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Ground Investigations Ireland

William Street West, Galway

CORA

Ground Investigation Report

March 2024

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Engineer	Lucy Burke
Client	CORA
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APPENDICES

1.0 Preamble

On the instructions of CORA Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between 21st February 2024 and 26th February 2024 at the site of the proposed residential development in William Street West, Galway.

2.0 Overview

2.1. Background

It is proposed to construct a new housing development. The site is currently vacant housing and is situated on William Street West in Galway City. The proposed construction is envisaged to consist of conventional residential construction.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 2 No. Foundation Inspection Pits to determine existing foundation details
- Carry out 1 No. Soakaway to determine a soil infiltration value to BRE digest 365
- Carry out 4 No. Window Sample Boreholes to recover soil samples
- Carry out 4 No. Dynamic Probes to determine soil strength/density characteristics
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Foundation Pits

The foundation inspection pits were excavated at the locations shown in the exploratory hole location plan in Appendix 1. The exposed foundations were logged and sketched prior to backfilling and reinstatement. The logs and sketches are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.4. Window Sampling

The window sampling was carried out at the locations shown in the location plan in Appendix 1 using a Tecopsa SPT Tec 10 percussion drilling rig. The window sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 50kg weight falling a height of 500mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by a Geotechnical Engineer/Engineering Geologist. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging.
Where less than 100% recovery has been achieved in the window sample liners, the logging engineer will use the information from adjacent exploratory holes to determine the nature of the strata, however this is not definite and is subject to variation. To assist with the review of this information by the client/consulting engineer the pictures of the recovery is presented with the recovery noted in the remarks column of the window sample log. The window sample records are provided in Appendix 4 of this Report.

3.5. Dynamic Probing (DPH)

The dynamic probe tests (DPH) were carried out at the locations shown in the location plan in Appendix 1 in accordance with B.S. 1377: Part 9 1990. The test consists of mechanically driving a cone with a 50kg weight in 100mm intervals and monitoring the number of blows required. An equivalent Standard Penetration Test (SPT) 'N' value may be calculated by dividing the total number of blows over a 300mm drive length by 1.5. The dynamic probe logs are provided in Appendix 5 of this Report.

3.6. Surveying

The exploratory hole locations have been recorded using a KQ GEO Technologies KQ-M8 System which records the coordinates and elevation of the locations to ITM or Irish National Grid as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.7. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental & Chemical testing as required by the specification, including the Rilta Suite pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.
The results of the laboratory testing are included in Appendix 6 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and generally comprised;

- Topsoil/Surfacing
- Made Ground
- Cohesive Deposits

TOPSOIL: Topsoil was encountered in all the majority of holes and was present to a maximum depth of 0.1m BGL. Gravel surfacing was present at SA01 and WS04, and was underlain by black membrane to a maximum depth of 0.06m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil and Surfacing and were present to depths of between 0.8m and 1.4m BGL. These deposits were described generally as *dark brown slightly sandy gravelly Clay with occasional fragments of red brick, plastic, glass and rootlets.* It should be noted that only 1 window sample proved the base of the made ground.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground in WS01 and were described typically as *grey sandy gravelly CLAY with occasional cobbles*. The strength of the cohesive deposits was soft to firm in WS01.

4.2. Insitu Strength Testing

The correlated DPH blow counts indicate that the overburden deposits are soft or soft to firm to varying depths of between 1.2m to 1.7m BGL and refuse at depths of between 0.6 and 2.50m.

4.3. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors.

4.4. Laboratory Testing

4.4.1. Chemical Laboratory Testing

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

4.4.2. Environmental Laboratory Testing

Two samples were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous*. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.

The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.

As part of the suite a leachate is generated from the solid sample which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).

While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous

properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation. A waste classification report is recommended to be carried out to provide an interpretation of the laboratory data should any material be required to be disposed of off site.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.1. Foundations

An allowable bearing capacity of 150kN/m^2 is recommended for conventional strip or pad foundations on the presumed weathered bedrock at a depth of between 1.50m and 2.50m BGL. The founding depth is based on the refusal depths of the dynamic probes. Due to access restrictions only small machinery was able to access site and the base of made ground was generally not proven in the window samples or trial pits.

Where the foundation is proposed to bear on the presumed weathered bedrock and the methods employed to determine the ground conditions ie. window samples, were not sufficient to prove the presence of weathered rock, it would be prudent to confirm the stratum with trial pitting or rotary coring if deemed necessary. Any soft spots or made ground encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations. In any part of the site, should part of the foundation be on rock we would recommend that all the foundations of the unit in question be lowered to the competent rock stratum to avoid differential settlement.

The depth of Made Ground/Soft deposits generally exceeds 0.9m on the site therefore suspended floor slabs should be considered.

The pH and sulphate testing completed on samples recovered from the exploratory holes indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack. The samples tested were below the limits of DS1 in the BRE Special Digest 1:2005.

5.2. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Excavations in the Made Ground, soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.
Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.
The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.
Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

5.3. Soakaway Design

An infiltration rate of f=2,4 x 10^{-4} was calculated for the soakaway locations SA01.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

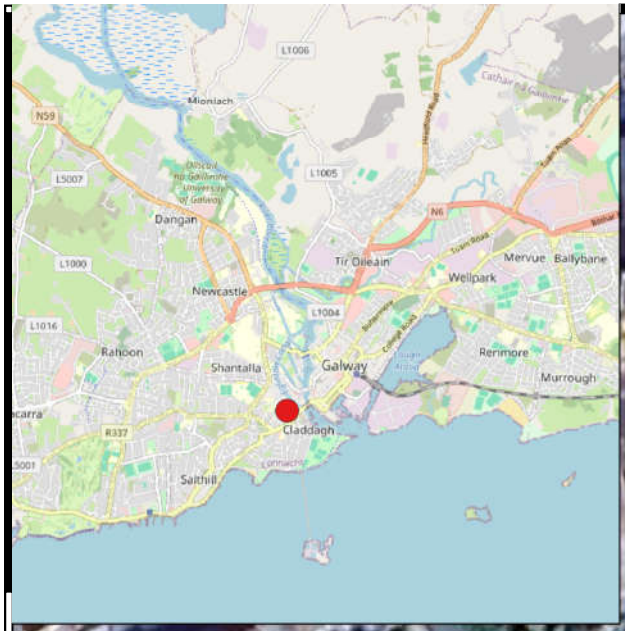
APPENDIX 1 - Site Location Plan

529300E

529400E

724900N

724800N



Site Location

Indicative Site Boundary

Client:

CORA
CONSULTING ENGINEERS

Project Code:
13517-01-24

Project Title:
William Street West, Galway

Drawing Title:
Figure 1 Site Location

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0 10 20 30 40 m

Drawn By:
LB

Date:
05/03/2024

Legend:

- Indicative Site Boundary
- Soak Away
- Foundation Pit
- Probe Window Sample

Client:

CORA CONSULTING ENGINEERS

Project Code:
13517-01-24

Project Title:
William Street West, Galway

Drawing Title:
Figure 2 Site Investigation Points

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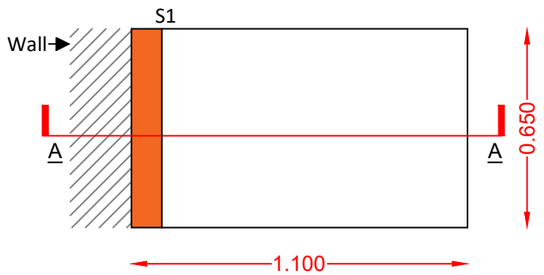
0 2 4 6 8 m

Drawn By:	Date:
LB	05/03/2024

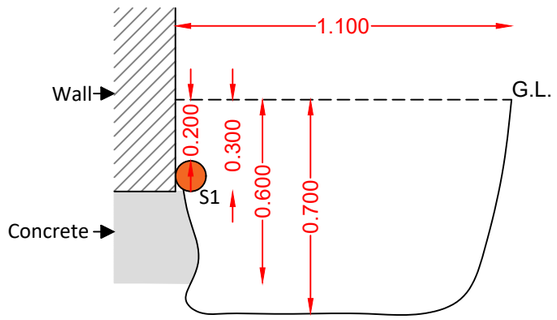
APPENDIX 2 – Foundation Pit Records

FP01

PLAN VIEW



SECTION A-A



FOUNDATION PIT LOG

0.00 - 0.10	CONCRETE.
0.10 - 0.70	MADE GROUND: Brown slightly gravelly fine to coarse SAND with cobbles and concrete blocks.

SERVICE:

S1 - Orange Ø0.100mm PVC drainage pipe.

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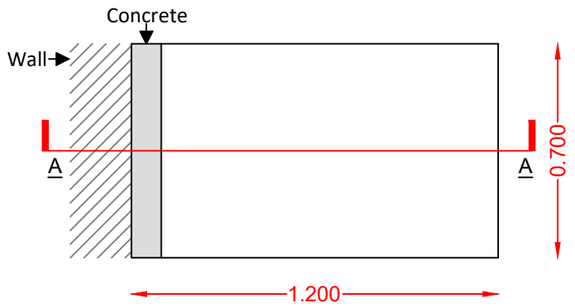
PROJECT:	13517-01-24 - William Street West, Galway
DRAWING No.:	FP01
DATE:	21/02/2024
CLIENT:	CORA
SCALE:	NTS

Version:	Date:	Drawn By:	Checked By:
1	05/03/2024	J.S.	L.B.

FP02

PLAN VIEW



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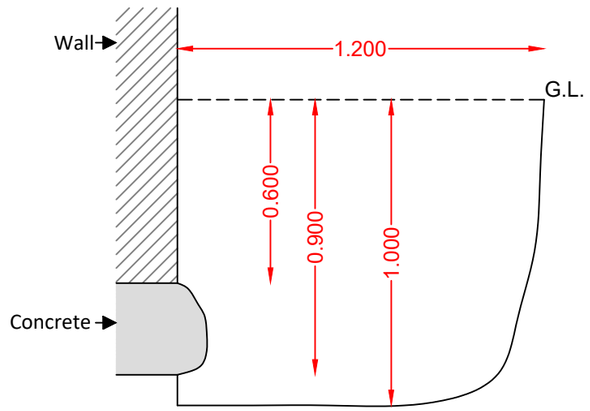

FOUNDATION PIT LOG

0.00 - 0.10	CONCRETE.
0.10 - 1.00	MADE GROUND: Grey sandy subangular to subrounded fine to coarse Gravel.

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PROJECT:	13517-01-24 - William Street West, Galway
DRAWING No.:	FP02
DATE:	21/02/2024
CLIENT:	CORA
SCALE:	NTS

Version:	Date:	Drawn By:	Checked By:
1	05/03/2024	J.S.	L.B.

Foundation Pit 1

Foundation Pit 1

Foundation Pit 1

Foundation Pit 1

Foundation Pit 2

Foundation Pit 2

Foundation Pit 2

Foundation Pit 2

Foundation Pit 2

APPENDIX 3 – Soakaway Records

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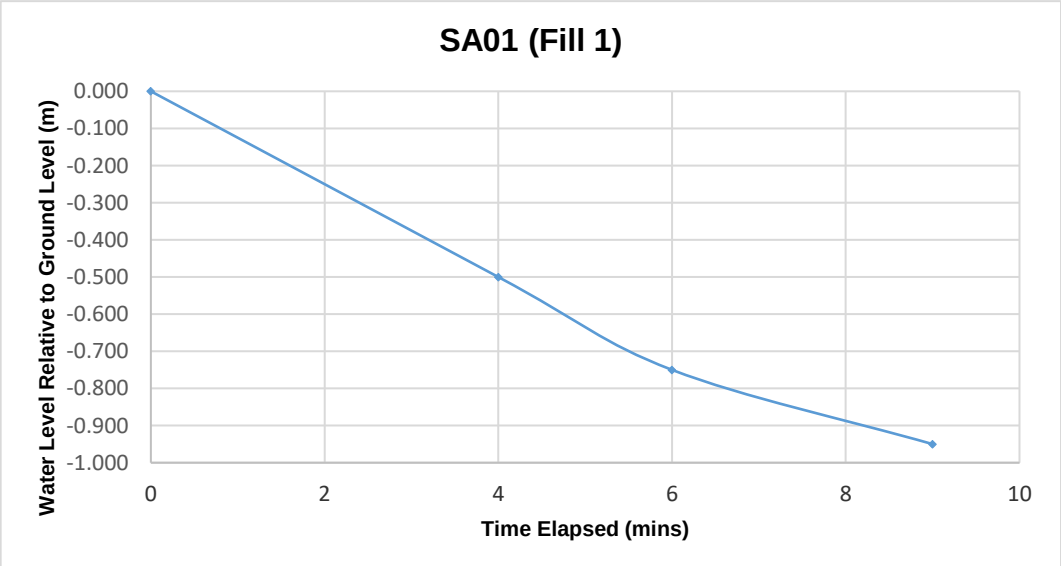
SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 0.9m x 0.60m x 0.95m (L x W x D)

Date	Time	Water level (m bgl)
21/02/2024	0	0.000
21/02/2024	4	-0.500
21/02/2024	6	-0.750
21/02/2024	9	-0.950

Start depth	Depth of Pit		Diff	75% full	25%full
0.00	**0.950**		**0.950**	**0.2375**	**0.7125**

Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
0.900	0.600		0.475	0.26
Tp75-25 (from graph) (s)		**210**	50% Eff Depth	ap50 (m2)
			0.475	1.965
f =	**6.216E-04**	**m/s**		



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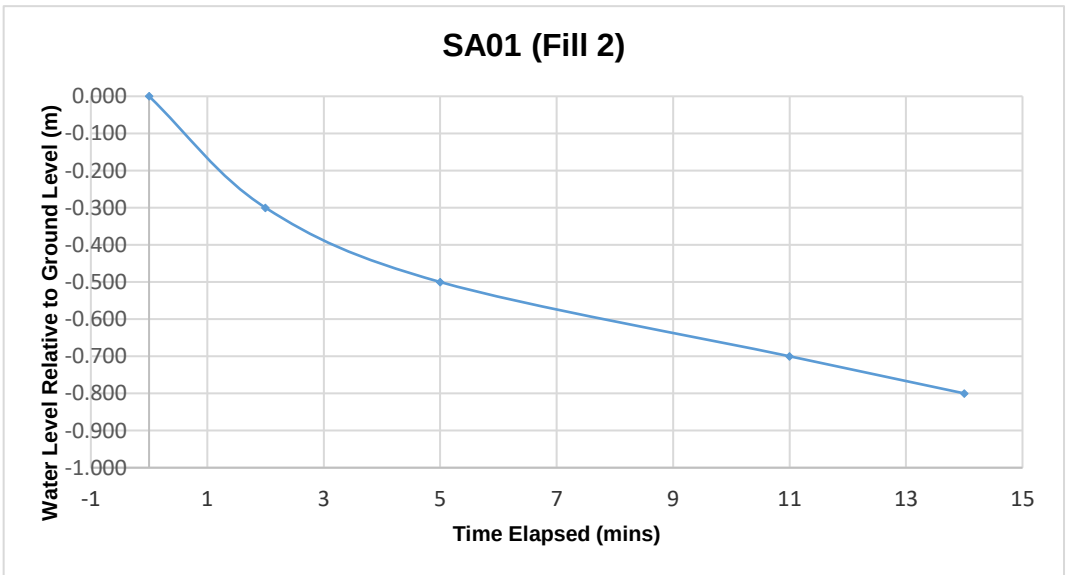
SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 0.9m x 0.60m x 0.95m (L x W x D)

Date	Time	Water level (m bgl)
21/02/2024	0	0.000
21/02/2024	2	-0.300
21/02/2024	5	-0.500
21/02/2024	11	-0.700
21/02/2024	14	-0.800

Start depth	Depth of Pit		Diff	75% full	25%full
0.00	**0.950**		**0.950**	**0.2375**	**0.7125**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
0.900	0.600			0.475	0.26
Tp75-25 (from graph) (s)		**510**		50% Eff Depth	ap50 (m2)
				0.475	1.965
f =	**2.559E-04**	**m/s**			



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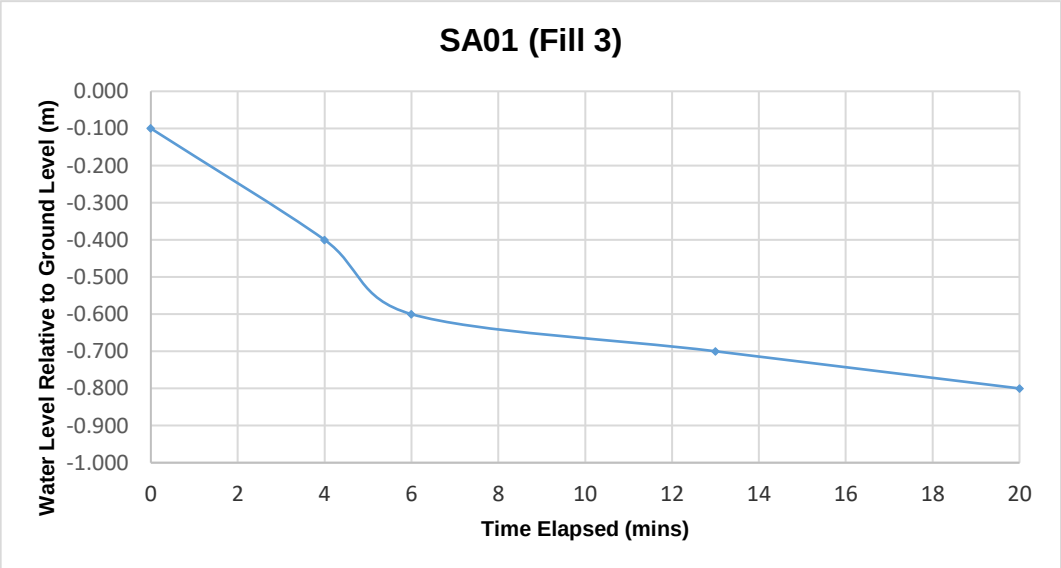
SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 0.9m x 0.60m x 0.95m (L x W x D)

Date	Time	Water level (m bgl)
21/02/2024	0	-0.100
21/02/2024	4	-0.400
21/02/2024	6	-0.600
21/02/2024	13	-0.700
21/02/2024	20	-0.800

Start depth	Depth of Pit		Diff	75% full	25%full
0.00	**0.950**		**0.950**	**0.2375**	**0.7125**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
0.900	0.600			0.475	0.26
Tp75-25 (from graph) (s)		**540**		50% Eff Depth	ap50 (m2)
				0.475	1.965
f =	**2.417E-04**	**m/s**			



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Site	Trial Pit Number
William Street West, Galway	SA01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	0.9 x 0.6 x 0.95m	3.59	CORA	13517-01-24
	Location	**Dates**	**Engineer**	**Sheet**
	529355.7 E 724861.2 N	21/02/2024	Lucy Burke	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.54	0.05	MADE GROUND: Grey sub rounded to round medium to coarse Gravel		
				3.53	0.06	MADE GROUND: Geotextile		
0.50	B01				(0.89)	MADE GROUND: Brown slightly clayey slightly gravelly fine to coarse Sand. Gravel is subangular to subrounded fine to coarse		
				2.64	0.95	Complete at 0.95m		

Plan

Remarks

Soak away stable.
No groundwater encountered during excavation.
Soak away backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	LB	13517-01-24.SA01

Soak Away 1

Soak Away 1

Soak away 1

APPENDIX 4 – Window Sample Records

Ground Investigations Ireland Ltd
www.gii.ie

Site William Street West, Galway			**Number** WS01
Machine : Tech 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 88mm to 1.00m 66mm to 2.00m	**Ground Level (mOD)** 3.47	**Client** CORA	**Job Number** 13517-01-24
	Location 529345.8 E 724877 N	**Dates** 26/02/2024	**Engineer** Lucy Burke	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	B					Recovery consists of MADE GROUND: dark brown slightly sandy gravelly Clay with occasional plastic glass and red brick fragements and rare charcoal fragments and plastic membrane		
0.50-1.00	ES				(1.50)			
1.00-2.00	B		Water strike(1) at 1.00m.					▽1
1.00-2.00	ES							
				1.97	1.50	Recovery consists of light grey sandy gravelly CLAY. Gravel is subangular fine to coarse		
					(0.50)			
				1.47	2.00	Complete at 2.00m		

Remarks
Refusal at 2.00m BGL
Groundwater encountered at 1.00m BGL

Scale (approx)	Logged By
1:25	AW

Figure No. 13517-01-24.WS01

Ground Investigations Ireland Ltd
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Site William Street West, Galway			**Number** WS02
Machine : Tech 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 88mm to 1.00m 66mm to 1.40m	**Ground Level (mOD)** 3.45	**Client** CORA	**Job Number** 13517-01-24
	Location 529340.4 E 724872.4 N	**Dates** 26/02/2024	**Engineer** Lucy Burke	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.40	B		Water strike(1) at 1.00m.		(1.40)	Recovery consists of MADE GROUND: dark brown slightly sandy gravelly Clay with with occasional plastic glass and red brick fragments and occasional rootlets and rare shells		▽1
				2.05	1.40	Complete at 1.40m		

Remarks
Refusal at 2.60m BGL
Groundwater encountered at 1.00m BGL

Scale (approx)	Logged By
1:25	AW

Figure No. 13517-01-24.WS02

Ground Investigations Ireland Ltd
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Site William Street West, Galway			**Number** WS03
Machine : Tech 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 88mm to 1.00m 66mm to 1.50m	**Ground Level (mOD)** 3.55	**Client** CORA	**Job Number** 13517-01-24
	Location 529355.6 E 724869.5 N	**Dates** 26/02/2024	**Engineer** Lucy Burke	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-1.50	B		Water strike(1) at 1.00m.	3.45	(0.10) 0.10	Dark brown slightly sandy gravelly TOPSOIL		
						MADE GROUND: dark brown slightly sandy slightly gravelly Clay with rare plastic glass wood and redbrick fragments and frequent rootlets		▽1
					(1.40)			
				2.05	1.50	Complete at 1.50m		

Remarks
Refusal at 1.50m BGL
Groundwater encountered at 1.00m BGL

Scale (approx)	Logged By
1:25	AW

Figure No. 13517-01-24.WS03

Ground Investigations Ireland Ltd
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Site William Street West, Galway			**Number** WS04
Machine : Tech 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 88mm to 0.80m	**Ground Level (mOD)** 3.62	**Client** CORA	**Job Number** 13517-01-24
	Location 529351.6 E 724860.8 N	**Dates** 26/02/2024	**Engineer** Lucy Burke	**Sheet** 1/1

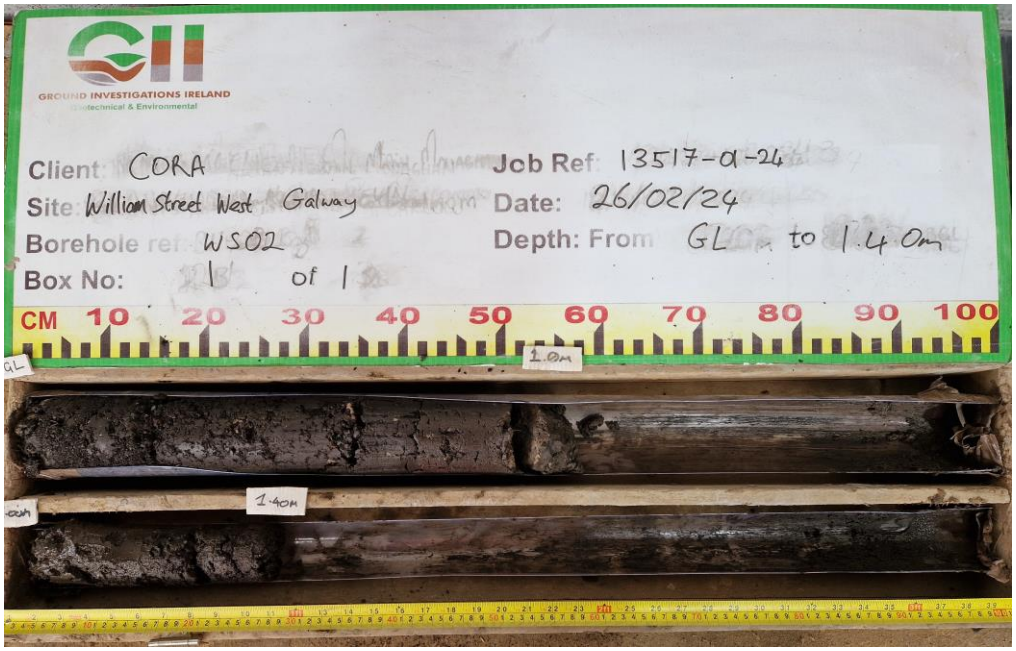
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.80	B				(0.80)	Recovery consists of MADE GROUND: dark brown slightly sandy slightly gravelly Clay with occasional plastic glass wood ceramic and shell fragments and rare plastic membrane		
0.50	ES							
				2.82	0.80	Complete at 0.80m		

Remarks
Refusal at 0.80m BGL

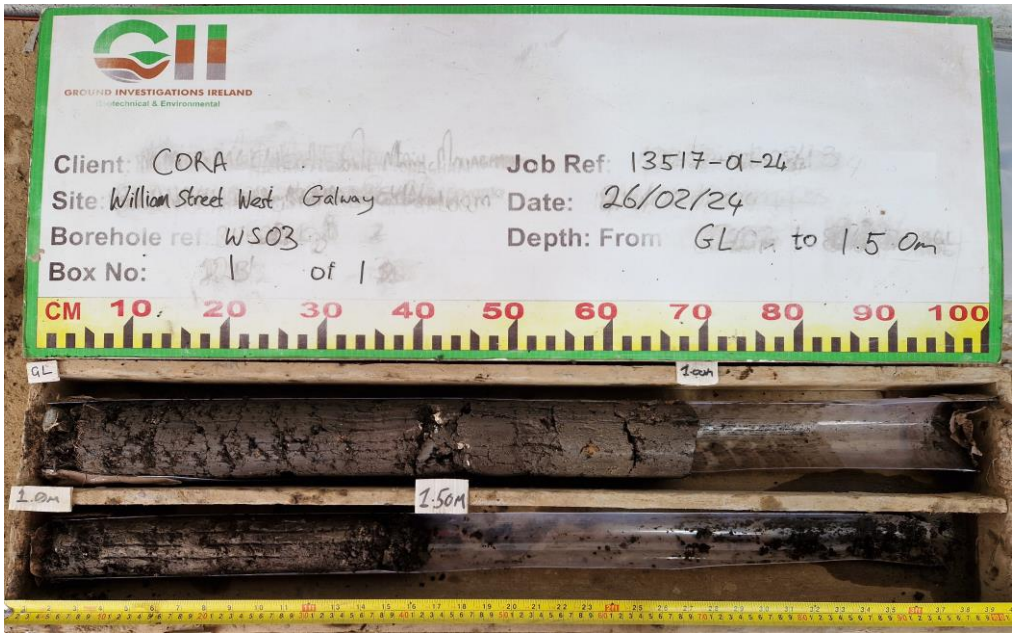
Scale (approx)	Logged By
1:25	AW

Figure No.
13517-01-24.WS04

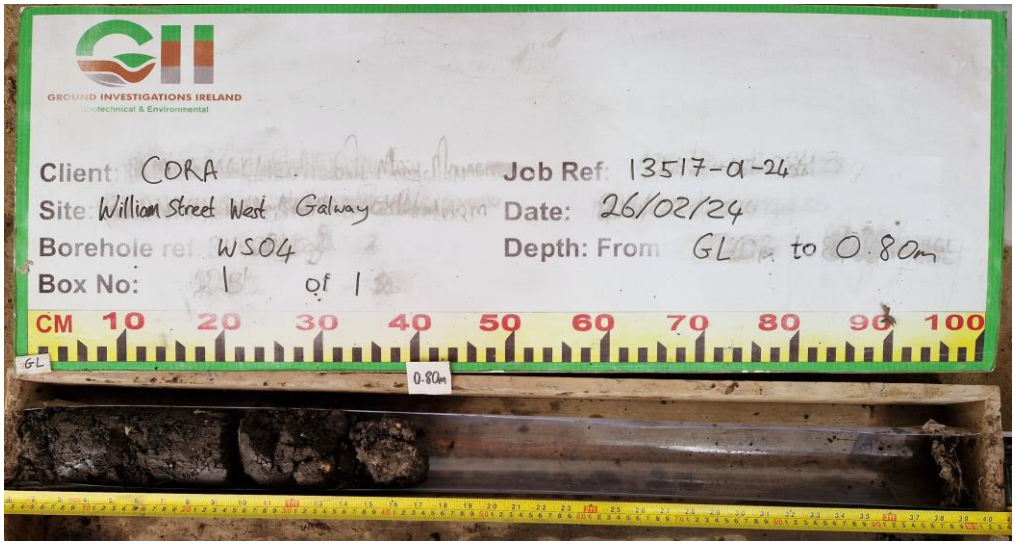
Window Sample 1



Window Sample 2



Window Sample 3



Window Sample 4

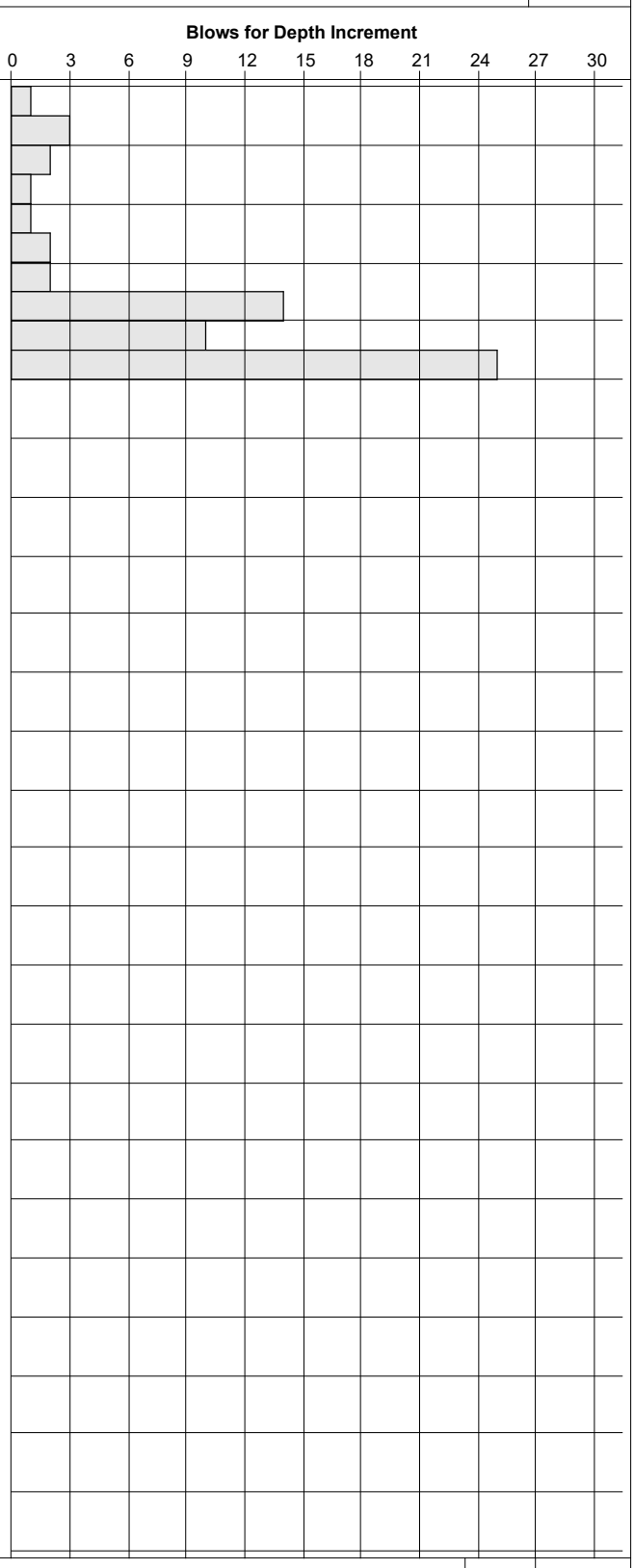
APPENDIX 5 – Dynamic Probe Records

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
William Street West, Galway	DP01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50kg	Diameter 43.7mm	3.47	CORA	13517-01-24
	Location	**Dates**	**Engineer**	**Sheet**
	529345.8 E 724877 N	26/02/2024	Lucy Burke	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		3.47	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	1			
0.40-0.50	1			
0.50-0.60	2		2.97	0.50
0.60-0.70	2			
0.70-0.80	14			
0.80-0.90	10			
0.90-1.00	25		2.47	1.00
			1.97	1.50
			1.47	2.00
			0.97	2.50
			0.47	3.00
			-0.04	3.50
			-0.54	4.00
			-1.04	4.50
			-1.54	5.00



Remarks
Refusal at 1.00m BGL

Scale (approx)	Logged By
1:25	AW

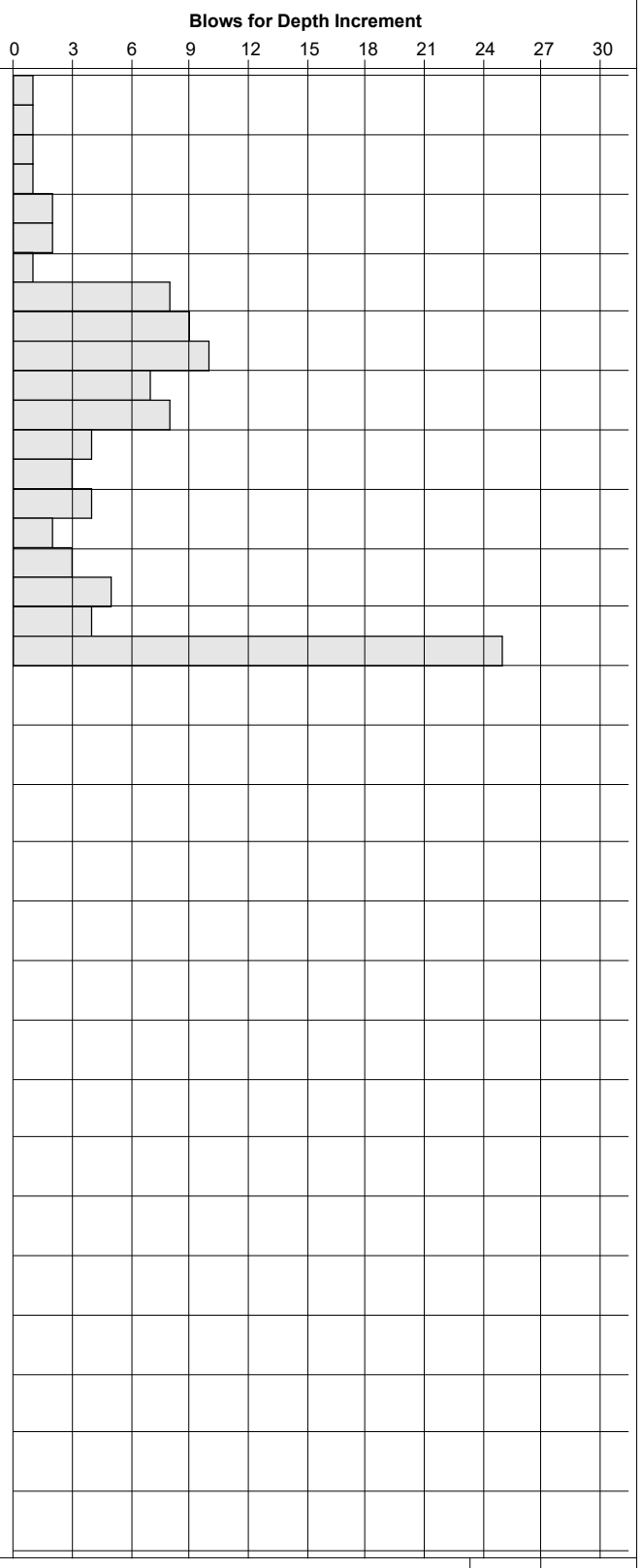
Figure No.
13517-01-24.DP01

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
William Street West, Galway	DP01A

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50kg	Diameter 43.7mm	3.47	CORA	13517-01-24
	Location	**Dates**	**Engineer**	**Sheet**
	529345.8 E 724877 N	26/02/2024	Lucy Burke	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		3.47	0.00
0.10-0.20	1			
0.20-0.30	1			
0.30-0.40	1			
0.40-0.50	2			
0.50-0.60	2		2.97	0.50
0.60-0.70	1			
0.70-0.80	8			
0.80-0.90	9			
0.90-1.00	10			
1.00-1.10	7		2.47	1.00
1.10-1.20	8			
1.20-1.30	4			
1.30-1.40	3			
1.40-1.50	4			
1.50-1.60	2		1.97	1.50
1.60-1.70	3			
1.70-1.80	5			
1.80-1.90	4			
1.90-2.00	25		1.47	2.00
			0.97	2.50
			0.47	3.00
			-0.04	3.50
			-0.54	4.00
			-1.04	4.50
			-1.54	5.00



Remarks
Refusal at 2.00m BGL

Scale (approx)	Logged By
1:25	AW

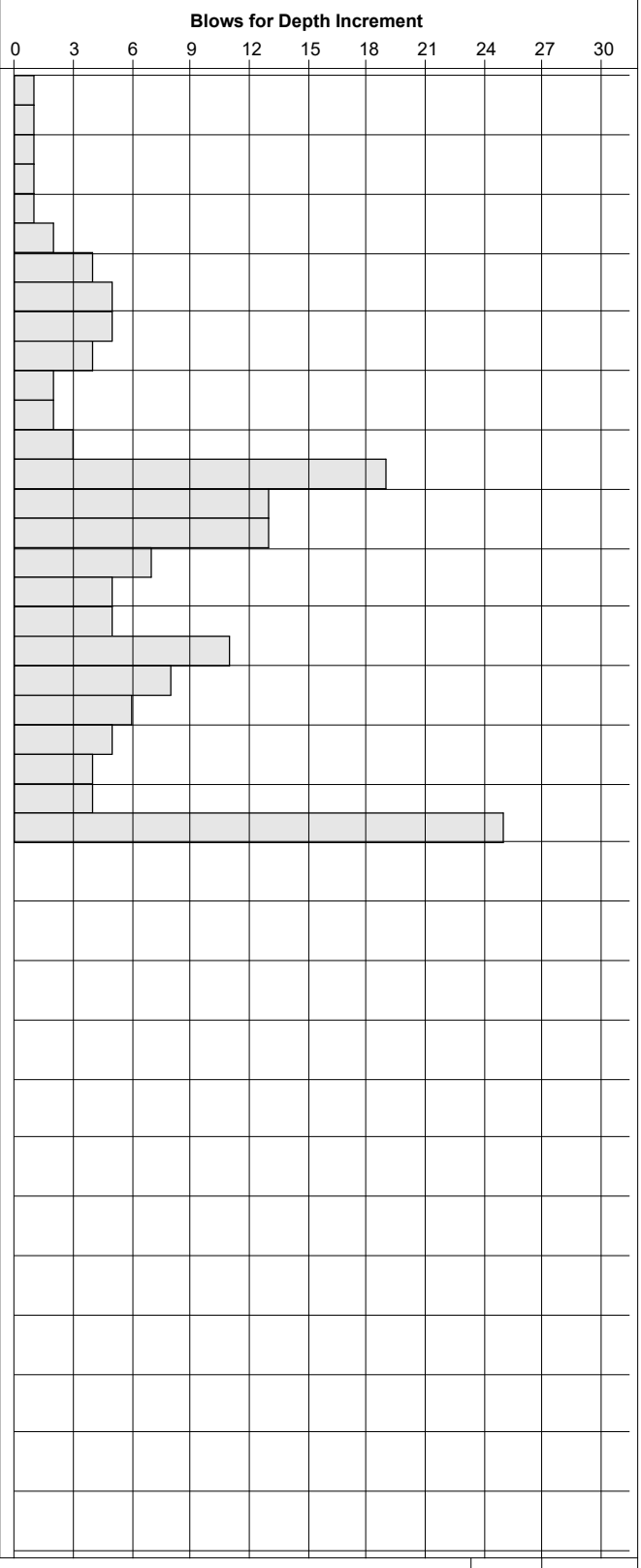
Figure No.
13517-01-24.DP01A

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
William Street West, Galway	DP02

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50kg	Diameter 43.7mm	3.45	CORA	13517-01-24
	Location	**Dates**	**Engineer**	**Sheet**
	529340.4 E 724872.4 N	26/02/2024	Lucy Burke	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		3.45	0.00
0.10-0.20	1			
0.20-0.30	1			
0.30-0.40	1			
0.40-0.50	1			
0.50-0.60	2		2.95	0.50
0.60-0.70	4			
0.70-0.80	5			
0.80-0.90	5			
0.90-1.00	4			
1.00-1.10	2		2.45	1.00
1.10-1.20	2			
1.20-1.30	3			
1.30-1.40	19			
1.40-1.50	13			
1.50-1.60	13		1.95	1.50
1.60-1.70	7			
1.70-1.80	5			
1.80-1.90	5			
1.90-2.00	11			
2.00-2.10	8		1.45	2.00
2.10-2.20	6			
2.20-2.30	5			
2.30-2.40	4			
2.40-2.50	4			
2.50-2.60	25		0.95	2.50
			0.45	3.00
			-0.05	3.50
			-0.55	4.00
			-1.05	4.50
			-1.55	5.00



Remarks
Refusal at 2.60m BGL

Scale (approx)	Logged By
1:25	AW

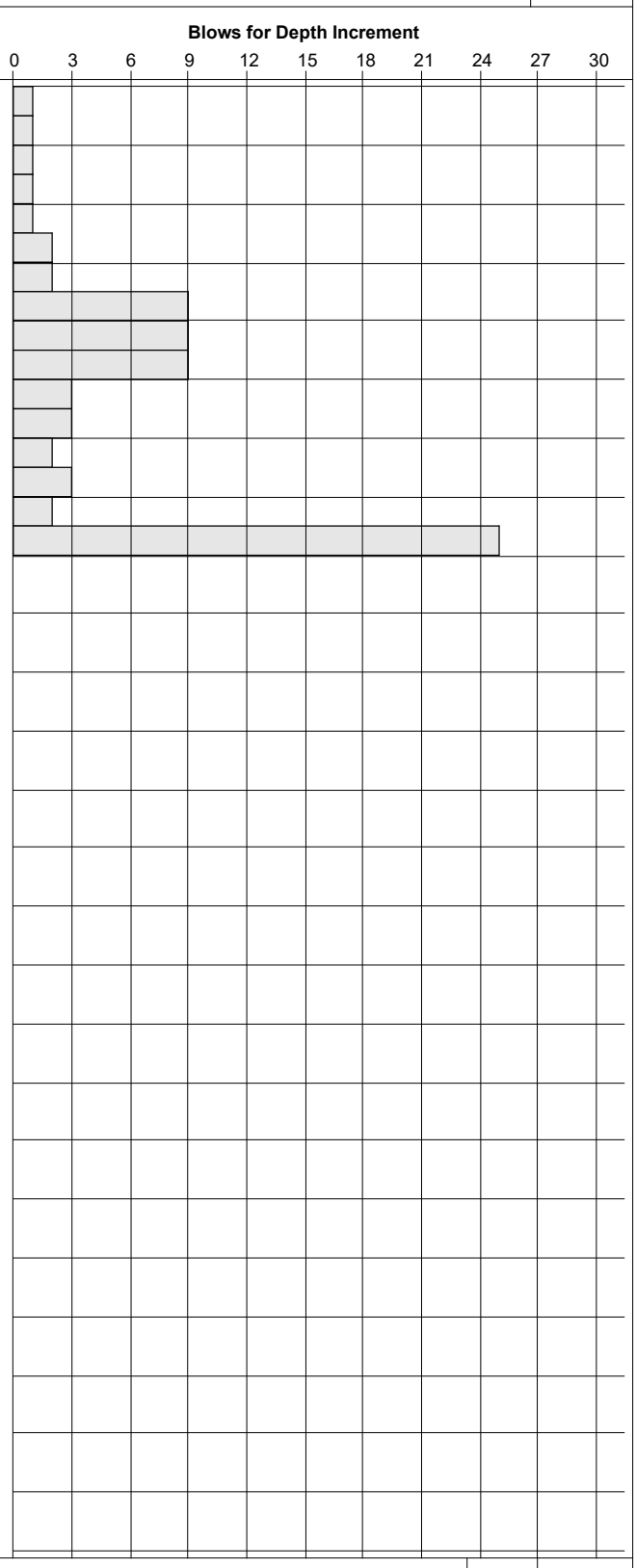
Figure No.
13517-01-24.DP02

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
William Street West, Galway	DP03

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50kg	Diameter 43.7mm	3.55	CORA	13517-01-24
	Location	**Dates**	**Engineer**	**Sheet**
	529355.6 E 724869.5 N	26/02/2024	Lucy Burke	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		3.55	0.00
0.10-0.20	1			
0.20-0.30	1			
0.30-0.40	1			
0.40-0.50	1			
0.50-0.60	2		3.05	0.50
0.60-0.70	2			
0.70-0.80	9			
0.80-0.90	9			
0.90-1.00	9			
1.00-1.10	3		2.55	1.00
1.10-1.20	3			
1.20-1.30	2			
1.30-1.40	3			
1.40-1.50	2			
1.50-1.60	25		2.05	1.50
			1.55	2.00
			1.05	2.50
			0.55	3.00
			0.05	3.50
			-0.45	4.00
			-0.95	4.50
			-1.45	5.00



Remarks
Refusal at 1.60m BGL

Scale (approx)	Logged By
1:25	AW

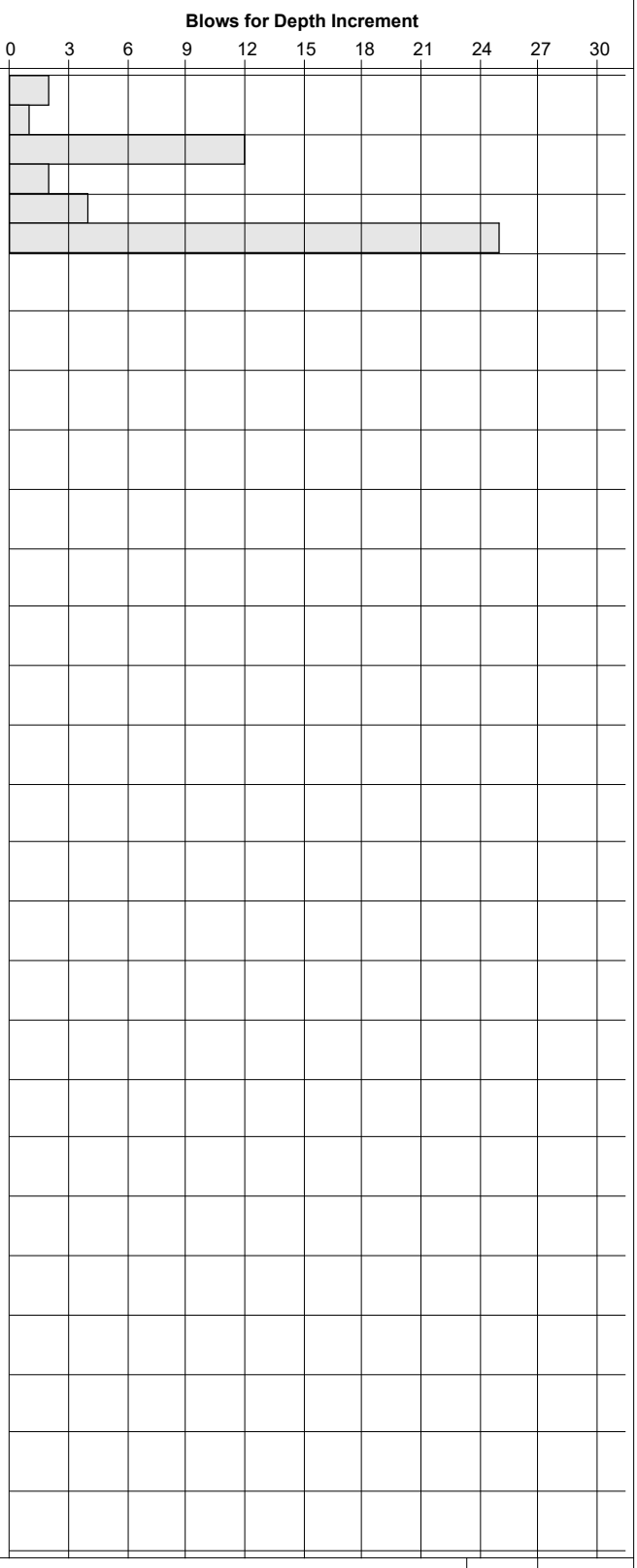
Figure No.
13517-01-24.DP03

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
William Street West, Galway	DP04

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50kg	Diameter 43.7mm	3.62	CORA	13517-01-24
	Location	**Dates**	**Engineer**	**Sheet**
	529351.6 E 724860.8 N	26/02/2024	Lucy Burke	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		3.62	0.00
0.10-0.20	1			
0.20-0.30	12			
0.30-0.40	2			
0.40-0.50	4			
0.50-0.60	25		3.12	0.50
			2.62	1.00
			2.12	1.50
			1.62	2.00
			1.12	2.50
			0.62	3.00
			0.12	3.50
			-0.38	4.00
			-0.88	4.50
			-1.38	5.00



Remarks
Refusal at 0.60m BGL

Scale (approx)	Logged By
1:25	AW

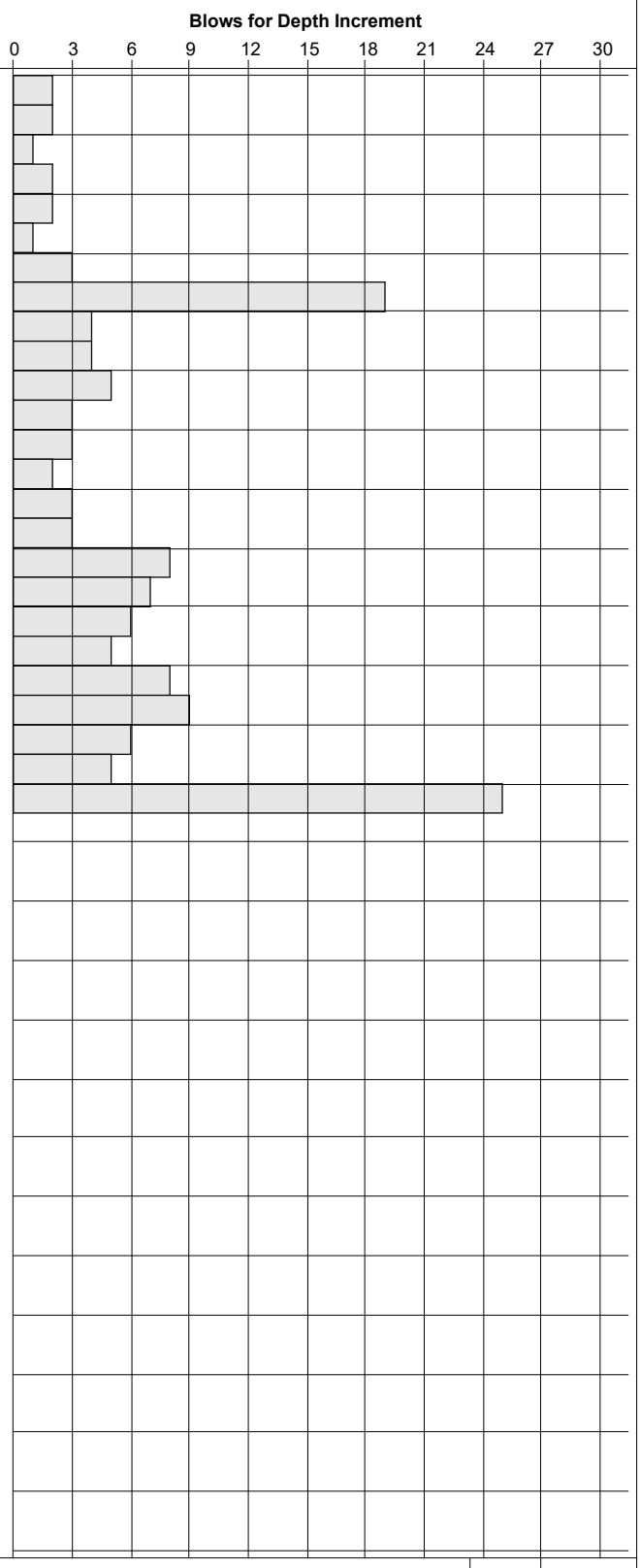
Figure No.
13517-01-24.DP04

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
William Street West, Galway	DP04A

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50kg	Diameter 43.7mm	3.62	CORA	13517-01-24
	Location	**Dates**	**Engineer**	**Sheet**
	529351.6 E 724860.8 N	26/02/2024	Lucy Burke	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		3.62	0.00
0.10-0.20	2			
0.20-0.30	1			
0.30-0.40	2			
0.40-0.50	2			
0.50-0.60	1		3.12	0.50
0.60-0.70	3			
0.70-0.80	19			
0.80-0.90	4			
0.90-1.00	4			
1.00-1.10	5		2.62	1.00
1.10-1.20	3			
1.20-1.30	3			
1.30-1.40	2			
1.40-1.50	3			
1.50-1.60	3		2.12	1.50
1.60-1.70	8			
1.70-1.80	7			
1.80-1.90	6			
1.90-2.00	5			
2.00-2.10	8		1.62	2.00
2.10-2.20	9			
2.20-2.30	6			
2.30-2.40	5			
2.40-2.50	25		1.12	2.50
			0.62	3.00
			0.12	3.50
			-0.38	4.00
			-0.88	4.50
			-1.38	5.00



Remarks
Refusal at 2.50m BGL

Scale (approx)	Logged By
1:25	AW

Figure No.
13517-01-24.DP04A

APPENDIX 6 – Laboratory Testing

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland
D22 K5P8

Attention :	Mike Sutton
Date :	18th March, 2024
Your reference :	13517-01-24
Our reference :	Test Report 24/3857 Batch 1
Location :	William Street West, Galway
Date samples received :	5th March, 2024
Status :	Final Report
Issue :	202403180903

Three samples were received for analysis on 5th March, 2024 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 10.136 kg of CO2

Scope 1&2&3 emissions - 23.954 kg of CO2

Authorised By:

Bruce Leslie
Project Manager

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton
EMT Job No: 24/3857

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5	6-9									
Sample ID	WS01	WS01	WS04									
Depth	0.50-1.00	1.00-2.00	0.50									
COC No / misc												
Containers	V J T	T	V J T									
Sample Date	28/02/2024	28/02/2024	28/02/2024									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	05/03/2024	05/03/2024	05/03/2024									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Antimony	12	-	6								<1	mg/kg	TM30/PM15
Arsenic #	25.7	-	28.6								<0.5	mg/kg	TM30/PM15
Barium #	555	-	482								<1	mg/kg	TM30/PM15
Cadmium #	1.7	-	1.3								<0.1	mg/kg	TM30/PM15
Chromium #	39.1	-	40.2								<0.5	mg/kg	TM30/PM15
Copper #	221	-	106								<1	mg/kg	TM30/PM15
Lead #	636	-	300								<5	mg/kg	TM30/PM15
Mercury #	1.1	-	1.0								<0.1	mg/kg	TM30/PM15
Molybdenum #	2.7	-	2.6								<0.1	mg/kg	TM30/PM15
Nickel #	26.4	-	20.8								<0.7	mg/kg	TM30/PM15
Selenium #	2	-	<1								<1	mg/kg	TM30/PM15
Zinc #	793	-	580								<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	-	0.19								<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.07	-	0.22								<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	-	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	-	<0.04								<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.24	-	0.46								<0.03	mg/kg	TM4/PM8
Anthracene #	0.11	-	0.29								<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.72	-	1.51								<0.03	mg/kg	TM4/PM8
Pyrene #	0.67	-	1.91								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.44	-	0.97								<0.06	mg/kg	TM4/PM8
Chrysene #	0.50	-	1.25								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.89	-	3.31								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.51	-	2.29								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.37	-	2.01								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.10	-	0.32								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.36	-	2.20								<0.04	mg/kg	TM4/PM8
Coronene	0.07	-	0.32								<0.04	mg/kg	TM4/PM8
PAH 6 Total #	2.85	-	11.32								<0.22	mg/kg	TM4/PM8
PAH 17 Total	5.05	-	17.25								<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.64	-	2.38								<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.25	-	0.93								<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	-	<1								<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	94	-	90								<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	31	-	43								<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton
EMT Job No: 24/3857

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5	6-9									
Sample ID	WS01	WS01	WS04									
Depth	0.50-1.00	1.00-2.00	0.50									
COC No / misc												
Containers	V J T	T	V J T									
Sample Date	28/02/2024	28/02/2024	28/02/2024									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	05/03/2024	05/03/2024	05/03/2024									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	-	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	<4	-	<4								<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	-	<7								<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	31	-	43								<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_CU_1D_AL)	<7	-	<7								<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH_CU+HS_1D_AL)	31	-	43								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_CU_1D_AL)	<10	-	<10								<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_CU_1D_AL)	27	-	40								<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	-	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	<4	-	<4								<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	30	-	51								<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	144	-	214								<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_CU_1D_AR)	<7	-	<7								<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH_CU+HS_1D_AR)	174	-	265								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH_CU+HS_1D_Total)	205	-	308								<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.1 SV	-	<0.1 SV								<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_CU_1D_AR)	79	-	127								<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_CU_1D_AR)	100	-	146								<10	mg/kg	TM5/PM8/PM16
MTBE#	<5 SV	-	<5 SV								<5	ug/kg	TM36/PM12
Benzene#	<5 SV	-	10 SV								<5	ug/kg	TM36/PM12
Toluene#	<5 SV	-	<5 SV								<5	ug/kg	TM36/PM12
Ethylbenzene#	<5 SV	-	<5 SV								<5	ug/kg	TM36/PM12
m/p-Xylene#	<5 SV	-	<5 SV								<5	ug/kg	TM36/PM12
o-Xylene#	<5 SV	-	<5 SV								<5	ug/kg	TM36/PM12
PCB 28#	<5	-	<5								<5	ug/kg	TM17/PM8
PCB 52#	<5	-	<5								<5	ug/kg	TM17/PM8
PCB 101#	<5	-	<5								<5	ug/kg	TM17/PM8
PCB 118#	<5	-	<5								<5	ug/kg	TM17/PM8
PCB 138#	<5	-	<5								<5	ug/kg	TM17/PM8
PCB 153#	<5	-	<5								<5	ug/kg	TM17/PM8
PCB 180#	<5	-	<5								<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	-	<35								<35	ug/kg	TM17/PM8

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton
EMT Job No: 24/3857

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	5	6-9								LOD/LOR	Units	Method No.
Sample ID	WS01	WS01	WS04										
Depth	0.50-1.00	1.00-2.00	0.50										
COC No / misc													
Containers	V J T	T	V J T										
Sample Date	28/02/2024	28/02/2024	28/02/2024										
Sample Type	Soil	Soil	Soil										
Batch Number	1	1	1										
Date of Receipt	05/03/2024	05/03/2024	05/03/2024										
Natural Moisture Content	43.0	-	27.9								<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	30.1	-	21.8								<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	-	<0.3								<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0141	0.0096	-								<0.0015	g/l	TM38/PM20
Chromium III	39.1	-	40.2								<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	17.27	-	6.16								<0.02	%	TM21/PM24
pH #	7.71	8.11	7.79								<0.01	pH units	TM73/PM11
Asbestos Type*	NAD	-	NAD									None	Subcontracted

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton
EMT Job No: 24/3857

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	6-9									LOD/LOR	Units	Method No.
Sample ID	WS01	WS04											
Depth	0.50-1.00	0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	28/02/2024	28/02/2024											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	05/03/2024	05/03/2024											
Dissolved Antimony #	0.412	0.005									<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	4.12	0.05									<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0068	0.0059									<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.068	0.059									<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.022	0.012									<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.22	0.12									<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005									<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005									<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015									<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015									<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007									<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07									<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005									<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05									<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	0.022	0.008									<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.22	0.08									<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	0.00001	<0.00001									<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	0.0001	<0.0001									<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01									<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1									<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3									<0.3	mg/l	TM173/PM0
Fluoride	<3	<3									<3	mg/kg	TM173/PM0
Sulphate as SO4 #	2.4	<0.5									<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	24	<5									<5	mg/kg	TM38/PM0
Mass of raw test portion	0.1518	0.1177										kg	NONE/PM17
Chloride #	1.6	0.4									<0.3	mg/l	TM38/PM0
Chloride #	16	4									<3	mg/kg	TM38/PM0
Mass of dried test portion	0.09	0.09										kg	NONE/PM17
Dissolved Organic Carbon	4	3									<2	mg/l	TM60/PM0
Dissolved Organic Carbon	40	30									<20	mg/kg	TM60/PM0
pH	8.16	8.21									<0.01	pH units	TM73/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton
EMT Job No: 24/3857

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-4	6-9											
Sample ID	WS01	WS04											
Depth	0.50-1.00	0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	28/02/2024	28/02/2024											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	05/03/2024	05/03/2024											

Please see attached notes for all abbreviations and acronyms

			LOD/LOR	Units	Method No.
Total Dissolved Solids #	127	108	<35	mg/l	TM20/PM0
Total Dissolved Solids #	1271	1080	<350	mg/kg	TM20/PM0

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton
EMT Job No: 24/3857

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	6-9									Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	WS01	WS04														
Depth	0.50-1.00	0.50														
COC No / misc																
Containers	V J T	V J T														
Sample Date	28/02/2024	28/02/2024														
Sample Type	Soil	Soil														
Batch Number	1	1														
Date of Receipt	05/03/2024	05/03/2024														
Solid Waste Analysis																
Total Organic Carbon #	17.27	6.16									3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025 SV	<0.025 SV									6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035									1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	31	43									500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	2.85	11.32									-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	5.05	17.25									100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	0.068	0.059									0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.22	0.12									20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005									0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015									0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07									2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	0.0001	<0.0001									0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02									0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02									0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05									0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	4.12	0.05									0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03									0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	0.22	0.08									4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	1271	1080									4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	40	30									500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1518	0.1177									-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	59.1	76.4									-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.838	0.872									-	-	-		l	NONE/PM17
Moisture Content 105C (% Dry Weight)	69.3	31.0									-	-	-	<0.1	%	PM4/PM0
pH #	7.71	7.79									-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1									1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3									10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	24	<5									1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	16	4									800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
24/3857	1	WS01	0.50-1.00	1-4	PAH's
24/3857	1	WS04	0.50	6-9	PAH's

Client Name: Ground Investigations Ireland
Reference: 13517-01-24
Location: William Street West, Galway
Contact: Mike Sutton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 24/3857						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/3857

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 24/3857

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes

EMT Job No: 24/3857

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	
Subcontracted	See attached subcontractor report for accreditation status and provider.					AR	