

## **Appendix 11.8**

# **DOCK DEPOSIT DISTURBANCE**

## Design Note

Project The People's Project  
Subject Bramley-Moore Dock – Dock Deposit Disturbance  
Project no 0040026  
Date 21 August 2020

Revision	Description	Issued by	Date	Approved
P01	For Discussion	JR	03/12/19	RF
P02	Revised to take into account the omission of the geotechnical membrane	JR	10/06/20	RF
P03	Revised to address consultee comments	JR	11/08/20	RF
P04	Revised to address consultee comments	JR	21/08/20	RF

This ES technical appendix relating to the Dock Infill Methodology has been reviewed against the following aspects and for each it has been confirmed that there are no amendments required to the content of the appendix:

- Baseline data validity: there have been no relevant changes to the baseline data, and it remains valid;
- Legislation/policy revisions: there have been no related updates to legislation/policy that have affected either the methodology or findings of this assessment;

However, due to the proposed development design changes, specifically omission of the geotechnical membrane during the dock infill, the information presented in this report varies from that submitted as part of the original application submission principally in Section 1.0 and the conclusions / discussion outlined in Section 5.0.

A planning application (LPA ref. 20F/0001) for the proposed scheme was submitted to Liverpool City Council (LCC) in December 2019 and has been subject to statutory consultation. There were limited statutory consultee comments received in relation to the information presented in this appendix, only comments received from Centre for Environment, Fisheries and Aquaculture Science (CEFAS) required a response. As such, this revision includes further detail on the physical sediment data as requested.

## 1 Introduction

The applicant's Design Team have developed a methodology for dock filling that removes the need to dredge the deposits that were encountered at the bottom of the dock basin during the Phase 1 and Phase 2 site specific ground investigation.

In addition to programme savings, by not dredging, the dock deposits will not require off-site disposal (excluding pile arisings) which is a sustainable approach. There is also a subsequent reduction in the volume of imported material required as Bramley-Moore Dock (BMD) is effectively partially filled.

The proposed development at BMD requires the dock to be infilled for the purposes of constructing the proposed new Everton Football Stadium over the area of BMD.

It is necessary to rake the dock deposits in advance of the dock infilling. The raking procedure will aim to recover metallic objects or obstructions that would otherwise disrupt the piling operations.

The rake will be dragged from the back of a purpose built boat and will systematically track across the dock, moving objects towards the western wharf of BMD.

The recovered objects will be lifted ashore and appropriately disposed of depending on what is encountered. If debris is encountered that cannot be moved by the raking procedure, these will be marked for removal with other equipment.

Following the raking procedure, the dock will be infilled with dredged sand. The dredged material will be fluidised in a hopper and hydraulically pumped via the pipeline over the River Mersey wall to a spreader pontoon within BMD, and hydraulically placed into the dock. The layers will be placed systematically to avoid 'mud waves' of the dock deposits using winches to move the spreader pontoon in the appropriate direction to achieve this. The proposed material to infill the dock is anticipated to be dredged approximately 25 nautical miles from BMD and transferred using a trailer dredger. The location is shown in Appendix A. The proposed dredging concession is Area 457 and covered by Government Permission MA 234 issued 19<sup>th</sup> May 2008. Area 457 has a valid Crown Estate Production Agreement allowing for up to 1,200,000 tonnes to be extracted annually to an end date of 13<sup>th</sup> July 2025. Vibrocoring campaigns in Area 457 have been completed in 1997, 2009 and 2011, and grab sampling for benthic and particle size distribution on a more frequent basis. A full suite of geotechnical tests of grab samples within the proposed dredge area are currently being undertaken with results available in December 2019. It is unusual for aggregate winning concessions to have chemical testing owing to the end product being used for the aggregate of concrete. However, in 2009 Area 457 was dredged for reclamation and beach recharge projects resulting in chemical testing being undertaken. The results are presented in Appendix B. Appendix B has also been supplemented with the physical data (as requested by CEFAS) of the infilled sand that was dredged for geotechnical sampling and interpretation by the design team in December 2017. Samples within Appendix B identified as Mix 2 are taken from the dredging location proposed for the infill of Bramley-Moore Dock.

Disturbance of the dock deposits during raking and the infilling procedure has the potential for mobilisation of contamination which could impact on the water quality of the wider Port of Liverpool Dock System.

## 2 Aims and Objectives

This Design Note has the aim of:

- Assessing the risk to water quality during the raking procedure;
- Assessing the risk to water quality during the infilling procedure.

The above aim will be met through the following objectives:

- Present the spacing of the dock deposit sampling on a site specific plan (Appendix C);
- Outline the number of samples taken from the dock deposits;
- Present the results of the contamination testing of the dock deposits (Appendix D);
- Assess and compare the contaminant levels against the current Cefas action levels (<https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans>, accessed November 2019) to assess whether disturbance of the dock deposits during raking has the potential for mobilisation of contamination which could impact on the water quality of the wider Port of Liverpool Dock System;
- Undertake a gap analysis to compare what determinands have been tested against what is required by Cefas;
- Comment on the results, focusing on where Cefas levels are exceeded.

## 3 Relevant Works to Date

### 3.1 Sampling

Samples of dock deposits contained within Bramley-Moore Dock were obtained as part of a bathymetric survey, and later during a Phase 2 ground investigation. This sampling was undertaken during July 2017 and January 2018, respectively. This included:

- Bathymetric survey – analysis of three grab samples; and
- Phase 2 – analysis of 12 grab samples.

### 3.2 Analysis

The analysis undertaken and rationale for the adopted analysis suites are summarised in Table 1.

**Table 1 - Analysis suites and rationale.**

Sampling phase	Suite	Rationale
Bathymetric survey	<b>Solid analysis:</b> Asbestos screen, pH, CLEA metals suite, total cyanide, free cyanide, total mercury, phenol, glycols, speciated TPH including BTEX, VOCs, SVOCs, Soil Organic Matter, TBT.	Potential contaminants of concern identified in a Desk Study (BMD01-BHE-ZX-XX-RP-CG-0001)
Phase 2 ground investigation	<b>Solid analysis:</b> Asbestos screen, pH, CLEA metals suite, total cyanide, free cyanide, total mercury, phenol, glycols, speciated TPH including BTEX, Soil Organic Matter, organotin suite [dibutyltin, tributyltin, triphenyltin, tetrabutyltin], PAHs 16.	As above, plus proposed analysis for assessment of deposits contained within the adjacent Wellington Dock to:
	<b>Leachate analysis:</b> CLEA metals suite, TPH total, tributyltin, PAHs 16.	1) Demonstrate that the deposits were not considered Hazardous Waste; and 2) Were suitable to be dredged and deposited at Frodsham Lagoon*.

*\*Note: dredging of Bramley-Moore Dock with deposition of dock deposits at Frodsham Lagoon was being considered as a potential engineering solution at the time of specifying the Phase 2 ground investigation.*

## 4 Comparison with Cefas Guideline Action Levels

Concentrations of determinands analysed within the 15 grab samples of dock deposits were compared against Cefas Action Level 1 and Level 2 thresholds. The results are summarised in Table 2.

**Table 2 - Comparison of dock deposit analysis against Cefas Guideline Action Levels.**

Determinand (no. samples)	Action Level 1 (no. exceedances)	Action Level 2 (no. exceedances)	Concentrations		
			Min.	Max.	Mean
Arsenic (15)	20 (2)	100 (0)	2	31	11.4
Mercury (15)	0.3 (15)	3 (0)	0.39	2.88	1.4
Cadmium (15)	0.4 (13)	5 (0)	<0.2	2.6	1.2
Chromium (15)	40 (12)	400 (0)	15	90	59.2
Copper (15)	40 (15)	400 (0)	41	165	104.5
Nickel (15)	20 (12)	200 (0)	15	36	26.9
Lead (15)	50 (14)	500 (0)	46	500	152.7
Zinc (15)	130 (15)	800 (0)	137	549	312.5
Organotins: TBT, DBT, MBT (7)*	0.1 (1)	1 (0)	0.02	0.25	0.08
PCBs – sum of ICES 7 (0)	0.01	None	No analysis undertaken		
PCBs – sum of 25 congeners (0)	0.02	0.2	No analysis undertaken		
PAHs* (12)	0.1 (9)	None	<0.08	16.4	2.0
DDT (0)	0.001		No analysis undertaken		
Dieldrin (0)	0.005		No analysis undertaken		

\*Comparison with sum of concentrations for tributyl tin, dibutyl tin, triphenyl tin and tetrabutyl tin.

\*Comparison with Total USEPA 16 PAHs concentration.

In general, contaminant concentrations in dredged material below Action Level 1 are considered to be of no concern and are unlikely to influence the licensing decision by the MMO. Dredged material with contaminant concentrations above Action Level 2 are generally considered unsuitable for sea disposal, suggesting that disturbance of the dock deposits during raking has the potential for mobilisation of contamination leading to a potential adverse impact on the water quality of the wider Port of Liverpool Dock System.

For metals (except arsenic) and PAHs, the majority of concentrations in the samples exceeded their respective Action Level 1 thresholds. For metals, the mean concentration was generally not significantly elevated above Action Level 1 (between 1.35 times for nickel and 4.6 times for mercury). For PAHs, the mean concentration was 20 times Action Level 1. Occasional samples exceeded the Action Level 1 for arsenic and organotins; however, the mean concentrations were below their respective thresholds.

It was not considered necessary to undertake analysis for DDT or dieldrin as they are not considered contaminants of concern based on known historical uses of the dock and surrounding uses. Although PCBs are likely to have been historically used within one of the outhouse structures on the wharf, the site walkover did not observe significant staining or cracking of the concrete floor slab suggesting risk of impact to underlying ground is low. Therefore, analysis of PCBs was also considered unnecessary.

In summary, following analysis of the 15 dock deposit samples, exceedances of Cefas Action Level 1 were reported for the determinands analysed; however, no exceedances were reported of Action Level 2.

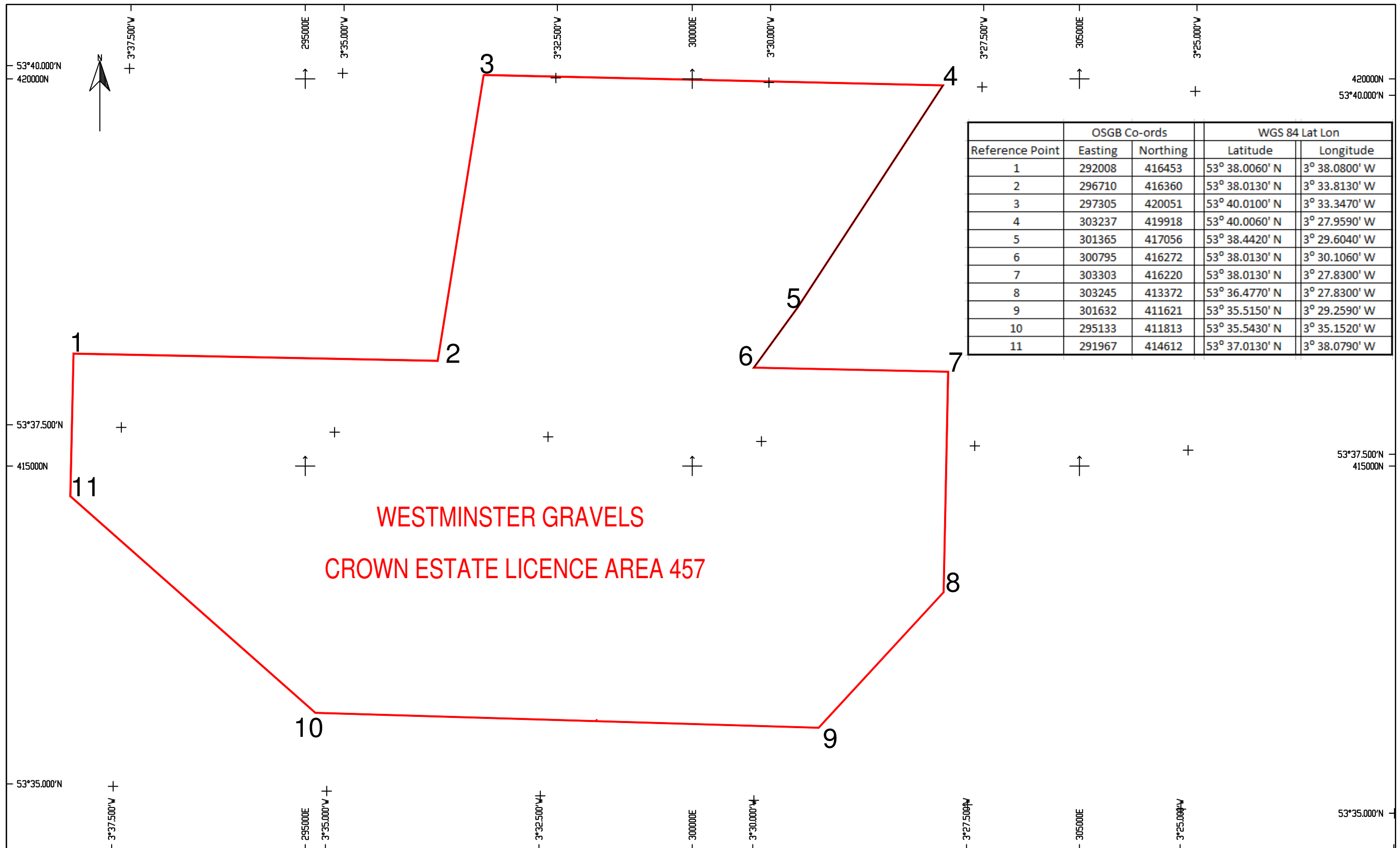
## 5 Discussion

Discussions were undertaken between the MMO and BuroHappold on 17<sup>th</sup> November 2019 where it was agreed that exceedances above Action Level 2 would require a mitigation measure (such as a silt curtain). As shown in Table 2, the majority of determinands for which analysis has been undertaken recorded mean concentrations between Cefas Guideline Action Level 1 and Action Level 2 with no exceedances of Action Level 2.

Owing to no exceedances above Action Level 2, and the justification of why some determinands were not tested, it is not believed that mitigation measures are required in advance of the raking and the infilling procedure. This is supported further by the requirement of the dock infill contractor having to adhere to the requirement of *careful placement and specific construction methodology to reduce the risk of mud waves and mixing of deposits* which will form part of the project's contractual performance specification.

The summary of consultation responses to the planning application are outlined in Table 10.2 of the Ground Conditions and Contamination (Chapter 10) ES chapter alongside the associated commentary. This includes the CEFAS response that has been addressed in this document.

## Appendix A: Sand Winning Area



 <p><b>Boskalis Westminister Ltd</b>          Westminster House          Crumpton Way          Farnham          FD15 5BB          T: 01489 885933          E: bwl@boskalis.com</p>			 <p>BRAMLEY MOORE DOCK INFILLING</p>	<p>Title: <b>BOSKALIS WESTMINSTER SAND WINNING AREA</b></p> <p>Survey Date:          Issue Date: 20191004          Drawing Number: F_Area457_19-10-04a_001          Scale: 1: 50000</p>
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**Appendix B: Sand Laboratory Results**



## ALcontrol Laboratories Analytical Services Sample Descriptions

**Job Number:** 09/10790/02/01

**Client:** BOSKALIS

**Client Ref :**

### Grain sizes

<0.063mm      Very Fine

0.1mm - 0.063mm Fine

0.1mm - 2mm      Medium

2mm - 10mm      Coarse

>10mm                      Very Coarse

[illegible]

\* These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials-whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

<sup>1</sup> Sample Description supplied by client

ALcontrol Laboratories - Table Of Results										
Job Number:	09/10790/02/01									
Client:	BOSKALIS									
Client Ref:										
Matrix:	SOLID									
All results expressed on a dry weight basis.										
		Sample Identity	VC 3	VC 10	VC 13	VC 20A	VC 21	VC 28		
		Depth	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.14-0.50	0.00-0.45		
		Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
		Sample Received Date	01/10/2009	01/10/2009	01/10/2009	01/10/2009	01/10/2009	01/10/2009		
		Sampled Date								
		Batch	1	1	1	1	1	1		
		Sample Number(s)	1	2	3	4	5	6		
		Method	Units	Method Detection Limit						
Arsenic	TM129	mg/kg	<3.0	9	6	8	11	12		
Cadmium	TM129	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Chromium	TM129	mg/kg	<4.5	6.9	<4.5	5.6	9.7	9.0		
Copper	TM129	mg/kg	<6	<6	<6	<6	<6	<6		
Lead	TM129	mg/kg	<2	13	6	6	11	9		
Mercury	TM129	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4		
Nickel	TM129	mg/kg	<0.9	5.7	4.2	5.4	9.4	8.3		
Selenium	TM129	mg/kg	<3	<3	<3	<3	<3	<3		
Zinc	TM129	mg/kg	<2.5	32	18	17	31	31		
Total Organic Carbon	TM132	%	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
TPH C6-40	TM154	mg/kg	<10	<10	<10	<10	<10	<10		
PCB 7 Congeners										
PCB congener 28	TM168	ug/kg	<3	<3	<3	<3	<3	<3		
PCB congener 52	TM168	ug/kg	<3	<3	<3	<3	<3	<3		
PCB congener 101	TM168	ug/kg	<3	<3	<3	<3	<3	<3		
PCB congener 118	TM168	ug/kg	<3	<3	<3	<3	<3	<3		
PCB congener 153	TM168	ug/kg	<3	<3	<3	<3	<3	<3		
PCB congener 138	TM168	ug/kg	<3	<3	<3	<3	<3	<3		
PCB congener 180	TM168	ug/kg	<3	<3	<3	<3	<3	<3		





Validated ☒  
Preliminary ☐

# ALcontrol Laboratories Analytical Services

## Table Of Results

# ISO 17025 accredited  
M MCERTS accredited  
\* Subcontracted test  
» Shown on prev. report

**Job Number:** 09/10790/02/01  
**Client:** BOSKALIS  
**Client Ref. No.:**

**Matrix:** SOLID  
**Location:** MARINE SAMPLES  
**Client Contact:** Ian Taylor

Sample Identity	VC 3	VC 10	VC 13	VC 20A	VC 21	VC 28				Method Code	LoD/Units
Depth (m)	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.14-0.50	0.00-0.45					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date											
Sample Received Date	01.10.09	01.10.09	01.10.09	01.10.09	01.10.09	01.10.09					
Batch	1	1	1	1	1	1					
Sample Number(s)	1	2	3	4	5	6					
Arsenic	9	6	8	6	11	12				TM129 <sup>#</sup> <sub>M</sub>	<3.0 mg/kg
Cadmium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				TM129	<0.2 mg/kg
Chromium	6.9	<4.5	5.6	5.6	9.7	9.0				TM129 <sup>#</sup> <sub>M</sub>	<4.5 mg/kg
Copper	<6	<6	<6	<6	<6	<6				TM129 <sup>#</sup> <sub>M</sub>	<6 mg/kg
Lead	13	6	6	11	9	12				TM129 <sup>#</sup> <sub>M</sub>	<2 mg/kg
Mercury	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4				TM129 <sup>#</sup> <sub>M</sub>	<0.4 mg/kg
Nickel	5.7	4.2	5.4	5.4	9.4	8.3				TM129 <sup>#</sup> <sub>M</sub>	<0.9 mg/kg
Selenium	<3	<3	<3	<3	<3	<3				TM129 <sup>#</sup> <sub>M</sub>	<3 mg/kg
Zinc	32	18	17	23	31	31				TM129 <sup>#</sup> <sub>M</sub>	<2.5 mg/kg
Total Organic Carbon	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				TM132 <sup>#</sup> <sub>M</sub>	<0.2 %
IPH C6-40	<10	<10	<10	<10	<10	<10				TM154 <sup>#</sup>	<10 mg/kg
<b>PCB 7 Congeners</b>											
PCB congener 28	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 52	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 101	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 118	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 153	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 138	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 180	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
Total of 7 Congener PCBs	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg

All results expressed on a dry weight basis.

Date 03.11.2009

Validated ☒  
Preliminary ☐

# ALcontrol Laboratories Analytical Services

## Table Of Results

# ISO 17025 accredited  
M MCERTS accredited  
\* Subcontracted test  
» Shown on prev. report

Job Number: 09/10790/02/01  
Client: BOSKALIS  
Client Ref. No.:

Matrix: SOLID  
Location: MARINE SAMPLES  
Client Contact: Ian Taylor

Sample Identity	VC 3	VC 10	VC 13	VC 20A	VC 21	VC 28				Method Code	LoD Units
Depth (m)	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.14-0.50	0.00-0.45					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date											
Sample Received Date	01.10.09	01.10.09	01.10.09	01.10.09	01.10.09	01.10.09					
Batch	1	1	1	1	1	1					
Sample Number(s)	1	2	3	4	5	6					
<b>PCB WHO 12 Congeners</b>											
PCB congener 77	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 81	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 105	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 114	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 118	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 123	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 126	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 156	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 157	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 167	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 169	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
PCB congener 189	<3	<3	<3	<3	<3	<3				TM168 <sup>#</sup>	<3 ug/kg
Tributyl Tin*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					mg/kg
Triphenyl Tin*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					mg/kg
Dibutyl Tin*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					mg/kg

All results expressed on a dry weight basis.

Date 03.11.2009

Validated ☒  
Preliminary ☐

# ALcontrol Laboratories Analytical Services

## Table Of Results

# ISO 17025 accredited  
M MCERTS accredited  
\* Subcontracted test  
» Shown on prev. report

Job Number: 09/10790/02/01  
Client: BOSKALIS  
Client Ref. No.:

Matrix: SOLID  
Location: MARINE SAMPLES  
Client Contact: Ian Taylor

Sample Identity	VC 3	VC 10	VC 13	VC 20A	VC 21	VC 28				Method Code	LoD/Units
Depth (m)	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.14-0.50	0.00-0.45					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date											
Sample Received Date	01.10.09	01.10.09	01.10.09	01.10.09	01.10.09	01.10.09					
Batch	1	1	1	1	1	1					
Sample Number(s)	1	2	3	4	5	6					
<b>OCP</b>											
Teconazene	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Trifluralin	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Alpha-BHC (Lindane)	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Hexachlorobenzene	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Beta-BHC (Lindane)	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Gamma-BHC (Lindane)	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Quintozone (PCNB)	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Triallate	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Chlorothalonil	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Heptachlor	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Aldrin	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Triadimefon	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Felodrin	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Isodrin	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Pendimethalin	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Heptachlor Epoxide	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
trans-Chlordane	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
o,p'-DDE	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Endosulphan I	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
cis-Chlordane	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
p,p'-DDE	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Dieldrin	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
p,p'-TDE(DDD)	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Endrin	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Endosulphan II	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
o,p'-TDE(DDD)	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
o,p'-DDT	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
p,p'-DDT	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
Endosulphan sulphate	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg
o,p'-Methoxychlor	<1	<1	<1	<1	<1	<1				TM144	<1 ug/kg

All results expressed on a dry weight basis.

Date 03.11.2009

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11

## Table Of Results

» Shown on prev. report

**Client Contact:** Ian Taylor

[illegible]

**All results expressed on a dry weight basis.**

Date 03.11.2009



## Table Of Results - Appendix

**Job Number:** 09/10790/02/01

**Client:** BOSKALIS

**Client Ref. No.:**

**Report Key :**

Results expressed as (e.g.) 1.03E-07 is equivalent to  $1.03 \times 10^{-7}$

NDP No Determination Possible

\* Subcontracted test

ACM Asbestos Containing Material

» Result previously reported (Incremental reports only)

# ISO 17025 accredited

M MCERTS Accredited

EC      Equivalent Carbon (Aromatics C8-C35)

**Note:** Method detection limits are not always achievable due to various circumstances beyond our control.

### **Summary of Method Codes contained within report :**

[illegible]

<sup>1</sup> Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. **NA** = not applicable.

WET indicates samples analysed as submitted.

## ALcontrol Laboratories Analytical Services Table Of Results - Appendix

**Job Number:** 09/10790/02/01

**Client:** BOSKALIS

**Client Ref. No.:**

### Summary of Coolbox temperatures

[illegible]

## Analytical Report


ALcontrol Geochem  
Unit7-8, Hawarden Business Park  
Manor Road (off Manor Lane)  
Hawarden, Deeside  
Flintshire, CH5 3US

Report No: 09-15024/1  
Date Received: 07/10/2009  
Date Tested: 13/10/2009 to 19/10/2009  
Date Issued: 19/10/2009  
Page: 1 of 1  
By email

For the attention of: **Martin Cotterell**

6 soil samples received from ALcontrol Geochem (O/N: 125837; Project: 09/10796b1) in plastic sample bags were analysed as shown below. Analytical methods employed are available on request. Results are reported on an as received basis unless otherwise specified.

Laboratory reference	Client reference	Other reference	dibutyltin mg/kg Sn 1002-53-5	tributyltin mg/kg Sn 56573-85-4	triphenyltin mg/kg Sn 668-34-8
158785	1	n/a	< 0.05	< 0.05	< 0.05
158786	2	n/a	< 0.05	< 0.05	< 0.05
158787	3	n/a	< 0.05	< 0.05	< 0.05
158788	4	n/a	< 0.05	< 0.05	< 0.05
158789	5	n/a	< 0.05	< 0.05	< 0.05
158790	6	n/a	< 0.05	< 0.05	< 0.05

  
**Robin T R Macdonald**  
Director

Notes	Test Method
	1. Gas jar : BS1377 : Part 2 : 1990 Clause 8.2
	2. Pycnometer : BS EN ISO 17892-3:2015

S Burke - Senior Technician  
22/02/2018

Project Name:

**PROJECT BLUE**  
**40026**



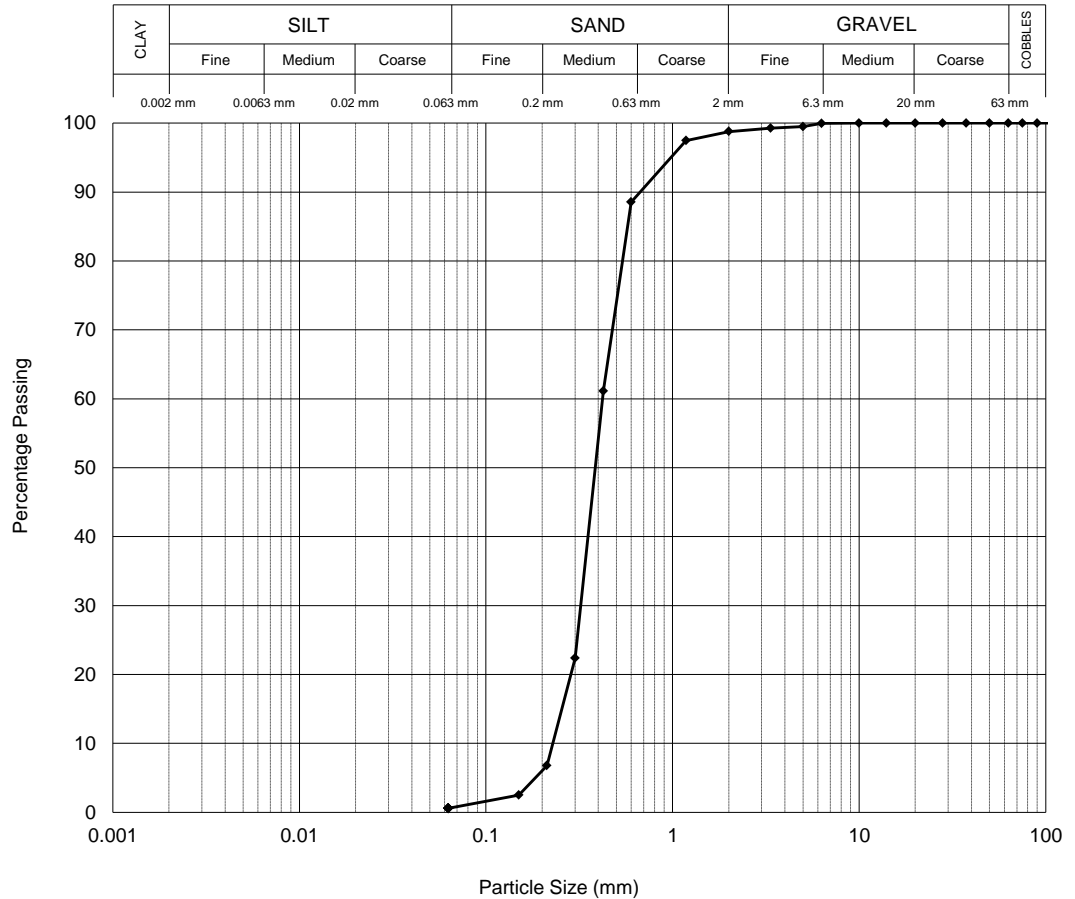
**PARTICLE SIZE DISTRIBUTION**BH / TP No.  
Sample TypeMix 2 - 1  
B

## Description

Greyish brown SAND with shell fragments.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	99
3.35 mm	99
2.00 mm	99
1.18 mm	97
600 µm	89
425 µm	61
300 µm	22
212 µm	7
150 µm	3
63 µm	1



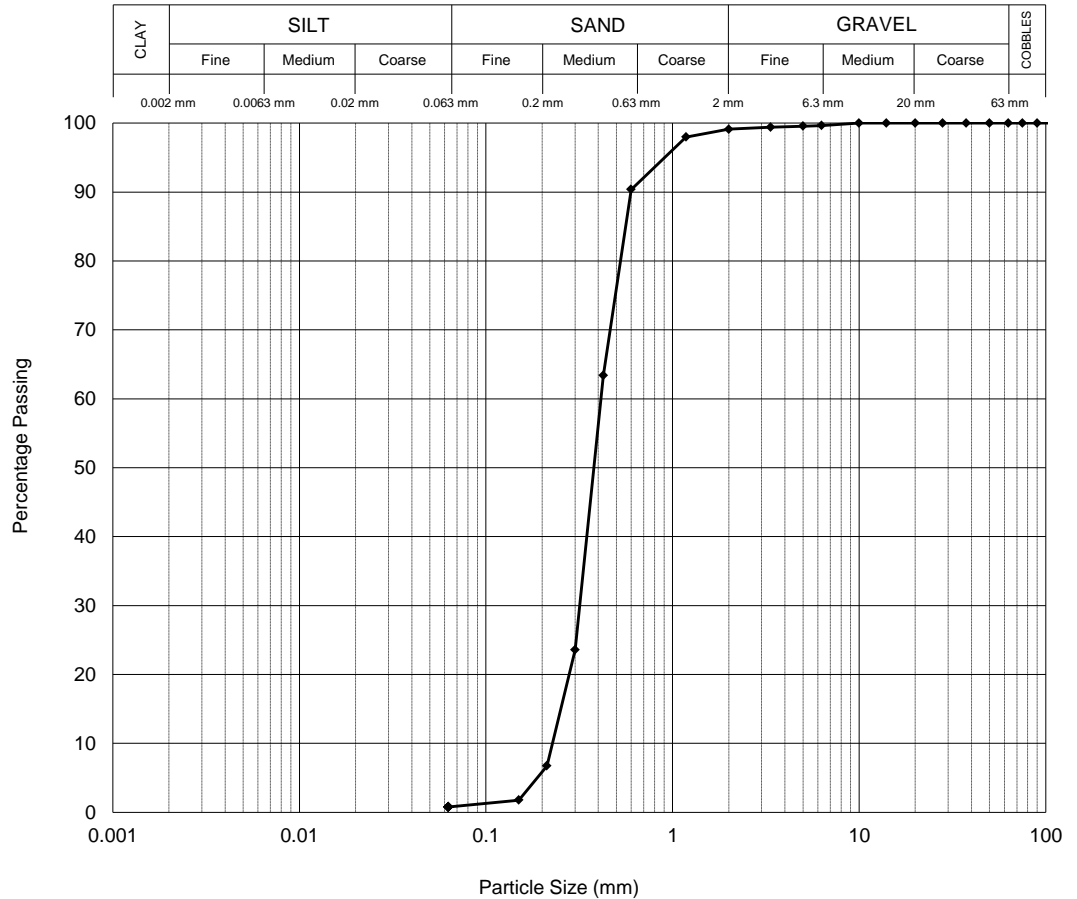
**PARTICLE SIZE DISTRIBUTION**BH / TP No.  
Sample TypeMix 2 - 2  
B

## Description

Brown slightly SAND with shell fragments.

## BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	99
2.00 mm	99
1.18 mm	98
600 µm	90
425 µm	63
300 µm	24
212 µm	7
150 µm	2
63 µm	1



Particle Proportions	
Cobbles	0
Gravel	1
Sand	98
Silt & Clay	1

Checked and Approved by

J Sturges - Operations Manager  
22/02/2018

Project Number:

GEO / 27050

Project Name:

PROJECT BLUE  
040026

GEOLABS®



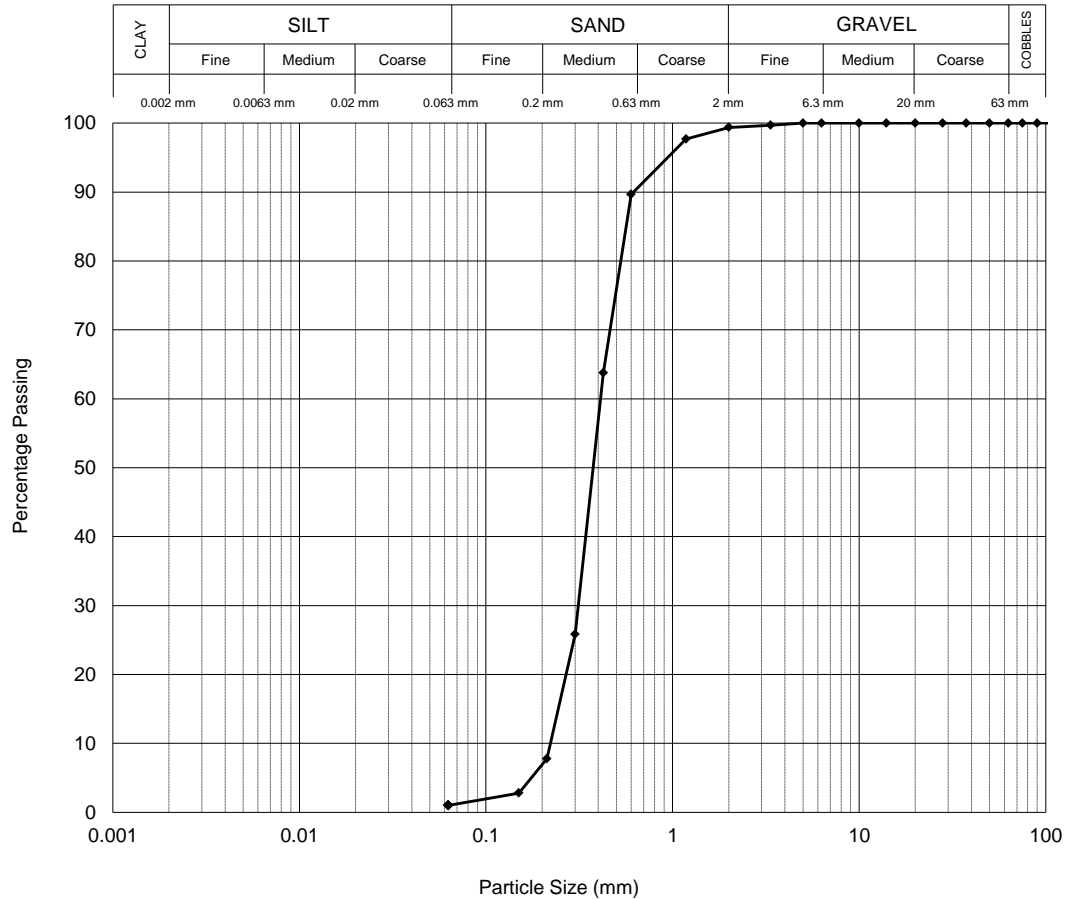
**PARTICLE SIZE DISTRIBUTION**BH / TP No.  
Sample TypeMix 2 - 3  
B

## Description

Greyish brown SAND with shell fragments.

## BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	99
1.18 mm	98
600 µm	90
425 µm	64
300 µm	26
212 µm	8
150 µm	3
63 µm	1



Particle Proportions	
Cobbles	0
Gravel	1
Sand	98
Silt & Clay	1

Checked and Approved by

J Sturges - Operations Manager  
22/02/2018

Project Number:

GEO / 27050

Project Name:

PROJECT BLUE  
040026

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## Appendix C: Dock Deposit Sampling Plan

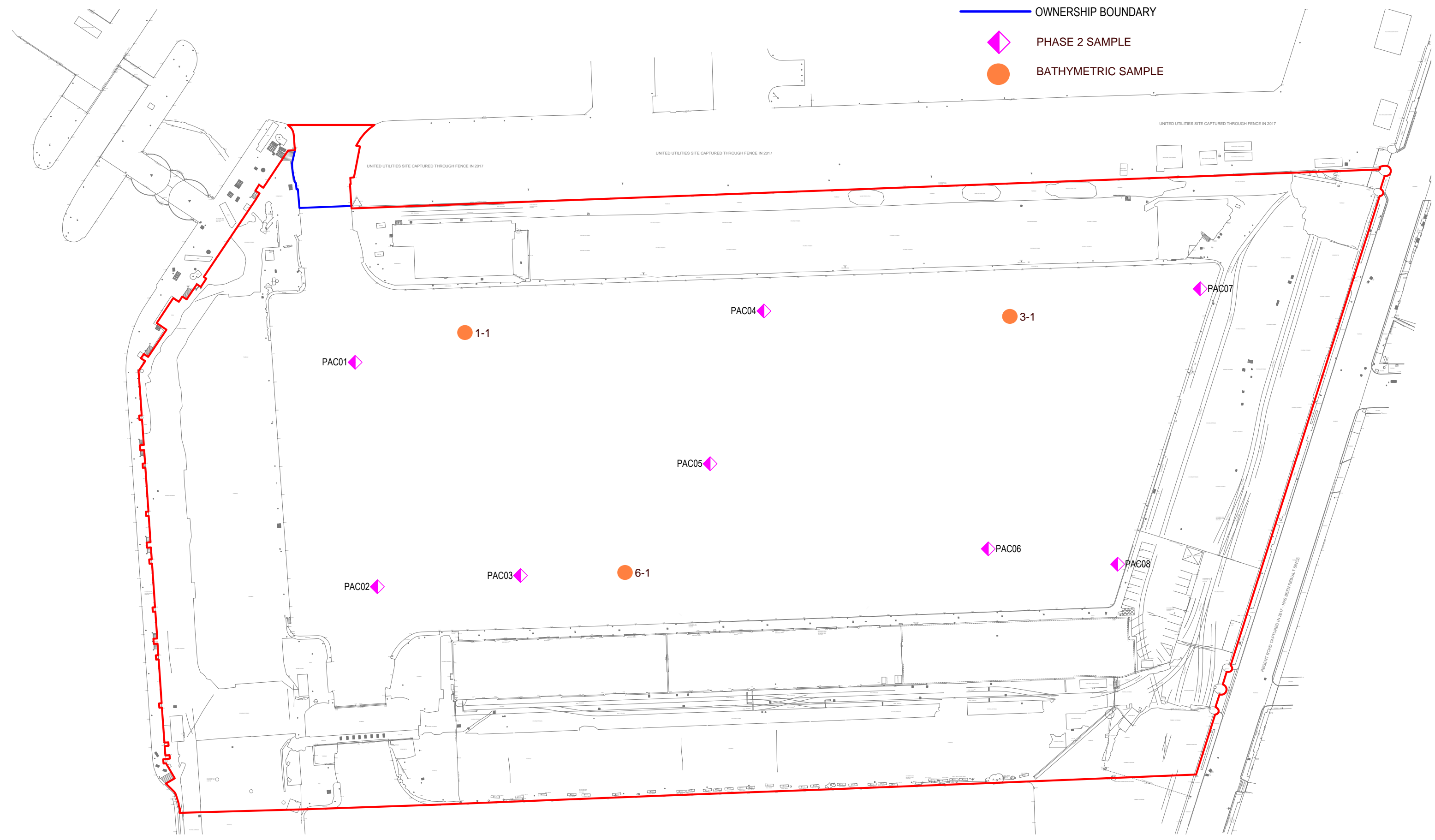


PLANNING APPLICATION SITE BOUNDARY

OWNERSHIP BOUNDARY

PHASE 2 SAMPLE

BATHYMETRIC SAMPLE



## **Appendix D: Dock Deposit Contamination Results**



**Peter Woolley**

Geotechnical Engineering Ltd  
Centurion House  
Olympus Park  
Quedgeley  
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GL2 4NF

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## **Analytical Report Number : 17-54291**

<b>Project / Site name:</b>	Project Blue	<b>Samples received on:</b>	13/07/2017
<b>Your job number:</b>	33138	<b>Samples instructed on:</b>	13/07/2017
<b>Your order number:</b>	33138-PW	<b>Analysis completed by:</b>	20/07/2017
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	20/07/2017
<b>Samples Analysed:</b>	1 soil sample		

**Signed:**

Dr Irma Doyle  
Senior Account Manager  
**For & on behalf of i2 Analytical Ltd.**

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 17-54291

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				782023				
Sample Reference				6				
Sample Number				1				
Depth (m)				None Supplied				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	44				
Total mass of sample received	kg	0.001	NONE	0.47				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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#### General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	5500				
Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)	mg/kg	2.5	MCERTS	5000				
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	2480				
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	13000				
Total Sulphur	mg/kg	50	MCERTS	7200				
Ammonium as NH <sub>4</sub>	mg/kg	0.5	MCERTS	3.8				
Ammonium as NH <sub>4</sub> (leachate equivalent)	mg/l	0.05	MCERTS	0.4				
Organic Matter	%	0.1	MCERTS	4.2				
Water Soluble Nitrate (2:1) as NO <sub>3</sub>	mg/kg	2	NONE	< 2.0				
Water Soluble Nitrate (2:1) as NO <sub>3</sub> (leachate equivalent)	mg/l	5	NONE	< 5.0				

#### Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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#### Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	31				
Boron (water soluble)	mg/kg	0.2	MCERTS	17				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.1				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	82				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	140				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	150				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2.1				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	440				
Magnesium (water soluble)	mg/kg	5	NONE	1100				
Magnesium (leachate equivalent)	mg/l	2.5	NONE	570				

Analytical Report Number: 17-54291

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				782023				
Sample Reference				6				
Sample Number				1				
Depth (m)				None Supplied				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

#### Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

#### Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	24				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	86				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	270				
<b>TPH-CWG - Aliphatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	380				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	22				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	140				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	540				
<b>TPH-CWG - Aromatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	710				

Analytical Report Number: 17-54291

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number	782023						
Sample Reference	6						
Sample Number	1						
Depth (m)	None Supplied						
Date Sampled	Deviating						
Time Taken	None Supplied						
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

#### VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0			
Chloroethane	µg/kg	1	NONE	< 1.0			
Bromomethane	µg/kg	1	ISO 17025	< 1.0			
Vinyl Chloride	µg/kg	1	NONE	< 1.0			
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0			
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0			
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0			
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0			
Trichloromethane	µg/kg	1	MCERTS	< 1.0			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0			
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0			
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0			
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0			
Benzene	µg/kg	1	MCERTS	< 1.0			
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0			
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0			
Trichloroethene	µg/kg	1	MCERTS	< 1.0			
Dibromomethane	µg/kg	1	MCERTS	< 1.0			
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0			
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0			
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0			
Tetrachloroethene	µg/kg	1	NONE	< 1.0			
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0			
Chlorobenzene	µg/kg	1	MCERTS	< 1.0			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0			
p & m-Xylene	µg/kg	1	MCERTS	< 1.0			
Styrene	µg/kg	1	MCERTS	< 1.0			
Tribromomethane	µg/kg	1	NONE	< 1.0			
o-Xylene	µg/kg	1	MCERTS	< 1.0			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0			
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0			
Bromobenzene	µg/kg	1	MCERTS	< 1.0			
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0			
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0			
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0			
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0			
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0			
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0			
Butylbenzene	µg/kg	1	MCERTS	< 1.0			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0			
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0			

Analytical Report Number: 17-54291

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				782023				
Sample Reference				6				
Sample Number				1				
Depth (m)				None Supplied				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1				
Phenol	mg/kg	0.2	ISO 17025	< 0.2				
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1				
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2				
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2				
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1				
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2				
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1				
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3				
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05				
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3				
4-Methylphenol	mg/kg	0.2	NONE	< 0.2				
Isophorone	mg/kg	0.2	MCERTS	< 0.2				
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3				
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3				
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3				
Naphthalene	mg/kg	0.05	MCERTS	0.17				
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3				
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1				
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1				
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1				
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1				
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2				
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1				
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1				
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1				
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1				
Acenaphthylene	mg/kg	0.05	MCERTS	0.24				
Acenaphthene	mg/kg	0.05	MCERTS	0.14				
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2				
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2				
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3				
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2				
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2				
Fluorene	mg/kg	0.05	MCERTS	0.29				
Azobenzene	mg/kg	0.3	MCERTS	< 0.3				
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2				
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3				
Phenanthrene	mg/kg	0.05	MCERTS	0.62				
Anthracene	mg/kg	0.05	MCERTS	0.33				
Carbazole	mg/kg	0.3	MCERTS	< 0.3				
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2				
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3				
Fluoranthene	mg/kg	0.05	MCERTS	1.2				
Pyrene	mg/kg	0.05	MCERTS	1.6				
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.85				
Chrysene	mg/kg	0.05	MCERTS	0.81				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.6				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.62				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.4				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.77				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.84				

Analytical Report Number: 17-54291

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				782023				
Sample Reference				6				
Sample Number				1				
Depth (m)				None Supplied				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

#### Organotins

Tributyl Tin	µg/kg	10	NONE	< 10				
Dibutyl Tin	µg/kg	10	NONE	U/S**				
Tetrabutyl Tin	µg/kg	10	NONE	U/S**				
Triphenyl Tin	µg/kg	10	NONE	< 10				

#### Environmental Forensics

##### Glycols

Ethylene Glycol	mg/kg	10	NONE	< 10				
Triethylene Glycol	mg/kg	10	NONE	U/S				
1,2-Propanediol	mg/kg	10	NONE	< 10				
1,3-Propanediol	mg/kg	10	NONE	< 10				
1,2-Butanediol	mg/kg	10	NONE	< 10				
1,3-Butanediol	mg/kg	10	NONE	< 10				
1,4-Butanediol	mg/kg	10	NONE	< 10				
1,5-Pentanediol	mg/kg	10	NONE	< 10				

\*\*Unsuitable due to matrix interference.





**Analytical Report Number : 17-54291**

**Project / Site name: Project Blue**

\* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
782023	6	1	None Supplied	Brown clay.

**Analytical Report Number : 17-54291**

**Project / Site name: Project Blue**

**Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH <sub>4</sub> in soil	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
EF - Organotins by GC-MS/MS in soil	Organotins by GC-MS/MS	In-house method	UK	W	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests <sup>***</sup>	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil by Gallery 16hr	Determination of water soluble Sulphate by discrete analyser (precipitation method).	In house method based on BS1377-3: 1990.	L082B-PL	D	MCERTS

Iss No 17-54291-1 Project Blue 33138

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The results included within the report are representative of the samples submitted for analysis.

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**Analytical Report Number : 17-54291**

**Project / Site name: Project Blue**

**Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TO - Glycols in Soil	Determination of glycols by GC-MS.	In-house method		W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO <sub>4</sub> in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

**For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.**

**For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.**

**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**

# Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
6	1	S	17-54291	782023	a			



**Peter Woolley**

Geotechnical Engineering Ltd  
Centurion House  
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Croxley Green  
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WD18 8YS

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## **Analytical Report Number : 17-54285**

<b>Project / Site name:</b>	Project Blue	<b>Samples received on:</b>	12/07/2017
<b>Your job number:</b>	33138	<b>Samples instructed on:</b>	12/07/2017
<b>Your order number:</b>	33138-PW	<b>Analysis completed by:</b>	19/07/2017
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	19/07/2017
<b>Samples Analysed:</b>	2 soil samples		

**Signed:**

Dr Irma Doyle  
Senior Account Manager  
**For & on behalf of i2 Analytical Ltd.**

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-54285

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				781972	781973			
Sample Reference				1	3			
Sample Number				1	1			
Depth (m)				None Supplied	None Supplied			
Date Sampled				Deviating	Deviating			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	57	50			
Total mass of sample received	kg	0.001	NONE	0.48	0.50			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
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#### General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	8.2			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	3900	3700			
Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)	mg/kg	2.5	MCERTS	3300	3400			
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1630	1680			
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	11000	5700			
Total Sulphur	mg/kg	50	MCERTS	3600	3000			
Ammonium as NH <sub>4</sub>	mg/kg	0.5	MCERTS	35	19			
Ammonium as NH <sub>4</sub> (leachate equivalent)	mg/l	0.05	MCERTS	3.5	1.9			
Organic Matter	%	0.1	MCERTS	3.6	3.3			
Water Soluble Nitrate (2:1) as NO <sub>3</sub>	mg/kg	2	NONE	4.9	5.7			
Water Soluble Nitrate (2:1) as NO <sub>3</sub> (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0			

#### Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
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#### Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	15			
Boron (water soluble)	mg/kg	0.2	MCERTS	17	18			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	55	44			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	100	99			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	87	100			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.0	0.9			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	25			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	250	220			
Magnesium (water soluble)	mg/kg	5	NONE	1300	1100			
Magnesium (leachate equivalent)	mg/l	2.5	NONE	650	570			

Analytical Report Number: 17-54285

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				781972	781973			
Sample Reference				1	3			
Sample Number				1	1			
Depth (m)				None Supplied	None Supplied			
Date Sampled				Deviating	Deviating			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

#### Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0			

#### Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	2.9	7.1			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	27	34			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	130	160			
<b>TPH-CWG - Aliphatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	160	200			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	16	11			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	86	74			
<b>TPH-CWG - Aromatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	100	85			



Analytical Report Number: 17-54285

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				781972	781973			
Sample Reference				1	3			
Sample Number				1	1			
Depth (m)				None Supplied	None Supplied			
Date Sampled				Deviating	Deviating			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

#### VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0			
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0			
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0			
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0			
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			



Analytical Report Number: 17-54285

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number	781972	781973			
Sample Reference	1	3			
Sample Number	1	1			
Depth (m)	None Supplied	None Supplied			
Date Sampled	Deviating	Deviating			
Time Taken	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

SVOCs					
Aniline	mg/kg	0.1	NONE	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	0.19	0.23
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Carbazole	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	0.39	0.48
Pyrene	mg/kg	0.05	MCERTS	0.46	0.54
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.23	0.32
Chrysene	mg/kg	0.05	MCERTS	0.28	0.30
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.52	0.64
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.29	0.30
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.41	0.48
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.28	0.29
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.33	0.33

Analytical Report Number: 17-54285

Project / Site name: Project Blue

Your Order No: 33138-PW

Lab Sample Number				781972	781973			
Sample Reference				1	3			
Sample Number				1	1			
Depth (m)				None Supplied	None Supplied			
Date Sampled				Deviating	Deviating			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

#### Organotins

Tributyl Tin	µg/kg	10	NONE	< 10	16			
Dibutyl Tin	µg/kg	10	NONE	U/S**	U/S**			
Triphenyl Tin	µg/kg	10	NONE	< 10	< 10			

#### Environmental Forensics

##### Glycols

Ethylene Glycol	mg/kg	10	NONE	< 10	< 10			
Triethylene Glycol	mg/kg	10	NONE	< 10	< 10			
1,2-Propanediol	mg/kg	10	NONE	< 10	< 10			
1,3-Propanediol	mg/kg	10	NONE	< 10	< 10			
1,2-Butanediol	mg/kg	10	NONE	< 10	< 10			
1,3-Butanediol	mg/kg	10	NONE	< 10	< 10			
1,4-Butanediol	mg/kg	10	NONE	< 10	< 10			
1,5-Pentanediol	mg/kg	10	NONE	< 10	< 10			

\*\*Unsuitable due to matrix interference.



**Analytical Report Number : 17-54285**

**Project / Site name: Project Blue**

\* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
781972	1	1	None Supplied	Brown clay.
781973	3	1	None Supplied	Brown clay.

**Analytical Report Number : 17-54285**

**Project / Site name: Project Blue**

**Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH <sub>4</sub> in soil	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
EF - Organotins by GC-MS/MS in soil	Organotins by GC-MS/MS	In-house method	UK	W	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests <sup>***</sup>	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil by Gallery 16hr	Determination of water soluble Sulphate by discrete analyser (precipitation method).	In house method based on BS1377-3: 1990.	L082B-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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**Analytical Report Number : 17-54285**

**Project / Site name: Project Blue**

**Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TO - Glycols in Soil	Determination of glycols by GC-MS.	In-house method		W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO <sub>4</sub> in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

**For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.**

**For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.**

**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.**

# Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
1	1	S	17-54285	781972	a			
3	1	S	17-54285	781973	a			

## FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 18/00300  
**Issue Number:** 1

**Date:** 26 January, 2018

**Client:** Structural Soils Limited (Castleford)  
The Potteries  
Pottery Street  
Castleford  
West Yorkshire  
UK  
WF10 1NJ

**Project Manager:** Alex Jones/Philip Rowlay  
**Project Name:** Project Blue  
**Project Ref:** 764393  
**Order No:** N/A  
**Date Samples Received:** 19/12/17  
**Date Instructions Received:** 16/01/18  
**Date Analysis Completed:** 25/01/18

**Prepared by:**



Melanie Marshall  
Laboratory Coordinator

**Approved by:**



Danielle Brierley  
Client Manager

Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/1	18/00300/3	18/00300/4	18/00300/5	18/00300/7	18/00300/8	18/00300/9	18/00300/11	Units	Method ref
Client Sample No	101				101	101	101	101		
Client Sample ID	PAC01A	PAC02A	PAC02B	PAC03A	PAC04A	PAC04B	PAC05A	PAC06A		
Depth to Top	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Depth To Bottom										
Date Sampled	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	11-Jan-18		
Sample Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid		
Sample Matrix Code	7	7	7	7	7	7	7	7		
% Stones >10mm <sub>A</sub>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	A-T-044
pH <sub>D</sub>	7.56	7.69	7.78	7.85	8.11	8.18	7.97	7.75	pH	A-T-031s
Cyanide (free) <sub>A</sub> <sup>M#</sup>	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sFCN
Cyanide (total) <sub>A</sub> <sup>M#</sup>	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sTCN
Phenols - Total by HPLC <sub>A</sub>	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Organic matter <sub>D</sub> <sup>M#</sup>	1.7	3.9	4.6	3.7	1.3	1.3	3.3	4.8	% w/w	A-T-032 OM
Arsenic <sub>D</sub> <sup>M#</sup>	2	8	8	9	5	5	5	9	mg/kg	A-T-024s
Barium <sub>D</sub>	69	183	174	169	88	74	162	172	mg/kg	A-T-024s
Beryllium <sub>D</sub> <sup>#</sup>	<0.5	1.0	1.0	0.8	<0.5	<0.5	0.7	0.6	mg/kg	A-T-024s
Boron (water soluble) <sub>D</sub> <sup>M#</sup>	7.7	18.5	16.7	12.2	8.8	7.8	13.7	14.6	mg/kg	A-T-027s
Cadmium <sub>D</sub> <sup>M#</sup>	0.6	1.6	1.6	1.4	0.6	0.5	1.3	1.6	mg/kg	A-T-024s
Copper <sub>D</sub> <sup>M#</sup>	41	118	118	93	55	47	125	120	mg/kg	A-T-024s
Chromium <sub>D</sub> <sup>M#</sup>	27	63	67	60	34	28	76	68	mg/kg	A-T-024s
Lead <sub>D</sub> <sup>M#</sup>	46	124	128	135	64	54	122	232	mg/kg	A-T-024s
Mercury <sub>D</sub>	0.39	1.19	1.46	1.58	0.80	0.51	1.17	1.43	mg/kg	A-T-024s
Nickel <sub>D</sub> <sup>M#</sup>	15	34	34	27	18	15	28	27	mg/kg	A-T-024s
Selenium <sub>D</sub> <sup>M#</sup>	<1	2	2	1	<1	1	2	2	mg/kg	A-T-024s
Vanadium <sub>D</sub> <sup>M#</sup>	23	52	51	45	30	24	47	47	mg/kg	A-T-024s
Zinc <sub>D</sub> <sup>M#</sup>	144	337	344	318	160	137	315	365	mg/kg	A-T-024s



Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/1	18/00300/3	18/00300/4	18/00300/5	18/00300/7	18/00300/8	18/00300/9	18/00300/11	Units	Method ref
Client Sample No	101				101	101	101	101		
Client Sample ID	PAC01A	PAC02A	PAC02B	PAC03A	PAC04A	PAC04B	PAC05A	PAC06A		
Depth to Top	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Depth To Bottom										
Date Sampled	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	11-Jan-18		
Sample Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid		
Sample Matrix Code	7	7	7	7	7	7	7	7		
Asbestos in Soil (inc. matrix)										
Asbestos in soil <sup>#</sup>	Chrysotile	NAD	NAD	NAD	NAD	NAD	NAD	NAD		A-T-045
Asbestos Matrix (microscope) <sub>A</sub>	Loose Fibres	-	-	-	-	-	-	-		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Glycol Suite 1										
1,2-Butanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
1,2-Propylene glycol (1,2-propanediol) <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
1,3-Butanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
1,3-Propylene glycol (1,3-propanediol) <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
1,4-Butanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
1,5-Pentanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
Diethylene glycol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
Ethylene glycol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
Triethylene glycol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	mg/kg	Subcon
Organotin Suite										
Dibutyltin <sub>A</sub>	<10	14	-	-	<10	-	<10	-	µg/kg	Subcon
Tributyltin <sub>A</sub>	10	14	-	-	27	-	220	-	µg/kg	Subcon
Triphenyltin <sub>A</sub>	<10	<10	-	-	<10	-	<10	-	µg/kg	Subcon
Tetrabutyltin <sub>A</sub>	<10	<10	-	-	<10	-	<10	-	µg/kg	Subcon

Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/1	18/00300/3	18/00300/4	18/00300/5	18/00300/7	18/00300/8	18/00300/9	18/00300/11	Units	Method ref
Client Sample No	101				101	101	101	101		
Client Sample ID	PAC01A	PAC02A	PAC02B	PAC03A	PAC04A	PAC04B	PAC05A	PAC06A		
Depth to Top	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Depth To Bottom										
Date Sampled	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	11-Jan-18		
Sample Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid		
Sample Matrix Code	7	7	7	7	7	7	7	7		
PAH 16										
Acenaphthene <sub>A</sub> <sup>M#</sup>	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Acenaphthylene <sub>A</sub> <sup>M#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Anthracene <sub>A</sub> <sup>M#</sup>	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	A-T-019s
Benzo(a)anthracene <sub>A</sub> <sup>M#</sup>	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019s
Benzo(a)pyrene <sub>A</sub> <sup>M#</sup>	0.18	<0.04	0.16	0.16	0.15	0.12	0.16	<0.04	mg/kg	A-T-019s
Benzo(b)fluoranthene <sub>A</sub> <sup>M#</sup>	0.18	<0.05	0.14	0.14	0.11	0.10	0.14	<0.05	mg/kg	A-T-019s
Benzo(ghi)perylene <sub>A</sub> <sup>M#</sup>	0.16	<0.05	0.14	0.14	0.13	0.10	0.14	<0.05	mg/kg	A-T-019s
Benzo(k)fluoranthene <sub>A</sub> <sup>M#</sup>	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	A-T-019s
Chrysene <sub>A</sub> <sup>M#</sup>	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	A-T-019s
Dibenzo(ah)anthracene <sub>A</sub> <sup>M#</sup>	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019s
Fluoranthene <sub>A</sub> <sup>M#</sup>	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	mg/kg	A-T-019s
Fluorene <sub>A</sub> <sup>M#</sup>	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Indeno(123-cd)pyrene <sub>A</sub> <sup>M#</sup>	0.21	<0.03	0.19	0.19	0.16	0.13	0.16	0.10	mg/kg	A-T-019s
Naphthalene <sub>A</sub> <sup>M#</sup>	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019s
Phenanthrene <sub>A</sub> <sup>M#</sup>	0.09	<0.03	0.16	<0.03	<0.03	0.05	0.07	<0.03	mg/kg	A-T-019s
Pyrene <sub>A</sub> <sup>M#</sup>	0.18	<0.07	<0.07	<0.07	<0.07	<0.07	0.23	<0.07	mg/kg	A-T-019s
PAH (total 16) <sub>A</sub> <sup>M#</sup>	0.98	<0.08	0.90	0.65	0.55	0.51	0.94	<0.08	mg/kg	A-T-019s

Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/1	18/00300/3	18/00300/4	18/00300/5	18/00300/7	18/00300/8	18/00300/9	18/00300/11	Units	Method ref
Client Sample No	101				101	101	101	101		
Client Sample ID	PAC01A	PAC02A	PAC02B	PAC03A	PAC04A	PAC04B	PAC05A	PAC06A		
Depth to Top	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Depth To Bottom										
Date Sampled	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	10-Jan-18	11-Jan-18		
Sample Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid		
Sample Matrix Code	7	7	7	7	7	7	7	7		
TPH CWG										
Ali >C5-C6 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C6-C8 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C8-C10 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C10-C12 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C12-C16 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9.8	<0.1	mg/kg	A-T-023s
Ali >C16-C21 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	22.0	<0.1	mg/kg	A-T-023s
Ali >C21-C35 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	40.5	<0.1	mg/kg	A-T-023s
Total Aliphatics <sub>A</sub>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	72.4	<0.1	mg/kg	A-T-023s
Aro >C5-C7 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C7-C8 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C8-C9 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C9-C10 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C10-C12 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Aro >C12-C16 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	7.3	mg/kg	A-T-023s
Aro >C16-C21 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	18.3	29.5	mg/kg	A-T-023s
Aro >C21-C35 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	12.3	35.6	mg/kg	A-T-023s
Total Aromatics <sub>A</sub>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	12.3	55.3	mg/kg	A-T-023s
TPH (Ali & Aro) <sub>A</sub>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	12.3	128	mg/kg	A-T-023s
BTEX - Benzene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Toluene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Ethyl Benzene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - m & p Xylene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - o Xylene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
MTBE <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s

Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/12	18/00300/13	18/00300/15	18/00300/16					Units	Method ref
Client Sample No	101	101	101	101						
Client Sample ID	PAC06B	PAC07A	PAC08A	PAC08B						
Depth to Top	0.00	0.00	0.00	0.00						
Depth To Bottom										
Date Sampled	11-Jan-18	11-Jan-18	11-Jan-18	11-Jan-18						
Sample Type	Solid	Solid	Solid	Solid						
Sample Matrix Code	7	7	7	7						
% Stones >10mm <sub>A</sub>	<0.1	<0.1	<0.1	<0.1					% w/w	A-T-044
pH <sub>D</sub>	7.93	8.03	8.05	8.09					pH	A-T-031s
Cyanide (free) <sub>A</sub> <sup>M#</sup>	<1	<1	<1	<1					mg/kg	A-T-042sFCN
Cyanide (total) <sub>A</sub> <sup>M#</sup>	<1	<1	<1	<1					mg/kg	A-T-042sTCN
Phenols - Total by HPLC <sub>A</sub>	<0.2	<0.2	<0.2	<0.2					mg/kg	A-T-050s
Organic matter <sub>D</sub> <sup>M#</sup>	3.9	6.3	4.5	5.6					% w/w	A-T-032 OM
Arsenic <sub>D</sub> <sup>M#</sup>	24	9	6	16					mg/kg	A-T-024s
Barium <sub>D</sub>	201	132	328	247					mg/kg	A-T-024s
Beryllium <sub>D</sub> <sup>#</sup>	0.7	0.5	0.6	0.8					mg/kg	A-T-024s
Boron (water soluble) <sub>D</sub> <sup>M#</sup>	11.4	14.4	10.0	12.0					mg/kg	A-T-027s
Cadmium <sub>D</sub> <sup>M#</sup>	2.4	1.0	1.6	2.6					mg/kg	A-T-024s
Copper <sub>D</sub> <sup>M#</sup>	122	87	138	165					mg/kg	A-T-024s
Chromium <sub>D</sub> <sup>M#</sup>	83	52	59	90					mg/kg	A-T-024s
Lead <sub>D</sub> <sup>M#</sup>	248	107	500	193					mg/kg	A-T-024s
Mercury <sub>D</sub>	2.48	0.93	1.43	2.88					mg/kg	A-T-024s
Nickel <sub>D</sub> <sup>M#</sup>	32	25	27	34					mg/kg	A-T-024s
Selenium <sub>D</sub> <sup>M#</sup>	2	2	2	2					mg/kg	A-T-024s
Vanadium <sub>D</sub> <sup>M#</sup>	51	39	52	53					mg/kg	A-T-024s
Zinc <sub>D</sub> <sup>M#</sup>	520	249	340	549					mg/kg	A-T-024s

Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/12	18/00300/13	18/00300/15	18/00300/16					Units	Method ref
Client Sample No	101	101	101	101						
Client Sample ID	PAC06B	PAC07A	PAC08A	PAC08B						
Depth to Top	0.00	0.00	0.00	0.00						
Depth To Bottom										
Date Sampled	11-Jan-18	11-Jan-18	11-Jan-18	11-Jan-18						
Sample Type	Solid	Solid	Solid	Solid						
Sample Matrix Code	7	7	7	7						
Asbestos in Soil (inc. matrix)										
Asbestos in soil <sub>A</sub> <sup>#</sup>	NAD	NAD	NAD	NAD						A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A	N/A						
Glycol Suite 1										
1,2-Butanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
1,2-Propylene glycol (1,2-propanediol) <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
1,3-Butanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
1,3-Propylene glycol (1,3-propanediol) <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
1,4-Butanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
1,5-Pentanediol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
Diethylene glycol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
Ethylene glycol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
Triethylene glycol <sub>A</sub>	<10.0	<10.0	<10.0	<10.0					mg/kg	Subcon
Organotin Suite										
Dibutyltin <sub>A</sub>	-	<10	<10	-					µg/kg	Subcon
Tributyltin <sub>A</sub>	-	16	34	-					µg/kg	Subcon
Triphenyltin <sub>A</sub>	-	<10	<10	-					µg/kg	Subcon
Tetrabutyltin <sub>A</sub>	-	<10	<10	-					µg/kg	Subcon

Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/12	18/00300/13	18/00300/15	18/00300/16					Units	Method ref
Client Sample No	101	101	101	101						
Client Sample ID	PAC06B	PAC07A	PAC08A	PAC08B						
Depth to Top	0.00	0.00	0.00	0.00						
Depth To Bottom										
Date Sampled	11-Jan-18	11-Jan-18	11-Jan-18	11-Jan-18						
Sample Type	Solid	Solid	Solid	Solid						
Sample Matrix Code	7	7	7	7						
PAH 16										
Acenaphthene <sub>A</sub> <sup>M#</sup>	<0.01	<0.01	0.11	0.02					mg/kg	A-T-019s
Acenaphthylene <sub>A</sub> <sup>M#</sup>	<0.01	<0.01	0.09	0.05					mg/kg	A-T-019s
Anthracene <sub>A</sub> <sup>M#</sup>	<0.02	<0.02	0.29	0.05					mg/kg	A-T-019s
Benzo(a)anthracene <sub>A</sub> <sup>M#</sup>	<0.04	<0.04	1.23	0.17					mg/kg	A-T-019s
Benzo(a)pyrene <sub>A</sub> <sup>M#</sup>	0.11	<0.04	1.43	0.45					mg/kg	A-T-019s
Benzo(b)fluoranthene <sub>A</sub> <sup>M#</sup>	<0.05	<0.05	1.12	0.41					mg/kg	A-T-019s
Benzo(ghi)perylene <sub>A</sub> <sup>M#</sup>	<0.05	<0.05	1.34	0.33					mg/kg	A-T-019s
Benzo(k)fluoranthene <sub>A</sub> <sup>M#</sup>	<0.07	<0.07	0.46	<0.07					mg/kg	A-T-019s
Chrysene <sub>A</sub> <sup>M#</sup>	<0.06	<0.06	1.41	0.24					mg/kg	A-T-019s
Dibenzo(ah)anthracene <sub>A</sub> <sup>M#</sup>	<0.04	<0.04	0.26	<0.04					mg/kg	A-T-019s
Fluoranthene <sub>A</sub> <sup>M#</sup>	<0.08	<0.08	3.77	0.36					mg/kg	A-T-019s
Fluorene <sub>A</sub> <sup>M#</sup>	<0.01	<0.01	0.11	0.02					mg/kg	A-T-019s
Indeno(123-cd)pyrene <sub>A</sub> <sup>M#</sup>	0.09	<0.03	1.63	0.41					mg/kg	A-T-019s
Naphthalene <sub>A</sub> <sup>M#</sup>	<0.03	<0.03	0.18	<0.03					mg/kg	A-T-019s
Phenanthrene <sub>A</sub> <sup>M#</sup>	<0.03	<0.03	0.37	0.12					mg/kg	A-T-019s
Pyrene <sub>A</sub> <sup>M#</sup>	<0.07	<0.07	2.60	0.48					mg/kg	A-T-019s
PAH (total 16) <sub>A</sub> <sup>M#</sup>	0.19	<0.08	16.4	3.13					mg/kg	A-T-019s

Envirolab Job Number: 18/00300

Client Project Name: Project Blue

Client Project Ref: 764393

Lab Sample ID	18/00300/12	18/00300/13	18/00300/15	18/00300/16					Units	Method ref
Client Sample No	101	101	101	101						
Client Sample ID	PAC06B	PAC07A	PAC08A	PAC08B						
Depth to Top	0.00	0.00	0.00	0.00						
Depth To Bottom										
Date Sampled	11-Jan-18	11-Jan-18	11-Jan-18	11-Jan-18						
Sample Type	Solid	Solid	Solid	Solid						
Sample Matrix Code	7	7	7	7						
TPH CWG										
Ali >C5-C6 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
Ali >C6-C8 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
Ali >C8-C10 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
Ali >C10-C12 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1					mg/kg	A-T-023s
Ali >C12-C16 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1					mg/kg	A-T-023s
Ali >C16-C21 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	7.0	<0.1					mg/kg	A-T-023s
Ali >C21-C35 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	70.7	<0.1					mg/kg	A-T-023s
Total Aliphatics <sub>A</sub>	<0.1	<0.1	77.8	<0.1					mg/kg	A-T-023s
Aro >C5-C7 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
Aro >C7-C8 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
Aro >C8-C9 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
Aro >C9-C10 <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
Aro >C10-C12 <sub>A</sub> <sup>#</sup>	<0.1	<0.1	<0.1	<0.1					mg/kg	A-T-023s
Aro >C12-C16 <sub>A</sub> <sup>#</sup>	1.7	<0.1	3.3	<0.1					mg/kg	A-T-023s
Aro >C16-C21 <sub>A</sub> <sup>#</sup>	7.6	0.7	26.9	4.5					mg/kg	A-T-023s
Aro >C21-C35 <sub>A</sub> <sup>#</sup>	5.0	1.6	77.5	6.5					mg/kg	A-T-023s
Total Aromatics <sub>A</sub>	14.3	2.5	108	11.0					mg/kg	A-T-023s
TPH (Ali & Aro) <sub>A</sub>	14.3	2.5	185	11.0					mg/kg	A-T-023s
BTEX - Benzene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
BTEX - Toluene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
BTEX - Ethyl Benzene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
BTEX - m & p Xylene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
BTEX - o Xylene <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s
MTBE <sub>A</sub> <sup>#</sup>	<0.01	<0.01	<0.01	<0.01					mg/kg	A-T-022s

## **REPORT NOTES**

### **General:**

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

### **Soil chemical analysis:**

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

### **TPH analysis of water by method A-T-007:**

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

### **Electrical Conductivity of water by Method A-T-037:**

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

### **Asbestos:**

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

### **Predominant Matrix Codes:**

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

### **Secondary Matrix Codes:**

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

### **Key:**

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.