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Marine Licence Application for Dredging and Sea Disposal

Version 1.0

Marine (Scotland) Act 2010

Marine Scotland, 375 Victoria Road, Aberdeen, AB11 9DB
http://www.gov.scot/Topics/marine/Licensing/marine

Acronyms

Please note the following acronyms referred to in this application form:

BPEO	Best Practicable Environmental Option
MHWS	Mean High Water Springs
MMO	Marine Mammal Observer
MPA	Marine Protected Area
MS-LOT	Marine Scotland – Licensing Operations Team
PAM	Passive Acoustic Monitoring
SAC	Special Area of Conservation
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WGS84	World Geodetic System 1984

Explanatory Notes

The following numbered paragraphs correspond to the questions on the application form and are intended to assist in completing the form. These explanatory notes are specific to this application and so you are advised to read these in conjunction with the Marine Scotland Guidance for Marine Licence Applicants document.

1. Applicant Details

The person making the application who will be named as the licensee.

2. Dredging Contractor Details

The person whose activities produce the substance(s) or object(s) to be dredged and/or intended for sea disposal (e.g the dredging contractor).

3. Agent Details

Any person acting under contract (or other agreement) on behalf of any party listed as the applicant and having responsibility for the control, management or physical deposit or removal of any substance(s) or object(s).

4. Payment

Indicate payment method. Cheques must be made payable to: The Scottish Government.

Marine licence applications will not be accepted unless accompanied by a cheque for the correct application fee, or if an invoice is requested, until that invoice is settled. Target timelines for determining applications do not begin until the application fee is paid.

5. Application Type

Indicate if the application is for a new dredging site or a site that has previously been dredged. Provide the existing or previous consent/licence number, expiry date and quantity (in wet tonnes) dredged under the consent/licence up to a stated date if applicable.

6. Dredging and Sea Disposal Details

(a) Give a brief description of the dredging and sea disposal operation.

(b) Provide the proposed start date of the project. The start date will not be backdated, since to commence a project for which a licence has not been obtained will constitute an offence, which may result in appropriate legal action. A licence is normally valid for the duration of the project but not exceeding 3 years. If a project will not be completed before a marine licence lapses, it will be necessary for licence holders to re-apply for a further licence to continue any ongoing work at least 14 weeks prior to the expiry date of the licence. **Target duration for determination of a marine licence application is 14 weeks.**

(c) Provide the proposed completion date of the project.

(d) Describe the location of the proposed works. Include a list of the latitude and longitude co-ordinates (WGS84) of the boundary points for each dredge site area. WGS84 is the World Geodetic System 1984 and the reference co-ordinate system used for marine licence applications. Co-ordinates taken from GPS equipment should be set to WGS84. Coordinates taken from recent admiralty charts will be on a WGS84 compatible datum. Ordnance survey maps do not use WGS84.

Example: For positions read from charts the format should be as in the example: 55°55.555'N 002°22.222'W (WGS84). The decimal point specifies that decimals of minutes are used and the datum is stated explicitly. If seconds are used then the format should be as in the example: 55°55'44''N 2°22'11''W (WGS84).

It is important that the correct positions, in the correct format, are included with this application, as any errors will result in the application being refused or delayed.

To supplement your application, please provide a suitably scaled extract of an Ordnance Survey Map (1:2,500 scale but not more than 1:10,000) or Admiralty Chart which must be marked to indicate:

- the full extent of the works in relation to the surrounding area;
- latitude and longitude co-ordinates defining the location of the works;
- the level of MHWS;
- any adjacent SAC, SPA, SSSI, MPA, Ramsar or similar conservation area boundary.

Drawings and plans will be consulted upon. If they are subject to copyright, **it is the responsibility of the applicant to obtain necessary approvals to reproduce the documents and to submit suitably annotated copies with the application.**

(e) Provide details of the proposed disposal site for the dredged substance(s) or object(s) and, if necessary, any alternative disposal site(s) considered. In determining whether to grant a marine licence, MS-LOT will take into account any site nominated by the applicant. However, should this site be unsuitable, the nearest suitable disposal site for the dredged substance(s) or object(s) will be identified. Should you wish to establish a new site, please provide details in a covering letter with your application and MS-LOT will contact you to discuss your proposal before your application is determined. The cost of any site investigations to identify any new disposal site will normally be the responsibility of the applicant.

(f) Indicate if any part of the works (dredging or sea disposal site) are located within the jurisdiction of a statutory harbour authority and provide details of the statutory harbour authority where relevant.

(g) Provide a full method statement. The method statement must include details such as the rate of dredging, timing of the operation and order of the areas to be dredged.

(h) Provide assessment of the potential impacts the works may have, including interference with other uses of the sea. Please include details of areas of concern e.g designated conservation areas, such as a SAC, SPA, SSSI, MPA or Ramsar site and shellfish harvesting areas. Further guidance on designated conservation areas can be obtained from SNH at this website: http://gateway.snh.gov.uk/sitelink/index.jsp and guidance on shellfish harvesting areas can be obtained from http://www.foodstandards.gov.scot/ with regards to the Shellfish Waters Directive (2006/113/EC) which has parameters set to protect the water quality in which edible shellfish are grown.

Applicants should also be aware of the need to pay due regard to coastal and marine archaeological matters and attention is drawn to Historic Scotland's Operational Policy Paper HP6, "Conserving the Underwater Heritage".

Any application for beach replenishment works must be cross checked as to whether the proposed site is a designated bathing water site. If so, all physical works should ideally be done outwith the Bathing Water Season (1st June to 15th September). Further guidance on the Bathing Waters Directive (2006/7/EC) can be obtained from http://apps.sepa.org.uk/bathingwaters/.

Where there are potential impacts from the works, please provide details of proposed mitigation, such as use of MMOs or PAM, in response to potential impacts.

7. Details of Substance(s) or Object(s) to be Dredged

Information is required for each dredge site area listed in section 6 (d). please provide the following information:

Name of Dredge Area: For example Approach Channel or West of South Quay**.**

Type (Maintenance or Capital): Maintenance dredge applies to an area that has been dredged more than once and either annually or on a regular basis and was last dredged with the past 7 years; and a **Capital dredge** applies where an area/depth is being dredged either for the first time, or which has not been dredged within the past 7 years.

For capital dredging operations, a pre-dredge survey and sediment chemical analysis report will be required by MS-LOT prior to the issue of a sea disposal licence. Please contact MS-LOT for details in relation to specific projects. For maintenance dredging operations sites that have not been chemically analysed for more than 3 years, pre-dredge chemical analysis will be required to be undertaken. In addition to those samples analysed by the applicant, sediment sub-sample(s) must be submitted to MS-LOT as check monitoring may be required.

Estimated Specific Gravity: Indicate the specific gravity of the substance(s) or object(s) to be dredged from each dredge area.

Depth: Indicate the maximum depth (in metres) below the current seabed level, to which it is expected dredging is to be carried out, for each dredge area.

Quantity to be Dredged per Year (wet tonnes): Indicate the quantity of substance(s) or object(s) to be dredged (per year) from each dredge area. The quantity must be provided in wet tonnes.

8. Physical Composition

Indicate the approximate proportions as a percentage for each size range against each of the dredge site areas listed in section 6 (d) which are expected to be removed.

9. Details of Substance(s) or Object(s) Quality

Please indicate whether the substance(s) or object(s) from any of the areas to be dredged have been chemically analysed within the past 3 years. If yes, please provide details (locations, dates, results) on a separate sheet. If no, please provide justification. For capital projects, you are required to have representative sediment samples analysed at a laboratory of choice (see MS-LOT Pre-dredge Sampling Guidance document at http://www.gov.scot/Topics/marine/Licensing/marine/Applications/predredge for analytical requirements. This is liable to extend the time required to consider your application **as marine licence applications will not be determined without provision of this chemistry data.**

As part of the application determination process, you are required to carry out an assessment of the chemical and physical characteristics of the substance(s) or object(s) to be deposited at sea and potential effects upon the marine environment. It is your responsibility to show that the substance(s) or object(s) are suitable to be considered for sea disposal. This assessment should form part of your BPEO.

Under section 27(2) of the Marine (Scotland) Act 2010, the licensing authority has an obligation to consider the availability of practical alternatives when considering applications involving disposal of substance(s) or object(s) at sea. All applications for sea disposal must be supported by a detailed assessment of the alternative options - BPEO assessment. This must include a statement setting out the reasons why deposit of the substance(s) or object(s) at sea is the preferred option and applications will not be considered unless they are accompanied by such an assessment. All options in the BPEO must be explored fully (as per the guidance documents) otherwise your form and BPEO are liable to be returned to you, thereby delaying processing of the application.

As part of the licence conditions, you are likely to be required to take representative samples of the dredged substance(s) or object(s) during the dredging/sea disposal operations for analysis by MS-LOT. In such cases, samples must be taken at specified locations and depths and placed in containers which will be provided. The

samples must then be returned to MS-LOT at the Marine Laboratory Aberdeen. This process enables MS-LOT to fulfil its obligations under international conventions.

10. Details of Vessel(s) Undertaking Dredging and Sea Disposal

Provide the vessel name, vessel type (e.g cutter-suction) and name and address of all vessel operators to be used for dredging and sea disposal operations. If vessel details are not available at the time of application, please indicate this on the form as these details will be required prior to licence issue.

11. Noise Monitoring

Under the Marine Strategy Regulations (2010), there is now a requirement to monitor loud, low to mid frequency (10Hz to 10kHz) impulsive noise. Activities where this type of noise is produced include seismic airguns, other geophysical surveys (<10kHz), pile driving, explosives and certain acoustic deterrent devices. Where noisy activity is being undertaken, you must complete an initial registration form for the noise registry which allows you to provide details on the proposed work. Completion of a 'close-out' form, which allows licensees to provide details of the actual dates and locations where the activities occurred, is also required within 12 weeks of the completion of the 'noisy' activity or, in the case of prolonged activities such as piling for harbour construction or wind farms, at quarterly intervals or after each phase of foundation installation.

These forms can be downloaded from:
http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/noise-reduction

Marine licence applications will not be accepted until this form has been completed and submitted.

12. Statutory Consenting Powers

Please describe in the answer to this question what (if any) statutory responsibilities you (or your client) have to consent any aspect of the project.

13. Scotland's National Marine Plan

Scotland's National Marine Plan has been prepared in accordance with the EU Directive 2014/89/EU, which came into force in July 2014. The Directive introduces a framework for maritime spatial planning and aims to promote the sustainable development of marine areas and the sustainable use of marine resources. It also sets out a number of minimum requirements all of which have been addressed in this plan. In doing so, and in accordance with article 5(3) of the Directive, Marine Scotland have considered a wide range of sectoral uses and activities and have determined how these different objectives are reflected and weighted in the marine plan. Land-sea interactions have also been taken into account as part of the marine planning process. Any applicant for a marine licence should consider their proposals with reference to Scotland's National Marine Plan. A copy of Scotland's National Marine Plan can be found at: http://www.gov.scot/Publications/2015/03/6517/0

Indicate whether you have considered the project with reference to Scotland's National Marine Plan and provide details of considerations made including reference to the policies that have been considered. If you have not considered the project with reference to Scotland's National Marine Plan please provide an explanation.

14. Consultation

Provide details of all bodies consulted and give details of any consents issued including date of issue.

15. Associated Works

Indicate whether the application is associated with any other marine projects (e.g. land reclamation, or marine/harbour construction works etc). If this is the case, provide reference/licence number for the related marine projects.

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It is the responsibility of the applicant to obtain any other consents or authorisations that may be required.

Under Section 54 of the Marine (Scotland) Act 2010, all information contained within and provided in support of this application will be placed on a Public Register. There are no national security grounds for application information not going on the Register under the 2010 Act.

Public Register

Do you consider that any of the information contained within or provided in support of this application should not be disclosed:

(a) for reasons of national security; YES ☐ NO ■

(b) for reasons of confidentiality of commercial or industrial information where such confidentiality is provided by law to protect a legitimate commercial interest? YES ☐ NO ■

If **YES**, to either (a) or (b), please provide full justification as to why all or part of the information you have provided should be withheld.

WARNING

It is an offence under the Act under which this application is made to fail to disclose information or to provide false or misleading information.

Target duration for determination is 14 weeks. Please note that missing or erroneous information in your application and complications resulting from consultation may result in the application being refused or delayed.

Marine licence applications will not be accepted unless accompanied by a cheque for the correct application fee, or if an invoice is requested, until that invoice is settled. Target timelines for determining applications do not begin until the application fee is paid.

Declaration

I declare to the best of my knowledge and belief that the information given in this form and related papers is true.

Signature [redacted] Date 4/7/17

Name in BLOCK LETTERS [redacted]

Application Check List

Please check that you provide all relevant information in support of your application, including but not limited to the following:

- Completed and signed application form ☑
- Maps/Charts ☑
- Co-ordinates of the boundary points of the area of harbour jurisdiction (if you are a statutory harbour authority) ☑
- Method Statement ☑
- BPEO Assessment ☑
- Analytical chemistry data (for capital projects) ☐
- Transportation plan (dredger route to and from disposal site – if required) ☐
- Additional information e.g. photographs, consultation correspondence ☐
- Noise Registry – Initial Registration Form (if applicable) ☐
- Payment (if paying by cheque) ☐

1. Applicant Details

Title: Mr Initials: N Surname: Yardley

Trading Title (if appropriate):

Address: Development and Housing Services, 4th Floor (South Wing), Renfrewshire House, Cotton St, Paisley, PA1 1JD

Name of contact (if different):

Telephone No. (inc. dialing code): 0300 300 0300

Email: norman.yardley@renfrewshire.gcsx.gov.uk

Statutory Harbour Authority? YES ☐ NO ■

If **YES**, please provide a list of the latitude and longitude co-ordinates (WGS84) of the boundary points of the area of harbour jurisdiction using Appendix 01 Additional Co-ordinates form if necessary.

2. Dredging Contractor Details (if any)

Title: Initials: Surname:

If the Dredging Contractor is the Applicant shown in section 1 please tick the box ☐

Trading Title (if appropriate):

Address:

Name of contact (if different):

Telephone No. (inc. dialing code):

Email:

3. Agent Details (if any)

Title: Mr Initials: C Surname: Cardno

Trading Title (if appropriate):

Address: Sweco, City Park, Suite 4.2, 368 Alexandra Parade, Glasgow, G31 3AU

Name of contact (if different):

Telephone No. (inc. dialing code): 0141 414 1700

Email: chris.cardno@sweco.co.uk

4. Payment

Enclosed Cheque ☐ Invoice ☒

Contact and address to send invoice to:

Applicant ☒ Agent ☐ Other ☐

If **OTHER**, please provide contact details:

Title: Initials: Surname:

Address:

Email:

5. Application Type

Is this application for a new dredging site or a site that has previously been dredged:

New Site ☒ Previously Dredged Site ☐

If an **PREVIOUSLY DREDGED SITE**, please provide the following:

Consent/Licence Number	Expiry Date	Quantity (wet tonnes) dredged under consent/licence as at (date)

6. Dredging and Sea Disposal Details

(a) Brief description of the dredging and sea disposal operation:

Capital dredge to facilitate emergency berthing of commercial shipping at new berthing structure adjacent to proposed Clyde Crossing.

(b) Proposed start date **(Target duration for determination of a marine licence application is 14 weeks):**

Jan 2020 (TBC)

(c) Proposed completion date:

Jan 2020 (TBC)

(d) Location of Dredging:

Coordinates for berthing structure are as per below.
Location plan and cross-section for clarity of related dredge shown in Appendix 01.

Latitude and Longitude co-ordinates (WGS84) defining the extent of all dredge areas (continue on Appendix 01 Additional Co-ordinates form if necessary):

Dredge Area A

Latitude											Longitude										
5	5	°	5	3	.	4	9	0	' N		0	0	4	°	2	3	.	9	9	0	' W
5	5	°	5	3	.	5	0	4	' N		0	0	4	°	2	3	.	9	7	6	' W
5	5	°	5	3	.	4	5	3	' N		0	0	4	°	2	3	.	8	7	8	' W
5	5	°	5	3	.	4	6	5	' N		0	0	4	°	2	3	.	8	6	6	' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W

Dredge Area B

Latitude											Longitude										
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W

Dredge Area C

Latitude											Longitude										
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W

Dredge Area D

Latitude											Longitude										
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W

Dredge Area E

Latitude											Longitude										
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W

(e) Name of Disposal Site and Oslo Code:

No sea disposal expected. TBC

Latitude and Longitude co-ordinates (WGS84) defining the extent of disposal site (continue on Appendix 01 Additional Co-ordinates form if necessary):

Latitude											Longitude										
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W
		°			.				' N					°			.				' W

(f) Is any part of the works (dredging or sea disposal site) located within the jurisdiction of a statutory harbour authority? YES ■ NO ☐

If **YES**, please specify statutory harbour authority:

Clydeport

(g) Method statement including rate of dredging, timing of the operation and order of the areas to be dredged (continue on separate sheet if necessary):

The rate of dredging will be as determined by the dredging contractor. The capital dredge is likely to occur concurrently with the existing Clyde maintenance dredge which will serve to minimise any concerns regarding operational timing. However, should this not be the case, any dredging shall be performed outwith migratory fish season (July-August). As this is a single dredge area, it is expected that this will be carried out in an east-west fashion or vice versa.

(h) Potential impacts the works may have (including details of areas of concern e.g designated conservation and shellfish harvesting areas) and proposed mitigation in response to potential impacts (continue on separate sheet if necessary):

Please see scoping update from Scottish National Heritage in Appendix 02.

7. Details of Substance(s) or Object(s) to be Dredged (Please provide details for each of the Dredge Areas listed in Section 5 (d) above. Continue on a separate sheet if necessary):

Dredge Area	**Name of Dredge Area**	**Type** (Maintenance or Capital)	**Harbour bed, Seabed or Estuary bed?**	**Estimated Specific Gravity**	**Depth** (metres)	**Quantity to be Dredged <u>per Year</u>** (wet tonnes)
A	Layby Berth	Capital	Harbour	2	3	36,000
B						
C						
D						
E						

Note: Quantity to be dredged will vary according to rate of sedimentation.

8. **Physical Composition of Substance(s) or Object(s) to be Dredged** (Please provide the approximate proportions as a percentage for each size range against each of the dredge site areas listed in Section 6 (d) above. Continue on a separate sheet if necessary):

Dredge Area	Clay and Silt (< 0.063 mm)	Sand (0.063 ≤ Sand < 2.0 mm)	Pebbles, Cobbles & Boulders (≤ 2.0 mm)
	Notye: This data can be found within Section 4.2 of the BPEO in Appendix 06.		
B			
C			
D			
E			

9. **Details of Substance(s) or Object(s) Quality**

Have the dredged substance(s) or object(s) been chemically analysed in the last 3 years? YES ■ NO ☐

10. **Details of Vessel(s) Undertaking Dredging and Sea Disposal** (please note that a marine licence cannot be issued until the vessel details have been confirmed. Continue on a separate sheet if necessary):

Vessel Name	Type of Vessel	Name and Address of Operator
Note: Dredging contractor not appointed at this stage. This will be confirmed upon contract award.		

11. Noise Monitoring

Will loud, low to mid frequency (10Hz to 10kHz) impulsive noise be produced by the project? YES ☐ NO ■

If **YES**, which please indicate the noise generating activities and sound frequencies:

Noise Generating Activity	Sound Frequency (Hertz)
Use of Explosives	
Other (please describe below):	

If you have ticked **YES**, please complete the Noise Registry – Initial Registration form located at: http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/noise-reduction

A marine licence application will not be accepted until this form has been completed and submitted.

12. Statutory Consenting Powers

Do you, or (if appropriate) your client, have statutory powers to consent any aspect of this project?

No

13. Scotland's National Marine Plan

Have you considered the application with reference to Scotland's National Marine Plan? YES ■ NO ☐

If **YES**, provide details of considerations made including reference to the policies that have been considered:

Please see Appendix 03

If **NO**, please provide an explanation of why you haven't considered the National Marine Plan?

14. Consultation

List all bodies you have consulted and provide copies of correspondence:

*Marine Coastguard Agency
*National Lighthouse Board
*SEPA
*SNH
*Clydeport
*Clyde River Foundation
*Clyde Fisherman's Association
*Association of Salmon Fishery Boards
*British Shipping
*UK Chamber of Shipping
*DIO
*Marine Safety Forum
*Royal Yacht Association
*Scottish Fishermen's Federation
*Scottish Fishermen's Organisations
*Whales and Dolphin Conservation Society (WDCS)

All bodies were provided with a copy of the Scoping Report (September 2016) and a copy of the Scoping Update (December 2016). A copy of the email issued is provided in Appendix 04.

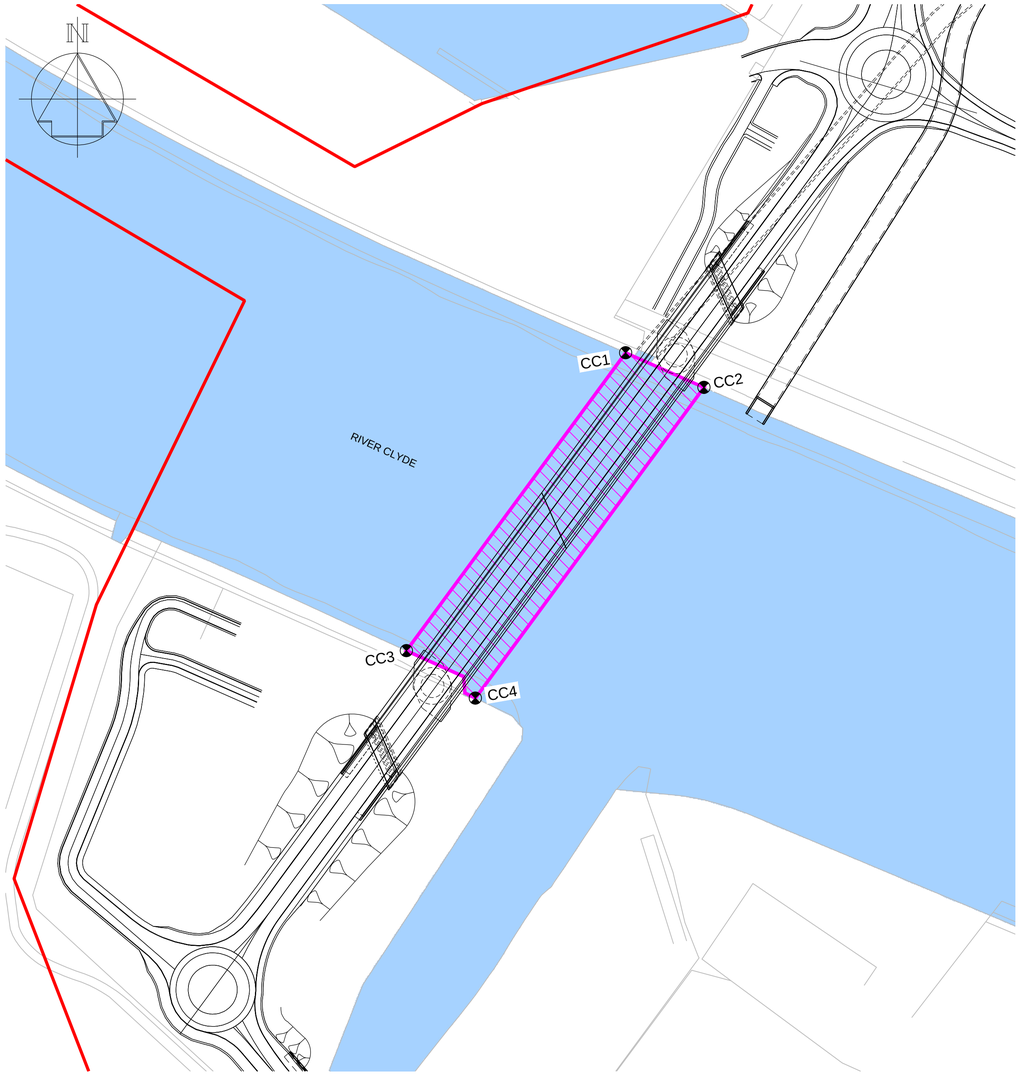
15. Associated Works

Provide details of other related marine projects, including reference/licence numbers (if applicable):

Clyde Waterfront and Renfrew Riverside Construction Marine Licence - Ref No TBC

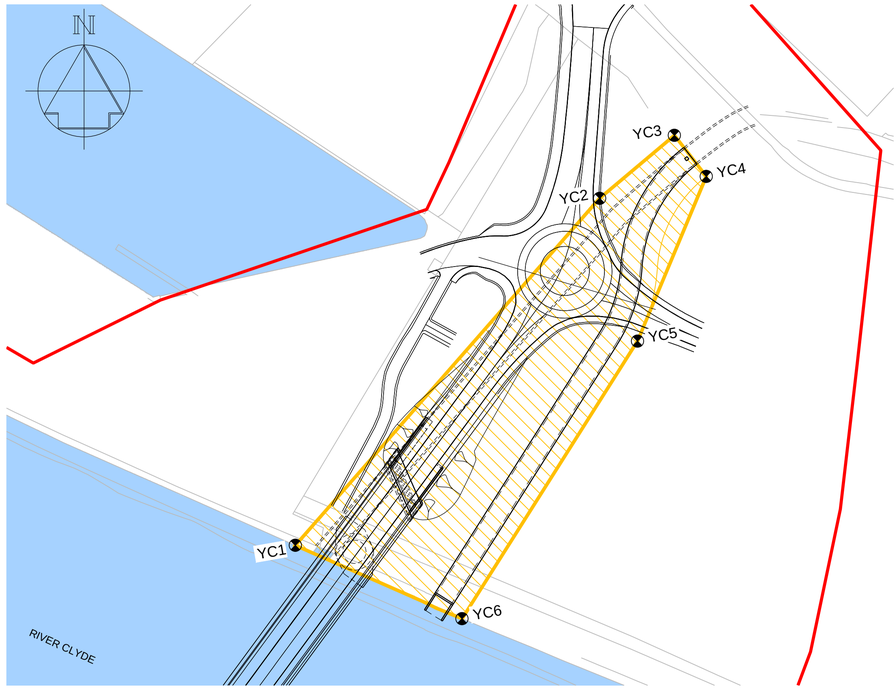
APPENDIX 01

DRAWINGS AND MAPS



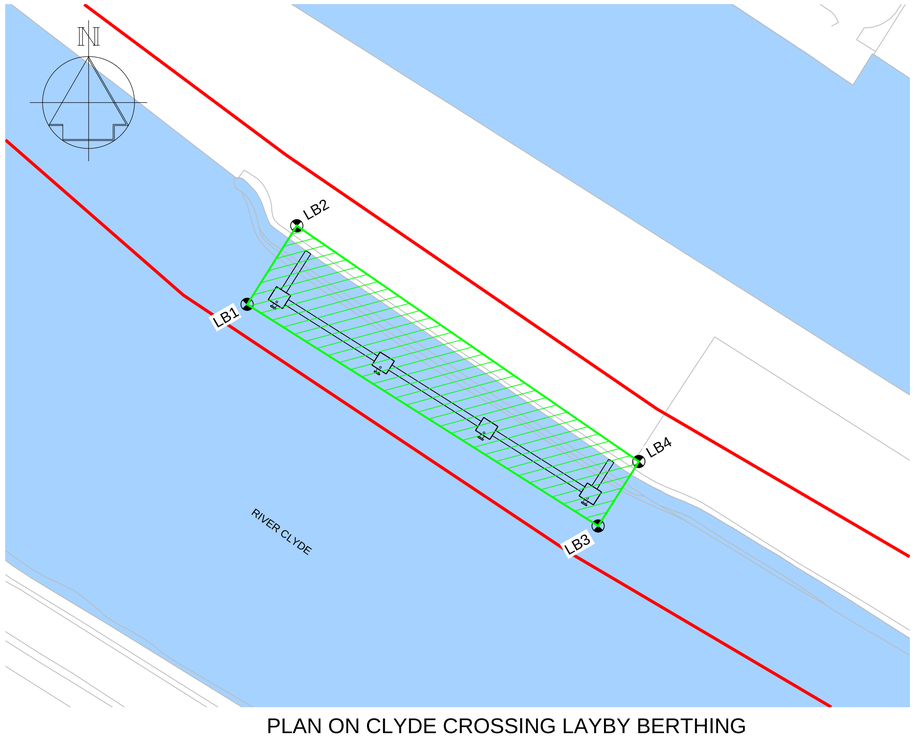
PLAN ON CLYDE CROSSING

(1:1000)



PLAN ON YOKER BURN CULVERT

(1:1000)



PLAN ON CLYDE CROSSING LAYBY BERTHING

(1:1000)

CLYDE CROSSING		
LOCATION	LATITUDE	LONGITUDE
CC1	55° 53.378'	4° 23.558'
CC2	55° 53.372'	4° 23.533'
CC3	55° 53.324'	4° 23.624'
CC4	55° 53.316'	4° 23.602'

YOKER BURN CULVERT		
LOCATION	LATITUDE	LONGITUDE
YC1	55° 53.378'	4° 23.561'
YC2	55° 53.441'	4° 23.470'
YC3	55° 53.453'	4° 23.447'
YC4	55° 53.446'	4° 23.437'
YC5	55° 53.416'	4° 23.456'
YC6	55° 53.366'	4° 23.508'

CLYDE CROSSING LAYBY BERTHING		
LOCATION	LATITUDE	LONGITUDE
LB1	55° 53.490'	4° 23.990'
LB2	55° 53.504'	4° 23.976'
LB3	55° 53.453'	4° 23.878'
LB4	55° 53.465'	4° 23.866'

Notes

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.
2. REFER TO DRAWINGS:
   117086-SWECO-SGN-00-DR-S-41000.
3. ALL DETAILS SHOWN ON THIS DRAWING ARE INDICATIVE ONLY AND SUBJECT TO DEVELOPMENT AT DETAILED DESIGN STAGE.
4. PROPOSED PIPE DIAMETER 600mm. PIPE MATERIAL AND BEDDING AS DESIGNED BY CONTRACTOR. HEADWALL DIMENSIONS AND MATERIAL AS DESIGNED BY CONTRACTOR, THOUGH PROPOSED AS PRECAST CONCRETE AT THIS TIME.

LEGEND:

- MEAN HIGH WATER SPRING AREA (MHWS)
- BRIDGE DEVELOPMENT AREA
- BRIDGE DEVELOPMENT AREA
- LAYBY BERTHING AREA
- RED LINE BOUNDARY

Reference drawings

REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
P01.1	16/05/17		---	---	---

Sweco
Suite 3/5, City Park
368 Alexandra Parade
Glasgow
G31 3AU
Tel: +44 (0)141 414 1700
Web: www.sweco.co.uk

SWECO

Client: RENFREWSHIRE COUNCIL

Renfrewshire Council

Drawing Status: Initial Status or WIP

Suitability: S0

Project Title: CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title: MARINE LICENCE LAYOUT
SHEET 2 OF 2

Scale	Designed	Drawn	Checked	Approved
1:1000	Mackay, Ruairidh	McIntosh, John	Mackay, Ruairidh	Webb, Alistair
Original Size: A1	Date: 11/05/17	Date: 11/05/17	Date: 11/05/17	Date: 11/05/17

Drawing Number

Project	Originator	Volume	Location	Type	Role	Number
117086	SWECO	SGN	00	DR	S	41001

Project Ref. No.: 117086 (R06)

Revision: P01.1

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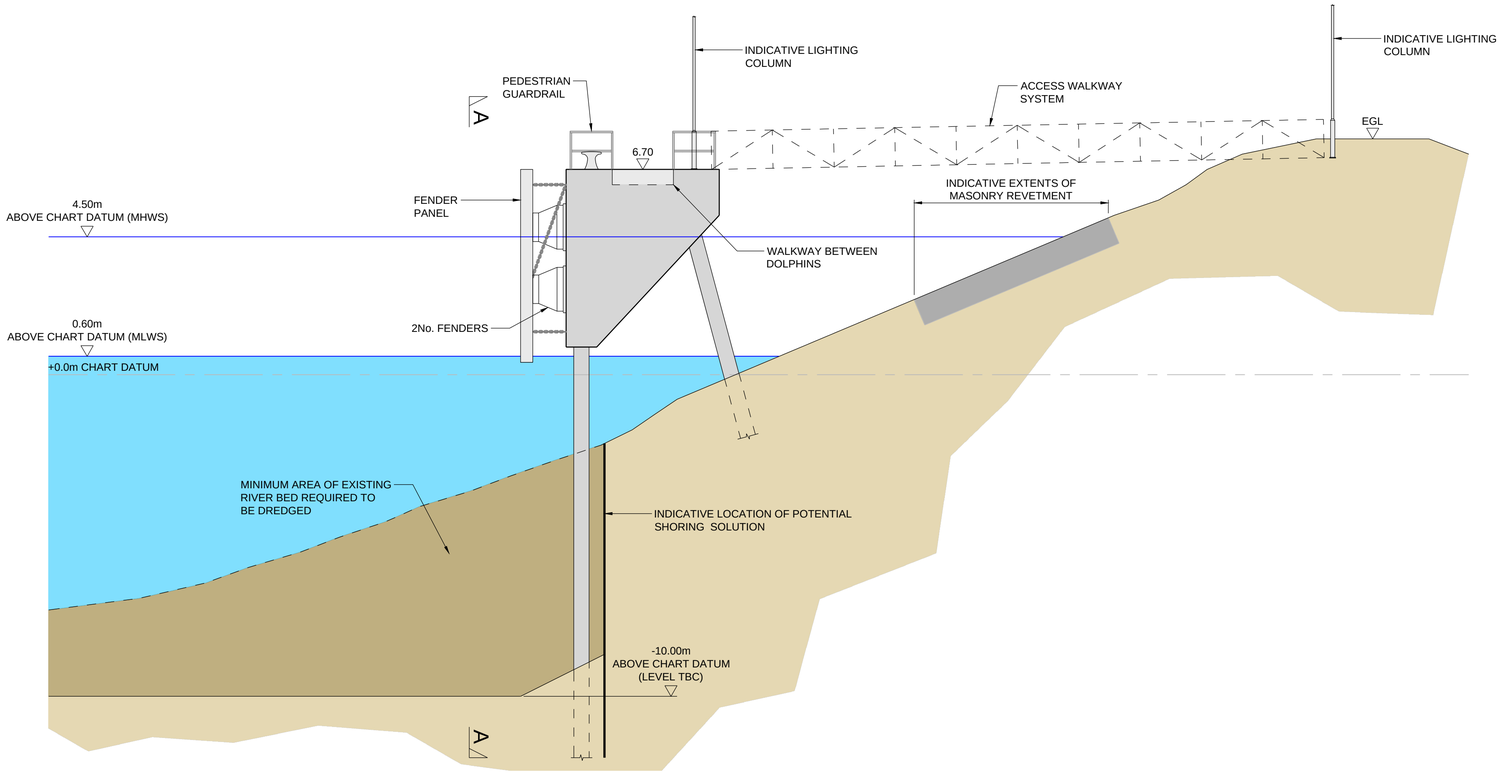

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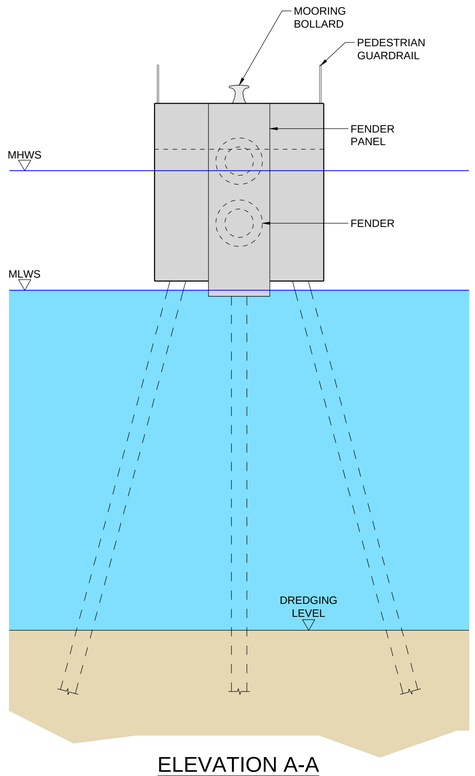
SCALE 1:100



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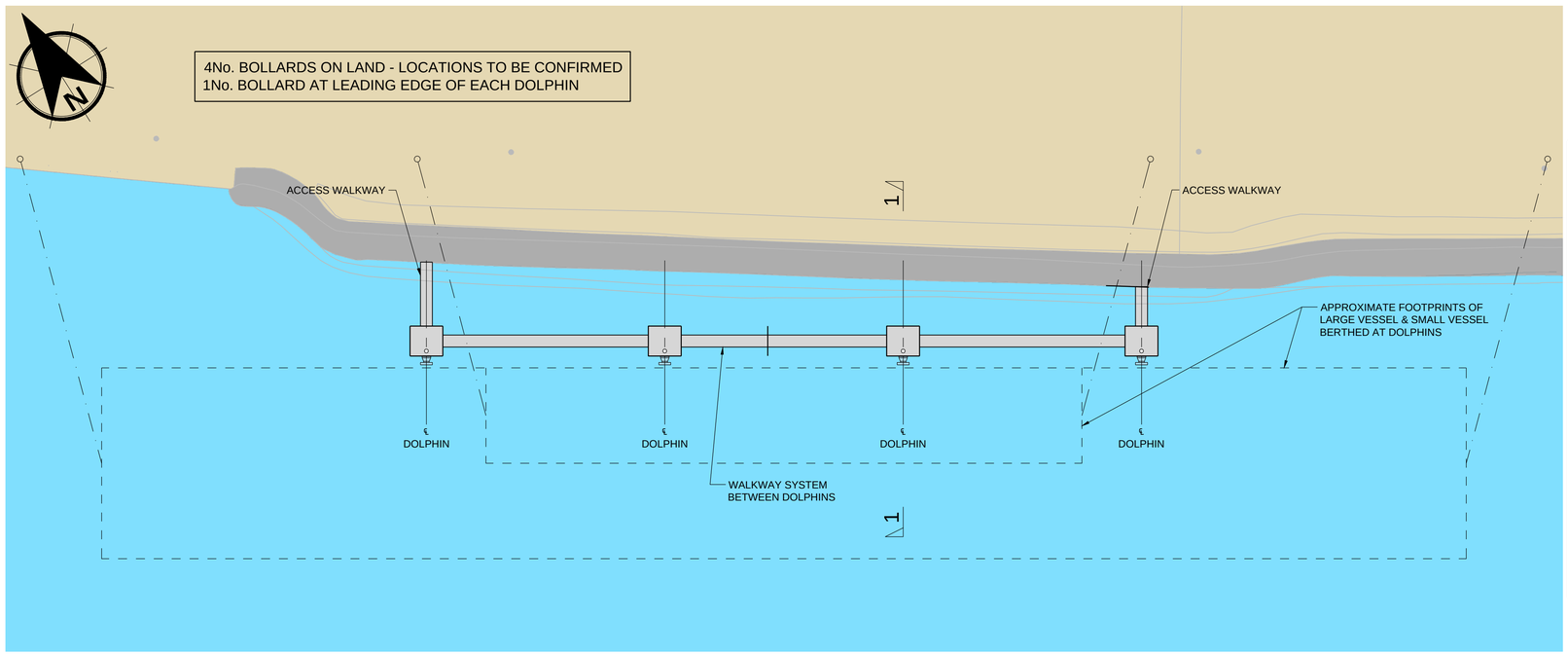
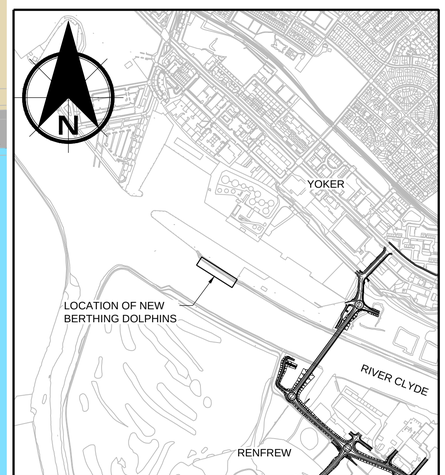
SCALE 1:100



PLAN ON NEW BERTHING LAYBY
SCALE 1:500



LOCATION PLAN
SCALE 1:10,000

Notes

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (m AOD) UNLESS NOTED OTHERWISE.
3. TIDE LEVELS ARE INDICATIVE AND ARE TAKEN FROM THE RIVER CLYDE AT ROTHESAY DOCK (ADMIRALTY TIDE TABLES 2015).

Reference drawings

REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
P01.1	16/05/17	FIRST ISSUE	---	---	---

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Web: www.sweco.co.uk

Client: RENFREWSHIRE COUNCIL

Drawing Status: INITIAL STATUS OR WIP

Suitability: S0

Project Title: CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title: CLYDE CROSSING BERTHING LAYBY GENERAL ARRANGEMENT PLANNING

Scale	Designed	Drawn	Checked	Approved
As Shown	Butler, Christopher	Jeffrey, Bryan	Mackay, Ruairidh	Webb, Alistair
Original Size	**Date**	**Date**	**Date**	**Date**
A1	15/05/17	15/05/17		

Drawing Number: 117086 - SWECO - SGN - 00 - DR - S - 43000 (Project – Originator – Volume – Location – Type – Role – Number)

Project Ref. No.: 117086 (R09)

Revision: P01.1

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APPENDIX 02

SNH SCOPING UPDATE

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

By e-mail only to citydeal@renfrewshire.gov.uk

Mr Kevin Waters
City Deal
Development and Housing Services
Fourth Floor (South Wing)
Renfrewshire House
Cotton Street
Paisley
PA1 1JD

Date: 27 October 2016
Our ref: CNS/EIA/REN – CEA143019

Dear Mr Waters,

GLASGOW AIRPORT INVESTMENT AREA
REQUEST FOR SCOPING OPINION IN ACCORDANCE WITH THE ENVIRONMENTAL IMPACT ASSESSMENT (SCOTLAND) REGULATIONS 2011

Many thanks for your consultation to Scottish Natural Heritage (SNH) dated 22 September 2016 requesting a scoping opinion for the above development proposal.

Description of the Proposal

The Glasgow Airport Investment Area (GAIA) is part of the wider Glasgow and Clyde Valley City Deal which includes 20 projects across eight council areas. The GAIA project is one of three City Deal Projects within the Renfrewshire council area. The proposal includes two new bridges across the White Cart Water, the realignment of a section of Abbotsinch Road, a Gateway route between airport and paisley town centre, and new cycle and pedestrian links to Inchinnan Business Park. We understand that new and upgraded cycling and pedestrian links will also form part of all new infrastructure proposed.

SNH's comments on Issue to Include in Environmental Impact Assessment

Statutory designated Sites

There are no statutory designated sites within the development footprint of the site. However, the proposal lies within 2km of the Black Cart Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) and the Inner Clyde SPA, Ramsar Site and SSSI.

Further information on these notified sites (including the site conservation objectives) can be found on the SiteLink pages of our website: http://gateway.snh.gov.uk/sitelink/index.jsp

Scottish Natural Heritage, Caspian House, Mariner Court, Clydebank Business Park, G81 2NR
Tel: 0141 9514488 Fax: 0141 9514510 www.snh.gov.uk

Dualchas Nàdair na h-Alba , Taigh Caspian, 2 Cùirt a' Mharaiche, Pàirc Gnothachais Bhruach Chluaidh, Bruach Chluaidh G81 2NR
Fòn: 0141 9514488 Facs: 0141 9514510 www.snh.gov.uk/gaelic

Black Cart SPA/SSSI

The proposed development lies around 325m away from the nearest part of the Black Cart SPA which supports a non-breeding population of European Importance Annex 1 bird species; Whooper swan.

The Black Cart SSSI, which is of national importance, shares the same boundary as the SPA and is also designated for non-breeding Whooper swan.

The site's status means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended the "Habitats Regulations" apply. Consequently, Renfrewshire Council will be required to consider the effect of the proposal on the SPA before it can be consented (commonly known as the Habitats Regulations Appraisal). The SNH website has a summary of the legislative requirements (http://www.snh.gov.uk/docs/A423286.pdf)

Survey data indicates that the proposed Inchinnan Cycleway lies within/adjacent to feeding/roosting areas used by wintering whooper swans from the SPA. Please see SNH reports at;

http://www.snh.org.uk/pdfs/publications/commissioned_reports/310.pdf

http://www.snh.org.uk/pdfs/publications/commissioned_reports/369.pdf

Any works carried out within or adjacent to feeding/roosting areas during the winter months (September to April inclusive) are likely to disturb the wintering whooper swan qualifying interest of the SPA. In addition, there is also potential for use of the completed cycle route in the winter months to result in disturbance to the wintering whooper swan qualifying interest of the SPA.

In our view, there is currently insufficient information to determine whether the proposal is likely to have a significant effect on the wintering whooper swan feature of the Black Cart SPA. We recommend that a full assessment of the impacts of the construction and operation of the cycle route on the wintering whooper swan qualifying interest of the Black Cart SPA is undertaken and presented in the ES. This assessment should identify any mitigation measures required to avoid a likely significant effect on the SPA (e.g. restricting the timing of the construction of the cycleway to the summer months, mid-March to mid-September, and the location of the cycleway in relation to the existing road/footpath).

Once this information has been provided we will be able to give this proposal further consideration.

The proposed route of the realigned Abbotsinch Road passes through fields that have occasionally been used by whooper swans in the past. However to maintain air safety, Glasgow Airport have an agreement with the farmer to ensure that these fields are harvested before the wintering period to avoid attracting swans across the runway to these fields. As a consequence, we are content that this element of the proposal is unlikely to have a significant effect on the SPA.

Inner Clyde SPA/SSSI and Ramsar site

The proposed development is located approximately 1.1km south of the Inner Clyde Special Protection Area (SPA) which supports a wintering non-breeding population of European importance Annex 1 bird species; Redshank.

The Inner Clyde Ramsar Site which shares the same boundary as the SPA is also designated internationally for non-breeding Redshank and the interests of this designation will addressed as part of the consideration for the above European site.

The Inner Clyde Site of Special Scientific Interest (SSSI) is of national importance and also shares the same boundary as the SPA. Its designated features include saltmarsh habitat and a range of non-breeding birds including; Cormorant, Eider, Goldeneye, Oystercatcher, Red-breasted merganser, Red-throated diver and Redshank.

The site's status means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended the "Habitats Regulations" apply. Consequently, Renfrewshire Council will be required to consider the effect of the proposal on the SPA before it can be consented (commonly known as the Habitats Regulations Appraisal). The SNH website has a summary of the legislative requirements (http://www.snh.gov.uk/docs/A423286.pdf)

Given the separation distance between the development site and the SPA (at least 1.1km) and the nature of the existing habitats within/adjacent to the development site, we are content that it is unlikely that the proposal will have a significant effect on the qualifying interest of the SPA either directly or indirectly. As a consequence, an appropriate assessment is not required for the Inner Clyde SPA.

Endrick Water Special Area of Conservation (SAC) and SSSI

The Endrick Water Special Area of Conservation (SAC) is listed in table 7.3 Statutory Designated Sites of the scoping report and is of European importance for supporting populations of Annex 2 fish species; Brook lamprey, River lamprey and Atlantic Salmon.

The Endrick Water SSSI is of national importance and shares the same boundary as the SAC. Its designated features include Scottish dock, fish species Brook & River lamprey as well as earth science interests Fluvial Geomorphology of Scotland and Quaternary of Scotland.

The site's status means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended the "Habitats Regulations" apply. Consequently, Renfrewshire Council will be required to consider the effect of the proposal on the SAC before it can be consented (commonly known as the Habitats Regulations Appraisal). The SNH website has a summary of the legislative requirements (http://www.snh.gov.uk/docs/A423286.pdf)

The above designated sites are situated over 10km to the north of the proposed development. In our view, we do not consider that the integrity or notified features of these sites will be affected by the proposal. Therefore we are satisfied that these sites do not require further consideration and can be "scoped" out of the EIA.

Statutory Protected Species

A number of protected species may be present and impacted by the development proposals and we therefore support the proposals to carry out badger, otter, water vole and bat surveys. Details of these species and associated legislation can be found on our website at http://www.snh.gov.uk/planning-and-development/advice-for-planners-and-developers/protected-animals/.

We have discussed proposed survey methodologies with the applicant at a meeting held on the 11 May 2016 and via follow up e-mail correspondence, however full details of survey methodologies, areas surveyed and details of any limitations to survey efforts should be included within the Environmental Statement (ES).

The ES should also report the survey results, evaluate impacts predicted to arise as a result of the development proposals, assess the significance of these impacts and recommend mitigation and/or compensation measures as is necessary and appropriate.

Species surveys should have been completed no more than 18 months prior to submission of the application, to ensure that the survey results are a contemporary reflection of species activity at and around the site.

Where survey methods or other work deviates from published guidance, deviations should have been agreed in writing with SNH in advance of carrying out survey work. A full description of the methodology used should be provided in the ES (technical appendices should be used for this where appropriate), along with an explanation of why any deviations are considered appropriate.

Otters

As detailed in Appendix 7:1 of the scoping report all watercourses and water features within 250m upstream and downstream of the proposed development/infrastructure locations were surveyed for otter in June 2016 following methods as detailed in "Ecology of European Otter: Conserving Natura 2000 Rivers Ecology Series No. 10 (Chanin, 2003"). As confirmed in our e-mail dated 26 May 2016, we support this survey methodology and we also support the proposals to repeat this survey in autumn 2016 to account for seasonal variation in use of the River Clyde, White and Black Cart Waters.

We refer the applicant to our recently published species guidance note for otters that brings together all the latest information and advice, including legal protection, survey methods, mitigation measures and licensing requirements - http://www.snh.gov.uk/docs/A1959316.pdf.

Water vole

We recommended that any suitable water vole habitat should be surveyed for water vole activity in conjunction with the otter survey work in our 26 May 2016 email. Appendix 7:1 of the scoping report states that all suitable watercourses and water features within the proposed project and 100-200m zone of influence (up and downstream of identified watercourses) will have been surveyed in accordance with Strachan & Moorhouse (2006) and Dean et al. (2016). We support the completion of this survey work and refer the applicant to our recently published species guidance note for water voles - http://www.snh.gov.uk/docs/A1959339.pdf

Badger

We support the proposal to undertake survey work for badgers as detailed in the scoping report.

Bats

We have reviewed the bat survey methods as detailed in the scoping report including Technical Appendix 7.1 and following previous discussions with the applicant we are satisfied with the bat survey methods which follow Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London - http://www.bats.org.uk/pages/batsurveyguide.html

With regard to tree roost surveys, where trees cannot be climbed and not all features can be seen from the ground, we support the proposed methods to carry out soft-felling of these trees under direct supervision of a licensed bat worker, however consideration should also be given to the use of a MEWP to survey unsafe trees at the pre-construction stage.

Great crested newts

We confirmed in an e-mail dated 20 June 2016 that we were content for further great crested newt surveys to be scoped out of the assessment given the absence of confirmed great crested newt records in the area, the low suitability of waterbodies within the study area for great crested newts and the isolated nature of these waterbodies.

Habitats

We note from the Scoping report and discussions with the applicant that a phase 1 habitat survey has been carried out and it is considered that NVC surveys are not required.

However, we reiterate our pre-application advice that NVC surveys should be undertaken if any habitats listed on Annex 1 of the EC Habitats Directive and UKBAP Priority Habitats are identified during the phase 1 habitat surveys. It is unclear from the scoping report whether any such habitats have been identified. This should be clarified in the ES and an appropriate level of survey work undertaken.

The presentation of survey results is important and should be presented clearly and transparently in the ES. It would also be helpful if the maps that present vegetation recorded on-site are marked with the finalised layout of the proposal. This information should be used to inform any necessary mitigation.

If tree felling/woodland clearance will be required as part of the proposed development, we recommend that the developer/their consultants contact Forestry Commission Scotland at as early a stage as possible to discuss the Control of Woodland Removal Policy and the implications it may have on the development.

Invasive non-native species

The ES should provide details of the measures that will be taken to prevent the spread of any invasive non-native species that have been identified on site as part of the Phase 1 habitat survey.

Landscape

We support the proposal to undertake a Landscape and Visual Impact Assessment (LVIA) in accordance with the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), 3rd Edition (Landscape Institute, 2013).

We recommend that the LVIA should include consideration of impacts on the landscape setting of the site and the surrounding area and how this may affect the enjoyment of existing outdoor recreational users. Consideration must also be given to the existing and potential use of the area for recreation by the general public, with reference to Scottish access rights under the Land Reform (Scotland) Act 2003 and rights of way.

The proposal should be successfully integrated into the surrounding area and it is imperative that the ES establishes a sufficient landscape and visual context to facilitate an understanding of the wider landscape and visual setting and how the development may influence and 'fit' into the landscape and visual character of the area.

The proposed development is primarily located within alluvial plain and green corridor landscape character types as informed by the Glasgow and Clyde Valley Landscape Character Assessment and the proposal should take cognisance of the advice and guidelines therein.

High-quality design of the development, and in particular the incorporation of well-planned green infrastructure, will be a key component of this development. There is potential for the development to form part of a wider City Deal green infrastructure network in conjunction with adjacent proposals. We recommend that such opportunities are maximised.

Water management and pollution prevention

Due to the riverside location of the proposed development, if not already done so, we advise that the applicant should liaise with SEPA regarding water management and pollution

prevention measures to ensure there will be no negative impacts on the White Cart, Black Cart and River Clyde.

Collecting and presenting information – general advice

We recommend that the ecological chapters are split into topics, e.g. protected areas, species (birds, bats, otter, etc.), habitats (terrestrial, freshwater), etc. Information and assessment of which activities associated with the construction and operation of the development are likely to have direct and indirect (including cumulative) significant environmental effects on the relevant natural heritage receptors, along with clear details of any mitigation, should be presented.

A schedule of environmental mitigation should be provided in an annex for developments with impacts on multiple natural heritage interests. The schedule should compile all the environmental mitigation/enhancement measures into one list/table, for ease of reference.

The information provided in this response is given without prejudice to any views that we may wish to express at a later date and is based upon our understanding of the project at this time.

I hope that you find this advice useful but please let me know if you have any questions.

Yours sincerely

Graeme Heenan
Operations Officer
Strathclyde & Ayrshire

Appendix 03: Consideration of National Marine Plan

GEN 2: The Clyde Waterfront and Renfrew Riverside project is being developed due to its projected significant benefit to areas on both sides of the Clyde River. It will create not only a direct link between the commercial and residential communities of Yoker, Clydebank and Renfrew but will establish an attractive setting for road and river traffic alike. Economic benefits to the surrounding area have been investigated in depth and consultation has been conducted with local businesses to achieve a beneficial solution for all.

GEN 3: The new bridge over the Clyde will provide residents on both sides of the river the direct link needed to reach destinations which previously meant travel via the Clyde tunnel, Erskine Bridge or Renfrew Ferry. This will cut down journey times and hence create significant social and environmental benefits.

GEN 7: The project is being developed in conjunction with Architecture and Design Scotland (ADS) who will seek to bring the maximum possible aesthetic benefit to the surrounding area. The conceptual designs for the new Clyde Crossing and associated buildings have been developed by an experienced and reputable team of aesthetic designers to bring a harmony between new development and the traditions of Clyde Port.

GEN 8: The developing organisation contains a team of flooding experts who have had major influence on the project since inception. Flood modelling has been carried out to ensure both tidal and fluvial flood events are not significantly impacted by the development.

GEN 13: Any successful tendering contractor shall be required to submit method statements for all construction work which must include the mitigation of noise impact. It is expected that best working practice will be conducted in order to minimise any disruption to the local community and marine wildlife including the appointment of an Ecological Clerk of Works (ECOW) to supervise the works.

GEN 14: Air quality monitoring of local roads has been carried out and this has been used to quantify an air quality projection based on anticipated road traffic levels. This is discussed within the wider Environmental Impact Assessment (EIA), Volumes 2 and 3, Chapter 9 – Air Quality.

REC & TOURISM 2: Recreational use of the Clyde has been an important consideration in development of the bridge with particular regards to its clearance between the underside of the deck and known water levels. These clearances can be seen in Appendix 02 of the licence application and will allow the vast majority of recreational craft to move freely with minimal opening frequency of the bridge.

TRANSPORT 1: An operational strategy for the crossing is being developed in conjunction with ClydePort with the intention of providing fully unimpeded movement of commercial vessels. The bridge piers, being the point of rotation of the individual bridge decks, have been situated so as to provide a clear 90m navigation channel set by ClydePort and this will be cited within the Employer's Requirements. In the unlikely event of bridge malfunction, or any other scenario which may prevent normal bridge operation, an emergency layby berth will be provided for all vessels that may require it, the form and location of which again will be finalised with agreement of ClydePort.

Appendix 04: Scoping Report Distribution Email

Dear Sir / Madam,

Renfrewshire Council City Deal Team (the 'Applicant') is intending to apply to Renfrewshire Council, Glasgow City Council, West Dunbartonshire Council and Marine Scotland (the competent authorities) for planning permission for the proposed infrastructure and associated works for the Clyde Waterfront and Renfrew Riverside project.

Whilst it is not a statutory requirement, as part of the Environmental Impact Assessment (EIA) process, the applicant wishes to seek a Scoping Opinion from Renfrewshire Council (and Glasgow City Council, West Dunbartonshire Council and Marine Scotland) under the provisions of Regulation 13 of the EIA Scotland Regulations 2011 and Schedule 4 of the Marine Works EIA Regulations 2007. We welcome your views regarding the Environmental Scoping Report which can found here http://www.renfrewshire.gov.uk/citydealeia-cwrr.

The proposed development comprises a number of infrastructure proposals that have been developed to meet the project aims (as described within the Scoping Report). The main elements of the project are:

- a new opening bridge across the River Clyde (the "Bridge"). In addition to vehicular traffic/public transport, the bridge will accommodate pedestrian and cycle traffic;
-
- the Renfrew Northern Development Road (RNDR), a single carriageway route connecting the junction of Kings Inch Road and Ferry Road to the north of Renfrew with the A8 Inchinnan Road between Renfrew and the Bascule Bridge over the White Cart Water, including a link to the southern road approach to the new Bridge;
-
- new single carriageway road connections to the north of the Bridge to connect with the A814 Dumbarton Road/Glasgow Road at Dock Street, Yoker and a new road connection to the south of the bridge linking with the RNDR;
-
- a new combined cycleway and footway to be constructed adjacent to all new sections of road infrastructure including across the new Bridge and along the existing section of A8 Inchinnan Road between the southern connection of the RNDR at Argyll Avenue and the Bascule Bridge. This will link to the proposals for non-motorised routes as part of the complementary Glasgow Airport Investment Area (GAIA) project;
-
- a strategy for Variable Message Signage (VMS) at indicative locations; and
-
- landscaping of the proposals to integrate them with surrounding land uses including urban areas, the bridge landfall locations and an area of woodland at Blythswood.

This Scoping Report considers the potential environmental issues relating to the proposal and discusses which issues are likely to be significant. It then provides an outline of how the EIA will deal with each of the issues raised, providing the scope for further desk based study and site surveys as required.

An electronic pdf copy of the Scoping Report and associated figures is now available for download from the following link:http://www.renfrewshire.gov.uk/citydealeia-cwrr.

How do I respond?

Please send your Scoping Response to the following address; **citydeal@renfrewshire.gov.uk** and title all responses "**City Deal Renfrewshire - CWRR Scoping Response**". All emails that are received into this inbox will be automatically forwarded to all consenting authorities so only one response is required from each consultee.

Appendix 04: Scoping Report Distribution Email

Timescales?

In line with the EIA Regulations, there will be a statutory five week consultation period. This will start from the 22nd September 2016 and will finish on the 27th October 2016. Please ensure that you submit your consultation response **on or before 27th October 2016**.

Queries?

If you have any queries or problems, please do not hesitate to contact Rebecca McLean, Technical Manager (EIA) at Sweco on 0131 550 6405 or via email rebecca.mclean@sweco.co.uk.

Regards,

City Deal Team (Renfrewshire)
Development and Housing Services

www.renfrewshire.gov.uk/citydeal

citydeal@renfrewshire.gov.uk

City Deal, Development and Housing Services, Fourth Floor (South Wing), Renfrewshire House, Cotton Street, Paisley, PA1 1JD

APPENDIX 06

BPEO Report

Marine Sediment Dredging and Disposal - Preliminary Scoping and BPEO Statement

Clyde Waterfront Renfrew Riverside (CWRR) City Deal

Renfrewshire Layby Berth, Rothesay Dock, River Clyde

117086/DEP/170509
Revision 0

Report Prepared For: Renfrewshire City Deal Team

SWECO

Issue	Date	Reason for Issue	Prepared		Checked		Approved	
0	16.06.17	Draft for Comment	DEP		RM		LB	

Marine Sediment Dredging and Disposal - Preliminary Scoping and BPEO Statement
117086/DEP/170509
Revision 0

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Contents

Tables

Figures

Appendices

1. Introduction

This Preliminary Scoping and Best Practicable Environment Option (BPEO) Statement has been prepared to support an application to Marine Scotland for capital dredging of marine sediment from Rothesay Dock located along the northern shore of the River Clyde Estuary, Glasgow, Scotland. The approximate grid reference at the centre of the dredge area is NS 250026, 669087. The dredging is proposed as part of the wider Clyde Waterfront and Renfrew Riverside project (CWRR) to provide sufficient draft for the layby berth.

The sediment dredging is considered essential to allow temporary berthing of vessels at Rothesay Dock in emergency situations when navigation further up the estuary is prohibited (i.e. due to closure of the opening bridge proposed as part of the wider CWRR project).

The preliminary scoping is required due to the known industrial heritage of the Clyde estuary and the potential for marine sediments to contain industrial contaminants such as heavy metals, petroleum hydrocarbons (including polycyclic aromatic hydrocarbons) and persistent organic pollutants.

At the time of reporting, the layby berthing structure has been through the specimen design process and the current design is included within the Design and Access Statement for the wider CWRR project. However, the final detailed design of the new layby berthing structure and the disposal route for the dredged material (re-use, land disposal or sea disposal) is still to be confirmed following planning approval and appointment of a contractor. This Preliminary Scoping and BPEO Statement will therefore be updated following planning approval, the appointment of a contractor and during the detailed design stage.

1.1 Aims and Objectives

The aim of this scoping report is to support the application to Marine Scotland for the proposed capital marine dredging at Rothesay Dock. As part of this the report aims to highlight the BPEO for managing sediment arisings from the dredging process. The concept of BPEO was first outlined in the Fifth Report of the Royal Commission on Environmental Pollution (RCEP) in 1976 to support decision making for environmentally sensitive activities. The concept of BPEO introduces a balancing of criteria, including technology, financial costs and pollution impacts to determine the option that provides the most benefits or the least impact to the environment, as a whole. The objectives of this report are to:

- Characterise the marine sediment from a contamination and geotechnical perspective;
- Identify if the sediment meets marine disposal criteria; and
- Identify preliminary impacts from the proposed dredging activity.
- Identify the BPEO for disposal of the sediment.

1.2 Development Context

The proposed capital dredging is planned as part of a wider package of infrastructure work for the CWRR project. The wider infrastructure work includes:

- A new opening bridge across the River Clyde (the "Bridge"). In addition to vehicular traffic/public transport, the bridge will accommodate pedestrian and cycle traffic;
- The extension of Argyll Avenue, a single carriageway route connecting the junction of Kings Inch Road and Ferry Road to the north of Renfrew with the A8 Inchinnan Road between Renfrew and the Bascule Bridge over the White Cart Water, including a link to the southern road approach to the new Bridge;
- A new single carriageway road connections to the north of the Bridge to connect with the A814 Dumbarton Road/Glasgow Road at Dock Street, Yoker and a new road connection to the south of the bridge linking with Argyll Avenue;
- A new section of single carriageway road which broadly follows the alignment of the existing walkway known as Fisher's Road, renamed Meadowside Street East and upgrade of the existing single carriageway road and provision of a section of new single carriageway road, forming Meadowside Street East, from the Blythswood Roundabout to the junction with Ferry Road/King's Inch Road;
- A new combined cycleway and footway to be constructed adjacent to all new sections of road infrastructure including across the new Bridge and along the existing section of A8 Inchinnan Road between the southern connection of Argyll Avenue and the Bascule Bridge;
- Landscaping of the proposals to integrate them with surrounding land uses including urban areas, the bridge landfall locations and an area of woodland at Blythswood;
- Realignment of the Yoker Burn Culvert to enable the bridge construction; and
- More specifically at the Rothesay Dock, a new layby berth consisting of berthing dolphins connected by gantry bridges is to be constructed. The new layby berth will sit within the current Clyde estuary channel and be connected to the existing dock by an access bridge.

A site location plan, the current layby berth design and cross sections through the estuary are provided on ***Figure 1***, drawing number 117086-Sweco-SGN-00-DR-S-4300, attached.

1.3 Dredging Proposal

The current layby berth design includes dredging approximately 18,100m^3 of sediment from adjacent to the existing Rothesay Dock. The proposed dredge covers an area of 110m^2 and includes reducing the base of the estuary channel to a sediment level of - 10.00 mOD (Ordnance Datum).

Dredging can cause the release of sediment (and sediment bound contaminants) into the water column. The quantity and rate of sediment release varies according to the dredging methodology. The type of sediment also affects the release rate of sediment bound contaminants since fine sediment is generally lost and dispersed to a greater extent than coarser materials. At the time of reporting, the proposed dredging methodology is Cutter Suction Dredging (CSD). CSD involves the employment of a cutter head at the suction inlet to loosen the sediment and take it to the suction mouth. The dredged sediment is then discharged through a pipeline or into a barge.

A geophysical survey of the estuary bed was undertaken as part of a wider site investigation programme and a drawing depicting the survey is shown in ***Appendix A.***

1.4 Previous Environmental Impact Assessment Scoping

The following section describes the statutory responses received with respect to the proposed layby berth following submission of the initial Environmental Impact Assessment (EIA) scoping exercise for the wider CWRR project. The EIA scoping report is referenced as:

- Clyde Waterfront Renfrew Riverside, Scoping Report, Sweco, September 2016

Since the original Scoping Reports were submitted, there have been a number of changes to the proposed project description for the CWRR (and the neighbouring GAIA) project. To provide consultees with information on these changes and the opportunity to review their original scoping responses and amend their previous comments on the proposed methodology and scope of the EIA, a Scoping Update Note was prepared and sent to all consultees in February 2017. The scoping update is referenced as:

- Clyde Waterfront Renfrew Riverside & Glasgow Airport Investment Area, Scoping Update Note, February 2017.

In response to the EIA scoping and scoping update exercise and considering potential effects from dredging and in river activities on nearby statutory protected species and habitats, it has been initially recognised by Scottish Natural Heritage (SNH) that although the proposed capital dredge will increase the volume of tidal water and alter the tidal dynamics in the estuary, the effects are likely to be very small and it is unlikely that any resulting geomorphological change would be discernible against both natural variability and the influence of periodic maintenance dredging already being undertaken along the Clyde estuary. Marine Scotland responded to the EIA Scoping Update with concerns regarding potential impacts on adult and juvenile (smolt) salmon and sea trout in the Clyde estuary. Their response recommended that consideration was given to the timing of any estuary works to minimise possible impacts during migration periods.

2. Sediment Dredging Legislation and Guidelines

2.1 Legislation

2.1.1 Dredging Activities

In the European Union, the Water Framework Directive (WFD[1]) is the key piece of legislation which relates to the protection of water quality and the ecological status of fresh and coastal waters. The WFD is implemented in the UK under the WFD (England and Wales) Regulation 2003[2] (the Water Environment Regulations) and the Water Environment and Water Services (Scotland) Act 2003[3] (WEWS Act). The Water Environment Regulations and WEWS Act enforce a set of criteria (Environmental Quality Standards, EQS) for both individual discharges and the receiving waters. When considering undertaking an activity that may affect water quality (such as dredging) the activity should be assessed in the context of the WFD.

2.1.2 Sea Disposal of Sediment

The UK is a signatory to the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, and the London Protocol which both address preventing marine pollution from disposal at sea. In England and Wales, sea disposal of dredged marine sediment is controlled and licensed by the Marine Management Organisation. In Scotland, sea disposal of dredged marine sediment is controlled and licensed by Marine Scotland under the Marine (Scotland) Act 2010[4].

2.2 Guidance Documentation

2.2.1 Dredging Activities

The WFD *Assessment Guidance for Estuarine and Coastal Waters,* 2016[5] has been published to support the assessment of an activity in an estuary or coastal water and to help parties understand:

- The impact an activity may have on the immediate water body and any linked water bodies, and;
- Whether an activity complies with the River Basin Management Plan (RBMP).

The WFD Guidance recommends a staged approach including screening, scoping and impact assessment.

The Scottish Government, through Marine Scotland, provide *Pre-disposal Sampling Guidance (Version 1 – January 2017)*[6] which recommends a staged approach to assessing

[1] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy, 2003.
[2] The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2003.
[3] Water Environment and Water Services (Scotland) Act, 2003.
[4] Marine (Scotland) Act, 2010.
[5] www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters, 2016.
[6] Marine Scotland, Pre-disposal Sampling Guidance Version 1, 2017.

the impact of dredging and sea disposal operations (see ***Section 2.2.2.1*** below for further details).

2.2.2 Sea Disposal of Sediment

Whilst disposal of dredged sediment at sea falls within the broader scope of the Water Environment Regulations and WEWS Act, more specific guidance is given under the OSPAR Dredged Material Assessment Framework which includes the OSPAR *Guidelines for the Management of Dredged Material at Sea* (2014)[7]. The OSPAR Guidelines address topics such as, dredged material sampling and characterisation through to selection of a disposal site.

In the UK the Centre for Environment, Fisheries and Aquaculture Science (CEFAS)[8] have published sediment quality Action Levels based on the OSPAR Guidelines.

The Marine Scotland *Pre-disposal Sampling and Analysis Guidance*[6], is based on both the OSPAR Guidelines and CEFAS Action Levels (see ***Section 2.2.2.1*** below).

2.2.2.1 Sampling Plans

The Marine Scotland *Pre-disposal Sampling and Analysis Guidance*[6], sets out the number of samples required based on the volume of sediment to be dredged and disposed. ***Table 1*** below, reproduced from the guidance gives the minimum 'sample stations' required by dredge volume.

Proposed Dredge Volume (m^3)	No. of sample stations required
≤25,000	3
32,500	4
50,000	5
75,000	6
100,000	7

Table 1: Number of Sampling Stations Required

The guidance goes on to state that:

"if you are dredging more than 1 metre in depth or in an area with known or suspected contamination you will be required to take core samples, cores should extend to the maximum dredge depth. Individual cores count as 1 station, so a 100,000m^3 dredge of over 1 metre would require 7 cores to be collected. When a core is collected you should sub-sample the surface layer (0-15cm) then every 50cm thereafter. Initially you should select sub-samples from the surface, middle and bottom of the core for analysis, with all sub-samples retained for further analysis".

[7] OSPAR Guidelines for the Management of Dredged Material at Sea, 2014-06.
[8] The Centre for Environment, Fisheries and Aquaculture Science.

Consultation[9] regarding the required sampling density for the proposed works was undertaken with Marine Scotland prior to the sediment investigation. At the time of the consultation, the dredge volume was estimated to be 33,000m^3. Marine Scotland confirmed that 15 initial sub samples from five boreholes (sample stations) should be collected and that any additional samples should be retained for future analysis if required. Refer to ***Section 4*** for a description of the sediment investigation.

2.2.2.2 Chemical Analysis

The Marine Scotland Guidance[6] recommends that the laboratory used must be ISO17025 accredited for marine sediment analysis and take part in inter-comparison exercises such as QUASIMEME. The laboratory should also meet the limit of detection and sensitivity requirements set out in the Clean Seas Environmental Monitoring Programme Green Book.

2.2.2.3 Classification Action Levels

In order to assess the significance of contamination, the Marine Scotland Guidance[6] recommends chemical sediment analysis results are compared with the CEFAS Action Level system. Action Levels are not statutory contamination concentrations, but are used as part of a '*weight of evidence*' approach adopted for determining licences for the disposal of dredged material at sea. The CEFAS Action Levels incorporated in the Marine Scotland Guidance are shown in ***Table 2*** below.

Contaminant	Revised AL1 mg/kg dry weight (ppm)	Revised AL2 mg/kg dry weight (ppm)
Arsenic (As)	20	70
Cadmium (Cd)	0.4	4
Chromium (Cr)	50	370
Copper (Cu)	30	300
Mercury (Hg)	0.25	1.5
Nickel (Ni)	30	150
Lead (Pb)	50	400
Zinc (Zn)	130	600
Tributyltin	0.1	0.5
Polychlorinated Biphenyls (PCB)	0.02	0.18
Polycyclic Aromatic Hydrocarbons		
Acenaphthene	0.1	
Acenaphthylene	0.1	
Anthracene	0.1	
Fluorene	0.1	
Naphthalene	0.1	
Phenanthrene	0.1	
Benzo[a]anthracene	0.1	
Benzo[b]fluoranthene	0.1	
Benzo[k]fluoranthene	0.1	
Benzo[g]perylene	0.1	

[9] Email from R.Sermpezi of Marine Scotland to R. Harrison of Sweco dated 8th February 2017.

Contaminant	Revised AL1 mg/kg dry weight (ppm)	Revised AL2 mg/kg dry weight (ppm)
Benzo[a]pyrene	0.1	
Benzo[g,h,i]perylene	0.1	
Dibenzo[a,h]anthracene	0.01	
Chrysene	0.1	
Fluoranthene	0.1	
Pyrene	0.1	
Indeno(1,2,3cd)pyrene	0.1	
Total hydrocarbons	100	

Table 2: Contaminant Action Levels

The action levels are used in conjunction with a range of other assessment methodologies (e.g. bioassays, comparison with historical data, knowledge of site environmental conditions, physical characteristics of disposal material, etc.) and are not therefore single pass or fail criteria, but can provide a trigger for additional assessment. In general, contamination levels in dredged material that are below Action Level 1 (AL1) are unlikely to influence a licensing decision. In contrast, contamination levels above Action Level 2 (AL2) are generally considered unsuitable for disposal at sea. Contamination levels between AL1 and AL2 require further consideration and testing before a decision can be made.

3. Baseline Conditions

The following summary of the baseline conditions at Rothesay Dock have been prepared in accordance with the WFD Guidance *Scoping Template for Activities in Estuarine and Coastal Waters*. A completed copy of the scoping template is included as ***Appendix B.***

3.1 River Clyde Estuary

Under the WFD and RBMP the Rothesay Dock sits within the boundary of the Inner Clyde Estuary water body (RBMP identifier code 200510). The water body is of a *Transitional* type and is recorded as having a total area of 44 hectares and an overall water body status of *Moderate*. The ecological status is described as *Bad* and the chemical status is described as *Pass*. The RBMP targets set for the water body include achieving an overall water body status of *Good* by 2017.

3.1.1 Coastal Evolution & Natural Habitat

Historically the River Clyde had a shallow estuary with sandbanks and islets known as inches. The estuary would have been surrounded by large areas of saltmarsh and tidal mudflats. In its upper reaches, the estuary was not navigable for larger vessels and as such, Dumbarton and Irvine were preferred as ports. The port of Glasgow was later established in the 1660's by merchants. By the seventeenth century increasing pressure from developing industry pushed engineers to design dykes to channel the natural scouring power of the water to help deepen the river and estuary. From around 1775 small boats could safely come upstream. Dyke building and dredging continued to deepen the Clyde throughout the 18th and 19th centuries to accommodate ever larger ships. This enabled the huge expansion of Clydeside's international trade and the rapid increase in shipbuilding along the Clyde riverfront and estuary.

Today the Clyde estuary is a highly modified environment and although the ship building industry has declined, Clyde port still offers the deepest sea entrance in Northern Europe and the busiest cruise terminal in Scotland. The estuary depth is maintained by annual maintenance dredging.

3.1.2 Anthropogenic Influences

The Inner Clyde Estuary water body is classed as a heavily modified waterbody on account of physical alterations that cannot be addressed without significant impact on navigation and from an increased risk of subsidence or flooding.

The RBMP data sheet describes the following anthropogenic pressures which contribute to the water body's failure to meet good ecological status:

- Point source pollution from numerous industrial and water treatment sewage disposal operations;
- Morphological alterations due to channelization, realignment and straightening; and
- Diffuse source pollution due to mixed farming.

The estuary sediments and water quality is also known to suffer from historical contamination issues associated with the areas industrial past.

3.1.3 Designated Conservation Areas

The Inner Clyde Special Protection Area (SPA) which supports an overwintering non-breeding population of European importance Annex 1 bird species (Redshank) is located approximately 730m downstream (west) of the proposed layby berth. The Inner Clyde SPA is shown on the attached map in ***Appendix C.*** The same area is also designated internationally as the Inner Clyde RAMSAR Site due to non-breeding redshank and as the Inner Clyde Site of Special Scientific Interest (SSSI) due to saltmarsh habitat and a range of non-breeding birds including; Cormorant, Eider, Goldeneye, Oystercatcher, Red-breasted merganser, Red-throated diver and Redshank.

No other statutory protected species and habitats are recorded within one kilometre of the proposed layby berth.

3.1.4 Salinity and Mixing

The Clyde estuary is an example of a stratified estuary where limited mixing between freshwaters and saltwater occurs. The Scottish Environment Protection Agency (SEPA) has continually monitored water quality in the inner Clyde estuary since 2011. SEPA describe the inner Clyde estuary as having '*limited mixing between fresh water and the more dense saltwater leading to large differences between the salinity of surface and bottom waters*'. SEPA also note that this can lead to large differences in dissolved oxygen between the surface and bottom waters as oxygen removed from the bottom waters by decomposition of organic matter in the sediments is not replaced by oxygen supplied by the river and transferred into the surface waters from the air.

3.1.5 Tides and Tidal Range

The SEPA water level data for the Clyde at the Renfrew Tide Gauge, anchored at - 2.211mOD indicates an average estuary water height of 2.498m. The highest and lowest levels recorded are 6.503m and -0.807m respectively. The approximate tidal flow of the estuary (incoming and outgoing) on a mean high water spring tide is estimated to be approximately 1,000 cumecs (refer to details provided in the Sweco Flood Risk Assessment documentation submitted as part of the EIA scoping exercise).

3.1.6 Freshwater Inputs

The principal sources of freshwater entering the River Clyde estuary include the, River Clyde upper catchment tributaries, North Calder Water, Rotten Calder Water, River Kelvin, River Leven, White Cart Water and Black Cart Water. The typical fluvial flow of freshwater entering the Clyde estuary is estimated to be 440 cumecs and the peak fluvial flow during a 1 in 200 flood event has been calculated to be approximately 1800 cumecs. In normal meteorological conditions, the freshwater flow is generally considered to be small in comparison to the tidal flow (refer to details provided in the Sweco Flood Risk Assessment documentation submitted as part of the EIA scoping exercise).

3.1.7 Sediment Sources

Sediments are continually collected in surface runoff within the Clyde catchment and are subsequently transported downstream towards the Clyde estuary. The catchment historically included a highly modified industrialised landscape which is now dominated by modern intensive agriculture and the urban environment of Glasgow and the surrounding towns. Contaminants from historical industrial activities may be bound in

deeper river sediments which can be mobilised during flood conditions. More recent agricultural pollutants can also be mobilised during sediment run-off within the catchment.

3.1.8 Estuarine Habitats

The WFD Guidance *Scoping Template for Activities in Estuarine and Coastal Waters*, included in ***Appendix B*** provides a preliminary assessment of *Lower and Higher Sensitivity Habitats* in the vicinity of the proposed dredging. Review of the Scotland Natural Heritage (SNH) interactive map indicates no higher or lower sensitivity marine habitats recorded within 1km of the dredge site. However, the Clyde estuary is known to support juvenile salmonids and to form part of the migratory route of adult fish which spawn within the Clyde (and Leven) Salmon Fishery District.

3.1.9 Ongoing Clyde Estuary Maintenance Dredging Activities

Peel Ports Ltd who operate Clydeport, oversee the annual maintenance dredging within the Clyde estuary. It is understood that the dredging is usually undertaken in late spring through to early summer (May-July), with an annual volume of sediment of up to 175,000m^3 being dredged.

3.2 Disposal Site

The preferred disposal option for the dredged sediment from the layby berth construction would be at Cloch Point sea disposal site, where the dredged arisings from the annual maintenance dredging of the Clyde are currently disposed. The Cloch Point disposal site lies to the south of Garroch Head on the Isle of Bute. Further assessment of the background conditions and current sediment disposal regime at Cloch Point will be undertaken should sea disposal of the sediment be considered an environmentally and economically suitable option.

Other possible disposal routes include reuse of the material (subject to geotechnical and chemical suitability) and disposal to landfill.

4. Sediment Quality Data

An investigation of the sediment quality was undertaken between the 2nd and 27th February 2017. The investigation included drilling of six cable percussion boreholes (with rotary follow-on in bedrock geology) within the proposed dredge area. The position of each borehole is shown on the geophysical survey provided in ***Appendix A***. Sediment and deeper rock cores were recovered from each borehole location. Sediment samples were recovered from the surface layer (0.0-15cm) then every 50cm thereafter in accordance with the Marine Scotland guidance and as agreed during preliminary consultation with Marine Scotland[9].

Table 3 shows a summary of the borehole information.

Borehole ID (Sample Station)	Borehole Easting	Borehole Northing	Approximate Ground Level / Depth to Sediment from Surface (-m)	Approximate Maximum Dredge Depth in Vicinity of Sample Station (m)*
BHCW1	249929	669179	-5.20	4.80
BHCW2	249978	669140	-5.36	4.64
BHCW3	250026	669087	-8.03	1.97
BHCW4	250077	669049	-7.38	2.62
BHCW5	250132	660919	-6.97	3.03
BHCW6	250192	668982	-4.94	5.06

Table 3: Summary of Borehole Information

*Proposed dredge depth of -10.00mOD required to allow temporary berthing.

Table 4 shows a summary of the samples collected and the samples selected for chemical analysis. All samples were sent to Chemtest Ltd under standard chain of custody conditions. Chemtest Ltd are an ISO17025 accredited laboratory and participate in QUASIMEME. Samples from approximately the surface, middle and base of the proposed dredge depth (-10.00 mOD) were selected for laboratory analysis.

Borehole ID (Sample Station)	Samples Depths Selected for Analysis (m from sediment surface)	Samples Depths Selected for Analysis (mOD)
BHCW1	0.50-0.65	-5.70 to -5.85
	1.50-1.65	-6.70 to -6.85
	2.50-2.65	-7.70 to -7.85
	4.50-4.65	-9.70 to -9.85
BHCW2	0.00-0.15	-5.36 to -5.51
	1.00-1.15	-6.36 to -6.51
	3.00-3.15	-8.36 to -8.51
	5.00-5.15	*-10.36 to -10.51**
BHCW3	0.00-0.15	-8.03 to -8.18
	1.50-1.65	-9.53 to -9.68
	2.50-2.65	*-10.53 to -10.68**
	4.00-4.15	*-12.03 to -12.18**
BHCW4	0.00-0.15	-7.38 to -7.53
	1.50-1.65	-8.88 to -9.03
	3.00-3.15	*-10.38 to -10.53**
	5.00-5.15	*-12.38 to -12.53**
BHCW5	0.00-0.15	-6.97 to -7.12
	1.50-1.65	-8.47 to -8.62
	3.00-3.15	9.97 to -10.12
	4.00-4.15	*-10.97 to -11.12**
BHCW6	0.00-0.15	-4.94 to -5.09
	1.50-1.65	-6.44 to -6.59
	3.00-3.15	-7.94 to -8.09
	5.00-5.15	-9.94 to -10.08

Table 4: Summary of Sediment Samples Collected

*sample depth outside of proposed maximum dredge depth of -10.00mOD.

4.1 Laboratory Analysis

All selected sediment samples were analysed for a suite of contaminants including those specified in the Marine Scotland guidance and additional analytes selected to allow assessment of land disposal options. The analytical suite included:

Contaminant Group	Analysis Suite	
Metals and Inorganics	• Asbestos Identification • Ammoniacal Nitrogen • Dissolved Organic Matter • Arsenic • Boron • Cadmium • Calcium • Chromium as Cr, dry weight • Chromium Trivalent • Chromium Hexavalent • Copper • Lead	• Mercury • Nickel • Selenium • Vanadium • Zinc • Cyanide, Free • Cyanide, Total • Sulphate, Total as SO4 • Sulphide • Sulphur • pH • Total Organic Carbon
Total Petroleum Hydrocarbons (TPH), BTEX and Phenols	• TPH CWG, Aliphatic and Aromatic Split • Benzene • Ethylbenzene • Toluene, • Xylene • Total Phenols	
Polyaromatic Hydrocarbons (PAH)	• Acenaphthene • Acenaphthylene • Anthracene • Benzo(a)anthracene • Benzo(a)pyrene • Benzo(b)fluoranthene • Benzo(k)fluoranthene • Benzo(ghi)perylene • Chrysene	• Dibenzo(ah)anthracene • Indeno(123-cd)pyrene • Fluoranthene • Fluorene • Naphthalene • Phenanthrene • Pyrene • PAH, Total of 16EPA
Polychlorinated Biphenyls	• PCB28 • PCB52 • PCB90+101 • PCB118 • PCB153	• PCB138 • PCB180 • Total PCB (sum of 7 Congeners)

Table 5: Sediment Chemical Analysis Suite

4.2 Physical Characteristics

In addition to the chemical analysis, sediment samples were also submitted for Particle Size Analysis (PSA) which assesses the percentage of the sediment within different size ranges, from clay up to gravel/cobbles. The PSA was undertaken in order to help determine the likely dispersal rate during dredging and potentially during sea disposal. A detailed engineering log of each sediment core was recorded during the investigation. In summary, other than a 'soft black slightly organic clayey silt' the material was generally logged as a mixture of grey-brown sands, silts and clays with gravel and a low cobble content.

Borehole logs are provided in ***Appendix D*** and the PSA data is provided in the laboratory results included in ***Appendix E***. The PSA data is summarised in ***Table 6*** below.

Sample Station / Sample Depth (m below sediment surface)	Percentage Clay and Silt (<0.063mm)	Percentage Sand (0.063 ≤ Sand < 2.0 mm)	Gravel, Cobbles & Boulders (≥2.0 mm)
BHCW1 (0.50-0.65m)	68.54	31.43	0.03
BHCW1 (1.50-1.65m)	76.01	23.80	0.18
BHCW1 (2.50-2.65m)	82.98	17.01	0.01
BHCW1 (4.50-4.65m)	71.58	28.37	0.05
BHCW2 (0.00-0.15m)	77.91	22.09	0.00
BHCW2 (1.00-1.15m)	78.59	21.35	0.06
BHCW2 (3.00-3.15m)	70.92	29.02	0.06
BHCW2 (5.00-5.15m)	72.21	20.80	7.00
BHCW3 (0.00-0.15m)	14.83	79.89	5.28
BHCW3 (1.50-1.65m)	16.32	81.43	2.25
BHCW3 (3.00-3.15m)	76.32	23.39	0.29
BHCW3 (5.00-5.15m)	5.86	31.78	62.36
BHCW4 (0.00-0.50m)	51.18	44.67	4.15
BHCW4 (1.50-1.65m)	86.34	13.63	0.03
BHCW4 (2.50-2.65m)	8.54	90.50	0.96
BHCW4 (4.00-4.15m)	73.67	23.28	3.06
BHCW5 (0.00-0.15m)	74.27	23.42	2.31
BHCW5 (1.50-1.65m)	82.49	17.33	0.17
BHCW5 (3.00-3.15m)	78.91	20.53	0.56
BHCW5 (4.00-4.15m)	83.89	15.01	1.10
BHCW6 (0.00-0.15m)	75.76	22.25	2.00
BHCW6 (1.50-1.65m)	75.66	24.28	0.05
BHCW6 (3.00-3.15m)	24.33	73.61	2.06
BHCW6 (5.00-5.15m)	28.68	67.38	3.94

Table 6: PSA Data

The samples submitted for PSA show a variable clay and silt content ranging from 5.86% to 86.34%. The average clay and silt content across all samples analysed was 58.09%. Based on this information there is a moderate-high potential for fine particulates (silts and clays) to be mobilised during dredging.

4.3 Chemical Quality Assessment

The sediment analysis results are provided in ***Appendix E*** with screened results provided in ***Appendix F***. ***Table 5*** shows a summary of the AL2 screening criteria exceedances.

Determinand	AL2 Criteria (mg/kg)	No. of Exceedances	Sample ID (mOD)	Result (mg/kg)
Chromium	370	1	BHCW1 -7.70 to -7.85	410
Lead	300	1	BHCW3 -8.03 to -8.18	610
Zinc	600	1	BHCW1 -7.70 to -7.85	670

Table 7: Summary of AL2 Exceedances

The three AL2 exceedances were in two samples (BHCW1 -7.70 to-7.85mOD and BHCW3 -8.03 to -8.18mOD) that each corresponds with the soft black slightly organic clayey silt. This material was encountered at the surface of the estuary bed in boreholes BHCW1, BHCW2 and BHCW3.

In addition to the three AL2 exceedances the chemical analysis results show exceedances of the AL1 criteria for one or more heavy metals in 19 of the 24 samples analysed and for two or more PAHs in eight of the 24 samples analysed. The AL1 exceedances for heavy metals are all within one order of magnitude of the criterion, however several of the PAH results exceed one order of magnitude of the corresponding AL1 criterion.

Petroleum hydrocarbon concentrations below the AL1 criterion were detected in two samples and PCBs were not detected in any sample.

5. Preliminary Impact Assessment

The following sections provide a preliminary assessment of potential impacts from the dredging activity. The assessment of potential impacts from disposal of the sediment material will be considered following detailed design and selection of a disposal route(s).

5.1 Key Contaminants

The screened chemical analyses results identify the key contaminants within the sediment as:

- Chromium, lead and zinc; and
- PAHs

In addition, if mobilised, the sediment itself may lead to increased turbidity in the estuarine water environment.

5.2 Key Impact Pathways

5.2.1 During Dredging

Dredging can cause the re-suspension of contaminants contained in the sediment which in turn can allow their transportation within the waterbody. Given the location of the proposed dredge within the tidal reaches of the Clyde estuary, re-suspended contaminants may migrate in both an upstream (rising tide) and downstream (falling tide) direction.

The type of material present can affect the release rate of sediment bound contaminants since fine sediment is generally dispersed to a greater extent than coarser materials. With the exception of the soft black slightly organic clayey silt the borehole logs generally identify the sediment as a mixture of grey brown sands, silts and clays with gravel and a low cobble content. The PSA data shows an average clay and silt content of 58.09%. Based on this information there is a moderate-high potential for fine particulates (silts and clays) to be mobilised during dredging.

The quantity and rate of sediment release varies according to the dredging methodology. At the time of reporting, the anticipated dredging methodology is Cutter Suction Dredging (CSD). CSD is designed to minimise the release of sediment into the water environment by reducing the mechanical movement of sediment during dredging.

5.2.2 During Disposal

Impacts to the land and water environment from disposal of the dredged material could occur at the disposal site and along the disposal transport route. Disposal of the dredged material to a landfill site is generally considered the most secure method of managing long term potential risks from the dredged material. However, a detailed assessment of the potential impacts from disposing of the dredged material will be undertaken during revision of this document following planning approval, the appointment of a contractor and confirmation of the disposal route/option.

5.3 Identified Receptors

5.3.1 During Dredging

At this preliminary stage of assessment, no Higher or Lower Sensitivity habitats have been identified within the immediate vicinity of the proposed dredge. However, the dredging is likely to mobilise sediment and sediment bound contaminants which may be redeposited on the surface of the estuary bed. As such, any benthic dwelling species may be affected should mitigation measures to minimise sediment mobilisation not be incorporated at the detail design phase. Additionally, migratory salmonids passing through the estuary water body and other fish species living within the estuary may be affected due to a potential increase in turbidity and concentration of dissolved contaminants.

5.3.2 During Disposal

The potential receptors during disposal will depend on the selected disposal route(s). A detailed assessment of the potential impacts from disposing of the dredged material will be undertaken during revision of this document following planning approval, the appointment of a contractor and confirmation of the disposal route/option.

5.4 Summary of Potential Impacts

The proposed dredging activity is anticipated to be undertaken over a period of two weeks. The volume of the dredge (18,100m^3) and the dredging timescale are relatively small in comparison to the ongoing maintenance dredging that occurs in the Clyde estuary (up to 175,000m^3 over three months). Potential impacts include the mobilisation of sediment and chemical contaminants into the waterbody resulting in changes to the water quality, increased turbidity and variation of the estuary flow/geomorphology. However, it is considered that the potential impacts from the proposed capital dredging are unlikely to be distinguishable from both natural variability in the estuary conditions and the influence of the periodic maintenance dredging already being undertaken along the Clyde estuary.

6. Preliminary Conclusions and Recommendations

6.1 Chemical Results

The chemical analysis undertaken has identified contaminants in two samples above the CEFAS AL2 criteria. The three AL2 exceedances were confined to a distinct layer of soft black slightly organic clayey silt at the surface of the estuary bed in BHCW1 and BHCW3. The soft black slightly organic clayey silt was also present at the surface of the estuary bed in BHCW2, however no contaminants exceeded the AL2 criteria at this location.

Due to the AL2 exceedances, the soft black slightly organic clayey silt is unlikely to be suitable for sea disposal. The remaining material to be dredged contains contaminant concentrations that fall between the AL1 and AL2 criterion. This material may be suitable for sea disposal following more detailed assessment of the potential impact at the selected sea disposal site. *However at the time of reporting and for the purposes of the planning application, it has been assumed that on a precautionary basis, all dredged material will be disposed of on land.*

6.2 Dredging Activity

At the time of reporting, the anticipated dredging methodology is Cutter Suction Dredging. It is proposed that the dredging activity be tendered to local contractors who are familiar with the Clyde estuary and the risks posed by marine sediment dredging. Following appointment of a suitably qualified contractor, mitigation measures to minimise potential impacts, at and surrounding the dredging site should be put in place. Mitigation measures may include:

- Selection of the least disturbing dredging technique;
- Sediment dispersal monitoring; and if required
- Sediment plume containment.

Disposal routes for the dredged material are still being considered and further assessment of the potential impacts from marine disposal at Cloch Point will be included following revision of this document.

6.3 BPEO

This report is designed to support an application to Marine Scotland for the proposed capital marine dredging at Rothesay Dock planned as part of the wider package of infrastructure work for the CWRR project, and to identify the BPEO for managing the sediment arisings.

As previously mentioned, for the purposes of the wider CWRR project planning application it is proposed that a conservative approach will be adopted, where all dredged material will be removed to a suitable land-based disposal facility. However, on the basis of the information reviewed to date, it is considered that a combination of land disposal and sea disposal (subject to further detailed assessment) is likely to be the best practicable environmental option for managing arisings from the dredging activity, although this requires further assessment following detailed design. Geotechnical and chemical data collected as part of the sediment investigation has highlighted a moderate-high potential for fine particulates (silts and clays) to be mobilised during

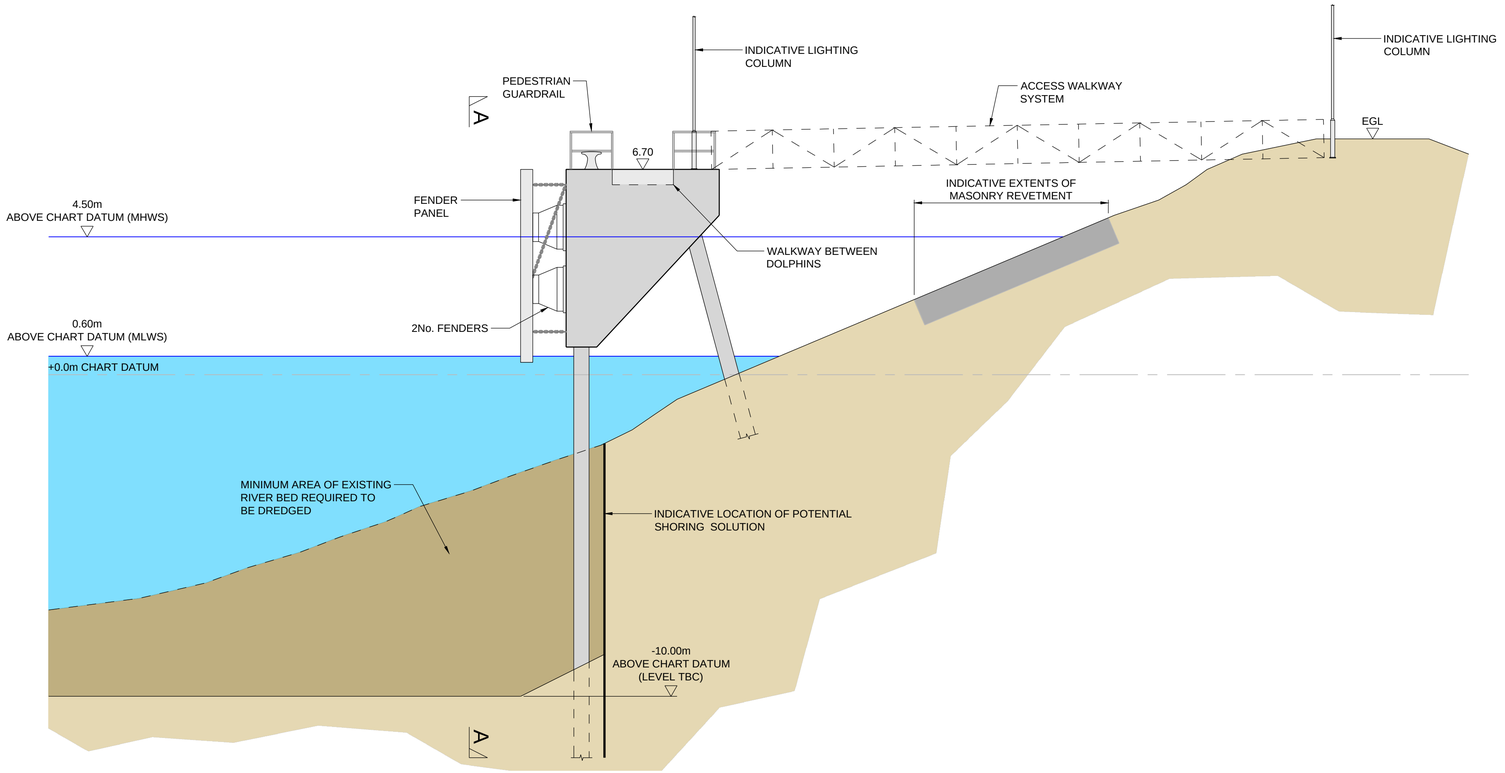
dredging. The sediments described as a 'soft black slightly organic clayey silt' at BHCW1 and BHCW3 have been identified to contain contaminants in excess of the Marine Scotland AL2 criterion. This material is not considered suitable for marine disposal. The remaining material has been identified to contain contaminants at concentrations either below the AL1 criterion or between the AL1 and AL2 criterion.

The sediment with contaminant concentrations above the Marine Scotland Guidance AL2 criterion is not considered suitable for marine disposal. When considering disposal of the material that falls between the AL1 and AL2 criterion, consideration should be given to both marine disposal and land disposal options. The potential impacts from both marine disposal and land disposal should be assessed and a qualitative assessment of the risk to the environment should be prepared. The qualitative assessment should consider the risks to the marine ecosystem at the disposal site and factors such as the number of vehicle movements required for land disposal, the distance to the land disposal site and the cost of both marine and land disposal options.

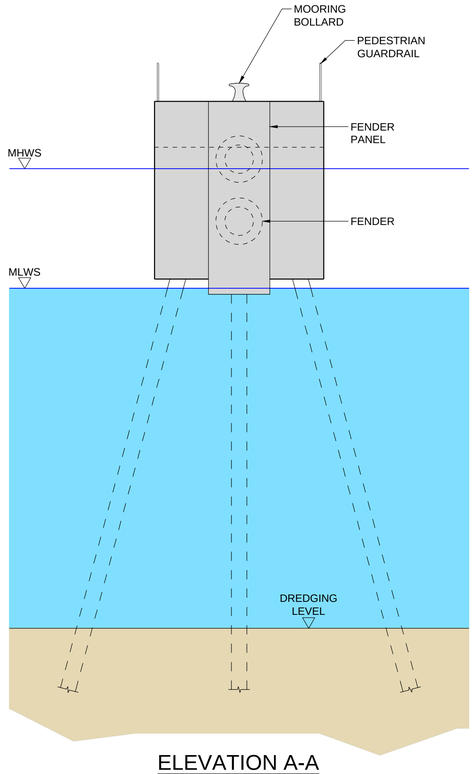
6.4 Recommendations

Following planning approval, the marine dredging and layby berth construction will be tendered to suitably qualified contractors. The final detailed design of the layby berthing structure will be confirmed by the contractor. As part of the detailed design process the following actions are recommended:

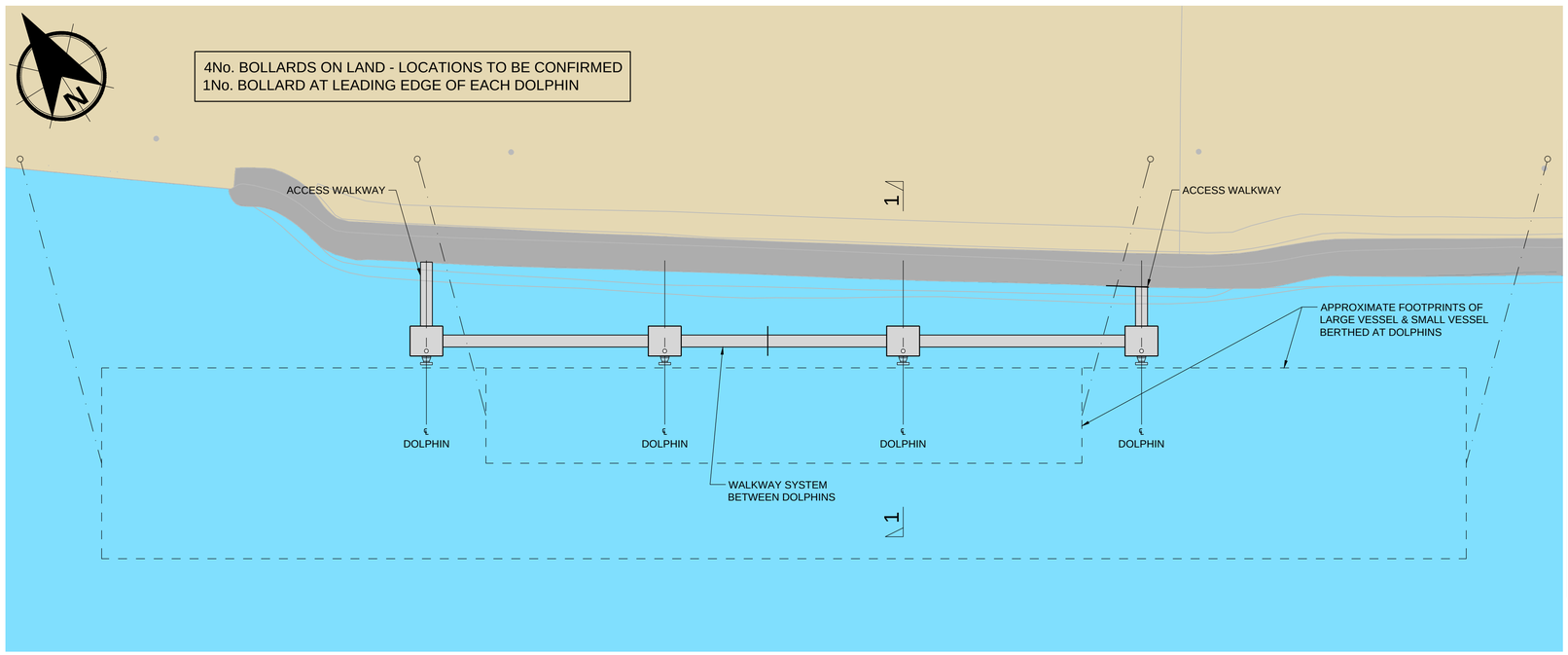
- Further assessment of the chemical data to determine suitable on land disposal routes for the material, but especially the soft black slightly organic clayey silt.
- More detailed assessment of the potential impacts at the selected sea disposal site to determine if the dredged material with contaminant concentrations that fall between the AL1 and AL2 criterion can be disposed of at sea. This should include comparison of the current dataset with historical disposal data and background conditions at the chosen disposal site, along with a detailed assessment of impacts on ecological receptors and further consultation with Marine Scotland regarding sea disposal of the sediment.
- The revised version of the Scoping Report and BPEO should be updated to include the final layby berth designs, estimate of dredge volume and detailed assessment of effects from the selected dredging technique and chosen disposal route(s).
- Any changes should be agreed in writing with the competent authorities and the Statutory Consultees (including but not limited to Marine Scotland, Scottish Natural Heritage, the Port Authority and the planning authorities).



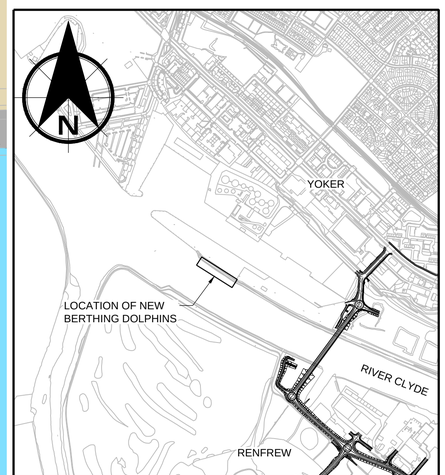
SECTION 1-1
SCALE 1:100



ELEVATION A-A
SCALE 1:100



PLAN ON NEW BERTHING LAYBY
SCALE 1:500



LOCATION PLAN
SCALE 1:10,000

Notes

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (m AOD) UNLESS NOTED OTHERWISE.
3. TIDE LEVELS ARE INDICATIVE AND ARE TAKEN FROM THE RIVER CLYDE AT ROTHESAY DOCK (ADMIRALTY TIDE TABLES 2015).

Reference drawings

REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
P01.1	16/05/17	FINAL	---	---	---

Sweco
Suite 3/5, City Park
368 Alexandra Parade
Glasgow
G31 3AU
Tel: +44 (0)141 414 1700
Web: www.sweco.co.uk

Client: RENFREWSHIRE COUNCIL

Drawing Status: FINAL

Suitability: S6

Project Title: CLYDE WATERFRONT AND RENFREW RIVERSIDE

Drawing Title: CLYDE CROSSING BERTHING LAYBY GENERAL ARRANGEMENT PLANNING

Scale	Designed	Drawn	Checked	Approved
As Shown	Butler, Christopher	Jeffrey, Bryan	Mackay, Ruairidh	Webb, Alistair
Original Size	**Date**	**Date**	**Date**	**Date**
A1	15/05/17	15/05/17		

Drawing Number: 117086 - SWECO - SGN - 00 - DR - S - 43000 (Project – Originator – Volume – Location – Type – Role – Number)

Project Ref. No.: 117086 (R09)

Revision: P01.1

pw:\\CSPWInt.grontmij.net:PW_UK Production\Documents\Projects\Transportation\117086 (R09) - Clyde Waterfront and Renfrew Riverside\Structures\General\Drawing\117086-SWECO-SSP-00-DR-S-43000

Appendices

Appendix A – Geophysical Survey

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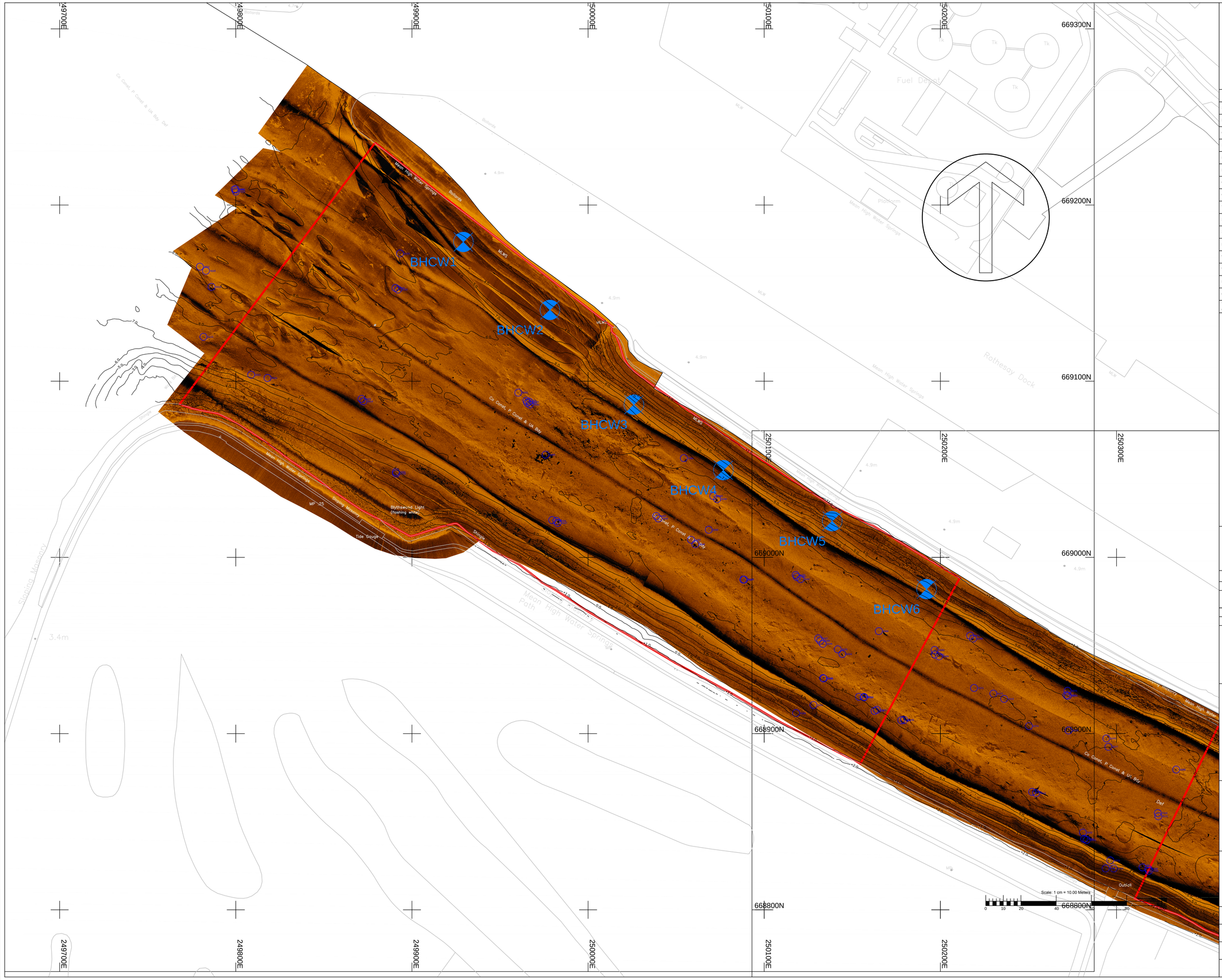

Legend

S18 — Sidescan Sonar Target

Sea-bed contour relative to CHART DATUM.

Survey Parameters & Equipment	
Survey Vessel:	Coastal Sensor II (MCA Cat III)
Positioning System:	Trimble Applanix POS MV
GPS Correction Source:	Trimble VRS NOW Network RTK
Sidescan Sonar:	Edgetech 4125 (400/900kHz)
Motion Compensator:	–
Positioning System Spheroid & Datum:	ETRS89
Grid System:	National Grid of Great Britain
Geoid Model:	OSGM02
Transformation Parameters:	OSTN02
Spheroid:	Airy
Semi Major Axis:	6377563.396
Flattening (1/f):	299.324964600
Vertical Datum (Topographic):	Ordnance Datum
Vertical Datum (Hydrographic):	Chart Datum
Distance Unit:	Metre

Chart Datum is 2.2m below Ordnance Datum.

The datum was established using corrected OS Rinex data and post-processed using Trimble Business Centre Software.

Coloured Depth Bands:

Notes:

The Bathymetric survey limits are MHWS, data is relative to Chart Datum.

Topographic survey data is relative to Ordnance Datum.

Horizontal and vertical datums were referenced to control stations on site.

Heights in metres above Chart Datum (Clydebank)

MHWS	MHWN	MLWN	MLWS
4.5	3.7	1.6	0.6

CONTROL STATION COORDINATES (OD)

STN	EASTING	NORTHING	LEVEL

Aspect
Land + Hydrographic Surveys
CHARTERED SURVEYORS
Thornhouse Business Centre
Ballot Road
Tel : 01294 313399 Irvine Fax : 01294 313389
KA12 OHW
E-mail: mail@aspectsurveys.com
Web: www.aspectsurveys.com

Client :

CAUSEWAY GEOTECH
8 DRUMAHISKEY ROAD
BALLYMONEY
COUNTY ANTRIM
BT53 7QL

Project Title :

SIDESCAN SONAR SURVEY
ROTHESAY DOCK
RIVER CLYDE
CITY DEAL INITIATIVE

Project No: A6177	Scale : 1:1000
Surveyed date : 24th January 2017	Issued date : 27th January 2017
Surveyed by : JEK	Checked by: CDT
Sheet No. : 2 of 2	Plot Scale: 1:1 @ A1

Appendices

Appendix B – WFD Scoping Template

117086/DEP/170509 Issue 1

Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water. If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your activity	Description, notes or more information
Applicant name	*Renfrewshire City Deal Team*
Application reference number (where applicable)	*Rothesay Dock, River Clyde.*
Name of activity	*Sediment Dredging and subsequent Disposal at Sea (Disposal operation assessed on separate sheet).*
Brief description of activity	*Dredging of marine sediment*
Location of activity (central point XY coordinates or national grid reference)	*NS 250026, 669086*
Footprint of activity (ha)	*4125m^2 (25m x 165m^2)*
Timings of activity (including start and finish dates)	*TBC*
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	*Capital dredging event to be undertaken over approximately 2 months to deepen the berthing channel at Rothesay Dock with the intention to allow temporary berthing of ships. The maximum sediment volume to be dredged is 18,500m^3.*
Use or release of chemicals (state which ones)	*Potential release of historical industrial contaminants from the sediment dredging operation, including metals, PAHs, Organotins, PCBs.*

Water body[1]	Description, notes or more information
WFD water body name	*Inner Clyde Estuary*
Water body ID	*200510*
River basin district name	*Clyde Estuary – Inner (Identifier Code 200510)*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*440 ha*
Overall water body status (2015)	*Moderate*
Ecological status	*Overall ecological status of Bad*
Chemical status	*Overall chemical status of Pass*
Target water body status and deadline	*Overall target of Good by 2027*
Hydromorphology status of water body	*Bad*
Heavily modified water body and for what use	*Classed as a heavily modified waterbody on account of physical alterations that cannot be addressed without significant impact on navigation and from an increased risk of subsidence or flooding.*
Higher sensitivity habitats present	*No*
Lower sensitivity habitats present	*No*
Phytoplankton status	*TBC*
History of harmful algae	*TBC*
WFD protected areas within 2km	*Yes – see Inner Clyde and Black Cart SPA information.*

[1] Water body information can be found in the Environment Agency's catchment data explorer and the water body summary table. Magic maps provide additional information on habitats and protected areas. Links to these information sources can be found in the WFD assessment guidance for estuarine and coastal waters.

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	*N/A*
Could significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	*N/A*
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	*Dredging will alter depth of the estuary channel by physically removing the existing channel bed. Dredging may locally alter estuary flow regime and sediment transport in the vicinity of the dredge, however this is unlikely to be discernible against both natural variability and the influence of periodic maintenance dredging already being undertaken along the Clyde estuary.*

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats [2]	Lower sensitivity habitats [3]
chalk reef *(No)*	cobbles, gravel and shingle
clam, cockle and oyster beds *(No)*	intertidal soft sediments like sand and mud *(No, the intertidal substrate foreshore immediately adjacent to Rothesay Dock is classed as manmade. Sand is registerd downstream around Newshot Island Inlet, however this is >1km downstream and concentrated within the inlet not the main estuary channel).*
intertidal seagrass *(No)*	rocky shore *(No)*
Maerl *(No)*	subtidal boulder fields *(No)*
mussel beds, including blue and horse mussel *(No)*	subtidal rocky reef *(No)*
polychaete reef *(No)*	subtidal soft sediments like sand and mud *(No)*
Saltmarsh *(No)*	
subtidal kelp beds *(No)*	
subtidal seagrass *(No)*	

[2] Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

[3] Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Consider if the footprint[4] of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	No to all – impact assessment not required	*No - 4125m^2 footprint of dredge which including the plume allowance is 6187.50m^2 or 0.0062km^2*
1% or more of the water body's area			*No*
Within 500m of any higher sensitivity habitat			*No*
1% or more of any lower sensitivity habitat			*No*

[4] *Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.*

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	Continue with questions	Go to next section	*Yes – activity is in an estuary, could affect resident fish in the estuary and could affect fish migration through the estuary.*
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	*Yes*
Could cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	*No*

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	*It is considered unlikely that the capital dredging will have any discernible effect on the water clarity given the ongoing maintenance dredging already undertaken in the Clyde estuary. However, the chemical quality of the water body may be effected.*
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	*TBC*
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	*TBC*

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	*Yes requires impact assessment*
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	*Yes requires impact assessment*

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	*Yes requires impact assessment*

[5] *Carry out your impact assessment using the Environment Agency's surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.*

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area[6]	Requires impact assessment	Impact assessment not required	*Yes at the dredging site – see Inner Clyde and Black Cart SPA info*

[6] *Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.*

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity could introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	*No – waterbody classified as having a HIGH status of freedom from invasive species*

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	
Biology: habitats	No	
Biology: fish	Yes	*Sediment plume could affect migratory fish although already highly modified environment. Further assessment may be required.*
Water quality	Yes	*Risks to water quality from suspended solids and dissolved chemicals. Further assessment required.*
Protected areas	Yes	*Due to two No. SPAs within 2km. Further assessment required.*

Invasive non-native species	No	*No identified risks.*

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

Appendices

Appendix C – Inner Clyde SPA

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General details

Protected area name:	Inner Clyde
Protected area identifier code:	UK9003061
Protected area type:	SPECIAL PROTECTION AREA
River basin district:	Scotland
Area advisory group:	Clyde
Associated surface areas:	Clyde Estuary - Inner (inc Cart)Clyde Estuary - Outer
Associated groundwater:	
Responsible body:	SEPA
	Glasgow, Renfrew & Inverclyde, Dunbartonshire

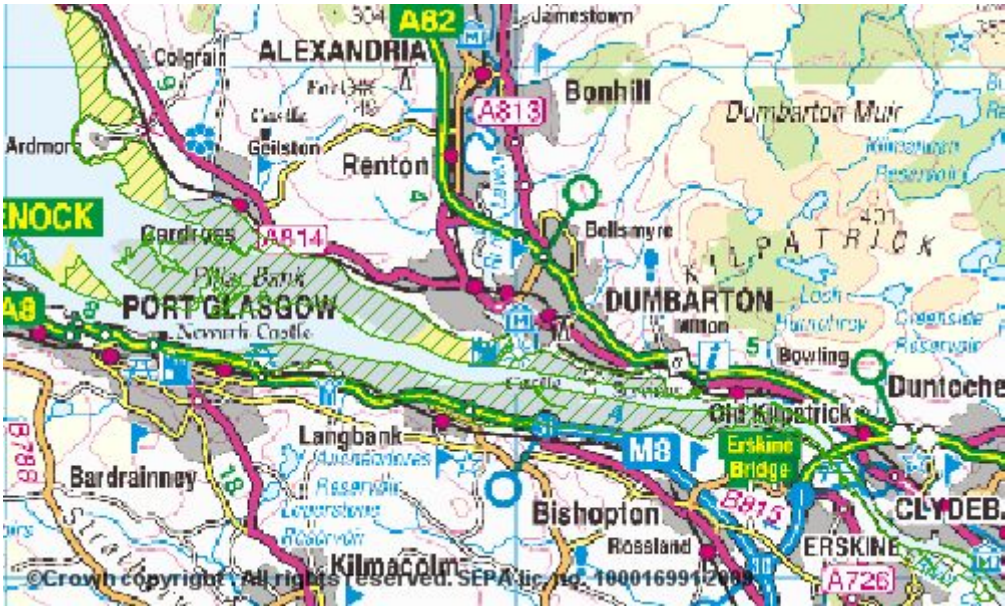
Current condition of this protected area

The data we currently hold on this protected area is as follows:

Parameter	Condition
Natura Overall Status	Favourable

Further details

You can find more details on protected areas at
www.sepa.org.uk/water/river_basin_planning.aspx



SEPA Contact Details: rbmp@sepa.org.uk

RBMP Water body information sheet for water body 200510 in Clyde

General details

Water body name:	Clyde Estuary - Inner (inc Cart)
Water body Identifier code:	200510
Area:	4.40 km^2
Water body category:	Transitional
Baseline:	Y
River basin district:	Scotland
Area advisory group:	Clyde
Catchment:	
Associated protected areas:	Inner Clyde - SPECIAL PROTECTION AREA Black Cart - SPECIAL PROTECTION AREA
Associated groundwater:	
Responsible body:	SEPA Dunbartonshire, Renfrew & Inverclyde, Glasgow
Heavily modified:	Yes
Artificial:	No
Typology:	TW2
National Grid Reference:	NS 50707 68425
Latitude:	55.88575
Longitude:	-4.38846

Current status of this water body

We have classified this water body as having an overall status of Moderate ecological potential with Medium confidence in 2008 with overall ecological status of Bad and overall chemical status of Pass.

It is important to note that the five classification ecological potential classes for Heavily Modified Water Bodies (HMWBs) and Artificial Water Bodies (AWBs) combine the level of mitigation measures for water levels and flow and physical habitat with measurements of the biological and chemical water quality. For example, a HMWB could have all the mitigation measures in place for the use (eg hydropower) to allow it to reach good ecological potential, but if water quality is poor due to elevated phosphorus levels, its overall ecological potential assessment could be moderate, poor or bad depending on the severity of the impact.

This overall classification of status is made up of many different tiers of classification data. A complete set of classification data for 2008 is shown at the end of this document.

Targets for the future status of this water body

We have set environmental objectives for this water body over future river basin planning cycles in order that sustainable improvements to its status can be made over time, or alternatively that no deterioration in status occurs, unless caused by a new activity providing significant specified benefits to society or the wider environment.

For this water body we have set the overall environmental objectives for the first, second and third River Basin Management Planning (RBMP) cycles as:

Year	2008	2015	2021	2027
Status	Moderate Ecological potential	Moderate	Moderate	Good

We have established an ongoing programme of monitoring in order to identify pressures on our water bodies. The pressures listed below contribute to this water body's failure to meet good ecological status. River basin planning allows us to plan improvements for particular parameters over time. We have collaborated with others to identify measures which will act to protect or improve our water environment in order that all water bodies reach good status over successive RBMP cycles.

Pressures and measures on this water body

The pressures listed below contribute to this water body's failure to meet good ecological status or potential. River basin planning allows us to plan improvements for particular parameters over time. We have collaborated with others to identify measures which will act to protect or improve our water environment in order that all water bodies reach good status over successive RBMP cycles.

The following table shows our collated information on the pressures on this water body, their causes and the measures which could be introduced to mitigate their effects. We have also indicated the current funding status of the measure; with projected measures being potentially funded and agreed measures having funding in place. Finally, we have included information on the potential or actual owner of the measure, the date it will be effective and information on the justification for extending the deadlines or for setting an alternative objective, where appropriate.

Pressure	**As a Result of**	**Assessment Parameter**	**Objective**	**Reasons for Failure**
	Measure	**Funding**	**Owner**	**Effective date**
Point Source Pollution	Sewage disposal	UK Specific pollutants (Annex 8)	Good by 2015	
	Change timing or frequency of discharge	Projected	Scottish Water	31/03/2019

Pressure	As a Result of	Assessment Parameter	Objective	Reasons for Failure
	Measure	Funding	Owner	Effective date
Point Source Pollution	Sewage disposal	UK Specific pollutants (Annex 8)	Good by 2015	
	Increase treatment	Projected	Scottish Water	31/03/2019
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by

Pressure	As a Result of	Assessment Parameter	Objective	Reasons for Failure
	Measure	**Funding**	**Owner**	**Effective date**
				an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Air transport	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Increase treatment	Agreed	BAA (British Airports Authority)	31/12/2012
Point Source Pollution	Sewage disposal	UK Specific pollutants (Annex 8)	Good by 2015	
	Reduce Point Source Inputs	Projected	Scottish Water	31/03/2019
	Change timing or frequency of discharge	Projected	Scottish Water	31/03/2019
Point Source Pollution	Sewage disposal	UK Specific pollutants (Annex 8)	Good by 2015	
	Increase treatment	Projected	Scottish Water	31/03/2019
Point Source Pollution	Sewage disposal	UK Specific pollutants (Annex 8)	Good by 2015	
	Increase treatment	Projected	Scottish Water	31/03/2019

Pressure	As a Result of	Assessment Parameter	Objective	Reasons for Failure
	Measure	**Funding**	**Owner**	**Effective date**
Morphological Alterations	Dredging - resulting in removal of sediment	Single pressure - Subtidal	Good by 2015	
	Improve Modified Habitat	Neither Agreed nor Projected	British Ports Association	31/12/2007
Diffuse Source Pollution	Mixed farming	Nitrogen	Good by 2015	
	Reduce at source	Agreed	Farmer(s)	31/12/2026
Morphological Alterations	Channelisation/ realingment/ straightening - unspecified	Multiple pressure - Intertidal	Good by 2015	
	Improve Modified Habitat	Neither Agreed nor Projected	Glasgow City Council	31/12/2007
Morphological Alterations	Channelisation/ realingment/ straightening - unspecified	Multiple pressure - Subtidal	Good by 2015	
	Improve Modified Habitat	Neither Agreed nor Projected	Glasgow City Council	31/12/2007
Point Source Pollution	Sewage disposal	Nitrogen	Good by 2015	
	Reduce at source	Agreed	Scottish Water	31/03/2014
Point Source Pollution	Sewage disposal	Nitrogen	Good by 2015	
	Reduce at source	Agreed	Scottish Water	31/03/2014
Morphological Alterations		Multiple pressure - Intertidal	Good by 2015	
	Improve Modified Habitat	Neither Agreed nor Projected	Glasgow City Council	31/12/2007
Morphological Alterations	Recreational activities Impounding - weir / dam	Single pressure - Hydrodynamic	Good by 2015	
	Improve Modified Habitat	Neither Agreed nor Projected	Glasgow City Council	31/12/2007
Point Source Pollution	Sewage disposal	Dissolved Oxygen	Moderate by 2015	Implementation of the measure by an earlier deadline would impose disproportionate burdens
	Reduce at source	Projected	Scottish Water	31/03/2014
Point Source Pollution	Sewage disposal	UK Specific pollutants (Annex 8)	Good by 2015	

Pressure	As a Result of	Assessment Parameter	Objective	Reasons for Failure
	Measure	**Funding**	**Owner**	**Effective date**
	Increase treatment	Projected	Scottish Water	31/03/2019

Future work

Additional work to identify pressures and to develop and implement measures to mitigate their impacts will continue over subsequent river basin cycles.

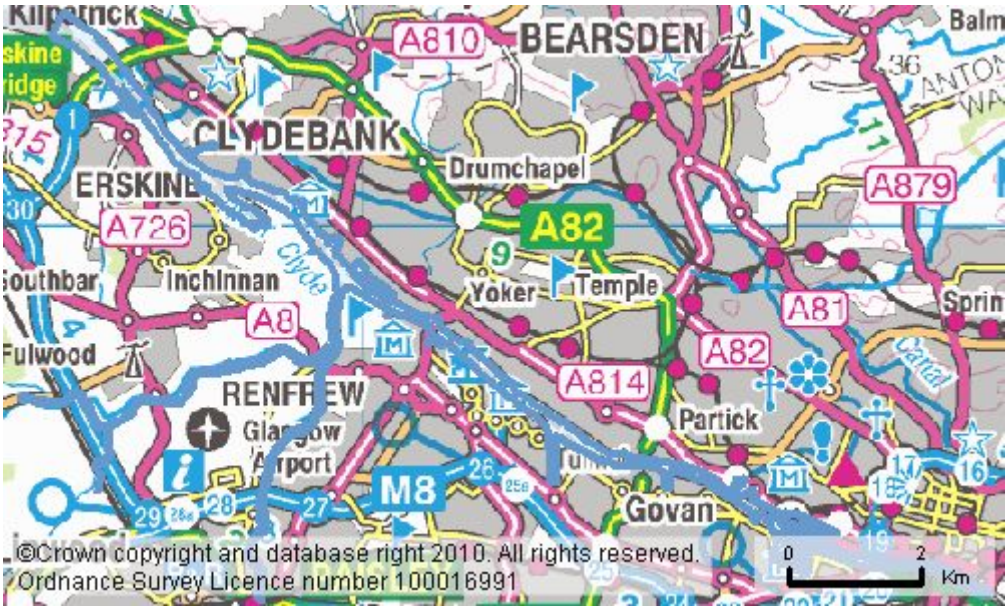
Complete classification for this water body in 2008

Parameter	Status	Confidence of Class
OVERALL STATUS	MODERATE ECOLOGICAL POTENTIAL	MEDIUM
Pre-HMWB status	Bad	High
Overall chemistry	Pass	Low
Priority substances	Pass	Low
Benzo-a-pyrene	Pass	Low
Hexachlorobenzene	Pass	Low
Overall ecology	Bad	High
Physico-Chem	Poor	Medium
Dissolved Oxygen	Poor	Medium
DO (lab. salinity)	Poor	Medium
DO (field salinity)	Poor	Medium
Dissolved inorganic nitrogen	Good	Medium
Biological elements	High	Low
Benthic invertebrates	High	Low
Alien species	High	Low
Fish	High	Low
Macroalgae	High	Low
Specific pollutants	Pass	High
Copper	Pass	High
Unionised ammonia	Pass	High
Hydromorphology	Bad	Medium

Parameter	Status	Confidence of Class
Morphology	Bad	Medium
Water quality	Moderate	

Location of this water body

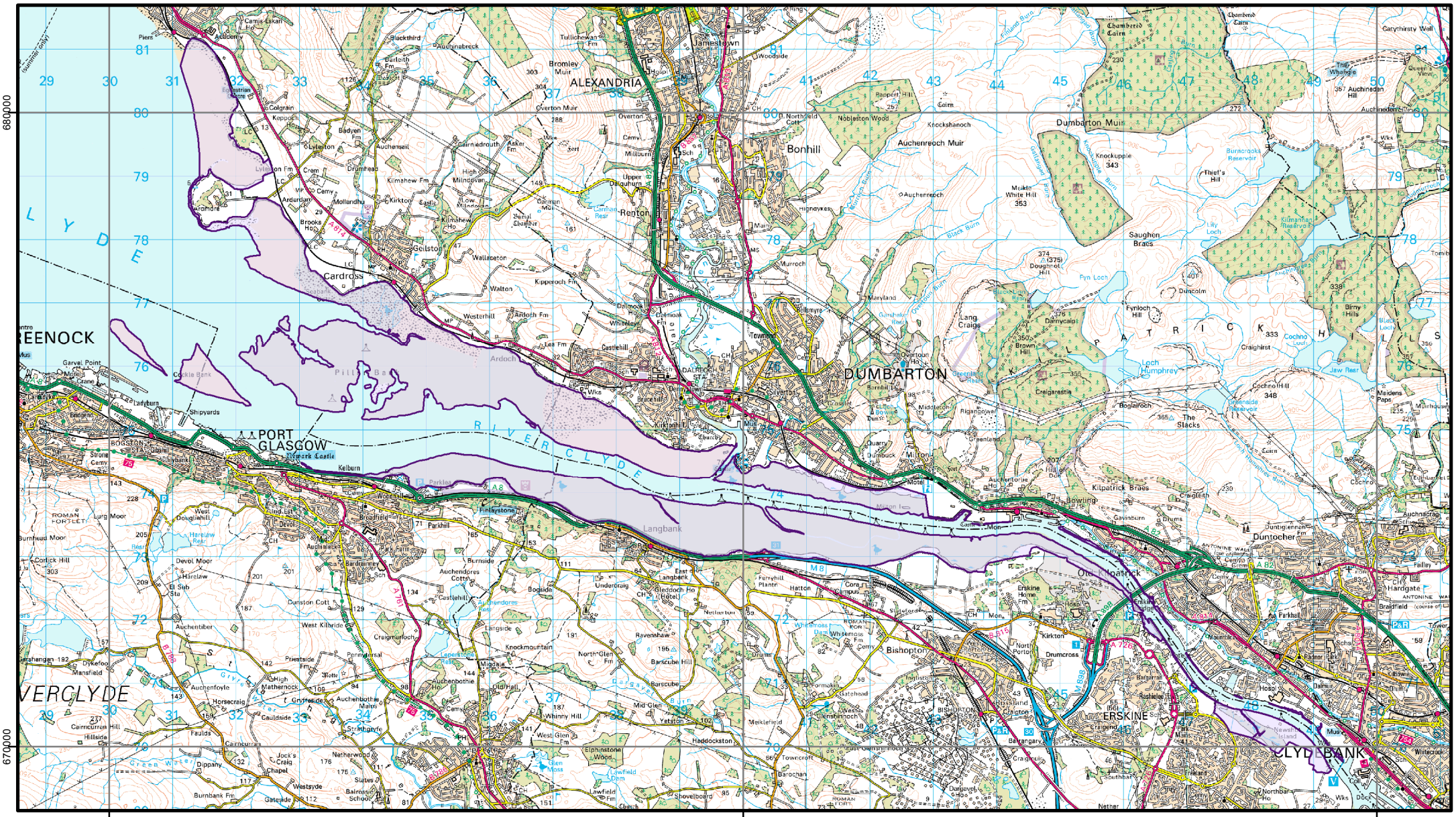
You can find the geographical location of this water body by searching on water body ID in the interactive maps at www.sepa.org.uk/water/river_basin_planning.aspx



SEPA Contact Details: rbmp@sepa.org.uk

Project: 16-1197 City Deals over Water GI - Rothesay Dock																														
Client: Causeway Geotech Ltd				Chemtest Job No.:		Marine Scotland Disposal Criteria (Table 2 Action levels)		BHCW01	BHCW01	BHCW01	BHCW01	BHCW02	BHCW02	BHCW02	BHCW02	BHCW03	BHCW03	BHCW03	BHCW03	BHCW04	BHCW04	BHCW04	BHCW04	BHCW05	BHCW05	BHCW05	BHCW05	BHCW06	BHCW06	BHCW06	BHCW06
Quotation No.: Q16-07849				Chemtest Sample ID.:																										
Order No.:				Client Sample Ref.:																										
				Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):				0.50	1.50	2.50	4.50	0.0	1.0	3.0	5.0	0.00	1.50	2.50	4.00	0.00	1.50	3.00	5.00	0.0	1.5	3.0	4.0	0.00	1.50	3.00	5.00
				Bottom Depth (m):				0.65	1.65	2.65	4.65	0.15	1.15	3.15	5.15	0.15	1.65	2.65	4.15	0.15	1.65	3.15	5.15	0.15	1.65	3.15	4.15	0.15	1.65	3.15	5.15
				Date Sampled:				02-Feb-2017	02-Feb-2017	02-Feb-2017	02-Feb-2017	28-Jan-2017	28-Jan-2017	28-Jan-2017	28-Jan-2017	03-Feb-2017	03-Feb-2017	03-Feb-2017	03-Feb-2017	06-Feb-2017	06-Feb-2017	06-Feb-2017	06-Feb-2017	13-Feb-2017	13-Feb-2017	13-Feb-2017	13-Feb-2017	09-Feb-2017	09-Feb-2017	09-Feb-2017	09-Feb-2017
				Asbestos Lab':				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		**Revised AL1 mg/kg dry weight (ppm)**	**Revised AL2 mg/kg dry weight (ppm)**																								
Arsenic	M	2450	mg/kg	1		20	70	16	25	29	9.1	17	19	17	6.2	16	< 1.0	1.2	5.0	19	13	4.8	5.4	3.7	3.7	3.0	4.3	5.4	4.0	5.4	3.4
Cadmium	M	2450	mg/kg	0.1		0.4	4	0.96	1.6	2.3	0.47	1.1	1.3	1.5	< 0.10	0.35	0.27	0.37	< 0.10	0.15	0.16	0.10	< 0.10	0.25	0.19	0.14	< 0.10	0.14	0.10	0.10	< 0.10
Chromium	M	2450	mg/kg	1		50	370	170	280	410	110	220	300	280	46	32	6.4	28	35	31	65	51	19	26	35	14	29	34	28	36	20
Copper	M	2450	mg/kg	0.5		30	300	82	140	200	54	92	120	130	27	26	5.4	23	22	22	44	32	8.1	23	26	8.6	19	24	18	25	12
Mercury	M	2450	mg/kg	0.1		0.25	1.5	0.56	1.0	1.2	0.28	0.70	0.83	0.68	< 0.10	< 0.10	< 0.10	0.18	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.5		30	150	54	67	85	28	53	54	53	49	20	5.4	39	46	17	78	62	23	38	49	21	39	42	37	44	26.0
Lead	M	2450	mg/kg	0.5		50	400	130	230	300	80	160	210	200	19	610	28	14	13	45	33	20	7.9	18	17	6.9	10	13	12	15	6.5
Zinc	M	2450	mg/kg	0.5		130	600	320	520	670	190	490	380	400	84	160	22	67	65	110	120	85	46	290	150	36	55	66	50	70	39
Total Petroleum Hydrocarbons	N	2680	mg/kg	2		100	-	22	< 2.0	< 2.0	< 2.0	34	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Naphthalene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.40	0.43	0.31	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	0.43	< 0.010
Acenaphthylene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.80	0.27	0.46	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	0.76	< 0.010
Acenaphthene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.24	0.25	0.12	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Fluorene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.22	0.23	0.11	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	0.24	< 0.010
Phenanthrene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	0.25	< 0.010	< 0.010	< 0.010	< 0.010	0.70	0.53	0.35	< 0.010	0.82	< 0.010	< 0.10	< 0.010	< 0.10	0.31	< 0.10	< 0.010	< 0.010	< 0.10	0.54	< 0.010
Anthracene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.10	0.12	0.060	< 0.010	0.32	< 0.010	< 0.10	< 0.010	< 0.10	0.11	< 0.10	< 0.010	< 0.010	< 0.10	0.28	< 0.010
Fluoranthene	N	2700	mg/kg	0.01		0.1	-	< 0.010	0.88	3.5	0.32	0.84	1.2	0.84	< 0.010	0.35	0.29	0.17	< 0.010	0.55	< 0.010	< 0.10	< 0.010	< 0.10	0.19	< 0.10	< 0.010	0.26	0.22	0.26	< 0.010
Pyrene	N	2700	mg/kg	0.01		0.1	-	1.5	1.3	1.5	0.23	1.2	1.5	1.6	< 0.010	0.36	0.24	0.16	< 0.010	0.76	< 0.010	< 0.10	< 0.010	< 0.10	0.26	< 0.10	< 0.010	0.30	0.25	0.28	< 0.010
Benzo[a]anthracene	N	2700	mg/kg	0.01		0.1	-	0.58	0.76	1.1	< 0.010	0.83	0.76	1.5	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Chrysene	N	2700	mg/kg	0.01		0.1	-	1.6	1.1	0.98	< 0.010	2.0	2.1	2.1	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[b]fluoranthene	N	2700	mg/kg	0.01		0.1	-	1.3	< 0.010	< 0.010	< 0.010	0.78	0.70	1.6	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[k]fluoranthene	N	2700	mg/kg	0.01		0.1	-	0.35	< 0.010	< 0.010	< 0.010	0.46	0.40	0.76	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[a]pyrene	N	2700	mg/kg	0.01		0.1	-	0.82	< 0.010	< 0.010	< 0.010	0.78	0.70	1.1	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.01		0.1	-	0.37	< 0.010	< 0.010	< 0.010	1.1	2.2	0.95	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.01		0.01	-	0.98	< 0.010	< 0.010	< 0.010	0.73	1.2	0.34	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[g,h,i]perylene	N	2700	mg/kg	0.01		0.1	-	0.85	< 0.010	< 0.010	< 0.010	0.52	0.50	1.5	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Total Of 16 PAH's	N	2700	mg/kg	0.2		-	-	8.4	4.0	7.1	0.81	9.2	11	12	< 0.20	3.1	2.4	1.7	< 0.20	2.5	< 0.20	< 2.0	< 0.20	< 2.0	0.87	< 2.0	< 0.20	0.56	< 2.0	2.8	< 0.20
Tributyl Tin	N	2730	mg/kg	0.01		0.1	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PCB 28	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Concentration > AL1 Criteria
Concentration > AL2 Criteria
LOR >Disposal Criteria



Inner Clyde

Special Protection Area

EC Site Code: UK9003061

Site boundary

0 2.5 5 km

0 500 1,000 2,000 3,000 4,000 5,000 m

Scale 1:80,000

This is an updated representation of the classified site boundary. Any apparent small differences are due to changes to the OS backdrop.

N

OS backdrop map is 1:50,000

Appendices

Appendix D – Borehole Logs

117086/DEP/170509 Issue 1

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
16-1197	Over Water Site Investigations for CWRR and GAIA projects	**BHCW01**

Coordinates:	Client:	Sheet 1 of 3
249929.16 E	Renfrewshire Council	
669179.01 N	Client's Representative: SWECO	Scale: 1:50
Ground Level: -5.21 mOD	Dates: 01/02/2017 - 03/02/2017	Driller: AH
		Logger: NH+AOK

Method: Cable Percussion+Rotary Coring

Plant: Dando 2000+Comacchio 405

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.15	ES2							Very soft black slightly sandy organic CLAY. Sand is fine to medium.		
0.00 - 1.00	P30									
0.50 - 0.65	ES3									
1.00	D12									
1.00 - 1.15	ES4									
1.00 - 2.00	P31									
1.50 - 1.65	ES5									
2.00 - 2.15	ES6									
2.00 - 3.00	P32									
2.50 - 2.65	ES7					(5.00)				
3.00 - 3.15	ES8									
3.00 - 4.00	P33									
3.40 - 3.85	UT1			Ublow=4 100%						
3.85 - 4.00	ES9									
4.00 - 4.50	B21									
	D13									
	ES10									
4.00 - 5.00	P34									
4.50 - 4.65	ES11									
					-10.21	5.00		Medium light brown slightly rounded to subrounded fine to coarse GRAVEL.		
						(0.80)				
5.80 - 6.24	SPT (C)			N=50 (6,8/50 for 290mm)	-11.01	5.80		Dense light brown slightly gravelly slightly silty fine to medium SAND. Gravel is subangular to subrounded, fine to medium.		
6.50 - 7.00	B22									
	D14									
6.50 - 6.92	SPT (C)			N=50 (3,3/50 for 275mm)		(2.20)				
7.50 - 8.00	B23									
	D15									
7.90 - 8.35	SPT (C)			N=22 (3,2/3,5,7,7)						
	N=22				-13.21	8.00		Medium dense light brown slightly silty slightly gravelly fine to medium SAND with shell fragments. Gravel is subrounded to rounded, fine to coarse.		
8.50 - 9.00	B24									
	D16									
8.70 - 9.15	SPT (C)			N=14 (2,3/4,4,3,3)		(1.60)				
	N=14									
9.50 - 10.00	B25									
	D17				-14.81	9.60		Light brown slightly gravelly fine SAND. Gravel is subrounded to rounded, fine to coarse.		

Remarks
Deck to bed 9.70m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
12.80	250	12.80	12.80	01:00

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW01
	Coordinates: 249929.16 E 669179.01 N	**Client:** Renfrewshire Council	Sheet 2 of 3
Method: Cable Percussion+Rotary Coring		**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: AH
Plant: Dando 2000+Comacchio 405	**Ground Level:** -5.21 mOD	**Dates:** 01/02/2017 - 03/02/2017	**Logger:** NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50 - 11.00	B26 D18					(1.60)		Light brown slightly gravelly fine SAND. Gravel is subrounded to rounded, fine to coarse.		
10.90	D29									
10.90 - 11.35	SPT (C) N=35			N=35 (4,5/7,9,9,10)	-16.41	11.20				
						(0.40)		Stiff light greyish brown slightly gravelly clayey SILT. Sand is fine to medium. Gravel is subrounded to rounded, fine to coarse.		
11.50 - 12.00	B27 D19				-16.81	11.60		Brown silty sandy fine to coarse subrounded to rounded GRAVEL with high cobble content. Sand is fine to coarse.		
12.00 - 12.50	B28 D20					(1.20)				
12.40 - 12.71	SPT (C)			50 (2,18/50 for 160mm)						
					-18.01	12.80		BOULDER of strong thinly laminated dark grey mudstone.		
					-18.36	(0.35) 13.15				
					-18.51	(0.15) 13.30		Grey brownish red and white slightly sandy slightly clayey fine to coarse GRAVEL of mixed lithologies. Sand is fine to coarse.		
	95				-18.76	(0.25) 13.55		Firm greyish brown slightly sandy slightly gravelly CLAY with low cobble content. (Low recovery) Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are angular to subangular of mixed lithologies.		
14.30 - 14.48				50 (25 for 85mm/50 for 90mm)				Very stiff greyish brown slightly sandy slightly gravelly CLAY with low cobble content. (Low recovery) Sand is fie to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are angular to subangular of mixed lithologies.		
14.30	51									
15.40 - 15.56				50 (25 for 77mm/50 for 87mm)		(3.55)				
15.80	76									
					-22.31	17.10				
17.30 - 17.46				50 (25 for 72mm/50 for 85mm)	-22.36	17.15		Very dense brown slightly clayey slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
17.30						(0.85)		Assumed zone of core loss		
	43				-23.21	18.00		Grey reddish brown and white sandy clayey subangular fine to coarse GRAVEL of mixed lithologies and one angular cobble of dark grey thinly laminated mudstone. Sand is fine to coarse.		
						(0.35)				
					-23.56	18.35		Very dense brown gravelly very clayey fine to coarse SAND with low cobble content. (low recovery) Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of mixed lithologies.		
18.80 - 18.89				50 (25 for 6mm/50 for 80mm)						
18.80						(4.45)				
20.30 - 20.54				50 (25 for 93mm/50 for 150mm)						
	TCR	SCR	RQD	FI						

Remarks
Deck to bed 9.70m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
12.80	250	12.80	12.80	01:00

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW01
	Coordinates: 249929.16 E 669179.01 N	**Client:** Renfrewshire Council	Sheet 3 of 3
Method: Cable Percussion+Rotary Coring		**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 2000+Comacchio 405	**Ground Level:** -5.21 mOD	**Dates:** 01/02/2017 - 03/02/2017	**Driller:** AH **Logger:** NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
				6					Very dense brown gravelly very clayey fine to coarse SAND with low cobble content. (low recovery) Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of mixed lithologies.		
	33	15	10	NI							
						-28.01	22.80				
23.30				20					Weak thinly laminated dark grey MUDSTONE. Largely unweathered: film of grey clay on fracture surfaces. Discontinuities: 1. 0 to 30 degree bedding fractures closely spaced (10/145/400) planar, smooth, film of grey clay on fracture surfaces. 2. 40 to 60 degree joints at 23.65m and 24.80m, undulating, smooth, film of grey clay on joint surfaces. 3. 70 to 90 degree joints medium spaced (40/390/1500) mostly undulating, but occasionally planar, smooth, film of grey clay on joint surfaces. *Medium strong highly fractured thinly laminated dark grey MUDSTONE.*		
				13							
				>20							
	98	59	51								
							(3.50)				
24.80											
				6							
	100	96	81								
26.30						-31.51	26.30		End of Borehole at 26.30m		
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 9.70m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
12.80	250	12.80	12.80	01:00

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
16-1197	Over Water Site Investigations for CWRR and GAIA projects	**BHCW02**
Coordinates: 249978.33 E 669140.44 N	**Client:** Renfrewshire Council	Sheet 1 of 6
Method: Cable Percussion+Rotary Coring	**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 3000+Comacchio 405	**Ground Level:** -5.36 mOD	**Driller:** SS+TA
	Dates: 27/01/2017 - 31/01/2017	**Logger:** NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.15	ES1							Very soft black slightly sandy organic clayey SILT. Sand is fine to medium.		
0.00 - 1.00	P34									
0.50 - 0.65	ES2									
1.00 - 1.15	ES3									
1.00 - 2.00	P35									
1.50 - 1.65	ES4									
2.00 - 2.15	ES5									
2.00 - 3.00	P36									
2.50 - 2.65	ES6					(4.90)				
3.00 - 3.15	ES7									
3.00 - 4.00	P37									
3.50 - 3.65	ES8									
4.00 - 4.15	ES9									
4.00 - 5.00	P38									
4.50 - 4.65	ES10									
4.60 - 5.05	UT13			Ublow=26 100%						
					-10.26	4.90				
						(0.20)		Loose light brown very clayey fine to medium SAND		
5.10 - 5.25	ES11				-10.46	5.10				
						(0.30)		Soft brown fissured thinly laminated slightly gravelly silty CLAY		
					-10.76	5.40				
5.50 - 5.65	ES12					(0.40)		Soft brown fissured thinly laminated slightly sandy gravelly silty CLAY. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse.		
					-11.16	5.80				
6.00 - 6.40	B14							Medium dense dark grey gravelly very clayey fine to coarse SAND. Gravel is subrounded fine to medium.		
6.20 - 6.65	SPT (C) N=29			N=29 (4,5/5,8,8,8)						
6.50	D25					(1.20)				
7.00 - 7.40	B15				-12.36	7.00				
7.20 - 7.65	SPT (C) N=15			N=15 (3,4/5,3,3,4)				Medium dense brown slightly silty to silty fine to coarse SAND with fine to medium gravel size shell fragments.		
7.50	D26									
8.00 - 8.40	B16									
8.50	D27									
8.70 - 9.15	SPT (C) N=20			N=20 (5,5/6,6,4,4)						
9.00 - 9.40	B17									
9.50	D28									
10.00 - 10.40	B18									
10.20 - 10.65	SPT (C) N=22			N=22 (4,5/5,6,5,6)						

Remarks
Deck to bed 9.92m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
14.40	250	16.80	17.10	01:00
17.10	200			

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW02
	Coordinates: 249978.33 E 669140.44 N	**Client:** Renfrewshire Council	Sheet 2 of 6
Method: Cable Percussion+Rotary Coring		**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: SS+TA
Plant: Dando 3000+Comacchio 405	**Ground Level:** -5.36 mOD	**Dates:** 27/01/2017 - 31/01/2017	**Logger:** NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50	D29							Medium dense brown slightly silty to silty fine to coarse SAND with fine to medium gravel size shell fragments.		
11.00 - 11.40	B19									
11.50	D30									
11.70 - 12.15	SPT (C) N=22			N=22 (4,4/5,6,6,5)						
12.00 - 12.40	B20					(7.00)				
12.50	D31									
13.00 - 13.40	B21									
13.20 - 13.65	SPT (C) N=25			N=25 (4,5/6,6,7,6)						
13.50	D32									
14.00 - 14.40	B22				-19.36	14.00		Brown very gravelly silty fine to medium SAND with medium cobble content. Gravel is subrounded and predominately coarse.		
14.50	D33					(0.80)				
					-20.16	14.80		Very stiff dark greyish brown slightly sandy gravelly CLAY with high cobble content. Sand is fine. Gravel is fine to medium subrounded of mixed lithologies. Cobbles are subrounded		
15.50 - 15.90	B23									
15.50 - 15.78	SPT (C)			50 (7,16/50 for 135mm)						
16.50 - 16.90	B24					(2.30)				
~~17.10 - 17.13~~	~~SPT (C)~~			~~50 (25 for 30mm/50 for 0mm)~~		~~17.10~~				
17.10 - 17.13				50 (25 for 30mm/50 for 0mm)	-22.46			Very stiff dark greyish brown slightly gravelly sandy CLAY with low cobble content and occasional medium lenses of sandy clayey gravel. Sand is fine to medium. Gravel is angular to subangular fine to coarse mixed lithologies. Cobbles are subangular to subrounded of grey and white sandstone. Boulder is subangular of greenish grey sandstone.		
	97							*17.10 - 17.35m - BOULDER of strong dark grey sandstone.*		
18.60										
	95					(6.10)				
20.10								*20.10 - 20.95m - Assumed Zone of Core Loss*		
	TCR SCR RQD FI									

Remarks
Deck to bed 9.92m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
14.40	250	16.80	17.10	01:00
17.10	200			

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW02
	Coordinates: 249978.33 E 669140.44 N	**Client:** Renfrewshire Council	Sheet 3 of 6
Method: Cable Percussion+Rotary Coring		**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: SS+TA
Plant: Dando 3000+Comacchio 405	**Ground Level:** -5.36 mOD	**Dates:** 27/01/2017 - 31/01/2017	**Logger:** NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	43								Very stiff dark greyish brown slightly gravelly sandy CLAY with low cobble content and occasional medium lenses of sandy clayey gravel. Sand is fine to medium. Gravel is angular to subangular fine to coarse mixed lithologies. Cobbles are subangular to subrounded of grey and white sandstone. Boulder is subangular of greenish grey sandstone.		
21.60											
	93										
23.10						-28.56	23.20				
	100								Firm thinly laminated dark grey slightly sandy gravelly CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of dark grey thinly laminated mudstone. Cobbles are angular of thinly laminated mudstone.		
24.60							(2.45)				
	100	10	0								
				8		-31.01	25.65		Weak thinly laminated highly fractured dark grey MUDSTONE. Partially weathered: closer fracture spacing with film of greyish brown clay on joint surfaces.		
26.10									Discontinuities:		
				>20			(1.30)		1. 0 to 30 degree fractures closely spaced (10/75/130) planar, smooth film of greyish brown clay on fracture surfaces.		
	100	72	37						2. 40 to 60 degree joints closely spaced (50/185/330) planar, smooth film of greyish brown clay on fracture surfaces.		
				5		-32.31	26.95		3. 70 to 90 degree joints closely spaced (40/750/200) undulating, smooth film of greyish brown clay on joint surfaces.		
									26.70 - 26.75m - Bed of soft grey slightly sandy slightly gravelly CLAY.		
27.60				10					Weak thinly laminated dark grey MUDSTONE. Unweathered.		
				>20					Discontinuities		
									1. 0 to 20 bedding fractures medium spaced (10/240/1080) mostly planar but occasionally undulating smooth film of grey clay on some fractures.		
	100	81	73	3					2. 40 to 60 degree joints widely spaced (50/90/3530) mostly planar but occasionally undulating polished unstained.		
									3. 70 to 90 degree joints very widely spaced (100/2300/6000) mostly undulating but occasionally planar smooth film of grey clay on joint surfaces.		
29.15				2							
	100	99	93	4							
30.70											
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 9.92m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
14.40	250	16.80	17.10	01:00
17.10	200			

CAUSEWAY GEOTECH

Project No.: 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects		**Borehole No.:** **BHCW02**
Coordinates: 249978.33 E 669140.44 N	**Client:** Renfrewshire Council		Sheet 4 of 6
Method: Cable Percussion+Rotary Coring	**Client's Representative:** SWECO		**Scale:** 1:50
Plant: Dando 3000+Comacchio 405	**Ground Level:** -5.36 mOD	**Dates:** 27/01/2017 - 31/01/2017	**Driller:** SS+TA **Logger:** NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	100	96	85								
32.20				10							
	100	99	97	4							
33.75				>20							
	100	90	63	7							
35.25				5							
				>20					35.80 - 35.85m - Very weak thinly laminated dark grey MUDSTONE		
	99	98	63	8			(18.65)		35.95 - 36.05m - Very weak thinly laminated dark grey MUDSTONE		
				7							
36.75				13							
				4							
				16							
	100	96	67	4							
				>20							
38.25				10							
				3							
	95	93	87	6							
39.75											
	99	69	53								
41.25				20							
	TCR	SCR	RQD	FI							

31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0 36.5 37.0 37.5 38.0 38.5 39.0 39.5 40.0 40.5 41.0

Remarks
Deck to bed 9.92m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
14.40	250	16.80	17.10	01:00
17.10	200			

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW02
	Coordinates: 249978.33 E 669140.44 N	**Client:** Renfrewshire Council	Sheet 5 of 6
Method: Cable Percussion+Rotary Coring		**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 3000+Comacchio 405	**Ground Level:** -5.36 mOD	**Dates:** 27/01/2017 - 31/01/2017	**Driller:** SS+TA
			Logger: NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
									Weak thinly laminated dark grey MUDSTONE. Unweathered. Discontinuities 1. 0 to 20 bedding fractures medium spaced (10/240/1080) mostly planar but occasionally undulating smooth film of grey clay on some fractures. 2. 40 to 60 degree joints widely spaced (50/90/3530) mostly planar but occasionally undulating polished unstained. 3. 70 to 90 degree joints very widely spaced (100/2300/6000) mostly undulating but occasionally planar smooth film of grey clay on joint surfaces.		
	10	75	63	3							
42.75											
	98	85	76	8							
				16							
44.25											
	97	90	90	5							
				7		-50.96	45.60				
45.75									Strong (locally medium strong) thinly laminated dark grey MUDSTONE. Unweathered Discontinuities 1. 0 to 30 bedding fractures medium spaced (10/315/1350) mostly planar but occasionally undulating smooth unstained. 2. 40 to 60 degree joints widely spaced (30/1400/2750) mostly planar but occasionally undulating but occasionally planar, polished unstained. 3. 70 to 90 degree joints medium spaced (30/570/1350) mostly undulating but occasionally planar polished unstained.		
	100	99	90	5							
47.25											
				10							
	100	86	71	13							
48.75							(9.15)				
	100	94	84	7							
50.25											
	100	94	79	16							
				2							
51.75											
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 9.92m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
14.40	250	16.80	17.10	01:00
17.10	200			

CAUSEWAY GEOTECH

Project No.: 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects		**Borehole No.:** BHCW02
Coordinates: 249978.33 E 669140.44 N	**Client:** Renfrewshire Council		Sheet 6 of 6
Method: Cable Percussion+Rotary Coring	**Client's Representative:** SWECO		**Scale:** 1:50
Plant: Dando 3000+Comacchio 405	**Ground Level:** -5.36 mOD	**Dates:** 27/01/2017 - 31/01/2017	**Driller:** SS+TA
			Logger: NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	100	99	99	3					Strong (locally medium strong) thinly laminated dark grey MUDSTONE. Unweathered Discontinuities 1. 0 to 30 bedding fractures medium spaced (10/315/1350) mostly planar but occasionally undulating smooth unstained. 2. 40 to 60 degree joints widely spaced (30/1400/2750) mostly planar but occasionally undulating but occasionally planar, polished unstained. 3. 70 to 90 degree joints medium spaced (30/570/1350) mostly undulating but occasionally planar polished unstained.		
53.25											
	100	94	94								
				16							
54.75						-60.11	54.75		End of Borehole at 54.75m		
	TCR	SCR	RQD	FI							

52.0 52.5 53.0 53.5 54.0 54.5 55.0 55.5 56.0 56.5 57.0 57.5 58.0 58.5 59.0 59.5 60.0 60.5 61.0 61.5 62.0

Remarks
Deck to bed 9.92m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
14.40	250	16.80	17.10	01:00
17.10	200			

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
16-1197	Over Water Site Investigations for CWRR and GAIA projects	**BHCW03**

Coordinates:	Client:	Sheet 1 of 3
250026.00 E	Renfrewshire Council	
Method: Cable Percussion+Rotary Coring	**Client's Representative:** SWECO	**Scale:** 1:50
669086.67 N		**Driller:** JR+AH
Plant: Dando 3000+Comacchio 405	**Ground Level:** -8.13 mOD	**Dates:** 03/02/2017 - 05/02/2017
		Logger: NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.15	ES5					(0.20)		Black organic silty CLAY		
0.00 - 1.00	P15				-8.33	0.20				
						(0.30)		BOULDER		
0.50 - 0.65	ES6				-8.63	0.50		Grey very silty fine to coarse SAND with shell fragments.		
1.00 - 2.00	P16					(0.90)				
1.50 - 1.65	ES7				-9.53	1.40		Soft greyish brown slightly sandy SILT. Sand is fine to medium.		
2.00 - 2.15	ES8					(0.80)				
2.00 - 3.00	P17				-10.33	2.20		Greyish brown clayey fine to medium SAND with frequent thick laminations of soft brown clay.		
2.50 - 2.65	ES9									
3.00 - 3.15	ES10									
3.00 - 4.00	P18					(1.80)				
3.50 - 3.65	ES11									
4.00 - 4.15	ES12				-12.13	4.00		Soft brown slightly sandy silty CLAY. Sand is fine to medium.		
4.00 - 5.00	P19					(0.50)				
4.50 - 4.65	ES13				-12.63	4.50		BOULDER		
						(0.30)				
4.80 - 5.25	SPT (S) N=7			N=7 (3,2/1,2,2,2)	-12.93	4.80		Loose grey slightly silty gravelly fine to coarse SAND. Gravel is subrounded fine,.		
						(0.20)				
5.00 - 5.15	ES14				-13.13	5.00		Medium dense light brown slightly gravelly fine to medium SAND. Gravel is subangular to subrounded, fine to coarse.		
5.00 - 6.00	P20									
6.00	B1 D3					(2.30)				
6.30 - 6.75	SPT (S) N=25			N=25 (2,3/4,6,7,8)						
7.30	B2 D4				-15.43	7.30 (0.20)		BOULDER		
7.30 - 7.33	SPT (S) 50			50 (25 for 25mm/50 for 5mm)	-15.63	7.50		Dense multicoloured subangular to subrounded fine to coarse GRAVEL with high cobble content. (Low recovery) Sand is fine to coarse. Gravel is of mixed lithologies. Cobbles are subangular of mixed lithologies.		
9.00 - 9.45	30			N=26 (4,4/6,6,7,7)						
9.00										

TCR	SCR	RQD	FI

Remarks
Deck to bed 12.20m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		0.20	0.50	01:00
		4.50	4.80	01:00
		7.30	7.50	01:00

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW03
	Coordinates: 250026.00 E 669086.67 N	**Client:** Renfrewshire Council	Sheet 2 of 3
Method: Cable Percussion+Rotary Coring		**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: JR+AH
Plant: Dando 3000+Comacchio 405	**Ground Level:** -8.13 mOD	**Dates:** 03/02/2017 - 05/02/2017	**Logger:** NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50 - 10.82 10.50	10				50 (5,13/50 for 170mm)						
12.00 - 12.33 12.00	0				49 (2,4/49 for 180mm)		(7.50)		12.00-13.50m: NO RECOVERY		
13.50 - 13.74 13.50	40				50 (3,10/50 for 95mm)						
15.00 - 15.12 15.00	40				31 (19 for 75mm/31 for 50mm)	-23.13 -23.33 -23.73	15.00 (0.20) 15.20 (0.40) 15.60 (0.90)		Dense brown slightly clayey gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies. BOULDER of very strong bluish grey dolerite. Assumed zone of core loss.		
16.50 - 16.64 16.50	80				39 (11 for 75mm/39 for 60mm)	-24.63 -25.58	16.50 (0.95) 17.45 (0.55)		Dense brown clayey fine to coarse SAND. Dense brown slightly clayey gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
18.00	100					-26.13	18.00 (1.50)		Stiff greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
19.50 - 19.61 19.50	30				33 (17 for 75mm/33 for 40mm)	-27.63 -28.63	19.50 (1.00) 20.50		Assumed zone of core loss. Brown slightly clayey fine to coarse SAND.		
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 12.20m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		0.20	0.50	01:00
		4.50	4.80	01:00

CAUSEWAY GEOTECH

Project No.: 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects		**Borehole No.:** BHCW03
Coordinates: 250026.00 E 669086.67 N	**Client:** Renfrewshire Council		Sheet 3 of 3
Method: Cable Percussion+Rotary Coring	**Client's Representative:** SWECO		**Scale:** 1:50
Plant: Dando 3000+Comacchio 405	**Ground Level:** -8.13 mOD	**Dates:** 03/02/2017 - 05/02/2017	**Driller:** JR+AH
			Logger: NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
							(0.50)		Brown slightly clayey fine to coarse SAND.		
21.00						-29.13	21.00				
							(0.25)		Brown clayey gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
						-29.38	21.25		Soft dark grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded of dark grey mudstone.		
	63						(0.70)				
						-30.08	21.95		Assumed zone of core loss		
							(0.55)				
22.50				NI 10		-30.63	22.50		Weak dark grey MUDSTONE. Unweathered film of brownish grey clay on fracture surfaces. Discontinuities: 1. 0 to 30 degree bedding fractures closely spaced (10/140/800) mostly planar but occasionally undulating, smooth, film of brownish grey clay on some fracture surfaces. 2. 40 to 60 degree joints medium spaced (20/230/450) mostly planar but occasionally undulating, smooth, film of brownish grey clay on some joint surfaces. 3. 70 to 90 degree joints widely spaced (70/750/125) mostly undulating but occasionally planar, smooth, film of brownish clay on some joint surfaces.		
				>20							
	96	67	55	7							
24.00							(3.00)				
				>20					*22.70-22.80m: Weak highly fractured dark grey MUDSTONE. (Recovered as gravel)*		
	95	76	36	18					*Soft dark grey slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of dark grey mudstone.*		
				10							
25.50				>20		-33.63	25.50		End of Borehole at 25.50m		
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 12.20m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		0.20	0.50	01:00
		4.50	4.80	01:00

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
16-1197	Over Water Site Investigations for CWRR and GAIA projects	**BHCW04**
Coordinates: 250076.80 E 669049.49 N	**Client:** Renfrewshire Council	Sheet 1 of 5
Method: Cable Percussion+Rotary Drilling	**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 4000+Commachio 405	**Ground Level:** -7.38 mOD	**Dates:** 05/02/2017 - 08/02/2017
		Driller: RW +RW
		Logger: NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
0.00 - 0.15	ES1					(0.20)		Very soft slightly organic clayey SILT.
0.00 - 1.00	P47				-7.58	0.20 (0.30)		Grey slightly silty fine to medium SAND.
0.50	B12				-7.88	0.50		Soft light brown silty CLAY.
	D13							
	ES2					(0.50)		
1.00 - 1.15	ES3				-8.38	1.00		Soft greyish brown fissured (laminated) CLAY
1.00 - 2.00	P48							
1.50	ES4					(0.90)		
1.60	B14							
	D15							
2.00 - 2.50	ES5				-9.28	1.90		Soft greyish brown fissured (laminated) silty CLAY.
2.00 - 3.00	P49							
2.50	ES6					(0.85)		
2.60 - 3.05	SPT (S)			N=42				
	N=42			(2,2/7,10,13,12)	-10.13	2.75		Dense brown sandy slightly silty GRAVEL with very thin beds of grey laminated silty CLAY. Sand is fine to coarse.
3.00	B16							
	D17							
3.00 - 3.15	ES7							
3.00 - 4.00	P50							
3.50 - 3.95	ES8					(1.75)		
4.00 - 4.50	ES9							
4.00 - 5.00	P51							
4.50	B18				-11.88	4.50		Loose grey slightly silty very gravelly fine to coarse SAND. Gravel is subrounded fine to medium.
	D19							
4.50 - 4.55	ES11							
4.60 - 5.05	SPT (C)			N=10 (1,1/1,1,4,4)				
	N=10							
5.00 - 5.50	ES10					(1.40)		
5.00 - 6.00	P52							
5.60	B20							
	D21							
6.10 - 6.55	SPT (C)			N=0 (1,0/0,0,0,0)	-13.28	5.90		Very loose brown very silty fine to coarse SAND.
6.60	B22							
	D23							
7.60	B24					(3.20)		
	D25							
7.60 - 8.05	SPT (C)			N=0 (1,0/0,0,0,0)				
8.60	B26							
	D27							
9.10 - 9.40	SPT (S)			50 (6,11/50 for 150mm)	-16.48	9.10		Medium dense (locally dense) silty fine to medium SAND.
9.60	B28							
	D29							

Water | Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
Deck to bed 11.40m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		19.60	19.60	01:00

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW04
	Coordinates: 250076.80 E	**Client:** Renfrewshire Council	Sheet 2 of 5
Method: Cable Percussion+Rotary Drilling	669049.49 N	**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: RW +RW
Plant: Dando 4000+Commachio 405	**Ground Level:** -7.38 mOD	**Dates:** 05/02/2017 - 08/02/2017	**Logger:** NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.60	B30 D31							Medium dense (locally dense) silty fine to medium SAND.		
10.60 - 11.05	SPT (S) N=24			N=24 (4,7/7,7,4,6)						
11.60	B32 D33									
12.10 - 12.55	SPT (S) N=25			N=25 (2,1/3,4,8,10)						
12.60	B34 D35									
						(7.40)				
13.60	B36 D37									
13.60 - 14.05	SPT (S) N=23			N=23 (2,4/5,6,6,6)						
14.60	B38 D39									
15.10 - 15.55	SPT (S) N=25			N=25 (5,5/5,5,7,8)						
15.60	B40 D41									
16.60	B42 D43				-23.88	16.50 (0.30)		Brownish grey slightly silty gravelly fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse.		
16.60 - 16.94	SPT (S)			50 (5,8/50 for 195mm)	-24.18	16.80		Dense brown very sandy silty fine to coarse angular to subrounded GRAVEL with low cobble content.		
17.60	B44 D45									
						(2.80)				
19.60	B46			B46	-26.98	19.60		Weak to medium strong thinly laminated dark grey MUDSTONE closely spaced very thin beds of SILTSTONE and occasional pyrite mineralisation. Unweathered. Discontinuities: 1. 0-30 degree bedding fractures, closely spaced (10/175/1050), mostly planar but occasionally undulating, smooth with film of grey clay on some fracture surfaces.		
	100	94	67	8 / 2						
	TCR	SCR	RQD	FI						

Remarks
Deck to bed 11.40m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		19.60	19.60	01:00

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW04
	Coordinates: 250076.80 E 669049.49 N	**Client:** Renfrewshire Council	Sheet 3 of 5
Method: Cable Percussion+Rotary Drilling		**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: RW +RW
Plant: Dando 4000+Commachio 405	**Ground Level:** -7.38 mOD	**Dates:** 05/02/2017 - 08/02/2017	**Logger:** NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
									2. 40-60 degree joints, widely spaced (60/1360/6500), mostly planar but occasionally undulating, smooth.		
20.85									*20.45 to 20.80m' Very strong grey MUDSTONE with 2 to 10mm sized fossils.*		
	99	75	25	18							
				3							
22.45											
	100	89	53	15					*22.80 to 22.82m; 2cm pocket of vitreous dark grey LIMESTONE.*		
									22.9 to 23.18m; 25cm pocket of vitreous dark grey LIGNITE.		
									23.45 to 27.40m; Medium strong thinly laminated dark grey MUDSTONE interbedded with very thinly spaced 20 to 300mm thick siltstone beds		
23.95											
	100	100	100	3							
25.45				4							
	100	99	95	4							
26.95											
	100	93	67	4					*22.74 to 22.75m; 1cm pocket of vitreous dark grey LIGNITE*		
				15							
				20					*28.20 to 28.45m; 25cm pocket of vitreous dark grey LIGNITE.*		
28.45									*28.47 to 28.50m; 3cm pocket of very soft grey CLAY, Gravel is subangular to subrounded fine to medium of MUDSTONE.*		
	100	91	73	8							
				4							
29.95				10							
	100	96	69	3							
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 11.40m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		19.60	19.60	01:00

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW04
	Coordinates: 250076.80 E 669049.49 N	**Client:** Renfrewshire Council	Sheet 4 of 5
Method: Cable Percussion+Rotary Drilling		**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: RW +RW
Plant: Dando 4000+Commachio 405	**Ground Level:** -7.38 mOD	**Dates:** 05/02/2017 - 08/02/2017	**Logger:** NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
31.45				14							
	99	93	73	2							
32.95				7							
	100	96	92								
34.45											
	100	96	75								
35.95				18							
	97	95	75	3			(29.85)				
37.45				19					*37.75 to 37.90m; 15cm pocket of vitreous dark grey LIGNITE.*		
	100	86	61	2					*37.98 TO 38.07m; 9cm pocket of vitreous dark grey LIGNITE.*		
38.95				>20							
				>20							
	100	96	67	2							
40.45				7							
	100	95	90								
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 11.40m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		19.60	19.60	01:00

CAUSEWAY GEOTECH

Project No.: 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects		**Borehole No.:** BHCW04
Coordinates: 250076.80 E 669049.49 N	**Client:** Renfrewshire Council		Sheet 5 of 5
Method: Cable Percussion+Rotary Drilling	**Client's Representative:** SWECO		**Scale:** 1:50
Plant: Dando 4000+Commachio 405	**Ground Level:** -7.38 mOD	**Dates:** 05/02/2017 - 08/02/2017	**Driller:** RW +RW
			Logger: NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
				20					Weak to medium strong thinly laminated dark grey MUDSTONE closely spaced very thin beds of SILTSTONE and occasional pyrite mineralisation. Unweathered. Discontinuities: 1. 0-30 degree bedding fractures, closely spaced (10/175/1050), mostly planar but occasionally undulating, smooth with film of grey clay on some fracture surfaces. 2. 40-60 degree joints, widely spaced (60/1360/6500), mostly planar but occasionally undulating, smooth.		
				16							
41.95				16							
				2							
	100	96	83								
43.45				11							
	100	98	70								
				3							
				4							
44.95				14							
	100	100	62								
				2							
				5							
46.45				17							
	99	89	70								
				8							
				3							
47.95				20							
				3							
				12							
	100	99	99								
				2							
49.45						-56.83	49.45		End of Borehole at 49.45m		
	TCR	SCR	RQD	FI							

41.5 42.0 42.5 43.0 43.5 44.0 44.5 45.0 45.5 46.0 46.5 47.0 47.5 48.0 48.5 49.0 49.5 50.0 50.5 51.0 51.5

Remarks
Deck to bed 11.40m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		19.60	19.60	01:00

CAUSEWAY GEOTECH

Project No.: 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW05
Coordinates: 250131.52 E 669019.46 N	**Client:** Renfrewshire Council	Sheet 1 of 2
Method: Cable Percussion	**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 4000	**Ground Level:** -6.75 mOD	**Dates:** 13/02/2017 - 14/02/2017	**Driller:** AH
			Logger: NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.15	ES1							Soft dark grey sandy silty CLAY. Sand is fine to medium.		
0.00 - 1.00	P32									
0.50 - 0.65	ES2					(1.30)				
1.00 - 1.15	ES3									
1.00 - 2.00	P33									
					-8.05	1.30		Loose greyish brown silty fine to coarse SAND.		
1.50 - 1.65	ES4									
2.00 - 2.15	ES5									
2.00 - 3.00	P34									
2.50 - 2.65	ES31					(2.20)				
3.00 - 3.15	ES6									
3.00 - 4.00	P35									
3.50 - 3.65	ES7				-10.25	3.50		Brown sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded to subangular of mixed lithologies.		
4.00 - 4.15	ES8					(0.80)				
4.00 - 5.00	P36									
					-11.05	4.30		Greyish brown very gravelly very clayey fine to coarse SAND with low cobble content. Gravel is subrounded fine to coarse of mixed lithologies.		
4.80 - 5.20	B9									
5.80 - 6.20	B10					(2.20)				
6.50 - 6.95	SPT (S) N=31			N=31 (4,6/7,8,7,9)	-13.25	6.50		Dense light brown gravelly very silty fine to coarse SAND with medium cobble content. Gravel is subangular to subrounded of mixed lithologies.		
7.00	B11 D12									
7.50 - 7.95	SPT (S) N=42			N=42 (8,9/12,10,10,10)		(2.00)				
8.00	B13 D14									
					-15.25	8.50		Dense light brown silty fine to medium SAND.		
9.00	B15 D16									
9.00 - 9.45	SPT (S) N=40			N=40 (7,7/9,10,11,10)						
~~10.00~~	~~B17~~									

Remarks
Deck to bed 11.20m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
17.60	200	15.00	17.60	01:00

CAUSEWAY GEOTECH

Project No.: 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW05
Coordinates: 250131.52 E 669019.46 N	**Client:** Renfrewshire Council	Sheet 2 of 2
Method: Cable Percussion	**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 4000	**Ground Level:** -6.75 mOD	**Dates:** 13/02/2017 - 14/02/2017	**Driller:** AH / **Logger:** NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
	D18							Dense light brown silty fine to medium SAND.
11.00	B19 D20							
12.00	B21 D22							
12.00 - 12.45	SPT (S) N=33			N=33 (4,7/7,8,9,9)		(6.00)		
13.00	B23 D24							
13.50 - 13.95	SPT (S) N=33			N=33 (3,4/5,6,10,12)				
14.00	B25 D26							
					-21.25	14.50		Dense light brown sandy slightly silty subangular fine to coarse GRAVEL. Sand is fine to coarse.
15.00	B27 D28							
15.00 - 15.30	SPT (S)			50 (18,25/50 for 155mm)		(1.50)		
16.00	B29				-22.75	16.00		Dense greyish brown sandy angular to subrounded fine to coarse GRAVEL of mixed lithologies with high cobble content. Sand is fine to coarse.
						(1.50)		
17.50	B30				-24.25	17.50		
17.50 - 17.93	SPT (C)			N=50 (3,1/50 for 285mm)	-24.35	17.60		Very stiff dark grey sandy gravelly CLAY with high cobble content, Gravel is subangular to subrounded of mixed lithologies. Sand is fine to coarse.
								End of Borehole at 17.60m

Remarks
Deck to bed 11.20m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
17.60	200	15.00	17.60	01:00

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
16-1197	Over Water Site Investigations for CWRR and GAIA projects	**BHCW06**
Coordinates: 250192.14 E 668981.99 N	**Client:** Renfrewshire Council	Sheet 1 of 4
Method: Cable Percussion +Rotary Drilling	**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 4000+Commachio 405	**Ground Level:** -4.94 mOD	**Dates:** 08/02/2017 - 10/02/2017
		Driller: SS+AH
		Logger: NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
0.00 - 0.15	ES1							Very soft greyish brown slightly sandy CLAY. Sand is fine to coarse.
0.00 - 1.00	P41							
0.50 - 0.65	ES2							
0.50 - 0.80	B11							
	D12							
1.00 - 1.15	ES3					(2.05)		
1.00 - 2.00	P42							
1.50 - 1.80	B13							
	D14							
1.90 - 2.35	SPT (S)			N=1 (1,0/0,1,0,0)				
	N=1				-6.99	2.05		
2.00 - 2.15	ES4							Very loose brownish grey slightly silty fine SAND.
2.00 - 3.00	P43					(0.55)		
2.50 - 2.60	D16							
2.50 - 2.65	ES5				-7.54	2.60		
2.50 - 2.80	B15							Medium dense brownish grey clayey fine to medium SAND.
3.00 - 3.15	ES6							
3.00 - 4.00	P44							
3.50 - 3.60	D18							
3.50 - 3.65	ES7							
3.50 - 3.80	B17							
3.70 - 4.15	SPT (S)			N=16 (2,2/3,3,4,6)				
	N=16					(2.90)		
4.00 - 4.15	ES8							
4.00 - 5.00	P45							
4.50 - 4.60	D20							
4.50 - 4.65	ES9							
4.50 - 4.80	B19							
4.70 - 5.15	SPT (S)			N=12 (2,2/2,3,3,4)				
	N=12							
5.00 - 5.50	ES10							
5.00 - 6.00	P46				-10.44	5.50		
5.50 - 5.60	D22							Loose brownish grey clayey fine to medium SAND.
5.50 - 5.80	B21							
5.70 - 6.15	SPT (S)			N=2 (1,2/1,1,0,0)				
	N=2							
6.50 - 6.60	D24							
6.50 - 6.80	B23					(2.50)		
7.50 - 7.60	D26							
7.50 - 7.80	B25							
7.80 - 8.25	SPT (S)			N=62				
	N=62			(5,11/12,22,15,13)	-12.94	8.00		
8.50 - 8.60	D28							Medium dense greyish brown slightly silty sandy fine to coarse angular to subrounded GRAVEL of mixed lithologies with high cobble content of mixed lithologies. Sand is fine to coarse.
8.50 - 8.80	B27							
9.30 - 9.75	SPT (C)			N=17 (3,3/4,3,5,5)		(2.10)		
	N=17							
9.50 - 9.60	D30							
9.50 - 9.80	B29							
					-15.04	10.10		Medium dense brownish grey silty fine to coarse SAND.

Water | Backfill

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
Deck to bed 9.50m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
15.30	200	15.30	15.90	01:00

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
16-1197	Over Water Site Investigations for CWRR and GAIA projects	BHCW06
Coordinates: 250192.14 E 668981.99 N	**Client:** Renfrewshire Council	Sheet 2 of 4
Method: Cable Percussion +Rotary Drilling	**Client's Representative:** SWECO	**Scale:** 1:50
Plant: Dando 4000+Commachio 405	**Ground Level:** -4.94 mOD	**Dates:** 08/02/2017 - 10/02/2017
		Driller: SS+AH
		Logger: NH+AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50 - 10.80	B31							Medium dense brownish grey silty fine to coarse SAND.		
10.80 - 11.25	SPT (C) N=20			N=20 (5,5/6,5,5,4)						
11.50 - 11.60	D33									
11.50 - 11.80	B32									
12.30 - 12.75	SPT (C) N=16			N=16 (5,5/4,3,4,5)						
12.50 - 12.60	D35					(4.50)				
12.50 - 12.80	B34									
13.50 - 13.60	D37									
13.50 - 13.80	B36									
14.50 - 14.60	D39									
14.50 - 14.80	B38				-19.54	14.60				
15.30	B40					(1.30)		Firm to stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
			NI		-20.84	(0.55)		Weak thinly laminated highly fractured non-intact dark grey MUDTONE. Unweathered.		
	99	33	9		-21.39	16.45		Discontinuities: 1.0 to 30 degree bedding fractures probably very closely unstained spaced planar smooth. 2. 40 to 60 degree joints probably very closely spaced planar smooth unstained. 3. 70 to 90 degree joints probably very closely spaced undulating and planar smooth unstained.		
			>20							
			5							
17.40								Medium strong (locally strong) thinly laminated dark grey MUDSTONE. Unweathered. Film of grey clay on some fracture surfaces. Discontinuities 1. 0 to 30 degree bedding fractures closely spaced (10/135/450) mostly planar but occasional undulating polished, film of grey clay on some fracture surfaces. 2. 40 to 60 degree joints medium spaced (10/500/2200) mostly planar but occasional undulating polished film of grey clay on some joint surfaces. 3. 70 to 90 degree joints widely spaced (20/760/2950) mostly undulating but occasional planar polished unstained.		
	99	76	41							
			18							
18.90								*17.25 to 17.40m - Strong thinly laminated dark grey MUDSTONE* *17.65 to 17.80m - Strong thinly laminated dark grey MUDSTONE*		
			>20							
			10					*19.20 to 19.40m - Strong thinly laminated dark grey MUDSTONE*		
			~~>20~~							
	100	83	50							
			13							
			7							
			~~>20~~					*20.20 to 20.50m - Strong thinly laminated dark grey MUDSTONE*		
20.40										
			7							
	TCR	SCR	RQD	FI						

Remarks
Deck to bed 9.50m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
15.30	200	15.30	15.90	01:00

CAUSEWAY GEOTECH	**Project No.:** 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects	**Borehole No.:** BHCW06
	Coordinates: 250192.14 E 668981.99 N	**Client:** Renfrewshire Council	Sheet 3 of 4
Method: Cable Percussion +Rotary Drilling		**Client's Representative:** SWECO	**Scale:** 1:50
			Driller: SS+AH
Plant: Dando 4000+Commachio 405	**Ground Level:** -4.94 mOD	**Dates:** 08/02/2017 - 10/02/2017	**Logger:** NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	100	79	51	>20							
				5							
				20							
21.90	100	91	61	10							
23.40				16							
	100	99	81								
				16							
				>20							
24.90				14							
	100	96	92	4							
				3					25.50 to 26.40m - Strong thinly laminated dark grey MUDSTONE		
							(20.45)				
26.40	100	95	49	5							
				10							
27.90	100	99	82	3							
29.40	100	91	71								
30.90				>20							
	TCR	SCR	RQD	FI							

Remarks
Deck to bed 9.50m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
15.30	200	15.30	15.90	01:00

CAUSEWAY GEOTECH

Project No.: 16-1197	**Project Name:** Over Water Site Investigations for CWRR and GAIA projects		**Borehole No.:** BHCW06
Coordinates: 250192.14 E 668981.99 N	**Client:** Renfrewshire Council		Sheet 4 of 4
Method: Cable Percussion +Rotary Drilling	**Client's Representative:** SWECO		**Scale:** 1:50
Plant: Dando 4000+Commachio 405	**Ground Level:** -4.94 mOD	**Dates:** 08/02/2017 - 10/02/2017	**Driller:** SS+AH
			Logger: NH+AOK

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	98	82	76	4					Medium strong (locally strong) thinly laminated dark grey MUDSTONE. Unweathered. Film of grey clay on some fracture surfaces. Discontinuities 1. 0 to 30 degree bedding fractures closely spaced (10/135/450) mostly planar but occasional undulating polished, film of grey clay on some fracture surfaces. 2. 40 to 60 degree joints medium spaced (10/500/2200) mostly planar but occasional undulating polished film of grey clay on some joint surfaces. 3. 70 to 90 degree joints widely spaced (20/760/2950) mostly undulating but occasional planar polished unstained.		
32.40											
	100	77	65	~~16~~ 5							
33.90				15							
	100	89	71	5 16 4 ~~20~~							
35.40											
	100	90	82	9							
				3							
				10							
36.90				>20		-41.84	36.90		End of Borehole at 36.90m		

TCR	SCR	RQD	FI

Remarks
Deck to bed 9.50m

Borehole terminated on the instruction of the Engineer

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
15.30	200	15.30	15.90	01:00

Appendices

Appendix E – Laboratory Analysis Results

117086/DEP/170509 Issue 1

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Amended Report

Report No.:	17-02862-3		
Initial Date of Issue:	10-Feb-2017	**Date of Re-Issue:**	27-Apr-2017
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Andy Garne Brian Mooney Colm Hurley Darren O'Mahony John Duggan Lucy Peaker Mark Nyhan Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Stephen Franey Stephen Watson		
Project	16-1197 City Deals over Water GI - Rothesay Dock		
Quotation No.:	Q16-07849	**Date Received:**	03-Feb-2017
Order No.:		**Date Instructed:**	06-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	35	**Results Due:**	24-Mar-2017
Date Approved:	27-Apr-2017		
Approved By:			

Details:

Martin Dyer, Laboratory Manager
Robert Monk, Technical Development Chemist

Chemtest
The right chemistry to deliver results

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 16-1197 City Deals over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-02862	17-02862	17-02862	17-02862
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	408439	408441	408443	408447
Order No.:					Client Sample Ref.:	BHCW01	BHCW01	BHCW01	BHCW01
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.50	2.50	4.50
					Bottom Depth (m):	0.65	1.65	2.65	4.65
					Date Sampled:	02-Feb-2017	02-Feb-2017	02-Feb-2017	02-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	55	59	55	11
pH	M	2010		N/A	8.2	8.1	8.2	7.4
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40				2.8
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	0.60	0.60	1.0
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	0.60	0.60	1.1
Arsenic	M	2450	mg/kg	1.0	16	25	29	9.1
Boron	N	2450	mg/kg	0.40	23	29	37	
Cadmium	M	2450	mg/kg	0.10	0.96	1.6	2.3	0.47
Chromium	M	2450	mg/kg	1.0	170	280	410	110
Copper	M	2450	mg/kg	0.50	82	140	200	54
Mercury	M	2450	mg/kg	0.10	0.56	1.0	1.2	0.28
Nickel	M	2450	mg/kg	0.50	54	67	85	28
Lead	M	2450	mg/kg	0.50	130	230	300	80
Selenium	M	2450	mg/kg	0.20	0.52	0.89	0.62	< 0.20
Vanadium	U	2450	mg/kg	5.0	60	76	90	33
Zinc	M	2450	mg/kg	0.50	320	520	670	190
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	7.8	8.5	9.8	5.5
Total Organic Carbon	M	2625	%	0.20	4.5	4.9	5.7	
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	0.13	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	1.3	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	2.5	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	14	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	1.1	< 0.10	< 0.10	< 0.10

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 16-1197 City Deals over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-02862	17-02862	17-02862	17-02862
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	408439	408441	408443	408447
Order No.:					Client Sample Ref.:	BHCW01	BHCW01	BHCW01	BHCW01
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.50	2.50	4.50
					Bottom Depth (m):	0.65	1.65	2.65	4.65
					Date Sampled:	02-Feb-2017	02-Feb-2017	02-Feb-2017	02-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	2.2	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	4.8	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	8.1	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	22	< 2.0	< 2.0	< 2.0
Naphthalene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	0.25
Anthracene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	0.010
Fluoranthene	N	2700	mg/kg	0.010	< 0.010	0.88	3.5	0.32
Pyrene	N	2700	mg/kg	0.010	1.5	1.3	1.5	0.23
Benzo[a]anthracene	N	2700	mg/kg	0.010	0.58	0.76	1.1	< 0.010
Chrysene	N	2700	mg/kg	0.010	1.6	1.1	0.98	< 0.010
Benzo[b]fluoranthene	N	2700	mg/kg	0.010	1.3	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	2700	mg/kg	0.010	0.35	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	2700	mg/kg	0.010	0.82	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.010	0.37	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.010	0.98	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	2700	mg/kg	0.010	0.85	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	2700	mg/kg	0.20	8.4	4.0	7.1	0.81
Tributyl Tin	N	2730	µg/kg	10	< 10	< 10	< 10	< 10
Benzene	M	2760	µg/kg	1.0	< 1.0	2.5	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 16-1197 City Deals over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-02862	17-02862	17-02862	17-02862
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	408439	408441	408443	408447
Order No.:					Client Sample Ref.:	BHCW01	BHCW01	BHCW01	BHCW01
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.50	2.50	4.50
					Bottom Depth (m):	0.65	1.65	2.65	4.65
					Date Sampled:	02-Feb-2017	02-Feb-2017	02-Feb-2017	02-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30
PSA	SN			N/A	See Attached	See Attached	See Attached	See Attached

Results - Single Stage WAC

Project: 16-1197 City Deals over Water GI - Rothesay Dock

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-02862						
Chemtest Sample ID:	408441						
Sample Ref:	BHCW01						
Sample ID:							
Top Depth(m):	1.50						
Bottom Depth(m):	1.65						
Sampling Date:	02-Feb-2017						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	4.9	3	5	6
Loss On Ignition	2610	M	%	12	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	4.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.010	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.0088	0.088	0.5	2	25
Barium	1450	U	0.023	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.031	0.31	0.5	10	70
Copper	1450	U	0.0094	0.094	2	50	100
Mercury	1450	U	0.0057	0.057	0.01	0.2	2
Molybdenum	1450	U	0.025	0.25	0.5	10	30
Nickel	1450	U	0.0026	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0063	0.063	0.06	0.7	5
Selenium	1450	U	0.026	0.26	0.1	0.5	7
Zinc	1450	U	0.0079	< 0.50	4	50	200
Chloride	1220	U	1100	11000	800	15000	25000
Fluoride	1220	U	2.5	25	10	150	500
Sulphate	1220	U	66	660	1000	20000	50000
Total Dissolved Solids	1020	N	2300	23000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	55	550	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.090
Moisture (%)	59

Waste Acceptance Criteria

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

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2730	Organo-Leads	Organo-Leads	Solvent extraction / GCMS detection

Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
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A - Date of sampling not supplied
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Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
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If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Amended Report

Report No.:	17-02272-5		
Initial Date of Issue:	06-Feb-2017	**Date of Re-Issue:**	27-Apr-2017
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Andy Garne Brian Mooney Colm Hurley Darren O'Mahony Lucy Peaker Mark Nyhan Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Stephen Franey Stephen Watson		
Project	16-1197 City Deals Over Water GI - Rothesay Dock		
Quotation No.:	Q16-07849	**Date Received:**	31-Jan-2017
Order No.:		**Date Instructed:**	31-Jan-2017
No. of Samples:	4		
Turnaround (Wkdays):	39	**Results Due:**	24-Mar-2017
Date Approved:	27-Apr-2017		
Approved By:	[redacted]		
Details:	Martin Dyer, Laboratory Manager Robert Monk, Technical Development Chemist		

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-02272	17-02272	17-02272	17-02272
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	405570	405572	405576	405579
					Client Sample ID.:	BHCW02	BHCW02	BHCW02	BHCW02
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.0	1.0	3.0	5.0
					Bottom Depth (m):	0.15	1.15	3.15	5.15
					Date Sampled:	28-Jan-2017	28-Jan-2017	28-Jan-2017	28-Jan-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	58	55	54	23
pH	M	2010		N/A	7.8	7.9	8.0	7.7
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	1.0	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	1.0	< 0.50
Arsenic	M	2450	mg/kg	1.0	17	19	17	6.2
Boron	N	2450	mg/kg	0.40	11	13	11	11
Cadmium	M	2450	mg/kg	0.10	1.1	1.3	1.5	< 0.10
Chromium	M	2450	mg/kg	1.0	220	300	280	46
Copper	M	2450	mg/kg	0.50	92	120	130	27
Mercury	M	2450	mg/kg	0.10	0.70	0.83	0.68	< 0.10
Nickel	M	2450	mg/kg	0.50	53	54	53	49
Lead	M	2450	mg/kg	0.50	160	210	200	19
Selenium	M	2450	mg/kg	0.20	0.66	0.80	0.82	< 0.20
Vanadium	U	2450	mg/kg	5.0	64	60	60	47
Zinc	M	2450	mg/kg	0.50	490	380	400	84
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	7.8	10	9.7	2.2
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	8.3	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	26	< 0.10	< 0.10	< 0.10

Chemtest
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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd				**Chemtest Job No.:**	17-02272	17-02272	17-02272	17-02272
Quotation No.: Q16-07849				**Chemtest Sample ID.:**	405570	405572	405576	405579
				Client Sample ID.:	BHCW02	BHCW02	BHCW02	BHCW02
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.0	1.0	3.0	5.0
				Bottom Depth (m):	0.15	1.15	3.15	5.15
				Date Sampled:	28-Jan-2017	28-Jan-2017	28-Jan-2017	28-Jan-2017
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	34	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	34	< 2.0	< 2.0	< 2.0
Naphthalene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	2700	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	2700	mg/kg	0.010	0.84	1.2	0.84	< 0.010
Pyrene	N	2700	mg/kg	0.010	1.2	1.5	1.6	< 0.010
Benzo[a]anthracene	N	2700	mg/kg	0.010	0.83	0.76	1.5	< 0.010
Chrysene	N	2700	mg/kg	0.010	2.0	2.1	2.1	< 0.010
Benzo[b]fluoranthene	N	2700	mg/kg	0.010	0.78	0.70	1.6	< 0.010
Benzo[k]fluoranthene	N	2700	mg/kg	0.010	0.46	0.40	0.76	< 0.010
Benzo[a]pyrene	N	2700	mg/kg	0.010	0.78	0.70	1.1	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.010	1.1	2.2	0.95	< 0.010
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.010	0.73	1.2	0.34	< 0.010
Benzo[g,h,i]perylene	N	2700	mg/kg	0.010	0.52	0.50	1.5	< 0.010
Total Of 16 PAH's	N	2700	mg/kg	0.20	9.2	11	12	< 0.20
Tributyl Tin	N	2730	µg/kg	10	< 10	< 10	< 10	< 10
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30
PSA	SN			N/A	See Attached	See Attached	See Attached	See Attached

Results - Single Stage WAC

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-02272						
Chemtest Sample ID:	405572						
Sample Ref:							
Sample ID:	BHCW02				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Top Depth(m):	1.0						
Bottom Depth(m):	1.15						
Sampling Date:	28-Jan-2017						
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	5.8	3	5	6
Loss On Ignition	2610	M	%	13	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	11	100	--	--
pH	2010	M		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.080	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.0072	0.072	0.5	2	25
Barium	1450	U	0.037	< 0.50	20	100	300
Cadmium	1450	U	0.00011	< 0.010	0.04	1	5
Chromium	1450	U	0.052	0.52	0.5	10	70
Copper	1450	U	0.0030	< 0.050	2	50	100
Mercury	1450	U	0.00052	0.0052	0.01	0.2	2
Molybdenum	1450	U	0.034	0.34	0.5	10	30
Nickel	1450	U	0.0036	< 0.050	0.4	10	40
Lead	1450	U	0.0012	0.012	0.5	10	50
Antimony	1450	U	0.014	0.14	0.06	0.7	5
Selenium	1450	U	0.039	0.39	0.1	0.5	7
Zinc	1450	U	0.0040	< 0.50	4	50	200
Chloride	1220	U	860	8600	800	15000	25000
Fluoride	1220	U	0.55	5.5	10	150	500
Sulphate	1220	U	17	170	1000	20000	50000
Total Dissolved Solids	1020	N	2100	21000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	82	820	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.090
Moisture (%)	55

Waste Acceptance Criteria

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

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2730	Organo-Leads	Organo-Leads	Solvent extraction / GCMS detection

Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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Email: info@chemtest.co.uk

Final Report

Report No.:	17-03222-1
Initial Date of Issue:	27-Apr-2017
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Andy Garne Brian Mooney Colm Hurley Darren O'Mahony Lucy Peaker Mark Nyhan Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Stephen Franey Stephen Watson
Project	16-1197 City Deals Over Water GI - Rothesay Dock

Quotation No.:	Q16-07849	**Date Received:**	07-Feb-2017
Order No.:		**Date Instructed:**	13-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	30	**Results Due:**	24-Mar-2017
Date Approved:	27-Apr-2017		

Approved By:

[redacted]

Details: Martin Dyer, Laboratory Manager

Chemtest
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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03222	17-03222	17-03222	17-03222
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	410215	410217	410219	410222
Order No.:					Client Sample Ref.:	BHCW03	BHCW03	BHCW03	BHCW03
					Client Sample ID.:	ES1	ES4	ES6	ES9
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.50	2.50	4.00
					Bottom Depth (m):	0.15	1.65	2.65	4.15
					Date Sampled:	03-Feb-2017	03-Feb-2017	03-Feb-2017	03-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	20	23	19	22
pH	M	2010		N/A	8.1	8.0	8.0	8.7
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40				0.49
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	16	< 1.0	1.2	5.0
Boron	N	2450	mg/kg	0.40	23	< 0.40	7.5	
Cadmium	M	2450	mg/kg	0.10	0.35	0.27	0.37	< 0.10
Chromium	M	2450	mg/kg	1.0	32	6.4	28	35
Copper	M	2450	mg/kg	0.50	26	5.4	23	22
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	0.18	< 0.10
Nickel	M	2450	mg/kg	0.50	20	5.4	39	46
Lead	M	2450	mg/kg	0.50	610	28	14	13
Selenium	M	2450	mg/kg	0.20	0.22	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	46	< 5.0	36	47
Zinc	M	2450	mg/kg	0.50	160	22	67	65
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	4.0	2.2	1.3	1.6
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0

Chemtest
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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03222	17-03222	17-03222	17-03222
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	410215	410217	410219	410222
Order No.:					Client Sample Ref.:	BHCW03	BHCW03	BHCW03	BHCW03
					Client Sample ID.:	ES1	ES4	ES6	ES9
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.50	2.50	4.00
					Bottom Depth (m):	0.15	1.65	2.65	4.15
					Date Sampled:	03-Feb-2017	03-Feb-2017	03-Feb-2017	03-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	
Naphthalene	N	2700	mg/kg	0.010			0.31	< 0.010	
Naphthalene	M	2700	mg/kg	0.10	0.40	0.43			
Acenaphthylene	N	2700	mg/kg	0.010			0.46	< 0.010	
Acenaphthylene	M	2700	mg/kg	0.10	0.80	0.27			
Acenaphthene	N	2700	mg/kg	0.010			0.12	< 0.010	
Acenaphthene	M	2700	mg/kg	0.10	0.24	0.25			
Fluorene	N	2700	mg/kg	0.010			0.11	< 0.010	
Fluorene	M	2700	mg/kg	0.10	0.22	0.23			
Phenanthrene	N	2700	mg/kg	0.010			0.35	< 0.010	
Phenanthrene	M	2700	mg/kg	0.10	0.70	0.53			
Anthracene	N	2700	mg/kg	0.010			0.060	< 0.010	
Anthracene	M	2700	mg/kg	0.10	< 0.10	0.12			
Fluoranthene	N	2700	mg/kg	0.010			0.17	< 0.010	
Fluoranthene	M	2700	mg/kg	0.10	0.35	0.29			
Pyrene	N	2700	mg/kg	0.010			0.16	< 0.010	
Pyrene	M	2700	mg/kg	0.10	0.36	0.24			
Benzo[a]anthracene	N	2700	mg/kg	0.010			< 0.010	< 0.010	
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10			
Chrysene	N	2700	mg/kg	0.010			< 0.010	< 0.010	
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10			
Benzo[b]fluoranthene	N	2700	mg/kg	0.010			< 0.010	< 0.010	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10			
Benzo[k]fluoranthene	N	2700	mg/kg	0.010			< 0.010	< 0.010	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10			
Benzo[a]pyrene	N	2700	mg/kg	0.010			< 0.010	< 0.010	
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10			
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.010			< 0.010	< 0.010	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10			
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.010			< 0.010	< 0.010	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10			
Benzo[g,h,i]perylene	N	2700	mg/kg	0.010			< 0.010	< 0.010	

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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03222	17-03222	17-03222	17-03222
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	410215	410217	410219	410222
Order No.:					Client Sample Ref.:	BHCW03	BHCW03	BHCW03	BHCW03
					Client Sample ID.:	ES1	ES4	ES6	ES9
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.50	2.50	4.00
					Bottom Depth (m):	0.15	1.65	2.65	4.15
					Date Sampled:	03-Feb-2017	03-Feb-2017	03-Feb-2017	03-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Total Of 16 PAH's	N	2700	mg/kg	0.20				1.7	< 0.20
Total Of 16 PAH's	M	2700	mg/kg	2.0		3.1	2.4		
Tributyl Tin	N	2730	µg/kg	10		< 10	< 10	< 10	< 10
Benzene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30	< 0.30
PSA	SN			N/A		See Attached	See Attached	See Attached	See Attached

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Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2730	Organo-Leads	Organo-Leads	Solvent extraction / GCMS detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
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Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	17-03210-1
Initial Date of Issue:	27-Apr-2017
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Andy Garne Brian Mooney Colm Hurley Darren O'Mahony John Duggan Lucy Peaker Mark Nyhan Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Stephen Franey Stephen Watson
Project	16-1197 City Deals Over Water GI - Rothesay Dock

Quotation No.:	Q16-07849	**Date Received:**	09-Feb-2017
Order No.:		**Date Instructed:**	09-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	32	**Results Due:**	24-Mar-2017
Date Approved:	27-Apr-2017		

Approved By:

[redacted]

Details: Martin Dyer, Laboratory Manager

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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd				**Chemtest Job No.:**	17-03210	17-03210	17-03210	17-03210
Quotation No.: Q16-07849				**Chemtest Sample ID.:**	410127	410130	410133	410137
Order No.:				Client Sample Ref.:	BHCW04	BHCW04	BHCW04	BHCW04
				Client Sample ID.:	ES1	ES4	ES7	ES11
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.00	1.50	3.00	5.00
				Bottom Depth (m):	0.15	1.65	3.15	5.15
				Date Sampled:	06-Feb-2017	06-Feb-2017	06-Feb-2017	06-Feb-2017
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	22	23	22	8.1
pH	M	2010		N/A	7.9	7.8	7.9	8.7
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40				1.2
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	19	13	4.8	5.4
Boron	N	2450	mg/kg	0.40	11	16	14	
Cadmium	M	2450	mg/kg	0.10	0.15	0.16	0.10	< 0.10
Chromium	M	2450	mg/kg	1.0	31	65	51	19
Copper	M	2450	mg/kg	0.50	22	44	32	8.1
Mercury	M	2450	mg/kg	0.10	0.18	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	17	78	62	23
Lead	M	2450	mg/kg	0.50	45	33	20	7.9
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	21	71	55	33
Zinc	M	2450	mg/kg	0.50	110	120	85	46
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	7.9	2.2	2.2	1.4
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03210	17-03210	17-03210	17-03210
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	410127	410130	410133	410137
Order No.:					Client Sample Ref.:	BHCW04	BHCW04	BHCW04	BHCW04
					Client Sample ID.:	ES1	ES4	ES7	ES11
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.50	3.00	5.00
					Bottom Depth (m):	0.15	1.65	3.15	5.15
					Date Sampled:	06-Feb-2017	06-Feb-2017	06-Feb-2017	06-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Naphthalene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Naphthalene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Acenaphthylene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Acenaphthene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Acenaphthene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Fluorene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Fluorene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Phenanthrene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Phenanthrene	M	2700	mg/kg	0.10	0.82		< 0.10		
Anthracene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Anthracene	M	2700	mg/kg	0.10	0.32		< 0.10		
Fluoranthene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Fluoranthene	M	2700	mg/kg	0.10	0.55		< 0.10		
Pyrene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Pyrene	M	2700	mg/kg	0.10	0.76		< 0.10		
Benzo[a]anthracene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Chrysene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Chrysene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[b]fluoranthene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[k]fluoranthene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[a]pyrene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[g,h,i]perylene	N	2700	mg/kg	0.010		< 0.010		< 0.010	

Chemtest
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Results - Soil

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03210	17-03210	17-03210	17-03210
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	410127	410130	410133	410137
Order No.:					Client Sample Ref.:	BHCW04	BHCW04	BHCW04	BHCW04
					Client Sample ID.:	ES1	ES4	ES7	ES11
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.50	3.00	5.00
					Bottom Depth (m):	0.15	1.65	3.15	5.15
					Date Sampled:	06-Feb-2017	06-Feb-2017	06-Feb-2017	06-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10		< 0.10	
Total Of 16 PAH's	N	2700	mg/kg	0.20			< 0.20		< 0.20
Total Of 16 PAH's	M	2700	mg/kg	2.0		2.5		< 2.0	
Tributyl Tin	N	2730	µg/kg	10		< 10	< 10	< 10	< 10
Benzene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30	< 0.30
PSA	SN			N/A		See Attached	See Attached	See Attached	See Attached

Results - Single Stage WAC

Project: 16-1197 City Deals Over Water GI - Rothesay Dock

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-03210						
Chemtest Sample ID:	410127						
Sample Ref:	BHCW04						
Sample ID:	ES1						
Top Depth(m):	0.00						
Bottom Depth(m):	0.15						
Sampling Date:	06-Feb-2017						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	4.6	3	5	6
Loss On Ignition	2610	M	%	12	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	2.5	100	--	--
pH	2010	M		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.013	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.013	0.13	0.5	2	25
Barium	1450	U	0.11	1.1	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0038	< 0.050	0.5	10	70
Copper	1450	U	0.0032	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.022	0.22	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.015	0.15	0.06	0.7	5
Selenium	1450	U	0.0021	0.021	0.1	0.5	7
Zinc	1450	U	0.024	< 0.50	4	50	200
Chloride	1220	U	270	2700	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	150	1500	1000	20000	50000
Total Dissolved Solids	1020	N	720	7200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.9	99	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.090
Moisture (%)	22

Waste Acceptance Criteria

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

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2730	Organo-Leads	Organo-Leads	Solvent extraction / GCMS detection

Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	17-03723-1
Initial Date of Issue:	27-Apr-2017
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Andy Garne Brian Mooney Colm Hurley Darren O'Mahony Lucy Peaker Mark Nyhan Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Stephen Franey Stephen Watson
Project	16-1197 City Deals Over Water GI

Quotation No.:	Q16-07849	**Date Received:**	15-Feb-2017
Order No.:		**Date Instructed:**	15-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	28	**Results Due:**	24-Mar-2017
Date Approved:	27-Apr-2017	**Subcon Results Due:**	08-Mar-2017

Approved By:

[redacted]

Details: Martin Dyer, Laboratory Manager

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Results - Soil

Project: 16-1197 City Deals Over Water GI

Client: Causeway Geotech Ltd				**Chemtest Job No.:**	17-03723	17-03723	17-03723	17-03723
Quotation No.: Q16-07849				**Chemtest Sample ID.:**	412533	412536	412538	412540
Order No.:				Client Sample Ref.:	ES1	ES4	ES6	ES8
				Client Sample ID.:	BHCW05	BHCW05	BHCW05	BHCW05
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.0	1.5	3.0	4.0
				Bottom Depth (m):	0.15	1.65	3.15	4.15
				Date Sampled:	13-Feb-2017	13-Feb-2017	13-Feb-2017	13-Feb-2017
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	25	25	18	23
pH	M	2010		N/A	8.0	7.9	8.1	8.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	2.3	2.1	1.3	
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	3.7	3.7	3.0	4.3
Boron	N	2450	mg/kg	0.40				6.4
Cadmium	M	2450	mg/kg	0.10	0.25	0.19	0.14	< 0.10
Chromium	M	2450	mg/kg	1.0	26	35	14	29
Copper	M	2450	mg/kg	0.50	23	26	8.6	19
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	38	49	21	39
Lead	M	2450	mg/kg	0.50	18	17	6.9	10
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	32	40	21	37
Zinc	M	2450	mg/kg	0.50	290	150	36	55
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	2.1	2.4	0.67	3.6
Total TPH >C6-C40	M	2670	mg/kg	10				< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0

Chemtest
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Results - Soil

Project: 16-1197 City Deals Over Water GI

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03723	17-03723	17-03723	17-03723
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	412533	412536	412538	412540
Order No.:					Client Sample Ref.:	ES1	ES4	ES6	ES8
					Client Sample ID.:	BHCW05	BHCW05	BHCW05	BHCW05
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.0	1.5	3.0	4.0
					Bottom Depth (m):	0.15	1.65	3.15	4.15
					Date Sampled:	13-Feb-2017	13-Feb-2017	13-Feb-2017	13-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	
Naphthalene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Naphthalene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Acenaphthylene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Acenaphthene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Acenaphthene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Fluorene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Fluorene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Phenanthrene	N	2700	mg/kg	0.010		0.31		< 0.010	
Phenanthrene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Anthracene	N	2700	mg/kg	0.010		0.11		< 0.010	
Anthracene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Fluoranthene	N	2700	mg/kg	0.010		0.19		< 0.010	
Fluoranthene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Pyrene	N	2700	mg/kg	0.010		0.26		< 0.010	
Pyrene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[a]anthracene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Chrysene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Chrysene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[b]fluoranthene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[k]fluoranthene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[a]pyrene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10		< 0.10		
Benzo[g,h,i]perylene	N	2700	mg/kg	0.010		< 0.010		< 0.010	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10		< 0.10		

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Results - Soil

Project: 16-1197 City Deals Over Water GI

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03723	17-03723	17-03723	17-03723
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	412533	412536	412538	412540
Order No.:					Client Sample Ref.:	ES1	ES4	ES6	ES8
					Client Sample ID.:	BHCW05	BHCW05	BHCW05	BHCW05
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.0	1.5	3.0	4.0
					Bottom Depth (m):	0.15	1.65	3.15	4.15
					Date Sampled:	13-Feb-2017	13-Feb-2017	13-Feb-2017	13-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Total Of 16 PAH's	N	2700	mg/kg	0.20		0.87		< 0.20	
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0		< 2.0		
Tributyl Tin	N	2730	µg/kg	10	< 10	< 10	< 10	< 10	
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
PCB 28	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	
PCB 52	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	
PCB 90+101	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	
PCB 118	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	
PCB 153	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	
PCB 138	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	
PCB 180	M	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	
PSA	SN			N/A	See Attached	See Attached	See Attached	See Attached	

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Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2730	Organo-Leads	Organo-Leads	Solvent extraction / GCMS detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
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Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	17-03596-1
Initial Date of Issue:	27-Apr-2017
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Stephen Curtis Andy Garne Brian Mooney Colm Hurley Darren O'Mahony John Duggan Lucy Peaker Mark Nyhan Matthew Gilbert Neil Haggan Paul Dunlop Paul McNamara Stephen Franey Stephen Watson
Project	16-1197 - City Deals Over Water GI - Rothesay Dock

Quotation No.:	Q16-07849	**Date Received:**	13-Feb-2017
Order No.:		**Date Instructed:**	13-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	30	**Results Due:**	24-Mar-2017
Date Approved:	27-Apr-2017		

Approved By:

[redacted]

Details: Martin Dyer, Laboratory Manager

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Results - Soil

Project: 16-1197 - City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd				**Chemtest Job No.:**	17-03596	17-03596	17-03596	17-03596
Quotation No.: Q16-07849				**Chemtest Sample ID.:**	411860	411863	411866	411870
Order No.:				Client Sample Ref.:	BHCW06	BHCW06	BHCW06	BHCW06
				Client Sample ID.:	ES1	ES4	ES7	ES11
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.00	1.50	3.00	5.00
				Bottom Depth (m):	0.15	1.65	3.15	5.15
				Date Sampled:	09-Feb-2017	09-Feb-2017	09-Feb-2017	09-Feb-2017
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	22	22	20	16
pH	M	2010		N/A	8.2	8.3	8.6	8.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40				0.53
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	5.4	4.0	5.4	3.4
Boron	N	2450	mg/kg	0.40	10	8.6	8.8	
Cadmium	M	2450	mg/kg	0.10	0.14	0.10	0.10	< 0.10
Chromium	M	2450	mg/kg	1.0	34	28	36	20
Copper	M	2450	mg/kg	0.50	24	18	25	12
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	42	37	44	26
Lead	M	2450	mg/kg	0.50	13	12	15	6.5
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	39	35	45	28
Zinc	M	2450	mg/kg	0.50	66	50	70	39
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	2.9	2.8	2.8	1.2
Total Organic Carbon	M	2625	%	0.20	1.7	1.6	1.6	
Aliphatic TPH >C5-C6	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C5-C7	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	N	2680	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

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Results - Soil

Project: 16-1197 - City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03596	17-03596	17-03596	17-03596
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	411860	411863	411866	411870
Order No.:					Client Sample Ref.:	BHCW06	BHCW06	BHCW06	BHCW06
					Client Sample ID.:	ES1	ES4	ES7	ES11
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.50	3.00	5.00
					Bottom Depth (m):	0.15	1.65	3.15	5.15
					Date Sampled:	09-Feb-2017	09-Feb-2017	09-Feb-2017	09-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C12-C16	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C16-C21	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C21-C35	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Aromatic TPH >C35-C44	N	2680	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Total Aromatic Hydrocarbons	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	
Naphthalene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Naphthalene	M	2700	mg/kg	0.10		< 0.10	0.43		
Acenaphthylene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Acenaphthylene	M	2700	mg/kg	0.10		< 0.10	0.76		
Acenaphthene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Acenaphthene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Fluorene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Fluorene	M	2700	mg/kg	0.10		< 0.10	0.24		
Phenanthrene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Phenanthrene	M	2700	mg/kg	0.10		< 0.10	0.54		
Anthracene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Anthracene	M	2700	mg/kg	0.10		< 0.10	0.28		
Fluoranthene	N	2700	mg/kg	0.010	0.26			< 0.010	
Fluoranthene	M	2700	mg/kg	0.10		0.22	0.26		
Pyrene	N	2700	mg/kg	0.010	0.30			< 0.010	
Pyrene	M	2700	mg/kg	0.10		0.25	0.28		
Benzo[a]anthracene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Benzo[a]anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Chrysene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Chrysene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Benzo[b]fluoranthene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Benzo[k]fluoranthene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Benzo[a]pyrene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10		
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.010	< 0.010			< 0.010	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10		

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Results - Soil

Project: 16-1197 - City Deals Over Water GI - Rothesay Dock

Client: Causeway Geotech Ltd					**Chemtest Job No.:**	17-03596	17-03596	17-03596	17-03596
Quotation No.: Q16-07849					**Chemtest Sample ID.:**	411860	411863	411866	411870
Order No.:					Client Sample Ref.:	BHCW06	BHCW06	BHCW06	BHCW06
					Client Sample ID.:	ES1	ES4	ES7	ES11
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.50	3.00	5.00
					Bottom Depth (m):	0.15	1.65	3.15	5.15
					Date Sampled:	09-Feb-2017	09-Feb-2017	09-Feb-2017	09-Feb-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Benzo[g,h,i]perylene	N	2700	mg/kg	0.010		< 0.010			< 0.010
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10			< 0.10	< 0.10	
Total Of 16 PAH's	N	2700	mg/kg	0.20		0.56			< 0.20
Total Of 16 PAH's	M	2700	mg/kg	2.0			< 2.0	2.8	
Tributyl Tin	N	2730	µg/kg	10		< 10	< 10	< 10	< 10
Benzene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	M	2815	mg/kg	0.010		< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30	< 0.30
PSA	SN			N/A		See Attached	See Attached	See Attached	See Attached

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Results - Single Stage WAC

Project: 16-1197 - City Deals Over Water GI - Rothesay Dock

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-03596						
Chemtest Sample ID:	411866						
Sample Ref:	BHCW06						
Sample ID:	ES7						
Top Depth(m):	3.00						
Bottom Depth(m):	3.15						
Sampling Date:	09-Feb-2017						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	1.6	3	5	6
Loss On Ignition	2610	M	%	5.6	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	2.8	100	--	--
pH	2010	M		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.021	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0031	< 0.050	2	50	100
Mercury	1450	U	0.0020	0.020	0.01	0.2	2
Molybdenum	1450	U	0.014	0.14	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0013	0.013	0.06	0.7	5
Selenium	1450	U	0.0025	0.025	0.1	0.5	7
Zinc	1450	U	0.0013	< 0.50	4	50	200
Chloride	1220	U	120	1200	800	15000	25000
Fluoride	1220	U	0.13	1.3	10	150	500
Sulphate	1220	U	34	340	1000	20000	50000
Total Dissolved Solids	1020	N	320	3200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.4	64	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.090
Moisture (%)	20

Waste Acceptance Criteria

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

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2730	Organo-Leads	Organo-Leads	Solvent extraction / GCMS detection

Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

CONTRACT: XCHEM16W
Sample analysis completed by: C. LIMPENNY
Results validated by: C. MASON
No of Samples: 18
Deadline: 31/03/2017

Method of analysis: Visual description and PSA (NMBAQC method)
Visual description completed.
Subsample removed and laser diffraction completed on <1mm fraction.
The rest of the sample is split at 1mm and the >1mm dry sieved at 0.5φ intervals.
The <1mm is dried and weighed and used to calculate proportion of <1mm:>1mm.
Sieve and laser data are merged to produce a complete particle size (PS) distribution at 0.5φ intervals.

Mason, C. 2011. NMBAQC's Best Practice Guidance. Particle Size Analysis (PSA) for Supporting Biological Analysis. National Marine Biological AQC Coordinating Committee, 72pp, December 2011.

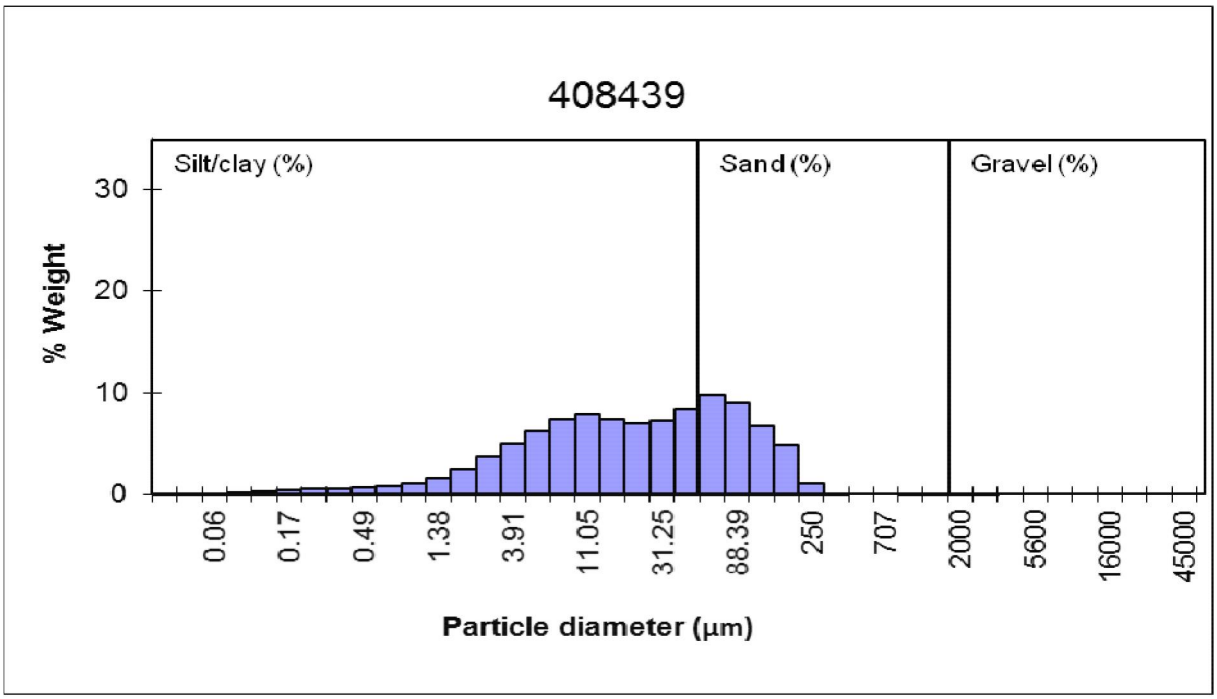
XCHEM16W			Gravel (%)	Sand (%)	Silt/Clay (%)	Very coarse and coarse sand (%)	Medium sand (%)	Fine sand and very fine sand (%)
Sample Reference	**Job number**							
408439 (BHCW01 0.5-0.65m)	17 - 02862		0.03	31.43	68.54	0.05	1.06	30.33
408441 (BHCW01 1.5-1.65m)			0.18	23.80	76.01	0.39	0.45	22.97
408443 (BHCW01 2.5-2.65m)			0.01	17.01	82.98	0.04	0.42	16.55
405570 (BHCW02 0.0-0.15m)	17 - 02272		0.00	22.09	77.91	0.44	0.99	20.65
405572 (BHCW02 1.0-1.15m)			0.06	21.35	78.59	0.53	1.91	18.91
405576 (BHCW02 3.0-3.15m)			0.06	29.02	70.92	0.23	3.87	24.91
410127 (BHCW03 0.0-0.15m)	17 - 03210		5.28	79.89	14.83	3.75	42.18	33.95
410130 (BHCW03 1.5-1.65m)			2.25	81.43	16.32	6.08	22.90	52.45
410133 (BHCW03 3.0-3.15m)			0.29	23.39	76.32	0.13	0.16	23.10
410215 (BHCW04 0.0-0.15m)	17 - 03222		4.15	44.67	51.18	10.29	21.08	13.29
410217 (BHCW04 1.5-1.65m)			0.03	13.63	86.34	0.03	0.13	13.46
410219 (BHCW04 2.5-2.65m)			0.96	90.50	8.54	15.36	55.08	20.07
412533 (BHCW05 0.0-0.15m)	17 - 03723		2.31	23.42	74.27	1.27	3.28	18.86
412536 (BHCW05 1.5-1.65m)			0.17	17.33	82.49	0.02	0.34	16.98
412538 (BHCW05 3.0-3.15m)			0.56	20.53	78.91	0.07	0.75	19.71
411860 (BHCW06 0.0-0.15m)	17 - 03596		2.00	22.25	75.76	0.43	0.93	20.89
411863 (BHCW06 1.5-1.65m)			0.05	24.28	75.66	0.26	1.17	22.85
411866 (BHCW06 3.0-3.15m)			2.06	73.61	24.33	3.15	33.16	37.30

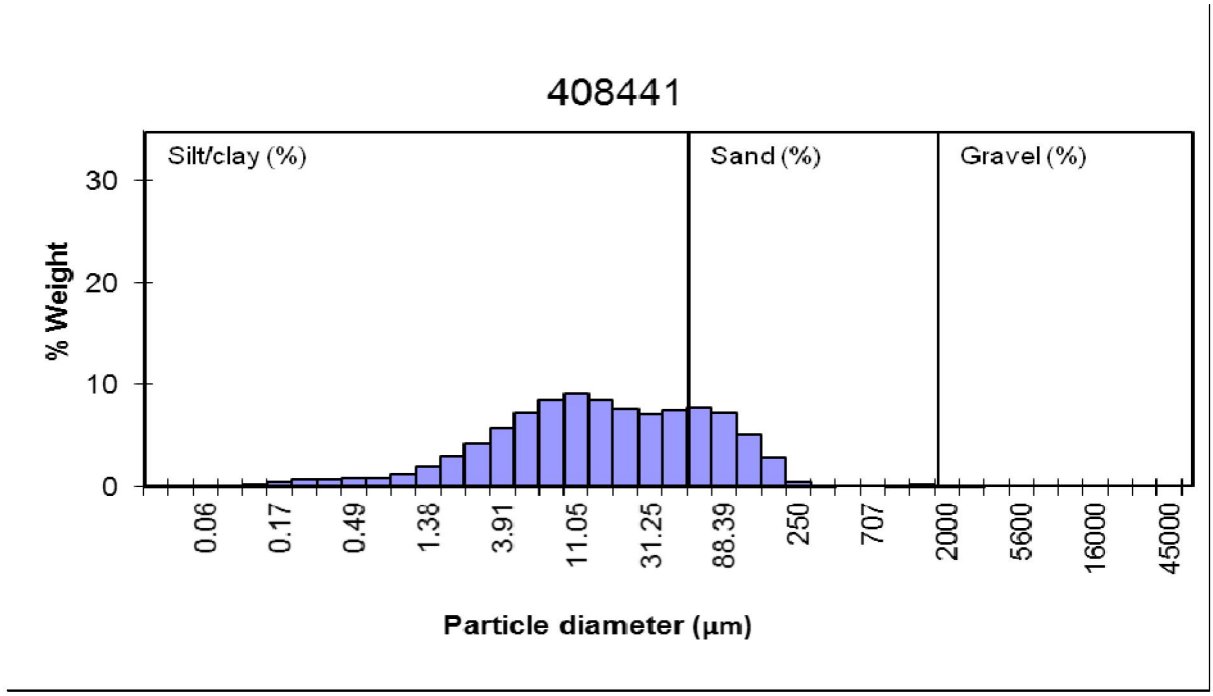
XCHEM16W		-5.5	-5	-4.5	-4	-3.5	-3	-2.5	-2	-1.5	-1	-0.5	0
Sample Reference	**Job number**	45mm	31.5mm	22.4mm	16mm	11.2mm	8mm	5.6mm	4mm	2.8mm	2mm	1.4mm	1mm
408439 (BHCW01 0.5-0.65m)	17 - 02862	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.02
408441 (BHCW01 1.5-1.65m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.07	0.23	0.16
408443 (BHCW01 2.5-2.65m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
405570 (BHCW02 0.0-0.15m)	17 - 02272	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
405572 (BHCW02 1.0-1.15m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.01	0.00
405576 (BHCW02 3.0-3.15m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.04
410127 (BHCW03 0.0-0.15m)	17 - 03210	0.00	0.00	0.00	3.41	0.00	0.00	0.55	0.39	0.45	0.48	0.63	0.59
410130 (BHCW03 1.5-1.65m)		0.00	0.00	0.00	1.41	0.00	0.00	0.00	0.37	0.24	0.23	0.34	0.33
410133 (BHCW03 3.0-3.15m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.07	0.04	0.07	0.06
410215 (BHCW04 0.0-0.15m)	17 - 03222	0.00	0.00	0.00	0.00	0.00	0.18	0.35	0.91	1.35	1.37	1.31	1.09
410217 (BHCW04 1.5-1.65m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
410219 (BHCW04 2.5-2.65m)		0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.29	0.23	0.29	0.35	0.44
412533 (BHCW05 0.0-0.15m)	17 - 03723	0.00	0.00	0.00	0.00	0.00	0.61	0.58	0.32	0.34	0.45	0.36	0.19
412536 (BHCW05 1.5-1.65m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.03	0.01	0.01
412538 (BHCW05 3.0-3.15m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.07	0.04	0.03	0.03
411860 (BHCW06 0.0-0.15m)	17 - 03596	0.00	0.00	0.00	0.00	1.03	0.00	0.19	0.36	0.34	0.08	0.11	0.12
411863 (BHCW06 1.5-1.65m)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.02
411866 (BHCW06 3.0-3.15m)		0.00	0.00	0.00	0.00	0.00	0.80	0.61	0.31	0.14	0.20	0.22	0.19

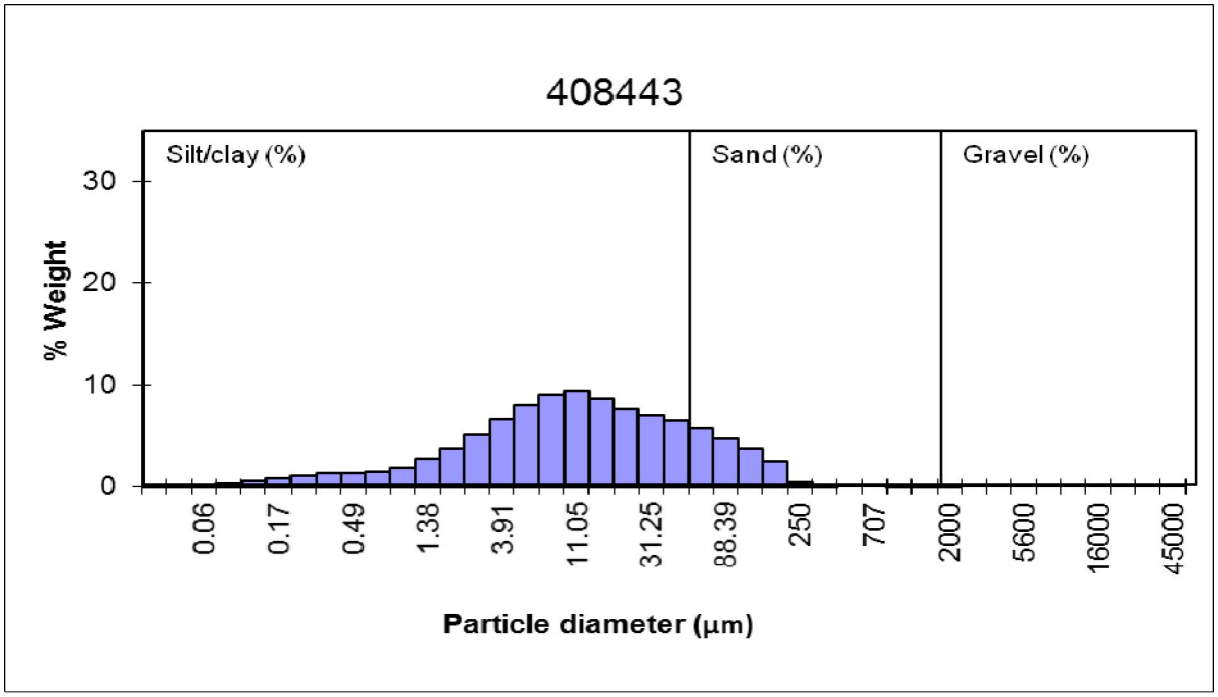
		0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Sample Reference	**Job number**	707um	500um	353.6um	250um	176.8um	125um	88.39um	63um	44.2um	31.3um	22.1um	15.6um
408439 (BHCW01 0.5-0.65m)	17 - 02862	0.00	0.00	0.01	1.05	4.82	6.66	9.04	9.81	8.38	7.20	6.93	7.38
408441 (BHCW01 1.5-1.65m)		0.00	0.00	0.00	0.45	2.83	5.16	7.19	7.79	7.46	7.16	7.59	8.44
408443 (BHCW01 2.5-2.65m)		0.00	0.00	0.00	0.42	2.41	3.66	4.75	5.74	6.47	7.01	7.56	8.56
405570 (BHCW02 0.0-0.15m)	17 - 02272	0.06	0.32	0.25	0.75	3.39	4.95	5.85	6.46	6.79	7.05	7.56	8.58
405572 (BHCW02 1.0-1.15m)		0.01	0.51	0.80	1.11	3.59	4.56	5.15	5.61	6.45	7.05	7.59	8.53
405576 (BHCW02 3.0-3.15m)		0.00	0.17	0.66	3.22	6.86	5.88	5.92	6.25	6.31	6.39	6.57	7.30
410127 (BHCW03 0.0-0.15m)	17 - 03210	0.89	1.64	10.58	31.60	22.59	6.14	2.75	2.48	2.25	1.56	1.31	1.12
410130 (BHCW03 1.5-1.65m)		1.92	3.49	6.47	16.43	26.60	17.56	5.92	2.37	1.62	1.53	1.39	1.40
410133 (BHCW03 3.0-3.15m)		0.00	0.00	0.00	0.16	2.00	4.40	7.62	9.09	7.31	5.88	5.63	6.30
410215 (BHCW04 0.0-0.15m)	17 - 03222	2.07	5.82	11.77	9.31	4.56	2.79	2.67	3.28	3.89	4.27	4.50	4.79
410217 (BHCW04 1.5-1.65m)		0.00	0.00	0.00	0.13	2.14	3.45	3.45	4.42	5.82	6.79	7.24	7.93
410219 (BHCW04 2.5-2.65m)		3.94	10.63	27.06	28.01	12.62	4.33	1.89	1.22	0.92	0.73	0.68	0.68
412533 (BHCW05 0.0-0.15m)	17 - 03723	0.01	0.72	1.56	1.72	3.47	3.95	5.04	6.40	6.68	6.33	6.17	6.53
412536 (BHCW05 1.5-1.65m)		0.00	0.00	0.00	0.34	2.52	3.34	4.63	6.49	7.05	7.00	6.70	7.37
412538 (BHCW05 3.0-3.15m)		0.00	0.00	0.00	0.75	3.87	4.61	4.95	6.29	7.25	6.99	6.45	6.68
411860 (BHCW06 0.0-0.15m)	17 - 03596	0.00	0.20	0.36	0.57	3.09	3.75	5.50	8.54	10.09	9.48	8.28	7.45
411863 (BHCW06 1.5-1.65m)		0.00	0.23	0.27	0.91	3.65	4.90	6.49	7.80	7.75	7.16	6.78	6.94
411866 (BHCW06 3.0-3.15m)		0.84	1.91	10.42	22.75	20.37	8.86	4.41	3.66	3.06	2.46	2.12	2.06

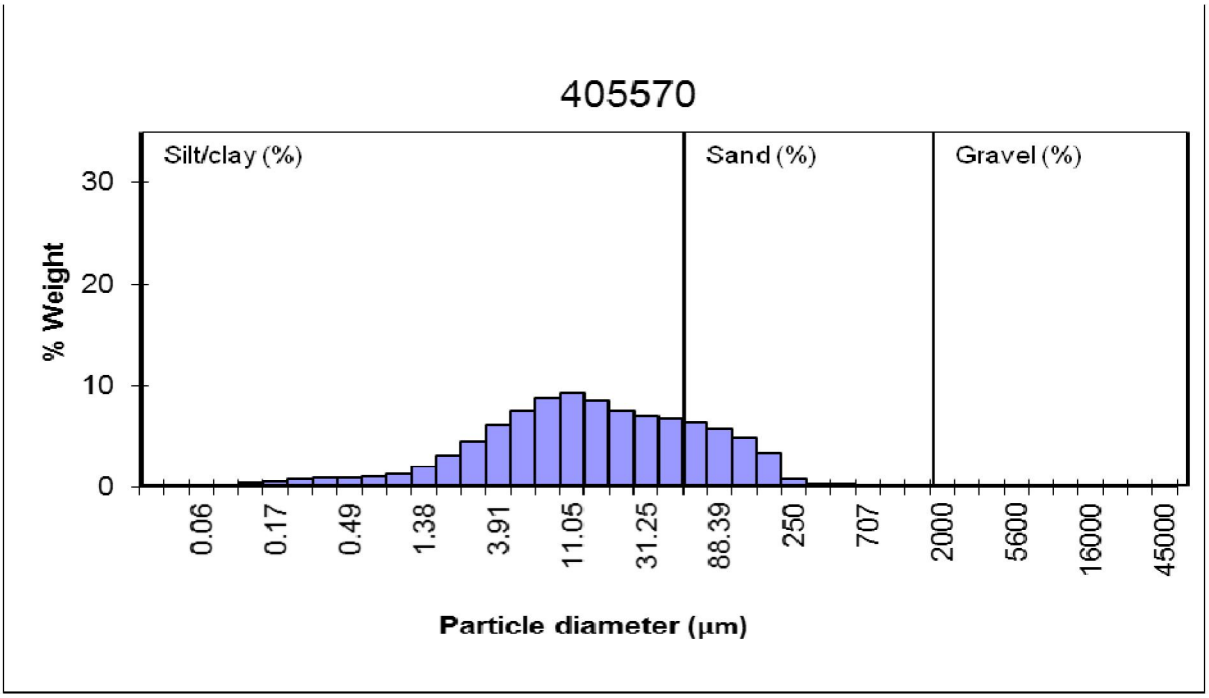
		6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12
Sample Reference	**Job number**	11um	7.8um	5.5um	3.9um	2.75um	1.95um	1.38um	0.98um	0.69um	0.49um	0.34um	0.24um
408439 (BHCW01 0.5-0.65m)	17 - 02862	7.80	7.26	6.24	5.00	3.64	2.47	1.60	1.04	0.77	0.68	0.63	0.55
408441 (BHCW01 1.5-1.65m)		9.10	8.47	7.23	5.78	4.29	3.00	1.98	1.27	0.92	0.83	0.80	0.69
408443 (BHCW01 2.5-2.65m)		9.45	9.04	8.00	6.63	5.08	3.72	2.64	1.87	1.47	1.34	1.27	1.10
405570 (BHCW02 0.0-0.15m)	17 - 02272	9.34	8.77	7.59	6.13	4.53	3.13	2.07	1.36	1.03	0.95	0.93	0.81
405572 (BHCW02 1.0-1.15m)		9.22	8.65	7.51	6.11	4.61	3.33	2.31	1.58	1.20	1.08	1.02	0.89
405576 (BHCW02 3.0-3.15m)		7.93	7.54	6.74	5.69	4.43	3.24	2.25	1.52	1.12	0.96	0.89	0.77
410127 (BHCW03 0.0-0.15m)	17 - 03210	1.30	1.14	1.08	0.95	0.73	0.66	0.61	0.47	0.37	0.33	0.31	0.26
410130 (BHCW03 1.5-1.65m)		1.46	1.39	1.26	1.11	0.95	0.81	0.70	0.60	0.51	0.43	0.35	0.28
410133 (BHCW03 3.0-3.15m)		7.16	6.90	6.33	5.53	4.62	3.95	3.39	2.78	2.32	2.07	1.89	1.61
410215 (BHCW04 0.0-0.15m)	17 - 03222	5.11	4.72	4.21	3.62	3.01	2.58	2.22	1.83	1.50	1.28	1.12	0.93
410217 (BHCW04 1.5-1.65m)		8.58	7.99	7.22	6.30	5.27	4.53	3.90	3.21	2.64	2.30	2.06	1.73
410219 (BHCW04 2.5-2.65m)		0.77	0.70	0.66	0.59	0.48	0.43	0.42	0.36	0.29	0.23	0.18	0.15
412533 (BHCW05 0.0-0.15m)	17 - 03723	7.04	6.60	5.98	5.21	4.35	3.75	3.24	2.68	2.21	1.94	1.72	1.45
412536 (BHCW05 1.5-1.65m)		7.85	7.27	6.65	5.83	4.90	4.29	3.73	3.06	2.50	2.19	1.95	1.62
412538 (BHCW05 3.0-3.15m)		7.30	6.97	6.44	5.71	4.79	4.06	3.43	2.79	2.29	1.99	1.77	1.48
411860 (BHCW06 0.0-0.15m)	17 - 03596	6.95	5.93	5.03	4.22	3.49	2.97	2.53	2.08	1.69	1.44	1.24	1.04
411863 (BHCW06 1.5-1.65m)		7.17	6.53	5.79	5.00	4.17	3.56	3.06	2.55	2.11	1.83	1.60	1.34
411866 (BHCW06 3.0-3.15m)		2.09	1.94	1.74	1.52	1.31	1.14	1.00	0.87	0.74	0.62	0.51	0.41

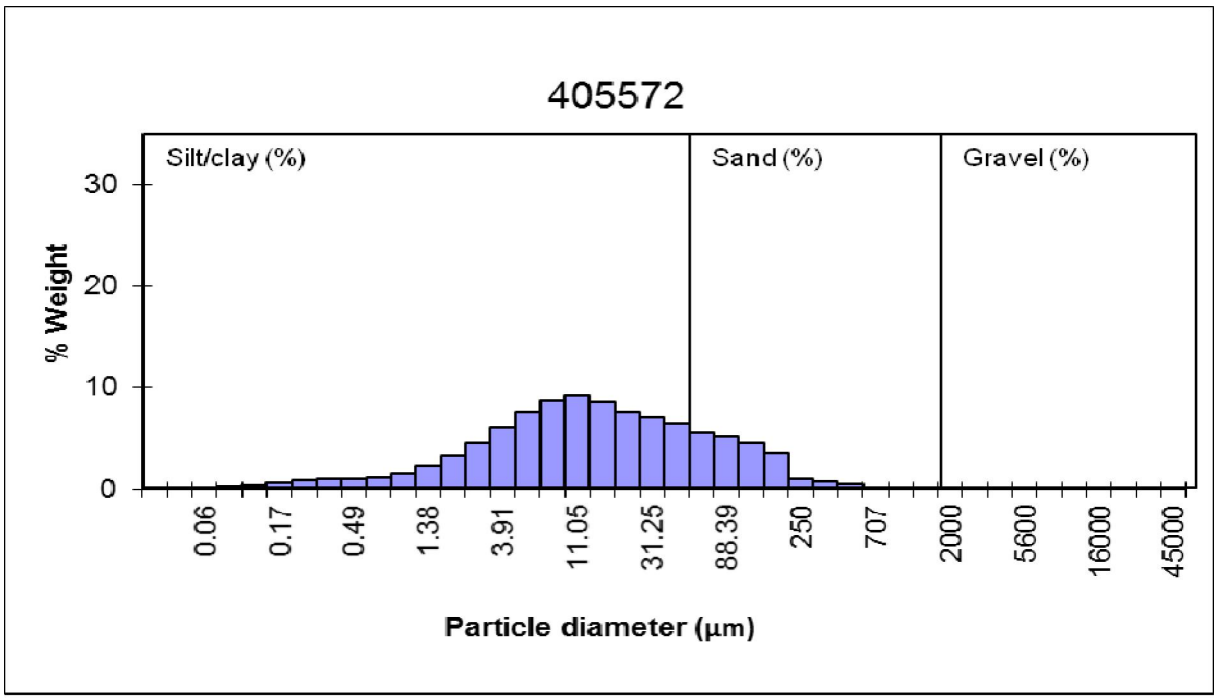
		12.5	13	13.5	14	14.5	>14.5	Weight of sample
Sample Reference	**Job number**	0.17um	0.12um	0.09um	0.06um	0.04um	<0.04um	(g)
408439 (BHCW01 0.5-0.65m)	17 - 02862	0.42	0.29	0.17	0.07	0.01	0.00	110.03
408441 (BHCW01 1.5-1.65m)		0.48	0.29	0.15	0.05	0.01	0.00	44.12
408443 (BHCW01 2.5-2.65m)		0.80	0.53	0.30	0.11	0.01	0.00	84.38
405570 (BHCW02 0.0-0.15m)	17 - 02272	0.59	0.39	0.21	0.08	0.01	0.00	33.27
405572 (BHCW02 1.0-1.15m)		0.66	0.45	0.26	0.10	0.01	0.00	101.2
405576 (BHCW02 3.0-3.15m)		0.57	0.39	0.23	0.09	0.01	0.00	51.23
410127 (BHCW03 0.0-0.15m)	17 - 03210	0.18	0.12	0.06	0.02	0.00	0.00	248.9
410130 (BHCW03 1.5-1.65m)		0.21	0.16	0.10	0.04	0.01	0.00	247.65
410133 (BHCW03 3.0-3.15m)		1.18	0.81	0.47	0.18	0.02	0.00	148.66
410215 (BHCW04 0.0-0.15m)	17 - 03222	0.69	0.49	0.29	0.11	0.01	0.00	205.69
410217 (BHCW04 1.5-1.65m)		1.26	0.86	0.50	0.19	0.02	0.00	201.92
410219 (BHCW04 2.5-2.65m)		0.11	0.08	0.05	0.02	0.00	0.00	284.08
412533 (BHCW05 0.0-0.15m)	17 - 03723	1.06	0.73	0.43	0.16	0.02	0.00	227.18
412536 (BHCW05 1.5-1.65m)		1.16	0.77	0.43	0.16	0.02	0.00	183.81
412538 (BHCW05 3.0-3.15m)		1.10	0.77	0.45	0.17	0.02	0.00	202.17
411860 (BHCW06 0.0-0.15m)	17 - 03596	0.78	0.56	0.35	0.14	0.02	0.00	245.48
411863 (BHCW06 1.5-1.65m)		0.99	0.70	0.42	0.16	0.02	0.00	229.03
411866 (BHCW06 3.0-3.15m)		0.31	0.23	0.14	0.06	0.01	0.00	297.59

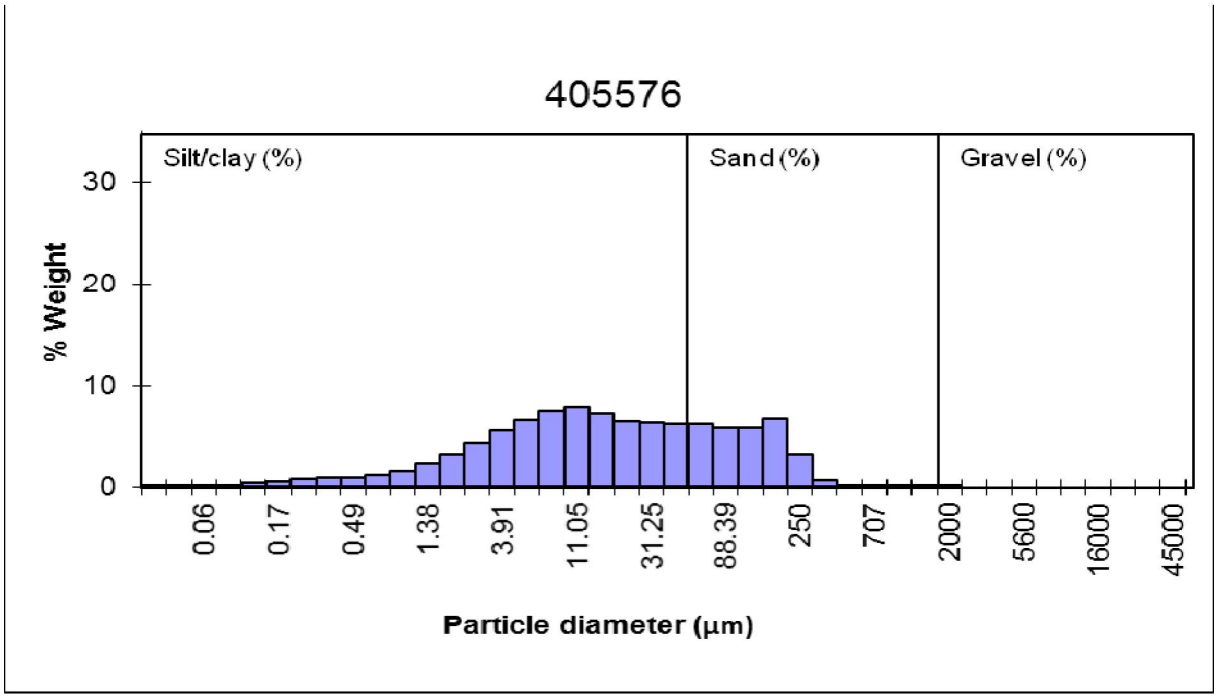

408439
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

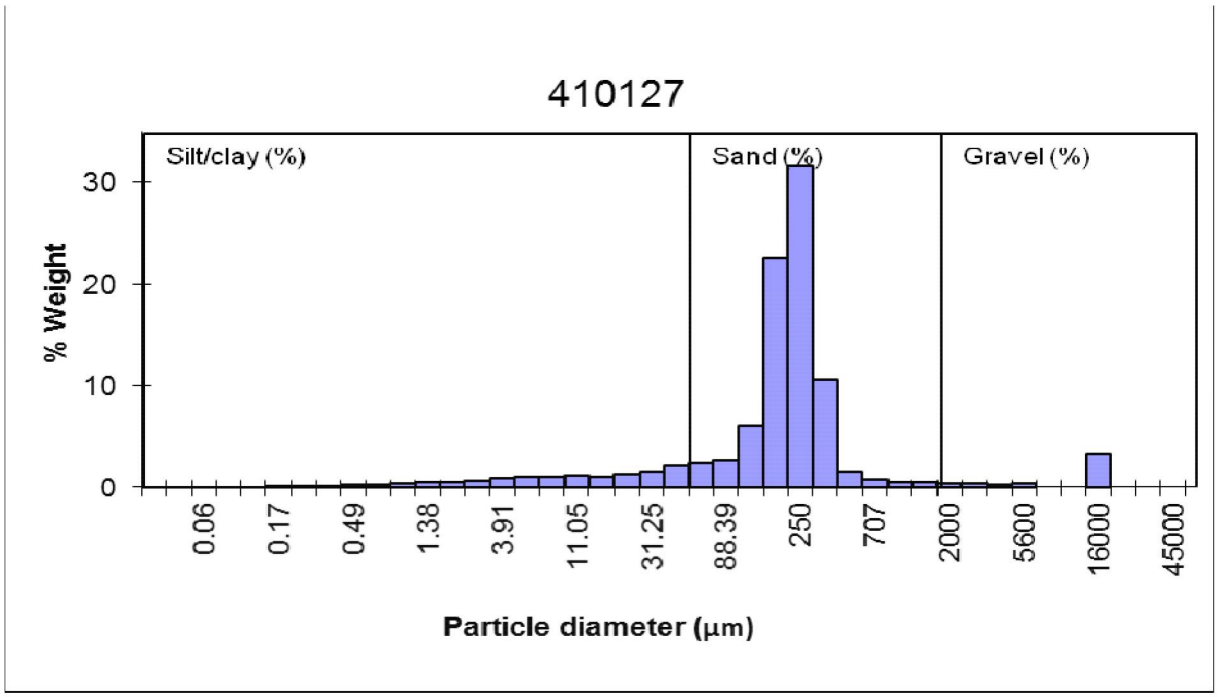

408441
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

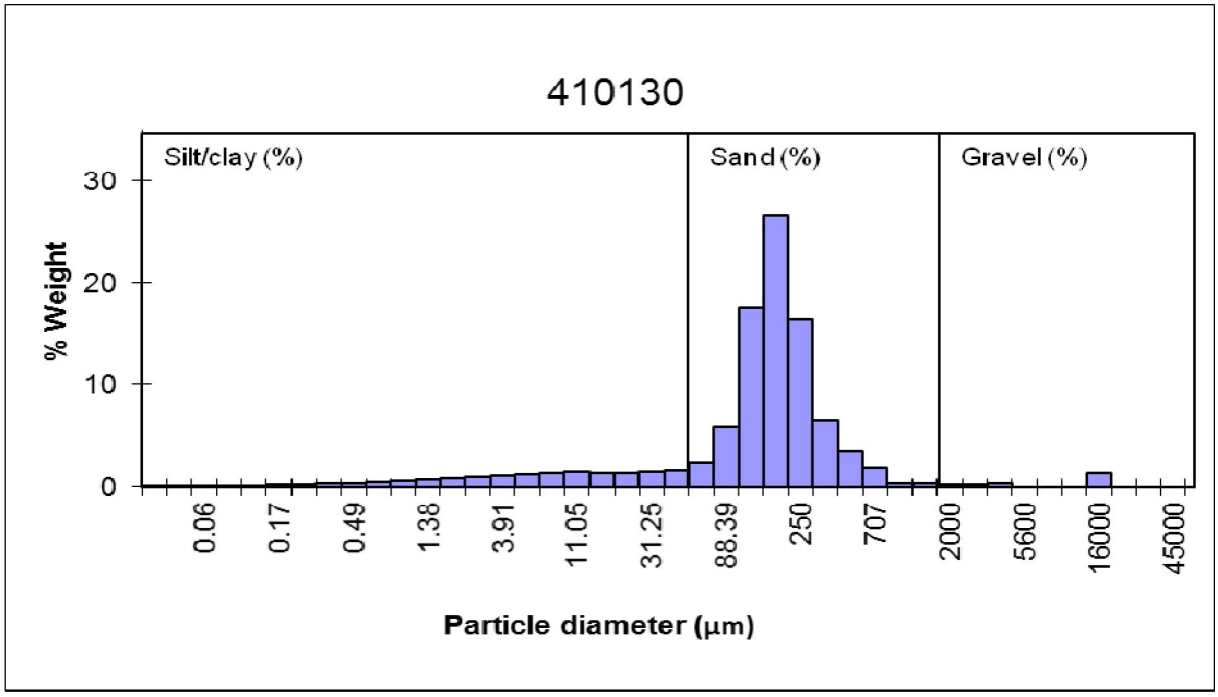

408443
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

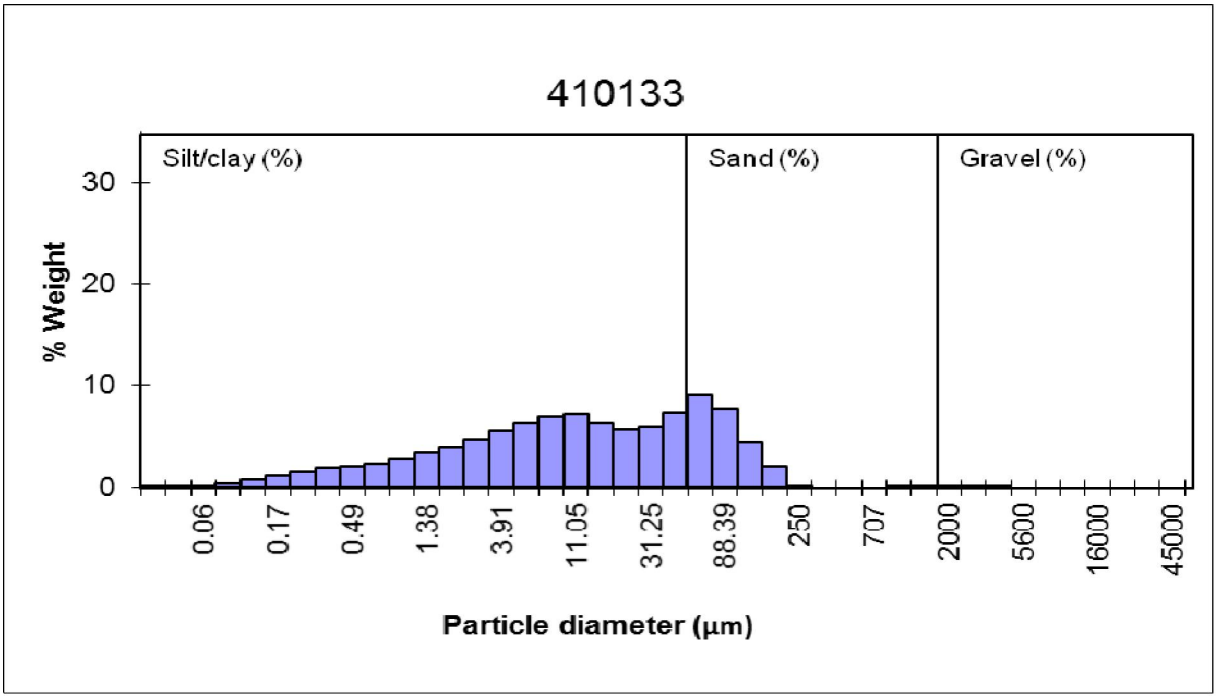

405570
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

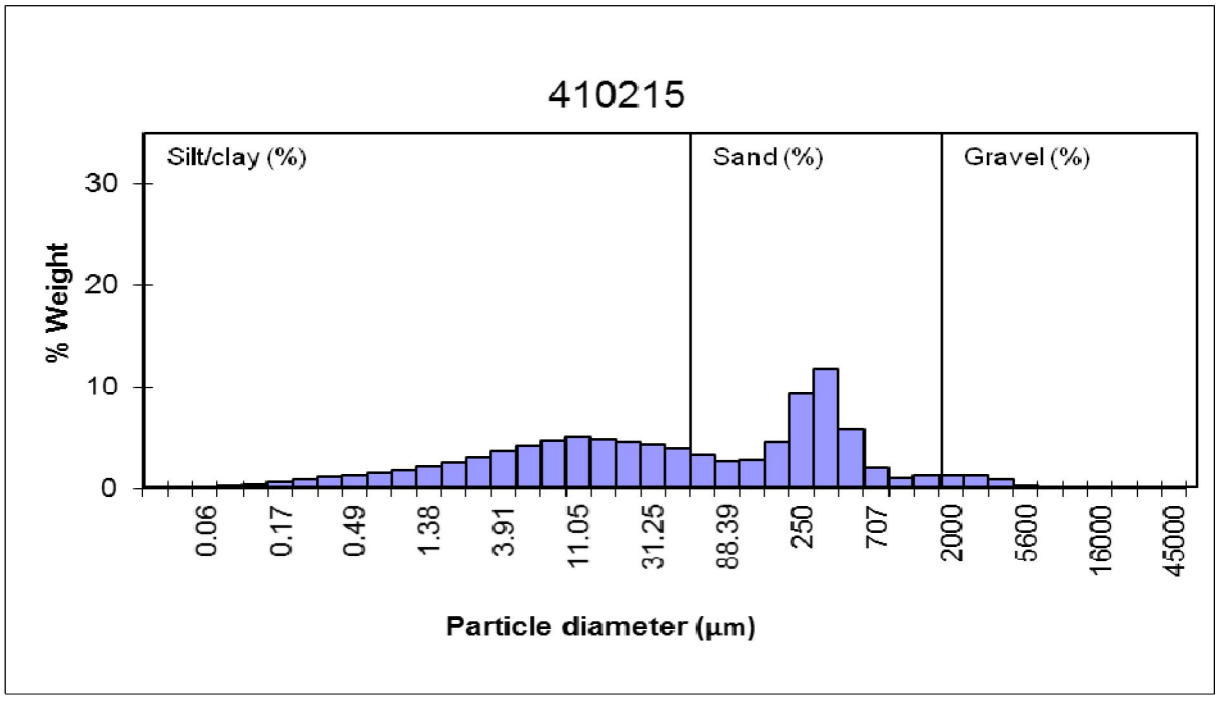

405572
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

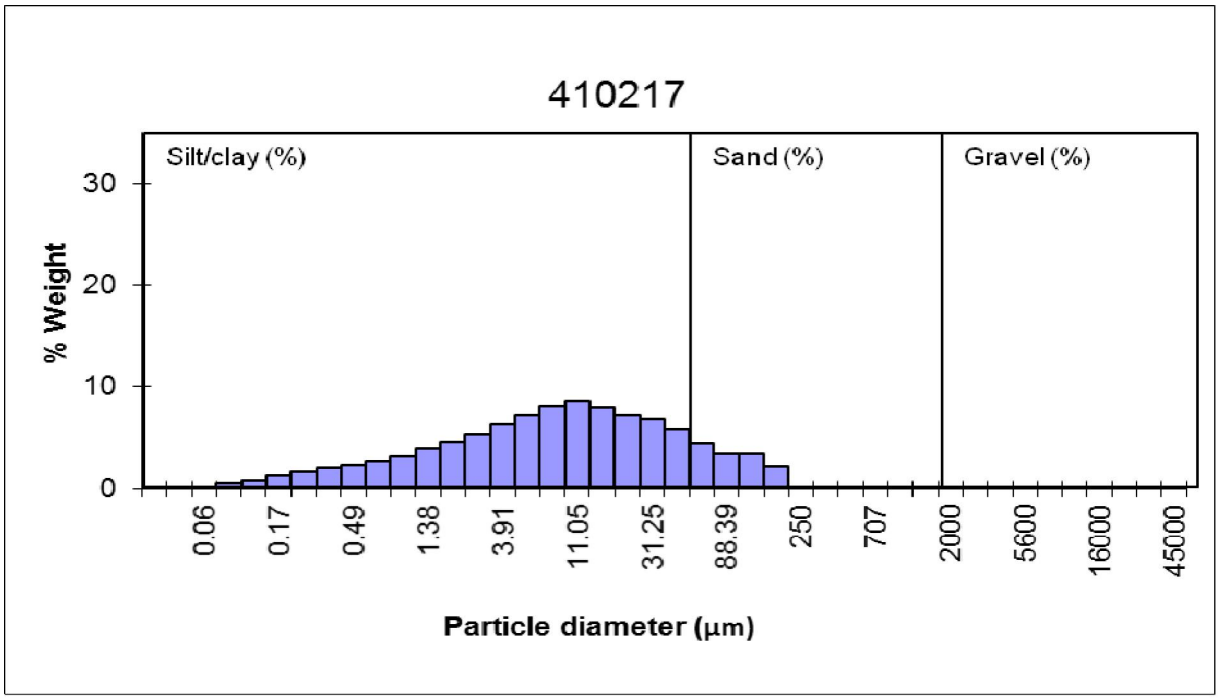

405576
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

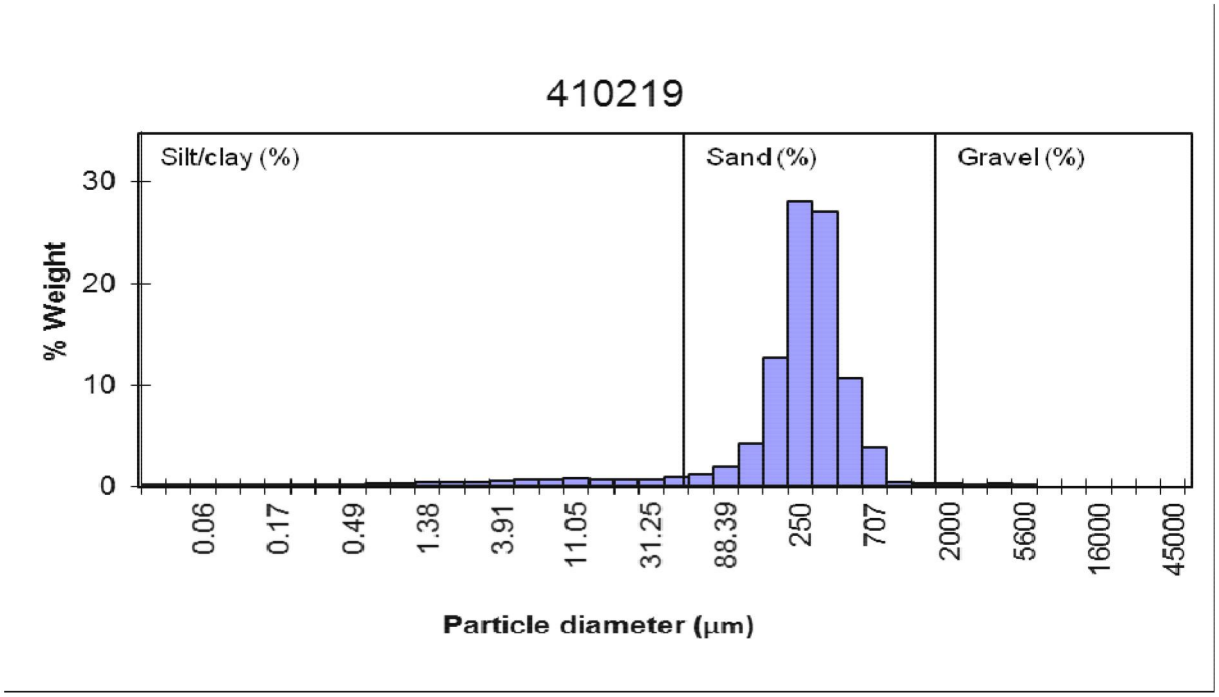

410127
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

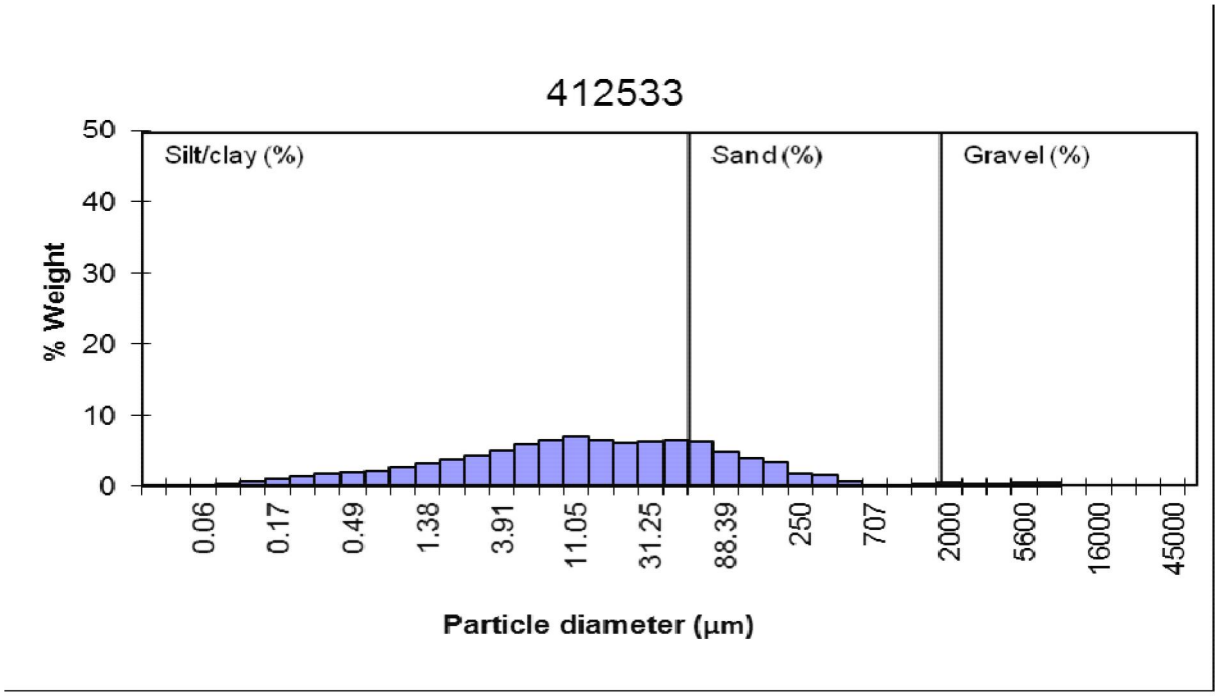

410130
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

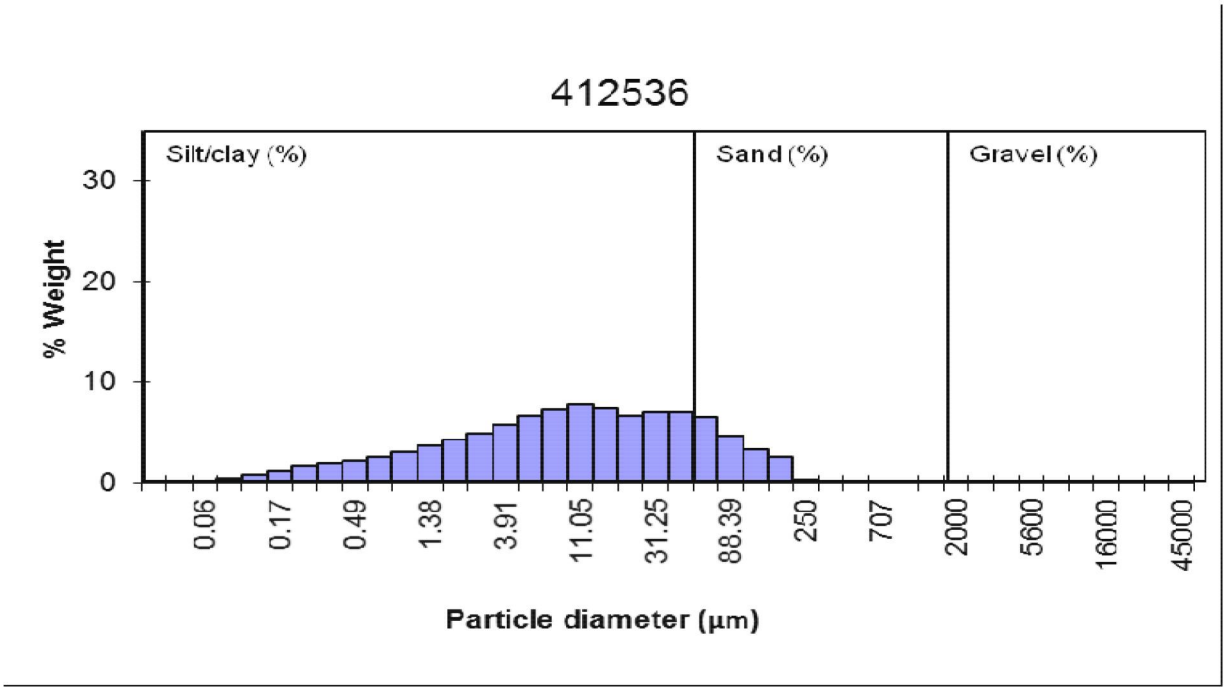

410133
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

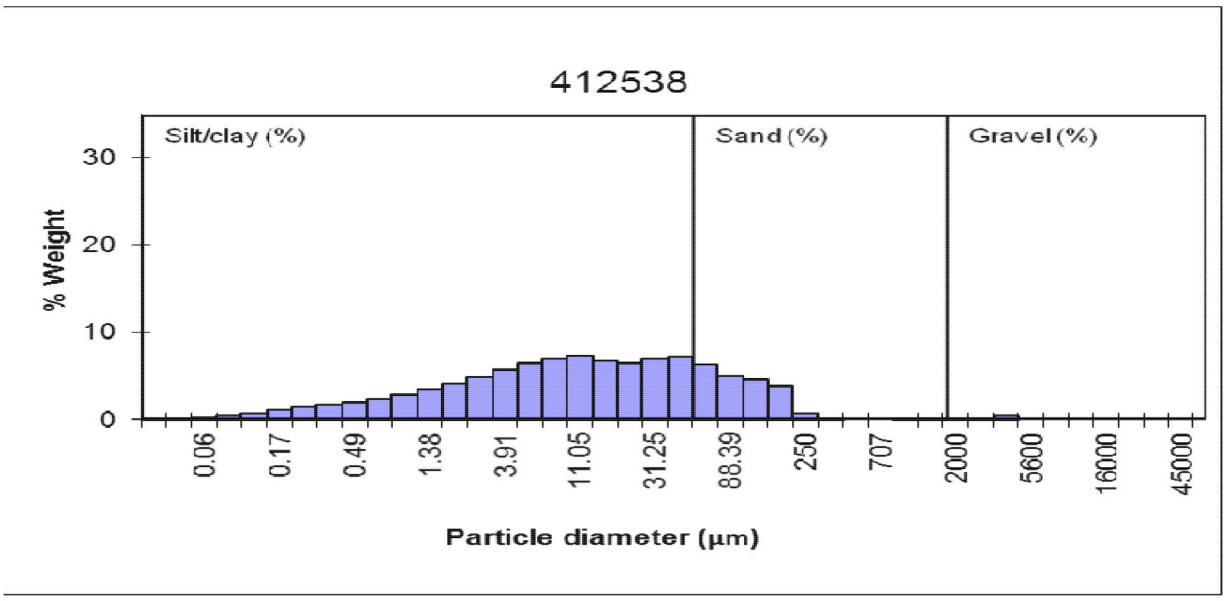

410215
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

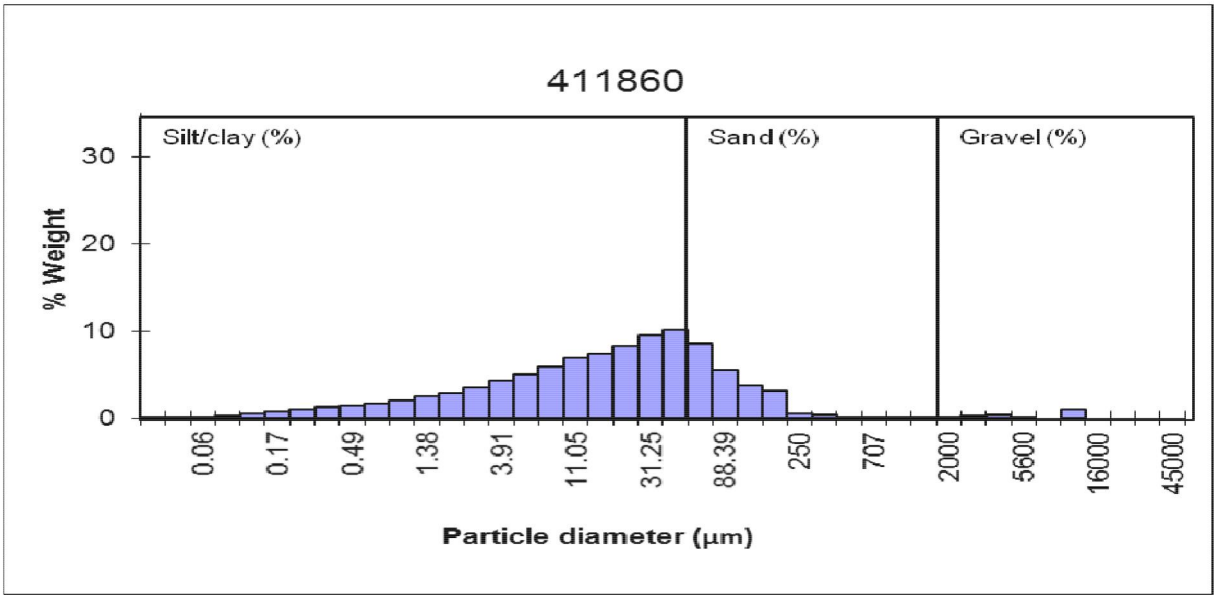

410217
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

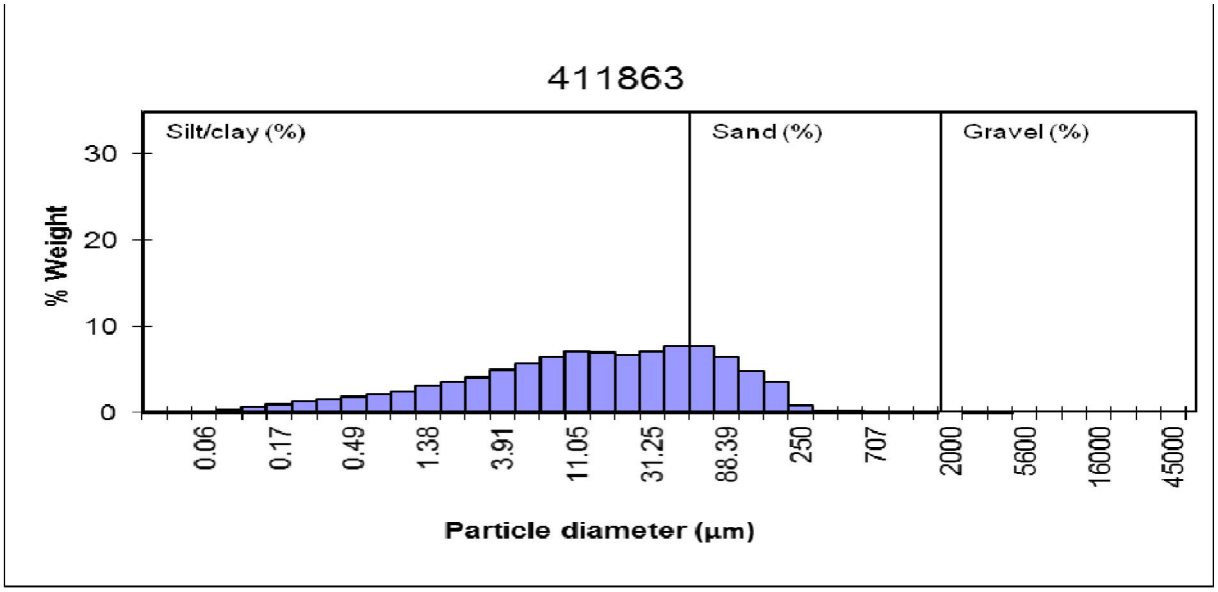

410219
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

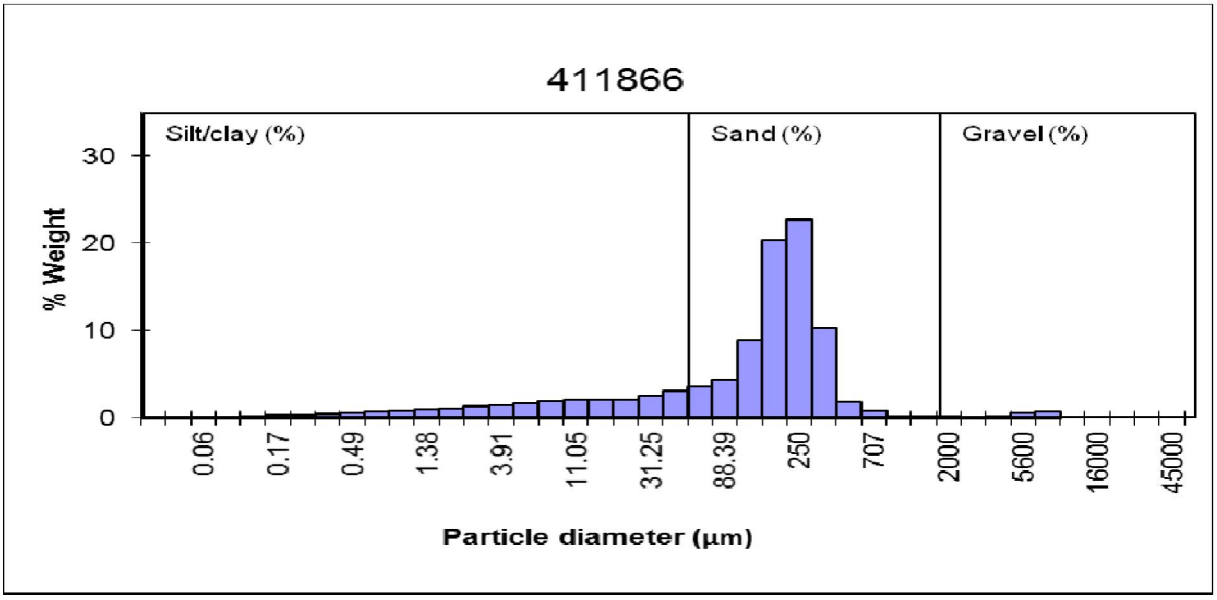

412533
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
50
40
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


412536
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


412538
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


411860
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


411863
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


411866
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

XCHEM16W		Visual description
Sample Reference	**Job number**	
408439 (BHCW01 0.5-0.65m)	17 - 02862	Thick, dark brown/black, sandy mud containing organic fragments. Sample smelt of fuel?.
408441 (BHCW01 1.5-1.65m)		Thick, dark brown/black, slightly sandy mud containing organic fragments including black fragments (coal?). Sample smelt of fuel?.
408443 (BHCW01 2.5-2.65m)		Thick, sticky, dark brown, slightly sandy mud/clay containing several black fragments (coal?).
405570 (BHCW02 0.0-0.15m)	17 - 02272	Sticky, dark brown/black, slightly sandy mud containing organic fragments. Sample smelt of fuel?.
405572 (BHCW02 1.0-1.15m)		Sticky, dark brown/black, slightly sandy mud containing organic fragments. Sample smelt of fuel?.
405576 (BHCW02 3.0-3.15m)		Sticky, dark brown/black, sandy mud containing some organic fragments. Sample smelt of fuel?.
410127 (BHCW03 0.0-0.15m)	17 - 03210	Brown, slightly gravelly, slightly muddy sand containing black fragments (coal?).
410130 (BHCW03 1.5-1.65m)		Brown, slightly gravelly, muddy sand containing black fragments (coal?).
410133 (BHCW03 3.0-3.15m)		Thick, sticky, brown, sandy mud/clay containing several black fragments (coal?).
410215 (BHCW04 0.0-0.15m)	17 - 03222	Thick, sticky, slightly gravelly, sandy mud/clay containing several black fragments (coal?).
410217 (BHCW04 1.5-1.65m)		Thick, sticky, brown, slightly sandy mud/clay.
410219 (BHCW04 2.5-2.65m)		Brown, slightly muddy sand containing black fragments (coal?).
412533 (BHCW05 0.0-0.15m)	17 - 03723	Thick, sticky, brown, slightly gravelly, slightly sandy mud/clay containing black fragments (coal?).
412536 (BHCW05 1.5-1.65m)		Thick, sticky, brown, slightly sandy mud containing black fragments (coal?).
412538 (BHCW05 3.0-3.15m)		Thick, sticky, brown, slightly sandy mud/clay containing several black fragments (coal?).
411860 (BHCW06 0.0-0.15m)	17 - 03596	Thick, sticky, brown, slightly gravelly, slightly sandy mud/clay containing several black fragments (coal?).
411863 (BHCW06 1.5-1.65m)		Thick, sticky, brown, slightly sandy mud/clay containing several black fragments (coal?).
411866 (BHCW06 3.0-3.15m)		Brown, slightly gravelly, muddy sand containing black fragments (coal?).

CONTRACT: XCHEM17C
Sample analysis completed by: C. LIMPENNY
Results validated by: C. MASON
No of Samples: 6
Deadline: 27/04/2017

Method of analysis: Visual description and PSA (NMBAQC method)
Visual description completed.
Subsample removed and laser diffraction completed on <1mm fraction.
The rest of the sample is split at 1mm and the >1mm dry sieved at 0.5φ intervals.
The <1mm is dried and weighed and used to calculate proportion of <1mm:>1mm.
Sieve and laser data are merged to produce a complete particle size (PS) distribution at 0.5φ intervals.

Mason, C. 2011. NMBAQC's Best Practice Guidance. Particle Size Analysis (PSA) for Supporting Biological Analysis. National Marine Biological AQC Coordinating Committee, 72pp, December 2011.

Notes:
Sample 411870/Job 17-0356 Amber glass bottle broken on receipt.

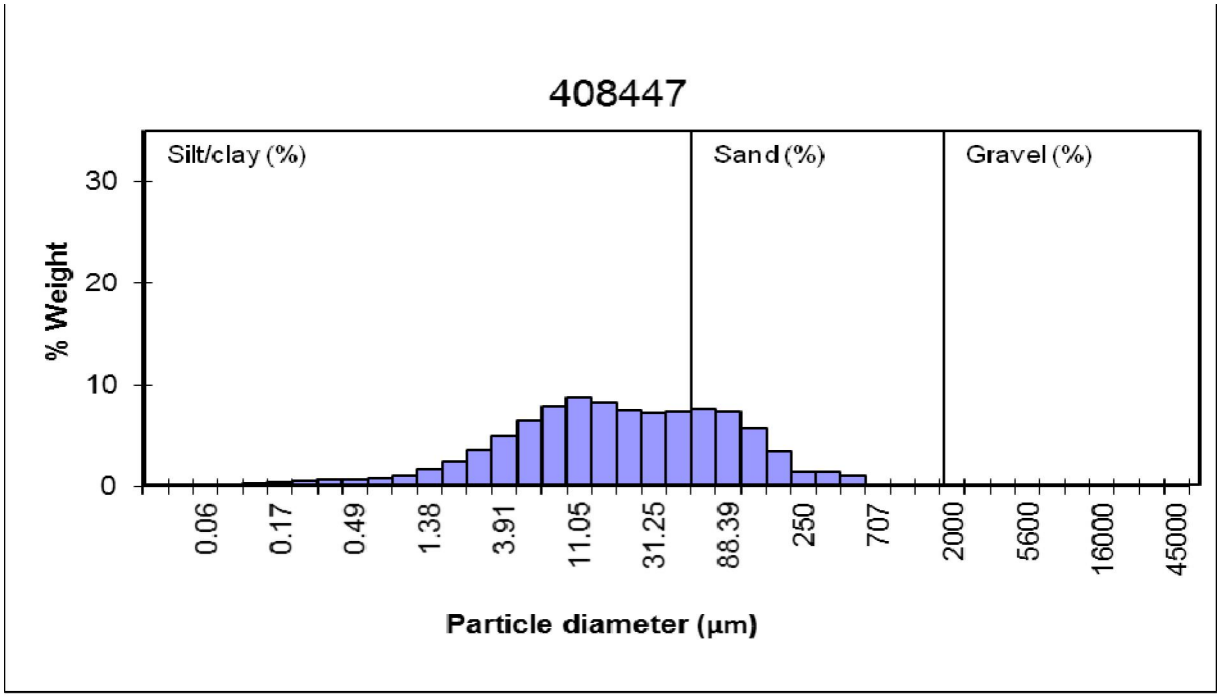
XCHEM16W			Gravel (%)	Sand (%)	Silt/ Clay (%)	Very coarse and coarse sand (%)	Medium sand (%)	Fine sand and very fine sand (%)
Sample Reference	**Job number**							
408447 (BHCW01 4.5-4.65m)	17-02862		0.05	28.37	71.58	1.16	2.76	24.45
405579 (BHCW02 5.0-5.15m)	17-02272		7.00	20.80	72.21	1.51	0.22	19.06
410137 (BHCW03 5.0-5.15m)	17-03210		62.36	31.78	5.86	14.78	11.50	5.50
410222 (BHCW04 4.0-4.15m)	17-03222		3.06	23.28	73.67	3.31	2.32	17.65
412540 (BHCW05 4.0-4.15m)	17-03723		1.10	15.01	83.89	0.10	0.65	14.26
411870 (BHCW06 5.0-5.15m)	17-03596		3.94	67.38	28.68	3.83	31.41	32.14

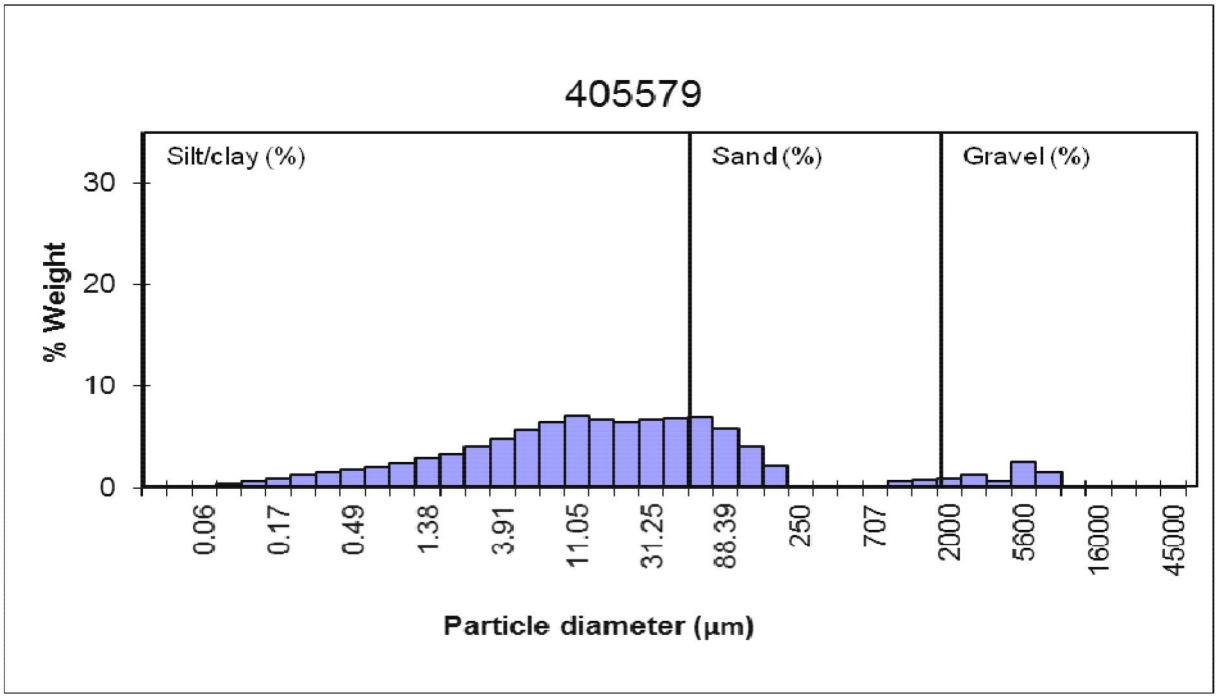
XCHEM16W		-5.5	-5	-4.5	-4	-3.5	-3	-2.5	-2	-1.5	-1	-0.5	0
Sample Reference	**Job number**	45mm	31.5mm	22.4mm	16mm	11.2mm	8mm	5.6mm	4mm	2.8mm	2mm	1.4mm	1mm
408447 (BHCW01 4.5-4.65m)	17-02862	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.03	0.03
405579 (BHCW02 5.0-5.15m)	17-02272	0.00	0.00	0.00	0.00	0.00	1.54	2.55	0.73	1.27	0.91	0.86	0.65
410137 (BHCW03 5.0-5.15m)	17-03210	0.00	0.00	12.81	3.39	13.51	9.95	8.21	5.83	5.36	3.31	2.51	1.56
410222 (BHCW04 4.0-4.15m)	17-03222	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.01	1.06	0.99	1.29	1.21
412540 BHCW05 4.0-4.15m)	17-03723	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	0.03	0.08	0.02
411870 (BHCW06 5.0-5.15m)	17-03596	0.00	0.00	0.00	0.00	0.00	1.25	1.47	0.46	0.42	0.34	0.27	0.21

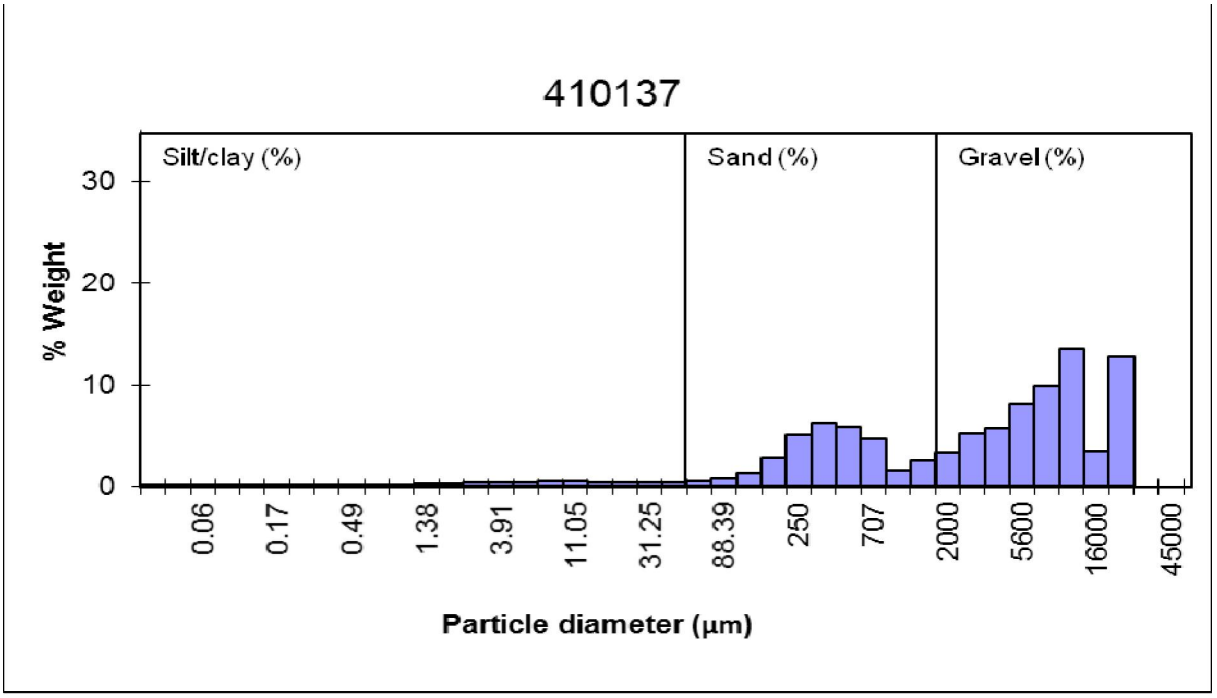
		0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Sample Reference	**Job number**	707um	500um	353.6um	250um	176.8um	125um	88.39um	63um	44.2um	31.3um	22.1um	15.6um
408447 (BHCW01 4.5-4.65m)	17-02862	0.03	1.07	1.39	1.37	3.44	5.86	7.45	7.70	7.43	7.27	7.60	8.34
405579 (BHCW02 5.0-5.15m)	17-02272	0.00	0.00	0.00	0.22	2.24	4.11	5.83	6.87	6.78	6.63	6.46	6.69
410137 (BHCW03 5.0-5.15m)	17-03210	4.85	5.87	6.29	5.21	2.84	1.28	0.79	0.59	0.47	0.45	0.45	0.49
410222 (BHCW04 4.0-4.15m)	17-03222	0.01	0.79	0.96	1.36	3.90	4.21	4.56	4.98	5.35	5.74	6.18	6.75
412540 BHCW05 4.0-4.15m)	17-03723	0.00	0.00	0.00	0.65	2.49	3.02	3.98	4.76	5.24	5.60	6.02	6.96
411870 (BHCW06 5.0-5.15m)	17-03596	1.21	2.14	10.37	21.03	17.03	7.14	4.30	3.67	3.15	2.65	2.29	2.39

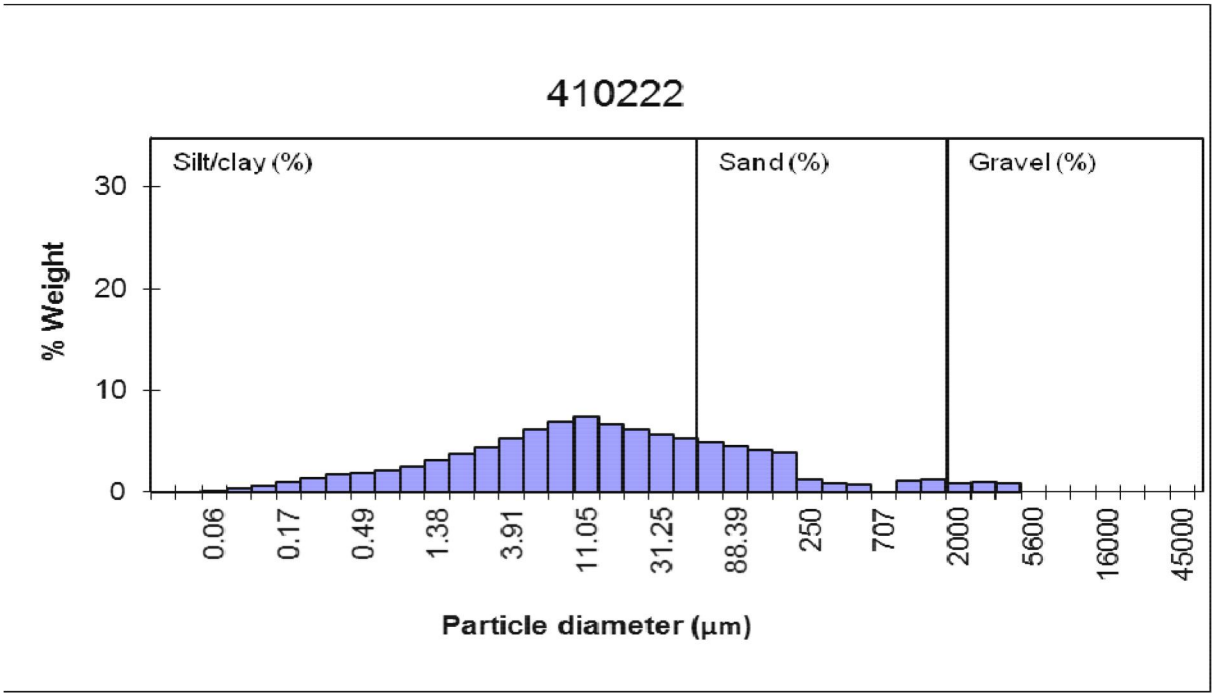
		6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12
Sample Reference	**Job number**	11um	7.8um	5.5um	3.9um	2.75um	1.95um	1.38um	0.98um	0.69um	0.49um	0.34um	0.24um
408447 (BHCW01 4.5-4.65m)	17-02862	8.79	7.97	6.60	5.07	3.59	2.44	1.63	1.11	0.84	0.73	0.66	0.57
405579 (BHCW02 5.0-5.15m)	17-02272	7.01	6.44	5.69	4.86	4.01	3.36	2.87	2.40	2.03	1.79	1.58	1.33
410137 (BHCW03 5.0-5.15m)	17-03210	0.54	0.52	0.49	0.44	0.38	0.33	0.28	0.24	0.19	0.16	0.14	0.11
410222 (BHCW04 4.0-4.15m)	17-03222	7.43	6.91	6.16	5.31	4.43	3.79	3.22	2.60	2.15	1.93	1.77	1.50
412540 (BHCW05 4.0-4.15m)	17-03723	8.09	7.87	7.43	6.62	5.55	4.78	4.11	3.36	2.79	2.50	2.28	1.90
411870 (BHCW06 5.0-5.15m)	17-03596	2.55	2.40	2.18	1.92	1.64	1.43	1.26	1.08	0.90	0.76	0.64	0.52

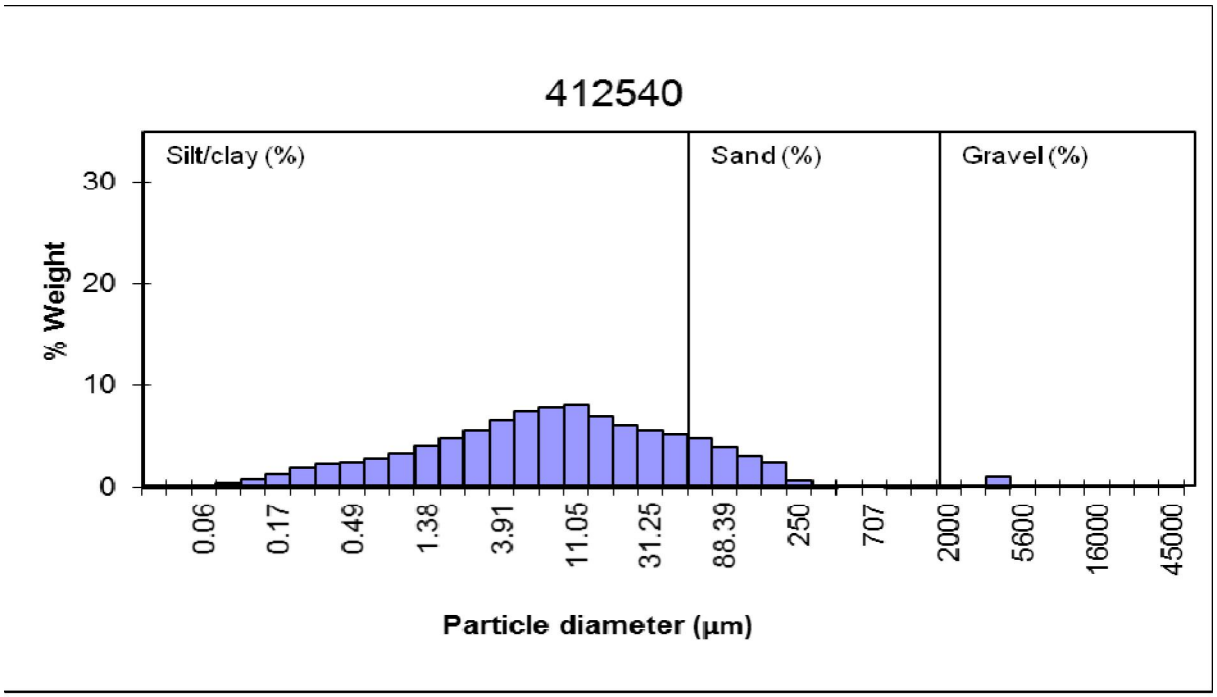
		12.5	13	13.5	14	14.5	>14.5
Sample Reference	**Job number**	0.17um	0.12um	0.09um	0.06um	0.04um	<0.04um
408447 (BHCW01 4.5-4.65m)	17-02862	0.42	0.29	0.17	0.06	0.01	0.00
405579 (BHCW02 5.0-5.15m)	17-02272	0.98	0.70	0.42	0.16	0.02	0.00
410137 (BHCW03 5.0-5.15m)	17-03210	0.08	0.06	0.04	0.02	0.00	0.00
410222 (BHCW04 4.0-4.15m)	17-03222	1.09	0.74	0.42	0.16	0.02	0.00
412540 (BHCW05 4.0-4.15m)	17-03723	1.31	0.84	0.44	0.16	0.02	0.00
411870 (BHCW06 5.0-5.15m)	17-03596	0.39	0.29	0.18	0.07	0.01	0.00

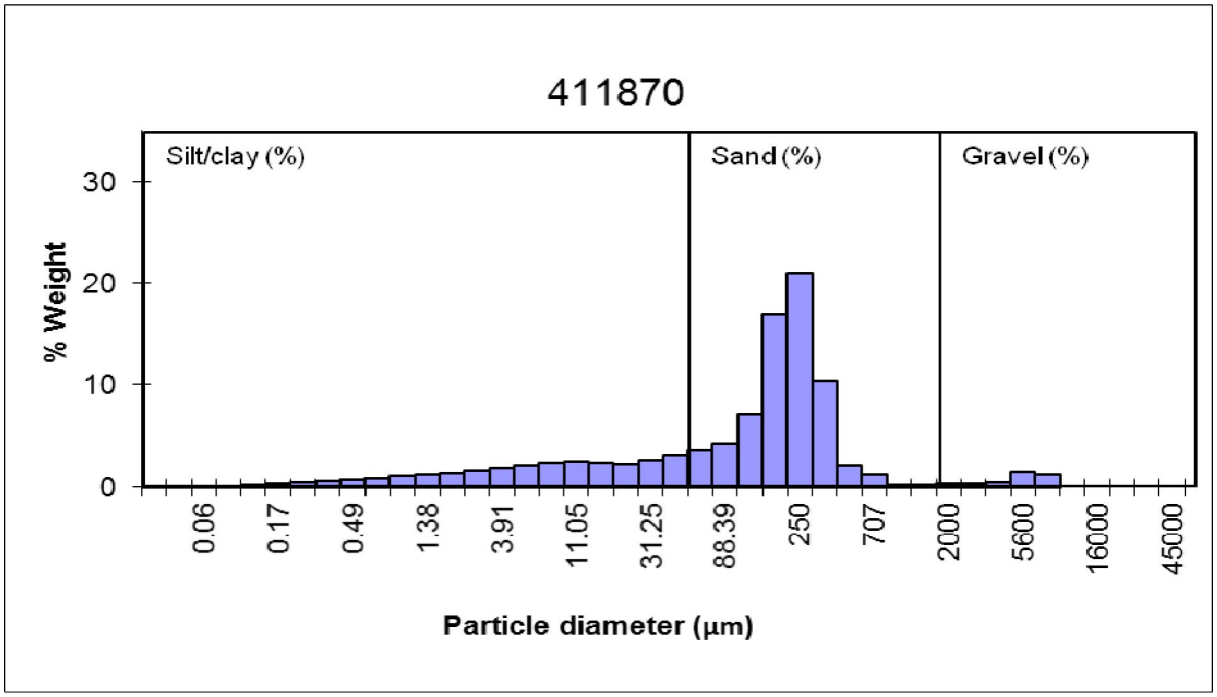

408447
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


405579
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


410137
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


410222
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


412540
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)


411870
Silt/clay (%)
Sand (%)
Gravel (%)
% Weight
30
20
10
0
0.06
0.17
0.49
1.38
3.91
11.05
31.25
88.39
250
707
2000
5600
16000
45000
Particle diameter (µm)

XCHEM16W		Visual description
Sample Reference	**Job number**	
408447 (BHCW01 4.5-4.65m)	17-02862	Thick, sticky, dark brown/black, sandy mud containing organic fragments.
405579 (BHCW02 5.0-5.15m)	17-02272	Thick, sticky, brown, slightly gravelly, slightly sandy mud/clay.
410137 (BHCW03 5.0-5.15m)	17-03210	Brown, slightly muddy, sandy gravel.
410222 (BHCW04 4.0-4.15m)	17-03222	Thick, sticky, brown, slightly gravelly, muddy (clay) sand.
412540 (BHCW05 4.0-4.15m)	17-03723	Thick, sticky, brown, slightly gravelly, slightly sandy mud/clay.
411870 (BHCW06 5.0-5.15m)	17-03596	Brown, slightly gravelly, muddy sand. Amber glass bottle broken on receipt.

Appendices

Appendix F – Screened Chemical Results

117086/DEP/170509 Issue 1

Project: 16-1197 City Deals over Water GI - Rothesay Dock																														
Client: Causeway Geotech Ltd				Chemtest Job No.:		Marine Scotland Disposal Criteria (Table 2 Action levels)		BHCW01	BHCW01	BHCW01	BHCW01	BHCW02	BHCW02	BHCW02	BHCW02	BHCW03	BHCW03	BHCW03	BHCW03	BHCW04	BHCW04	BHCW04	BHCW04	BHCW05	BHCW05	BHCW05	BHCW05	BHCW06	BHCW06	BHCW06	BHCW06
Quotation No.: Q16-07849				Chemtest Sample ID.:																										
Order No.:				Client Sample Ref.:																										
				Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):				0.50	1.50	2.50	4.50	0.0	1.0	3.0	5.0	0.00	1.50	2.50	4.00	0.00	1.50	3.00	5.00	0.0	1.5	3.0	4.0	0.00	1.50	3.00	5.00
				Bottom Depth (m):				0.65	1.65	2.65	4.65	0.15	1.15	3.15	5.15	0.15	1.65	2.65	4.15	0.15	1.65	3.15	5.15	0.15	1.65	3.15	4.15	0.15	1.65	3.15	5.15
				Date Sampled:				02-Feb-2017	02-Feb-2017	02-Feb-2017	02-Feb-2017	28-Jan-2017	28-Jan-2017	28-Jan-2017	28-Jan-2017	03-Feb-2017	03-Feb-2017	03-Feb-2017	03-Feb-2017	06-Feb-2017	06-Feb-2017	06-Feb-2017	06-Feb-2017	13-Feb-2017	13-Feb-2017	13-Feb-2017	13-Feb-2017	09-Feb-2017	09-Feb-2017	09-Feb-2017	09-Feb-2017
				Asbestos Lab':				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		**Revised AL1 mg/kg dry weight (ppm)**	**Revised AL2 mg/kg dry weight (ppm)**																								
Arsenic	M	2450	mg/kg	1		20	70	16	25	29	9.1	17	19	17	6.2	16	< 1.0	1.2	5.0	19	13	4.8	5.4	3.7	3.7	3.0	4.3	5.4	4.0	5.4	3.4
Cadmium	M	2450	mg/kg	0.1		0.4	4	0.96	1.6	2.3	0.47	1.1	1.3	1.5	< 0.10	0.35	0.27	0.37	< 0.10	0.15	0.16	0.10	< 0.10	0.25	0.19	0.14	< 0.10	0.14	0.10	0.10	< 0.10
Chromium	M	2450	mg/kg	1		50	370	170	280	410	110	220	300	280	46	32	6.4	28	35	31	65	51	19	26	35	14	29	34	28	36	20
Copper	M	2450	mg/kg	0.5		30	300	82	140	200	54	92	120	130	27	26	5.4	23	22	22	44	32	8.1	23	26	8.6	19	24	18	25	12
Mercury	M	2450	mg/kg	0.1		0.25	1.5	0.56	1.0	1.2	0.28	0.70	0.83	0.68	< 0.10	< 0.10	< 0.10	0.18	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.5		30	150	54	67	85	28	53	54	53	49	20	5.4	39	46	17	78	62	23	38	49	21	39	42	37	44	26.0
Lead	M	2450	mg/kg	0.5		50	400	130	230	300	80	160	210	200	19	610	28	14	13	45	33	20	7.9	18	17	6.9	10	13	12	15	6.5
Zinc	M	2450	mg/kg	0.5		130	600	320	520	670	190	490	380	400	84	160	22	67	65	110	120	85	46	290	150	36	55	66	50	70	39
Total Petroleum Hydrocarbons	N	2680	mg/kg	2		100	-	22	< 2.0	< 2.0	< 2.0	34	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Naphthalene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.40	0.43	0.31	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	0.43	< 0.010
Acenaphthylene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.80	0.27	0.46	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	0.76	< 0.010
Acenaphthene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.24	0.25	0.12	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Fluorene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.22	0.23	0.11	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	0.24	< 0.010
Phenanthrene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	0.25	< 0.010	< 0.010	< 0.010	< 0.010	0.70	0.53	0.35	< 0.010	0.82	< 0.010	< 0.10	< 0.010	< 0.10	0.31	< 0.10	< 0.010	< 0.010	< 0.10	0.54	< 0.010
Anthracene	N	2700	mg/kg	0.01		0.1	-	< 0.010	< 0.010	< 0.010	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.10	0.12	0.060	< 0.010	0.32	< 0.010	< 0.10	< 0.010	< 0.10	0.11	< 0.10	< 0.010	< 0.010	< 0.10	0.28	< 0.010
Fluoranthene	N	2700	mg/kg	0.01		0.1	-	< 0.010	0.88	3.5	0.32	0.84	1.2	0.84	< 0.010	0.35	0.29	0.17	< 0.010	0.55	< 0.010	< 0.10	< 0.010	< 0.10	0.19	< 0.10	< 0.010	0.26	0.22	0.26	< 0.010
Pyrene	N	2700	mg/kg	0.01		0.1	-	1.5	1.3	1.5	0.23	1.2	1.5	1.6	< 0.010	0.36	0.24	0.16	< 0.010	0.76	< 0.010	< 0.10	< 0.010	< 0.10	0.26	< 0.10	< 0.010	0.30	0.25	0.28	< 0.010
Benzo[a]anthracene	N	2700	mg/kg	0.01		0.1	-	0.58	0.76	1.1	< 0.010	0.83	0.76	1.5	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Chrysene	N	2700	mg/kg	0.01		0.1	-	1.6	1.1	0.98	< 0.010	2.0	2.1	2.1	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[b]fluoranthene	N	2700	mg/kg	0.01		0.1	-	1.3	< 0.010	< 0.010	< 0.010	0.78	0.70	1.6	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[k]fluoranthene	N	2700	mg/kg	0.01		0.1	-	0.35	< 0.010	< 0.010	< 0.010	0.46	0.40	0.76	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[a]pyrene	N	2700	mg/kg	0.01		0.1	-	0.82	< 0.010	< 0.010	< 0.010	0.78	0.70	1.1	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.01		0.1	-	0.37	< 0.010	< 0.010	< 0.010	1.1	2.2	0.95	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.01		0.01	-	0.98	< 0.010	< 0.010	< 0.010	0.73	1.2	0.34	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Benzo[g,h,i]perylene	N	2700	mg/kg	0.01		0.1	-	0.85	< 0.010	< 0.010	< 0.010	0.52	0.50	1.5	< 0.010	< 0.10	< 0.10	< 0.010	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.10	< 0.010	< 0.010	< 0.10	< 0.10	< 0.010
Total Of 16 PAH's	N	2700	mg/kg	0.2		-	-	8.4	4.0	7.1	0.81	9.2	11	12	< 0.20	3.1	2.4	1.7	< 0.20	2.5	< 0.20	< 2.0	< 0.20	< 2.0	0.87	< 2.0	< 0.20	0.56	< 2.0	2.8	< 0.20
Tributyl Tin	N	2730	mg/kg	0.01		0.1	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PCB 28	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	M	2815	mg/kg	0.01		0.02	0.18	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Concentration > AL1 Criteria
Concentration > AL2 Criteria
LOR >Disposal Criteria