Glasgow City Council
Best Practicable Environmental Options (BPEO) Report -Partick to Govan Bridge

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Contents

Appendices

Tables

1 INTRODUCTION

1.1 Scope of Report

EnviroCentre have been commissioned by Arch Henderson on behalf Glasgow City Council to produce a Best Practicable Environmental Option Assessment (BPEO) in support of dredging on the River Clyde, as part of the proposed development of the Partick to Govan bridge.

The dredge site is shown in EnviroCentre figure 174260-002 provided in Appendix A.

The purpose of this report is to review each of the available potential disposal options for the dredged materials. The options which are not considered to be practicable are rejected and the reasons for doing so are explained.

Those options which are practicable are examined in detail and assessed against the following considerations: -

- Environmental;
- Strategic; and
- Cost.

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

1.2 Programme of Work

The programme of work involves the removal of up to 23,165m3 (46,330 tonnes) of material in the bridge and associated layby area, assumed to form a mixture of silts, sands and clays. It is likely that the silt will require to be removed by trailer suction or grab dredger.

Chemical testing of the material has been undertaken in part to support this assessment and is included within this application. The sediment sampling summary report is provided in Appendix B.

1.3 Dredging Activities

The method of dredging at the dredge site has not been completely finalised and the specific plant will not be confirmed until a contractor has been appointed. However, the method is most likely to be a combination of using a suction cutter dredger or a grab dredger or marine based plant working in conjunction with a hopper barge.

These are all tried and tested techniques which have been ongoing on the River Clyde (and continue with other river users) for decades. There is understood to be no impact on wildlife and sedimentation patterns continue as per previous dredging exercises.

1.4 Nature of the Marine Sediments

A pre-dredge sampling exercise incorporating 8 vibrocored sample locations (and subsequent analysis of 24 samples from these cores) was undertaken in February 2021.

The locations of the samples are detailed in EnviroCentre drawings 174260-GIS-03. The sediment sampling report is provided in Appendix B.

A summary of the laboratory testing is detailed below:

Table 1-1: Exceedances of Revised Action Levels and Maximum Concentrations

Contaminant	No. of Individual Exceedances (of 24 samples)		Maximum Concentration (mg/kg) and Location
	RAL 1	RAL2	
Arsenic	1	0	28.2 (VC04 0.0 – 0.15m)
Cadmium	20	4	4.6 (VC01 1.1 – 1.6m)
Copper	23	1	300.2 (VC08 0.0 – 0.15m)
Chromium	22	2	465.4 (VC04 1.85 - 2.35m)
Lead	23	1	423.6 (VC01 1.10 - 1.60m)
Mercury	23	0	1.07(VC04 1.85 - 2.35m)
Nickel	22	0	56.0 (VC08 1.00 - 1.50m)
Zinc	17	7	977.4 (VC04 1.85 - 2.35m)
PAH (All Species)	24	-	19.1(Phenanthrene at VC03 1.6 – 2.1m)
PCBs	18	4	351.8 (VC03 1.60 - 2.10m)
TBT	5	0	0.323 (VC08 1.50 - 2.00m)
TPH			11,000 (Total Hydrocarbon Content at VC01 0.60 – 1.10m)

All samples recorded exceedances above RAL 1 for more than one metal, with 7 samples exceeding RAL 2 for at least one metal. All samples recorded exceedances for PAH species. All samples exceeded RAL 1 for TPH. Out of 24 samples, 18 exceeded RAL1 for PCBs, with a further 4 exceeding RAL2.

2 DISCUSSION OF AVAILABLE DISPOSAL OPTIONS

The BPEO process is geared towards identifying a preferred overall strategy from the perspective of the environment as a whole, as opposed to detailed optimisation of any one selected scheme. It is a structured and systematic process to identify and compare strategic options in a transparent manner. Alternatives are evaluated in terms of their projected implications for the environment together with consideration of practicability, social and economic issues as well as within a wider strategic context.

The key stages of a BPEO are:

- Identification of options;
- Screening of options;
- Selection of assessment criteria;
- Analysis and evaluation of criteria; and
- Evaluation of BPEO.

Further details on methodology are provided within each section.

2.1 Identification and Screening of Available Disposal Options

A number of options are available for disposal of dredged sediments. The options considered are provided in Table 2-1 along with justification for screening out those options which have not been taken forward for further consideration.

Table 2-1: Initial Best Practicable Available Options

Location	Options	Screening Assessment	Carry forward?
Estuary/ Riverbank	Leave in situ	Not an option due to the project specific requirements to provide appropriate depth for the bridge and associated layby berth.	No
	Infilling of an existing dry dock/harbour facility/development site (re-use)	There are no identified projects that are currently progressing that will require material within the timeframe of the proposed dredging work.	No
	Beach Nourishment	Large areas of the Firth of Clyde and Inner Estuary are designated sites (SSSI, SPA, Ramsar) and hold both national and international importance to nature conservation. Specific beach nourishment projects would require to be supported by Environmental Assessments as a minimum to inform how the project could affect the environment as a result of disturbance to the intertidal area, changes to the sediment levels, the variable composition and quality of the material and measures devised from the assessment outcomes to minimise impacts on the environment. The dredge material comprises a mixture of sand and predominately silt. Fine sediments (i.e. silt) are not suitable for beach nourishment in the traditional sense.	No
Land	Landfill Disposal	This is possible but it is unlikely that this option will offer long term solution due to lack of space at landfills. Landfill space is currently at a premium and does not offer a sustainable solution either financially or environmentally for the disposal of dredged arisings. Dredged material likely to require treatment first in a dewatering facility. Chloride levels within the material may also prove problematic for landfill disposal. Significant cost associated with set up of dewatering facility at the quayside plus transportation and additional costs associated with gaining the necessary planning and regulatory consents.	Yes
	Land Incineration	The dredged material consists of non-combustible material (silts, sands, gravels, shells, rock) with a low combustible component and very high-water content.	No

	Application to Agricultural Land	The dredged material would need to be treated to reduce salt concentrations to acceptable levels. Would require detailed chemical analysis and assessment as well as a Waste Management License Exemption. Would require special precautions during spreading in relation to the risk of odour and watercourses / aquifers. The availability of land for this option will be limited within a reasonable haulage distance of the dredge arisings. Large volumes each year are unlikely to be viable to dispose of in this manner and would potentially have a detrimental effect on existing terrestrial habitats.	No
	Recycling	Recycling of dredged material is theoretically possible, however, due to the varied lithology there would need to be either segregation during dredging works to minimise the entrainment of fine-grained material into the sands, or energy and water rich processing on land. This is not currently understood to be an established disposal and reuse route in the Clyde estuary at present and is not likely to be something which could be established in the project timeframes due to the requirement for various permitting requirements including waste management licencing, discharge consents for process water as well as increased road transportation for delivery of waste material and collection of processed material.	No
Sea	Aquatic disposal direct to seabed.	Relatively low cost, minimal transportation requirements compared to all other options and potential for low environmental risk. The closest spoil ground Cloch Point (MA021) is located approximately 35km from the closest proposed dredge site with an assigned licensed annual capacity of 830,000 tonnes.	Yes

2.2 Summary of Identified BPEO Options

Following review of the available options, two options were identified for further detailed BPEO assessment which are as follows:

- Landfill Disposal; and
- Sea Disposal.

A brief summary of the necessary works or methodology for each option being taken forward for detailed BPEO assessment is provided below.

2.2.1 Landfill Disposal

Dredged material is considered to be controlled waste for the purpose of transport, storage and disposal as per Section 34 (7) of the Environmental Protection Act 1990. The Landfill (Scotland) Regulations 2003 require the classification and characterisation (i.e. inert, non-hazardous or hazardous) of the dredged material to be determined prior to landfill acceptance.

Disposal to landfill would require several stages in material handling operations:

- Dredging and transport to shore;
- Transfer to shore to a dewatering facility;
- Dewatering;
- Transfer of dewatered material to storage area for stockpiling;
- Loading of lorries and transport to landfill site; and
- Disposal at Landfill site.

Transport to the shore would require the identification of an available jetty facility suitable for receiving material directly to the dewatering facility. Two options are available for off-loading; namely grabbing the spoil from the barge or hopper or pumping directly ashore.

The dewatering facility would require being purpose built and capable of receiving large quantities of bulk material. Currently no facility exists on the Clyde. Settlement tanks, with the aid of sluices and rotational management, would allow solids to settle out and the water element drain off and return to the River Clyde. Temporary mobilisation of bespoke mechanical dewatering equipment could also be utilised but at greater cost. The dewatered dredged sediment would then be removed from the facility and stockpiled for transfer via lorry to a suitably licensed landfill.

We understand that the type of vehicle most suitable for transporting the dewatered dredged material is either a rigid bodied tipper or an articulated tanker both with a 16 tonne load capacity. It is estimated that the dredge volume equates to c. 46,330 tonnes of material and would require approximately 2,895 return trips would typically be required to transport the dewatered dredged material to landfill.

The number of landfills within a viable distance of the River Clyde is considered to be low. In addition, the available capacity of each site is limited by the amount of material it can receive per annum. Due to the proposed quantity of material to be dredged it is therefore unlikely that any landfill within viable distance of the River Clyde will have the capacity to receive the dredged material.

2.2.2 Sea disposal

This option handles material in a single stage namely transport to the disposal site. The existing licensed disposal site is 1.6 nautical miles North of Cloch Point. It is located in naturally deep water with ease of access, has a large capacity and is anticipated to be active for the foreseeable future.

3 FURTHER CONSIDERATION OF REMAINING DISPOSAL OPTIONS

3.1 Detailed BPEO Assessment

Each of the identified options was assessed against the criteria detailed in Table 3.1 below.

Table 3-1: BPEO Detailed Assessment Criteria

Primary Criteria	Description and Attributes
Strategic	• Operational aspects, including handling, transport etc. • Availability of suitable sites/facilities • General Public/local acceptability • Legislative Implications • Summary of the outcome of consultation with third parties
Environmental	• Safety Implications • Public Health Implications • Pollution/ Contamination Implications • General Ecological Implications • Interference with other legitimate activities e.g. fishing • Amenity/Aesthetic Implications
Costs	• Operating costs e.g. labour, site operations, environmental monitoring • Capital e.g. Transport, equipment hire

3.1.1 BPEO Strategic Assessment

Table 3-2 below provides details of the strategic assessment for each option taken forward for the detailed BPEO assessment:

Table 3-2: BPEO Strategic Assessment

Criteria	Landfill	Sea Disposal
Operational Aspects (inc. handling and transport)	Would involve double handling of material through dewatering and transportation to landfill. A facility would need to be built for dewatering purposes. Would also increase the number of HGV's on the road network. Four jetties which could be suitable for landing the spoil have been identified within 30 km of the dredge site; these are: • BAE SYSTEMS, Clyde Yards; • Faslane, Gare Loch. Owned and operated by MoD; • James Watt Dock, Greenock. Owned and operated by Peelports Clydeport Limited; and • Inchgreen Owned and operated by Peelports Clydeport Limited. Faslane and BAE Systems have been discounted by their owners as being unavailable for this type of activity. The James Watt Dock has previously been used for the unloading of aggregates and has been confirmed as being suitable but a temporary storage area is not readily available. Inchgreen may be suitable but further discussions on availability and storage area available are required.	There would be no double handling of the dredged material. Transportation to the disposal site would be by dredger or barge(s) depending on methodology.
Availability of suitable sites/facilities	The geotechnical composition of the dewatered River Clyde dredged material is considered to be suitable for disposal via this route. However, there is typically a limit to the amount of waste that can be accepted both on a daily and annual basis at a landfill. The landfill capacity will therefore not be able to accommodate the quantity of material generated by the River Clyde dredging activities and another disposal option will be required for the surplus material.	The marine disposal site has been designed to accommodate the quantities typically generated by dredging operations and is anticipated to be active for the foreseeable future. The chemical analysis of the sediments from the proposed dredge sites would indicate that the material is likely to be acceptable for testing pending further risk assessment for contaminants present at levels between Action Level 1 and Action Level 2.

Criteria	Landfill	Sea Disposal
General Public /Local acceptability	Increase traffic on haul routes therefore potential for increase in public complaints because of danger to pedestrians and other road users, impact on the environment and interruption to traffic flow.	Traditionally accepted disposal route for dredged material and limited public impact.
Legislative Implications	Contravenes the principles of minimising waste and long-term commitments by the government to reduce land filling.	This is an accepted disposal route as long as a Marine Licence is obtained.

3.1.2 BPEO Environmental Assessment

Table 3-3 details the environmental assessment for each option taken forward for detailed BPEO assessment.

Table 3-3: BPEO Environmental Assessment

Criteria	Landfill	Sea Disposal
Safety Implications	Double handling of material increases the potential for accidents to occur. Work would be undertaken in accordance with H&S legislation.	Minimal handling of material required as it is directly placed at the disposal site. Work would be undertaken in accordance with H&S legislation.
Public Health	Measures will be required to limit human contact during transfer of material from dredger to dewatering facility and transportation to landfill. The additional lorry movements are likely to give rise to increases in noise, dust and exhaust emission levels and interference for other road users. Security measures typically employed at licensed landfills which will minimise human contact once accepted and emplaced at site.	Low potential for human contact during dredging and disposal operations. Once deposited at disposal site pathways for human contact greatly reduced.
Pollution/contamination	Pumping ashore to dewatering facility and transportation to landfill will all require energy. Road transport increases the carbon footprint of this disposal option. Potential for spillages to occur. Saline sediment may not meet Waste Acceptance Criteria requirements for disposal in inert landfill facilities.	Pollutant concentrations in dredged material to be disposed are limited to acceptable levels through regulatory licensing processes. Information with regards to the type of disposal site with regards to its effects on sediments has not been provided. Correspondence with Marine Scotland has previously concluded that disposal sites in Scotland are Dispersive.
General Ecological Implications	Licensed landfill would be away from protected species and habitats with measures in place to prevent or minimise pollution of the surrounding environment.	Disposal at Cloch Point site has historically been used and is the closest licensed disposal site.

Criteria	Landfill	Sea Disposal
Interference with other legitimate activities	Potential from limited short term local impact to commercial operations in the area of the dredged material handling and road hauling principally related to noise and dust potential.	Designated disposal site, as such there is considered no significant impact to commercial vessels or commercial fishing.
Amenity / Aesthetic Implications	Odour release from dewatering facility. Increase traffic noise during transportation from dewatering facility to landfill facility. Potential for spillages on haul route. No significant additional visual/ odour/noise effects as using existing landfill site.	Limited short term visual / odour / noise effects as dredged material is transported by dredger and disposed of below sea level.

3.1.3 BPEO Cost Assessment

An operating cost estimate is provided in the table below. It should be noted that the rates in Table 4a are based on the dredged spoil being able to be transferred ashore in its as dug state and do not allow for placing within a bunded area, draining the material or transporting in watertight wagons. If any of these are required, the costs would increase significantly.

Table 3-4 provides details on the Cost assessment for each option taken forward for detailed BPEO assessment:

Table 3-4: BPEO Cost Analysis

Disposal Option	Activity Description	Weight (Tons)	Unit Cost (Tonne)	Cost (£)
Landfill Disposal	Excavation	46,330	1.50	69,495
	Transport by barge	46,330	3.00	138,990
	Transfer to lorry	46,330	2.00	92,660
	Transport by lorry	46,330	8.00	370,640
	Disposal to land	46,330	2.50	115,825
	Total	**46,330**	**17**	**£787,610**
Sea Disposal	**Sea Disposal**	**46,330**	**4.50**	**£208,485**

3.2 BPEO Assessment Discussion

For each of the above assessment criteria, the options were qualitatively and semi-quantitatively (for costs) assessed against feasibility/preference and awarded a ranking ranging from 1 to 4; 1 being the most acceptable and 4 being the least acceptable option. The assignment of rank was on the basis of professional judgement.

The individual assessment criteria rankings for each option were added up to give an overall hierarchy of preference. Table 3-5 below provides a summary of the BPEO assessment.

Table 3-5: BPEO Summary

Criteria	Landfill Disposal	Sea Disposal
Environment	4	2
Strategic	4	2
Costs	4	1
TOTAL SCORE	**12**	**5**

Disposal to landfill is considered to be the least suitable option for the dredged material. It contravenes the principles of minimising waste and reducing landfilling. Several stages in material handling operations would be required to dispose of the material by this route. The cost associated with setting up a suitable treatment facility to dewater the dredged material is significant. Transportation of material by road is also undesirable as a result of increased traffic and the potential for accidental spillages. Landfill capacity is also typically limited and potentially unable to accommodate the quantities of material typically generated by the River Clyde dredging operations. Any surplus dredged material will therefore require to be disposed of via an alternative route.

Deposition of the dredged material at a licensed marine disposal site has traditionally been deemed acceptable. The licensed marine disposal site has been designed to allow easy access as well as being capable of accommodating the quantities of material typically generated by dredging activities. Material handling is limited to transportation thereby reducing the risk for pollution incidences occurring. Pollutant concentrations within sediments are also limited to acceptable levels through regulatory requirements. On comparison with other disposal options the cost associated with sea disposal of the dredged material is considered to be the most financially viable.

3.3 Conclusions

The Best Practicable Environmental Option for disposal of the River Clyde dredged material has therefore been assessed as sea disposal.

As identified in the sediment chemical quality section, further assessment is deemed necessary to confirm the suitability of the sediment for sea disposal. The following section details this assessment.

4 FURTHER ASSESSMENT

As detailed in Section 1, on the basis of the exceedances of Action Level 1, further assessment to determine the suitability of the material for sea disposal is deemed a requirement.

The approach for this further assessment is outlined as follows:

- Provide an overview of the proposed dredge works and the identified disposal site including existing chemical monitoring data for the site where available; and
- Compare existing chemical data with other recognised sediment assessment criteria including those listed below. Summary tables are provided in Appendix B.

Background Assessment Concentration (BAC) - BACs were developed by the OSPAR Commission (OSPAR) for testing whether concentrations are near background levels. Mean concentrations significantly below the BAC are said to be near background. However, it should be noted that river catchments have their own unique geochemical finger prints and are also governed by the geology within the catchment, so in theory one set of background level values is not applicable to all situations;

Effects Range Low (ERL) - ERLs were developed by the United States Environmental Protection Agency (USEPA) for assessing the ecological significance of sediment concentrations. Concentrations below the ERL rarely cause adverse effects in marine organisms. Concentrations above the ERL will often cause adverse effects in some marine organisms;

Probable Effects Level (PEL) – PELs (Marine) have been adopted from the Canadian Environmental Quality Guidelines http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/) If a concentration is recorded above the PEL this is the probable effect range within which adverse effects frequently occur. The Threshold Effect levels (TELs) have been included in the summary table in Appendix C, but have not been used as part of the further assessment as they typically fall below the RAL1

Review of potential risks to the list of receptors identified in “Water Framework Directive Assessment: estuarine and coastal waters (https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters) to draw conclusions from available information and provide recommendation for proposed disposal routes.

4.1 Background Data – Dredge and Disposal Site

Cloch Point Disposal site is located in the Firth of Clyde and is licensed annually to receive close to 830,000 tonnes of dredge material. Less than half of the annual licensed capacity has been used in the past 3 years.

Marine Scotland noted that in Scotland the preference for disposal site selection is those which are dispersive, and as such it is assumed that the Cloch Point disposal ground is dispersive.

Chemical analysis data for samples collected from the disposal ground in 1995, 1997, 2003, and 2005 were provided for review by Marine Scotland, to enable an assessment of the existing conditions at the site to be undertaken. A high-level review of these data highlights the following with the summary table presented as Table C in Appendix C with observations as follows:

- Average concentrations at Cloch Point exceed the ERL for chromium, copper, mercury, lead, zinc and benzo(a)pyrene (PAHs)

- Average concentrations at Cloch Point exceed the PEL for lead and benzo(a)pyrene (PAHs)
- The maximum concentrations of the following contaminants exceed the PEL at Cloch Point chromium, copper, mercury, lead and zinc as well as PCBs (ICEs 7) and various PAH species including benzo(a)pyrene.

4.2 Analytical Data Review

Existing analytical data for the proposed dredge site is provided in Summary Table A in Appendix C. This data has been summarised against RAL 1 & 2, the BAC, ERL and PEL. As detailed previously, the data has not been reviewed against the Canadian TEL as these numbers are typically lower than RAL1.

A summary of the exceedances is detailed below:

Existing analytical data for the proposed dredge site is provided in Appendix C.

4.3 Analytical Summary

The information can be summarised as follows:

- All 24 samples exceed RAL1 for one or more metal;
- All 24 samples record exceedances of RAL1 for various PAH species;
- All 24 samples record RAL1 exceedances for THC
- 22 of 24 samples record total PCBs above RAL1;
- The ERL is exceeded in all samples by various metals and PAHs where values are available for review;
- The PEL is exceeded for cadmium (4 samples), chromium (14 samples) copper (13 samples), mercury (6 samples), lead (21samples) and zinc (21 samples). The PEL is exceeded in all 24 samples for a number of PAHs

4.4 Averages

Review of the averaged data as presented in in Appendix C for both sites i.e. considering the material as a single volume for disposal. The concentrations of the various contaminants of concern are quite variable, the review of average data against the available adopted assessment criteria are as follows:

- Averaged concentrations for both sites exceeded RAL1 for all contaminants of concern with the exception of arsenic and TBT.

- Averaged concentrations of cadmium, chromium, copper, lead, mercury, zinc, and various PAH species exceed the ERL;

- Chromium, copper, lead, zinc, naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, pyrene, chrysene, benzo(a)pyrene and dibenz(a,h)anthracene recorded averages which were above the PEL;

- All samples recorded average concentrations below RAL2.

4.5 Chemical Assessment Conclusions

The majority of the contaminants were recorded over AL1 for a range of contaminants, with the average concentrations for the material exceeding AL1.

Individual samples recorded concentrations that exceeded AL2 for certain contaminants, however the average concentrations were noted to be below the AL2 for all contaminants of concern.

The Partick average were generally recorded as being slightly higher than the average concentrations for the Cloch Point site. When compared to the maximum concentrations only the average cadmium value is noted to exceed the Cloch Point data.

On the basis of the average results for the Partick Data the sediment does not record an exceedance of AL2 and the data set is generally considered to be similar with the range of concentrations in the existing Cloch Point data. As such the disposal of the sediment from the Partick site is not considered to have a detrimental impact to the chemical conditions at the disposal ground and is largely similar in chemical nature due to the industrial heritage of the River Clyde.

It is noted that there are currently a number of projects which will incorporate disposal of sediment at Cloch Point including the ongoing routine maintenance dredge and the CWRR project. Materials from these may allow for additional capping of the Partick material following disposal.

4.6 Water Framework Directive Assessment

As outlined in the Water Framework Directive Assessment: estuarine and coastal waters, there are several key receptors which can be impacted upon including the following:

- Hydromorphology
- Biology – habitats
- Biology – fish
- Water quality
- Protected areas

Each of these points are considered in Table 4-1 below:

Table 4-1: Receptor Risk Assessment

Key Receptor[1]	Brief Summary of Potential Effects on Receptor	Further Consideration Required?	Comment
Hydromorphology (Source Area and Disposal Site)	Morphological conditions, for example depth variation, the seabed and intertidal zone structure tidal patterns, for example dominant currents, freshwater flow and wave exposure	No	The dredge site is within the Inner Clyde Estuary which is classified as a Heavily Modified Water Body (HWMB) of Moderate Status/Potential[2]. The disposal site is located within the Firth of Clyde Inner - Dunoon and Wemyss Bay area which is Classified as Good and is not considered to be heavily Modified. The classification of this water body takes into account the presence of the disposal site, so no further assessment is considered to be required.
Biology - habitats	Included to assess potential impacts to sensitive/high value habitats.	No	The inner and outer Clyde Estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay are all classified as Good Potential/Status or pass for Coastal and Transitional Waters for fish. The outer Clyde Estuary has been classified as High Potential Status for macro invertebrates. There was no classification for the inner estuary. Clyde Inner - Dunoon and Wemyss Bay are all classified as Good Potential/Status or pass for Coastal waters for macro invertebrates. Proposed material to be deposited as part of dredging campaign(s) similar in nature with material previously deposited. No further assessment considered necessary.

[1] https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters
[2] https://map.environment.gov.scot/sewebmap/

Key Receptor[1]	Brief Summary of Potential Effects on Receptor	Further Consideration Required?	Comment
Biology – fish	Consideration of fish both within the estuary and also potential effects on migratory fish in transit through the estuary	No	The inner Clyde Estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay are all classified as Good Potential/Status or pass for Coastal and Transitional Waters for fish. Proposed material to be deposited as part of dredging campaign(s) similar in nature with material previously deposited. No further assessment considered necessary. It is noted that under periods of exceptionally hot and dry weather the potential for oxygen related issues to arise i.e. oxygen depletion and it is proposed that dredging works will be avoided as far as practicable during such times.
Water Quality	Consideration must be given to water quality when contaminants are present in exceedance of CEFAS RAL1 and RAL 2.	No	The inner Clyde Estuary is classified as Bad potential/status or fail for “specific pollutants”. The outer estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay are classified as Good potential/status or pass for “specific pollutants”. No classification is provided for the inner Clyde Estuary for status for “priority pollutants”. The Outer estuary and Firth of Clyde Inner - Dunoon and Wemyss Bay both are both classified as Good Potential/Status or pass for Coastal and Transitional Waters. Contaminants are noted to exceed CEFAS RAL1 and RAL2 within sediment samples. It is noted that sediments with comparable contaminant levels have been deposited at Cloch Point historically, chemical status has not been affected. Potential effects are considered to be both local and temporary. Further consideration of potential effects is discussed in section 4.7 for completeness.

Key Receptor[1]	Brief Summary of Potential Effects on Receptor	Further Consideration Required?	Comment
Protected Areas	If your activity is within 2km of any WFD protected area, include each identified area in your impact assessment. • special areas of conservation (SAC) • special protection areas (SPA) • shellfish waters • bathing waters • nutrient sensitive areas	Yes	The proposed disposal site is not located within 2km of an SAC or SPA, marine protected area or Ramsar sites. The disposal site is located approximately 4.5km from the closest designated bathing water at Lunderston Bay. The dredge and disposal sites are not designated as shellfish water. The closest Shellfish Waters Protected Areas are located at Kyles of Bute and Loch Striven over 20km to the south and west; and Loch Long located approximately 20km north of the disposal site. The locations of dredging activity area are within close proximity to (but not within) the Inner Clyde SPA and River Clyde Ramsar site. The minimum distance between any of the dredge areas and the designated SPA/Ramsar is approximately 40m. The Inner Clyde Estuary has been notified as a Special Protection Area (SPA) under the EC Wild Birds Directive and as a Ramsar site under international designation. The dredging activities are focussed adjacent to the maintained channel area of the River Clyde. The birds of the estuary feed on the eelgrass, mussel beds, and on the abundant invertebrate fauna of the intertidal mudflats, sandflats and saltmarsh which are not included with the proposed works.

4.7 Potential Risk to Water Quality and Marine Life

The potential risks to water quality at the dredge sites and disposal site are further considered as all other receptors have been screened out of the assessment.

SEPA classified the coastal water body Firth of Clyde Inner - Dunoon and Wemyss in the area of the disposal ground as “good” for both specific and priority pollutants in 2018[3]. The dredge area is in the Inner estuary, which has an estuarine classification of “moderate ecological potential” (SEPA, 2018). No further information was available relating to the reason for the moderate status.

Although there are contaminants of concern above the RAL1 and RAL2 within the sediment for disposal, it is considered that these levels will not contribute to an overall degradation of water quality in proximity to the disposal site. While any effects are considered to be both localised and temporary, the potential for dilution in the Firth of Clyde (Firth of Clyde Inner - Dunoon and Wemyss) is considerable when comparing the size of disposal site in relation to the wider Firth of Clyde.. On this basis the risks from the sediment are considered to be low, with the associated dilution potential providing further mitigation.

The key contaminants for impacting water quality are considered to be metals as these have the potential to dissolve/desorb from sorption sites, whereas the organic contaminants (e.g. PAHs and PCBs) have a greater affinity for the organic materials which they are bound to, and are more likely to remain strongly bound to the sediment, or if become dissolved, quickly adsorbed onto organic matter within the water column or sediments.

Additionally, the sediment quality within the disposal ground which is also noted to contain levels of contaminants of concern, with some recorded to exceed the PEL, does not appear to have impacted on the Water Quality classification of “good” in this area.

The key risk is considered to be an increase in turbidity/suspended solids during the disposal activity, although this is likely to cause localised degradation in water quality, it is considered that this will be a local and temporary event and has been factored in to the selection and location of the agreed disposal ground. The material is similar in chemical nature to material previously deposited.

The sediment material primarily ranges silt to gravel with the dominant fraction recorded as silt.

Consultation previously undertaken with Marine Scotland in November 2017 indicated there was no recent information regarding modelling or dispersion studies for the area. On this basis, there is no current information available to inform the potential for dispersion of sediment out with the disposal grounds (i.e. water current velocity, stratification in water column, weather impacts etc). The disposal site is a sacrificial disposal ground and as such there is considered to be an allowance for some lateral dispersal of materials within the area of disposal.

The dominant sediment type at the site is silt. Considering the dredge volume as a whole using averaged particle size analysis data, the dominant sediment type is silt comprising up to 86.2% silt and the remainder made up of sand and a minor content of gravel.

Once deposited larger grained materials (rock, gravel and sands) will fall quickly to the bottom, while finer grained material (silt and clay) can suspend for longer within the water column. If the finer grained material is cohesive and in clumps, the it will sink much quicker than if in a slurry.

[3] https://map.environment.gov.scot/sewebmap/

It is noted that the Cloch Point disposal grounds have been utilised for the maintenance dredge disposal from the River Clyde for a number of previous exercises (including the period of the most recent SEPA water quality classification for chemical status of the waterbody which accommodates the disposal grounds as “good”).

On the basis of the information from dredge disposal to the Cloch Point site, it is considered that the potential for impact to the Water Environment out with the disposal grounds from the clay/silt sediment fractions is considered to be low.

The associated risk with degradation of water quality directly associated with the proposed disposal is considered to be Low i.e. unlikely to cause a change in status of the waterbodies in question at both the dredge and disposal sites.

4.8 Conclusions and Recommendations

Review of available information has highlighted that although several contaminants of concern exceed RAL1 and RAL2 sediment samples (no exceedances of RAL2 when the average concentrations of the material are considered), assessment of key receptors identified from the Water Framework Directive assessment for estuarine and coastal waters concluded that there is a low risk of the sediments impacting upon the overall ecological or chemical status. Additionally, the contaminants of concern levels recorded in the sediment are not considered likely to have a significant adverse impact on the sediment quality already located within the disposal grounds and are at similar levels previously deposited at Cloch Point.

Overall, based on the multiple lines of evidence approach adopted to further assess the exceedances identified in the sediment assessment, the recommendation for sea disposal is considered to be the preferred option.

The sea disposal option is considered to have no significant long-term impact on the marine environment; the disposal site is readily accessible from all the dredging areas and is the most cost effective option.

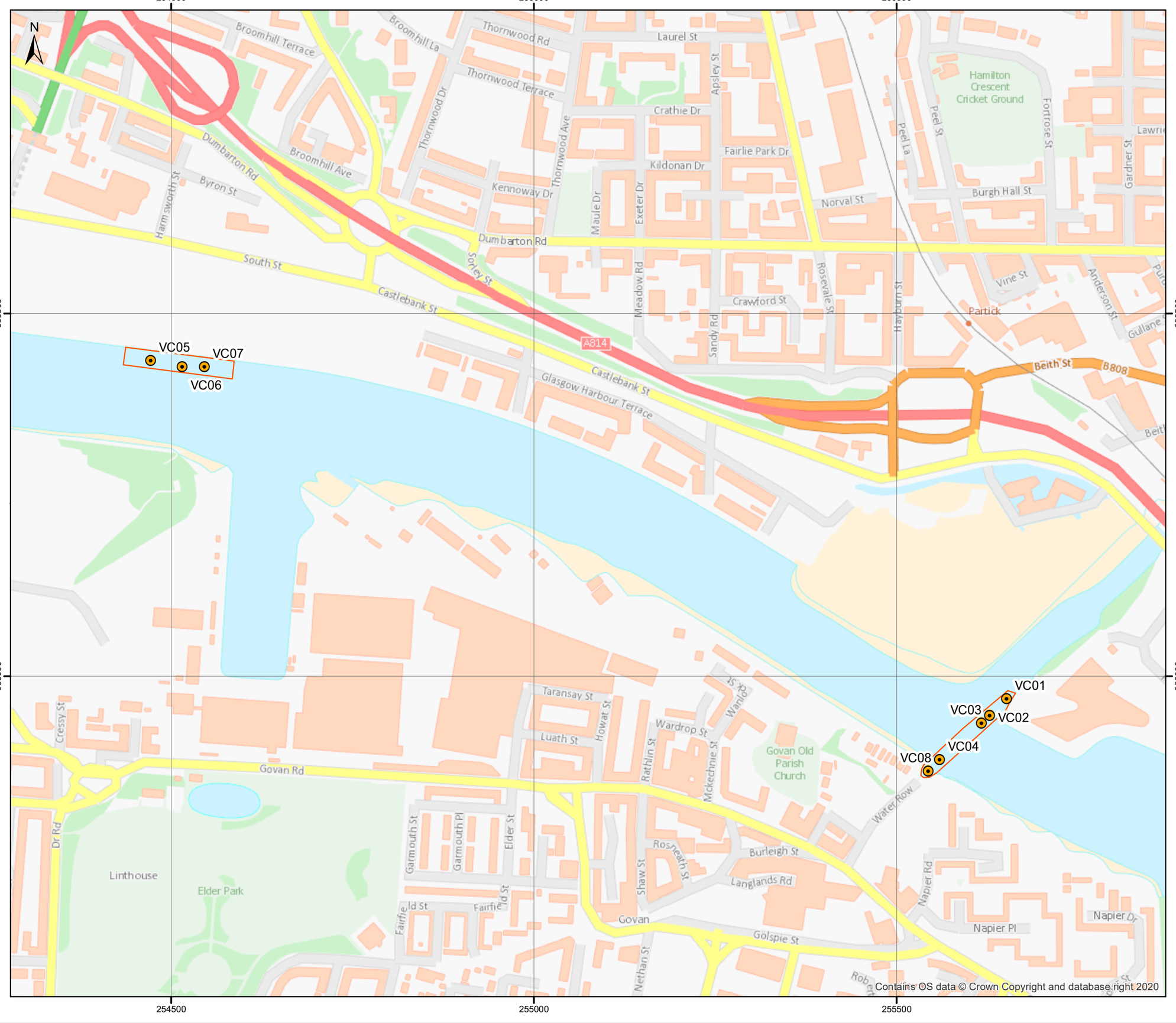
REFERENCES

Marine Scotland (2017). *Pre-Dredge Sampling Guidance Version 2*: Scottish Government.

Marine Scotland (2015). *Guidance for Marine Licence Applicants Version 2*: Scottish Government.

APPENDICES

A FIGURES



Legend

- Vibrocore
- Approximate Dredge Areas

Do not scale this map

Client
Arch Henderson

Project
Partick Bridge

Title
Vibrocore Locations - February 2021

Status
Final

Drawing No.	Revision	Date
174260-GIS002	-	11 Feb. 2021
Drawn	**Checked**	**Approved**
NC	FR	GD

Scale
1:5,000 @A3
0 25 50 100 150 Metres

Rev	Date	Amendment	Initials
-	-	-	-

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B SEDIMENT SAMPLING REPORT

Govan to Partick Bridge
Sediment Sampling Report

March 2021

Govan to Partick Bridge
Sediment Sampling Report

Client:	Arch Henderson
Document number:	9459
Project number:	174260
Status:	Final
Author:	Natasha Caven
Reviewer:	Graeme Duff
Date of issue:	1 March 2021
Filename:	Govan to Partick Sediment Reports

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Contents

Appendices

Tables

1 INTRODUCTION

1.1 Background

In October 2020, Arch Henderson on behalf of Glasgow City Council appointed EnviroCentre Ltd to undertake the collection of eight sediment samples from the proposed Govan to Partick Bridge area, including:

- The layby berth dredge area;
- Point Key Main Dredge;
- Point Key side area;
- South Pier; and,
- North Pier

These samples were collected to support a dredge licence application required as part of the construction works for the proposed crossing. The dredging and disposal activities are regulated by Marine Scotland under the Marine (Scotland) Act 2010. The licensing conditions require representative samples to be collected and the nature (i.e. physical composition), quality and contamination status to be determined.

In total, 8 cores were taken from within the dredge are. The samples were sub –sampled for analysis in accordance with best practice, as described in the Sampling Plan and Method Statement.

Sample locations and the proposed dredge area are detailed in Drawing No. 174260-GIS002 in Appendix A

1.2 Action Levels

Two action levels are currently used to assess the suitability of sea based disposal of dredged sediment material AL1 and AL2.

Sediment with contaminant concentrations below AL1 is generally considered to be below background levels for contamination and is suitable for disposal at sea.

For samples between AL1 and AL2, additional risk assessment may be required including further sampling and testing to fully identify pockets of contamination or implementation of bioassays to assess the suitability of the material for marine disposal. This would need to be agreed with, and approved by, Marine Scotland.

Material above AL2 Is generally considered to be unsuitable for disposal to sea. If the sea disposal route is to be pursued, further testing along the lines of bioassay accompanied by robust justification for selection of the BPEO may be required. This would need to be supported further with additional information regarding any mitigation measures which could be put in place as part of these works. This would require further discussion and agreement with Marine Scotland.

1.3 Scope of Report

The following report detailed the sampling methodology, analytical suite and field results of the sediment sampling works.

1.4 Report Usage

The information and recommendations contained within this report have been prepared in the specific context stated above and should not be utilised in any other context without prior written permission from EnviroCentre.

If this report is to be submitted for regulatory approval more than 12 months following the report date, it is recommended that it is referred to EnviroCentre for review to ensure that any relevant changes in data, best practice, guidance or legislation in the intervening period are integrated into an updated version of the report.

2 SAMPLING LOCATIONS AND METHODOLOGY

Sampling works were undertaken on 4th February 2021. The following section details the sampling methodology used to retrieve sediment samples.

2.1 Sample Locations

Sediment cores were collected from eight locations. Sample station locations are outlined in Table 2-1.

Sample Station ID	Latitude	Longitude	Easting	Northing
VC01	55°51.91296'	-004°18.49160'	255651.674	665969.184
VC02	55°51.90012'	-004°18.51290'	255628.442	665946.549
VC03	55°51.89400'	-004°18.52308'	255617.036	665935.754
VC04	55°51.86604'	-004°18.57704'	255559.352	665885.685
VC05	55°51.85710'	-004°18.59185'	255543.602	665869.71
VC06	55°52.13970'	-004°19.56577'	254545.627	666427.26
VC07	55°52.13916'	-004°19.59451'	254515.102	666427.26
VC08	55°52.14264'	-004°19.63692'	254471.527	666435.435

2.2 Survey Vessel

Sampling works were undertaken from the vessel *Challenger of Leith*. The vessel was operated by Coastworks, with EnviroCentre Ltd personnel undertaking the sampling works.

2.3 Navigation and Sample Location

Sample stations were navigated to using pre-determined coordinates. The sample stations were located using a combination of a Trimble Kenai Tablet and Trimble TDC100 GPS equipment, as well as the vessel's navigation system. Once in position, the spud legs were deployed to keep the vessel in position. Sampling equipment was then deployed and recovered. The position was then recorded on the GPS device. The spud legs would then be lifted and the vessel moved to the next sample location.

2.4 Sample Collection

Core samples were recovered using a vibrocorer with 75mm sample tube. The vibrocorer was deployed and recovered using the deck mounted crane.

Once the tube was recovered, the core was detached from the head unit, and the recovery depth and sediment type at the base were noted. Where necessary, additional attempts were made at the same location to obtain a better recovery and/or meet the required sampling depth. Cores were sub-sampled on the vessel immediately after collection.

All core samples were supplemented by a grab sample, to ensure there was sufficient surface sediment for analysis. Grab samples were obtained using a 0.045m^2 stainless steel Van Veen grab sampler. Recovered material was emptied into a plastic bucket ready for sub-sampling. Where required, the grab was deployed multiple times to ensure enough sample was recovered for testing.

2.5 Field Information

The following field data was recorded for each sample obtained:

- A unique sample ID;
- Sample location;
- Sample coordinate in latitude and longitude in degrees, minutes and decimals of minutes;
- Date, time and depth of collection;
- Sampler's ID;
- Sediment description;
- Sample photographs(); and,
- Detailed of any deviation from sampling protocol.

2.6 Sample Preparation

Cores were cut into subsections and extruded into a plastic core holder, spilt in half lengthways, photographed and logged prior to sub sampling. Grab samples were also photographed and logged prior to sub-sampling.

Where part of a core was not required to be sub-sampled, these sections were labelled, capped and retained by EnviroCentre.

Samples for metals and particle sized analysis were sub-sampled using a plastic spoon and stored in plastic tubs. Samples for organic analysis were collected using stainless steel spoons and stored in amber glass jars.

Sampling equipment (spoons etc) were cleaned with sea water between samples to minimise the risk of cross contamination.

Once samples had been placed within appropriate containers, they were labelled and placed immediately into cool boxes. Samples were dispatched to the project laboratory (Socotec) on 5th February 2021.

2.7 Analysis Requirements

The laboratory analysis required by Marine Scotland (MS-LOT), and undertaken as part of this investigation, was as follows:

- Metals – Arsenic, Chromium, Cadmium, Copper, Mercury, Nickel, Lead, Zinc;
- Organotins – Tributyl Tin and Dibutyl Tin (TBT)
- Polycyclic Aromatic Hydrocarbons (PAH USEPA 16);
- Polychlorinated Biphenyls (PCB ICES 7);
- Total Hydrocarbons (TPH);
- Moisture Content;
- Total Organic Carbon (TOC);
- Particle Size Analysis (PSA); and,
- Asbestos (presence/absence)

Samples were sent to Socotec's Marine Laboratory for analysis.

3 RESULTS

The following section details sample results. Core sample logs are provided in Appendix B. The laboratory certificate is provided in Appendix C and a summary sheet highlighting exceedances above the RALs in Excel format accompanies this report in the submission to Marine Scotland.

3.1 Sediment Summary

Sediment generally comprised of soft, dark grey silt. Full descriptions and photographs for each sampling station are provided in Appendix B.

3.2 Physical Analysis

3.2.1 Particle Size Analysis (PSA)

The Particle Size Analysis data set for each sample is included within Appendix C.

3.3 Chemical Analysis

3.3.1 Chemical Analysis Assessment Criteria

All chemical analysis results were assessed against Revised Action Levels (RAL) criteria as adopted by Marine Scotland. The results are summarised in sections 3.3 and 3.4 summary reports detailing exceedances in the Marine Scotland format have been submitted along with the supporting information for the application. The laboratory certificate is provided in Appendix C.

Where contaminants has RALs as adopted by Marine Scotland, exceedances above these criteria are summarised in Table 3-1 , along with the maximum concentration recorded for each parameter.

Table 3-1: Exceedances of Revised Action Levels and Maximum Concentrations

Contaminant	No. Exceedances (of 24 samples)		Maximum Concentration (mg/kg) and Location
	RAL 1	RAL2	
Arsenic	1	0	28.2 (VC04 0.0 – 0.15m)
Cadmium	20	4	4.6 (VC01 1.1 – 1.6m)
Copper	23	1	300.2 (VC08 0.0 – 0.15m)
Chromium	22	2	465.4 (VC04 1.85 - 2.35m)
Lead	23	1	423.6 (VC01 1.10 - 1.60m)
Mercury	23	0	1.07(VC04 1.85 - 2.35m)
Nickel	22	0	56.0 (VC08 1.00 - 1.50m)
Zinc	17	7	977.4 (VC04 1.85 - 2.35m)
PAH (All Species)	24	-	19,100 (Phenanthrene at VC03 1.6 – 2.1m)
PCBs	18	4	351.8 (VC03 1.60 - 2.10m)
TBT	5	0	0.323 (VC08 1.50 - 2.00m)
TPH			11,000 (Total Hydrocarbon Content at VC01 0.60 – 1.10m)

All samples recorded exceedances above RAL 1 for more than one metal, with 7 samples exceeding RAL 2 for at least one metal. All samples recorded exceedances for PAH species. All samples exceeded RAL 1 for TPH. Out of 24 samples, 18 exceeded RAL1 for PCBs, with a further 4 exceeding RAL2.

Parameters exceeding RAL1 and RAL 2 for each sample are given in Table 3-2.

Table 3-2: Exceedances above RAL 1 and RAL 2 by sample

Sample Station ID	Depth (m)	Parameters Exceeding RAL 1	Parameters Exceeding RAL 2
VC01	0.0 – 0.15	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH	-
	0.6 – 1.1	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	1.1 – 1.6	Chromium, Copper, Mercury, Nickel, PAH, PCBs	Cadmium, Lead, Zinc
VC02	0.0 – 0.15	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	0.6 – 1.1	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	1.1 – 1.6	Copper, Mercury, Nickel, Lead, PAH, PCBs, TBT	Cadmium, Chromium, Zinc
VC03	0.0 – 0.15	Cadmium, Chromium, Copper, Mercury, Lead, Zinc, PAH, PCBs	-
	1.1 – 1.6	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH	PCBs
	1.6 – 2.1	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH	PCBs
VC04	0.0 – 0.15	Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	1.2 – 1.7	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, PAH, PCBs, TBT	Zinc, PCBs
	1.85 – 2.35	Copper, Mercury, Nickel, Lead, PAH, PCBs, TBT	Cadmium, Chromium, Zinc
VC05	0.0 – 0.15	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	1.25—1.75	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	2.0 – 2.5	Cadmium, Chromium, Copper, Lead, Zinc, PAH, PCBs	-
VC06	0.0 – 0.15	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	0.9 – 1.4	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PAH, PCBs	-
	1.4 – 1.9	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PCBs	-
VC07	0.0 – 0.15	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PCBs	-

	1.2 – 1.7	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PCBs	-
	1.85 – 2.35	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PCBs	-
VC08	0.0 – 0.15	Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, PCBs	-
	1.0 – 1.5	Chromium, Mercury, Nickel, Lead, PCBs	Cadmium, Copper, Zinc, TBT
	1.5 – 2.0	Cadmium, Chromium, Copper, Mercury, Nickel, Lead	Zinc, PCBs, TBT

3.4 Asbestos

Asbestos was detected within the following samples:

- VC02 1.40-1.90m
- VC03 1.10-1.60m
- VC03 1.60-2.10m
- VC04 0.00-0.15m
- VC04 1.20-1.70m
- VC04 1.85-2.35m
- VC05 0.00-0.15m
- VC05 1.25-1.75m
- VC05 2.00-2.50m
- VC06 1.40-1.90m
- VC07 1.20-1.70m
- VC07 1.85-2.35m
- VC08 1.00-1.50m

4 SUMMARY

A pre-dredge sampling exercise was undertaken within the area of the proposed Govan to Partick Crossing on the River Clyde in January 2021. Eight core samples were obtained, all supplemented by an additional Van-Veen grab sample. A total of 24 sediment samples were submitted for analysis for the standard Marine Scotland suite.

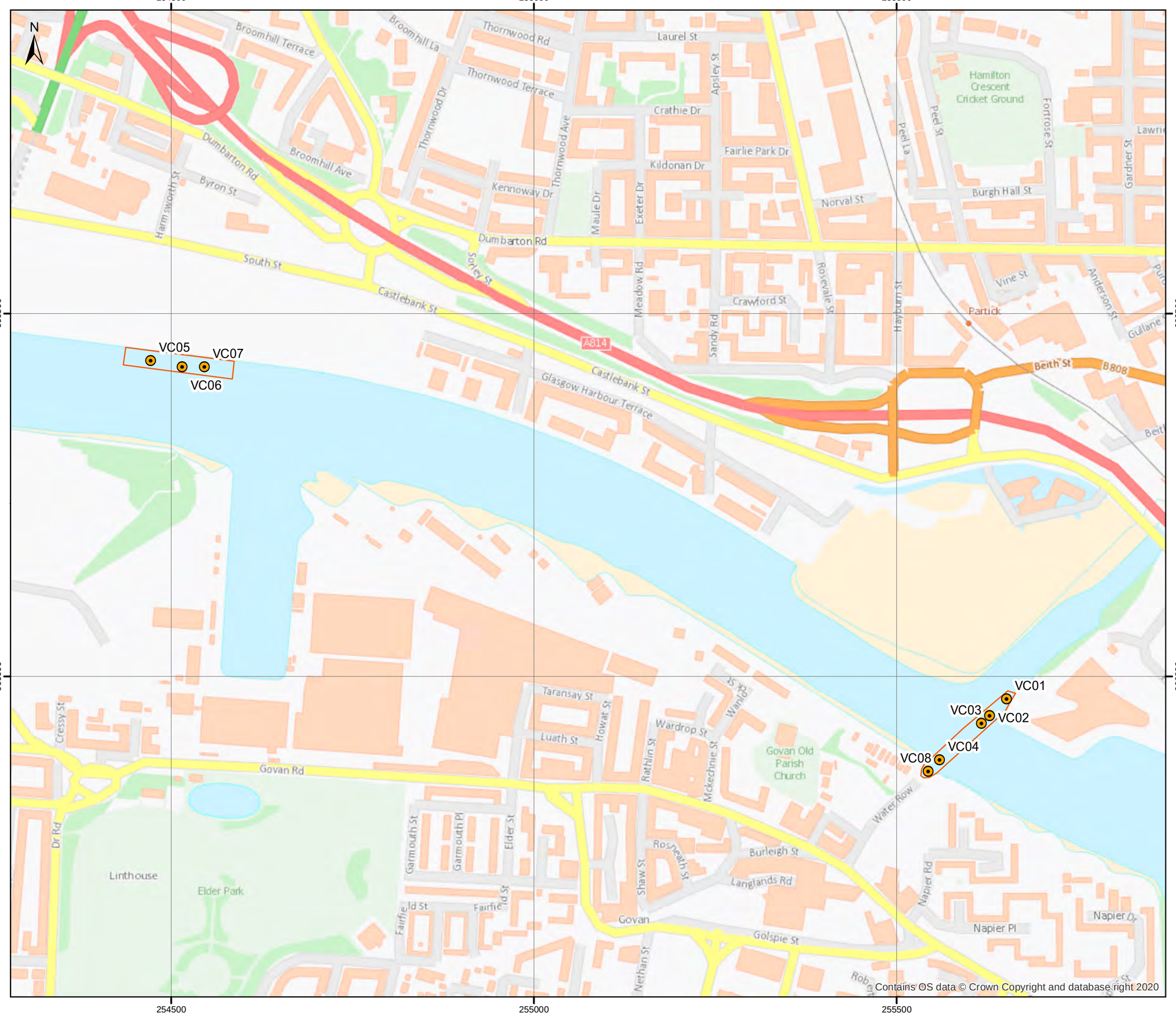
Sediment generally comprised soft, dark grey silt.

All samples recorded exceedances above RAL 1 for more than one metal, with 7 samples exceeding RAL 2 for at least one metal. All samples recorded exceedances for PAH species. All samples exceeded RAL 1 for TPH. Out of 24 samples, 18 exceeded RAL1 for PCBs, with a further 4 exceeding RAL2.

Asbestos was detected in 13 out of 24 samples.

APPENDICES

A FIGURES



Legend

- Vibrocore
- Approximate Dredge Areas

Do not scale this map

Client
Arch Henderson

Project
Partick Bridge

Title
Vibrocore Locations - February 2021

Status
Final

Drawing No.	Revision	Date
174260-GIS002	-	11 Feb. 2021
Drawn	**Checked**	**Approved**
NC	FR	GD

Scale 1:5,000 @A3 (0 25 50 100 150 Metres)

Rev	Date	Amendment	Initials
-	-	-	-

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B SEDIMENT LOGS

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC01**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 10:15	**Latitude/Longitude:**	55°51.91296', -004°18.49160'
Dredge Area:	Bridge	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	1.6m

Remarks:

0.0m – 0.2m
Soft black silt with rare leaf litter.

0.2m – 0.7m
Dark grey brown clayey silt with thin interbedded fine gravel throughout.

0.7m – 1.6m
Dark grey black clayey silt. Rare twigs and leaves.

Biota: One ragworm noted in top 0.2m.

Odours: Faint H_2S odour from 0.7m – 1.6m

Anthropogenic Inputs: None noted.

Notes: Two attempts made. Attempt #2 was sub sampled.

0.0m – 0.6m of core retained.

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC02**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 11:00	**Latitude/Longitude:**	55°51.90012', -004°18.51290'
Dredge Area:	Bridge	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	1.9m

Remarks:

0.0m – 0.15m
Soft black silt with occasional leaf litter.

0.9m – 1.9m
Soft black clayey silt with rare shell fragments. Occasional interbedding with grey clayey silt layer. Rare rootlets.

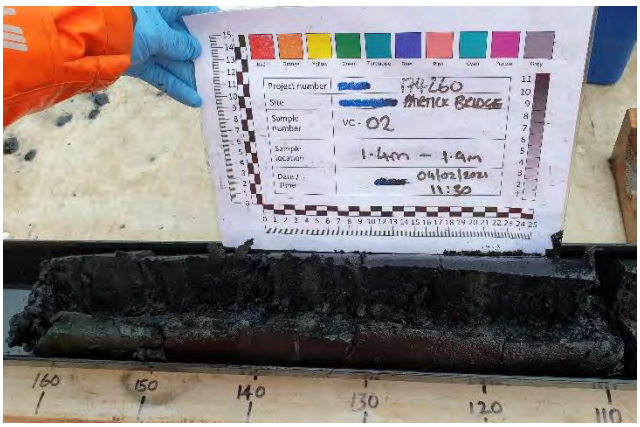
Biota: None noted.

Odours: Slight H_2S odour throughout.

Anthropogenic Inputs: None noted,

Notes: Three attempts made. Attempt #3 sub sampled.

0.0m – 0.5m retained.
0.5m – 0.9m partly retained. Part of core lost during transportation.



envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC03**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 11:45	**Latitude/Longitude:**	55°51.89400', -004°18.52308'
Dredge Area:	Bridge	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	2.1m

Remarks:

0.0m – 0.15m
Soft black silt with occasional leaf litter.

1.1m – 1.3m
Soft black silt within occasional twigs.

1.3m – 1.4m
Black silt and fine to coarse sand.

1.4m – 2.1m
Soft black silt with occasional grey interbedding.

Biota: Several ragworms noted within top 0.15m.

Odours: Possible hydrocarbon odour at depth.

Anthropogenic Inputs: None noted.

Notes: Three attempts made. Attempt #3 sub sampled.

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC04**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 12:20	**Latitude/Longitude:**	55°51.86604', -004°18.57704'
Dredge Area:	Bridge	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	2.35m

Remarks:

0.0m – 0.15m
Soft black silt with occasional twigs and leaf litter.

1.2m - 1.9m
Soft black silt with occasional hydrocarbon sheen and rare twigs.

1.9m – 2.35m
Soft black silt.

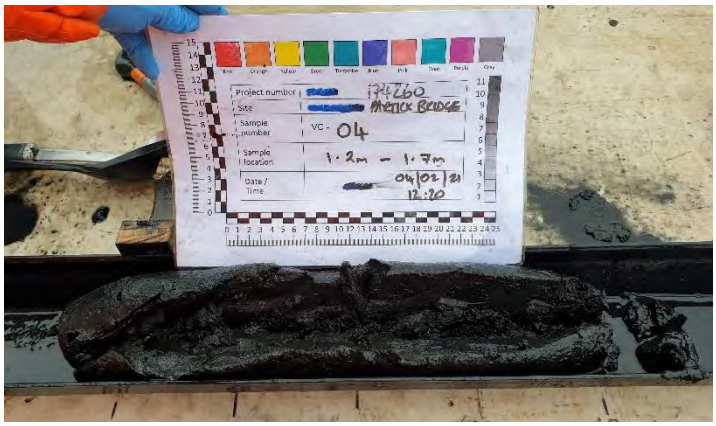
Biota: Several ragworms in top 0.15m.

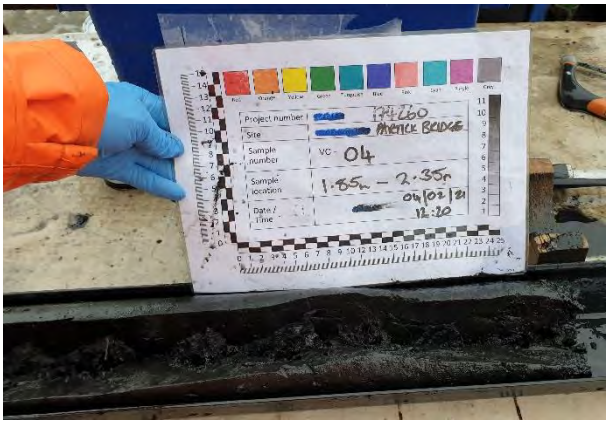
Odours: Hydrocarbon odour from 1.2m - 2.35m.

Anthropogenic Inputs: None noted.

Notes: Two attempts made. Attempt #2 sub –sampled

0.0m – 0.6m and 0.6m – 1.2m retained.





envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC05**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 15:30	**Latitude/Longitude:**	55°52.14264', -004°19.63692'
Dredge Area:	Layby Berth	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	2.5

Remarks:

0.0m – 0.15m
Soft black brown silt with rare leaf litter and twigs.

1.25m – 1.75m
Soft black silt

1.75m - 2.5m
Soft dark grey brown slightly clayey silt.

Biota: Several ragworms within top 0.15m.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: One attempt made.

0.0m – 0.6m; 0.6m – 1.25m & 1.75m – 2.0m retained.

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC06**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 15:00	**Latitude/Longitude:**	55°52.13916', -004°19.59451'
Dredge Area:	Layby Berth	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	1.9m

Remarks:

0.0m – 0.15m
Soft black silt with rare leaf litter.

0.9m – 1.6m
Solft black slightly clayey silt.

1.6m – 1.9m
Soft black slightly clayey silt interbedded with dark grey fine to medium sand.

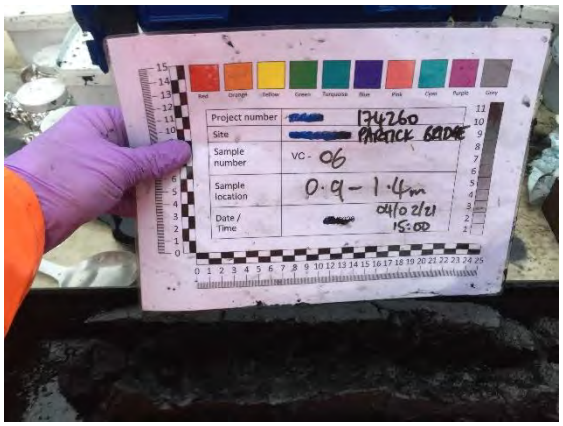
Biota: Several ragworms and two mussels noted within top 0.15m.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: Two attempts made. Attempt #2 sub sampled.

0.0m – 0.5m & 0.5m – 0.9m retained.



envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC07**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 14:30	**Latitude/Longitude:**	55°52.13970', -004°19.56577'
Dredge Area:	Layby Berth	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	1.6

Remarks:

0.0m – 0.15m
Soft black silt with rare leaf litter.

1.2m – 2.1m
Soft black silt.

2.1m – 2.35m
Soft black silt interbedded with dark grey fine to medium sand.

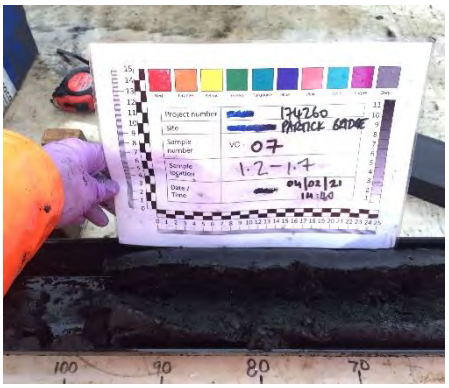
Biota: Two ragworms noted in top 0.15m.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: One attempt made – core barrel hit hard base.

0.0 m – 0.6m & 0.6m – 1.2m retained.



envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	Govan to Partick Bridge	**Location ID**
	Project No.	174260	**VC08**
	Client	Arch Henderson	

SEDIMENT CORE LOG

Date/Time:	04/02/21 12:45	**Latitude/Longitude:**	55°51.85710', -004°18.59185'
Dredge Area:	Bridge	**Sampled/logged by:**	AK/FR/NC
Method:	0.045m^2 Van-Veen Grab & Vibrocore	**Core Length (m):**	2.0m

Remarks:

0.0m – 0.15m
Soft black silt with rare leaf litter.

1.0m – 2.0m
Soft black silt with rare rootlets.

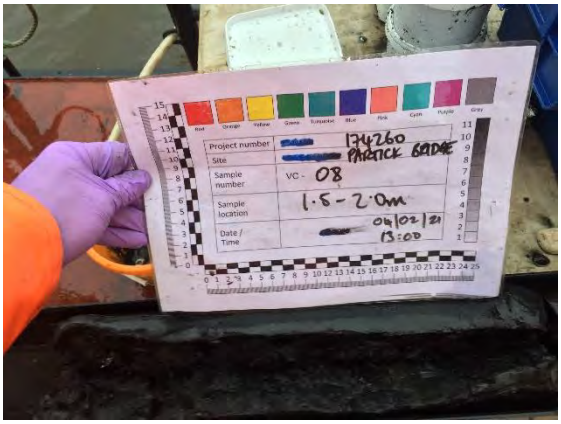
Biota: None noted.

Odours: Slight H_2S odour within top 0.15m.

Anthropogenic Inputs: Small piece of metal at 1.8m.

Notes: Four attempts made due to insufficient core in barrel – assumed sediment too soft to hold within core. Attempt #4 sub sampled.

0.0m – 0.5m & 0.5m – 1.0m retained.



C LABORATORY CERTIFICATE

Certificate of Analysis

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

Test Report ID	**MAR00912**	
Issue Version	1	
Customer	Envirocentre, Craighall Business Park, 8 Eagle Street, Glasgow, G4 9XA	
Customer Reference	Partick to Govan Marine Scotland Sediment Analysis	
Date Sampled	04-Feb-21	
Date Received	08-Feb-21	
Date Reported	01-Mar-21	
Condition of samples	Ambient	Satisfactory

[Redacted]

Authorised by: Marya Hubbard

Position: Laboratory Manager

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

Certificate of Analysis

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

Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	%	%	%	%	%	N/A	% M/M
		Method No	ASC/SOP/303	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*	SUB_02*	SOCOTEC Env Chem*
		Limit of Detection	0.2	0.2	N/A	N/A	N/A	N/A	0.02
		Accreditation	UKAS	UKAS	N	N	N	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Total Moisture @ 120°C**	**Total Solids**	**Gravel (>2mm)**	**Sand (63-2000 µm)**	**Silt (<63 µm)**	**Asbestos**	**TOC**
VC01 0.00-0.15	MAR00912.001	Sediment	69.4	30.6	0.0	42.9	57.1	NADIS	6.49
VC01 0.60-1.10	MAR00912.002	Sediment	52.1	47.9	6.6	37.6	55.8	NADIS	7.64
VC01 1.10-1.60	MAR00912.003	Sediment	49.4	50.6	0.4	34.1	65.5	NADIS	7.77
VC02 0.00-0.15	MAR00912.004	Sediment	57.6	42.4	3.7	38.4	57.8	NADIS	7.18
VC02 0.90-1.40	MAR00912.005	Sediment	49.9	50.1	0.0	33.5	66.5	NADIS	8.81
VC02 1.40-1.90	MAR00912.006	Sediment	51.4	48.6	0.0	22.0	78.0	AM	8.28
VC03 0.00-0.15	MAR00912.007	Sediment	65.5	34.5	1.5	44.8	53.7	NADIS	7.64
VC03 1.10-1.60	MAR00912.008	Sediment	32.2	67.8	2.1	47.6	50.2	AM	5.68
VC03 1.60-2.10	MAR00912.009	Sediment	38.9	61.1	6.5	41.3	52.2	CH	6.82
VC04 0.00-0.15	MAR00912.010	Sediment	68.8	31.2	0.0	37.2	62.8	CH	4.04
VC04 1.20-1.70	MAR00912.011	Sediment	61.5	38.5	0.0	20.0	80.0	CH	6.64
VC04 1.85-2.35	MAR00912.012	Sediment	49.3	50.7	0.0	32.5	67.5	CH, AM	4.84
VC05 0.00-0.15	MAR00912.013	Sediment	69.2	30.8	0.0	29.8	70.2	CH, AM	5.68
VC05 1.25-1.75	MAR00912.014	Sediment	53.2	46.8	5.4	19.3	75.3	AM	5.78
VC05 2.00-2.50	MAR00912.015	Sediment	21.0	79.0	4.3	73.7	21.9	CH	2.38
VC06 0.00-0.15	MAR00912.016	Sediment	66.8	33.2	0.0	28.5	71.5	NADIS	6.02
VC06 0.90-1.40	MAR00912.017	Sediment	54.9	45.1	0.0	23.8	76.2	NADIS	4.62
VC06 1.40-1.90	MAR00912.018	Sediment	52.4	47.6	0.0	52.7	47.3	CH	3.11
VC07 0.00-0.15	MAR00912.019	Sediment	65.1	34.9	0.0	29.0	71.0	NADIS	4.69
VC07 1.20-1.70	MAR00912.020	Sediment	57.8	42.2	0.0	16.5	83.5	CH	6.82
VC07 1.85-2.35	MAR00912.021	Sediment	41.4	58.6	0.0	29.8	70.2	AM	4.47
VC08 0.00-0.15	MAR00912.022	Sediment	73.5	26.5	0.0	31.7	68.3	NADIS	7.78
VC08 1.00-1.50	MAR00912.023	Sediment	64.1	35.9	0.0	14.1	85.9	AM	8.05
VC08 1.50-2.00	MAR00912.024	Sediment	63.1	36.9	0.4	13.4	86.2	NADIS	7.64
		Reference Material (% Recovery)	N/A	N/A	N/A	N/A	N/A	N/A	104
		QC Blank	N/A	N/A	N/A	N/A	N/A	N/A	<0.02

* See Report Notes
NADIS - No Asbestos Detected In Sample
CH - Chrysotile Detected in Sample
AM - Amosite Detected in Sample

Certificate of Analysis

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

Test Report ID	MAR00912
Issue Version	1
Customer Reference	Partick to Govan Marine Scotland Sediment Analysis

		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS	UKAS	UKAS	UKAS	N	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Arsenic**	**Cadmium**	**Chromium**	**Copper**	**Mercury**	**Nickel**	**Lead**	**Zinc**
VC01 0.00-0.15	MAR00912.001	Sediment	12.4	0.91	59.00	51.40	0.34	31.0	111.2	255.5
VC01 0.60-1.10	MAR00912.002	Sediment	19.2	2.12	77.60	96.80	0.61	43.2	258.0	494.7
VC01 1.10-1.60	MAR00912.003	Sediment	17.9	4.60	180.8	153.8	0.85	47.7	423.6	807.0
VC02 0.00-0.15	MAR00912.004	Sediment	12.9	1.16	123.2	68.70	0.43	32.7	135.1	307.2
VC02 0.90-1.40	MAR00912.005	Sediment	16.3	2.53	196.9	119.9	0.66	38.9	263.0	559.0
VC02 1.40-1.90	MAR00912.006	Sediment	19.8	4.39	419.9	200.5	0.97	39.7	334.5	811.4
VC03 0.00-0.15	MAR00912.007	Sediment	11.3	1.04	120.5	64.60	0.35	29.3	122.5	322.9
VC03 1.10-1.60	MAR00912.008	Sediment	15.4	1.92	205.8	111.6	0.62	32.0	212.2	497.5
VC03 1.60-2.10	MAR00912.009	Sediment	17.5	2.27	238.5	129.8	0.74	36.8	249.8	581.8
VC04 0.00-0.15	MAR00912.010	Sediment	28.2	1.15	146.6	87.60	0.47	39.6	154.2	341.4
VC04 1.20-1.70	MAR00912.011	Sediment	16.9	3.16	344.2	171.8	0.88	53.1	301.5	730.4
VC04 1.85-2.35	MAR00912.012	Sediment	19.7	4.26	465.4	214.1	1.07	52.2	389.1	977.4
VC05 0.00-0.15	MAR00912.013	Sediment	14.1	1.32	179.9	102.6	0.47	45.7	163.0	429.5
VC05 1.25-1.75	MAR00912.014	Sediment	15.3	1.58	237.4	124.9	0.59	45.1	196.6	478.3
VC05 2.00-2.50	MAR00912.015	Sediment	11.8	0.95	123.6	57.90	0.24	27.7	95.30	256.8
VC06 0.00-0.15	MAR00912.016	Sediment	11.9	0.95	135.0	74.10	0.35	38.8	118.9	315.9
VC06 0.90-1.40	MAR00912.017	Sediment	16.5	1.71	249.8	146.8	0.61	51.2	208.8	506.4
VC06 1.40-1.90	MAR00912.018	Sediment	13.4	1.18	151.8	76.20	0.31	38.6	137.6	340.1
VC07 0.00-0.15	MAR00912.019	Sediment	9.80	0.80	111.9	62.00	0.30	36.6	104.9	257.5
VC07 1.20-1.70	MAR00912.020	Sediment	13.2	1.16	174.5	95.30	0.45	40.8	145.6	353.0
VC07 1.85-2.35	MAR00912.021	Sediment	15.8	1.75	233.6	122.6	0.56	46.0	189.9	485.8
VC08 0.00-0.15	MAR00912.022	Sediment	13.4	4.26	137.5	300.2	0.47	53.9	260.0	773.8
VC08 1.00-1.50	MAR00912.023	Sediment	14.8	2.55	264.6	152.0	0.64	56.0	250.3	635.2
VC08 1.50-2.00	MAR00912.024	Sediment	16.5	3.36	312.0	154.3	0.72	51.0	288.4	748.7
Certified Reference Material SETOC 774 (% Recovery)			101	95	97	97	95	95	94	100
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

* See Report Notes

Certificate of Analysis

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

Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
VC01 0.00-0.15	MAR00912.001	Sediment	24.5	<5
VC01 0.60-1.10	MAR00912.002	Sediment	27.4	93.7
VC01 1.10-1.60	MAR00912.003	Sediment	22.9	59.1
VC02 0.00-0.15	MAR00912.004	Sediment	12.6	<5
VC02 0.90-1.40	MAR00912.005	Sediment	32.5	58.8
VC02 1.40-1.90	MAR00912.006	Sediment	46.8	158
VC03 0.00-0.15	MAR00912.007	Sediment	<5	<5
VC03 1.10-1.60	MAR00912.008	Sediment	12.3	43.1
VC03 1.60-2.10	MAR00912.009	Sediment	12.6	10.8
VC04 0.00-0.15	MAR00912.010	Sediment	19.3	88.5
VC04 1.20-1.70	MAR00912.011	Sediment	110	303
VC04 1.85-2.35	MAR00912.012	Sediment	45.1	315
VC05 0.00-0.15	MAR00912.013	Sediment	<5	<5
VC05 1.25-1.75	MAR00912.014	Sediment	26.5	54.7
VC05 2.00-2.50	MAR00912.015	Sediment	<5	<5
VC06 0.00-0.15	MAR00912.016	Sediment	22.2	<5
VC06 0.90-1.40	MAR00912.017	Sediment	41.3	43.5
VC06 1.40-1.90	MAR00912.018	Sediment	43.5	53.4
VC07 0.00-0.15	MAR00912.019	Sediment	20.6	<5
Certified Reference Material BCR-646 (% Recovery)			87	72
QC Blank			<1	<1

* See Report Notes

Certificate of Analysis

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

Test Report ID	MAR00912
Issue Version	1
Customer Reference	Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
VC07 1.20-1.70	MAR00912.020	Sediment	34.9	26.4
VC07 1.85-2.35	MAR00912.021	Sediment	34.2	50.8
VC08 0.00-0.15	MAR00912.022	Sediment	27.5	<5
VC08 1.00-1.50	MAR00912.023	Sediment	37.5	143
VC08 1.50-2.00	MAR00912.024	Sediment	104	323
Certified Reference Material BCR-646 (% Recovery)			94	74
QC Blank			<1	<1

* See Report Notes

Certificate of Analysis

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

Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
VC01 0.00-0.15	MAR00912.001	Sediment	221	92.0	551	1050	987	953
VC01 0.60-1.10	MAR00912.002	Sediment	2750	698	3140	4650	4870	4390
VC01 1.10-1.60	MAR00912.003	Sediment	2330	779	2710	4110	4220	3910
VC02 0.00-0.15	MAR00912.004	Sediment	81.4	37.0	171	359	423	443
VC02 0.90-1.40	MAR00912.005	Sediment	1090	511	1800	2660	2750	2510
VC02 1.40-1.90	MAR00912.006	Sediment	1290	582	2100	3340	3440	3400
VC03 0.00-0.15	MAR00912.007	Sediment	176	82	314	733	831	925
VC03 1.10-1.60	MAR00912.008	Sediment	552	472	1230	2470	2430	2220
VC03 1.60-2.10	MAR00912.009	Sediment	4520	490	6210	6680	6350	4910
VC04 0.00-0.15	MAR00912.010	Sediment	281	77.3	360	936	992	1160
VC04 1.20-1.70	MAR00912.011	Sediment	293	249	675	2360	2300	2520
VC04 1.85-2.35	MAR00912.012	Sediment	774	827	2220	6400	6190	6570
VC05 0.00-0.15	MAR00912.013	Sediment	202	71.9	281	852	992	1050
VC05 1.25-1.75	MAR00912.014	Sediment	120	84.8	380	932	983	1200
Certified Reference Material QPH100MS (% Recovery)			101	117	105	103	100	96
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Certificate of Analysis

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

Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BKF**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**
VC01 0.00-0.15	MAR00912.001	Sediment	781	483	1100	158	2440	273
VC01 0.60-1.10	MAR00912.002	Sediment	3480	2760	5620	729	12700	2850
VC01 1.10-1.60	MAR00912.003	Sediment	3010	2700	4890	715	10700	2430
VC02 0.00-0.15	MAR00912.004	Sediment	415	219	419	85.8	728	112
VC02 0.90-1.40	MAR00912.005	Sediment	2030	1640	3160	513	7220	1360
VC02 1.40-1.90	MAR00912.006	Sediment	2550	2010	3960	626	8110	1590
VC03 0.00-0.15	MAR00912.007	Sediment	791	397	728	138	1590	228
VC03 1.10-1.60	MAR00912.008	Sediment	1640	1290	2690	404	5610	586
VC03 1.60-2.10	MAR00912.009	Sediment	4060	3620	7460	929	19000	4370
VC04 0.00-0.15	MAR00912.010	Sediment	986	514	1020	176	1810	186
VC04 1.20-1.70	MAR00912.011	Sediment	2020	942	2040	435	2360	332
VC04 1.85-2.35	MAR00912.012	Sediment	4020	3970	5790	977	14100	1130
VC05 0.00-0.15	MAR00912.013	Sediment	919	391	818	154	1530	184
VC05 1.25-1.75	MAR00912.014	Sediment	928	812	979	195	1790	304
Certified Reference Material QPH100MS (% Recovery)			101	98	101	105	93	91
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Certificate of Analysis

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

Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**INDPYR**	**NAPTH**	**PHENANT**	**PYRENE**	**THC**
VC01 0.00-0.15	MAR00912.001	Sediment	836	666	1990	2130	689000
VC01 0.60-1.10	MAR00912.002	Sediment	3620	1990	9920	11400	11000000
VC01 1.10-1.60	MAR00912.003	Sediment	3130	1830	8580	9580	9370000
VC02 0.00-0.15	MAR00912.004	Sediment	429	226	554	677	500000
VC02 0.90-1.40	MAR00912.005	Sediment	2160	1460	5200	6340	2020000
VC02 1.40-1.90	MAR00912.006	Sediment	2740	1840	5900	7470	2590000
VC03 0.00-0.15	MAR00912.007	Sediment	852	375	781	1440	757000
VC03 1.10-1.60	MAR00912.008	Sediment	1730	969	2140	4940	1660000
VC03 1.60-2.10	MAR00912.009	Sediment	4180	6740	19100	17000	2220000
VC04 0.00-0.15	MAR00912.010	Sediment	1050	265	748	1750	858000
VC04 1.20-1.70	MAR00912.011	Sediment	2300	702	1260	4590	2160000
VC04 1.85-2.35	MAR00912.012	Sediment	4360	1630	3430	15900	2860000
VC05 0.00-0.15	MAR00912.013	Sediment	880	184	596	1450	818000
VC05 1.25-1.75	MAR00912.014	Sediment	957	295	930	1710	1180000
Certified Reference Material QPH100MS (% Recovery)			105	94	97	97	97~
QC Blank			<1	<1	<1	<1	<100

For full analyte name see method summaries
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As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Certificate of Analysis

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

Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
VC05 2.00-2.50	MAR00912.015	Sediment	68.0	29.3	82.2	129	142	139
VC06 0.00-0.15	MAR00912.016	Sediment	89.5	52.8	240	622	751	755
VC06 0.90-1.40	MAR00912.017	Sediment	168	93.2	409	995	1100	1190
VC06 1.40-1.90	MAR00912.018	Sediment	168	73.5	334	737	816	889
VC07 0.00-0.15	MAR00912.019	Sediment	92.5	53.0	241	573	681	701
VC07 1.20-1.70	MAR00912.020	Sediment	145	91.4	378	1050	1220	1320
VC07 1.85-2.35	MAR00912.021	Sediment	227	125	431	698	755	822
VC08 0.00-0.15	MAR00912.022	Sediment	75.2	50.0	198	553	673	693
VC08 1.00-1.50	MAR00912.023	Sediment	303	159	587	1610	1700	1820
VC08 1.50-2.00	MAR00912.024	Sediment	507	385	1130	3070	3270	3090
Certified Reference Material QPH100MS (% Recovery)			96	129	92	77	78	76
QC Blank			<1	<1	<1	<1	<1	<1

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		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BKF**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**
VC05 2.00-2.50	MAR00912.015	Sediment	109	85.1	132	21.9	355	101
VC06 0.00-0.15	MAR00912.016	Sediment	641	466	657	124	1350	137
VC06 0.90-1.40	MAR00912.017	Sediment	913	584	1150	182	2000	254
VC06 1.40-1.90	MAR00912.018	Sediment	701	435	907	141	1530	256
VC07 0.00-0.15	MAR00912.019	Sediment	593	313	613	89.3	1240	139
VC07 1.20-1.70	MAR00912.020	Sediment	995	608	1160	199	2150	227
VC07 1.85-2.35	MAR00912.021	Sediment	613	386	796	133	1580	371
VC08 0.00-0.15	MAR00912.022	Sediment	615	345	658	93.3	1140	110
VC08 1.00-1.50	MAR00912.023	Sediment	1390	1120	1690	284	2220	247
VC08 1.50-2.00	MAR00912.024	Sediment	2480	1820	3590	509	4510	495
Certified Reference Material QPH100MS (% Recovery)			91	91	86	91	86	85
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries
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Test Report ID MAR00912
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Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**INDPYR**	**NAPTH**	**PHENANT**	**PYRENE**	**THC**
VC05 2.00-2.50	MAR00912.015	Sediment	83.4	32.4	186	454	102000
VC06 0.00-0.15	MAR00912.016	Sediment	602	141	572	1390	1350000
VC06 0.90-1.40	MAR00912.017	Sediment	924	263	1030	1950	2630000
VC06 1.40-1.90	MAR00912.018	Sediment	694	300	1010	1520	2010000
VC07 0.00-0.15	MAR00912.019	Sediment	577	218	583	1170	1470000
VC07 1.20-1.70	MAR00912.020	Sediment	1010	251	978	2070	2150000
VC07 1.85-2.35	MAR00912.021	Sediment	618	274	1020	1550	1840000
VC08 0.00-0.15	MAR00912.022	Sediment	529	152	585	1090	1710000
VC08 1.00-1.50	MAR00912.023	Sediment	1390	320	1020	3360	3900000
VC08 1.50-2.00	MAR00912.024	Sediment	2570	613	1630	6940	5090000
Certified Reference Material QPH100MS (% Recovery)			91	81	85	90	104~
QC Blank			<1	<1	<1	<1	<100

For full analyte name see method summaries
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Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB138**	**PCB153**	**PCB180**
VC01 0.00-0.15	MAR00912.001	Sediment	2.40	2.76	2.88	2.28	3.15	2.81	2.10
VC01 0.60-1.10	MAR00912.002	Sediment	9.35	7.44	6.86	5.22	7.13	6.39	4.82
VC01 1.10-1.60	MAR00912.003	Sediment	10.5	16.8	17.0	14.4	19.8	18.4	15.2
VC02 0.00-0.15	MAR00912.004	Sediment	3.19	4.47	4.99	3.00	4.02	3.38	2.42
VC02 0.90-1.40	MAR00912.005	Sediment	7.40	10.1	9.49	7.29	10.9	12.6	7.84
VC02 1.40-1.90	MAR00912.006	Sediment	15.9	24.2	17.0	14.0	17.0	22.4	14.9
VC03 0.00-0.15	MAR00912.007	Sediment	6.29	8.72	7.37	5.98	8.42	7.93	6.95
VC03 1.10-1.60	MAR00912.008	Sediment	16.9	37.5	25.9	17.3	27.9	31.3	23.5
VC03 1.60-2.10	MAR00912.009	Sediment	42.3	76.1	45.4	36.2	51.1	53.7	47.0
VC04 0.00-0.15	MAR00912.010	Sediment	4.81	6.43	4.82	4.44	4.82	4.57	3.95
VC04 1.20-1.70	MAR00912.011	Sediment	20.1	23.7	23.5	17.1	28.5	33.9	31.3
VC04 1.85-2.35	MAR00912.012	Sediment	30.5	43.5	41.1	34.6	44.5	33.8	40.6
VC05 0.00-0.15	MAR00912.013	Sediment	5.14	6.50	4.72	4.56	4.84	4.90	3.68
VC05 1.25-1.75	MAR00912.014	Sediment	11.3	15.2	9.69	6.79	9.04	10.0	7.71
VC05 2.00-2.50	MAR00912.015	Sediment	1.57	1.96	1.45	1.04	1.40	1.49	1.17
VC06 0.00-0.15	MAR00912.016	Sediment	4.66	6.29	4.55	4.40	4.58	4.47	3.09
VC06 0.90-1.40	MAR00912.017	Sediment	12.0	16.4	10.4	10.9	8.99	11.3	7.12
Certified Reference Material QOR141 MS (% Recovery)			100	95	102	93	111	91	97
QC Blank			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

For full analyte name see method summaries
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Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB138**	**PCB153**	**PCB180**
VC06 1.40-1.90	MAR00912.018	Sediment	4.08	6.91	3.81	2.46	3.88	3.50	3.02
VC07 0.00-0.15	MAR00912.019	Sediment	3.54	4.37	3.18	2.78	3.56	2.73	2.37
VC07 1.20-1.70	MAR00912.020	Sediment	3.94	5.24	3.65	2.96	3.85	3.78	3.25
VC07 1.85-2.35	MAR00912.021	Sediment	7.71	10.5	7.11	5.89	7.83	7.28	6.48
VC08 0.00-0.15	MAR00912.022	Sediment	3.13	4.22	3.16	2.61	3.66	3.26	3.15
VC08 1.00-1.50	MAR00912.023	Sediment	22.1	24.9	22.0	18.2	21.2	20.0	16.7
VC08 1.50-2.00	MAR00912.024	Sediment	21.2	31.3	35.8	29.0	33.0	43.7	26.2
Certified Reference Material QOR141 MS (% Recovery)			96	87	102	101	108	88	92
QC Blank			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

For full analyte name see method summaries
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Test Report ID MAR00912
Issue Version 1
Customer Reference Partick to Govan Marine Scotland Sediment Analysis

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
SOCOTEC Env Chem*	MAR00912.001-024	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SUB_01*	MAR00912.001-024	Analysis was conducted by an approved subcontracted laboratory.
SUB_02*	MAR00912.001-024	Analysis was conducted by an approved subcontracted laboratory.
ASC/SOP/301	MAR00912.001, .004, .007, .013, .015, .016, .019, .022	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304	MAR00912.001-024	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene).This should be taken into consideration when utilising the data.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A

Certificate of Analysis

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Test Report ID	MAR00912
Issue Version	1
Customer Reference	Partick to Govan Marine Scotland Sediment Analysis

Method	Sample and Fraction Size	Method Summary
Total Solids	Wet Sediment	Calculation (100%-Moisture Content).Moisture content determined by drying a portion of the sample at 120°C to constant weight.
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Wet Sediment	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Metals	Air dried and seived to <63µm	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions

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

C DATA SUMMARY TABLES

Summary Table A1

Sampling Results Incorporated with BPEO Assessment (mg/kg)

	AL1	AL2	BAC	ERL	PEL	VC01 0.00-0.15	VC01 0.60-1.10	VC01 1.10-1.60	VC02 0.00-0.15	VC02 0.90-1.40	VC02 1.40-1.90	VC03 0.00-0.15	VC03 1.10-1.60	VC03 1.60-2.10	VC04 0.00-0.15	VC04 1.20-1.70	VC04 1.85-2.35	VC05 0.00-0.15	VC05 1.25-1.75	VC05 2.00-2.50	VC06 0.00-0.15	VC06 0.90-1.40	VC06 1.40-1.90	VC07 0.00-0.15	VC07 1.20-1.70	VC07 1.85-2.35	VC08 0.00-0.15	VC08 1.00-1.50	VC08 1.50-2.00	AVERAGE	No. Exceed RAL 1	No. Exceed RAL 2	No.Exceed BAC?	No. Exceed ERL	No. Exceed PEL?
Source			CSEMP	CSEMP	Canada																													
Arsenic	20	70	25		41.6	12.4	19.2	17.9	12.9	16.3	19.8	11.3	15.4	17.5	28.2	16.9	19.7	14.1	15.3	11.8	11.9	16.5	13.4	9.8	13.2	15.8	13.4	14.8	16.5	15.58	1	0	1	N/A	0
Cadmium	0.4	4	0.31	1.2	4.2	0.91	2.12	4.6	1.16	2.53	4.39	1.04	1.92	2.27	1.15	3.16	4.26	1.32	1.58	0.95	0.95	1.71	1.18	0.8	1.16	1.75	4.26	2.55	3.36	2.13	24	4	24	15	4
Chromium	50	370	81	81	160	59	77.6	180.8	123.2	197	420	121	206	239	147	344	465	180	237	124	135	250	152	112	175	234	138	265	312.0	203.75	24	2	22	22	14
Copper	30	300	27	34	108	51	97	153.8	69	119.9	200.5	64.6	111.6	129.8	87.6	171.8	214.1	102.6	124.9	57.9	74.1	146.8	76.2	62	95.3	122.6	300	152	154.3	122.48	24	1	24	24	13
Mercury	0.25	1.5	0.07	0.15	0.7	0.34	0.61	0.85	0.43	0.66	0.97	0.35	0.62	0.74	0.47	0.88	1.07	0.47	0.59	0.24	0.35	0.61	0.31	0.3	0.45	0.56	0.47	0.64	0.72	0.57	23	0	24	24	6
Nickel	30	150	36	-	-	31.0	43.2	47.7	32.7	38.9	39.7	29.3	32.0	36.8	39.6	53.1	52.2	45.7	45.1	27.7	38.8	51.2	38.6	36.6	40.8	46.0	53.9	56.0	51.0	41.98	22	0	19	N/A	N/A
Lead	50	400	38	47	112	111	258	424	135	263	335	123	212	250	154	302	389	163	197	95	119	209	138	104.9	146	190	260	250.3	288.4	213.08	24	1	24	24	21
Zinc	130	600	122	150	271	256	495	807	307	559	811	323	498	582	341	730	977	430	478	257	316	506	340	258	353	486	774	635	749	511.13	24	7	24	24	21
Napthalene	0.1		0.08	0.16	0.391	0.666	1.990	1.830	0.226	1.460	1.840	0.375	0.969	6.740	0.265	0.702	1.630	0.184	0.295	0.032	0.141	0.263	0.300	0.218	0.251	0.274	0.152	0.320	0.613	0.91	23	N/A	23	21	10
Acenaphthylene	0.1		-	-	0.128	0.092	0.698	0.778	0.037	0.511	0.582	0.082	0.472	0.490	0.077	0.249	0.827	0.072	0.085	0.029	0.053	0.093	0.074	0.053	0.091	0.125	0.050	0.159	0.385	0.26	11	N/A	N/A	N/A	10
Acenaphthene	0.1		-	-	0.0889	0.221	2.75	2.33	0.0814	1.09	1.29	0.176	0.552	4.52	0.281	0.293	0.774	0.202487574	0.12	0.068	0.0895	0.168	0.168	0.0925	0.145	0.227	0.0752	0.303	0.5	0.69	19	N/A	N/A	N/A	21
Fluorene	0.1		-	-	0.144	0.273	2.850	2.430	0.112	1.360	1.590	0.228	0.586	4.370	0.186	0.332	1.130	0.184	0.304	0.101	0.137	0.254	0.256	0.139	0.227	0.371	0.110	0.247	0.495	0.76	24	N/A	N/A	N/A	19
Phenanthrene	0.1		0.032	0.24	0.544	1.990	9.920	8.580	0.554	5.200	5.900	0.781	2.140	19.100	0.748	1.260	3.430	0.596	0.930	0.186	0.572	1.030	1.010	0.583	0.978	1.020	0.585	1.020	1.63	2.91	24	N/A	24	23	23
Anthracene	0.1		0.05	0.085	0.245	0.551	3.140	2.710	0.171	1.800	2.100	0.314	1.230	6.210	0.360	0.675	2.220	0.281	0.380	0.082	0.240	0.409	0.334	0.241	0.378	0.431	0.198	0.587	1.13	1.09	23	N/A	24	23	19
Fluoranthene	0.1		0.039	0.6	1.494	2.440	12.700	10.700	0.728	7.220	8.110	1.590	5.610	19.000	1.810	2.360	14.100	1.530	1.790	0.355	1.350	2.000	1.530	1.240	2.150	1.580	1.140	2.220	4.51	4.49	24	N/A	24	23	19
Pyrene	0.1		0.024	0.665	1.398	2.130	11.400	9.580	0.677	6.340	7.470	1.440	4.940	17.000	1.750	4.590	15.900	1.450	1.710	0.454	1.390	1.950	1.520	1.170	2.070	1.550	1.090	3.360	6.94	4.49	24	N/A	24	23	19
Benzo(a)anthracene	0.1		0.016	0.261	0.693	1.050	4.650	4.110	0.359	2.660	3.340	0.733	2.470	6.680	0.936	2.360	6.400	0.852	0.932	0.129	0.622	0.995	0.737	0.573	1.050	0.698	0.553	1.610	3.07	1.98	24	N/A	24	23	19
Chrysene	0.1		0.02	0.384	0.846	1.100	5.620	4.890	0.419	3.160	3.960	0.728	2.690	7.460	1.020	2.040	5.790	0.818	0.979	0.132	0.657	1.150	0.907	0.613	1.160	0.796	0.658	1.690	3.59	2.17	24	N/A	24	23	16
Benzo(b)fluoranthene	0.1		-	-	-	0.953	4.390	3.910	0.443	2.510	3.400	0.925	2.220	4.910	1.160	2.520	6.570	1.050	1.200	0.139	0.755	1.190	0.889	0.701	1.320	0.822	0.693	1.820	3.09	1.98	24	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1		-	-	-	0.483	2.760	2.700	0.219	1.640	2.010	0.397	1.290	3.620	0.514	0.942	3.970	0.391	0.812	0.085	0.466	0.584	0.435	0.313	0.608	0.386	0.345	1.120	1.82	1.16	23	N/A	N/A	N/A	N/A
Benzo(a)pyrene	0.1		0.03	0.384	0.763	0.987	4.870	4.220	0.423	2.750	3.440	0.831	2.430	6.350	0.992	2.300	6.190	0.992	0.983	0.142	0.751	1.100	0.816	0.681	1.220	0.755	0.673	1.700	3.27	2.04	24	N/A	N/A	24	23	18
Indeno(1,2,3cd)pyrene	0.1		0.103	0.24	-	0.836	3.620	3.130	0.429	2.160	2.740	0.852	1.730	4.180	1.050	2.300	4.360	0.880	0.957	0.083	0.602	0.924	0.694	0.577	1.010	0.618	0.529	1.390	2.57	1.59	23	N/A	N/A	23	23	N/A
Benzo(ghi)perylene	0.1		0.08	0.085	-	0.781	3.480	3.010	0.415	2.030	2.550	0.791	1.640	4.060	0.986	2.020	4.020	0.919	0.928	0.109	0.641	0.913	0.701	0.593	0.995	0.613	0.615	1.390	2.48	1.53	24	N/A	N/A	24	24	N/A
Dibenzo(a,h)anthracene	0.01		-	-	0.135	0.158	0.729	0.715	0.086	0.513	0.626	0.138	0.404	0.929	0.176	0.435	0.977	0.154	0.195	0.022	0.124	0.182	0.141	0.089	0.199	0.133	0.093	0.284	0.509	0.33	24	N/A	N/A	N/A	18
TPH	100		-	-	-	689	11000	9370	500	2020	2590	757	1660	2220	858	2160	2860	818	1180	102	1350	2630	2010	1470	2150	1840	1710	3900	5090	2538.92	24	N/A	N/A	N/A	N/A
PCBs	0.02	0.18	-	-	0.189	0.01838	0.04721	0.1121	0.025	0.066	0.125	0.052	0.180	0.352	0.034	0.178	0.269	0.034	0.070	0.010	0.032	0.077	0.028	0.023	0.027	0.053	0.023	0.145	0.220	0.092	22	4	N/A	N/A	3
TBT	0.1	0.5	-	-	-	0.005	0.0937	0.0591	0.005	0.0588	0.158	0.005	0.0431	0.0108	0.0885	0.303	0.315	0.005	0.0547	0.005	0.005	0.0435	0.0534	0.005	0.0264	0.0508	0.005	0.143	0.323	0.0777	5	0	N/A	N/A	N/A

Note: Underlined Values are < LOD. Values highlighted red are equal to or greater than AL1.
PEL Data Source: http://ceqg-rcqe.ccme.ca/en/index.html#void

Summary Table B

River Clyde Average Concentrations

All units in mg/kg

	AL1	AL2	BAC	<ERL	PEL	Partick Data	Exceed AL1?	Exceed AL2?	Exceed BAC?	Exceed ERL ?	Exceed PEL?
Source			CSEMP	CSEMP	Canada						
Arsenic	20	70	25	-	41.6	15.6	No	No	No	N/A	No
Cadmium	0.4	4	0.31	1.2	4.2	2.1	**Yes**	No	**Yes**	**Yes**	No
Chromium	50	370	81	81	160	203.8	**Yes**	No	**Yes**	**Yes**	**Yes**
Copper	30	300	27	34	108	122.5	**Yes**	No	**Yes**	**Yes**	**Yes**
Mercury	0.25	1.5	0.07	0.15	0.7	0.6	**Yes**	No	**Yes**	**Yes**	No
Nickel	30	150	36	-	-	42.0	**Yes**	No	**Yes**	N/A	N/A
Lead	50	400	38	47	112	213.1	**Yes**	No	**Yes**	**Yes**	**Yes**
Zinc	130	600	122	150	271	511.1	**Yes**	No	**Yes**	**Yes**	**Yes**
					-						
Napthalene	0.1	-	0.08	0.16	0.319	0.91	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Acenaphthylene	0.1	-	-	-	0.128	0.26	**Yes**	N/A	N/A	N/A	**Yes**
Acenaphthene	0.1	-	-	-	0.0889	0.69	**Yes**	N/A	N/A	N/A	**Yes**
Fluorene	0.1	-	-	-	0.144	0.76	**Yes**	N/A	N/A	N/A	**Yes**
Phenanthrene	0.1	-	0.032	0.24	0.544	2.91	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Anthracene	0.1	-	0.05	0.085	0.245	1.09	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Fluoranthene	0.1	-	0.039	0.6	1.494	4.49	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Pyrene	0.1	-	0.024	0.665	1.398	4.49	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Benzo(a)anthracene	0.1	-	0.016	0.261	0.693	1.98	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Chrysene	0.1	-	0.02	0.384	0.846	2.17	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Benzo(b)fluoranthene	0.1	-	-	-	-	1.98	**Yes**	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1	-	-	-	-	1.16	**Yes**	N/A	N/A	N/A	N/A
Benzo(a)pyrene	0.1	-	0.03	0.384	0.763	2.04	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Indeno(1,2,3cd)pyrene	0.1	-	0.103	0.24	-	1.59	**Yes**	N/A	**Yes**	**Yes**	N/A
Benzo(ghi)perylene	0.1	-	0.08	0.085	-	1.53	**Yes**	N/A	**Yes**	**Yes**	N/A
Dibenzo(a,h)anthracene	0.01	-	-	-	0.135	0.33	**Yes**	N/A	N/A	N/A	**Yes**
TPH	100	-	-	-	-	2538.92	**Yes**	N/A	N/A	N/A	N/A
PCBs	0.02	0.18	-	-	0.189	0.092	**Yes**	No	N/A	N/A	No
TBT	0.1	0.5	-	-	-	0.078	No	No	N/A	N/A	N/A

Summary Table D
Disposal Site Average Data (mg/kg)

	AL1	AL2	BAC	<ERL	ISQG/TEL	PEL	Partick Dredge Average	Cloch Point Average	Cloch Point Maximum
Source			CSEMP	CSEMP	Canada				
Arsenic	20	70	25	-	7.2	41.6	15.6	15.2	28.36
Cadmium	0.4	4	0.31	1.2	0.7	4.2	2.1	0.7	1.52
Chromium	50	370	81	81	52.3	160	203.8	151.5	243.03
Copper	30	300	27	34	18.7	108	122.5	68.8	163.31
Mercury	0.25	1.5	0.07	0.15	0.13	0.7	0.6	0.6	2.84
Nickel	30	150	36	-	-	-	42.0	35.2	54.56
Lead	50	400	38	47	30.2	112	213.1	154.6	302.99
Zinc	130	600	122	150	124	271	511.1	259.6	1214.79
Napthalene	0.1		0.08	0.16	-	0.319	0.91		
Acenaphthylene	0.1		-	-	0.00587	0.128	0.26		
Acenaphthene	0.1		-	-	0.00671	0.0889	0.69		
Fluorene	0.1		-	-	0.0212	0.144	0.76		
Phenanthrene	0.1		0.032	0.24	0.0867	0.544	2.91		
Anthracene	0.1		0.05	0.085	0.0469	0.245	1.09		
Fluoranthene	0.1		0.039	0.6	0.113	1.494	4.49		
Pyrene	0.1		0.024	0.665	0.153	1.398	4.49		
Benzo(a)anthracene	0.1		0.016	0.261	0.0748	0.693	1.98		
Chrysene	0.1		0.02	0.384	0.108	0.846	2.17		
Benzo(b)fluoranthene	0.1		-	-	-	-	1.98		
Benzo(k)fluoranthene	0.1		-	-	-	-	1.16		
Benzo(a)pyrene	0.1		0.03	0.384	0.0888	0.763	2.04	0.84	3.090
Indeno(1,2,3cd)pyrene	0.1		0.103	0.24	-	-	1.59		
Benzo(ghi)perylene	0.1		0.08	0.085	-	-	1.53		
Dibenzo(a,h)anthracene	0.01		-	-	0.00622	0.135	0.33		
PCBs	0.02	0.18	-	-	0.0215	0.189	0.092	0.047	0.191
TBT	0.1	0.5	-	-	-	-	0.078	0.056	0.342