River Clyde Maintenance Dredge - July 2023
Best Practicable Environmental Options (BPEO) Report

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1 INTRODUCTION

1.1 Scope of Report

This Best Practicable Environmental Option report (BPEO) has been prepared by EnviroCentre Ltd with regard to renewing the maintenance dredge disposal licence for the River Clyde navigable channel and associated berths within the Clyde Estuary on behalf of Peel Ports Group Ltd. The sites are currently licenced on Dredging Licence MS-00008994 which expires 27th May 2024. Pre-dredge sampling was undertaken across the dredge areas in July 2023 as per the sampling plan EnviroCentre report 13480, June 2023.

Peel Ports Group routinely undertake dredging to maintain the shipping channel and associated berths in the River Clyde from Greenock eastwards.

These areas were the subject of the most recent sediment sampling campaign and the intention is that these sites are once again licensed for maintenance dredging purposes.

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.

At present, the exact dredging details are unconfirmed, but it is envisaged that dredging would be carried out potentially by a combination of Trailer Suction Hopper Dredger, Cutter suction dredger, Grab Hopper Dredger and Back-hoe Dredger as appropriate. Plough dredging is carried out in support of Trailer Suction Hopper Dredger operations and for limited and / or urgent dredging projects in between larger scale maintenance projects.

The sites are out with the Inner Clyde Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar designated areas. The minimum distance between any of the proposed dredge areas and designated ecological protected areas is approximately 40 metres.

1.2 Action Levels – AL1 vs AL2

Two action levels are currently used to assess the suitability of sea-based disposal of dredged sediment material: Revised Action Level 1 (RAL1) and Revised Action Level 2 (RAL2).

Sediment with contaminant concentrations below RAL1 is generally considered to be below background levels for contamination and is suitable for disposal at sea.

For samples recording contaminant concentrations between RAL1 and RAL2, additional risk assessment may be required including further sampling and testing to fully identify pockets of contamination or implementation of bioassays to assess the materials suitability for sea disposal.

Material recording contaminant concentrations above RAL2 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 a robust justification for selecting sea disposal as 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.

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2 SAMPLING LOCATIONS AND METHODOLOGY

Sediment sampling was undertaken in July 2023. The following section details the sampling methodology used to retrieve sediment samples. Works were undertaken in line with the Sampling Plan agreed with Marine Directorate Licencing Operations Team (EnviroCentre Document No. 13480, dated 13/06/2023),

The dredge areas and proposed volumes are detailed in Table 2-1 below and locations detailed in drawings Dredge areas are shown on Drawing No's 178303-GIS002A to 178303-GIS002F, in Appendix A.

Table 2-1: Proposed Dredge Areas and Approximate Dredge Volumes

Dredge Area	Estimated Annual Dredge Volume (m^3)	Dredge thickness (m)	No. of Dredge Samples
001	8,500	<1.0m	3
002	15,000	<1.0m	3
003	25,000	<1.0m	3
004	45,000	<1.0m	5
005	35,000	<1.0m	5
006	12,000	<1.0m	3
007	5,500	<1.0m	3
008	35,000	<1.0m	5
009	80,000	<1.0m	7
010 Greenock Ocean Terminal (GOT) Approaches	550	<1.0m	3
011 GOT Berth		<1.0m	
012 Adams Scrap Berth	7,500	<1.0m	3
014 Shieldhall Riverside (Bolls 1 – 23)		<1.0m	
013 KGV Dock	25,000	<1.0m	3
015 Rothesay Dock Canting Basin	13,900	<1.0m	7
016 River Cart Entrance		<1.0m	
017 Rothesay Dock		<1.0m	
Total	**307,950**	**-**	**53**

2.1 Sample Locations

52 samples were collected across the 17 dredge areas. Sample locations and dredge areas are detailed in Drawings 178303-GIS002A to 178303-GIS002F in Appendix A.

2.2 Sample Collection

All samples were collected using a 0.045m2 stainless steel van veen grab which was emptied into a plastic bucket for logging and sub sampling following best practice.

Sample logs are provided ion Appendix B.

2.3 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,
- Details of any deviation from sampling protocol.

2.4 Sample Preparation

Grab samples were photographed and logged prior to sub-sampling.

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 estuarine 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 for dispatch to the project laboratory (Socotec).

2.5 Analysis Requirements

The laboratory analysis undertaken as part of this assessment was as follows:

- Metals - Arsenic, Chromium, Cadmium, Copper, Mercury, Nickel, Lead, Zinc;
- Organotins - Tributyl Tin & Dibutyl Tin (TBT);
- Polycyclic Aromatic Hydrocarbons (PAH USEPA 16);
- Polychlorinated Biphenyls (PCB ICES 7);
- Total Hydrocarbons (THC);
- Moisture Content;
- Particle Size Analysis (PSA);

- Total Organic Carbon (TOC); and
- Asbestos (presence/absence).

Samples were dispatched to Socotec's Marine Laboratory for analysis, which holds UKAS accreditation for analysis of marine sediment samples.

2.6 Deviations from the Sampling Plan

There were no significant deviations from sampling plan. Samples from location SL03 was almost entirely shells and stones. Even with multiple attempts and changes of location, suitable material was not recovered. The laboratory could not test this sample which resulted in 52 samples from 53 being tested compared to the sample plan.

3 RESULTS

All chemical analytical results were assessed against Revised Action Levels (RAL) criteria as adopted by Marine Scotland. The results are summarised in sections 3.2 and 3.3 with the Summary Tables provided in Appendix C.

Summary reports detailing exceedances in the Marine Scotland format have been submitted along with the supporting information for the application. Please note that there is a formatting issue in the sheet which incorrectly highlights samples with results in exceedance of RAL2. This is noted where samples have a "<" denoting less than the limit of detection. So while the sheet indicates there is a breach of RAL2, there are no RAL2 exceedances with samples being below detectable limits where a "<" is denoted unless otherwise specified.

Where contaminants have RALs as adopted by Marine Scotland, recorded exceedances above these criteria are summarised in Table 3 1.

All chemical data is reported and assessed on a dry weight basis.

Further consideration of these exceedances undertaken in Section 4.

Table 3-1: Exceedances of Revised Action Levels

Contaminant	No. of Exceedances (of 52 samples)	
	RAL 1	RAL 2
Arsenic	10	0
Cadmium	17	0
Copper	28	0
Chromium	31	0
Lead	25	0
Mercury	24	0
Nickel	31	0
Zinc	30	0
PAH (All Species Maximum)	44	-
PCBs	12	0
TBT	0	0
THC	41	-

Up to 44 samples recorded exceedances of various RAL1 criteria, however no exceedances were recorded for RAL2.

3.1 Asbestos

Asbestos was not detected in any of the samples analysed.

4 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.

4.1 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 4-1 along with justification for screening out those options which have not been taken forward for further consideration.

Table 4-1: 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 maintain the depth of the shipping channel in the River Clyde.	No
	Infilling of an existing dry dock/harbour facility/development site (beneficial re-use)	While there are no projects in proximity to the dredge site(s) identified at time of writing. Any opportunities which can be utilised for beneficial reuse will be explored as and when possible. Beneficial reuse of material would be the preferred option when a suitable project is identified (as an example beneficial reuse was recently used as part of the Govan Basin infilling) The biggest factor affecting the beneficial use of material is a combination of suitability for engineering and a programme which meets both the timings for dredging and reuse. While this option will be considered as and when needed, it is not taken through the BPEO process as there is no current obvious project which can be considered.	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 gravel, sand and silt. Fine sediments (i.e. silt) is 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. 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) with a low combustible component and very high-water content. This makes it unsuitable for treatment/disposal by this route.	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 open spoil ground Cloch Point (MA021) is located approximately 7 km from the closest proposed dredge site.	Yes

4.2 Summary of Identified BPEO Options

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

- Landfill
- Sea Disposal

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

4.2.1 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. 555,000 tonnes of material and approximately 35,000 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.

4.2.2 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.

5 FURTHER CONSIDERATION OF REMAINING DISPOSAL OPTIONS

5.1 Detailed BPEO Assessment

Each of the identified options was assessed against the criteria detailed in Table 5-1 below.

Table 5-1: 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

5.1.1 BPEO Strategic Assessment

Table 5-2 provides details of the strategic assessment for each option taken forward for the detailed BPEO assessment:

Table 5-2: 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.	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. 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.
General Public /Local acceptability	Increase traffic on haul routes therefore potential for increase in public complaints.	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.	Material falls under jurisdiction of SEPA when it is brought to land. A Waste Management Exemption will likely be required.

5.1.2 BPEO Environmental Assessment

Table 5-3 below details the environmental assessment for each option taken forward for detailed BPEO assessment.

Table 5-3: BPEO Environmental Assessment

Criteria	Landfill	Sea Disposal
Safety Implications	Double handling of material increases the potential for accidents to occur.	Minimal handling of material required as it is directly placed at the disposal site. Work would be undertaken in accordance with H&S legislation.

Criteria	Landfill	Sea Disposal
Public Health	Measures will be required to limit human contact during transfer of material from dredger to dewatering facility and transportation to landfill. 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. Suitability of material would need agreed with landfill manager.	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. Previous 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.
Interference with other legitimate activities	Potential for 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.

5.1.3 BPEO Cost Assessment

Costs were assessed for each of the options taken forward for detailed BPEO assessment. The BPEO assessment considered the typical costs associated with dredging, transportation to the disposal site, construction of treatment facilities (where applicable) and methods employed to protect the environment for each of the identified options. As costs are generally "Commercially Sensitive" the rates are based on experience within industry (as opposed to formal quotations).

For the purposes of comparing costs associated with each option a benchmark of 100,000 tonnes (approximately 50,500m^3) of dredged material has been set.

The assumptions to calculate the costs are as follows:

- Dredging costs are estimated to be £3.21 per m^3;
- Ship transportation costs from the dredged area to disposal / transfer site have been calculated based on £1.85 per tonne;
- Costs associated with construction and operation of a dewatering facility are estimated to be in the order of £1,000,000 or greater;
- Cost associated with transfer of dewatered material to lorry are based on a wheeled shovel (costing £47 per hour) operating 2 hours per day for 6 days per week for ten weeks;
- Transportation costs from a dewatering facility to landfill are estimated to be £4.85 per tonne; and
- Landfill gate fees are estimated to be £15 per tonne for a non-hazardous landfill (Note Maintenance dredgings are currently exempt from landfill tax as defined in HM Customs and Excise Notice LFT1, A general guide to landfill tax, May 2012, Part 4).

Table 5-4 provides details on the Cost assessment for each option taken forward for detailed BPEO assessment:

Table 5-4: BPEO Cost Analysis (based on 100,000 tonnes only)

Activity	Landfill Disposal (£)	Sea Disposal (£)
Dredging	160,500	160,500
Transport by vessel to disposal site	185,000	185,000
Reception facility	70,000	-
Dewatering Facility	1000,000	-
Transfer of material to lorry	5,640	-
Transportation Cost	485,000	-
Landfill Gate Fee	1,500,000	-
Total Costs	**3,406,140**	**345,500**

Note: The above costs do not take into account the cost required to gain planning or licensing consents or potentially to purchase land (where applicable). They also do not take account of the influence volumes will have on costs (economies of scale).

5.2 BPEO Scoring

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 5-5 below provides a summary of the BPEO assessment.

Table 5-5: BPEO Summary

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

5.3 BPEO Assessment Discussion

Disposal to landfill is considered to be the least suitable option for the River Clyde 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 is traditionally 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 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 out of the main options available. Additionally, the material is retained within the marine environment where it can be naturally redistributed over time.

Clydeport have a track record of utilising the sand fraction of maintenance dredging in a beneficial way and will continue to consider options for using this type of dredged material for other developments on Clydeport's estate as and when they become available.

6 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 **Error! Reference source not found.**.

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 **Error! Reference source not found.**, 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.

6.1 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 the table in Appendix D 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.

6.2 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:

Table 6-1: Exceedances of Revised Action Levels

Contaminant	No. of Exceedances (of 52 samples)	
	RAL 1	RAL 2
Arsenic	10	0
Cadmium	17	0
Copper	28	0
Chromium	31	0
Lead	25	0
Mercury	24	0
Nickel	31	0
Zinc	30	0
PAH (All Species Maximum)	44	-
PCBs	16	0
TBT	0	0
THC	41	-

6.2.1 ERL & PEL Review

Exceedances of the ERL and PEL (where one is available) is summarised in Table 6-2 Full summary tables are provided in Table B in Appendix C : Note any contaminant of concern with N/A indicates no corresponding ERL or PEL value currently available.

Table 6-2: Exceedances of ERL and PEL

Contaminant	No. of Exceedances (of 52 samples)	
	ERL	PEL
Cadmium	3	0
Copper	25	1
Chromium	20	12
Lead	27	14
Mercury	33	1
Zinc	23	14

Contaminant	No. of Exceedances (of 52 samples)	
	ERL	PEL
PAH (All Species Maximum)	32	8
PCBs	-	0

6.3 Averages

Review of the averaged data for all the data has been undertaken 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:

Table 6-3: Exceedances of ERL and PEL – Average Concentrations

Contaminant	Do Average Concentrations exceed?	
	ERL	PEL
Cadmium	No	No
Copper	Yes	No
Chromium	Yes	No
Lead	Yes	No
Mercury	Yes	No
Zinc	Yes	No
PAH (All Species Maximum)*	Yes (Benzo ghi)perylene only	No
PCBs	-	No

*Note – where values are available for review.

Average concentrations of the ERL for copper, chromium, lead, mercury and zinc are all recorded. However, no corresponding PEL exceedance is recorded where one is available for review.

6.4 Previous Sampling Campaign Data

Previous sampling campaigns and assessments undertaken in 2019 and 2020 throughout the river Clyde resulted in similar results.

October 2019 sampling concluded the following for individual samples:

- Exceedances of RAL1 for arsenic, cadmium, copper, chromium, lead, mercury, nickel, zinc, PAHs and THC
- No exceedances of RAL2 were recorded

July 2020 sampling results concluded the following:

- Exceedances of RAL1 for arsenic, cadmium, copper, chromium, lead, mercury, nickel, zinc, PAHs, PCBs and THC
- No exceedances of RAL2 were recorded

6.4.1 Averages

Average concentrations for samples collected in the October 2019 sampling campaign concluded the following:

- Averaged concentrations exceeded the ERL for benzo(ghi)perylene only;
- No averaged concentrations exceeded the PEL where one is available; and
- All samples recorded averaged concentrations below RAL2 where they exist.

Average concentrations for samples collected in the 2020 (Upper Clyde) sampling campaign concluded the following:

- Averaged concentrations exceeded the ERL cadmium, chromium, copper, mercury, lead, zinc and numerous PAH species;
- Average concentrations exceeded the PEL for chromium and acenapthene;
- All samples recorded averaged concentrations below RAL2 where they exist.

In summary, the findings of the 2023 sampling reflect results and conclusions of previous sampling campaigns within the River Clyde.

6.5 Chemical Assessment Conclusions

Multiple samples recorded exceedances of RAL1 for metals, PAHs and THC. There were no exceedances of RAL2 in any of the samples analysed where one is available for review.

Up to 33 individual samples recorded exceedances of the ERL for various metals and PAH species. Up to 14 samples were recorded above the PEL for chromium, lead and zinc, and single exceedances recorded for copper, mercury and various PAH species.

However, when the averaged data is considered, which is representative of all contaminants of concern in all of the material proposed to be disposed of, there are no exceedances of the PEL are recorded.

Review of the background contaminant levels at the disposal site has identified that there are contaminants of concern with individual sample exceedances of the adopted ERL and PELs for the key contaminants of concern (lead, zinc and PAHs). There is no PEL currently available for Nickel but the average concentration of the proposed dredge material is 32.4 mg/kg compared to 35.3 mg/kg at Cloch Point, based on available data. Additionally, the average concentrations of lead, zinc and various PAH species across the disposal site are noted to be above the PEL.

Further consideration of the potential risks associated with the proposed disposal is considered in the following sections.

6.6 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 6-4 below:

Table 6-4: 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 areas proposed to be dredged have previously been subjected to routine maintenance dredging. The dredge sites are within the Inner and Outer 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 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. 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.	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 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 6.7 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 to the existing and 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. However, given the close proximity of the works to the Ramsar/SPA, Scottish Natural Heritage (SNH) were consulted. Dredging works undertaken between mid-March and mid-September would have ‘no likely significant effect’ as birds would be absent. If dredging is to occur in the winter months, then SNH state that a Habitat Regulations Appraisal will be required. The SNH response is included in Appendix D.

6.7 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.

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 areas are all on the Inner and Outer Clyde 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 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.

Additionally, when the sediment results are reviewed as an average to assess the sediment mass as a single unit for disposal there are marginal exceedances for chromium, copper, mercury, lead and zinc plus benzo(ghi)perylene. All averaged results were recorded below both the PEL and RAL2. 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 into the selection and location of the agreed disposal ground. Finally, the material sampled in the most recent campaign is similar in chemical nature to material previously deposited under licence.

The physical composition of sediment varies between sites, with silt content in the main channel generally decreasing the closer to Greenock. The average proportion of the three key size components in the samples is 5.9% gravel, 59.4% sand and 34.7% silt for the entire dredge. Average particle sizes are presented in Table 6-5 for each dredge area.

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

Table 6-5: Average particle size by dredge area

Dredge Area	Estimated Annual Dredge Volume (m^3)	Average % gravel	Average % Sand	Average %Silt
001	8,500	30.6	56.8	12.6
002	15,000	3.8	95.0	1.2
003	25,000	5.6	92.4	2.0
004	45,000	2.6	75.7	21.7
005	35,000	8.6	75.9	15.6
006	12,000	6.0	78.5	15.6
007	5,500	7.0	80.6	12.4
008	35,000	9.5	60.2	30.3
009	80,000	8.5	51.5	40.0
010 Greenock Ocean Terminal (GOT) Approaches	550	2.9	57.0	40.1
011 GOT Berth				
012 Adams Scrap Berth	7,500	0.0	26.1	73.9
014 Shieldhall Riverside (Bolls 1 – 23)				
013 KGV Dock	25,000	0.0	20.4	79.5
015 Rothesay Dock Canting Basin	13,900	1.0	29.6	69.4
016 River Cart Entrance				
017 Rothesay Dock				
Total	**307,950**	5.9	59.4	34.7

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 across the majority of the dredge areas is sand, with the westernmost and easternmost dredge areas most likely to record a dominant sediment type of gravel or silt. Considering the dredge volume as a whole using averaged particle size analysis data, the dominant sediment type is sand comprising 59.4% of the total and the remainder made up of 34.7% silt and 5.9% comprising gravel sized fractions.

Given that an average of 65.3% of the sediment across all dredge areas comprises sand and gravel, it is considered that the majority of the deposited sediment will fall out of suspension quickly at the disposal site with limited lateral spread.

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”).

The previous sediment quality report and BPEOs compiled by EnviroCentre in February and August 2020, elevated metals and PAHs exceeding AL1 for sediment within several of the maintenance dredge sites throughout the river, indicating similar chemical quality findings to the samples collected the most recent sampling exercise. Water quality does not appear to have been impacted as a result of previous maintenance dredge exercise.

On this basis, 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.

6.8 Conclusions and Recommendations

Review of available information has highlighted that although several contaminants of concern exceed RAL1 in sediment samples, 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 BPEO for the maintenance dredge arisings. Additionally, should any suitable beneficial re-use opportunities be identified during the active period of the renewed licence, these would be further explored to ascertain their viability with the relevant regulatory bodies notified to agree and discharge any pre use requirements.

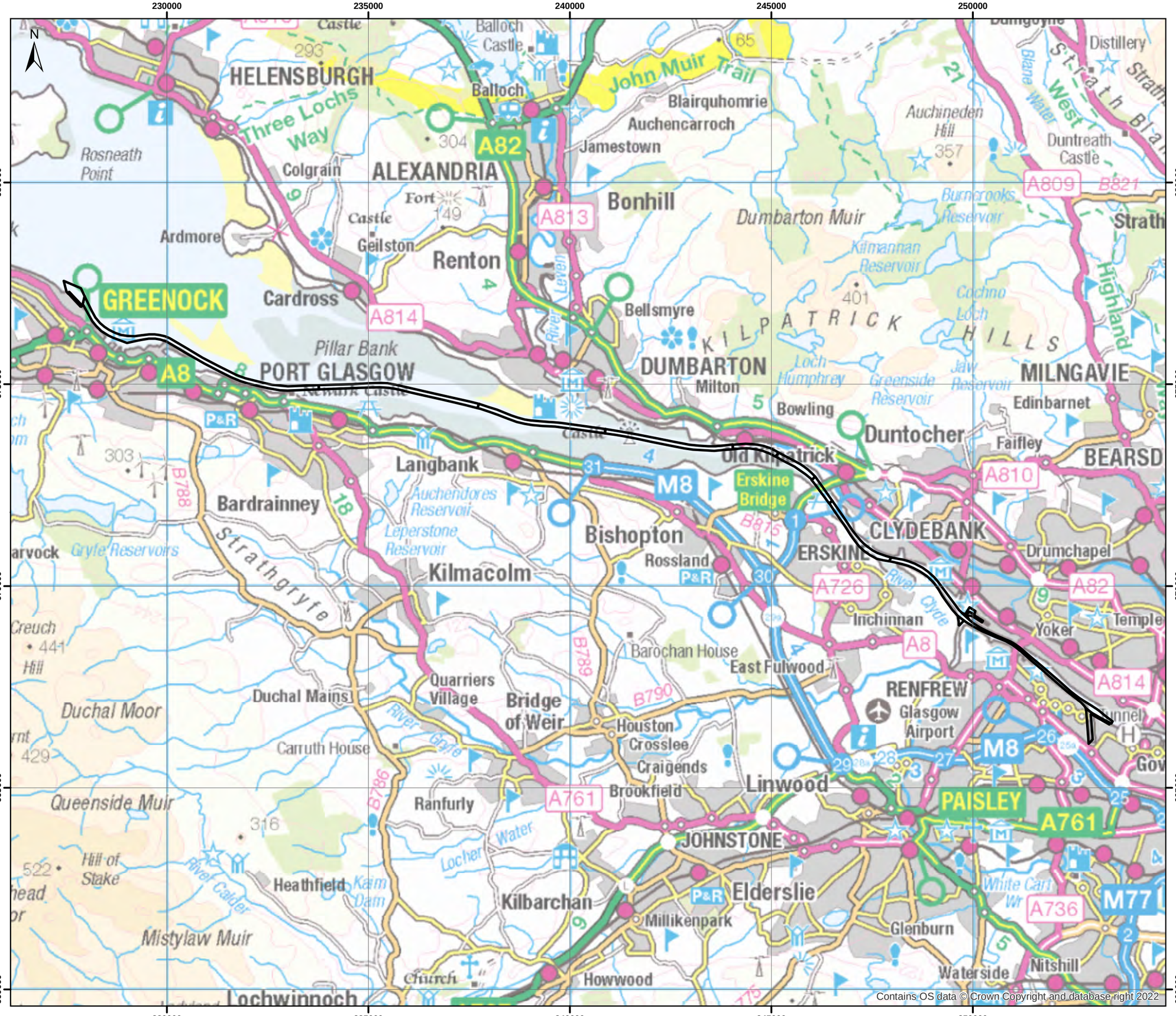
REFERENCES

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

Dredge Areas (2023)

Do not scale this map

Client
Peel Ports Group

Project
River Clyde Maintenance Dredge 2023

Title
Dredge Area Overview

Status
Final

Drawing No.	Revision	Date
178303-GIS002	-	08 Jun 2023
Drawn	**Checked**	**Approved**
MMF	FR	CCAS

Scale
1:90,000 @A3
0 455 910 1,820 2,730 Metres

Rev	Date	Amendment	Initials
-	-	-	-

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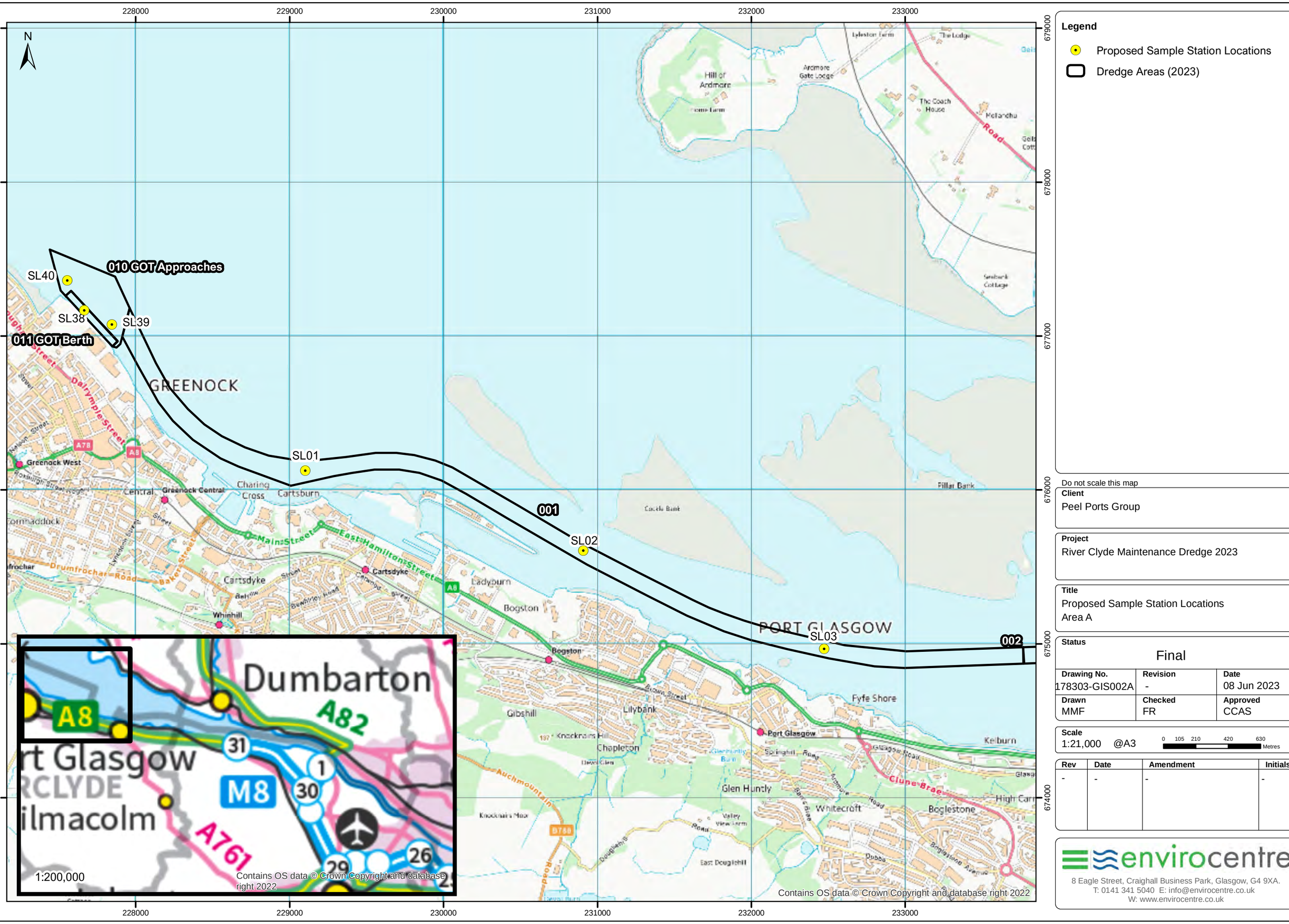

Legend

- Proposed Sample Station Locations
- Dredge Areas (2023)

Do not scale this map

Client
Peel Ports Group

Project
River Clyde Maintenance Dredge 2023

Title
Proposed Sample Station Locations
Area A

Status
Final

Drawing No.	Revision	Date
178303-GIS002A	-	08 Jun 2023
Drawn	**Checked**	**Approved**
MMF	FR	CCAS

Scale
1:21,000 @A3
0 105 210 420 630 Metres

Rev	Date	Amendment	Initials
-	-	-	-

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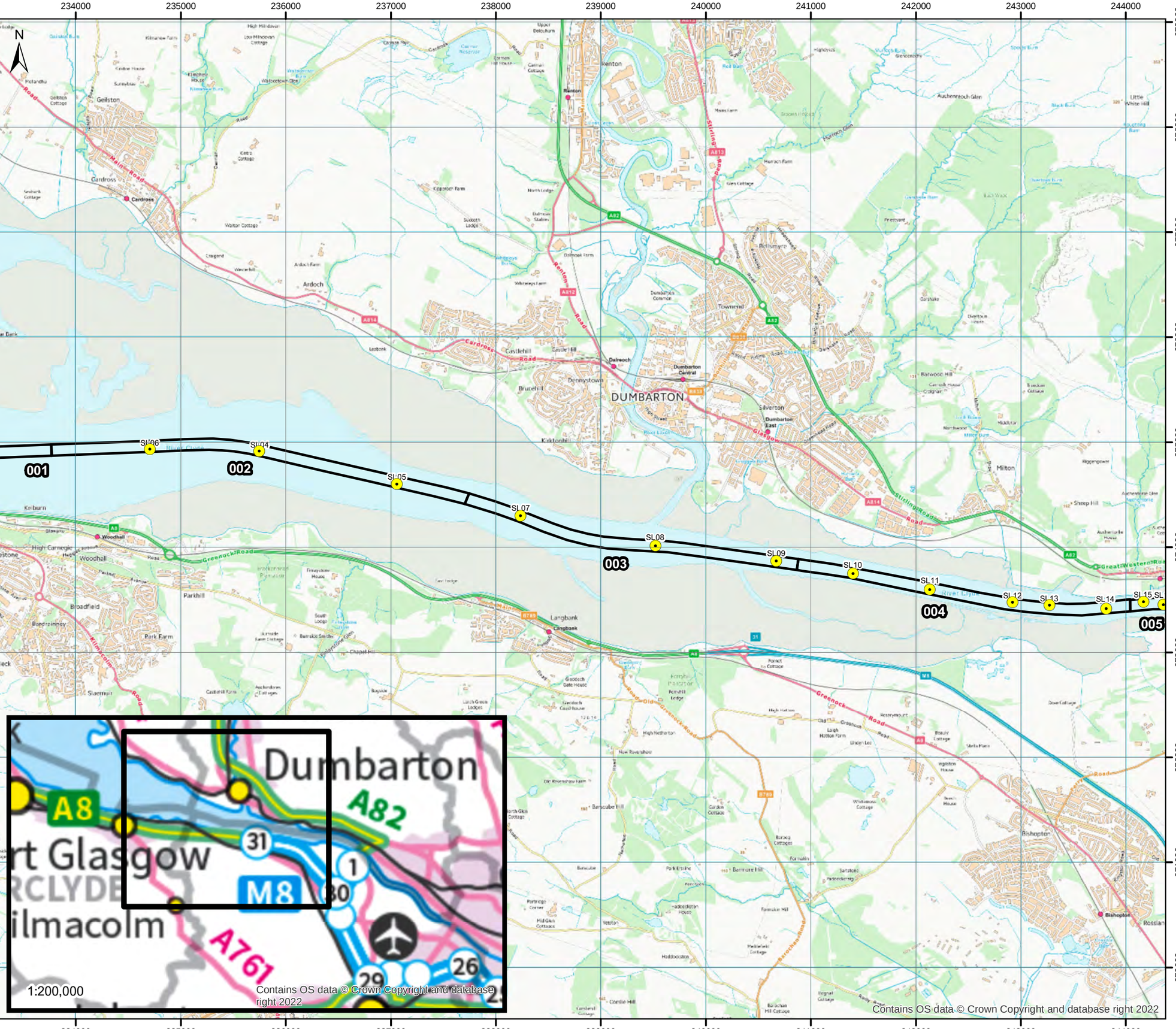

Legend

- Proposed Sample Station Locations
- Dredge Areas (2023)

Do not scale this map

Client
Peel Ports Group

Project
River Clyde Maintenance Dredge 2023

Title
Proposed Sample Station Locations
Area B

Status
Final

Drawing No.	Revision	Date
178303-GIS002B	-	08 Jun 2023
Drawn	**Checked**	**Approved**
MMF	FR	CCAS

Scale
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Rev	Date	Amendment	Initials
-	-	-	-

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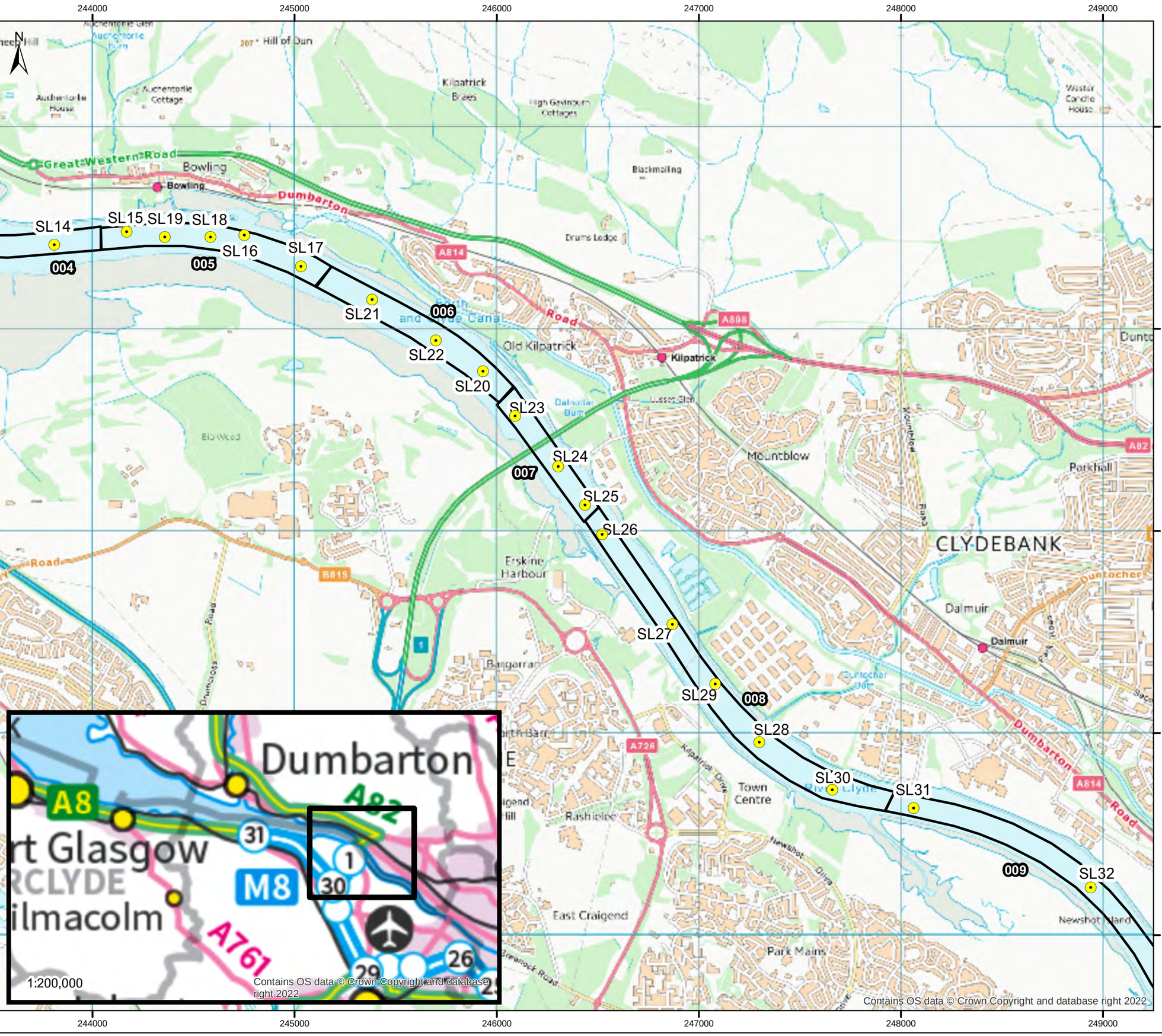

Legend

- Proposed Sample Station Locations
- Dredge Areas (2023)

Do not scale this map

Client
Peel Ports Group

Project
River Clyde Maintenance Dredge 2023

Title
Proposed Sample Station Locations
Area C

Status
Final

Drawing No.	Revision	Date
178303-GIS002C	-	08 Jun 2023
Drawn	**Checked**	**Approved**
MMF	FR	CCAS

Scale
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Rev	Date	Amendment	Initials
-	-	-	-

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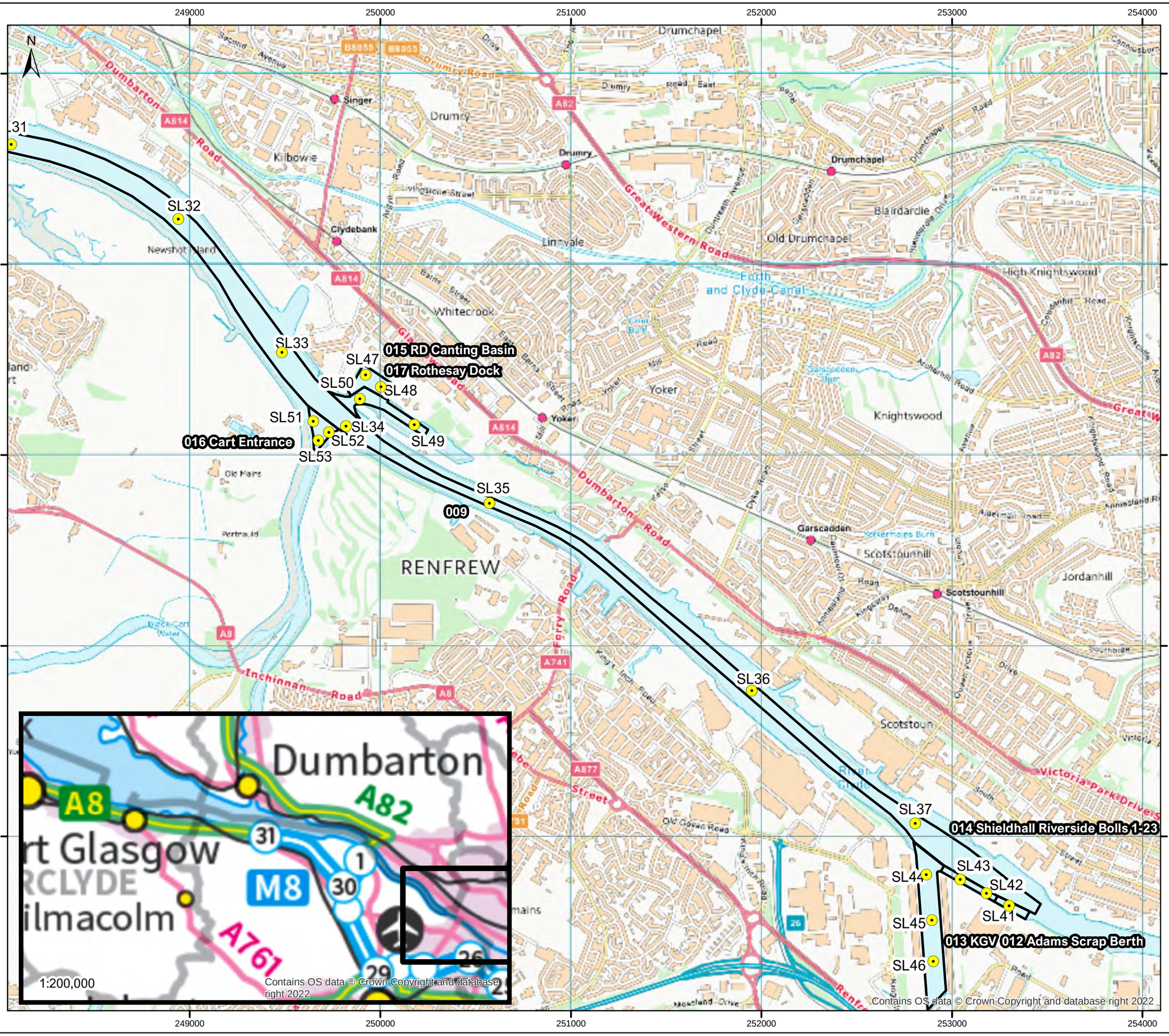

Legend

- Proposed Sample Station Locations
- Dredge Areas (2023)

Do not scale this map

Client
Peel Ports Group

Project
River Clyde Maintenance Dredge 2023

Title
Proposed Sample Station Locations
Area D

Status
Final

Drawing No.	Revision	Date
178303-GIS002D	-	08 Jun 2023
Drawn	**Checked**	**Approved**
MMF	FR	CCAS

Scale
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Rev	Date	Amendment	Initials
-	-	-	-

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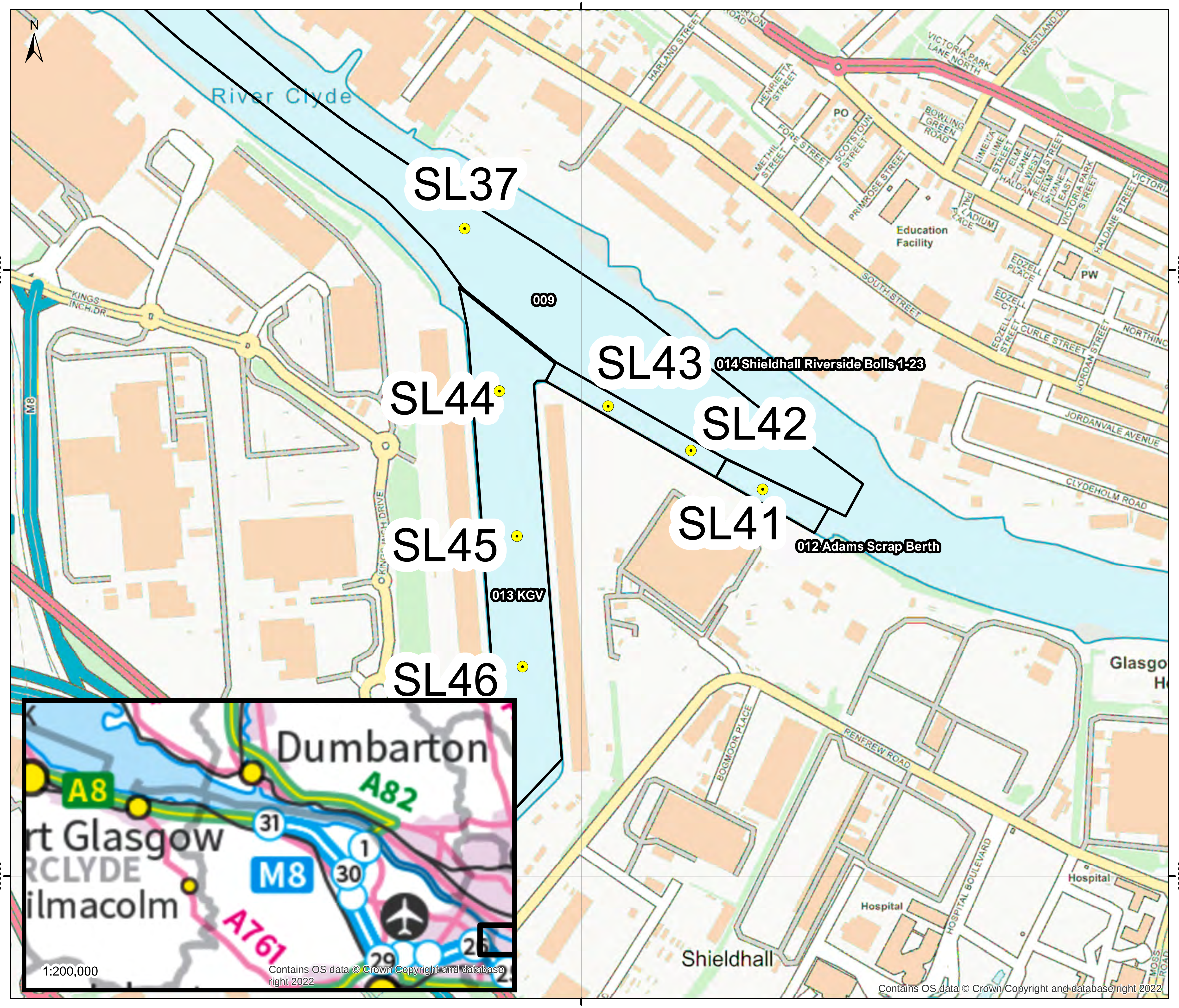

Legend

- Proposed Sample Station Locations
- Dredge Areas (2023)

Do not scale this map

Client	Peel Ports Group	
Project	River Clyde Maintenance Dredge 2023	
Title	Proposed Sample Station Locations Area E	
Status	Final	
Drawing No. 178303-GIS002E	**Revision** -	**Date** 08 Jun 2023
Drawn MMF	**Checked** FR	**Approved** CCAS
Scale 1:6,000 @A3	0 30 60 120 180 Metres	

Rev	Date	Amendment	Initials
-	-	-	-

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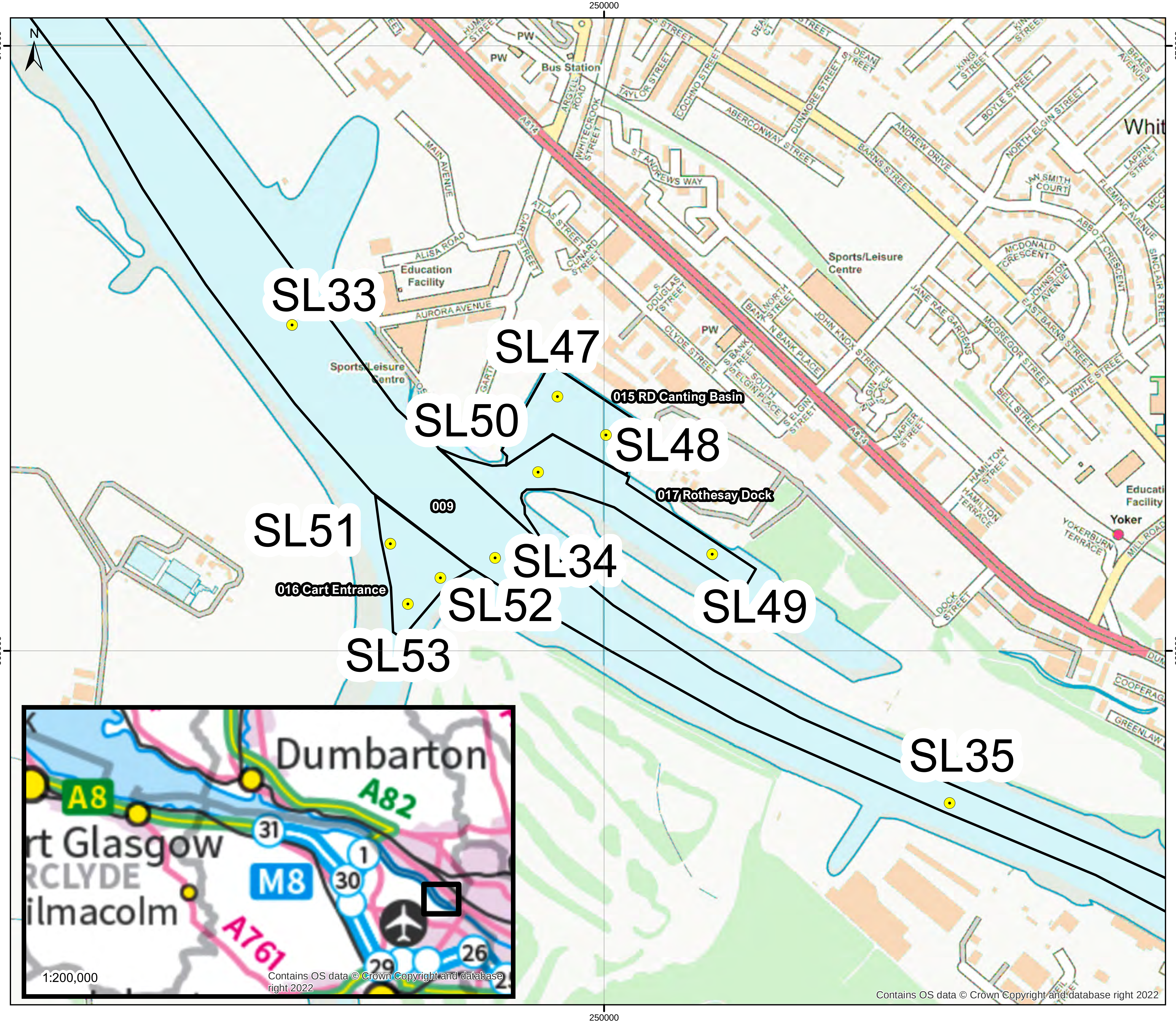

Legend

- Proposed Sample Station Locations
- Dredge Areas (2023)

Do not scale this map

Client
Peel Ports Group

Project
River Clyde Maintenance Dredge 2023

Title
Proposed Sample Station Locations
Area F

Status
Final

Drawing No.	Revision	Date
178303-GIS002F	-	08 Jun 2023
Drawn	**Checked**	**Approved**
MMF	FR	CCAS

Scale
1:6,000 @A3
0 30 60 120 180 Metres

Rev	Date	Amendment	Initials
-	-	-	-

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B SAMPLE LOGS

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL01**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.947688
Dredge Area	001	**Longitude**	-4.7383679
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown clayey very gravelly sand. Gravel is angular and shell-derived.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL02**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.94366
Dredge Area	001	**Longitude**	-4.7091409
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown coarse sand and gravel sized shell fragments with a few complete scallop and mussel shells. Rare rounded gravel.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL03**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.938491
Dredge Area	001	**Longitude**	-4.6837329
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Angular cobbles and barnacles with frequent angular coarse gravel.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: Several unsuccessful attempts with several attempts made at micro-siting. Eventual recovery of some material but was not suitable for analysis.

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL04**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.939146
Dredge Area	002	**Longitude**	-4.6313301
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown medium to coarse sand with rare rounded gravel and black fine gravel of coal. Rare mussel shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL05**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.936774
Dredge Area	002	**Longitude**	-4.6101914
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown medium to coarse sand with rare fine black gravel of coal, twigs, mussel shells and shell fragments. Rare cobbles with small mussels attached.

Biota: Mussels

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL06**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.938941
Dredge Area	002	**Longitude**	-4.6480353
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown medium to coarse sand, occasionally derived from shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL07**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.934451
Dredge Area	003	**Longitude**	-4.5912204
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown very sandy fine to medium gravel. Sand is coarse. Frequent shell fragments. Rare intact scallop and mussel shells.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL08**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.932333
Dredge Area	003	**Longitude**	-4.5704722
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown fine to medium sand with rare black coarse sand (possibly coal derived) and shell fragments. Occasional lenses of grey clay.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL09**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.931423
Dredge Area	003	**Longitude**	-4.5519832
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown fine to medium sand with rare black coarse and fine gravel of coal. One lens of soft grey clay.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL10**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.930606
Dredge Area	004	**Longitude**	-4.5402096
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown medium sand with occasional shells and shell fragments. Rare fine to medium gravel.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL11**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.929473
Dredge Area	004	**Longitude**	-4.528464
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Greyish-brown fine to medium sand with occasional mussel shells and shell fragments. Rare black fine to medium gravel of coal.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	SL12
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.928645
Dredge Area	004	**Longitude**	-4.5157784
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Grey-brown fine to medium sand with occasional mussel shells and shell fragments. Rare black fine to medium gravel of coal.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL13**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.928517
Dredge Area	004	**Longitude**	-4.5101667
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Soft greyish-brown sandy clay with rare shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL14**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.928379
Dredge Area	004	**Longitude**	-4.5015126
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown and black very clayey gravelly sand with frequent mussels and mussel shells. Rare twigs and vegetation.

Biota: Mussels.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	SL15
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.929069
Dredge Area	005	**Longitude**	-4.4958256
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown silty gravelly fine sand. Gravel is fine to coarse. Rare vegetation and mussel shells.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL16**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.929096
Dredge Area	005	**Longitude**	-4.4865097
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown silty fine sand with rare shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL17**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.927804
Dredge Area	005	**Longitude**	-4.4819443
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown clayey silty slightly gravelly fine to medium sand with rare mussel shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL18**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.928979
Dredge Area	005	**Longitude**	-4.4891918
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown fine to medium sand with rare shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL19**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.928897
Dredge Area	005	**Longitude**	-4.4927887
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

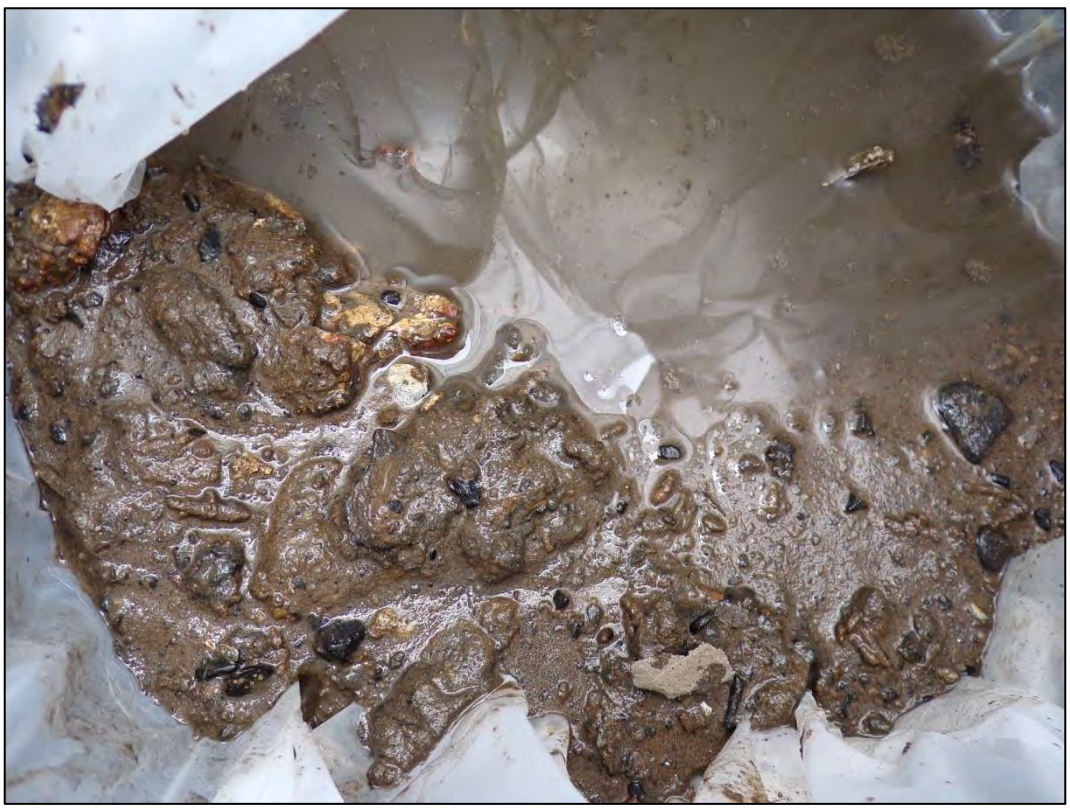
Remarks: Brown clayey silty gravelly fine to medium sand. Gravel is angular and fine to coarse. Occasional shells and shell fragments. One glass fragment.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: One glass fragment.

Notes: -



envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL20**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.923453
Dredge Area	006	**Longitude**	-4.4672434
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown silty fine to medium sand with occasional mussel shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL21**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.926445
Dredge Area	006	**Longitude**	-4.4762224
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown silty fine to medium sand with occasional shells, shell fragments and small mussels. One sandworm.

Biota: One sandworm and mussels.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL22**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.924734
Dredge Area	006	**Longitude**	-4.4710546
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown silty fine to medium sand with rare shell fragments. Two ragworms.

Biota: Two ragworms.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL23**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	18/07/2023	**Latitude**	55.921511
Dredge Area	007	**Longitude**	-4.4645909
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/CCAS

Remarks: Brown and dark grey slightly clayey slightly silty fine to medium sand with rare small mussels.

Biota: Small mussels.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL24**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.919335
Dredge Area	007	**Longitude**	-4.4610116
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Brown silty gravelly fine to medium sand. Gravel is fine to coarse. Rare twigs and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: Multiple attempts made at obtaining material. Strong pull from flooding tide. Limited sample volume.

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL25**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.917645
Dredge Area	007	**Longitude**	-4.4588078
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Soft dark brown silty sand with frequent black angular fine gravel of possible coal and frequent mussel shells.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL26**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.916388
Dredge Area	008	**Longitude**	-4.4573518
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Soft dark brown sandy silt with frequent angular cobbles, mussels and rare rootlets.

Biota: Mussels.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL27**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.912505
Dredge Area	008	**Longitude**	-4.4515371
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Soft dark brown silty sand with lenses of black silt. Frequent fine shell fragments, rare mussel shells and rare rootlets.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL28**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.907408
Dredge Area	008	**Longitude**	-4.444335
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft light brown and dark greyish-brown sandy silt with rare fine gravel, shell fragments and twigs.

Biota: None noted.

Odours: Very faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	SL29
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.909924
Dredge Area	008	**Longitude**	-4.4479818
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Soft dark brown silty sand with frequent mussel shells and fine shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL30**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.905422
Dredge Area	008	**Longitude**	-4.4384341
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft greyish-brown and dark grey slightly sandy silt with occasional mussel shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL31**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.904715
Dredge Area	009	**Longitude**	-4.4319419
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Brown silty fine to medium sand with occasional mussel shells.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL32**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.90148
Dredge Area	009	**Longitude**	-4.4177251
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Soft brown and greyish-brown sandy silt. Sand is fine. Occasional mussel shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL33**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.895376
Dredge Area	009	**Longitude**	-4.4086437
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown sandy silt. Sand is fine to coarse. Occasional mussel shells and shell fragments.

Biota: None noted.

Odours: Faint H_2S anoxic odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL34**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.892016
Dredge Area	009	**Longitude**	-4.4030614
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Dark greyish-brown sandy slightly gravelly silt. Gravel is fine. Rare leaf litter and shells.

Biota: None noted.

Odours: Slight anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL35/ SL35A**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.888614
Dredge Area	009	**Longitude**	-4.3908245
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: SL35 - Few cobbles with frequent mussel shells.

SL35A - Brown silty gravelly fine to coarse sand with occasional mussel shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: SL35 - Multiple attempts at obtaining material but an insufficient amount obtained for analysis. The location is adjacent to CWRR construction works, therefore there is a possibility that recent dredging work has been undertaken in the area.

SL35A - Relocated upstream.

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL36**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.880206
Dredge Area	009	**Longitude**	-4.3682744
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark grey/black silt with rare shell fragments, leaf litter and vegetation.

Biota: None noted.

Odours: Very strong anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL37**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	20/07/2023	**Latitude**	55.874221
Dredge Area	009	**Longitude**	-4.3541934
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark grey/black silt with rare twigs and vegetation.

Biota: None noted.

Odours: Strong anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL38**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.956517
Dredge Area	011 GOT Berth	**Longitude**	-4.7620157
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Brown very sandy clay with occasional twigs, shells and shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL39**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.955756
Dredge Area	010 GOT Approaches	**Longitude**	-4.7590775
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Greyish-brown very sandy clay with occasional shell fragments.

Biota: None noted.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL40**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	17/07/2023	**Latitude**	55.958236
Dredge Area	010 GOT Approaches	**Longitude**	-4.7639008
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Soft greyish-brown slightly clayey silt. One starfish.

Biota: One starfish.

Odours: None noted.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL41**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	21/07/2023	**Latitude**	55.870511
Dredge Area	012 Adams Scrap Berth	**Longitude**	-4.3461042
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark grey/black silt with rare leaf litter.

Biota: None noted.

Odours: Very faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL42**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	21/07/2023	**Latitude**	55.871049
Dredge Area	014 Shieldhall Riverside Bolls 1-23	**Longitude**	-4.3480389
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown silt with rare vegetation and leaf litter.

Biota: None noted.

Odours: Faint H_2S anoxic odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	SL43
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	21/07/2023	**Latitude**	55.871663
Dredge Area	014 Shieldhall Riverside Bolls 1-23	**Longitude**	-4.35025
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark grey and dark greyish-brown silt with rare vegetation.

Biota: None noted.

Odours: Faint H_2S anoxic odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL44**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	21/07/2023	**Latitude**	55.871833
Dredge Area	013 KGV Dock	**Longitude**	-4.3531376
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

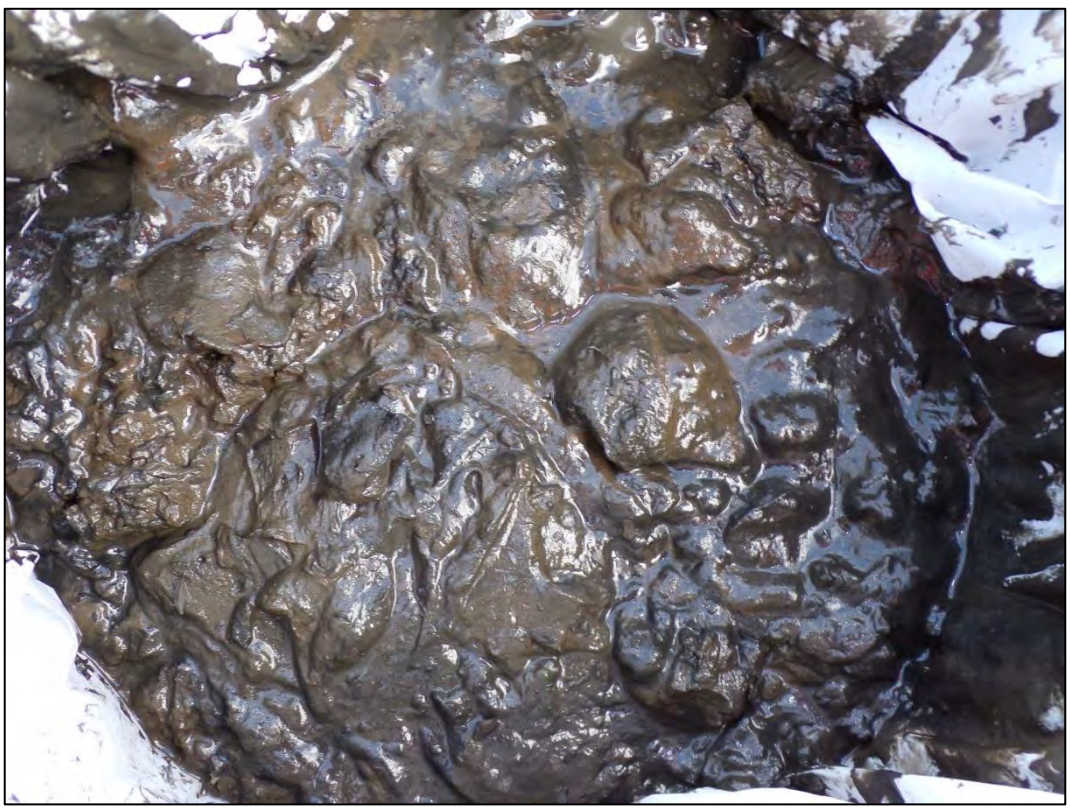
Remarks: Very soft dark greyish-brown silt with rare vegetation and leaf litter.

Biota: None noted.

Odours: Faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -



envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL45**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	21/07/2023	**Latitude**	55.869696
Dredge Area	013 KGV Dock	**Longitude**	-4.3525448
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown silt.

Biota: None noted.

Odours: Moderate H_2S anoxic odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL46**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	21/07/2023	**Latitude**	55.86776
Dredge Area	013 KGV Dock	**Longitude**	-4.3522838
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

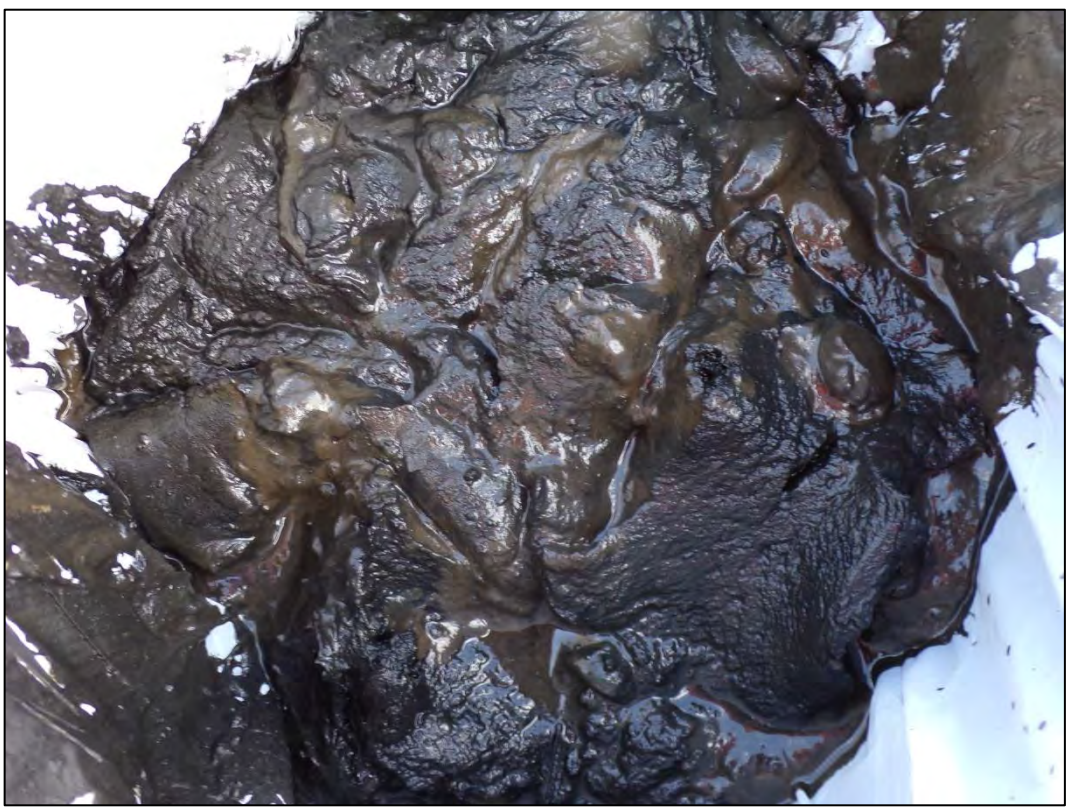
Remarks: Very soft dark greyish-brown silt.

Biota: None noted.

Odours: Moderate anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -



envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL47**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.894445
Dredge Area	015 Rothesay Dock Canting Basin	**Longitude**	-4.4015641
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown silt.

Biota: None noted.

Odours: Slight anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL48**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.893896
Dredge Area	015 Rothesay Dock Canting Basin	**Longitude**	-4.4002346
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown silt.

Biota: None noted.

Odours: Slight anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL49**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.892191
Dredge Area	017 Rothesay Dock	**Longitude**	-4.3973303
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown silt with rare twigs.

Biota: None noted.

Odours: Faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	**SL50**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.893313
Dredge Area	017 Rothesay Dock	**Longitude**	-4.40199
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown silt with rare twigs and leaf litter.

Biota: None noted.

Odours: Faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre	Project Name	River Clyde Maintenance Sampling July 2023	Location ID
8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	Project No.	178303	SL51
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.892168
Dredge Area	016 Cart Entrance	**Longitude**	-4.4058378
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown and light brown silt with occasional twigs and leaf litter.

Biota: None noted.

Odours: Very faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL52**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.891692
Dredge Area	016 Cart Entrance	**Longitude**	-4.4044808
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Dark grey sandy silt with occasional twigs and leaf litter. Sand is fine to coarse.

Biota: None noted.

Odours: Very faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

envirocentre 8 Eagle Street, Craighall Business Park, Glasgow, G4 9XA	**Project Name**	River Clyde Maintenance Sampling July 2023	**Location ID**
	Project No.	178303	**SL53**
	Client	Peel Ports Group Ltd.	

GRAB SAMPLE LOG

Date	19/07/2023	**Latitude**	55.891289
Dredge Area	016 Cart Entrance	**Longitude**	-4.4053195
Method	0.045m^2 Van Veen Grab Sampler	**Sampled/logged by**	FR/MMF

Remarks: Very soft dark greyish-brown silt with rare twigs and leaf litter.

Biota: None noted.

Odours: Very faint anoxic H_2S odour.

Anthropogenic Inputs: None noted.

Notes: -

C DATA SUMMARY TABLES

Summary Table A

Sampling Results Incorporated with BPEO Assessment (mg/kg)

	AL1	AL2	BAC	ERL	PEL	SL01	SL02	SL04	SL05	SL06	SL07	SL08	SL09	SL10	SL11	SL12	SL13	SL14	SL15	SL16	SL17	SL18	SL19	SL20	SL21	SL22	SL23	SL24	SL25	SL26	SL27	SL28	SL29	SL30	SL31	SL32	SL33	SL34	SL35
Source			CSEMP	CSEMP	Canada																																		
Arsenic	20	70	25		41.6	22.6	17.7	18.3	24.2	18.5	31	10.8	22.1	30.4	20.8	4.9	4.3	23.8	10.1	12	13.8	21.6	7.3	5.6	6.1	5.1	5.7	6.8	5.8	10	7.8	8.1	7.6	1.2	5.9	8.4	8.4	9.4	9
Cadmium	0.4	4	0.31	1.2	4.2	0.14	0.15	0.12	0.13	0.12	0.09	0.12	0.26	0.17	0.32	0.04	0.07	0.33	0.28	0.34	0.4	0.35	0.14	0.15	0.1	0.09	0.15	0.12	0.12	0.27	0.19	0.27	0.2	0.04	0.11	0.32	0.38	0.43	0.34
Chromium	50	370	81	81	160	48.4	24.3	49.9	44.2	52.6	44.4	45.4	66.2	77.6	66.4	9.7	30.7	101	69.4	96.7	104	106	41.2	39.3	49.3	33.3	39.4	38.4	33.8	58.2	44.4	59.4	46.1	11	31.4	62.3	64.9	87.6	61
Copper	30	300	27	34	108	25.1	53.8	32.4	33.6	12.1	13.5	21.7	24.7	24.4	37.2	4	15.9	36	34.8	41.7	46.5	42.9	10.6	15.3	13.2	8.8	12.8	23.1	18.9	28	23.7	27.8	20.3	6.2	14.6	32.6	41.3	47.1	55.1
Mercury	0.25	1.5	0.07	0.15	0.7	0.17	0.07	0.05	0.06	0.06	0.06	0.07	0.32	0.34	0.72	0.01	0.02	0.25	0.14	0.36	0.31	0.2	0.07	0.11	0.1	0.09	0.09	0.11	0.11	0.15	0.18	0.2	0.13	0.12	0.23	0.69	0.32	0.33	0.18
Nickel	30	150	36	-	-	35.7	20.9	35.4	33.7	32.4	32.2	39.6	41.1	31.1	41.5	11.8	32.4	36.8	46.5	39.1	40.5	41.2	18	15	16.2	14	16.2	18.4	14.6	20.1	17	20.8	19.1	3	16.4	21.6	20.3	24.7	32.9
Lead	50	400	38	47	112	47.8	45.9	45.2	46.4	41.9	43.2	27.9	52	62	44.4	4.4	10.3	72.3	45.2	76.7	87	70.8	24.7	28.4	34.6	20.8	28	27.4	24.2	49.8	39.5	43.3	38.7	8.4	23.4	56.7	69.2	74.3	46.2
Zinc	130	600	122	150	271	114	112	155	148	131	147	101	123	140	145	25.6	52.7	174	134	165	185	183	84.5	75.7	76.3	58.2	80.7	114	84.3	128	101	119	98.4	23.4	76	138	205	178	172
Napthalene	0.1		0.08	0.16	0.391	0.0266	0.0147	0.001	0.00147	0.001	0.0169	0.00131	0.0105	0.00477	0.0109	0.0239	0.0513	0.019	0.0113	0.0225	0.0281	0.0205	0.0151	0.035	0.0202	0.0415	0.0124	0.0219	0.0214	0.0495	0.025	0.0316	0.0258	0.0552	0.0262	0.037	0.096	0.0853	0.0378
Acenaphthylene	0.1		-	-	0.128	0.0158	0.0159	0.001	0.001	0.001	0.00482	0.001	0.00195	0.00126	0.00314	0.00413	0.00537	0.02	0.00673	0.0117	0.00908	0.0058	0.00754	0.0395	0.0107	0.0126	0.00587	0.00687	0.00641	0.0194	0.0101	0.0121	0.00446	0.0282	0.00786	0.0183	0.0316	0.084	0.0107
Acenaphthene	0.1		-	-	0.0889	0.0431	0.00219	0.001	0.00127	0.001	0.033	0.001	0.00519	0.00251	0.00716	0.0111	0.0261	0.0294	0.00693	0.0219	0.0166	0.00879	0.00703	0.0185	0.00978	0.0199	0.0129	0.0122	0.014	0.0393	0.0484	0.028	0.00837	0.0254	0.0185	0.0402	0.0746	0.0625	0.0156
Fluorene	0.1		-	-	0.144	0.0438	0.00759	0.001	0.00211	0.001	0.0162	0.00119	0.00944	0.00487	0.0125	0.0174	0.0553	0.025	0.00979	0.0271	0.022	0.0209	0.0141	0.031	0.0167	0.0277	0.0149	0.0186	0.0223	0.0468	0.0506	0.0387	0.0118	0.051	0.0234	0.0578	0.0967	0.133	0.0311
Phenanthrene	0.1		0.032	0.24	0.544	0.306	0.0186	0.00841	0.00365	0.0023	0.138	0.00733	0.0516	0.0169	0.0778	0.234	0.3	0.0839	0.0571	0.117	0.0875	0.122	0.0573	0.106	0.0547	0.0976	0.109	0.0868	0.0686	0.23	0.343	0.152	0.0477	0.139	0.0735	0.267	0.314	0.74	0.113
Anthracene	0.1		0.05	0.085	0.245	0.0769	0.00879	0.00204	0.00201	0.00101	0.025	0.00198	0.0114	0.00678	0.0125	0.0144	0.0474	0.0393	0.0161	0.066	0.0316	0.0206	0.0251	0.0496	0.0274	0.0443	0.0349	0.0369	0.039	0.0739	0.113	0.0577	0.0221	0.102	0.03	0.104	0.107	0.25	0.0407
Fluoranthene	0.1		0.039	0.6	1.494	0.384	0.0708	0.016	0.0081	0.00428	0.243	0.0115	0.0658	0.0293	0.0747	0.186	0.243	0.248	0.0957	0.245	0.185	0.0566	0.095	0.224	0.128	0.165	0.267	0.177	0.165	0.318	0.477	0.354	0.0986	0.578	0.149	0.597	0.499	1.67	0.184
Pyrene	0.1		0.024	0.665	1.398	0.412	0.0561	0.0209	0.00999	0.00738	0.269	0.0173	0.0973	0.0434	0.117	0.176	0.247	0.3	0.111	0.253	0.186	0.077	0.122	0.256	0.16	0.225	0.281	0.213	0.19	0.333	0.436	0.365	0.123	0.609	0.162	0.624	0.594	1.51	0.221
Benzo(a)anthracene	0.1		0.016	0.261	0.693	0.162	0.047	0.00475	0.00325	0.00212	0.13	0.00535	0.0256	0.0105	0.0407	0.0988	0.0974	0.102	0.0453	0.136	0.074	0.0304	0.0472	0.0999	0.0594	0.0772	0.118	0.0778	0.0626	0.145	0.172	0.154	0.0483	0.249	0.0644	0.222	0.245	0.78	0.0878
Chrysene	0.1		0.02	0.384	0.846	0.185	0.0469	0.00927	0.0047	0.00378	0.154	0.0082	0.0361	0.0151	0.0519	0.165	0.144	0.114	0.0505	0.146	0.0787	0.0341	0.0559	0.119	0.0673	0.0899	0.133	0.0935	0.0784	0.167	0.193	0.171	0.0523	0.226	0.0717	0.237	0.269	0.806	0.099
Benzo(b)fluoranthene	0.1		-	-	-	0.184	0.0489	0.00954	0.00626	0.00506	0.0983	0.0105	0.0355	0.0157	0.0612	0.088	0.119	0.117	0.0419	0.157	0.0851	0.0289	0.0525	0.169	0.0632	0.0938	0.116	0.0968	0.0765	0.147	0.159	0.172	0.0551	0.297	0.0658	0.212	0.3	0.74	0.111
Benzo(k)fluoranthene	0.1		-	-	-	0.156	0.0439	0.00837	0.00569	0.00575	0.0758	0.00634	0.0236	0.014	0.0444	0.071	0.0645	0.142	0.0524	0.118	0.0769	0.0295	0.0597	0.153	0.0794	0.102	0.108	0.0765	0.0737	0.157	0.157	0.171	0.053	0.303	0.0761	0.191	0.26	0.716	0.102
Benzo(a)pyrene	0.1		0.03	0.384	0.763	0.208	0.0549	0.00585	0.00505	0.00421	0.0913	0.00747	0.0269	0.0123	0.0534	0.063	0.0963	0.135	0.0564	0.154	0.0818	0.0301	0.0619	0.165	0.0703	0.11	0.127	0.0913	0.069	0.178	0.184	0.192	0.0586	0.33	0.0774	0.229	0.318	0.93	0.118
Indeno(1,2,3cd)pyrene	0.1		0.103	0.24	-	0.137	0.0366	0.0043	0.00379	0.00316	0.0341	0.00525	0.0129	0.00702	0.027	0.0256	0.0415	0.0955	0.0374	0.0859	0.0467	0.0165	0.0353	0.0908	0.04	0.0638	0.0663	0.0509	0.0354	0.107	0.108	0.122	0.0335	0.237	0.0487	0.14	0.222	0.632	0.0796
Benzo(ghi)perylene	0.1		0.08	0.085	-	0.157	0.0359	0.00813	0.00494	0.00493	0.0856	0.00733	0.0226	0.01	0.0633	0.12	0.162	0.116	0.0567	0.11	0.0681	0.0257	0.0478	0.115	0.0544	0.0776	0.0727	0.0703	0.0548	0.159	0.122	0.151	0.0502	0.257	0.0679	0.183	0.263	0.62	0.107
Dibenzo(a,h)anthracene	0.01		-	-	0.135	0.0284	0.00698	0.00118	0.001	0.001	0.0138	0.001	0.00364	0.00166	0.00799	0.0135	0.0165	0.0166	0.00786	0.0165	0.00928	0.00356	0.00765	0.0212	0.01	0.0133	0.014	0.0109	0.00793	0.0215	0.0231	0.0264	0.00771	0.0419	0.0122	0.0331	0.0514	0.115	0.0193
TPH	100		-	-	-	86.6	32.4	14.9	13.8	10.4	92.5	17.1	33.9	22.2	60.3	115	121	161	108	161	130	75.3	101	191	130	130	114	137	112	289	210	414	164	952	219	504	924	1000	349
PCBs	0.02	0.18	-	-	0.189	0.00253	0.00059	0.00056	0.00056	0.0006	0.00108	0.00075	0.00113	0.00085	0.00057	0.00056	0.00056	0.00267	0.00189	0.00274	0.00311	0.00163	0.0026	0.00532	0.07179	0.00182	0.00415	0.00362	0.00438	0.0093	0.00544	0.00764	0.01337	0.02208	0.00497	0.00864	0.01614	0.02011	0.01807
TBT	0.1	0.5	-	-	-	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0219	0.005	0.005	0.005	0.005	0.005

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 A

Sampling Results Incorporated with BPEO Assessment (mg/kg)

	AL1	AL2	BAC	ERL	PEL																				
Source			CSEMP	CSEMP	Canada	SL36	SL37	SL38	SL39	SL40	SL41	SL42	SL43	SL44	SL45	SL46	SL47	SL48	SL49	SL50	SL51	SL52	SL53	AVERAGE	No. Exceed RAL 1	No. Exceed RAL 2	No.Exceed BAC?	No. Exceed ERL	No. Exceed PEL?
Arsenic	20	70	25		41.6	11.9	12.2	11.3	9.8	7.2	18.4	17.7	16.7	18.2	16.7	16.8	20	20.1	17.3	15.5	19.8	16.6	19.3	13.67	10	0	2	N/A	0
Cadmium	0.4	4	0.31	1.2	4.2	0.62	0.87	0.12	0.1	0.11	1.22	1.06	1.05	1.15	1.12	1.26	1.17	1.03	1.01	0.86	1.01	1.74	1.1	0.45	17	0	24	3	0
Chromium	50	370	81	81	160	119	138	51.6	39.4	38.4	202	187	189	186	183	200	201	192	176	154	191	268	189	91.20	31	0	20	20	12
Copper	30	300	27	34	108	61.8	71.3	28.5	16.7	15.6	95.7	85.1	85.1	88.1	85.5	101	92.8	85.9	84.6	72.5	84.9	129	85.6	43.64	28	0	31	25	1
Mercury	0.25	1.5	0.07	0.15	0.7	0.41	0.42	0.24	0.15	0.14	0.53	0.52	0.55	0.49	0.48	0.55	0.6	0.63	0.62	0.5	0.65	0.61	0.52	0.29	24	0	46	33	1
Nickel	30	150	36	-	-	37.8	43.7	28.5	27.3	24	51.1	45.6	47.2	45.3	49.2	51.1	50.9	47.5	45.9	46	49.2	44.5	47.7	32.36	31	0	23	N/A	N/A
Lead	50	400	38	47	112	104	127	56.7	40.4	37.2	157	135	138	143	138	159	153	143	138	132	147	178	139	71.66	25	0	39	27	14
Zinc	130	600	122	150	271	243	301	113	87.4	76.7	431	334	337	356	350	395	357	327	321	296	324	393	329	181.13	30	0	32	23	14
Napthalene	0.1		0.08	0.16	0.391	0.0463	0.0529	0.0195	0.0219	0.0248	0.055	0.0516	0.0463	0.0487	0.0529	0.0195	0.0219	0.0248	0.055	0.0516	0.0463	0.0487	0.046	0.03	0	N/A	2	0	0
Acenaphthylene	0.1		-	-	0.128	0.0215	0.0239	0.0363	0.00948	0.0162	0.0221	0.0217	0.023	0.0222	0.0239	0.0363	0.00948	0.0162	0.0221	0.0217	0.023	0.0222	0.0196	0.02	0	N/A	N/A	N/A	0
Acenaphthene	0.1		-	-	0.0889	0.0256	0.0373	0.00833	0.00727	0.0121	0.0322	0.0319	0.0319	0.0279	0.0373	0.00833	0.00727	0.0121	0.0322	0.0319	0.0319	0.0279	0.0245	0.02	0	N/A	N/A	N/A	0
Fluorene	0.1		-	-	0.144	0.0423	0.0633	0.0167	0.0141	0.0202	0.0483	0.0467	0.0483	0.0521	0.0633	0.0167	0.0141	0.0202	0.0483	0.0467	0.0483	0.0521	0.0448	0.03	1	N/A	N/A	N/A	0
Phenanthrene	0.1		0.032	0.24	0.544	0.14	0.206	0.058	0.0605	0.082	0.225	0.202	0.205	0.202	0.206	0.058	0.0605	0.082	0.225	0.202	0.205	0.202	0.176	0.14	28	N/A	46	6	1
Anthracene	0.1		0.05	0.085	0.245	0.0593	0.0865	0.0247	0.0141	0.0268	0.0728	0.0828	0.0729	0.0781	0.0865	0.0247	0.0141	0.0268	0.0728	0.0828	0.0729	0.0781	0.0659	0.05	5	N/A	21	7	1
Fluoranthene	0.1		0.039	0.6	1.494	0.393	0.466	0.12	0.0725	0.118	0.395	0.396	0.371	0.394	0.466	0.12	0.0725	0.118	0.395	0.396	0.371	0.394	0.352	0.26	38	N/A	47	1	1
Pyrene	0.1		0.024	0.665	1.398	0.384	0.451	0.169	0.166	0.159	0.4	0.392	0.359	0.404	0.451	0.169	0.166	0.159	0.4	0.392	0.359	0.404	0.348	0.28	44	N/A	48	1	1
Benzo(a)anthracene	0.1		0.016	0.261	0.693	0.189	0.223	0.0864	0.036	0.0587	0.194	0.193	0.175	0.197	0.223	0.0864	0.036	0.0587	0.194	0.193	0.175	0.197	0.175	0.12	24	N/A	47	1	1
Chrysene	0.1		0.02	0.384	0.846	0.19	0.242	0.0937	0.049	0.07	0.216	0.216	0.193	0.221	0.242	0.0937	0.049	0.07	0.216	0.216	0.193	0.221	0.197	0.14	27	N/A	47	1	0
Benzo(b)fluoranthene	0.1		-	-	-	0.237	0.25	0.124	0.0711	0.111	0.239	0.252	0.216	0.256	0.25	0.124	0.0711	0.111	0.239	0.252	0.216	0.256	0.227	0.15	30	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1		-	-	-	0.22	0.248	0.114	0.0621	0.0963	0.222	0.227	0.21	0.239	0.248	0.114	0.0621	0.0963	0.222	0.227	0.21	0.239	0.208	0.14	28	N/A	N/A	N/A	N/A
Benzo(a)pyrene	0.1		0.03	0.384	0.763	0.261	0.285	0.14	0.0714	0.12	0.267	0.278	0.248	0.29	0.285	0.14	0.0714	0.12	0.267	0.278	0.248	0.29	0.25	0.16	30	N/A	46	1	1
Indeno(1,2,3cd)pyrene	0.1		0.103	0.24	-	0.199	0.209	0.109	0.0479	0.0976	0.199	0.211	0.19	0.215	0.209	0.109	0.0479	0.0976	0.199	0.211	0.19	0.215	0.176	0.11	22	N/A	22	1	N/A
Benzo(ghi)perylene	0.1		0.08	0.085	-	0.217	0.232	0.12	0.0692	0.117	0.221	0.227	0.205	0.234	0.232	0.12	0.0692	0.117	0.221	0.227	0.205	0.234	0.211	0.13	30	N/A	31	31	N/A
Dibenzo(a,h)anthracene	0.01		-	-	0.135	0.037	0.0449	0.0215	0.0118	0.0204	0.0379	0.0451	0.0368	0.0428	0.0449	0.0215	0.0118	0.0204	0.0379	0.0451	0.0368	0.0428	0.0413	0.02	38	N/A	N/A	N/A	0
TPH	100		-	-	-	1010	1220	221	134	196	1850	1970	1950	1640	1220	221	134	196	1850	1970	1950	1640	1760	544.76	41	N/A	N/A	N/A	N/A
PCBs	0.02	0.18	-	-	0.189	0.01963	0.00891	0.01121	0.00237	0.00305	0.03885	0.0303	0.03592	0.03641	0.00891	0.01121	0.00237	0.00305	0.03885	0.0303	0.03592	0.03641	0.04334	0.0126	12	0	N/A	N/A	0
TBT	0.1	0.5	-	-	-	0.005	0.0121	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0121	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0049	0	0	N/A	N/A	N/A

Note: Underlined Values are < LOD. Values highlighted red are equal to or great
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	Dredge Average	Exceed AL1?	Exceed AL2?	Exceed BAC?	Exceed ERL ?	Exceed PEL?
Source			CSEMP	CSEMP	Canada						
Arsenic	20	70	25	-	41.6	13.7	No	No	No	N/A	No
Cadmium	0.4	4	0.31	1.2	4.2	0.5	**Yes**	No	**Yes**	No	No
Chromium	50	370	81	81	160	91.2	**Yes**	No	**Yes**	**Yes**	No
Copper	30	300	27	34	108	43.6	**Yes**	No	**Yes**	**Yes**	No
Mercury	0.25	1.5	0.07	0.15	0.7	0.3	**Yes**	No	**Yes**	**Yes**	No
Nickel	30	150	36	-	-	32.4	**Yes**	No	No	N/A	N/A
Lead	50	400	38	47	112	71.7	**Yes**	No	**Yes**	**Yes**	No
Zinc	130	600	122	150	271	181.1	**Yes**	No	**Yes**	**Yes**	No
					-						
Napthalene	0.1	-	0.08	0.16	0.319	0.03	No	N/A	No	No	No
Acenaphthylene	0.1	-	-	-	0.128	0.02	No	N/A	N/A	N/A	No
Acenaphthene	0.1	-	-	-	0.0889	0.02	No	N/A	N/A	N/A	No
Fluorene	0.1	-	-	-	0.144	0.03	No	N/A	N/A	N/A	No
Phenanthrene	0.1	-	0.032	0.24	0.544	0.14	**Yes**	N/A	**Yes**	No	No
Anthracene	0.1	-	0.05	0.085	0.245	0.05	No	N/A	No	No	No
Fluoranthene	0.1	-	0.039	0.6	1.494	0.26	**Yes**	N/A	**Yes**	No	No
Pyrene	0.1	-	0.024	0.665	1.398	0.28	**Yes**	N/A	**Yes**	No	No
Benzo(a)anthracene	0.1	-	0.016	0.261	0.693	0.12	**Yes**	N/A	**Yes**	No	No
Chrysene	0.1	-	0.02	0.384	0.846	0.14	**Yes**	N/A	**Yes**	No	No
Benzo(b)fluoranthene	0.1	-	-	-	-	0.15	**Yes**	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	0.1	-	-	-	-	0.14	**Yes**	N/A	N/A	N/A	N/A
Benzo(a)pyrene	0.1	-	0.03	0.384	0.763	0.16	**Yes**	N/A	**Yes**	No	No
Indeno(1,2,3cd)pyrene	0.1	-	0.103	0.24	-	0.11	**Yes**	N/A	**Yes**	No	N/A
Benzo(ghi)perylene	0.1	-	0.08	0.085	-	0.13	**Yes**	N/A	**Yes**	**Yes**	N/A
Dibenzo(a,h)anthracene	0.01	-	-	-	0.135	0.02	**Yes**	N/A	N/A	N/A	No
TPH	100	-	-	-	-	544.76	**Yes**	N/A	N/A	N/A	N/A
PCBs	0.02	0.18	-	-	0.189	0.013	No	No	N/A	N/A	No
TBT	0.1	0.5	-	-	-	0.0049	No	No	N/A	N/A	N/A

Summary Table C

Cloch Point Contaminant Summary - Source: Marine Scotland

	Site Name	As mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Hg mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg	ICES7 ug/kg	TBT+ mg/kg	(a)Pyrene (mg/kg)
ERL	Cloch Point	-	1.2	81	34	0.15	-	47	150	-	-	0.384
PEL		41.6	4.2	160	108	0.7	-	112	271	189	-	0.763
Min		0.00	0.08	43.08	3.83	0.01	15.89	45.74	43.97	8.61	9.82	0.17
Average		15.18	0.69	151.51	68.83	0.61	35.25	154.58	259.60	46.89	55.93	0.84
Max		28.36	1.52	243.03	163.31	2.84	54.56	302.99	1214.74	191.05	342.71	3.09

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

	AL1	AL2	BAC	<ERL	ISQG/TEL	PEL	Clyde Dredge Average	Cloch Point Average
Source			CSEMP	CSEMP	Canada			
Arsenic	20	70	25	-	7.2	41.6	13.7	15.18
Cadmium	0.4	4	0.31	1.2	0.7	4.2	0.5	0.69
Chromium	50	370	81	81	52.3	160	91.2	151.51
Copper	30	300	27	34	18.7	108	43.6	68.83
Mercury	0.25	1.5	0.07	0.15	0.13	0.7	0.3	0.61
Nickel	30	150	36	-	-	-	32.4	35.25
Lead	50	400	38	47	30.2	112	71.7	154.58
Zinc	130	600	122	150	124	271	181.1	259.60
Napthalene	0.1		0.08	0.16	-	0.319	0.03	
Acenaphthylene	0.1		-	-	0.00587	0.128	0.02	
Acenaphthene	0.1		-	-	0.00671	0.0889	0.02	
Fluorene	0.1		-	-	0.0212	0.144	0.03	
Phenanthrene	0.1		0.032	0.24	0.0867	0.544	0.14	
Anthracene	0.1		0.05	0.085	0.0469	0.245	0.05	
Fluoranthene	0.1		0.039	0.6	0.113	1.494	0.26	
Pyrene	0.1		0.024	0.665	0.153	1.398	0.28	
Benzo(a)anthracene	0.1		0.016	0.261	0.0748	0.693	0.12	
Chrysene	0.1		0.02	0.384	0.108	0.846	0.14	
Benzo(b)fluoranthene	0.1		-	-	-	-	0.15	
Benzo(k)fluoranthene	0.1		-	-	-	-	0.14	
Benzo(a)pyrene	0.1		0.03	0.384	0.0888	0.763	0.16	0.837
Indeno(1,2,3cd)pyrene	0.1		0.103	0.24	-	-	0.11	
Benzo(ghi)perylene	0.1		0.08	0.085	-	-	0.13	
Dibenzo(a,h)anthracene	0.01		-	-	0.00622	0.135	0.02	
PCBs	0.02	0.18	-	-	0.0215	0.189	0.013	0.047
TBT	0.1	0.5	-	-	-	-	0.005	0.056

D SNH CONSULTATION RESPONSE

Campbell Stewart

From: Dave Lang <Dave.Lang@nature.scot>
Sent: 10 December 2019 14:05
To: Fraser Russell
Cc: Campbell Stewart
Subject: RE: Clyde Maintenance Dredge Revisions

Hi Fraser,

As you may very well be aware, prior to the advent of Marine Licensing in 2010 SNH were required to regulate maintenance and capital dredging of the Clyde in that part of the channel that passed through the SPA.

Originally, our view was that dredging should be undertaken in the 'summer' months of April to August when the protected birds were not present as this meant that there was no requirement to undertake the potentially tricky process of establishing what impact dredging has on them in order to demonstrate on the basis of "no reasonable scientific doubt" (as required by the legislation).

This, ultimately, was not deemed to be a workable restriction by the Port Authority, as they often could not guarantee in advance when dredging equipment would become available to them.

Consequently, we were ultimately unable to avoid the whole process of Habitats Regs Appraisal and appropriate assessment.

Happily, with the help of sedimentation modelling carried out by the FRS Marine Lab, SNH were able to conclude that dredging OF THE SORT THEN BEING DISCUSSED would not impact on the protected birds, regardless of where it was undertaken in the Clyde. The main reason we were able to reach this conclusion in a manner that met the legislative tests was because it had been clearly demonstrated to us that the dredging equipment proposed for use in all of the projects for which Clydeport (as they were then) were seeking consent did not give rise to levels of noise or vibration that were in excess of those from normal shipping in the Clyde – to which we had confirmed that the birds were generally habituated.

So given all that I would say –

If all of your dredging for this project can be scheduled for the 'summer' months of – at the most generous – mid-March to mid-September, then the birds we are concerned about will likely be absent and there will be no issues. There will be 'no likely significant effect' and Marine Scotland need give the issue no further thought. (I presume that Marine Scotland will be the regulators for this project – with ourselves as statutory consultees?)

If that is not possible, and you would rather have the freedom to also dredge in winter, then Marine Scotland will need to perform and HRA. But if it can be demonstrated in some way that all of the equipment you refer to is either similar or better (in terms of noise and vibration levels) to that used by Clydeport for their capital and maintenance dredging prior to 2010, then that HRA should conclude that there will be no adverse effects on the birds and everything should still be fine.

I hope that the above helps in developing these proposals.

Yours,

Dave Lang
SNH Operations Officer
Strathclyde & Ayrshire