PHASE 2 GEO-ENVIRONMENTAL SITE ASSESSMENT REPORT

1 – 5 CAUSEY DRIVE,
MIDDLETON,
MANCHESTER,
M24 5PN

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Virtue FM

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Date: 8th April 2022

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Document Verification

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Executive Summary

EnviroSolution Ltd was commissioned to undertake a Phase 2 Geo-Environmental Site Assessment at Causey Drive in Middleton, Manchester.

The recent intrusive ground investigation has proven that Made Ground underlies the site with a thickness of between 0.30m and 0.50m.

A total of 5 no. representative soil samples were collected and analysed for a range of chemical parameters. Low level soil contaminants (e.g. heavy metals and SVOCs) have been detected the shallow soils beneath the site. However, generic quantitative risk assessments have proven that they will not present a risk to any of the receptors identified in the preliminary conceptual site model, if they remain present beneath the site following redevelopment. Asbestos was not detected.

The site can be classified as Characteristic Situation 1 (CS1; very low risk) in terms of ground gases and gas protection measures will not be required in the new development.

It is recommended that discussions are undertaken with the water supply company to confirm their requirements for water supply pipes.

The Made Ground would not be suitable for the construction of traditional shallow spread foundations due to the risk of unacceptable total and differential settlement occurring.

The underlying glacial deposits are considered to be suitable bearing strata for the construction of conventional shallow strip/ trench fill footings with an allowable bearing pressure of 80 kN/m^2. This is based on a maximum foundation width of 1m for strip footings. Further assessment would be required for larger foundations. Foundations should be set at a minimum depth of 0.75m bgl.

Foundation excavations should be checked by an experienced ground worker prior to placing concrete. Any soft spots or unsuitable founding materials should be removed if encountered and replaced with compacted granular fill or lean mix concrete.

The ground conditions would be suitable for a ground bearing floor slab where the Made Ground does not exceed a thickness of 600mm.

The results from the chemical laboratory sulphate and pH analysis for the site indicate a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

The infiltration tests conducted at the site failed, it is therefore not recommended that soakaway drainage systems are installed at this site.

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1 Introduction

1.1 Background

EnviroSolution Ltd was commissioned to undertake a Phase 2 Geo-Environmental Site Assessment at Beaconsfield Road in Liverpool. This work was required to inform development plans for the construction of two new detached dwellings with basements.

A Phase 1 Environmental Site Assessment has previously been completed for this site:

- EnviroSolution Limited, Phase 1 Environmental Site Assessment Report, Causey Drive, V3, April 2021.

The Phase 1 report should be read in conjunction with this report as this will form the basis for the conceptual understanding of the site. The Phase 1 concluded a moderate risk of contamination at the site resulting from the presence of Made Ground and the potential for associated contaminants to be present.

1.2 Objectives

The objectives of the ground investigation were:

1. To develop a ground model of the site, summarising the ground conditions.
2. To obtain information to inform foundation design.
3. To develop a conceptual site model and complete a generic quantitative risk assessment in order to identify any environmental risks and liabilities associated with ground conditions at the site.
4. To identify the requirements for any additional works prior to site development (e.g. further ground investigation or remedial works).

1.3 Scope of Work

The intrusive investigation was designed to inform the foundation solution at the site. As part of this investigation a limited number of samples were recovered for contamination testing from across the site. The scope of work included the following:

- An intrusive ground investigation in order to obtain information on the ground conditions beneath the site.
- Generic quantitative risk assessments utilising the ground investigation data in line with industry approved guidelines.

The scope of work was developed in accordance with the Environment Agency of England and Wales Environment Agency (2020) Land Contamination Risk Management Report LCRM “How to assess and manage the risks from land contamination” and BS10175:2011+A2:2017 ‘Investigation of Potentially Contaminated Sites – Code of Practice’.

1.4 Site Location

The site is located at Beaconsifeld Road, Liverpool, L25 6EH. The British National Grid Reference for the approximate site centre is GR: 341755 387570.

The site location is shown on **Figure 1** in **Appendix A**.

1.5 Site Description

The site is rectangular in shape and covers an approximate area of 450 square metres. The site is currently a vacant plot of green space which lies to the south of existing residential properties.

The entire site is covered in grass lawn.

A single small tree is located in the south-eastern corner of the site.

The topography of the site is generally flat with little change in elevation from 122m aOD to the east and 121m aOD to the west.

Land use in the surrounding area is predominantly residential.

There are no petrol filling stations located within a 250m radius of the site.

The existing site plan is shown on **Figure 2** which is included in **Appendix A**.

1.6 Development Proposals

It is understood that the development proposal includes the construction of a three-storey residential apartment building containing 6 no. flats. The final plans include a car park, bin store and cycle store areas.

The development plans are included in **Figure 3** in **Appendix A**.

2 Ground Investigation Methodology

2.1 Intrusive Field Works

The intrusive investigation works were undertaken by EnviroSolution Ltd on the 18th of April 2022. The work comprised the following:

- The drilling of 3 no. window sample boreholes (designated as WS1 – WS3) to depths of up to 4.0m below ground level (bgl).
- Infiltration testing at 2 no. locations (designated as IF1 and IF2).
- Geotechnical logging of ground conditions at each location.
- In-situ geotechnical testing within boreholes.
- Collection of representative soil samples from boreholes for subsequent chemical and geotechnical laboratory analysis.

The window samples boreholes were positioned evenly across the site to provide full coverage of the external areas. The exploratory hole locations are shown on **Figure 4** in **Appendix A**.

2.2 Soil Sampling Methodology

The exploratory holes were logged in accordance with the requirements of BS 5930: 2015 +A2:2020 and BS EN 14688 Pts 1&2. Visual and olfactory evidence of contamination was noted if encountered. These observations were used to aid scheduling of samples for chemical laboratory analysis. Soil samples were collected at distinct changes in lithology, or on the basis of field observations.

Samples were collected with a clean trowel or by hand (using dedicated nitrile gloves for each sampling location). Samples were placed immediately into laboratory supplied sampling containers, specific to the type of analyses required. All sample containers were sealed and labelled with a unique location identity, depth and date of sampling.

2.3 Laboratory Analysis

2.3.1 Chemical Analysis

All soil samples were transported in cool boxes at the end of the day under a chain of custody regime to Chemtest, who are a UKAS accredited laboratory. Analysis was conducted to MCerts standards where applicable.

Chemical analysis was scheduled on a total of 5 no. soil samples (3 no. Made Ground and 2 no. natural ground) for a range of chemical parameters including: Toxic 9 metals, pH, asbestos ID, asbestos quantification, volatile and semi-volatile organic compounds (VOCs and SVOCs) and TPH criteria working group.

2.3.2 QA/QC

Field methods and procedures complied with accepted industry standards (BS10175:2011+A2:2017). These standards include the use of specified sample container types and agreed sampling decontamination procedures.

All samples were transported from the site to the analytical laboratory under a chain of custody regime within cool boxes containing ice packs. All analytical results were subjected to a QA/QC validation check to ensure they met the Laboratory's target criteria.

2.3.3 Geotechnical Analysis

A programme of laboratory testing was undertaken in accordance with BS:1377 (1990) 'Methods of Test for Soils for Civil Engineering Purposes'. The following tests being carried out:

Table 1: BS:1377 Testing

BS Test No.	Description
Part 2: 3.2.3.3	Moisture Content
Part 3: 5.2	Sulphate Content, pH Value

The following in-situ and laboratory testing outside the scope of BS:1377 was also undertaken:

Table 2: Non-BS:1377 Testing

Standard or Methodology	Test Description
BRE Special Digest 1	Total Sulphate, Aqueous Extract Sulphate, Total Sulphur, pH

3 Ground Conditions

3.1 Made Ground

Made Ground was encountered in all of the exploratory hole locations, generally with a thickness of between 0.30m and 0.50m.

The Made Ground generally consists of brown clayey sandy gravelly loam with fragments of brick and rootlets.

There was no visual or olfactory evidence of contamination.

3.2 Glacial Deposits

Superficial glacial deposits were encountered in all exploratory holes beneath the Made Ground. The base of the glacial deposits was not proven during the investigation.

The glacial deposits generally consist of brown/ grey clayey fine sand with variable amounts of gravel and clay. A 1m thick band of brown silt was recorded in WS3 at 3.0m bgl.

Uncorrected SPT N values for the glacial material range between 6 and 42.

The recorded borehole logs are shown in **Appendix C.**

3.3 Groundwater

Groundwater was encountered during the investigation in WS1 and WS2 only at depths of 2.0m bgl.

3.4 Chemical Analysis

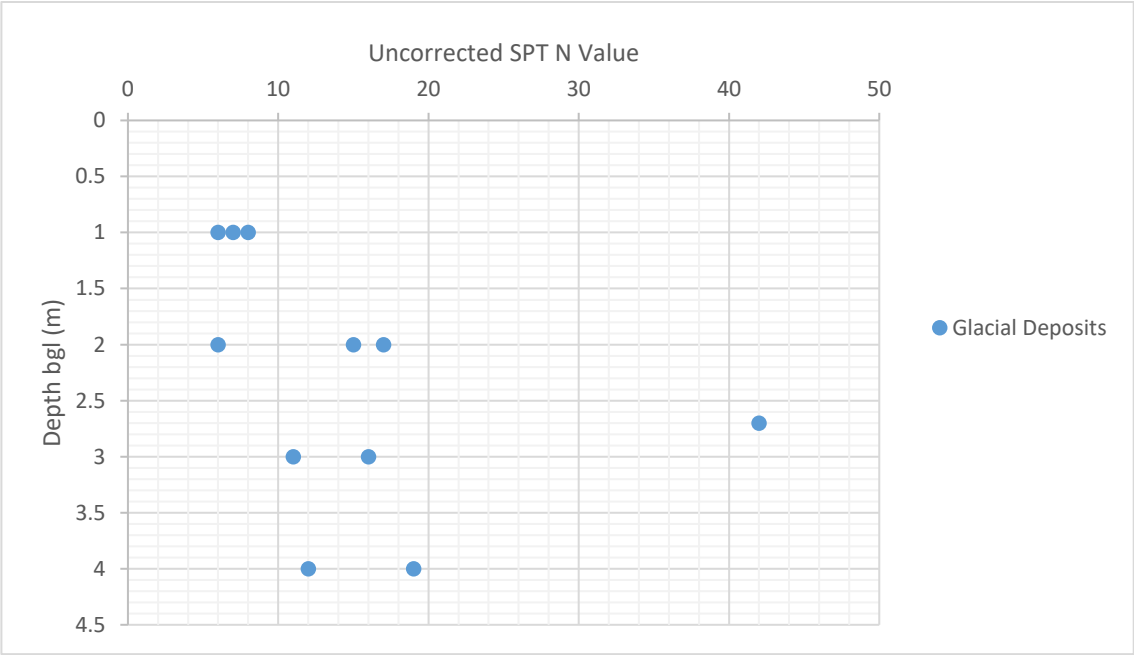
A copy of the laboratory test certificates is included in **Appendix F**. An assessment of the data is presented in Section 6.

3.5 Geotechnical Model

Table 3: Geotechnical Model

Stratum	Depth to Base (m bgl)	Parameters/ Comments	
		Strength Parameters	**Other Parameters/ Notes**
Made Ground	0.30m – 0.50m	SPT N values 6	Brown clayey sandy gravelly loam with fragments of brick and rootlets.
Glacial Deposits	Not Proven	SPT N values 6 – 42	Brown/ grey clayey fine sand with variable amounts of gravel and clay. A 1m thick band of brown silt was recorded in WS3 at 3.0m bgl.

A total of 11 no. Standard Penetration Tests (SPTs) were performed during the drilling works. The results are recorded on the borehole logs at the appropriate depths and are displayed on the graph below.



3.6 Geotechnical Laboratory Results

3.6.1 Sulphate Testing

The results of chemical testing carried out in accordance with BRE Special Digest 1:2005 Concrete in Aggressive Ground are summarised as follows (See **Appendix F**):

Table 5: BRE Special Digest 1:2005 Test Results

Material	Property	No. of Tests	Range of Results	Characteristic Values (BRE Special Digest 1)	Design Sulphate Class and ACEC Class
Made Ground	Sulphate (SO4) by 2:1 water soil extract (mg/l)	1	24	24	**DS-1** **AC-1**
	pH	1	7.7	7.7	
	Total Sulphur %	1	0.04	0.04	
	Chloride by 2:1 water soil extract (mg/l)	1	2.3	N/a	N/a
	Nitrate by 2:1 water soil extract (mg/l)	1	5.9	N/a	N/a
Sandstone	Sulphate (SO4) by 2:1 water soil extract (mg/l)	2	35 – 56	56	**DS-1** **AC-1**
	pH	2	7.3 – 7.5	7.3	
	Total Sulphur %	2	0.0 2 – 0.03	0.03	
	Chloride by 2:1 water soil extract (mg/l)	2	1.5 – 3.1	N/a	N/a
	Nitrate by 2:1 water soil extract (mg/l)	2	2.8 – 5.9	N/a	N/a

3.6.2 Plasticity Testing

The results of the plasticity testing are summarised below. A copy of the laboratory testing results is included in **Appendix F**.

Table 5: Plasticity Results

Sample	Plasticity Index	Modified Plasticity Index	Volume Change Potential
WS1 at 1.80m	13	12	Low
WS2 at 2.50m	14	13	Low

The results show a low plasticity clay soil with a low volume change potential.

4 Infiltration Testing

As part of the site investigation EnviroSolution also undertook the following:

- 2 no. Infiltration Tests over 2 no. test locations

The infiltration tests were commissioned to investigate the ground conditions and to assess their suitability for soakaways. The tests were completed in accordance with the methodology set out in BRE 365.

4.1 Infiltration Test Methodology

A total of 2 no. infiltration tests were completed on site in 2 no. borehole locations (designated as IF1 and IF2). See **Figure 4** in **Appendix A**.

The falling head test methodology was used.

The infiltration test pit dimensions were as follows:

Infiltration Test ID	Dimensions (m)		
	Length	Width	Depth
IF1	0.10	0.10	1.5
IF2	0.10	0.10	1.0

Each test location was filled rapidly with water. Subsequent water level observations were made with a dip-meter lowered down into the water from the top of the hole. During the tests, the borehole sides remained stable.

4.2 Results

The infiltration test data obtained (tabulated and graphed) are included in **Appendix D**. The results are presented in the tables below:

Infiltration Test Location IF1	
Parameter	**Test 1**
Depth of Water	Ground Level
Total Effective Storage Depth (m)	1.50m
Effective Storage Depth (m)	1.50m
Volume (m^3)	0.006
Area (m^2)	0.25
Time (seconds)	-
Soil infiltration rate (m/s)	**Failed**

	Infiltration Test Location IF2
Parameter	**Test 1**
Depth of Water	Ground Level
Total Effective Storage Depth (m)	1.0
Effective Storage Depth (m bgl)	1.0
Volume (m^3)	0.004
Area (m^2)	0.16
Time (seconds), t_{p75-25}	-
Soil infiltration rate (m/s), f	**Failed**

The results show that all infiltration tests failed as it was not possible to determine the infiltration rate using the standard methodology set out in BRE 365. The water failed to drain and remained at a stable level after about 10-30 minutes of the testing.

Given that the infiltration tests conducted at the site failed, it is therefore not recommended that soakaway drainage systems are installed at this site.

5 Geotechnical Appraisal

5.1 Foundations

The Made Ground would not be suitable for the construction of traditional shallow spread foundations due to the risk of unacceptable total and differential settlement occurring. This is due to the variable nature of the material and the lack of controlled compaction when the material was placed.

The underlying glacial deposits are considered to be suitable bearing strata for the construction of conventional shallow strip/ trench fill footings with an allowable bearing pressure of 80 kN/m^2. This is based on a maximum foundation width of 1m for strip footings. Further assessment would be required for larger foundations. Foundations should be set at a minimum depth of 0.75m bgl.

Foundation excavations should be checked by an experienced ground worker prior to placing concrete. Any soft spots or unsuitable founding materials should be removed if encountered and replaced with compacted granular fill or lean mix concrete.

The ground conditions would be suitable for a ground bearing floor slab where the Made Ground does not exceed a thickness of 600mm.

5.2 Excavations and Groundwater

Groundwater inflows were recorded during the drilling works in WS1 and WS2 at 2.0m bgl.

Sump pumps should be adequate for dewatering shallow service excavations if required. Advice on groundwater control in construction is given in CIRIA Report C515: Groundwater Control Design and Practice.

Shallow excavations within the Made Ground could be relied upon to stand unsupported in the short term only. Further advice on excavation support is given in CIRIA Document 97: Trenching Practice.

Further advice on excavation support is given in CIRIA Document 97: Trenching Practice.

5.3 Concrete Design

The results from the chemical laboratory sulphate and pH analysis for the site indicate a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

6 Generic Quantitative Risk Assessment

6.1 Introduction

The quantitative risk assessment has been undertaken in general accordance with guidance issued by the Environment Agency and comprises a Generic Quantitative Risk Assessment (GQRA) which screens site concentrations against Generic Assessment Criteria (GAC) based on the Preliminary Risk Assessment (PRA) and associated Preliminary Conceptual Site Model. Where a concentration exceeds the GAC, the substance is confirmed as a Contaminant of Concern (CoC).

6.2 Human Health

6.2.1 Long Term Risks to Human Health

Taking into account the proposed land use at the site (residential) GAC for residential land use without plant uptake has been adopted as the GAC for this assessment, as it is considered that the shared external areas will not be used to grow home grown produce.

The source of the GAC utilised for this assessment comprise the LQM 'Suitable 4 Use Levels' and Category 4 Screening Levels'.

Several substances were detected in the soils above the limit of detection (i.e. heavy metals and SVOCs). However, all detected substances were at concentrations below the GAC. This indicates that if these substances remain present in the shallow soils beneath the site following redevelopment, there would be negligible impact to future site users if exposure occurs. A copy of the assessment table is included in **Appendix E**.

Asbestos was not detected in any of the exploratory borehole locations, thus indicating a low risk to future site users from asbestos in the shallow soils beneath the site.

6.2.2 Short Term Risks

During the redevelopment of the site, it will be necessary to implement measures to protect construction workers, and adjacent site users from the soil contaminants identified at the site. In addition, to ensure that they do not encounter contaminated soils and/or groundwater, construction workers and site visitors should wear appropriate personal protective equipment (PPE). Health and safety procedures would ensure that ingestion of contaminated soils and / or groundwater is avoided (e.g. by washing hands prior to eating, drinking and smoking).

6.3 Buildings and Buried Services

Plastic pipe materials are potentially vulnerable to attack from elevated levels of hydrocarbons, which can potentially lead to contamination of potable water supplies, and water supply companies require the risk to their workers from other contaminants in the ground to be assessed. Therefore, if new water supply pipes are to be installed on site, it is

recommended that discussions are undertaken with the water supply company to confirm their requirements.

6.4 Controlled Waters

The site is immediately underlain by superficial deposits which are predominantly cohesive and of low permeability. The diamicton will act as an impermeable barrier, preventing contaminant migration from any Made Ground at the surface to the underlying aquifer.

The site does not lie within a Source Protection Zone and there are no groundwater abstraction licences held nearby.

Langley Brook is considered to be a sufficient distance from the site to not be affected by direct surface water run-off (>210m).

Overall, the risk to controlled waters is deemed to be low.

6.5 Ground gas

The preliminary Phase 1 report did not identify a significant source of ground gas. The intrusive investigation has shown that the Made Ground is limited in thickness and does not contain any putrescible material.

The site can therefore be classified as Characteristic Situation 1 (CS1 very low risk).

7 Conclusions and Recommendations

7.1 Contaminated Land

The recent intrusive ground investigation has proven that Made Ground underlies the site with a thickness of between 0.30m and 0.50m.

A total of 5 no. representative soil samples were collected and analysed for a range of chemical parameters. Low level soil contaminants (e.g. heavy metals and SVOCs) have been detected the shallow soils beneath the site. However, generic quantitative risk assessments have proven that they will not present a risk to any of the receptors identified in the preliminary conceptual site model, if they remain present beneath the site following redevelopment. Asbestos was not detected.

The site can be classified as Characteristic Situation 1 (CS1; very low risk) in terms of ground gases and gas protection measures will not be required in the new development.

It is recommended that discussions are undertaken with the water supply company to confirm their requirements for water supply pipes.

7.2 Geotechnical

The Made Ground would not be suitable for the construction of traditional shallow spread foundations due to the risk of unacceptable total and differential settlement occurring.

The underlying glacial deposits are considered to be suitable bearing strata for the construction of conventional shallow strip/ trench fill footings with an allowable bearing pressure of 80 kN/m^2. This is based on a maximum foundation width of 1m for strip footings. Further assessment would be required for larger foundations. Foundations should be set at a minimum depth of 0.75m bgl.

Foundation excavations should be checked by an experienced ground worker prior to placing concrete. Any soft spots or unsuitable founding materials should be removed if encountered and replaced with compacted granular fill or lean mix concrete.

The ground conditions would be suitable for a ground bearing floor slab where the Made Ground does not exceed a thickness of 600mm.

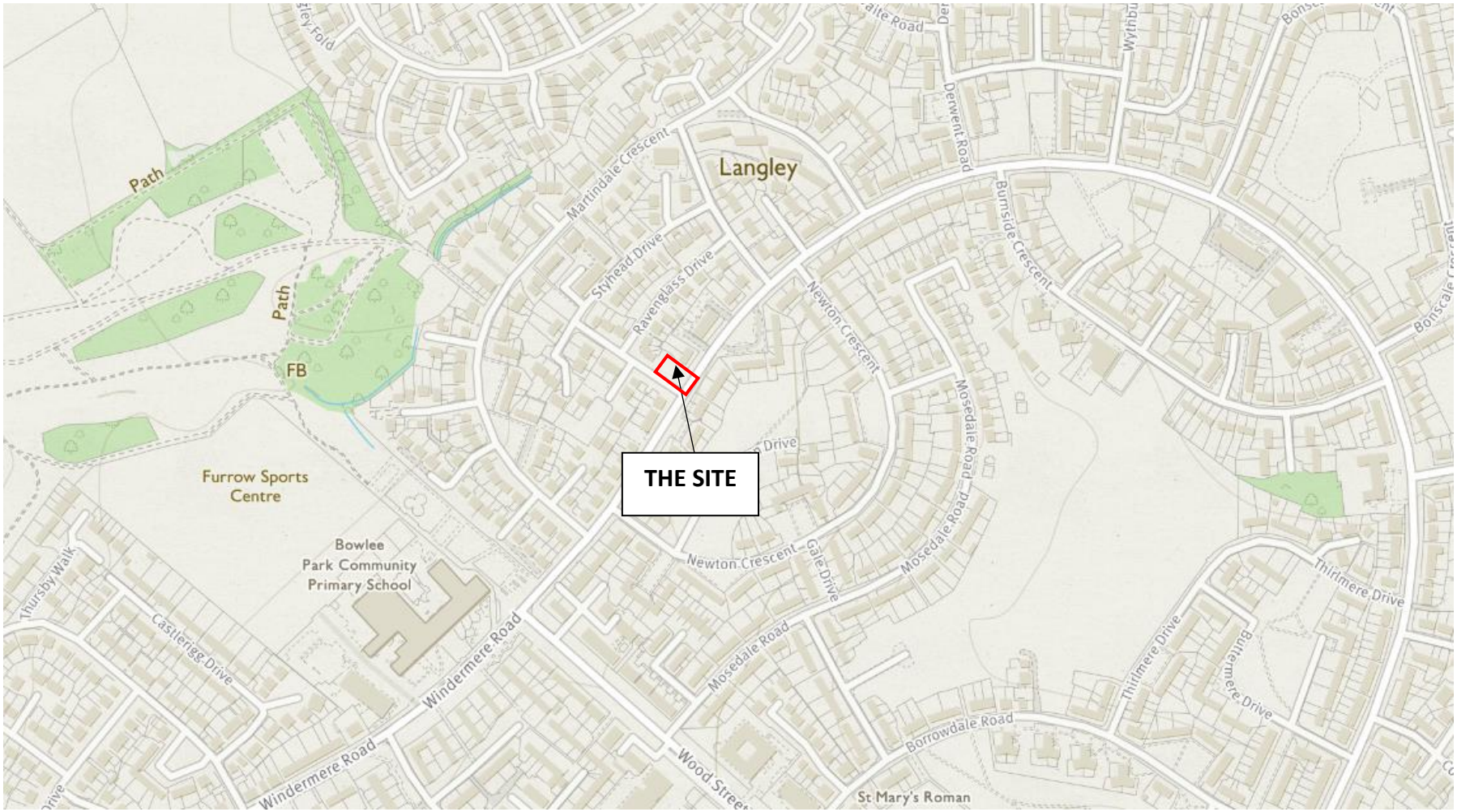
The results from the chemical laboratory sulphate and pH analysis for the site indicate a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

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APPENDICES

Appendix A – Site Location and Site Plan



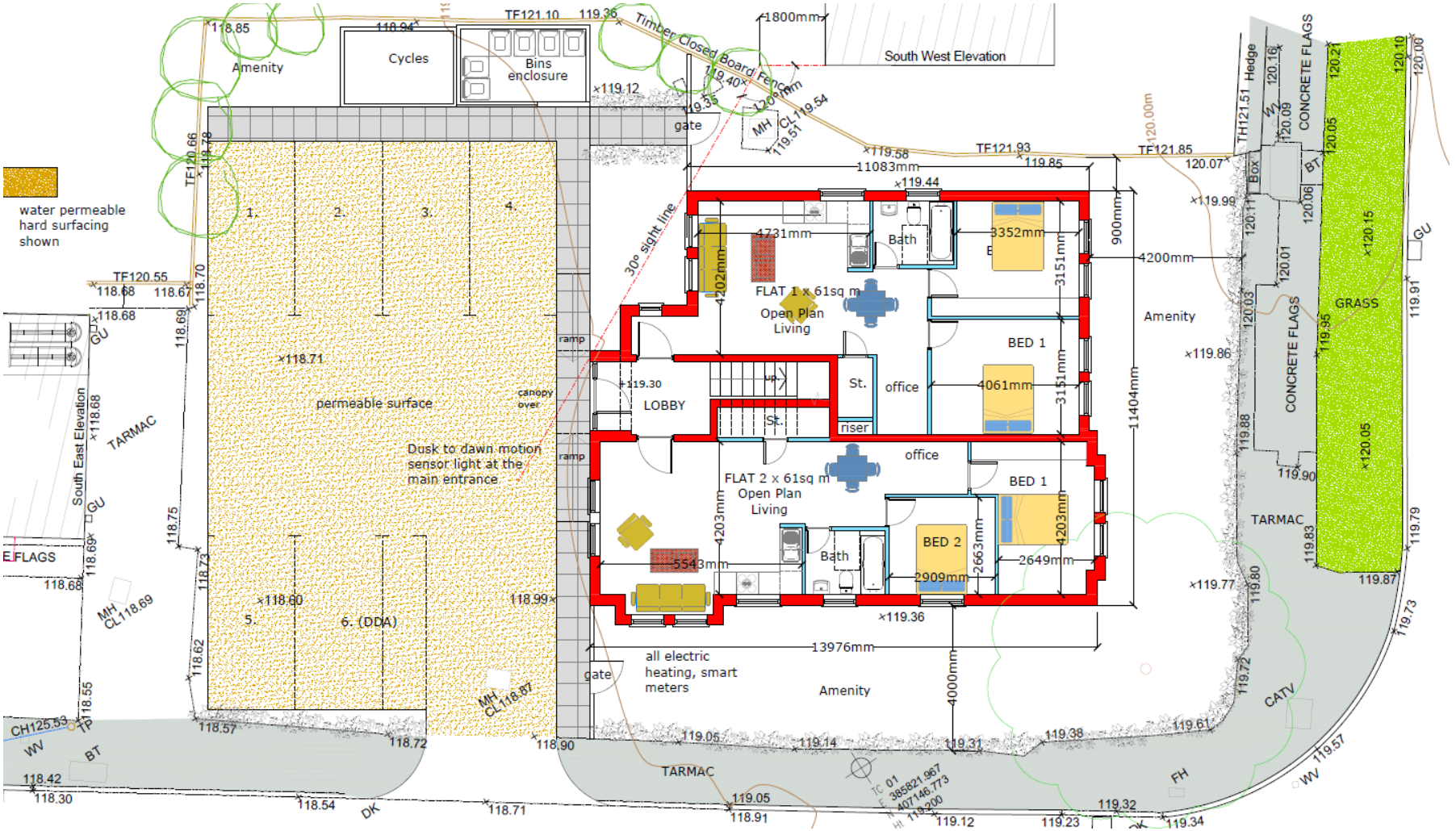
enviro | solution	**Site Location Map**

Figure 1



enviro | solution	**Existing Site Plan**

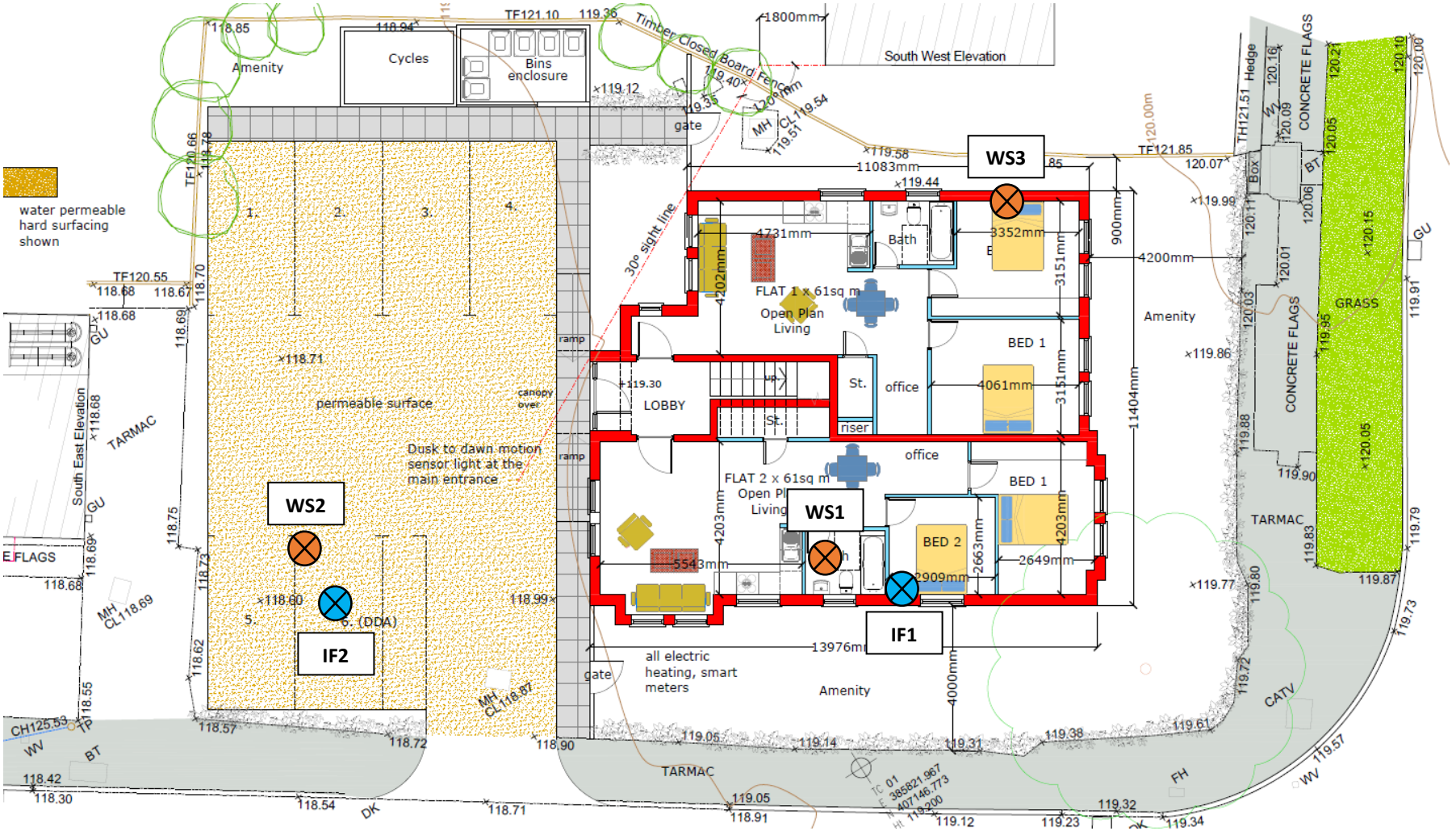
Figure 2



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Proposed Development Plan

Figure 3



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Exploratory Hole Location Plan

Figure 4

Appendix B – Site Photographs



enviro | solution	**Standing water in foundation test pit**

Appendix C – Borehole Logs

Job Title: Causey Drive	Client: Virtue FM	**Borehole No: WS1**
Location: Causey Drive, Middleton		**Page 1 of 3**

Drilling Dates: 18.03.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Sample Number	Sample Type	Depth (m)	SPT	Description	Comments
		0		Description	Comments
0.3m	♦			Made Ground: Grass on brown clayey sandy gravelly loam with brick fragments	
0.7m	♦	1	7	Brown/ orange/ grey clayey slightly gravelly fine gained SAND	
				Brown sandy CLAY	
1.8m	♦	2	15	Brown/ grey clayey SAND	
		3	16	Brown slightly sandy CLAY	
		4	19	End of borehole at 4.0m	
		5			

Non-slotted Install — Surrounded by bentonite seal, capped with flush cover and gas valve

Slotted Install — Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample — † Down Borehole Analysis

◡ Undisturbed Sample — ∇ Groundwater Table

∅ Headspace Analysis — ∆ Perched Water Table

Job Title: Causey Drive	Client: Virtue FM	**Borehole No: WS2**
Location: Causey Drive, Middleton		**Page 2 of 3**

Drilling Dates: 18.03.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments
					0			
	0.3m	♦					Made Ground: Grass on brown clayey gravelly loam with bricks and rootlets	
	0.8m	♦					Brown clayey fine grained SAND	
	1.0m	♦			1	6		
				▽	2	17		
	2.5m	♦				42	Stiff brown sandy CLAY	
							End of borehole at 2.70m	
					3			
					4			
					5			

Non-slotted Install	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

∪ Undisturbed Sample ▽ Groundwater Table

∅ Headspace Analysis Δ Perched Water Table

Job Title: Causey Drive	Client: Virtue FM	**Borehole No: WS3**
Location: Causey Drive, Middleton		**Page 3 of 3**

Drilling Dates: 18.03.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments
					0		Made Ground: Grass on brown sandy clayey gravelly loam with brick fragments	
	0.3m	♦						
	0.5m	♦					Brown/ grey slightly clayey fine grained SAND	
					1	8	Brown coarse SAND with occasional gravels	
				▽	2	6	Brown SILT	
					3	11	No Recovery	
					4	12	End of borehole at 4.0m	
					5			

Non-slotted Install	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	Surrounded by 10mm gravel and installed with end cap

Legend:

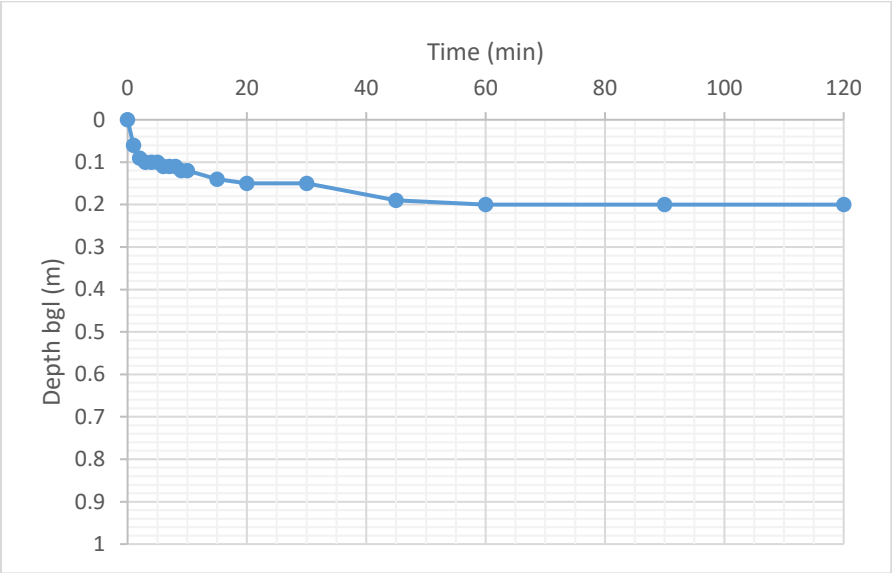
♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ▽ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

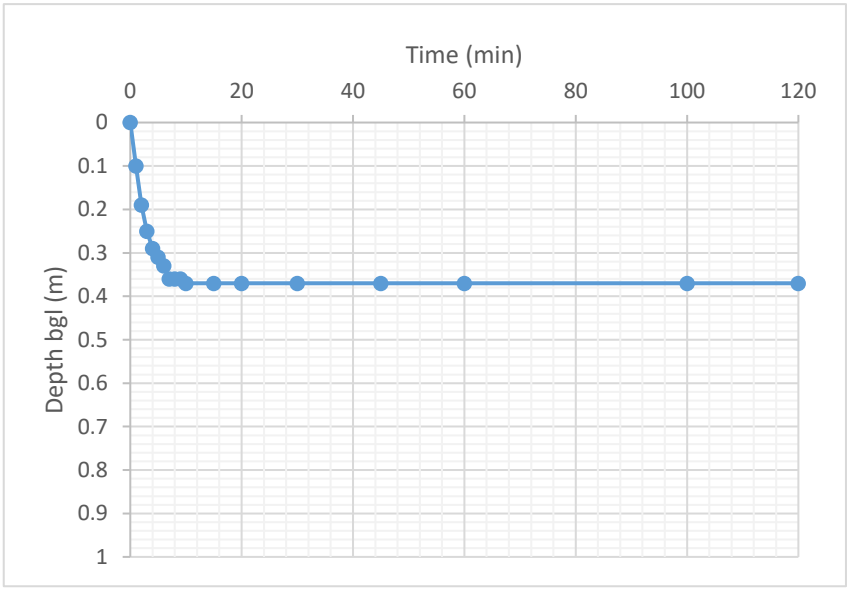
Appendix D – Infiltration Test Results

IF 1 – Test 1



Time Elapsed	Depth of water bgl
0	0
1	0.06
2	0.09
3	0.1
4	0.1
5	0.1
6	0.11
7	0.11
8	0.11
9	0.12
10	0.12
15	0.14
20	0.15
30	0.15
45	0.19
60	0.2
90	0.2
120	0.2

IF2 – Test 1



Time Elapsed	Depth of water Bgl
0	0
1	0.1
2	0.19
3	0.25
4	0.29
5	0.31
6	0.33
7	0.36
8	0.36
9	0.36
10	0.37
15	0.37
20	0.37
30	0.37
45	0.37
60	0.37
100	0.37
120	0.37

Appendix E – Tier 1 Human Health Risk Assessment

Client Sample ID	Units	Limit of Detection	GAC	WS1	WS1	WS2	WS3	WS3
Depth				0.30m	0.70m	0.30m	0.80m	0.30m
Date Sampled				18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24
Sample Type				Soil - D	Soil - D	Soil - D	Soil - D	Soil - D
pH	pH	0.01		8.15	6.13	8	7.39	7.89
Heavy Metals								
Arsenic	mg/kg	1	40	10	3	9	3	7
Cadmium	mg/kg	0.5	85	1.4	1	1.3	<0.5	4.2
Copper	mg/kg	1	7100	46	17	48	12	37
Chromium	mg/kg	1	910	21	14	25	10	19
Lead	mg/kg	1	310	94	10	95	21	83
Mercury	mg/kg	0.17	1.2	0.2	<0.17	0.28	<0.17	<0.17
Nickel	mg/kg	1	180	22	12	21	12	21
Zinc	mg/kg	5	40000	103	26	95	50	359
SVOC								
Carbazole	µg/kg	100		<100	<100	<100	<100	188
Anthracene	µg/kg	100	31000000	<100	<100	194	<100	341
Benzo(a)anthracene	µg/kg	100	11000	240	<100	916	<100	1830
Benzo(b)fluoranthene	µg/kg	100	3900	285	<100	1020	<100	1880
Benzo(k)fluoranthene	µg/kg	100	110000	<100	<100	398	<100	849
Benzo(a)pyrene	µg/kg	100	3200	232	<100	838	<100	1620
Benzo(ghi)perylene	µg/kg	100	360000	177	<100	590	<100	1020
Chrysene	µg/kg	100	30000	215	<100	835	<100	1580
Fluoranthene	µg/kg	100	1500000	346	<100	1560	<100	3230
Indeno(1,2,3-cd)pyrene	µg/kg	100	45000	189	<100	592	<100	1130
Phenanthrene	µg/kg	100	1300000	131	<100	727	<100	1370
Pyrene	µg/kg	100	3700000	348	<100	1530	<100	3050
Perylene	µg/kg	100		<100	<100	251	<100	511
Notes:								
Only those determinands that have been detected at concentrations in excess of LoD have been included in the table								
GAC = Human health generic assessment criteria for residential land use without plant uptake								
	GAC Exceedance							

Appendix F – Laboratory Data

Laboratory:
Unit 4
Rose Lane Industrial Estate
Lenham Heath
Kent ME17 2JN
01622 851176

UKAS TESTING
4727

XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No: **XTE 61831**
Page 1 of 1

TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 61831
CUSTOMER/SITE SAMPLE REF	592258

CLIENT	DETS Ltd
SITE	Causey Drive
SOIL DESCRIPTION	Brown orange Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS1 @ 1.80m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 March 2022
DATE RECEIVED	28 March 2022
DATE TESTED	29 March 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	8
Liquid Limit	25
Plastic Limit	12
Plasticity Index	13

REMARKS:

ISSUE TO: DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane, Lenham Heath
Maidstone
ME17 2JN

DATE: 07 April 2022

AUTHORISED BY: A Schofield Quality Manager

The results reported represents only the material tested supplied to the laboratory or the material has been sampled by Xtratec the quanity of the material repesented by the sample This report shall not be reproduced, except in full, without approval of the laborato

Laboratory:
Unit 4
Rose Lane Industrial Estate
Lenham Heath
Kent ME17 2JN
01622 851176

UKAS TESTING
4727

XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No: **XTE 61831**
Page 1 of 1

TEST REPORT OF MOISTURE CONTENT OF SOILS

Method: BS 1377-2:1990, Method 3.2.3.3. Oven Drying

XTRATEC SAMPLE REF	XTE 61831
CUSTOMER/SITE SAMPLE REF	592258

CLIENT	DETS Ltd
SITE	Causey Drive
TYPE OF MATERIAL	For Classification
SOIL DESCRIPTION	Brown orange Clay
SPECIFICATION	For Classification
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS1 @ 1.80m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 March 2022
DATE RECEIVED	28 March 2022
DATE TESTED	29 March 2022
PREPARATION METHOD	BS 1377-1. 7.3.5.2 (Sub dividing)

TEST RESULTS	
Moisture Content (%)	15.3

REMARKS:

ISSUE TO: DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane, Lenham Heath
Maidstone
ME17 2JN

DATE: 07 April 2022

AUTHORISED BY: A Schofield Quality Manager

The results reported represents only the material tested supplied to the laboratory or if the material has been sampled by Xtratec the quantity of the material represented by the sample.
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Laboratory:
Unit 4
Rose Lane Industrial Estate
Lenham Heath
Kent ME17 2JN
01622 851176

4727

XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No: XTE 61832
Page 1 of 1

TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 61832
CUSTOMER/SITE SAMPLE REF	592259

CLIENT	DETS Ltd
SITE	Causey Drive
SOIL DESCRIPTION	Brown Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS2 @ 2.50m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 March 2022
DATE RECEIVED	28 March 2022
DATE TESTED	29 March 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	6
Liquid Limit	28
Plastic Limit	14
Plasticity Index	14

REMARKS:

ISSUE TO: DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane, Lenham Heath
Maidstone
ME17 2JN

DATE: 07 April 2022

AUTHORISED BY: A Schofield Quality Manager

The results reported represents only the material tested supplied to the laboratory or the material has been sampled by Xtratec the quanity of the material repesented by the sample
This report shall not be reproduced, except in full, without approval of the laborato

Tom Craig
Envirosolution Ltd
Suite 5
The Quay
No. 12 Princes Dock
Liverpool Waters
Liverpool
L3 1DL

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 22-02897

Site Reference:	Causey Drive
Project / Job Ref:	Causey Drive
Order No:	ES230322
Sample Receipt Date:	25/03/2022
Sample Scheduled Date:	28/03/2022
Report Issue Number:	1
Reporting Date:	31/03/2022

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate						
DETS Report No: 22-02897	**Date Sampled**	18/03/22	18/03/22	18/03/22		
Envirosolution Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Causey Drive	**TP / BH No**	WS1	WS2	WS3		
Project / Job Ref: Causey Drive	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: ES230322	**Depth (m)**	0.30	1.00	0.50		
Reporting Date: 31/03/2022	**DETS Sample No**	592255	592256	592257		

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	7.7	7.5	7.3		
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	496	429	399		
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.05	0.04	0.04		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	24	35	56		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.02	0.04	0.06		
Total Sulphur	%	< 0.02	NONE	0.04	0.03	0.02		
Ammonium as NH_4	mg/kg	< 0.5	MCERTS	2.7	3.3	2.3		
Ammonium as NH_4	mg/l	< 0.05	MCERTS	0.27	0.33	0.23		
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	5	3	6		
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	2.3	1.5	3.1		
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	MCERTS	12	12	6		
Water Soluble Nitrate (2:1) as NO_3	mg/l	< 1.5	MCERTS	5.9	5.9	2.8		
W/S Magnesium	mg/l	< 0.1	NONE	1.9	1.1	1.6		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Sample Descriptions
DETS Report No: 22-02897
Envirosolution Ltd
Site Reference: Causey Drive
Project / Job Ref: Causey Drive
Order No: ES230322
Reporting Date: 31/03/2022

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
592255	WS1	None Supplied	0.30	17.5	Brown sandy clay with brick
592256	WS2	None Supplied	1.00	16.4	Brown sandy clay
592257	WS3	None Supplied	0.50	17.1	Brown sandy clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

4480

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 22-02897
Envirosolution Ltd
Site Reference: Causey Drive
Project / Job Ref: Causey Drive
Order No: ES230322
Reporting Date: 31/03/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/02752
Issue Number: 1 **Date:** 01 April, 2022

Client:
Envirosolution Ltd
Suite 5
The Quay
No 12 Princes Dock
Liverpool Waters
Liverpool
L3 1DL

Project Manager: Tom Craig
Project Name: Causey Drive
Project Ref: Not specified
Order No: ES220322
Date Samples Received: 21/03/22
Date Instructions Received: 23/03/22
Date Analysis Completed: 01/04/22

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 22/02752

Client Project Name: Causey Drive

Client Project Ref: Not specified

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS3					
Depth to Top	0.30	0.70	0.30	0.80	0.30					
Depth To Bottom										
Date Sampled	18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	6AE	5A	6AE	6AE	6AE					
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1			% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	8.15	6.13	8.00	7.39	7.89			pH	0.01	A-T-031s
Arsenic$_D$$^{M\#}$	10	3	9	3	7			mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	1.4	1.0	1.3	<0.5	4.2			mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	46	17	48	12	37			mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	21	14	25	10	19			mg/kg	1	A-T-024s
Lead$_D$$^{M\#}$	94	10	95	21	83			mg/kg	1	A-T-024s
Mercury$_D$	0.20	<0.17	0.28	<0.17	<0.17			mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	22	12	21	12	21			mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	<1	<1	<1			mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	103	26	95	50	359			mg/kg	5	A-T-024s

Envirolab Job Number: 22/02752

Client Project Name: Causey Drive

Client Project Ref: Not specified

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS3					
Depth to Top	0.30	0.70	0.30	0.80	0.30					
Depth To Bottom										
Date Sampled	18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	6AE	5A	6AE	6AE	6AE					
Asbestos in Soil (inc. matrix) ^										
Asbestos in soil$_{D}^{\#}$	NAD	-	NAD	-	NAD					A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-					A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-					A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	-	N/A	-	N/A					A-T-045

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS3					
Depth to Top	0.30	0.70	0.30	0.80	0.30					
Depth To Bottom										
Date Sampled	18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	6AE	5A	6AE	6AE	6AE					
SVOC										
4-Bromophenyl phenyl ether$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Hexachlorobenzene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Diethyl phthalate$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Dimethyl phthalate$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Dibenzofuran$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Carbazole$_A$	<100	<100	<100	<100	188			µg/kg	100	A-T-052s
Butylbenzyl phthalate$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate$_A$	<500	<500	<500	<500	<500			µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
4-Nitrophenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
3+4-Methylphenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
4-Chloro-3-methylphenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2-Nitrophenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2-Methylphenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2-Chlorophenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2,6-Dinitrotoluene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2,4-Dinitrotoluene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2,4-Dimethylphenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2,4-Dichlorophenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2,4,6-Trichlorophenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2,4,5-Trichlorophenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2-Chloronaphthalene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
2-Methylnaphthalene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Acenaphthylene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Acenaphthene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Anthracene$_A$	<100	<100	194	<100	341			µg/kg	100	A-T-052s
Benzo(a)anthracene$_A$	240	<100	916	<100	1830			µg/kg	100	A-T-052s
Benzo(b)fluoranthene$_A$	285	<100	1020	<100	1880			µg/kg	100	A-T-052s
Benzo(k)fluoranthene$_A$	<100	<100	398	<100	849			µg/kg	100	A-T-052s
Benzo(a)pyrene$_A$	232	<100	838	<100	1620			µg/kg	100	A-T-052s
Benzo(ghi)perylene$_A$	177	<100	590	<100	1020			µg/kg	100	A-T-052s

Envirolab Job Number: 22/02752

Client Project Name: Causey Drive

Client Project Ref: Not specified

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS3					
Depth to Top	0.30	0.70	0.30	0.80	0.30					
Depth To Bottom										
Date Sampled	18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	6AE	5A	6AE	6AE	6AE					
Chrysene$_A$	215	<100	835	<100	1580			µg/kg	100	A-T-052s
Fluoranthene$_A$	346	<100	1560	<100	3230			µg/kg	100	A-T-052s
Fluorene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Indeno(1,2,3-cd)pyrene$_A$	189	<100	592	<100	1130			µg/kg	100	A-T-052s
Phenanthrene$_A$	131	<100	727	<100	1370			µg/kg	100	A-T-052s
Pyrene$_A$	348	<100	1530	<100	3050			µg/kg	100	A-T-052s
Naphthalene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Dibenzo(ah)anthracene$_A$	<100	<100	128	<100	249			µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Phenol$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Pentachlorophenol (SVOC)$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
n-Dioctylphthalate$_A$	<500	<500	<500	<500	<500			µg/kg	500	A-T-052s
n-Dibutylphthalate$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Nitrobenzene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Isophorone$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Hexachloroethane$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Hexachlorocyclopentadiene$_A$	<100	<100	<100	<100	<100			µg/kg	100	A-T-052s
Perylene$_A$	<100	<100	251	<100	511			µg/kg	100	A-T-052s

Envirolab Job Number: 22/02752

Client Project Name: Causey Drive

Client Project Ref: Not specified

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS3					
Depth to Top	0.30	0.70	0.30	0.80	0.30					
Depth To Bottom										
Date Sampled	18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	6AE	5A	6AE	6AE	6AE					
VOC										
Dichlorodifluoromethane$_{A}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Chloromethane$_{A}$	<10	<10	<10	<10	<10			µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene)$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Bromomethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Chloroethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Trichlorofluoromethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,1-Dichloroethene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Carbon Disulphide$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Dichloromethane$_{A}$	<5	<5	<5	<5	<5			µg/kg	5	A-T-006s
trans 1,2-Dichloroethene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,1-Dichloroethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
cis 1,2-Dichloroethene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
2,2-Dichloropropane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Bromochloromethane$_{A}^{\#}$	<5	<5	<5	<5	<5			µg/kg	5	A-T-006s
Chloroform$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,1,1-Trichloroethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,1-Dichloropropene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Carbon Tetrachloride$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,2-Dichloroethane$_{A}^{\#}$	<2	<2	<2	<2	<2			µg/kg	2	A-T-006s
Benzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Trichloroethene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,2-Dichloropropane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Dibromomethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Bromodichloromethane$_{A}^{\#}$	<10	<10	<10	<10	<10			µg/kg	10	A-T-006s
cis 1,3-Dichloropropene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Toluene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
trans 1,3-Dichloropropene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,1,2-Trichloroethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,3-Dichloropropane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Tetrachloroethene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Dibromochloromethane$_{A}^{\#}$	<3	<3	<3	<3	<3			µg/kg	3	A-T-006s
1,2-Dibromoethane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s

Envirolab Job Number: 22/02752

Client Project Name: Causey Drive

Client Project Ref: Not specified

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS3					
Depth to Top	0.30	0.70	0.30	0.80	0.30					
Depth To Bottom										
Date Sampled	18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	6AE	5A	6AE	6AE	6AE					
Chlorobenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane$_{A}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Ethylbenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
m & p Xylene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
o-Xylene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Styrene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Bromoform$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Isopropylbenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane$_{A}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,2,3-Trichloropropane$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
Bromobenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
n-Propylbenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
2-Chlorotoluene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
4-Chlorotoluene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
tert-Butylbenzene$_{A}^{\#}$	<2	<2	<2	<2	<2			µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
sec-Butylbenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
4-Isopropyltoluene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,3-Dichlorobenzene$_{A}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,4-Dichlorobenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
n-Butylbenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,2-Dichlorobenzene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP)$_{A}$	<2	<2	<2	<2	<2			µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene$_{A}$	<3	<3	<3	<3	<3			µg/kg	3	A-T-006s
Hexachlorobutadiene$_{A}^{\#}$	<1	<1	<1	<1	<1			µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene$_{A}$	<3	<3	<3	<3	<3			µg/kg	3	A-T-006s

Envirolab Job Number: 22/02752

Client Project Name: Causey Drive

Client Project Ref: Not specified

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS3					
Depth to Top	0.30	0.70	0.30	0.80	0.30					
Depth To Bottom										
Date Sampled	18-Mar-22	18-Feb-22	18-Mar-23	18-Feb-23	18-Mar-24					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	6AE	5A	6AE	6AE	6AE					
TPH CWG with Clean Up *C1										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<1	<1	<1	<1			mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<1	<1	<1	<1			mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	<1	<1	<1	<1			mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	4	<1	1	<1	1			mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	33	2	12	6	21			mg/kg	1	A-T-055s
Total Aliphatics$_A$	37	2	14	6	22			mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<1	<1	<1	<1	<1			mg/kg	1	A-T-055s
Aro >C10-C12$_A$	<1	<1	<1	<1	<1			mg/kg	1	A-T-055s
Aro >C12-C16$_A$	1	<1	4	<1	5			mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	5	<1	20	<1	20			mg/kg	1	A-T-055s
Aro >C21-C35$_A$	19	<1	59	2	51			mg/kg	1	A-T-055s
Total Aromatics$_A$	25	<1	82	2	75			mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	62	2	96	8	98			mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01			mg/kg	0.01	A-T-022s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
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, 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.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

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, 9 = INCINERATOR ASH.
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
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Envirosolution Ltd, Suite 5, The Quay, No 12 Princes Dock, Liverpool Waters, Liverpool, L3 1DL

Project: Causey Drive

Clients Project No:

Project No: 22/02752

Date Received: 23/03/2022 (am)

Cool Box Temperatures (°C): 8.9

Lab Sample ID	22/02752/2
Client Sample No	
Client Sample ID/Depth	WS1 0.70m
Date Sampled	18/02/22
Deviation Code	
F	✓

Key
F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	22/02752/2
Client Sample No	
Client Sample ID/Depth	WS1 0.70m
Date Sampled	18/02/22
EPHCWG	✓
VPHCWG	✓
SVOC	✓
VOC	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/02752/1	22/02752/2	22/02752/3	22/02752/4	22/02752/5
Client Sample No					
Client Sample ID/Depth	WS1 0.30m	WS1 0.70m	WS2 0.30m	WS3 0.80m	WS3 0.30m
Date Sampled	18/03/22	18/02/22	18/03/23	18/02/23	18/03/24
A-T-006s	29/03/2022	29/03/2022	30/03/2022	29/03/2022	30/03/2022
A-T-022s	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
A-T-024s	01/04/2022	01/04/2022	01/04/2022	01/04/2022	01/04/2022
A-T-031s	31/03/2022	31/03/2022	31/03/2022	31/03/2022	31/03/2022
A-T-044	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
A-T-045	25/03/2022		25/03/2022		25/03/2022
A-T-052s	31/03/2022	31/03/2022	31/03/2022	31/03/2022	31/03/2022
A-T-055s	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report