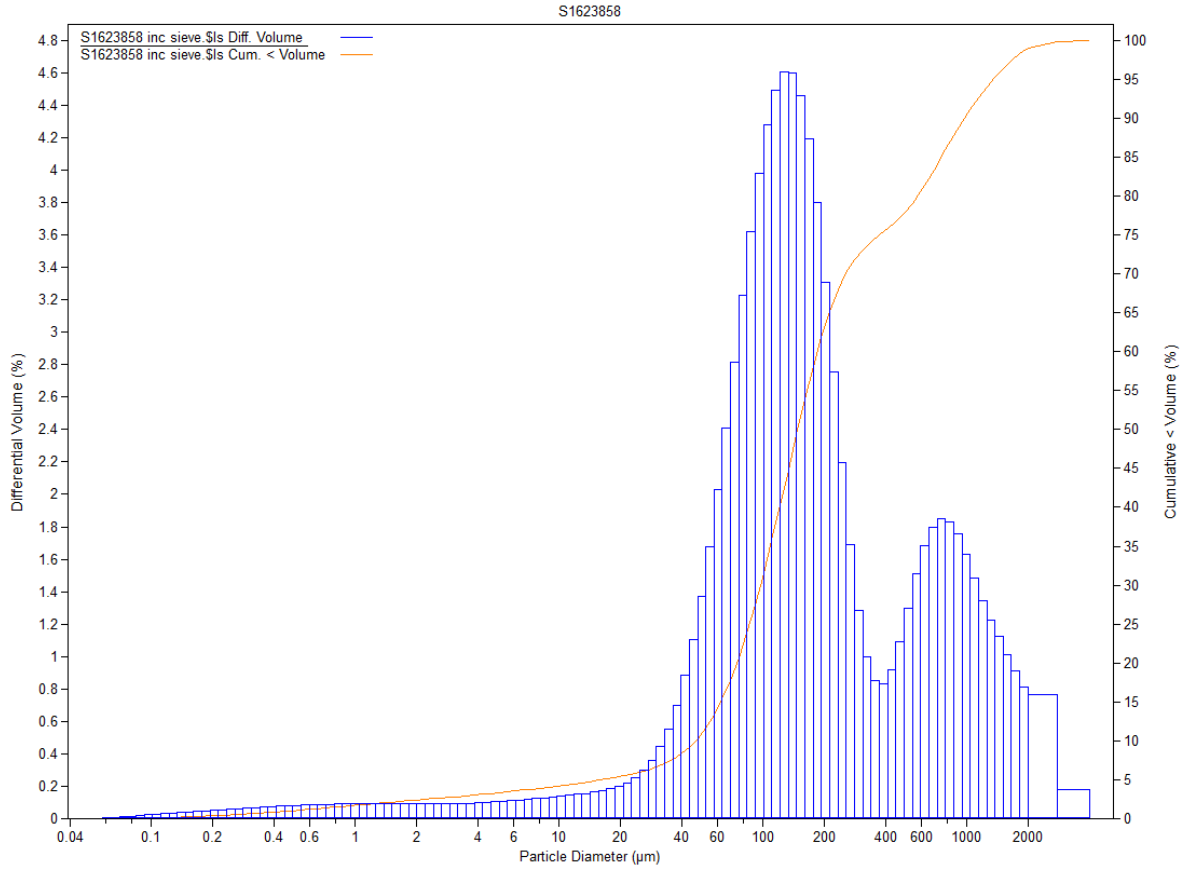


FIGURE 5 - VC1-2-1 PARTICLE SIZE ANALYSIS

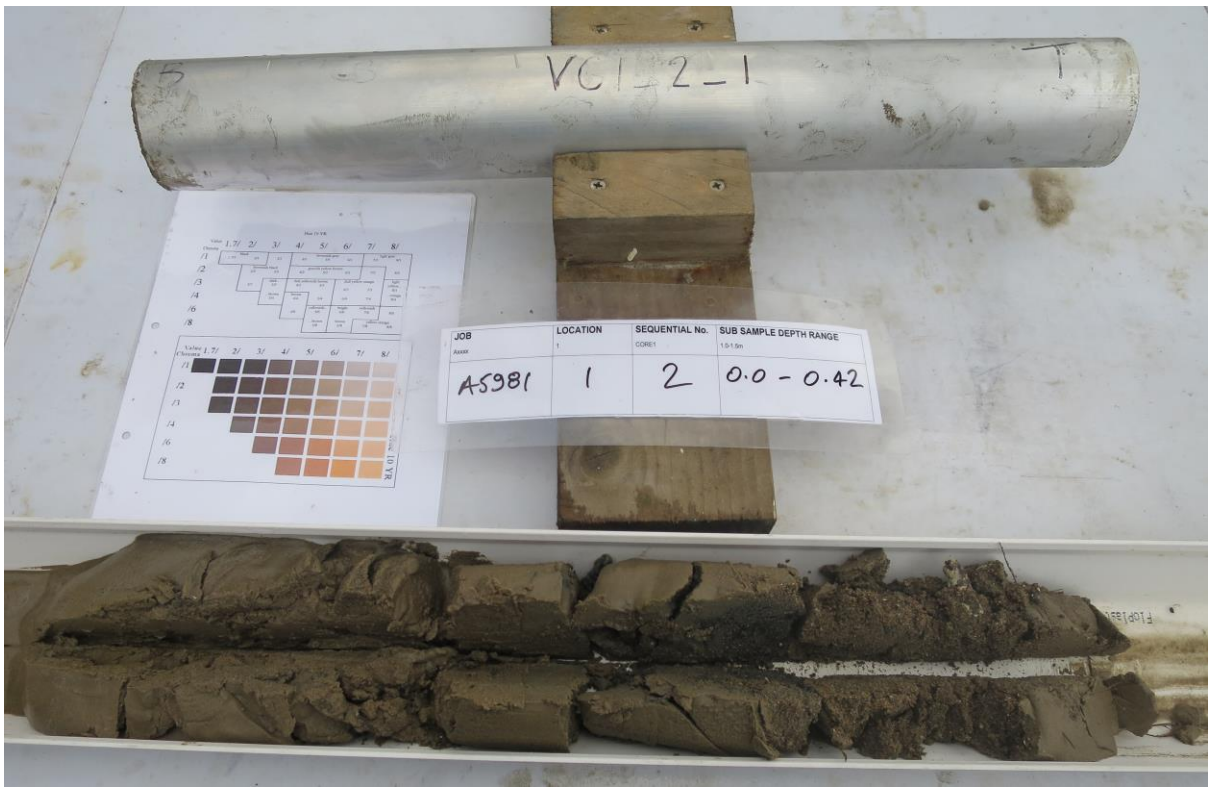


FIGURE 6 - VC1-2-1

TABLE 6 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC1-2-2

METALS	Action Level 1 (mg/Kg)	VC1-2-2 (mg/Kg)	Action Level 2 (mg/Kg)	VC1-2-2 (mg/Kg)
Arsenic	20	1	70	1
Cadmium	0.4	0.1	4	0.1
Chromium	50	46.4	370	46.4
Copper	30	13	300	13
Mercury	0.25	<0.01	1.5	<0.01
Nickel	30	20.7	150	20.7
Lead	50	14.6	400	14.6
Zinc	130	27.2	600	27.2
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC1-2-2 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 7 – DETECTED LEVELS IN VC1-2-2 LEACHATE

Sample ID: VC1-2-2		
	Units	VC1-2-2
pH	pH Units	7.2
Conductivity	uS/cm	5600
Chloride	mg/l	1690
Fluoride	mg/l	0.6
Total Sulphur (Dissolved)	mg/l	245
Barium (Dissolved)	mg/l	0.34
Nickel (Dissolved)	mg/l	0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.004
Lead (Dissolved)	mg/l	<0.001
Zinc (Dissolved)	mg/l	0.037
Arsenic (Dissolved)	mg/l	0.006
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.011
Molybdenum (Dissolved)	mg/l	0.005
Antimony as Sb (Dissolved)	mg/l	0.003
Ammoniacal Nitrogen	mg/l	<0.01
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	
Aluminium (Dissolved)	mg/l	0.03
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	4.5

POLYAROMATIC HYDROCARBONS	VC1-2-2 Concentration (ug/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	0.023
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.183

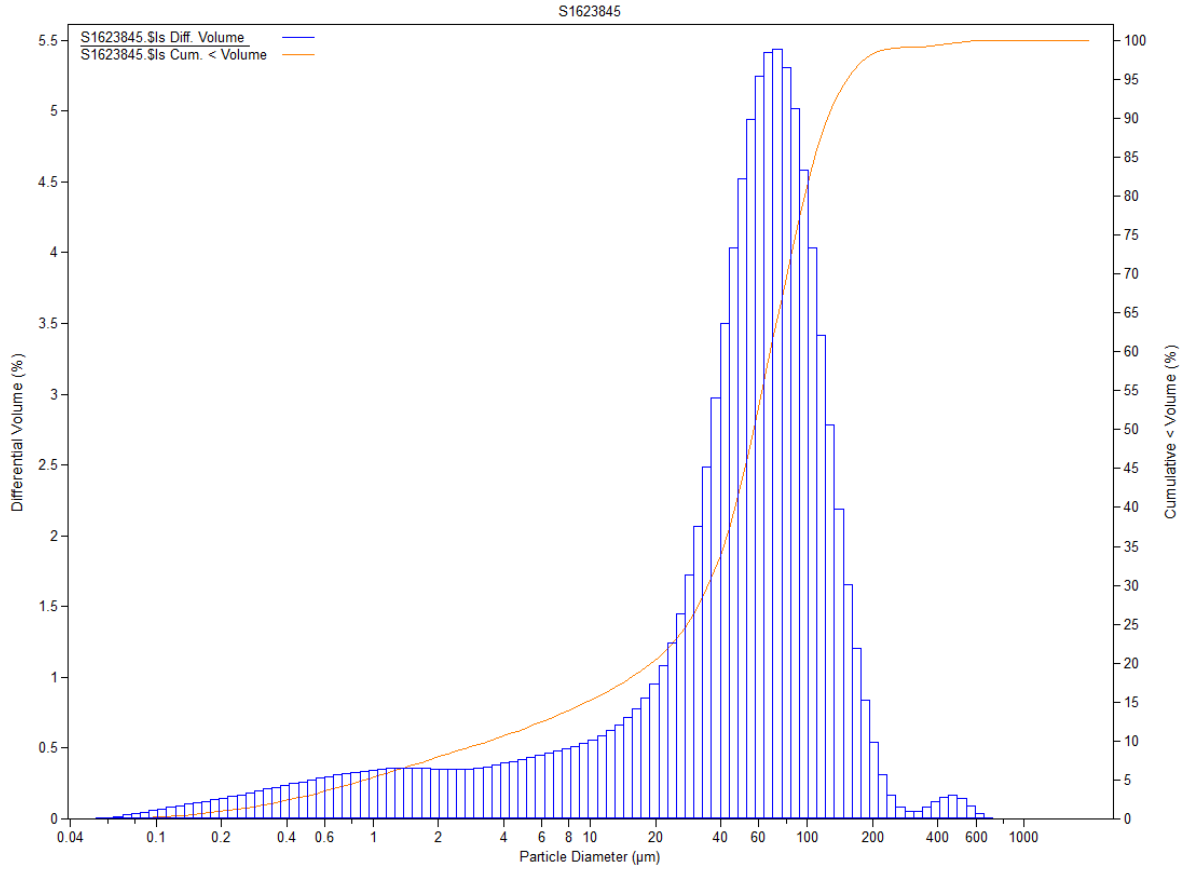


FIGURE 7 - VC1-2-2 PARTICLE SIZE ANALYSIS

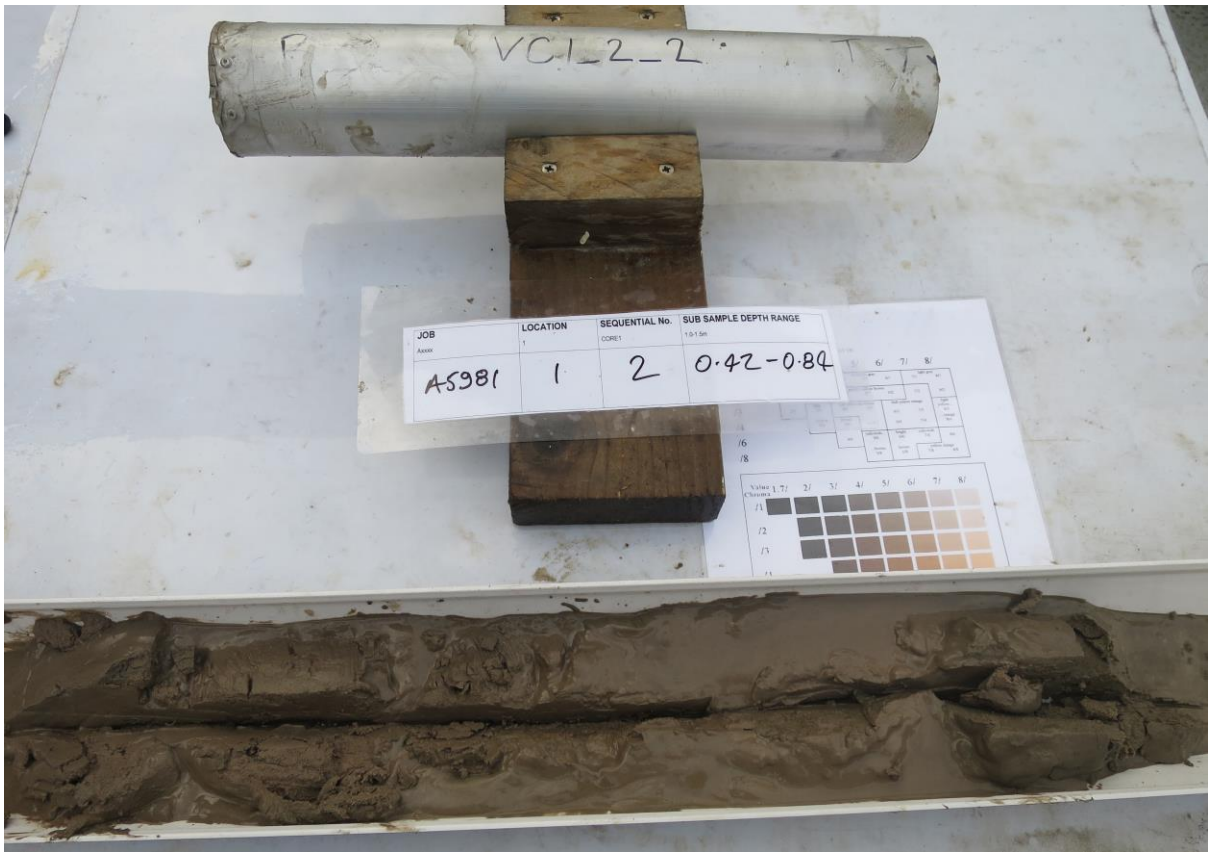


FIGURE 8 - VC1-2-2

TABLE 8 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC2-2-1

Sample ID: VC2-2-1				
METALS	Action Level 1 (mg/Kg)	VC2-2-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC2-2-1 (mg/Kg)
Arsenic	20	1.6	70	1.6
Cadmium	0.4	0.1	4	0.1
Chromium	50	50.7	370	50.7
Copper	30	13.2	300	13.2
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	22.1	150	22.1
Lead	50	15	400	15
Zinc	130	26.4	600	26.4
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC2-2-1 (ng/g)
Acenaphthene	100	2.3
Acenaphthylene	100	< 1
Anthracene	100	1.7
Fluorene	100	1.1
Naphthalene	100	< 1
Phenanthrene	100	9.1
Benzo[a]anthracene	100	8.8
Benzo[b]fluoranthene	100	7.8
Benzo[k]fluoranthene	100	11.6
Benzo[a]pyrene	100	11.1
Benzo[g,h,i]perylene	100	6.9
Dibenzo[a,h]anthracene	10	1.3
Chrysene	100	10.3
Fluoranthene	100	23.1
Pyrene	100	17.5
Indeno(1,2,3cd)pyrene	100	9.3

PCBs were below Revised AL1 in all cases.

TABLE 9 - DETECTED LEVELS IN VC2-2-1 LEACHATE

Sample ID: VC2-2-1		
	Units	VC2-2-1
pH	pH Units	7.2
Conductivity	uS/cm	5130
Chloride	mg/l	1640
Fluoride	mg/l	0.5
Total Sulphur (Dissolved)	mg/l	238
Barium (Dissolved)	mg/l	0.11
Nickel (Dissolved)	mg/l	<0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.008
Lead (Dissolved)	mg/l	<0.001
Zinc (Dissolved)	mg/l	0.018
Arsenic (Dissolved)	mg/l	0.003
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.007
Molybdenum (Dissolved)	mg/l	0.009
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	0.2
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	3900
Aluminium (Dissolved)	mg/l	0.04
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	1.1

POLYAROMATIC HYDROCARBONS	VC2-2-1 Concentration (µg/l)
Naphthalene	0.024
Acenaphthylene	<0.010
Acenaphthene	0.013
Fluorene	<0.010
Phenanthrene	<0.010
Anthracene	<0.010
Fluoranthene	0.014
Pyrene	0.011
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.182

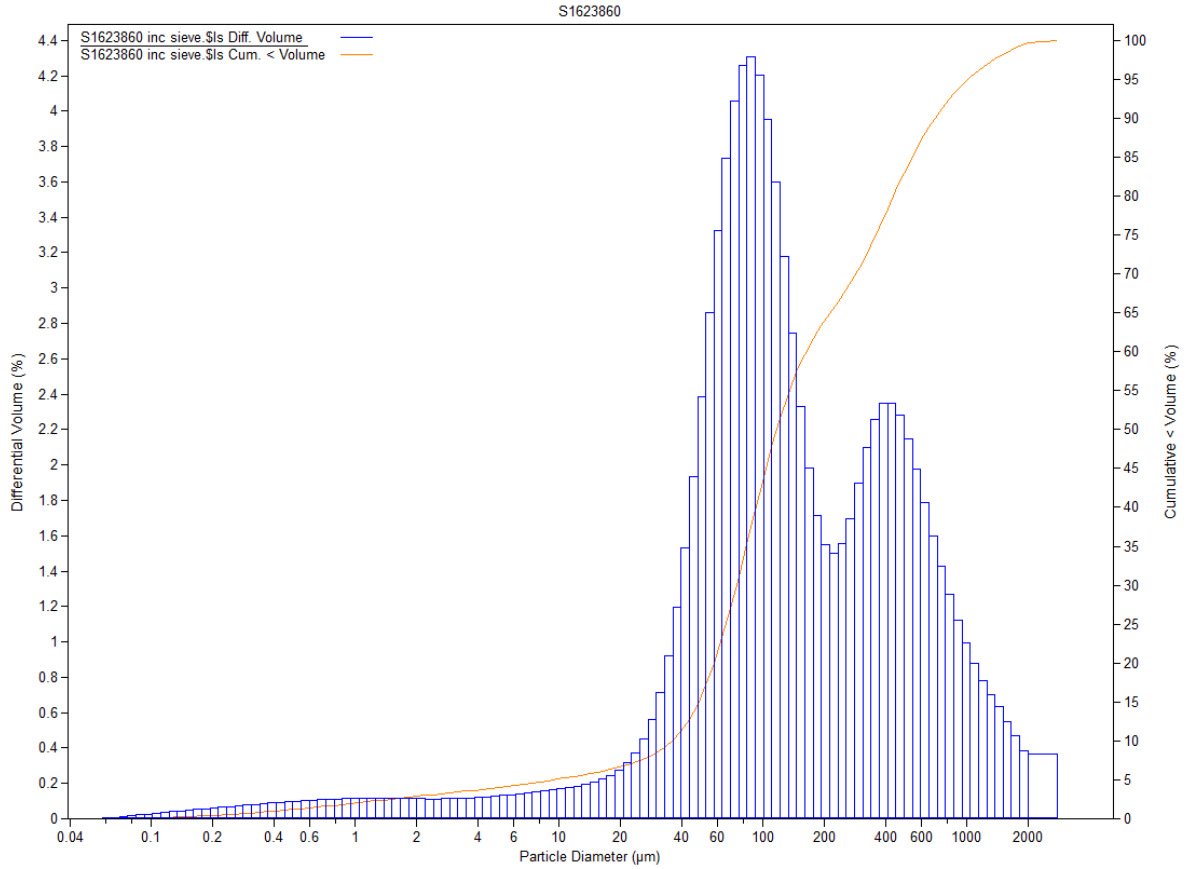


FIGURE 9 - VC2-2-1 PARTICLE SIZE ANALYSIS

FIGURE 10 - VC2-2-1

TABLE 10 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC2-2-2

Sample ID: VC2-2-2				
METALS	Action Level 1 (mg/Kg)	VC2-2-2 (mg/Kg)	Action Level 2 (mg/Kg)	VC2-2-2 (mg/Kg)
Arsenic	20	< 1	70	< 1
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	36.8	370	36.8
Copper	30	13.6	300	13.6
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	16.2	150	16.2
Lead	50	15.9	400	15.9
Zinc	130	20.4	600	20.4
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	µg/Kg	VC2-2-2 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 11 - DETECTED LEVELS IN VC2-2-2 LEACHATE

Sample ID: VC2-2-2		
	Units	VC2-2-2
pH	pH Units	6.8
Conductivity	uS/cm	5800
Chloride	mg/l	1940
Fluoride	mg/l	0.6
Total Sulphur (Dissolved)	mg/l	261
Barium (Dissolved)	mg/l	0.09
Nickel (Dissolved)	mg/l	<0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.001
Lead (Dissolved)	mg/l	0.001
Zinc (Dissolved)	mg/l	0.044
Arsenic (Dissolved)	mg/l	0.001
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.007
Molybdenum (Dissolved)	mg/l	0.005
Antimony as Sb (Dissolved)	mg/l	<0.001
Ammoniacal Nitrogen	mg/l	<0.01
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	44600
Aluminium (Dissolved)	mg/l	0.05
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	1.6

POLYAROMATIC HYDROCARBONS	VC2-2-2 Concentration (µg/l)
Naphthalene	0.021
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	0.013
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.174

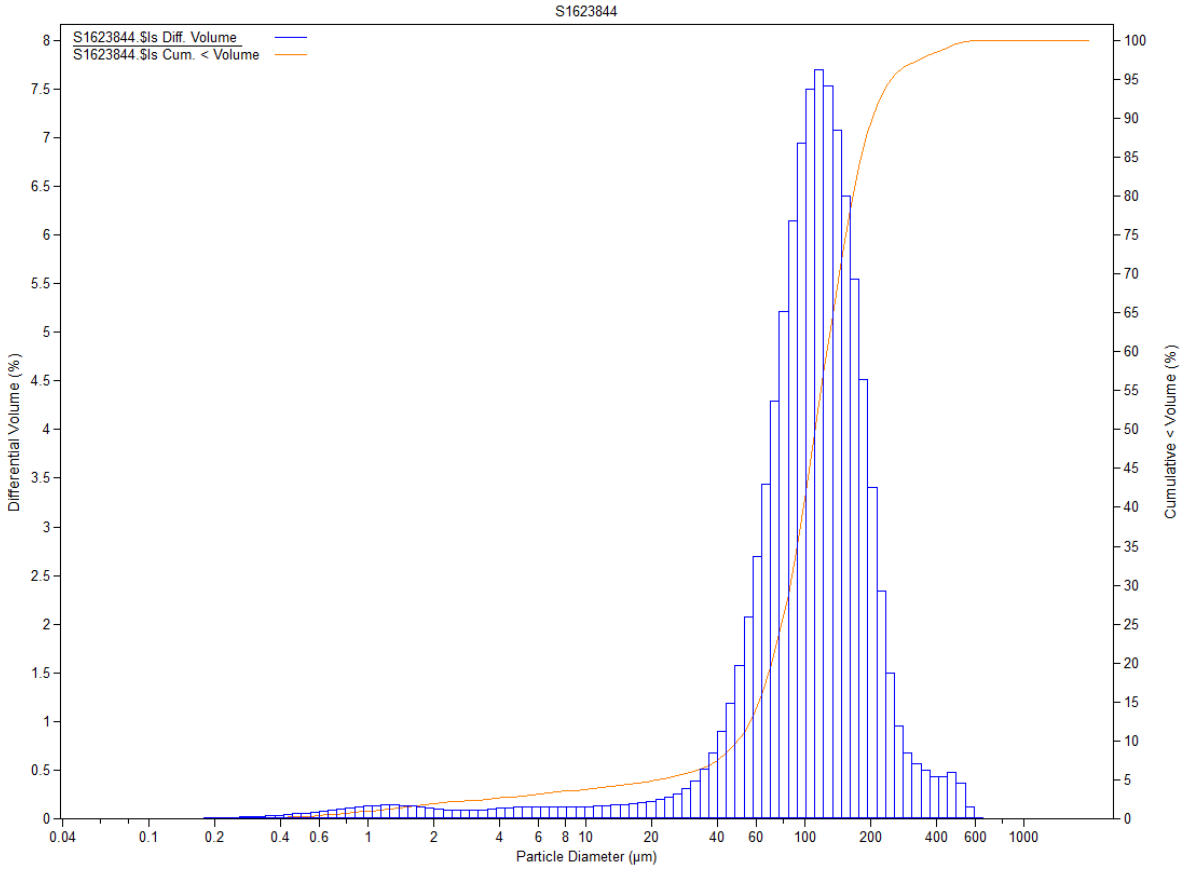


FIGURE 11 - VC2-2-2 PARTICLE SIZE ANALYSIS

FIGURE 12 - VC2-2-2

TABLE 12 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC3-2-1

Sample ID: VC3-2-1				
METALS	Action Level 1 (mg/Kg)	VC3-2-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC3-2-1 (mg/Kg)
Arsenic	20	< 1	70	< 1
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	43.7	370	43.7
Copper	30	19.3	300	19.3
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	18.6	150	18.6
Lead	50	12.1	400	12.1
Zinc	130	22.8	600	22.8
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC3-2-1 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 13 - DETECTED LEVELS IN VC3-2-1 LEACHATE

Sample ID: VC3-2-1		
	Units	VC3-2-1
pH	pH Units	7
Conductivity	uS/cm	5690
Chloride	mg/l	1860
Fluoride	mg/l	0.8
Total Sulphur (Dissolved)	mg/l	300
Barium (Dissolved)	mg/l	0.18
Nickel (Dissolved)	mg/l	<0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	0.0007
Copper (Dissolved)	mg/l	0.004
Lead (Dissolved)	mg/l	<0.001
Zinc (Dissolved)	mg/l	0.037
Arsenic (Dissolved)	mg/l	0.002
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.008
Molybdenum (Dissolved)	mg/l	0.017
Antimony as Sb (Dissolved)	mg/l	0.002
Ammoniacal Nitrogen	mg/l	<0.01
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4500
Aluminium (Dissolved)	mg/l	0.04
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	2.1

POLYAROMATIC HYDROCARBONS	VC3-2-1 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	<0.010
Anthracene	<0.010
Fluoranthene	0.019
Pyrene	0.012
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.181

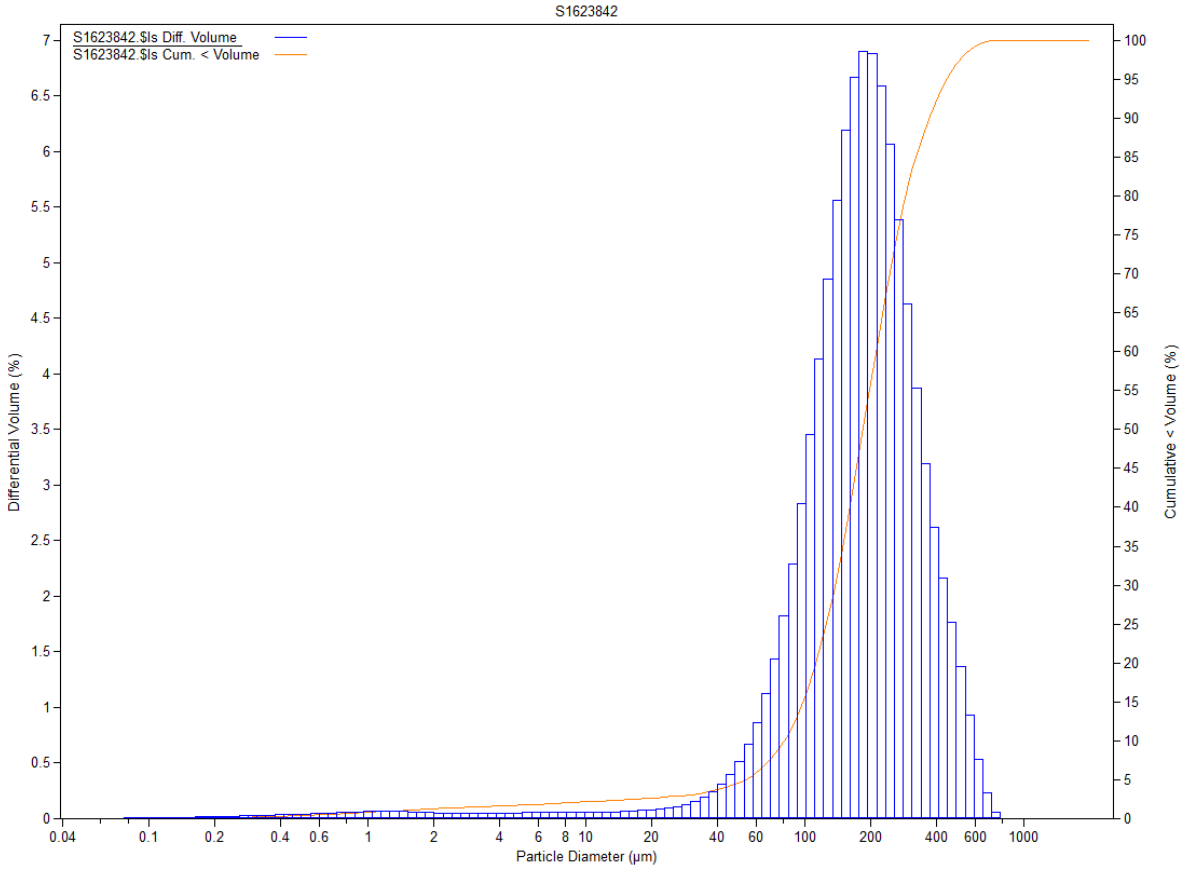


FIGURE 13 - VC3-2-1 PARTICLE SIZE ANALYSIS

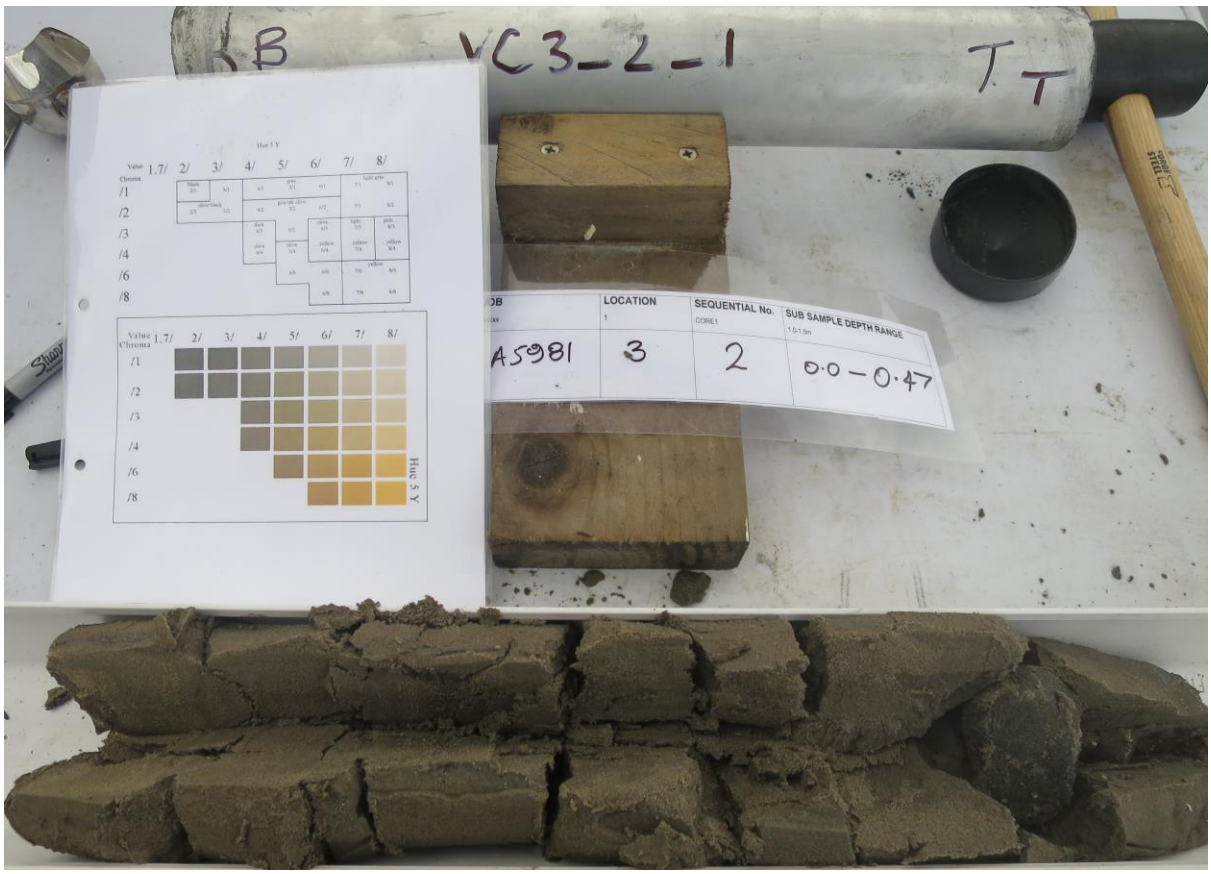


FIGURE 14 - VC3-2-1

TABLE 14 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC3-2-2

Sample ID: VC3-2-2				
METALS	Action Level 1 (mg/Kg)	VC3-2-2 (mg/Kg)	Action Level 2 (mg/Kg)	VC3-2-2 (mg/Kg)
Arsenic	20	< 1	70	< 1
Cadmium	0.4	< 0.2	4	< 0.2
Chromium	50	38.3	370	38.3
Copper	30	14	300	14
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	17.1	150	17.1
Lead	50	13.5	400	13.5
Zinc	130	18.5	600	18.5
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC3-2-2 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 15 - DETECTED LEVELS IN VC3-2-2 LEACHATE

Sample ID: VC3-2-2		
	Units	VC3-2-2
pH	pH Units	6.9
Conductivity	uS/cm	6180
Chloride	mg/l	1960
Fluoride	mg/l	2.4
Total Sulphur (Dissolved)	mg/l	266
Barium (Dissolved)	mg/l	0.12
Nickel (Dissolved)	mg/l	<0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.002
Lead (Dissolved)	mg/l	0.003
Zinc (Dissolved)	mg/l	0.041
Arsenic (Dissolved)	mg/l	0.001
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.007
Molybdenum (Dissolved)	mg/l	0.006
Antimony as Sb (Dissolved)	mg/l	<0.001
Ammoniacal Nitrogen	mg/l	<0.01
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4700
Aluminium (Dissolved)	mg/l	0.06
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	2

POLYAROMATIC HYDROCARBONS	VC3-2-2 Concentration (µg/l)
Naphthalene	0.024
Acenaphthylene	<0.010
Acenaphthene	0.015
Fluorene	<0.010
Phenanthrene	0.063
Anthracene	0.021
Fluoranthene	0.04
Pyrene	0.033
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.296

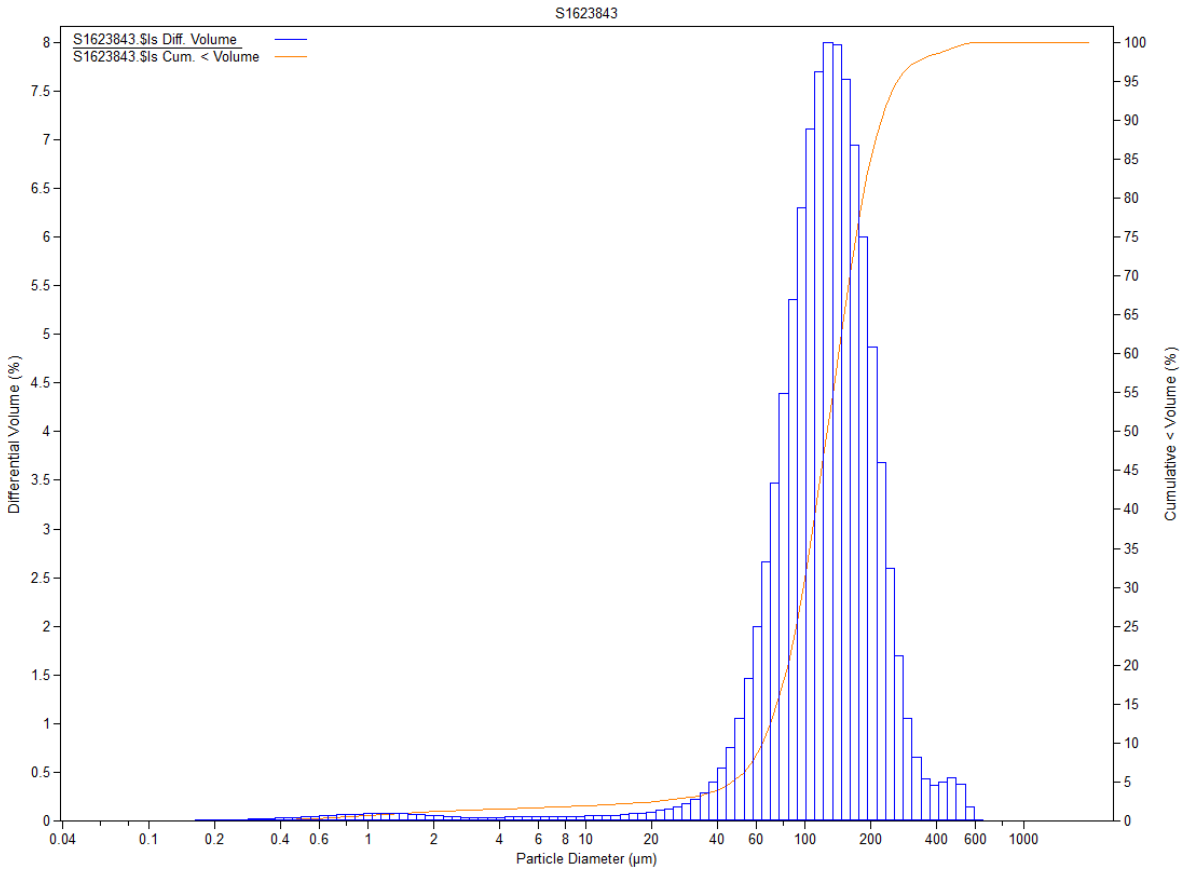


FIGURE 15 - VC3-3-2 PARTICLE SIZE ANALYSIS

FIGURE 16 - VC3-2-2

TABLE 16 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN GRVC4

Sample ID: GRVC4				
METALS	Action Level 1 (mg/Kg)	GRVC4 (mg/Kg)	Action Level 2 (mg/Kg)	GRVC4 (mg/Kg)
Arsenic	20	3.3	70	3.3
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	36.5	370	36.5
Copper	30	10.1	300	10.1
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	13.7	150	13.7
Lead	50	15.7	400	15.7
Zinc	130	29.4	600	29.4
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	GRVC4 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 17 - DETECTED LEVELS IN GRVC4 LEACHATE

Sample ID: GRVC4		
	Units	GRVC4
pH	pH Units	8
Conductivity	uS/cm	7450
Chloride	mg/l	2790
Fluoride	mg/l	0.9
Total Sulphur (Dissolved)	mg/l	176
Barium (Dissolved)	mg/l	0.21
Nickel (Dissolved)	mg/l	0.003
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.009
Lead (Dissolved)	mg/l	0.002
Zinc (Dissolved)	mg/l	0.051
Arsenic (Dissolved)	mg/l	0.144
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.014
Molybdenum (Dissolved)	mg/l	0.012
Antimony as Sb (Dissolved)	mg/l	0.002
Ammoniacal Nitrogen	mg/l	15.3
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4900
Aluminium (Dissolved)	mg/l	0.03
Ammonia (Free)	mg/l	0.55
Dissolved Organic Carbon	mg/l	18

POLYAROMATIC HYDROCARBONS	GRVC4 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	0.015
Fluorene	<0.010
Phenanthrene	0.062
Anthracene	0.01
Fluoranthene	0.046
Pyrene	0.027
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.280

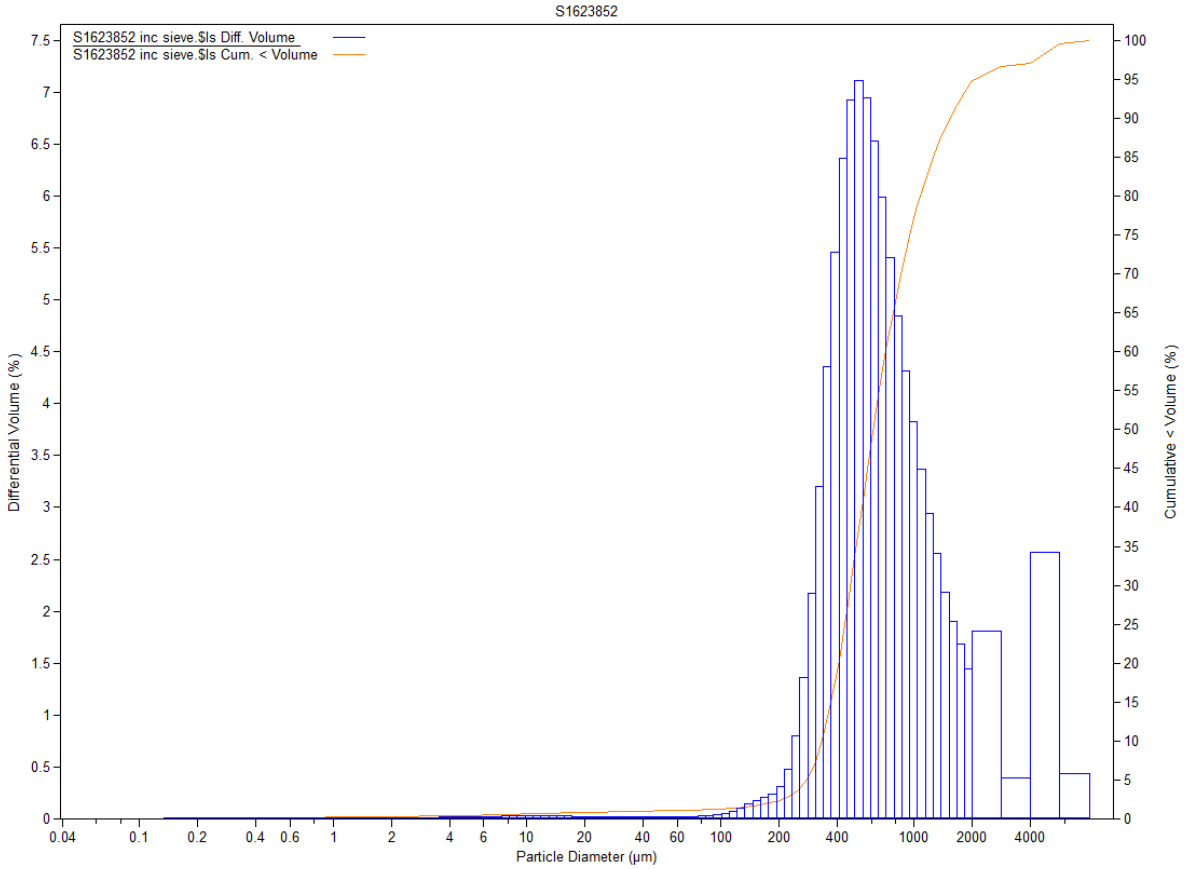


FIGURE 17 - GRVC4 PARTICLE SIZE ANALYSIS

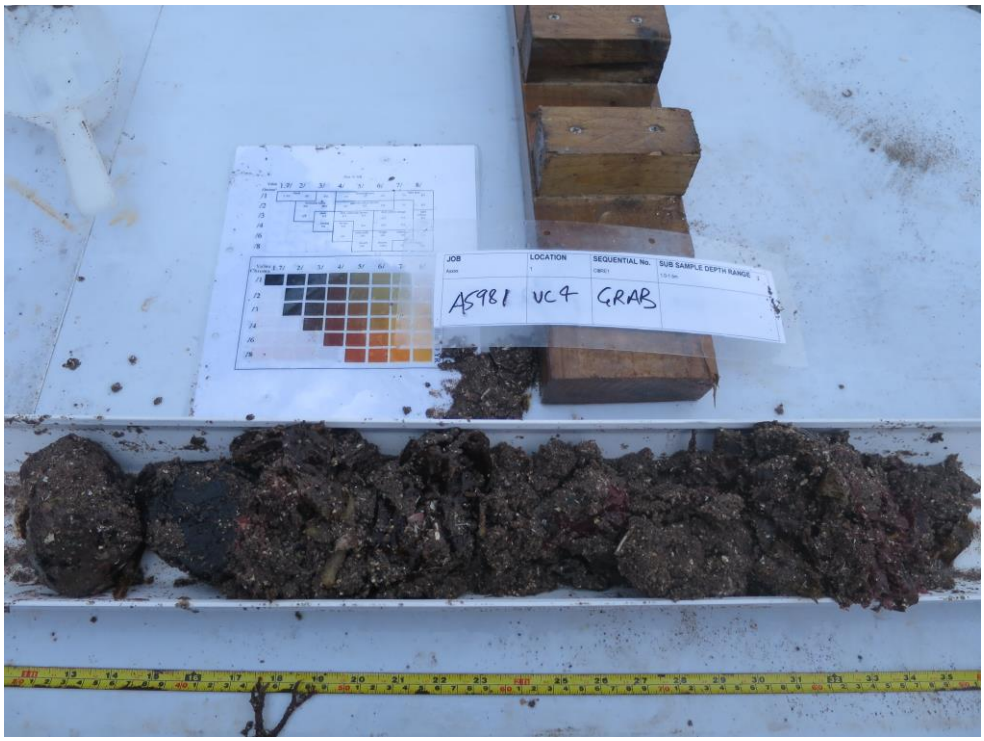


FIGURE 18 – VC4 GRAB SAMPLE

TABLE 18 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC5-2-1

Sample ID: VC5-2-1				
METALS	Action Level 1 (mg/Kg)	VC5-2-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC5-2-1 (mg/Kg)
Arsenic	20	1.6	70	1.6
Cadmium	0.4	0.1	4	0.1
Chromium	50	41.9	370	41.9
Copper	30	14	300	14
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	15.8	150	15.8
Lead	50	12	400	12
Zinc	130	25	600	25
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC5-2-1 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 19 DETECTED LEVELS IN VC5-2-1 LEACHATE

Sample ID VC5-2-1		
	Units	VC5-2-1
pH	pH Units	7.1
Conductivity	uS/cm	6400
Chloride	mg/l	2000
Fluoride	mg/l	0.5
Total Sulphur (Dissolved)	mg/l	292
Barium (Dissolved)	mg/l	0.11
Nickel (Dissolved)	mg/l	<0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.005
Lead (Dissolved)	mg/l	0.001
Zinc (Dissolved)	mg/l	0.026
Arsenic (Dissolved)	mg/l	0.002
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.007
Molybdenum (Dissolved)	mg/l	0.006
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	<0.01
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4700
Aluminium (Dissolved)	mg/l	0.02
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	0.3

POLYAROMATIC HYDROCARBONS	VC5-2-1 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	0.016
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.176

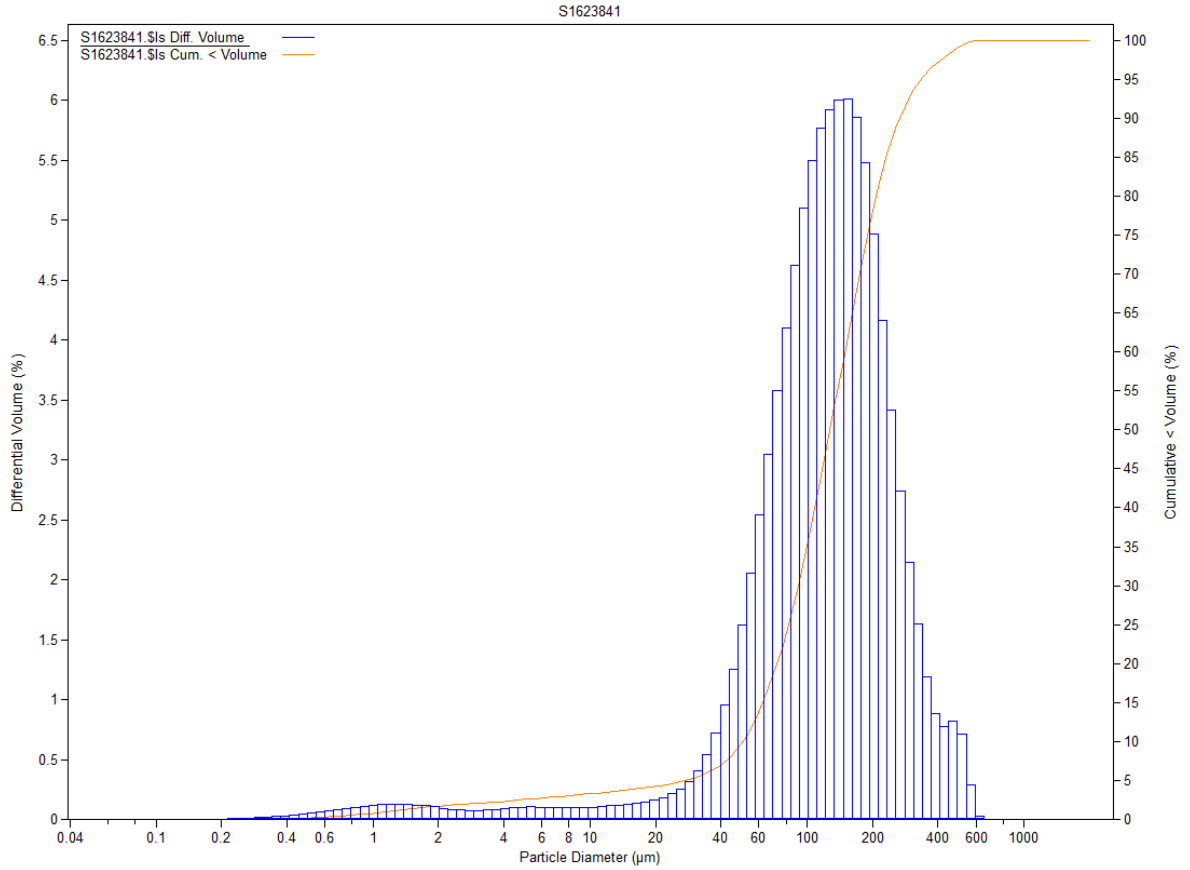


FIGURE 19 - VC5-2-1 PARTICLE SIZE ANALYSIS

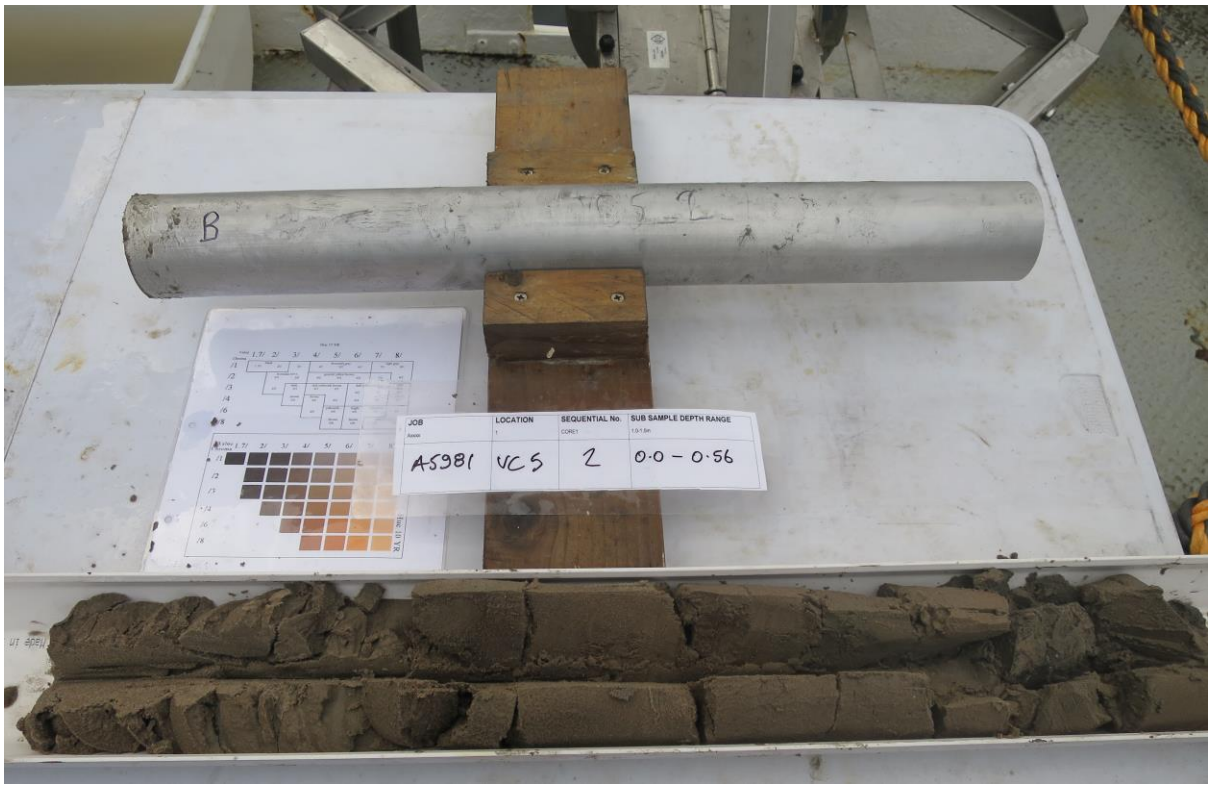


FIGURE 20 - VC5-2-1

TABLE 20 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC5-2-2

Sample ID: VC5-2-2				
METALS	Action Level 1 (mg/Kg)	VC5-2-2 (mg/Kg)	Action Level 2 (mg/Kg)	VC5-2-2 (mg/Kg)
Arsenic	20	< 1	70	< 1
Cadmium	0.4	0.1	4	0.1
Chromium	50	44.2	370	44.2
Copper	30	17.8	300	17.8
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	16.4	150	16.4
Lead	50	19.2	400	19.2
Zinc	130	24.3	600	24.3
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC5-2-2 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 21 - DETECTED LEVELS IN VC5-2-2 LEACHATE

Sample ID: VC5-2-2		
	Units	VC5-2-2
pH	pH Units	7.2
Conductivity	uS/cm	6260
Chloride	mg/l	1980
Fluoride	mg/l	0.4
Total Sulphur (Dissolved)	mg/l	262
Barium (Dissolved)	mg/l	0.14
Nickel (Dissolved)	mg/l	<0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.003
Lead (Dissolved)	mg/l	<0.001
Zinc (Dissolved)	mg/l	0.025
Arsenic (Dissolved)	mg/l	0.003
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.009
Molybdenum (Dissolved)	mg/l	0.003
Antimony as Sb (Dissolved)	mg/l	<0.001
Ammoniacal Nitrogen	mg/l	<0.01
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4600
Aluminium (Dissolved)	mg/l	0.06
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	1.5

POLYAROMATIC HYDROCARBONS	VC5-2-2 Concentration (µg/l)
Naphthalene	0.029
Acenaphthylene	<0.010
Acenaphthene	0.014
Fluorene	<0.010
Phenanthrene	0.023
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.196

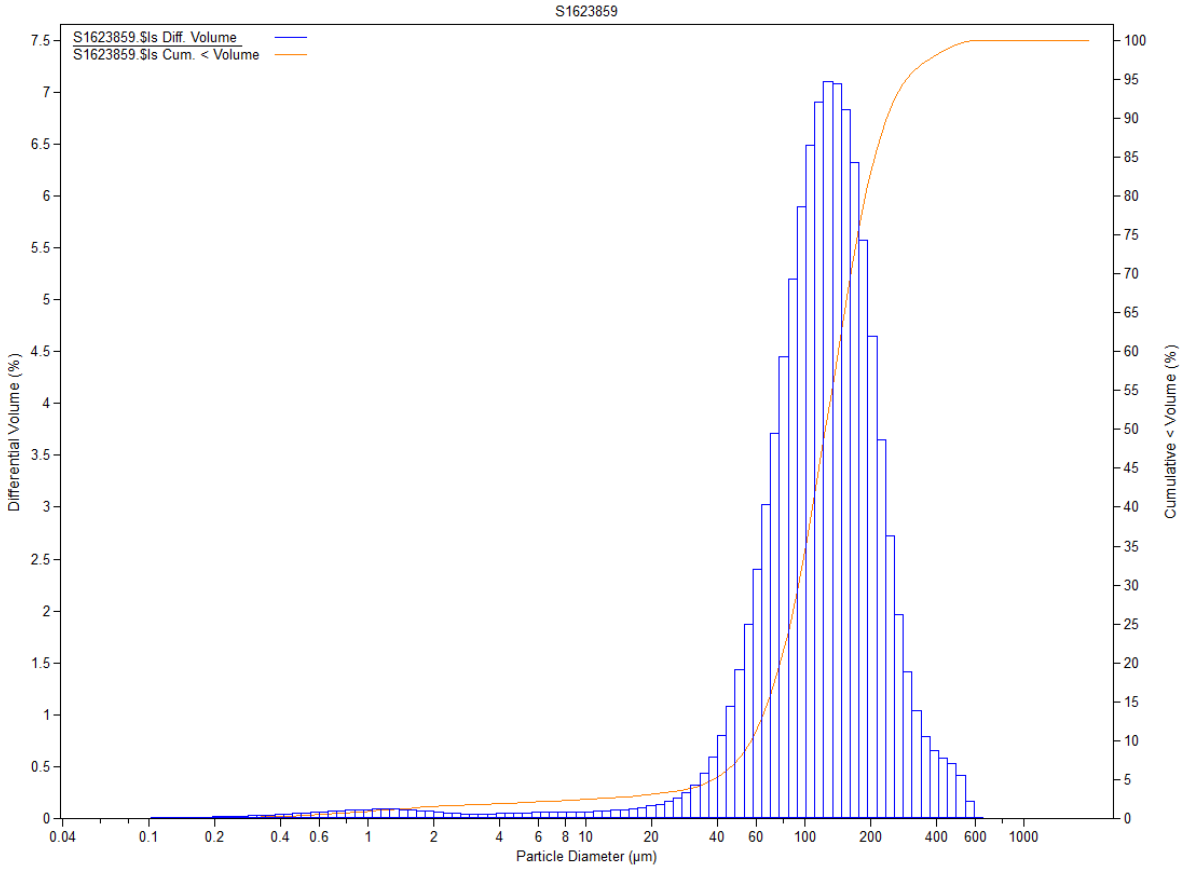


FIGURE 21 - VC5-2-2 PARTICLE SIZE ANALYSIS

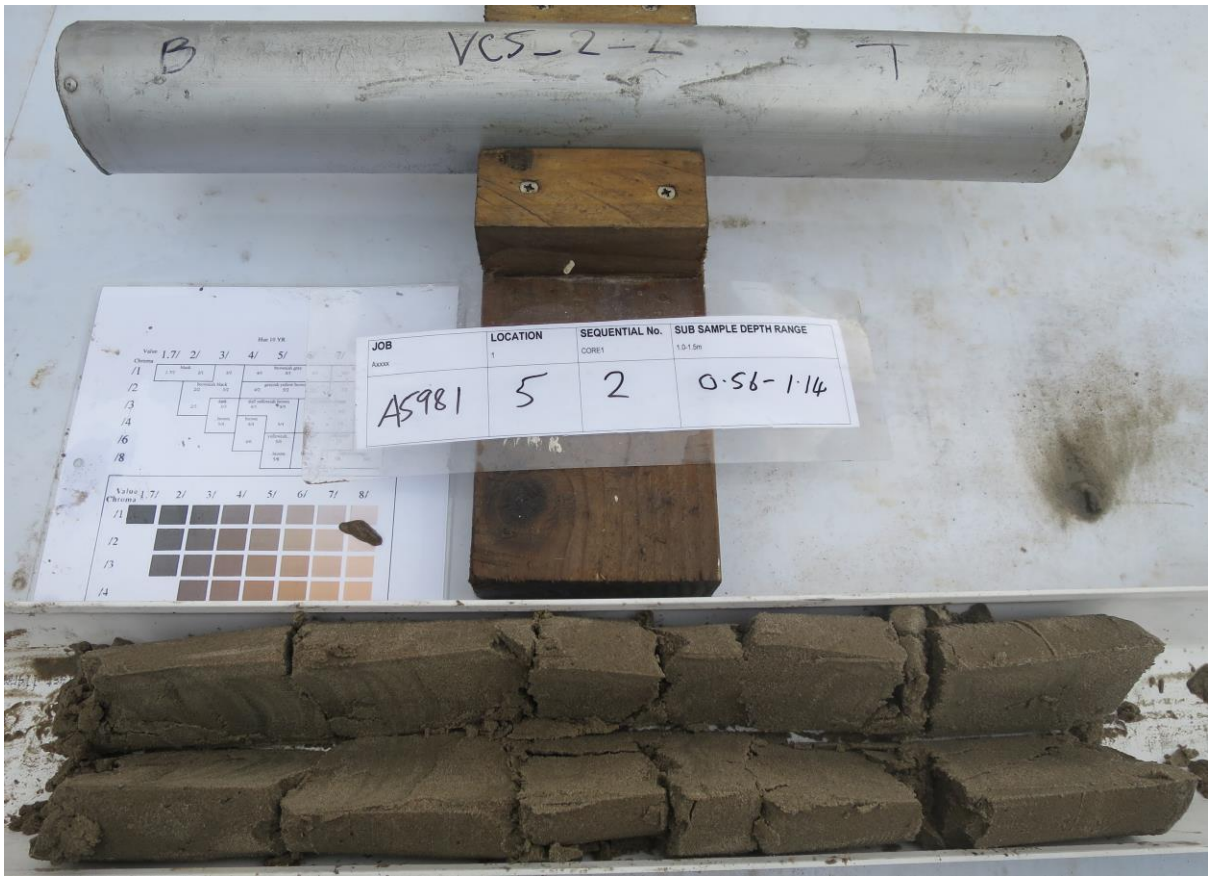


FIGURE 22 - VC5-2-2

TABLE 22 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC6-2-1

Sample ID: VC6-2-1				
METALS	Action Level 1 (mg/Kg)	VC6-2-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC6-2-1 (mg/Kg)
Arsenic	20	2.9	70	2.9
Cadmium	0.4	0.1	4	0.1
Chromium	50	85.2	370	85.2
Copper	30	49.3	300	49.3
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	35.3	150	35.3
Lead	50	22.4	400	22.4
Zinc	130	112	600	112
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	<2.00	500	<2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC6-2-1 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	1.0
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	1.2
Fluoranthene	100	1.8
Pyrene	100	3.0
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 23 - DETECETD LEVELS IN VC6-2-1 LEACHATE

Sample ID: VC6-2-1		
	Units	VC6-2-1
pH	pH Units	7.5
Conductivity	uS/cm	5910
Chloride	mg/l	1930
Fluoride	mg/l	0.7
Total Sulphur (Dissolved)	mg/l	285
Barium (Dissolved)	mg/l	0.12
Nickel (Dissolved)	mg/l	0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.004
Lead (Dissolved)	mg/l	0.003
Zinc (Dissolved)	mg/l	0.053
Arsenic (Dissolved)	mg/l	0.002
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.008
Molybdenum (Dissolved)	mg/l	0.039
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	0.12
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4600
Aluminium (Dissolved)	mg/l	0.03
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	4.2

POLYAROMATIC HYDROCARBONS	VC6-2-1 Concentration (µg/l)
Naphthalene	0.038
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	0.013
Anthracene	<0.010
Fluoranthene	0.028
Pyrene	0.017
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.216

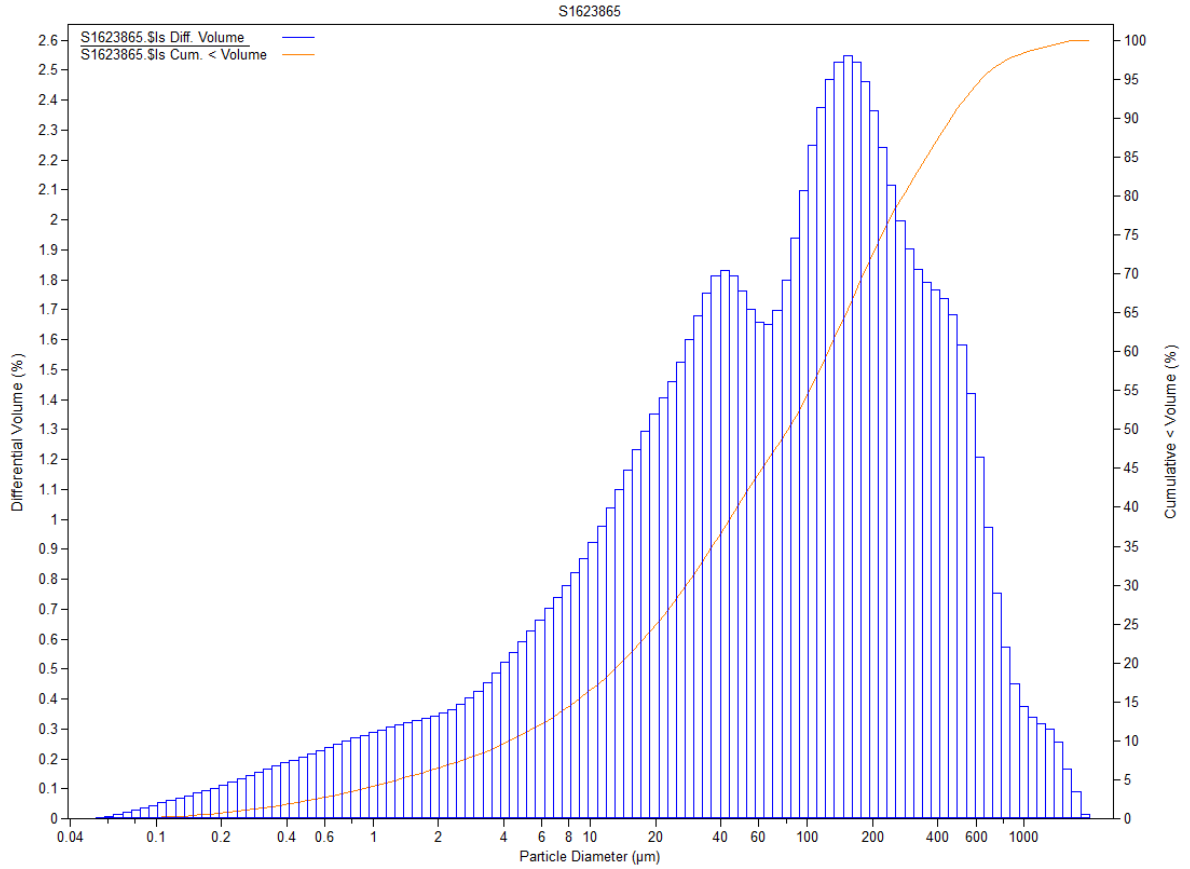


FIGURE 23 - VC6-2-1 PARTICLE SIZE ANALYSIS

FIGURE 24 - VC6-2-1

TABLE 24 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC6-2-2

Sample ID: VC6-2-2				
METALS	Action Level 1 (mg/Kg)	VC6-2-2 (mg/Kg)	Action Level 2 (mg/Kg)	VC6-2-2 (mg/Kg)
Arsenic	20	2	70	2
Cadmium	0.4	0.1	4	0.1
Chromium	50	65.2	370	65.2
Copper	30	35.1	300	35.1
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	33.1	150	33.1
Lead	50	15	400	15
Zinc	130	36.8	600	36.8
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC6-2-2 (ng/g)
Acenaphthene	100	2.0
Acenaphthylene	100	< 1
Anthracene	100	4.1
Fluorene	100	1.5
Naphthalene	100	< 1
Phenanthrene	100	15.2
Benzo[a]anthracene	100	10.7
Benzo[b]fluoranthene	100	8.7
Benzo[k]fluoranthene	100	12.9
Benzo[a]pyrene	100	10.3
Benzo[g,h,i]perylene	100	6.3
Dibenzo[a,h]anthracene	10	1.2
Chrysene	100	12.9
Fluoranthene	100	26.5
Pyrene	100	25.1
Indeno(1,2,3cd)pyrene	100	7.5

PCBs were below Revised AL1 in all cases.

TABLE 25 - DETECTED LEVELS IN VC6-2-2 LEACHATE

Sample ID: VC6-2-2		
	Units	VC6-2-2
pH	pH Units	7.6
Conductivity	uS/cm	7560
Chloride	mg/l	2280
Fluoride	mg/l	0.5
Total Sulphur (Dissolved)	mg/l	494
Barium (Dissolved)	mg/l	0.18
Nickel (Dissolved)	mg/l	0.003
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.004
Lead (Dissolved)	mg/l	0.004
Zinc (Dissolved)	mg/l	0.082
Arsenic (Dissolved)	mg/l	0.002
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.01
Molybdenum (Dissolved)	mg/l	0.032
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	0.11
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	5700
Aluminium (Dissolved)	mg/l	0.03
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	6.1

POLYAROMATIC HYDROCARBONS	Concentrations (µg/l)
Naphthalene	0.041
Acenaphthylene	<0.010
Acenaphthene	0.011
Fluorene	<0.010
Phenanthrene	0.028
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.210

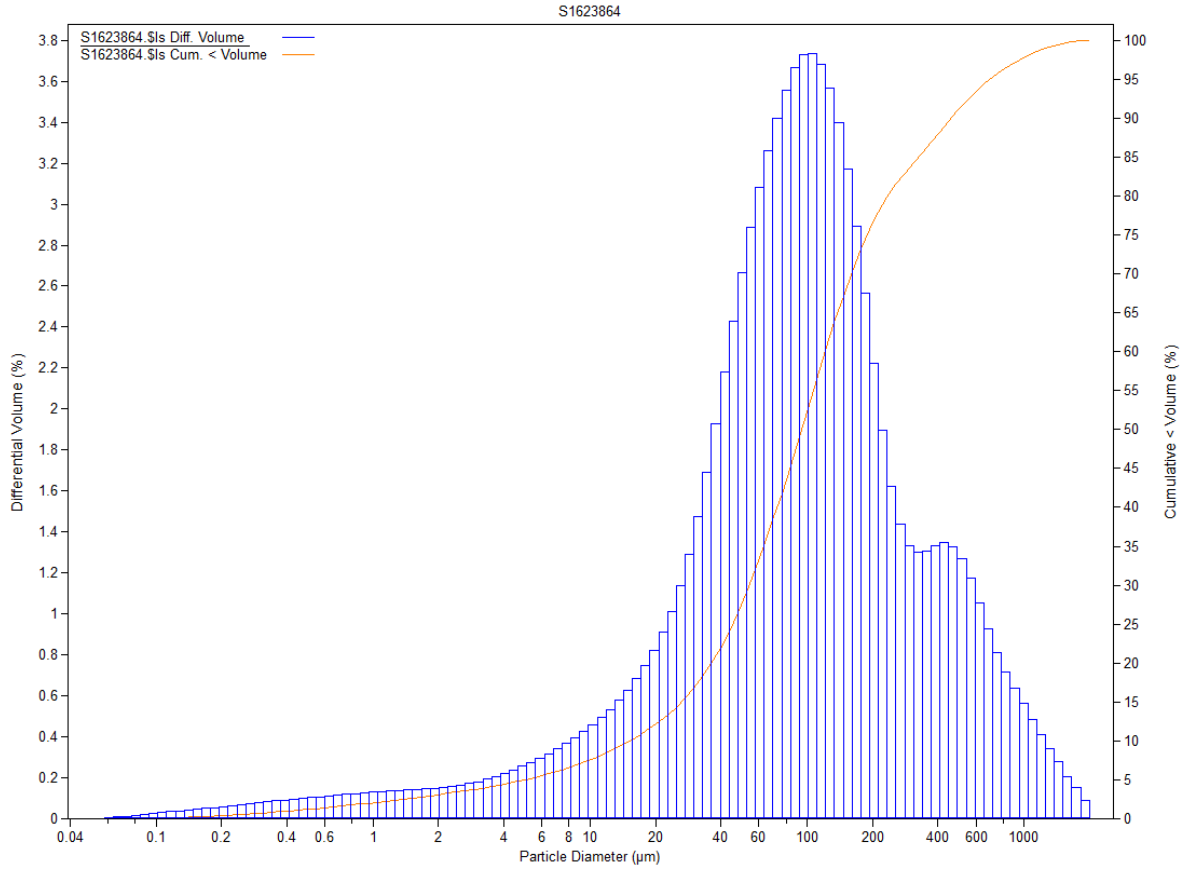


FIGURE 25 - VC6-2-2 PARTICLE SIZE ANALYSIS

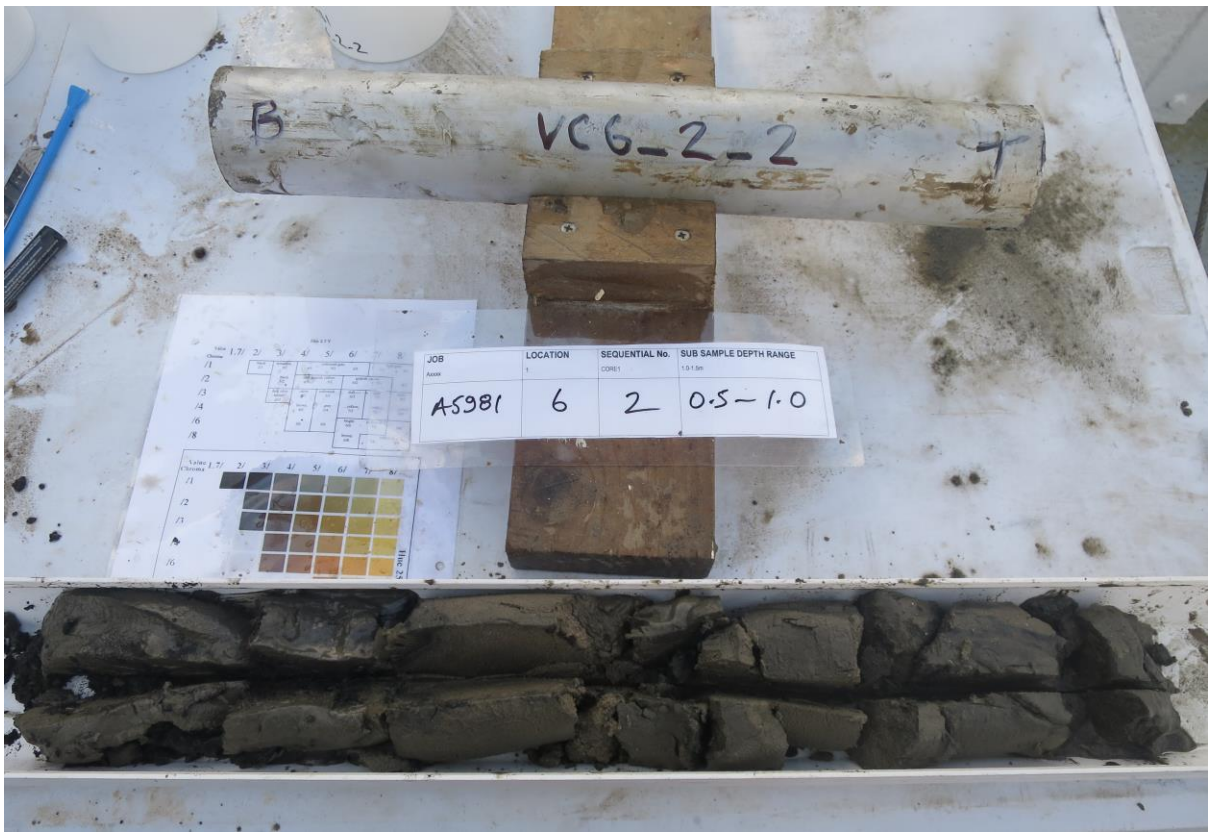


FIGURE 26 - VC6-2-2

TABLE 26 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC6-2-3

Sample ID: VC6-2-3				
METALS	Action Level 1 (mg/Kg)	VC6-2-3 (mg/Kg)	Action Level 2 (mg/Kg)	VC6-2-3 (mg/Kg)
Arsenic	20	1.5	70	1.5
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	74.2	370	74.2
Copper	30	44	300	44
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	33.6	150	33.6
Lead	50	18.6	400	18.6
Zinc	130	45.3	600	45.3
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC6-2-3 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 27 - DETECTED LEVELS IN VC6-2-3 LEACHATE

Sample ID: VC6-2-3		
	Units	VC6-2-3
pH	pH Units	7.2
Conductivity	uS/cm	6910
Chloride	mg/l	2290
Fluoride	mg/l	0.7
Total Sulphur (Dissolved)	mg/l	370
Barium (Dissolved)	mg/l	0.28
Nickel (Dissolved)	mg/l	0.009
Chromium (Dissolved)	mg/l	0.002
Cadium (Dissolved)	mg/l	0.0003
Copper (Dissolved)	mg/l	0.012
Lead (Dissolved)	mg/l	0.006
Zinc (Dissolved)	mg/l	0.175
Arsenic (Dissolved)	mg/l	0.003
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.009
Molybdenum (Dissolved)	mg/l	0.073
Antimony as Sb (Dissolved)	mg/l	0.002
Ammoniacal Nitrogen	mg/l	0.3
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	5400
Aluminium (Dissolved)	mg/l	0.09
Ammonia (Free)	mg/l	<0.01
Dissolved Organic Carbon	mg/l	6.1

POLYAROMATIC HYDROCARBONS	VC6-2-3 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	<0.010
Anthracene	<0.010
Fluoranthene	0.038
Pyrene	0.026
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.214

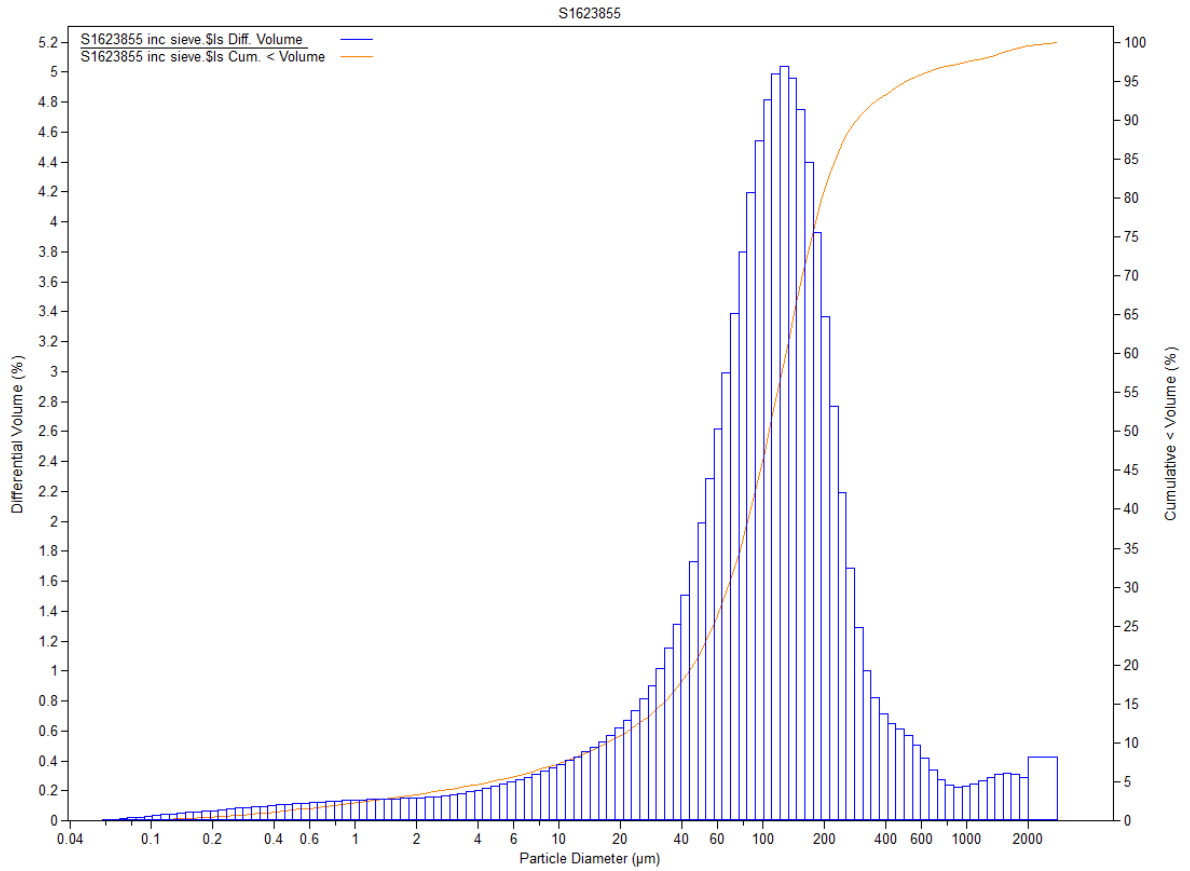


FIGURE 27 - VC6-2-3 PARTICLE SIZE ANALYSIS

FIGURE 28 - VC6-2-3

TABLE 28 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC7-1-1

Sample ID: VC7-1-1				
METALS	Action Level 1 (mg/Kg)	VC7-1-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC7-1-1 (mg/Kg)
Arsenic	20	3.7	70	3.7
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	58.5	370	58.5
Copper	30	6.8	300	6.8
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	22.3	150	22.3
Lead	50	13.6	400	13.6
Zinc	130	30.6	600	30.6
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC7-1-1 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 29 - DETECTED LEVELS IN VC7-1-1 LEACHATE

Sample ID: VC7-1-1		
	Units	VC7-1-1
pH	pH Units	7.6
Conductivity	uS/cm	4380
Chloride	mg/l	1320
Fluoride	mg/l	0.7
Total Sulphur (Dissolved)	mg/l	209
Barium (Dissolved)	mg/l	0.15
Nickel (Dissolved)	mg/l	0.001
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	0.0001
Copper (Dissolved)	mg/l	0.007
Lead (Dissolved)	mg/l	0.001
Zinc (Dissolved)	mg/l	0.039
Arsenic (Dissolved)	mg/l	0.013
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.005
Molybdenum (Dissolved)	mg/l	0.013
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	4.3
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	3100
Aluminium (Dissolved)	mg/l	0.08
Ammonia (Free)	mg/l	0.06
Dissolved Organic Carbon	mg/l	4.6

POLYAROMATIC HYDROCARBONS	VC7-1-1 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	0.014
Fluorene	<0.010
Phenanthrene	<0.010
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	0.011
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.175

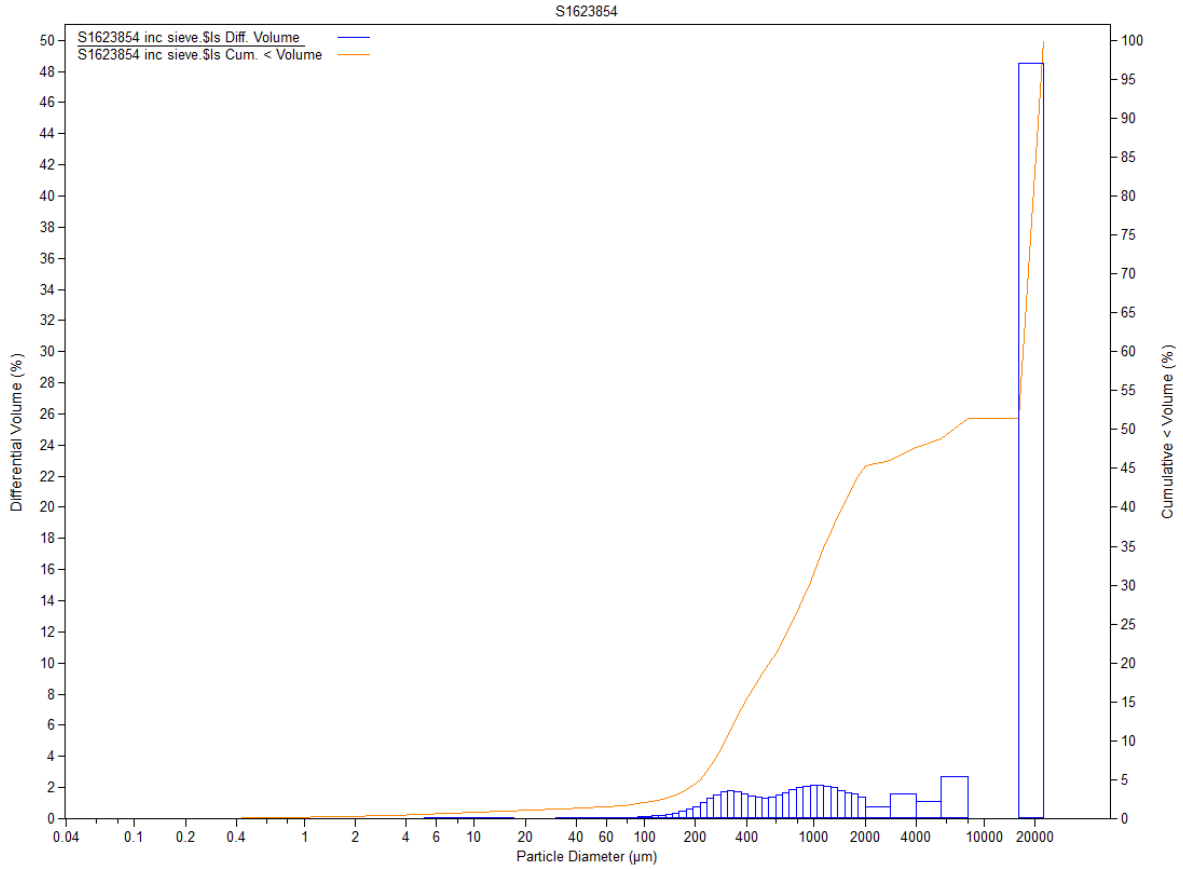


FIGURE 29 - VC7-1-1 PARTICLE SIZE ANALYSIS

FIGURE 30 - VC7-1-1

TABLE 30 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN GRVC8

Sample ID: GRVC8				
METALS	Action Level 1 (mg/Kg)	GRVC8 (mg/Kg)	Action Level 2 (mg/Kg)	GRVC8 (mg/Kg)
Arsenic	20	3	70	3
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	51.9	370	51.9
Copper	30	25.7	300	25.7
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	34.2	150	34.2
Lead	50	17.7	400	17.7
Zinc	130	45.6	600	45.6
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

Polyaromatic Hydrocarbons	Action Level (µg/Kg)	GRVC8 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 31 - DETECETD LEVELS IN GRVC8 LEACHATE

Sample ID: GRVC8		
	Units	GRVC8
pH	pH Units	8
Conductivity	uS/cm	1560
Chloride	mg/l	321
Fluoride	mg/l	0.3
Total Sulphur (Dissolved)	mg/l	68.1
Barium (Dissolved)	mg/l	0.18
Nickel (Dissolved)	mg/l	0.004
Chromium (Dissolved)	mg/l	0.004
Cadium (Dissolved)	mg/l	0.0001
Copper (Dissolved)	mg/l	0.029
Lead (Dissolved)	mg/l	0.016
Zinc (Dissolved)	mg/l	0.117
Arsenic (Dissolved)	mg/l	0.03
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.001
Molybdenum (Dissolved)	mg/l	0.005
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	0.3
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	1100
Aluminium (Dissolved)	mg/l	0.06
Ammonia (Free)	mg/l	0.01
Dissolved Organic Carbon	mg/l	33

POLYAROMATIC HYDROCARBONS	Grvc8 Concentration (µg/l)
Naphthalene	0.065
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	0.03
Anthracene	<0.010
Fluoranthene	0.025
Pyrene	0.018
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.258

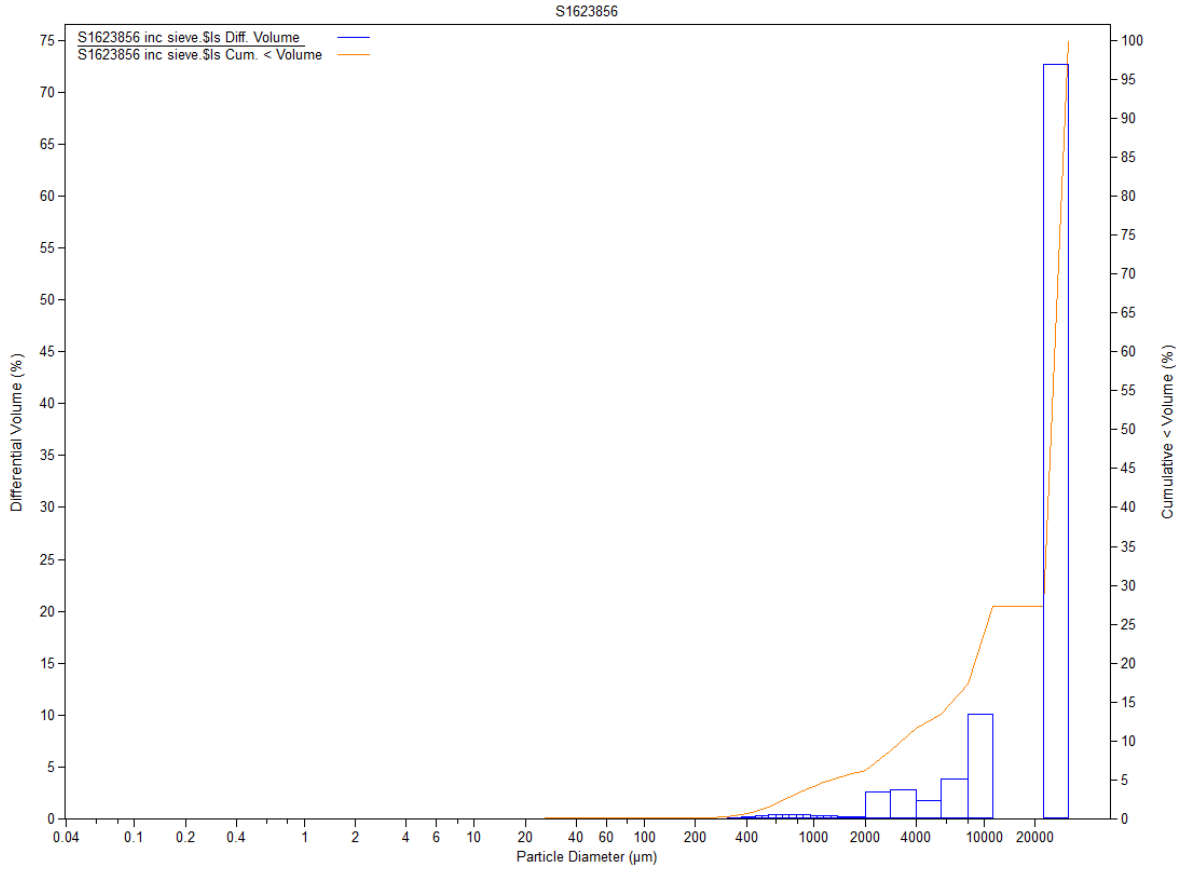


FIGURE 31 - GRVC8 PARTICLE SIZE ANALYSIS

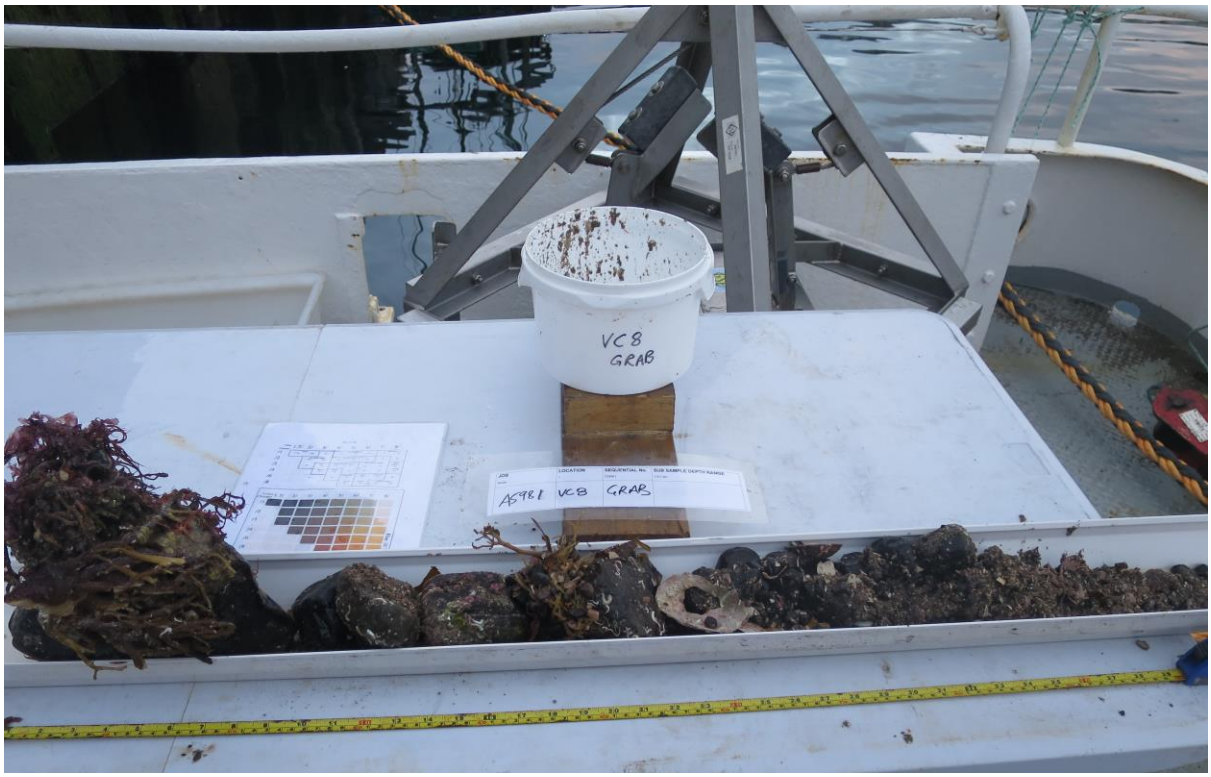


FIGURE 32 - GRVC8

TABLE 32 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC9-1-1

Sample ID: VC9-1-1				
METALS	Action Level 1 (mg/Kg)	VC9-1-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC9-1-1 (mg/Kg)
Arsenic	20	3.4	70	3.4
Cadmium	0.4	0.1	4	0.1
Chromium	50	46.7	370	46.7
Copper	30	7.06	300	7.06
Mercury	0.25	0.01	1.5	0.01
Nickel	30	16.4	150	16.4
Lead	50	14.1	400	14.1
Zinc	130	28.1	600	28.1
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC9-1-1 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 33 - DETECTED LEVELS IN VC9-1-1 LEACHATE

Sample ID: VC9-1-1		
	Units	VC9-1-1
pH	pH Units	7.9
Conductivity	uS/cm	5430
Chloride	mg/l	1690
Fluoride	mg/l	0.4
Total Sulphur (Dissolved)	mg/l	319
Barium (Dissolved)	mg/l	0.11
Nickel (Dissolved)	mg/l	0.002
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.005
Lead (Dissolved)	mg/l	0.003
Zinc (Dissolved)	mg/l	0.054
Arsenic (Dissolved)	mg/l	0.019
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.008
Molybdenum (Dissolved)	mg/l	0.121
Antimony as Sb (Dissolved)	mg/l	0.005
Ammoniacal Nitrogen	mg/l	5.2
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4300
Aluminium (Dissolved)	mg/l	0.05
Ammonia (Free)	mg/l	0.15
Dissolved Organic Carbon	mg/l	6.4

POLYAROMATIC HYDROCARBONS	VC9-1-1 Concentration (µg/l)
Naphthalene	0.033
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	<0.010
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.183

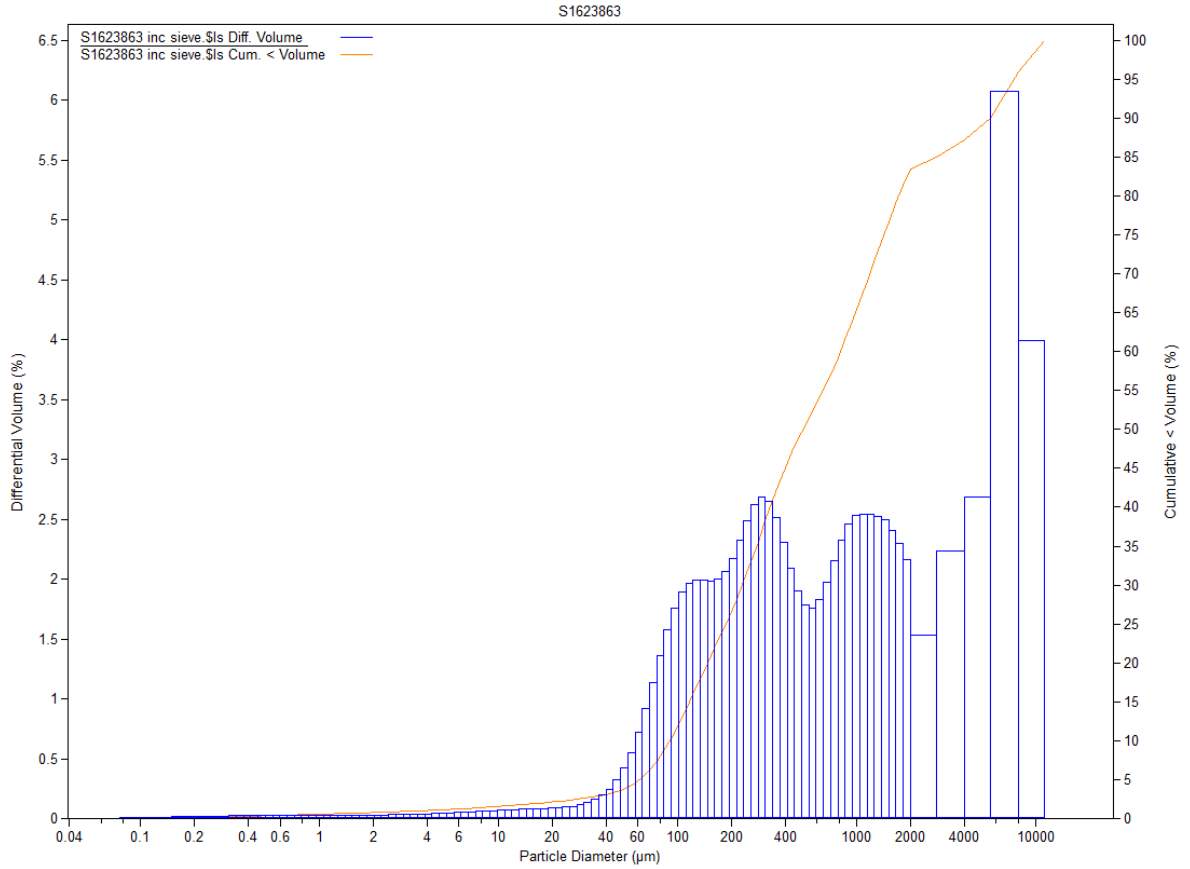


FIGURE 33 – V9-1-1 PARTICLE SIZE ANALYSIS

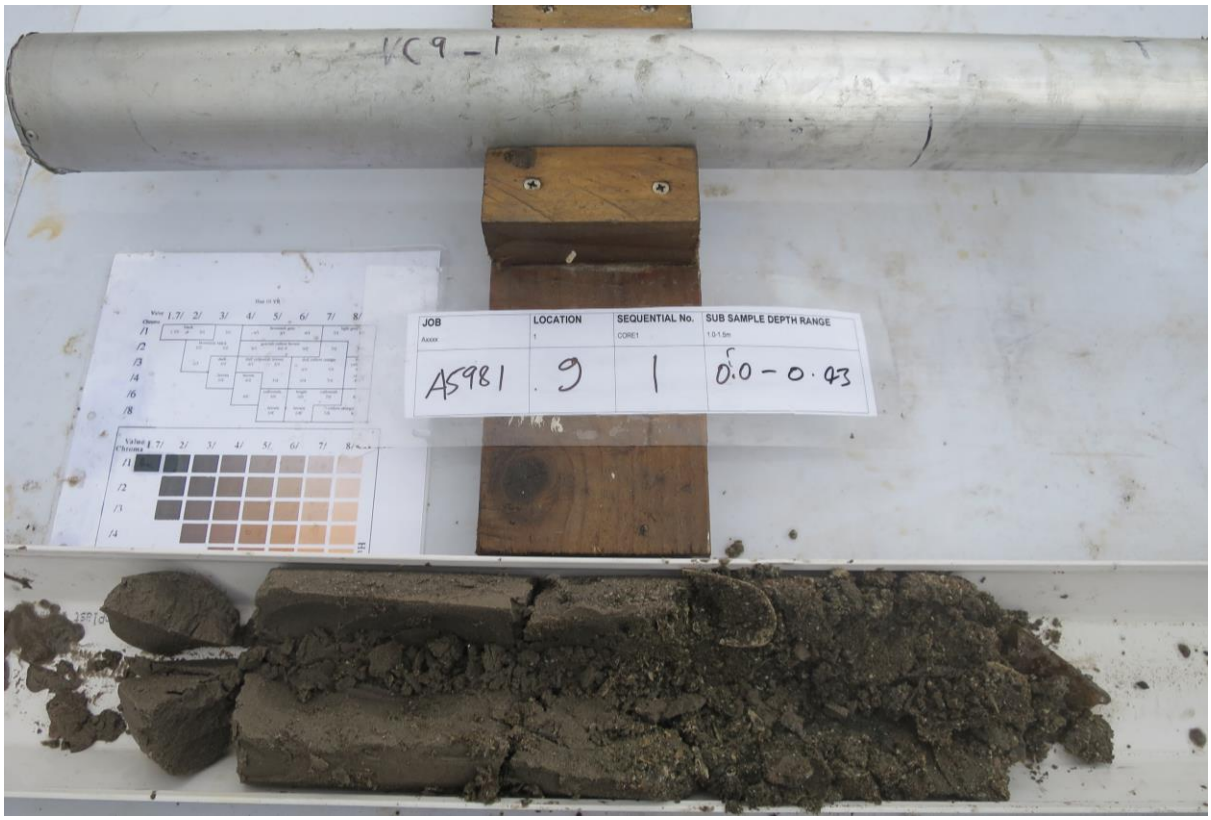


FIGURE 34 - VC9-1-1

TABLE 34 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC10

Sample ID: VC10				
METALS	Action Level 1 (mg/Kg)	VC10 (mg/Kg)	Action Level 2 (mg/Kg)	VC10 (mg/Kg)
Arsenic	20	2.9	70	2.9
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	67.4	370	67.4
Copper	30	14.7	300	14.7
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	30.3	150	30.3
Lead	50	12.8	400	12.8
Zinc	130	46.4	600	46.4
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC10 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 35 - DETECTED LEVELS IN VC10 LEACHATE

Sample ID: VC10		
	Units	VC10
pH	pH Units	7.8
Conductivity	uS/cm	4360
Chloride	mg/l	1150
Fluoride	mg/l	0.7
Total Sulphur (Dissolved)	mg/l	199
Barium (Dissolved)	mg/l	0.15
Nickel (Dissolved)	mg/l	0.002
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.018
Lead (Dissolved)	mg/l	0.005
Zinc (Dissolved)	mg/l	0.087
Arsenic (Dissolved)	mg/l	0.017
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.006
Molybdenum (Dissolved)	mg/l	0.007
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	6.4
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	0.12
Total Dissolved solids	mg/l	2900
Aluminium (Dissolved)	mg/l	0.03
Ammonia (Free)	mg/l	0.16
Dissolved Organic Carbon	mg/l	11

POLYAROMATIC HYDROCARBONS	VC10 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	0.014
Fluorene	0.012
Phenanthrene	0.015
Anthracene	<0.010
Fluoranthene	0.02
Pyrene	0.016
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.197

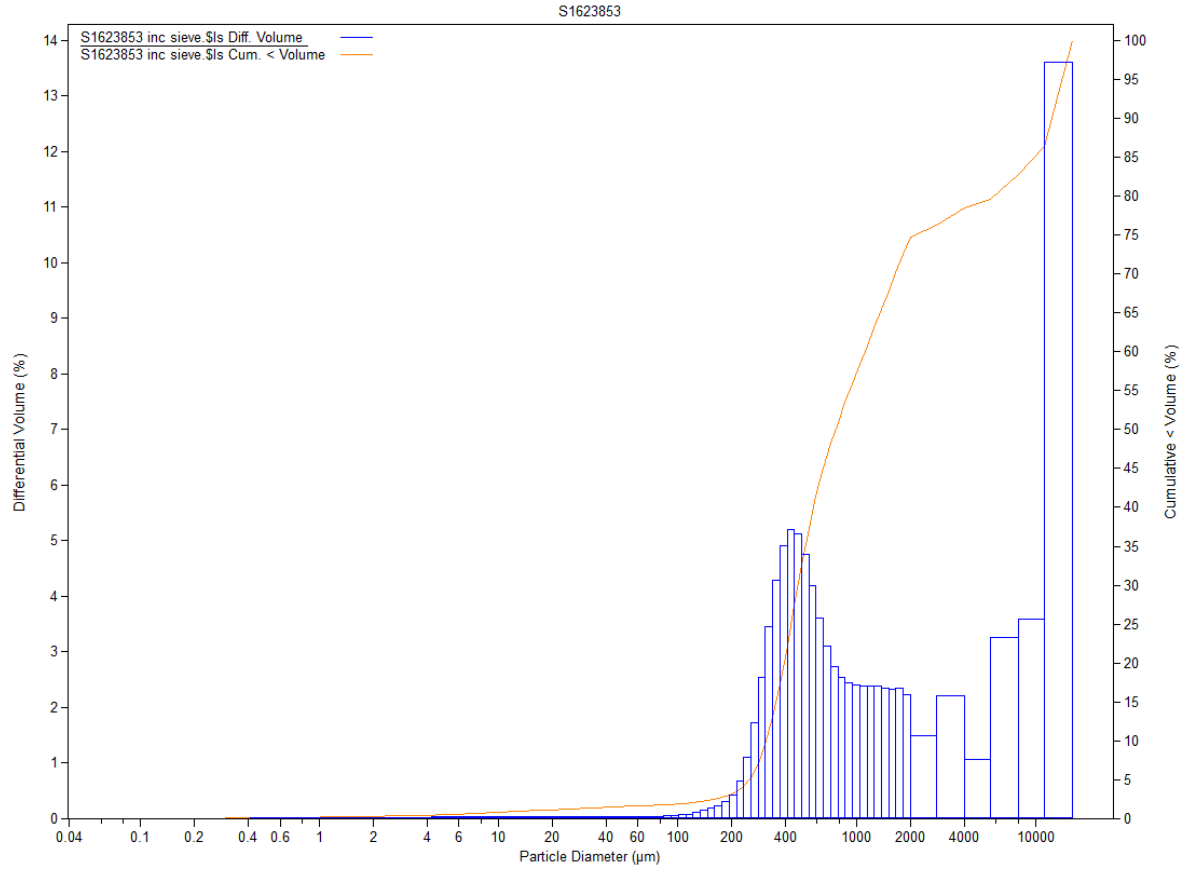


FIGURE 35 - VC10 PARTICLE SIZE ANALYSIS

FIGURE 36 - VC10

TABLE 36 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN VC11-1

Sample ID: VC11-1				
METALS	Action Level 1 (mg/Kg)	VC11-1 (mg/Kg)	Action Level 2 (mg/Kg)	VC11-1 (mg/Kg)
Arsenic	20	2.8	70	2.8
Cadmium	0.4	0.1	4	0.1
Chromium	50	33	370	33
Copper	30	15.2	300	15.2
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	15.3	150	15.3
Lead	50	17.8	400	17.8
Zinc	130	91.5	600	91.5
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	VC11-1 (ng/g)
Acenaphthene	100	1.2
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	6.8
Benzo[a]anthracene	100	2.4
Benzo[b]fluoranthene	100	2.5
Benzo[k]fluoranthene	100	3.6
Benzo[a]pyrene	100	2.2
Benzo[g,h,i]perylene	100	1.8
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	3.4
Fluoranthene	100	7.4
Pyrene	100	6.1
Indeno(1,2,3cd)pyrene	100	2.3

PCBs were below Revised AL1 in all cases.

TABLE 37 - DETECETD LEVELS IN VC11-1 LEACHATE

Sample ID: VC11-1		
	Units	VC11-1
pH	pH Units	7.8
Conductivity	uS/cm	7660
Chloride	mg/l	2340
Fluoride	mg/l	0.6
Total Sulphur (Dissolved)	mg/l	464
Barium (Dissolved)	mg/l	0.32
Nickel (Dissolved)	mg/l	0.002
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	0.0002
Copper (Dissolved)	mg/l	0.006
Lead (Dissolved)	mg/l	0.003
Zinc (Dissolved)	mg/l	0.077
Arsenic (Dissolved)	mg/l	0.01
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.013
Molybdenum (Dissolved)	mg/l	0.051
Antimony as Sb (Dissolved)	mg/l	0.002
Ammoniacal Nitrogen	mg/l	3.2
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	6000
Aluminium (Dissolved)	mg/l	0.03
Ammonia (Free)	mg/l	0.08
Dissolved Organic Carbon	mg/l	12

POLYAROMATIC HYDROCARBONS	VC11-1 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	<0.010
Anthracene	<0.010
Fluoranthene	0.015
Pyrene	0.01
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.175

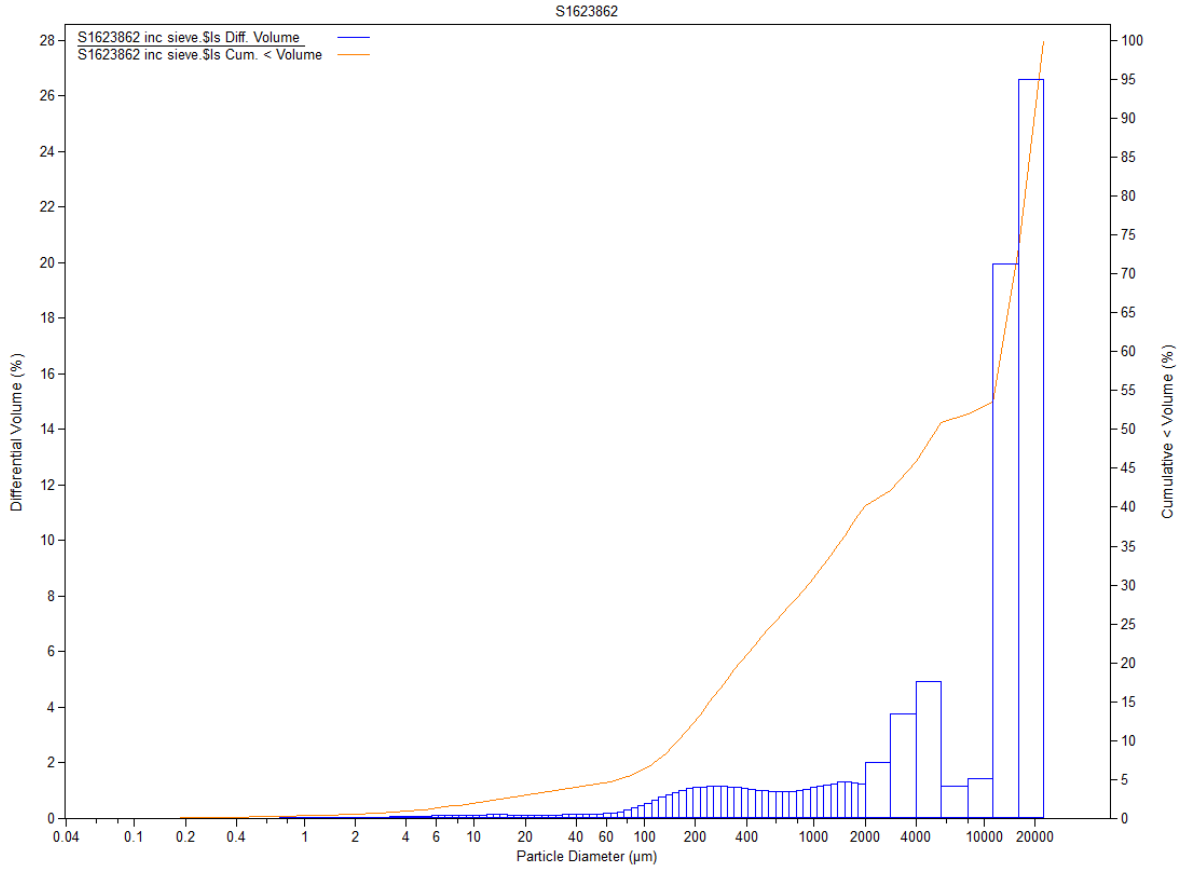


FIGURE 37 - VC11-1 PARTICLE SIZE ANALYSIS

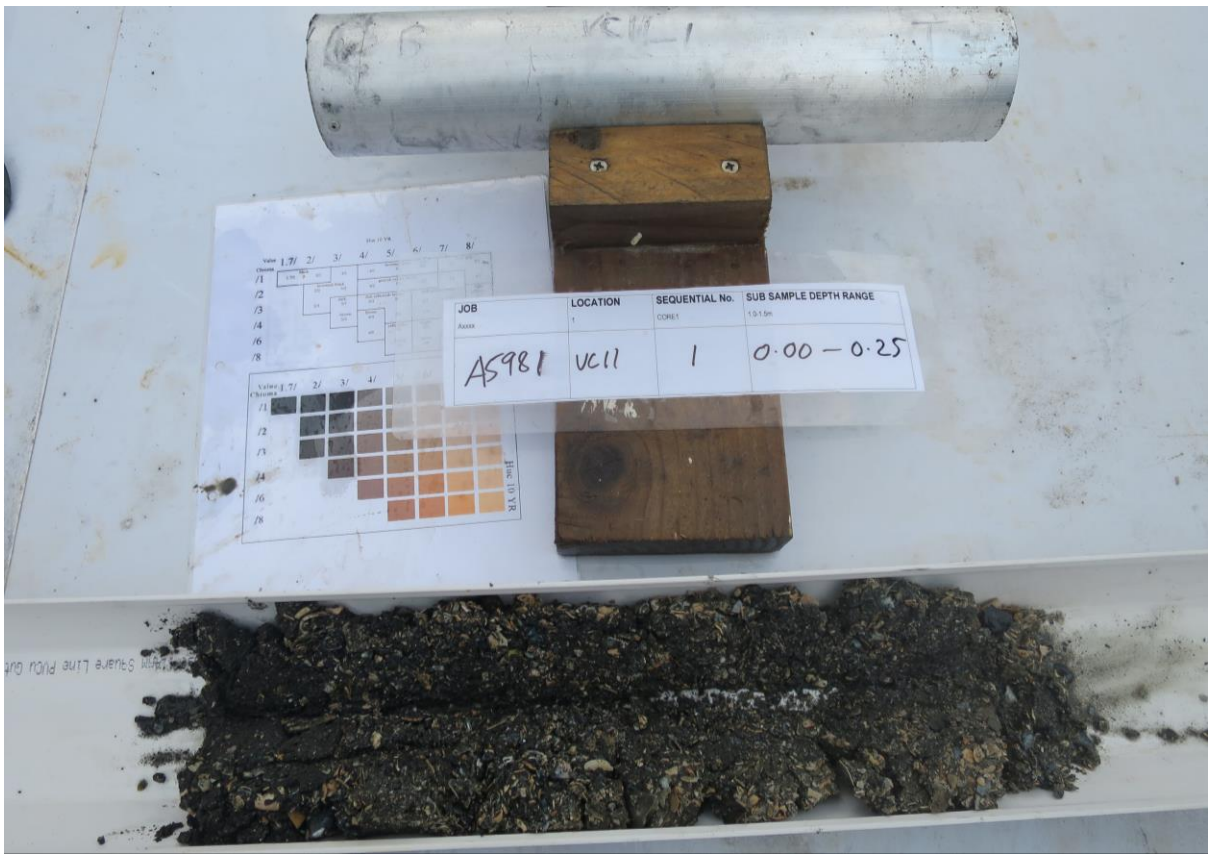


FIGURE 38 - VC11-1

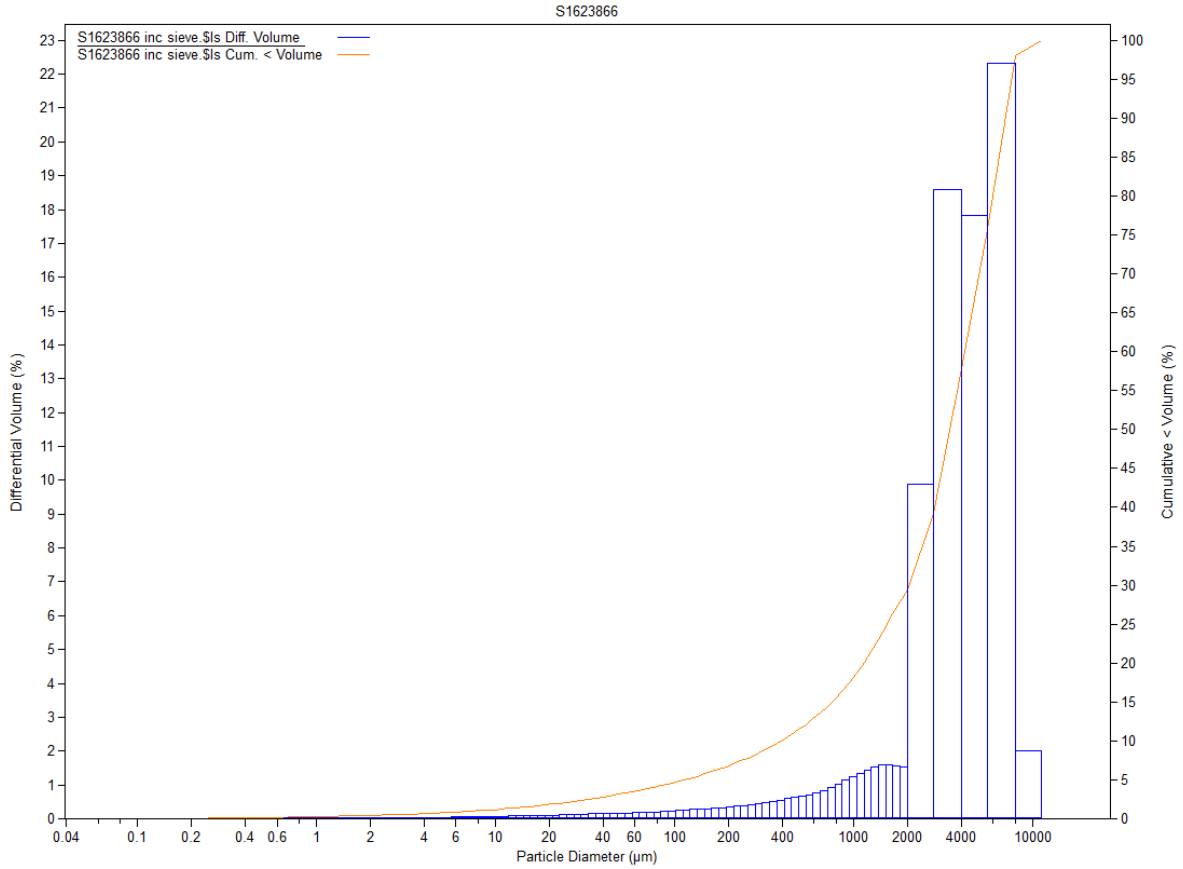


FIGURE 39 - G1 PARTICLE SIZE ANALYSIS

FIGURE 40 - G1

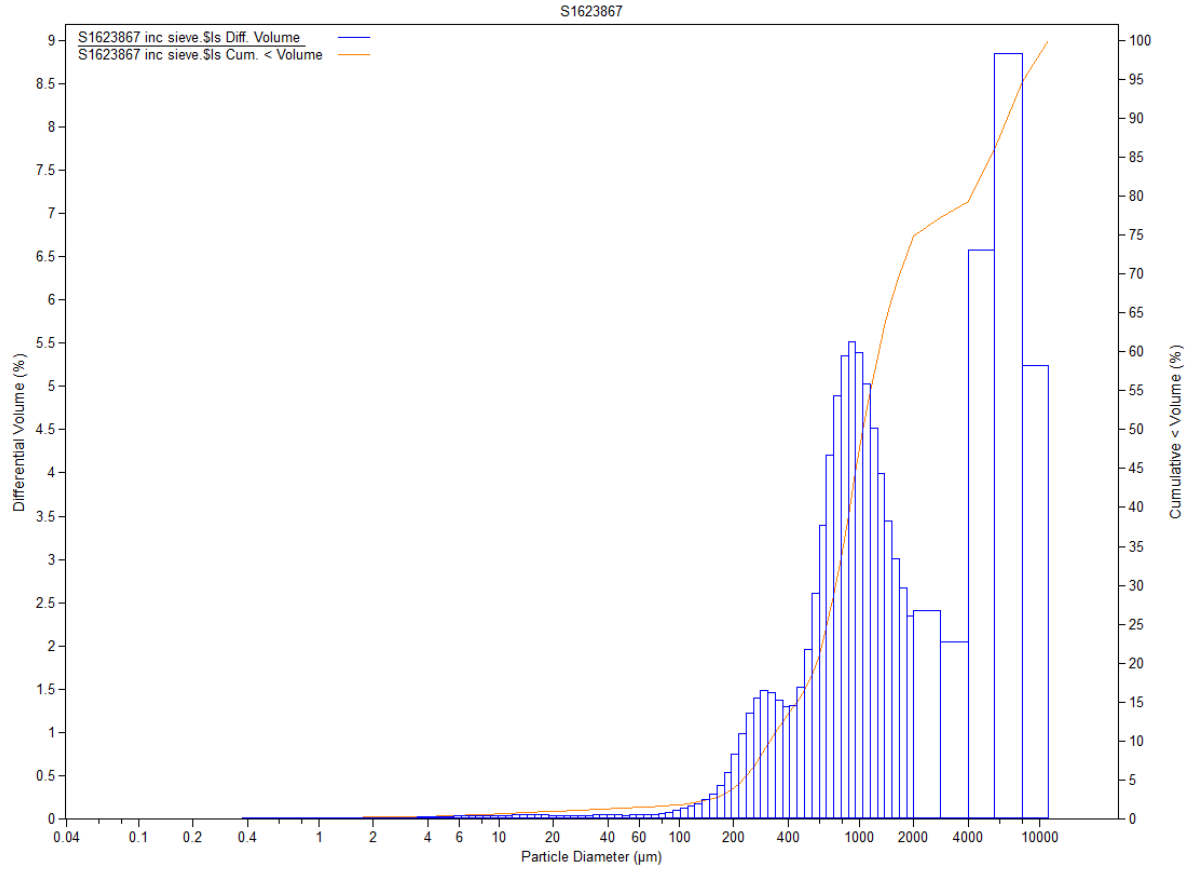


FIGURE 41 - G2 PARTICLE SIZE ANALYSIS

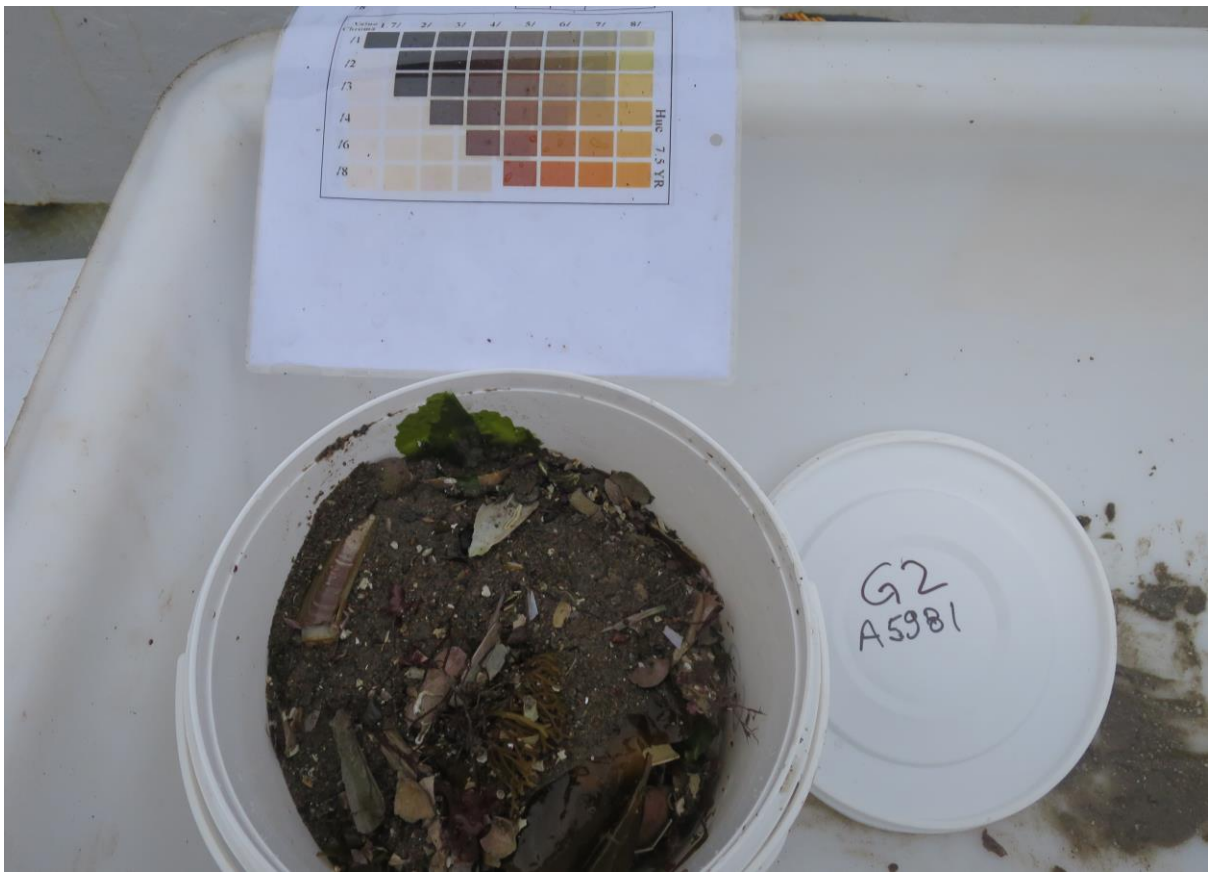


FIGURE 42 - G2

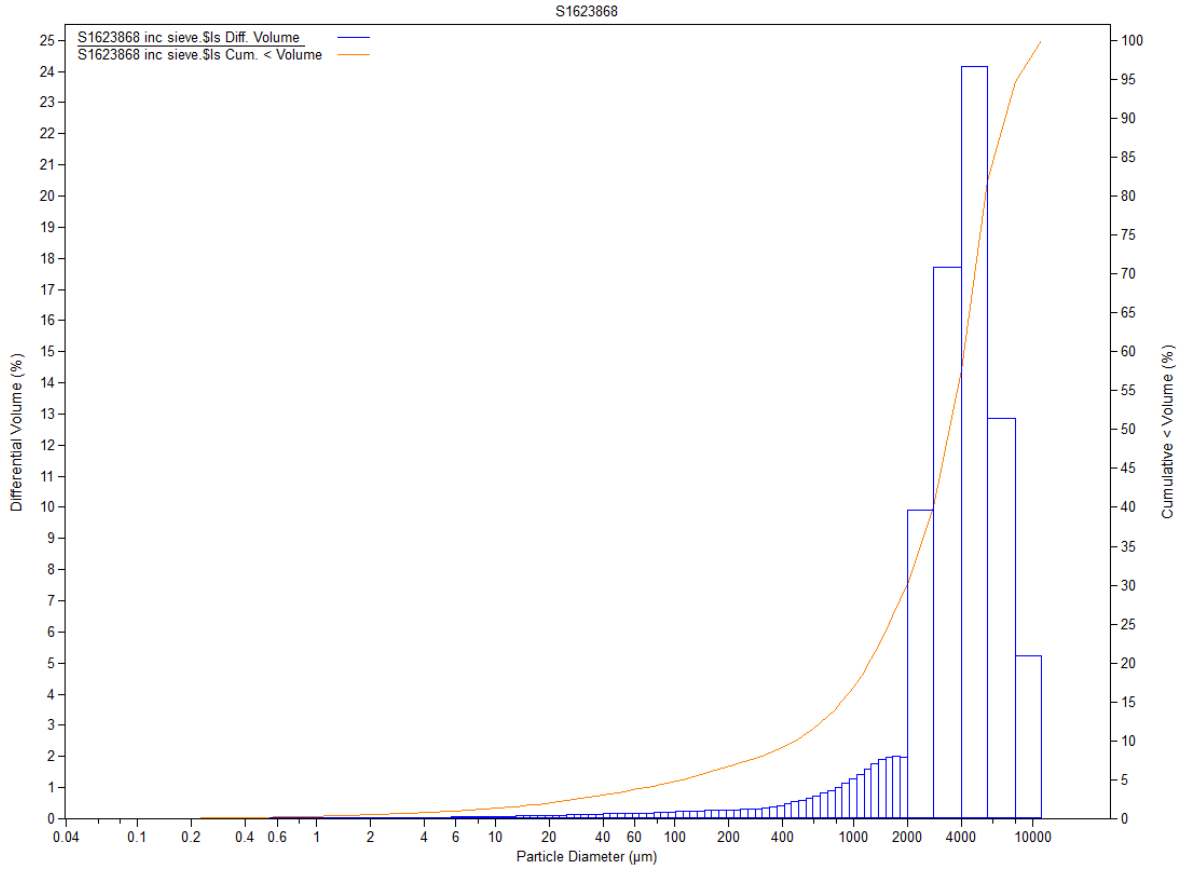


FIGURE 43 - G3 PARTICLE SIZE ANALYSIS

FIGURE 44 - G3

TABLE 38 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN G4

Sample ID: G4				
METALS	Action Level 1 (mg/Kg)	G4 (mg/Kg)	Action Level 2 (mg/Kg)	G4 (mg/Kg)
Arsenic	20	4.4	70	4.4
Cadmium	0.4	0.1	4	0.1
Chromium	50	40.2	370	40.2
Copper	30	8.9	300	8.9
Mercury	0.25	0.01	1.5	0.01
Nickel	30	17.9	150	17.9
Lead	50	14	400	14
Zinc	130	26.6	600	26.6
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Levels (µg/Kg)	G4 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	1.2
Naphthalene	100	< 1
Phenanthrene	100	5.3
Benzo[a]anthracene	100	1.4
Benzo[b]fluoranthene	100	1.7
Benzo[k]fluoranthene	100	2.7
Benzo[a]pyrene	100	1.6
Benzo[g,h,i]perylene	100	1.6
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	3.3
Fluoranthene	100	5.8
Pyrene	100	4.7
Indeno(1,2,3cd)pyrene	100	1.5

PCBs were below Revised AL1 in all cases.

TABLE 39 - DETECTED LEVELS IN G4 LEACHATE

Sample ID: G4		
	Units	G4
pH	pH Units	7.3
Conductivity	uS/cm	6620
Chloride	mg/l	2050
Fluoride	mg/l	0.6
Total Sulphur (Dissolved)	mg/l	289
Barium (Dissolved)	mg/l	0.25
Nickel (Dissolved)	mg/l	0.002
Chromium (Dissolved)	mg/l	<0.001
Cadium (Dissolved)	mg/l	0.0002
Copper (Dissolved)	mg/l	0.021
Lead (Dissolved)	mg/l	0.002
Zinc (Dissolved)	mg/l	0.091
Arsenic (Dissolved)	mg/l	0.027
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.004
Molybdenum (Dissolved)	mg/l	0.008
Antimony as Sb (Dissolved)	mg/l	0.001
Ammoniacal Nitrogen	mg/l	1.7
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	4600
Aluminium (Dissolved)	mg/l	0.21
Ammonia (Free)	mg/l	0.01
Dissolved Organic Carbon	mg/l	7

POLYAROMATIC HYDROCARBONS	G4 Concentration (µg/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	<0.010
Anthracene	<0.010
Fluoranthene	0.051
Pyrene	0.027
Benzo(a)anthracene	0.016
Chrysene	0.01
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.234

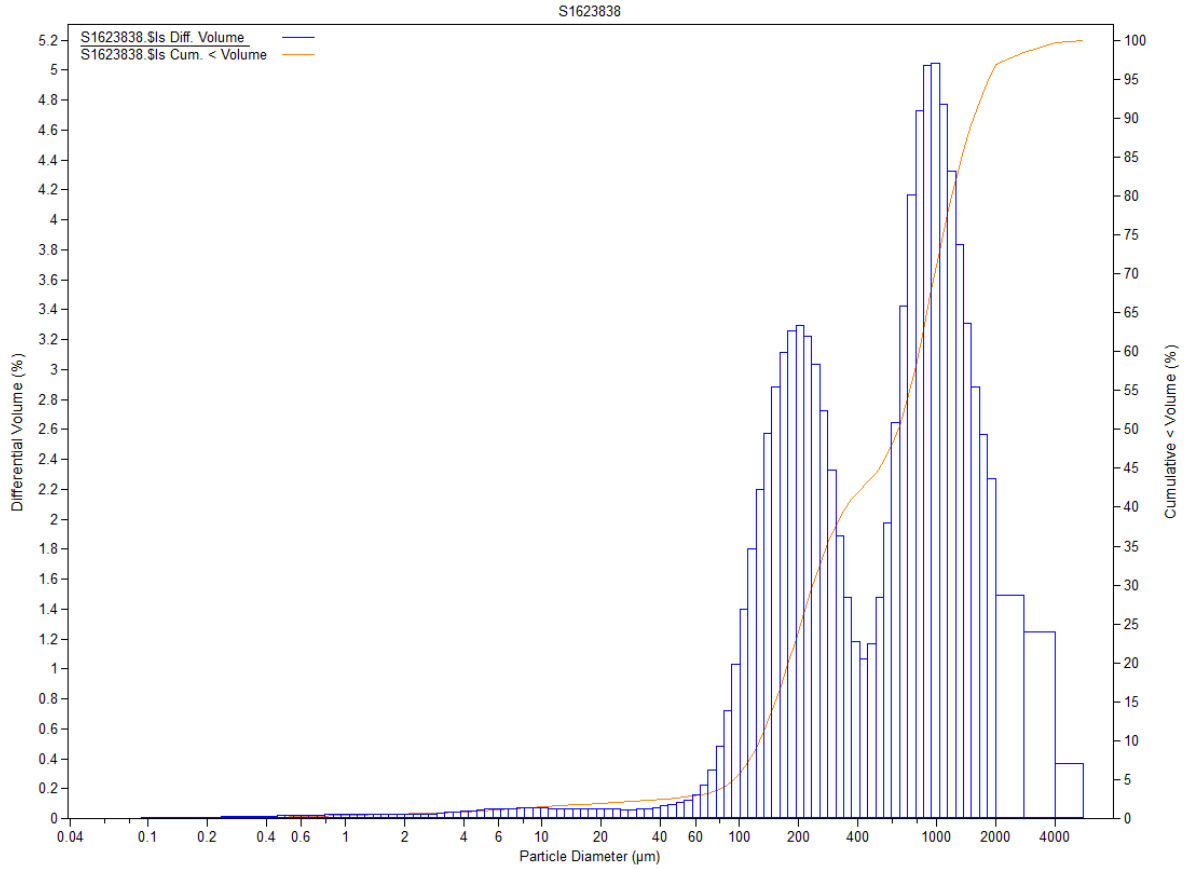


FIGURE 45 - G4 PARTICLE SIZE ANALYSIS

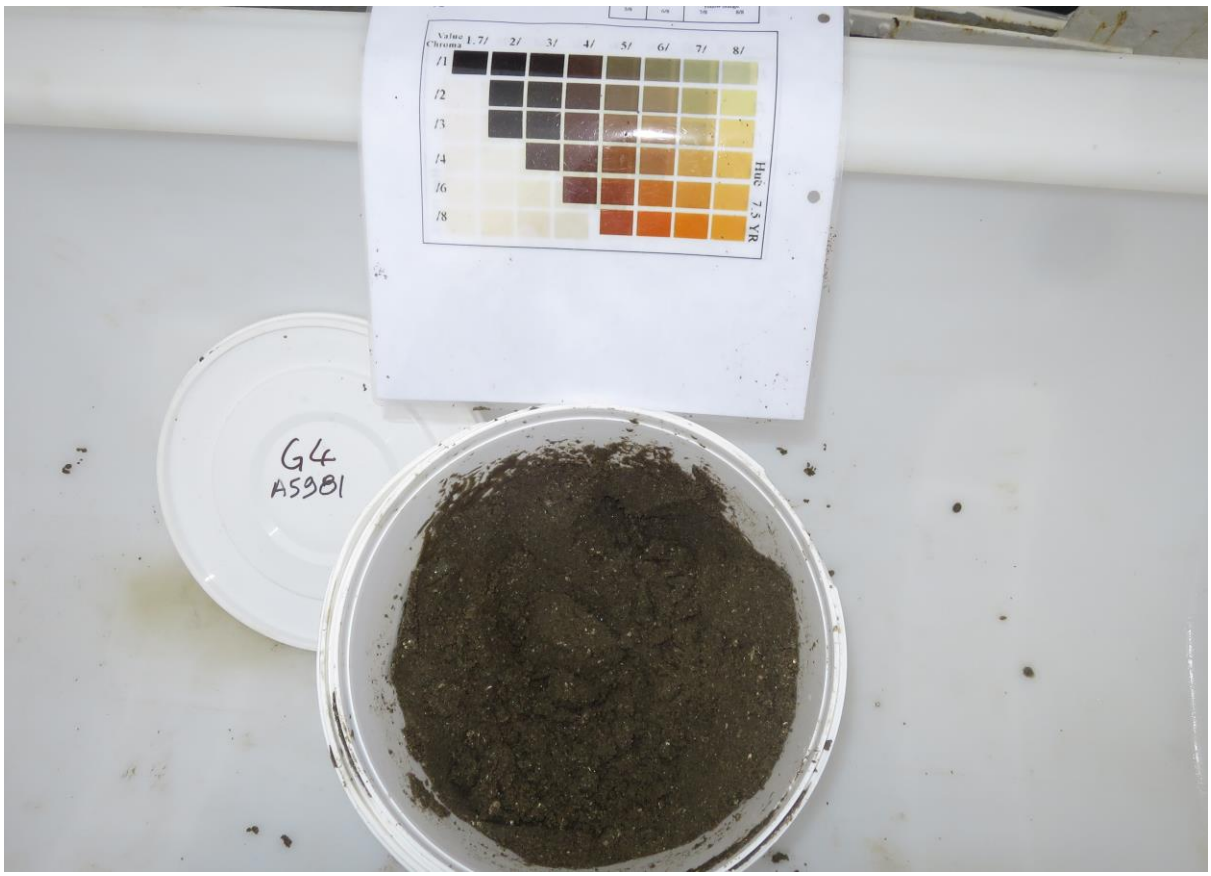


FIGURE 46 – G4

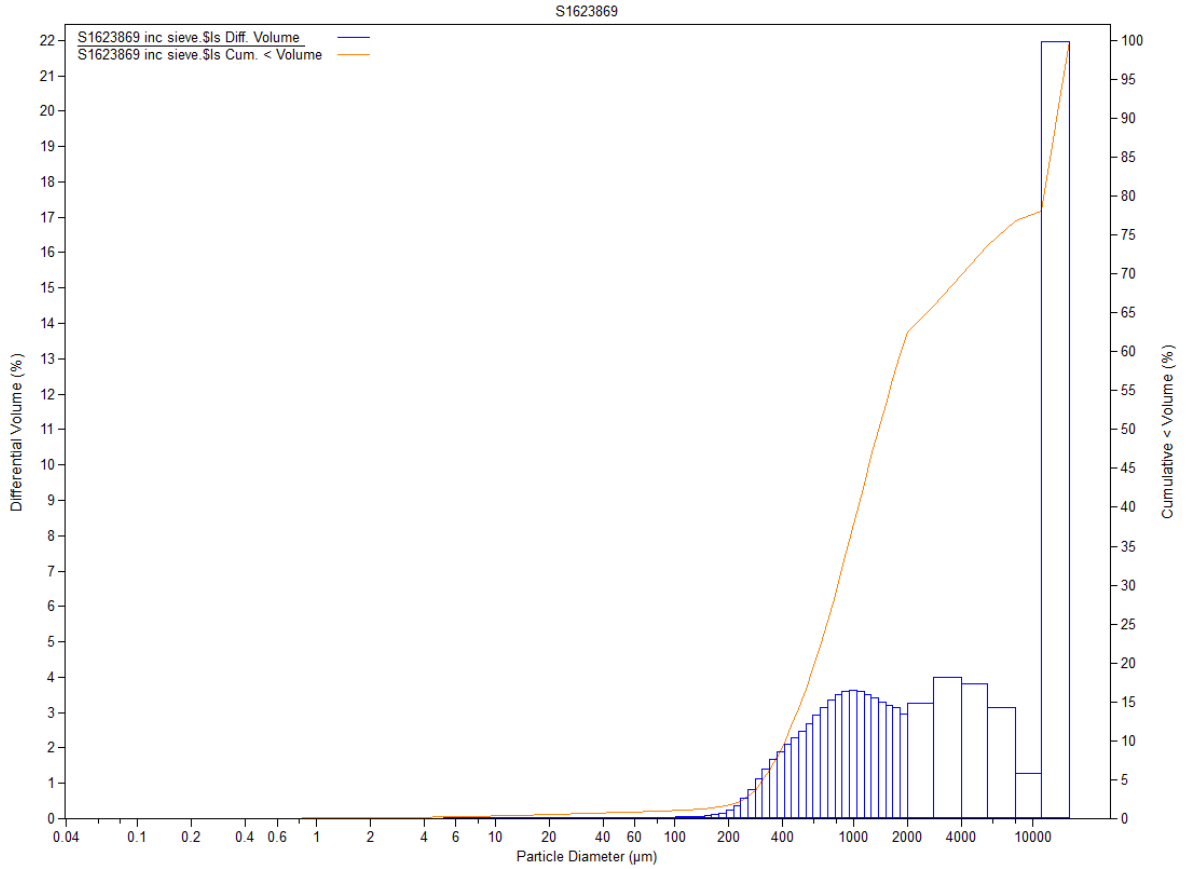


FIGURE 47 - G5 PARTICLE SIZE ANALYSIS

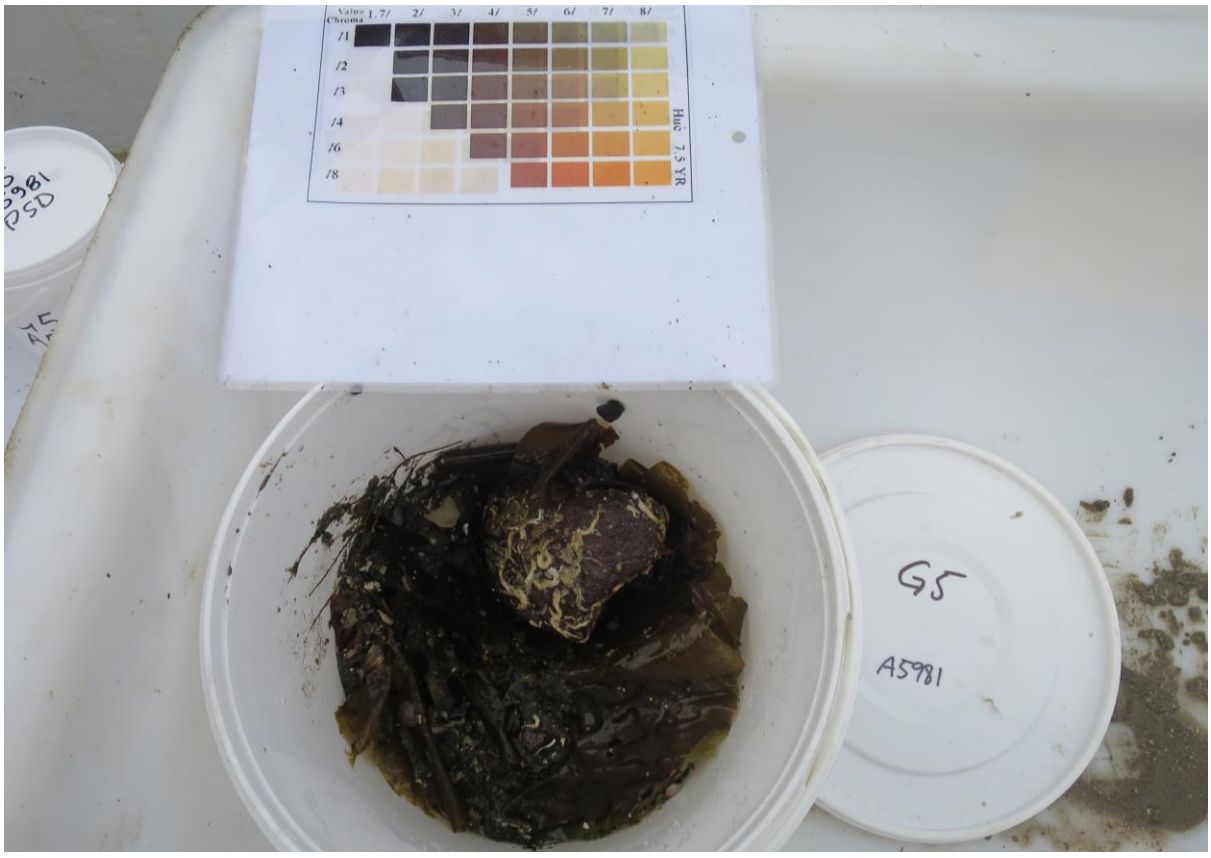


FIGURE 48 - G5

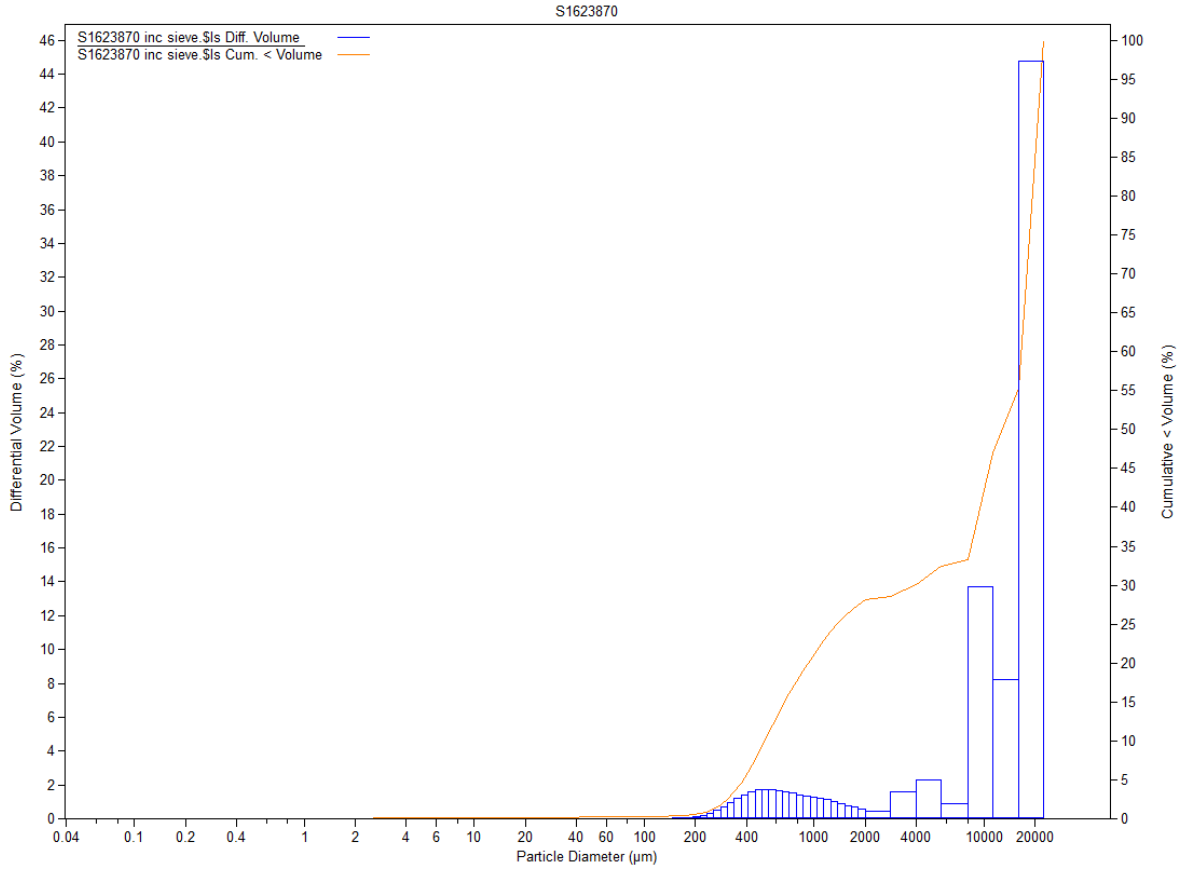


FIGURE 49 - G6 PARTICLE SIZE ANALYSIS

FIGURE 50 - G6

TABLE 40 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN G7

Sample ID: G7				
METALS	Action Level 1 (mg/Kg)	G7 (mg/Kg)	Action Level 2 (mg/Kg)	G7 (mg/Kg)
Arsenic	20	2.8	70	2.8
Cadmium	0.4	< 0.1	4	< 0.1
Chromium	50	56	370	56
Copper	30	13.5	300	13.5
Mercury	0.25	<0.01	1.5	<0.01
Nickel	30	19.5	150	19.5
Lead	50	14.2	400	14.2
Zinc	130	34	600	34
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	ng/g
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 41 - DETECTED LEVELS IN G7 LEACHATE

Sample ID: G7		
	Units	G7
pH	pH Units	8.2
Conductivity	uS/cm	5740
Chloride	mg/l	1990
Fluoride	mg/l	0.6
Total Sulphur (Dissolved)	mg/l	133
Barium (Dissolved)	mg/l	0.38
Nickel (Dissolved)	mg/l	0.004
Chromium (Dissolved)	mg/l	0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.011
Lead (Dissolved)	mg/l	0.002
Zinc (Dissolved)	mg/l	0.103
Arsenic (Dissolved)	mg/l	0.063
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.004
Molybdenum (Dissolved)	mg/l	0.01
Antimony as Sb (Dissolved)	mg/l	0.004
Ammoniacal Nitrogen	mg/l	1
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	0.05
Total Dissolved solids	mg/l	4400
Aluminium (Dissolved)	mg/l	0.17
Ammonia (Free)	mg/l	0.05
Dissolved Organic Carbon	mg/l	22

POLYAROMATIC HYDROCARBONS	Concentrations (ug/l)
Naphthalene	<0.020
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	0.016
Anthracene	<0.010
Fluoranthene	<0.010
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.176

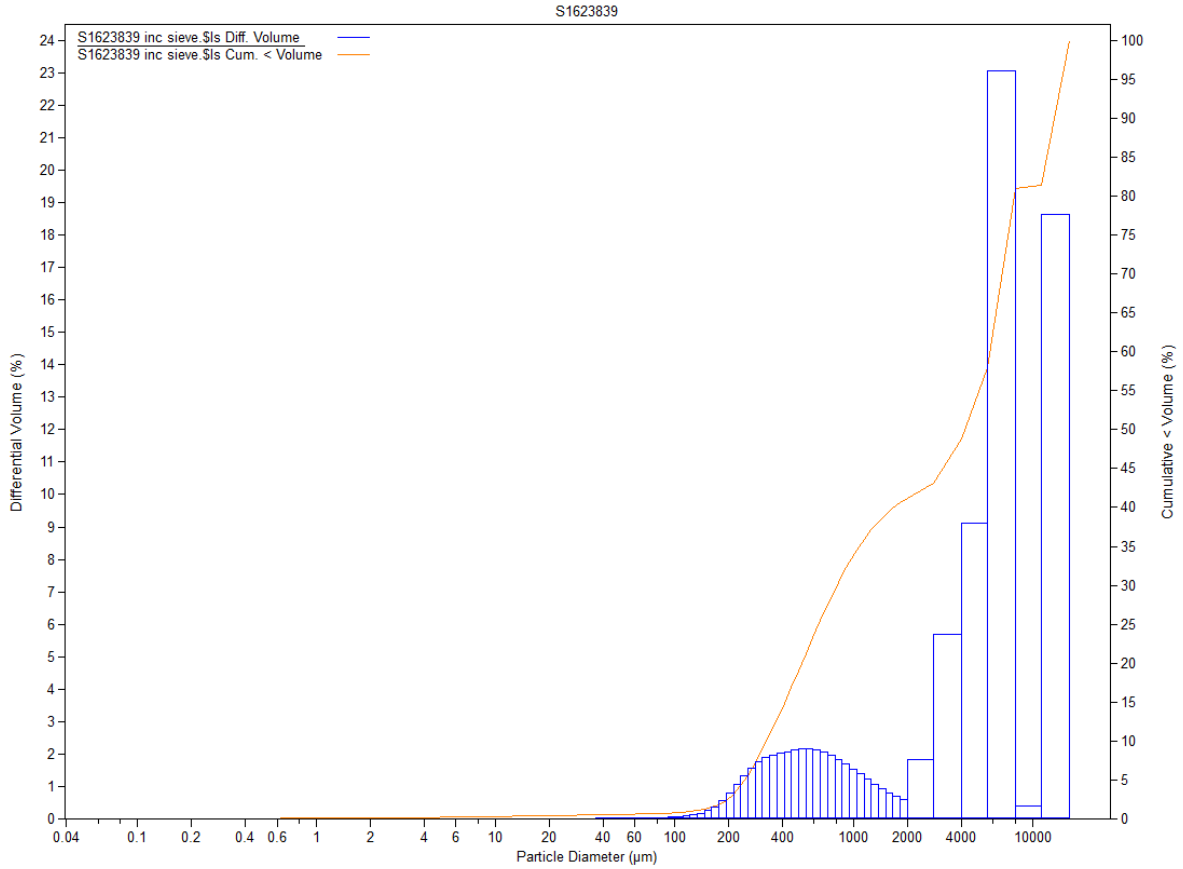


FIGURE 51 - G7 PARTICLE SIZE ANALYSIS

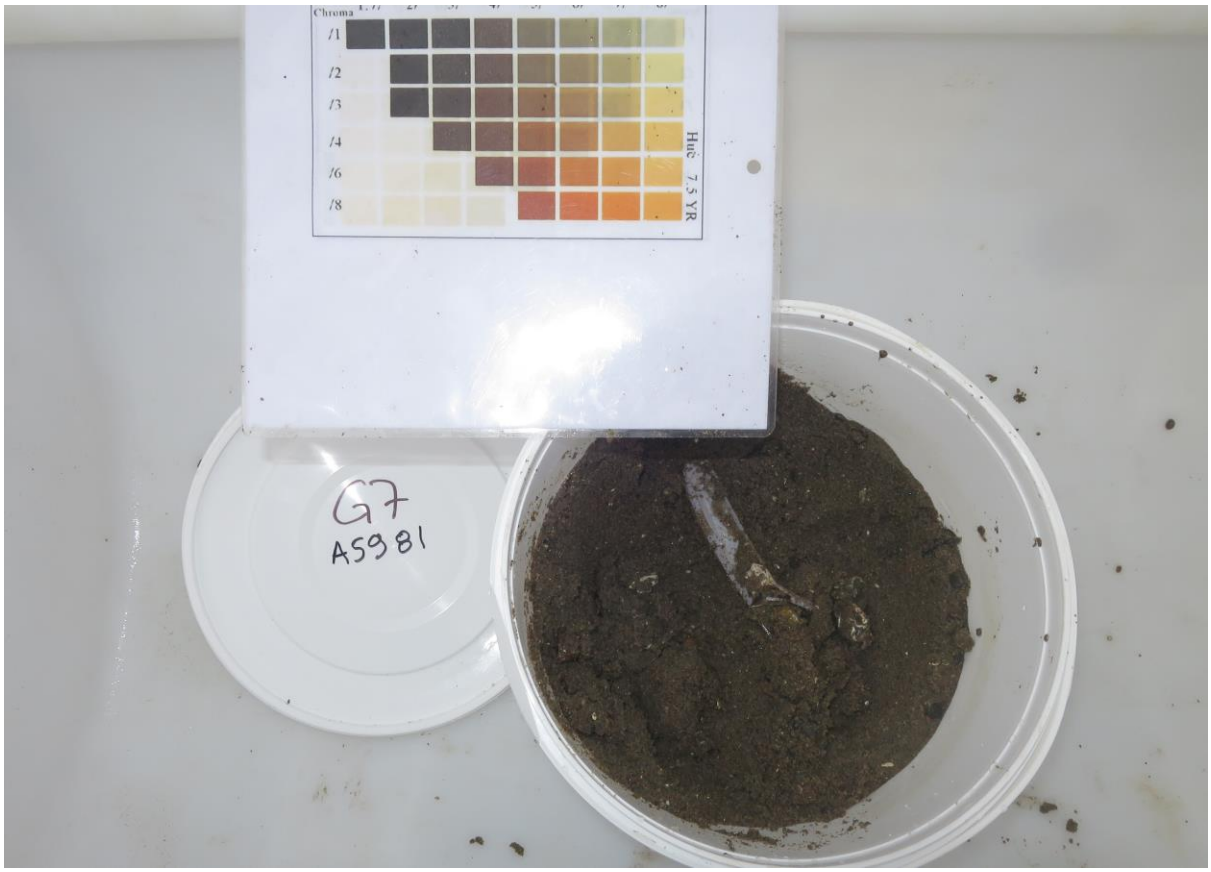


FIGURE 52 - G7

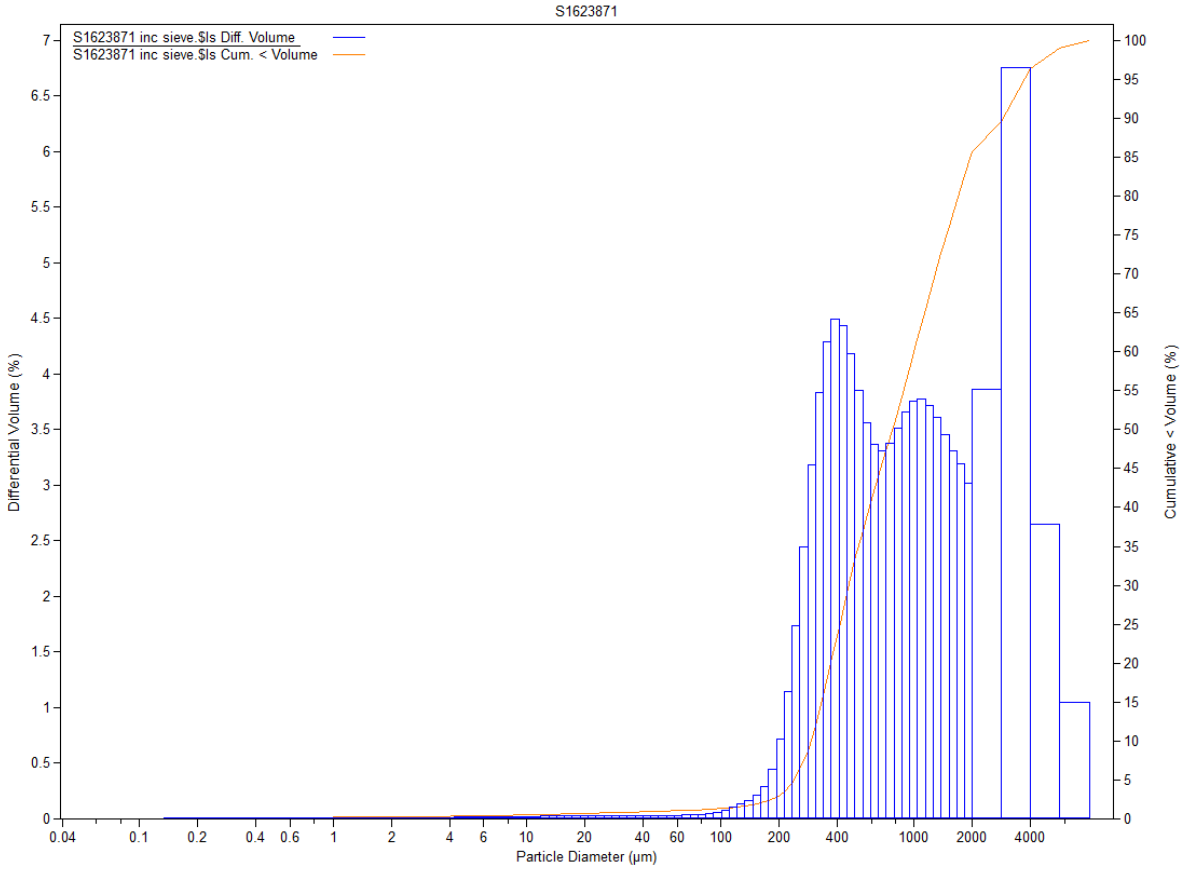


FIGURE 53 - G9 PARTICLE SIZE ANALYSIS

FIGURE 54 - G9

TABLE 42 - MARINE SCOTLAND REVISED ACTION LEVELS AGAINST DETECTED LEVELS IN G11

Sample ID: G11				
METALS	Action Level 1 (mg/Kg)	G11 (mg/Kg)	Action Level 2 (mg/Kg)	G11 (mg/Kg)
Arsenic	20	3.4	70	3.4
Cadmium	0.4	0.1	4	0.1
Chromium	50	68.2	370	68.2
Copper	30	18	300	18
Mercury	0.25	< 0.01	1.5	< 0.01
Nickel	30	29.5	150	29.5
Lead	50	26	400	26
Zinc	130	43.3	600	43.3
Dibutyltin		< 5.00		< 5.00
Tributyltin	100	< 2.00	500	< 2.00

POLYAROMATIC HYDROCARBONS	Action Level (µg/Kg)	G11 (ng/g)
Acenaphthene	100	< 1
Acenaphthylene	100	< 1
Anthracene	100	< 1
Fluorene	100	< 1
Naphthalene	100	< 1
Phenanthrene	100	< 1
Benzo[a]anthracene	100	< 1
Benzo[b]fluoranthene	100	< 1
Benzo[k]fluoranthene	100	< 1
Benzo[a]pyrene	100	< 1
Benzo[g,h,i]perylene	100	< 1
Dibenzo[a,h]anthracene	10	< 1
Chrysene	100	< 1
Fluoranthene	100	< 1
Pyrene	100	< 1
Indeno(1,2,3cd)pyrene	100	< 1

PCBs were below Revised AL1 in all cases.

TABLE 43 - DETECTED LEVELS IN G11 LEACHATE

Sample ID: G11		
	Units	G11
pH	pH Units	7.9
Conductivity	uS/cm	6350
Chloride	mg/l	2130
Fluoride	mg/l	0.4
Total Sulphur (Dissolved)	mg/l	275
Barium (Dissolved)	mg/l	0.13
Nickel (Dissolved)	mg/l	0.001
Chromium (Dissolved)	mg/l	0.001
Cadium (Dissolved)	mg/l	<0.0001
Copper (Dissolved)	mg/l	0.006
Lead (Dissolved)	mg/l	0.003
Zinc (Dissolved)	mg/l	0.065
Arsenic (Dissolved)	mg/l	0.006
Mercury (Dissolved)	mg/l	<0.0001
Selenium (Dissolved)	mg/l	0.008
Molybdenum (Dissolved)	mg/l	0.008
Antimony as Sb (Dissolved)	mg/l	<0.001
Ammoniacal Nitrogen	mg/l	4.5
Chromium VI	mg/l	<0.01
Phenol Index	mg/l	<0.05
Total Dissolved solids	mg/l	5100
Aluminium (Dissolved)	mg/l	0.04
Ammonia (Free)	mg/l	0.13
Dissolved Organic Carbon	mg/l	5.1

POLYAROMATIC HYDROCARBONS	Concentrations (ug/l)
Naphthalene	0.057
Acenaphthylene	<0.010
Acenaphthene	<0.010
Fluorene	<0.010
Phenanthrene	0.019
Anthracene	<0.010
Fluoranthene	0.013
Pyrene	<0.010
Benzo(a)anthracene	<0.010
Chrysene	<0.010
Benzo(b)fluoranthene	<0.010
Benzo(k)fluoranthene	<0.010
Benzo(a)pyrene	<0.010
Indeno(1,2,3-cd)pyrene	<0.010
Dibenzo(a,h)anthracene	<0.010
Benzo(g,h,i)perylene	<0.010
Total (USEPA16) PAHs	<0.219

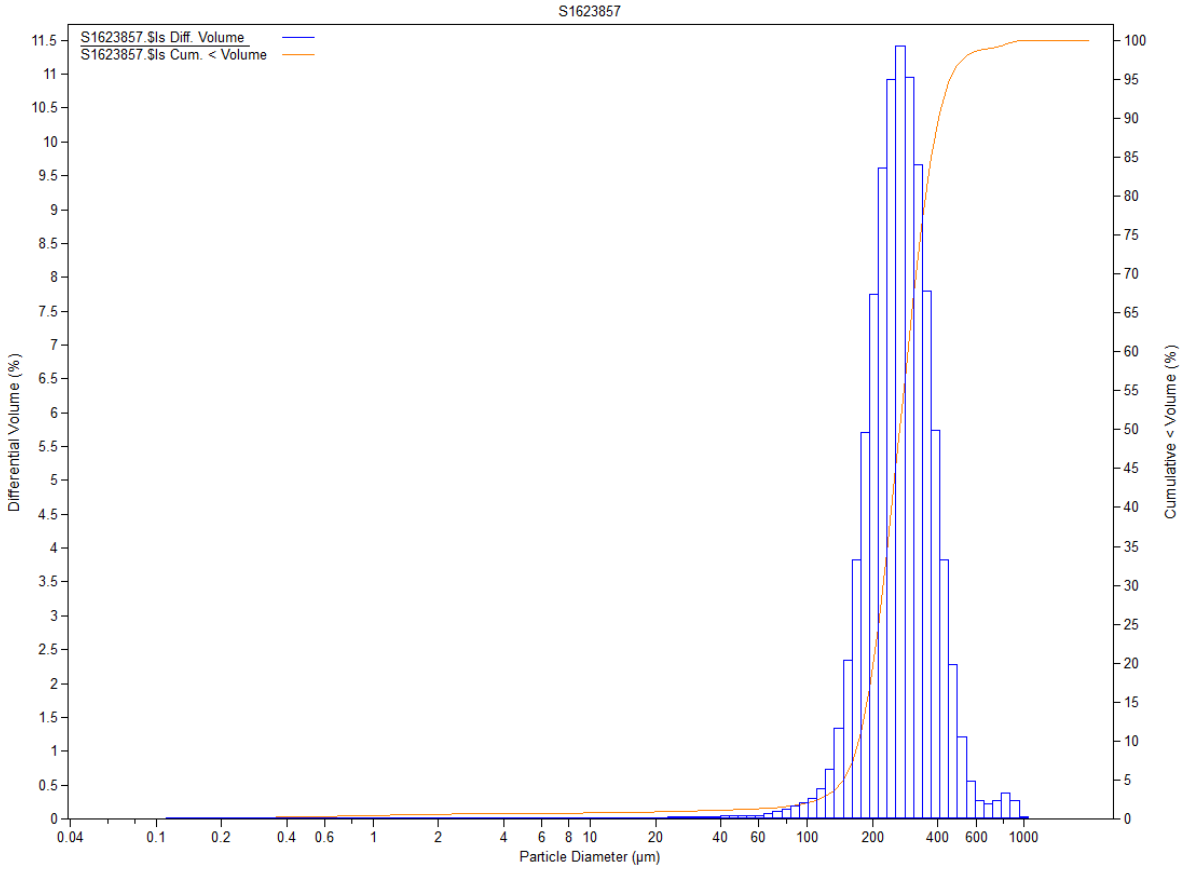


FIGURE 55 - G11 PARTICLE SIZE ANALYSIS

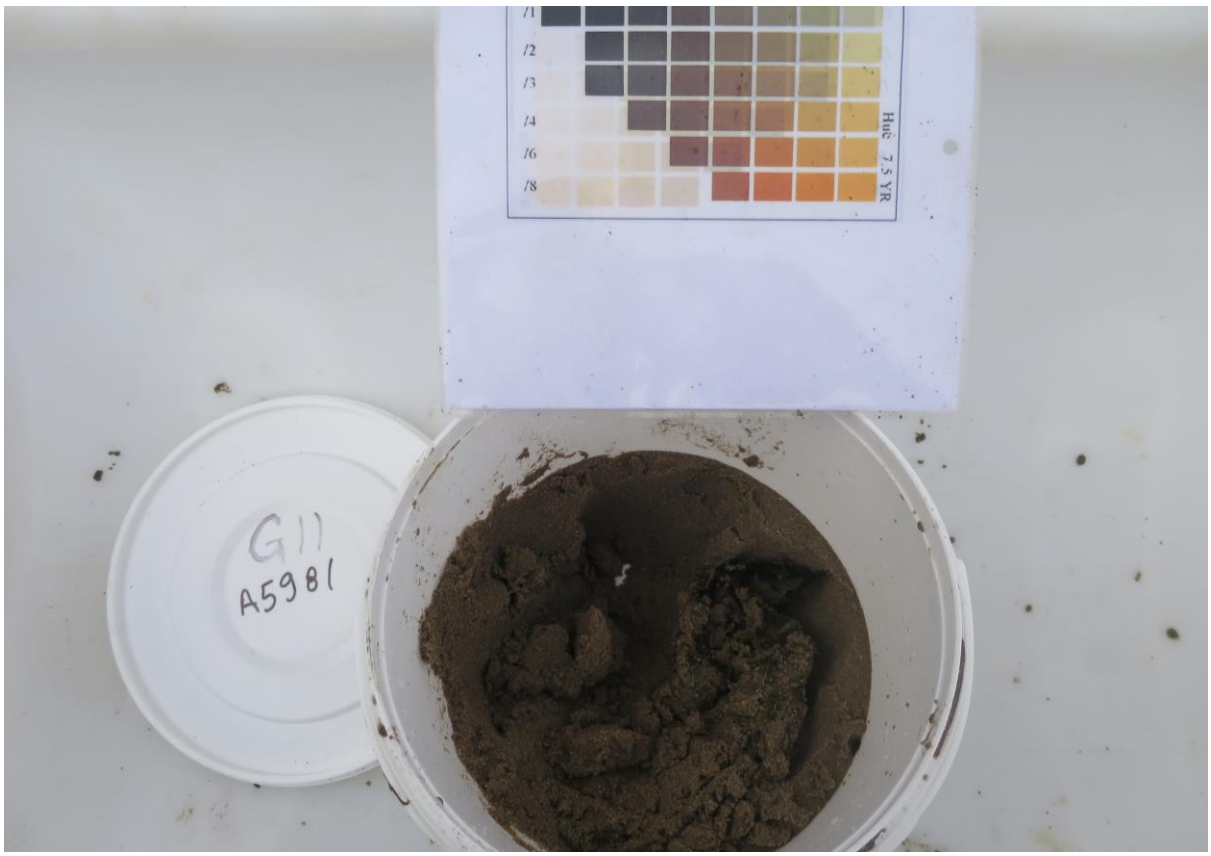


FIGURE 56 - G11

7. Survey Vessel

ALHS' 16.5m survey vessel Vigilance was mobilised for the sampling operation. The vessel is MCA Cat II coded for work up to 60nm offshore and is well equipped with a crane and 'A frame' to carry out the sampling operations as well as a trawl winch to recover samples.

On-board freezers are used to store and maintain the samples in good condition as prior to despatch to the laboratory for analysis.

FIGURE 57 - ALHS' MCA CAT II VESSEL: VIGILANCE

8. Personnel

The following personnel were involved in the survey:

Name	Position
Colin Thomson	Project Management, Party Chief
Nicol McCallum	Sampler / Surveyor
Andrew McCormick	Vessel Skipper / Engineer / Sampler
Paul McCormick	Deck Hand

All staff have marine survey experience, and adhered to Health & Safety instructions, including the wearing of life jackets at all times. The client provided an induction prior to commencement of the work, to enable personnel to work within the Marine Base unescorted.

Annex A
Standard Disclaimer

A5981

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.

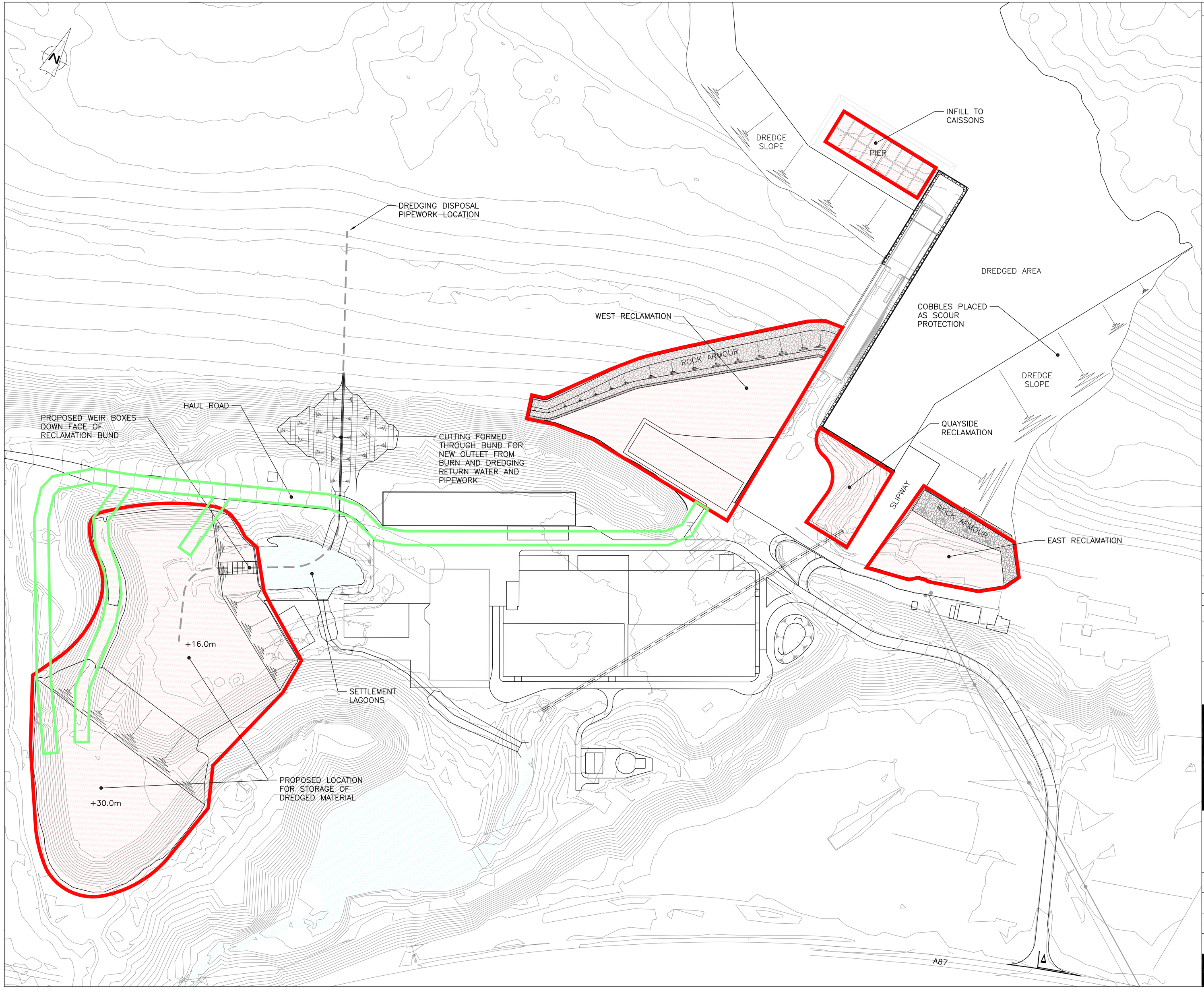
2. Geophysical interpretation of bathymetry and sonar is based on an informed opinion of the supplied data, and is subject to inherent errors out with the control of the interpretational hydrographer or geophysicist, which include but are not limited to GPS positioning errors, navigation busts, data 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.

Appendix C

Dredge Disposal Ashore Location Drawing



GENERAL NOTES

LEGEND

DREDGE DISPOSAL AREA

HAUL ROAD

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D
A	24.11.16	HAUL ROAD AMENDED	JHG	TR	TR

AMENDMENTS

CLIENT

marineharvest

PROJECT

KYLEAKIN FEED MILL
MARINE WORKS

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DRAWING TITLE

PROPOSED DREDGE
DISPOSAL AREAS

DRAWN	CHECKED	APPROVED
JHG	TR	TR
DATE	DATE	DATE
NOV 2016	NOV 2016	NOV 2016

SCALE (A1) 1:1000

STAGE CONSENTS

REVISION A

PROJECT No. 1849

DRAWING No. 112