Appendix A14.2
Ground Investigation Report

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

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Ground Investigations Ireland

Bus Connect Detailed Stage 1 Lot 1

Route 14

National Transport Authority

Ground Investigation Report

March 2021

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DOCUMENT CONTROL SHEET

Project Title	Bus Connect Detailed Stage 1 Lot 1
Engineer	Arup
Client	National Transport Authority
Project No	9754-07-20 R14
Document Title	Ground Investigation Report

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A	Draft	P. Cochran	J. Duggan	A. McDonnell	Dublin	30 November 2020
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APPENDICES

1.0 Preamble

On the instructions of Arup, a site investigation was carried out by Ground Investigations Ireland Ltd., in October 2020 at the site of the proposed bus corridor along Route 14: UCD Ballsbridge to Dublin City Centre.

2.0 Overview

2.1. Background

It is proposed to construct a new Bus Connects Core Bus Corridor on several commuter routes into Dublin City Centre. Route 14 is a main commuter route from UCD Ballsbridge to Dublin city centre with high pedestrian, cyclists, and vehicular flows.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising trial pitting 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 3 No. Trial Pits to a maximum depth of 2.90m BGL
- Geotechnical & Environmental Laboratory testing
- Factual Report

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 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.
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. Trial Pits

The trial pits were excavated using a 3T tracked excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged, and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report. R14-TP02 was not excavated due to the proposed location being within the bounds of an active construction site.

3.3. Surveying

The exploratory hole locations have been recorded using a Trimble R10 GNSS 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. It was not possible to record the location of R14-TP04 due to the tree canopy.

3.4. 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 page the Engineers Ireland Suite E, organic matter content, pH, chloride, and sulphate testing was carried out by Element Materials Technology Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer was carried out in NMTL's Geotechnical Laboratory in Carlow.

The results of the laboratory testing are included in Appendix 3 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to 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 variable across the site and are generally comprised;

- Topsoil
- Made Ground
- Cohesive Deposits
- Granular Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.30m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil in TP01 and TP04 and were present to a depth of between 1.80m and 2.00m BGL. These deposits were described generally as *brown* or *dark brownish grey slightly sandy gravelly Clay* or *light brown gravelly clayey fine to coarse Sand with occasional or some cobbles and boulders and contained occasional fragments of concrete, red brick, glass, plastic, and wood.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil in TP03 and were described as *brown sandy gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had occasional, some or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: The granular deposits were encountered below the base of the Made Ground deposits in TP01 and were described as *brownish grey very gravelly fine to coarse SAND with some subangular to subrounded cobbles.* It should be noted that in the trial pit where granular deposits were encountered, experienced instability.

4.2. Groundwater

No groundwater was noted during the investigation however 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 time of year, rainfall, nearby construction, and other factors.

4.3. Laboratory Testing

4.3.1. Geotechnical Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low to intermediate plasticity. The Particle Size Distribution tests confirm that the cohesive deposits are well-graded with percentages of sands and gravels of 57.6% with fines contents of 42.5%.

The Particle Size Distribution tests confirm that generally the granular deposits are well-graded with percentages of sands and silt/clay typically between 3.1% and 32.60% with a gravel content of typically 44.4% to 62.4%.

4.3.2. Chemical Laboratory Testing

The pH and sulphate testing carried out in TP01 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 sample tested classify the soil as a Design Sulphate Level DS-1.

4.3.3. Environmental Laboratory Testing

A number of 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.

The results from the completed laboratory testing are included in Appendix 3 of this report.

APPENDIX 1 - Site Location Plan

Trial Pit

Client:

ARUP

Project Code:

9754-07-20 R14

Project Title:

Bus Connect Route 14

Drawing Title:

Figure 1 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
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Newcastle, Co. Dublin
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0 2 4 6 8 10 m

Drawn By:	Date:
PC	30/11/2020

Trial Pit

Client:

ARUP

Project Code:

9754-07-20 R14

Project Title:

Bus Connect Route 14

Drawing Title:

Figure 2 Site Location

GROUND INVESTIGATIONS IRELAND
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0 2 4 6 8 10 m

Drawn By:	Date:
PC	30/11/2020

Trial Pit

Client:

ARUP

Project Code:

9754-07-20 R14

Project Title:

Bus Connect Route 14

Drawing Title:

Figure 3 Site Location

GROUND INVESTIGATIONS IRELAND
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0 2 4 6 8 10 m

Drawn By:	Date:
PC	30/11/2020

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Trial Pit Number** R14-TP01
Machine : 3T Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.00m (L) x 0.40m (W) x 2.90m (D)	**Ground Level (mOD)** 5.45	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 718292.9 E 732116.4 N	**Dates** 21/10/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy slightly gravelly TOPSOIL with occasional rootlets		
				5.15	0.30			
0.50 0.50 0.50	B ES T				(0.50)	MADE GROUND: Dark brownish grey slightly sandy slightly gravelly Clay with some angular to subangular cobbles, occasional rootlets and occasional fragments of concrete, red brick and wood		
				4.65	0.80			
1.00 1.00	B T				(0.50)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional angular to subangular cobbles, rootlets and occasional fragments of wood.		
				4.15	1.30			
1.50 1.50	B ES				(0.70)	MADE GROUND: Light brown gravelly clayey fine to coarse Sand with some angular to subrounded cobbles, occasional rootlets and occasional fragments of wood		
				3.45	2.00			
2.00 2.00	B T				(0.90)	Brownish grey very gravelly fine to coarse SAND with some subangular to subrounded cobbles. Gravel is subangular to subrounded fine to coarse		
2.50 2.50	B ES							
				2.55	2.90			
2.90 2.90	B T					Complete at 2.90m		

Plan

Remarks

Trial pit terminated at 2.90m BGL due to side wall instability
Trial pit unstable
No groundwater encountered during excavation
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	PC	9754-07-20.R14-TP01

Ground Investigations Ireland Ltd
www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Trial Pit Number** R14-TP03
Machine : 3T Tracked Excavtor **Method :** Trial Pit	**Dimensions** 2.60m (L) x 0.40m (W) x 1.30m (D)	**Ground Level (mOD)** 14.39	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 718522.5 E 730860.8 N	**Dates** 06/10/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.25)	Dark brown slightly sandy slightly gravelly TOPSOIL with frequent rootlets		
				14.14	0.25	Firm brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subrounded fine to coarse		
0.50	B				(0.25)			
0.50	ES			13.89	0.50	Stiff brown slightly sandy slightly gravelly CLAY with occasional angular to subangular cobbles, occasional rootlets and occasional shell fragments. Gravel is angular to subrounded fine to coarse		
					(0.25)			
1.00	B			13.64	0.75	Very stiff brown slightly sandy gravelly CLAY with some angular to subangular cobbles and occasional boulders. Gravel is angular to subrounded fine to coarse		
					(0.55)			
1.30	B			13.09	1.30	Obstruction: Boulders		
1.30	ES					Refusal at 1.30m		

Plan

Remarks

Trial pit terminated at 1.30m BGL due to an obstruction on boulders
Trial pit stable
No groundwater encountered during excavation
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	PC	9754-07-20.R14-TP03

Ground Investigations Ireland Ltd
www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Trial Pit Number** R14-TP04
Machine : 3T Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.50m (L) x 0.40m (W) x 1.80m (D)	**Ground Level (mOD)**	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location	**Dates** 06/10/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.25)	Dark brown slightly sandy slightly gravelly TOPSOIL with frequent rootlets		
					0.25	MADE GROUND: Brown slightly sandy gravelly Clay with some angular to subangular cobbles, occasional boulders, occasional rootlets and occasional fragments of concrete, glass, plastic and red brick		
0.50 0.50	B ES							
1.00	B				(1.55)			
1.50 1.50	B ES							
					1.80	Obstruction: Boulders		
						Refusal at 1.80m		

Plan

Remarks

Trial pit terminated at 1.80m BGL due to obstruction on boulders
Trial pit stable
No groundwater encountered during excavation
Trial pit backfilled upon completion
Unable to survey trial pit due to tree canopy

Scale (approx)	Logged By	Figure No.
1:25	PC	9754-07-20.R14-TP04

Bus Connect Detailed Stage 1 Lot 1 – Trial Pit Photographs

R14 – TP01

Bus Connect Detailed Stage 1 Lot 1 – Trial Pit Photographs

R14 – TP01

Bus Connect Detailed Stage 1 Lot 1 – Trial Pit Photographs

R14 - TP03

Bus Connect Detailed Stage 1 Lot 1 – Trial Pit Photographs

R14 – TP03

Bus Connect Detailed Stage 1 Lot 1 – Trial Pit Photographs

R14 – TP04

Bus Connect Detailed Stage 1 Lot 1 – Trial Pit Photographs

R14 – TP04

APPENDIX 3 – Laboratory Testing

National Materials Testing Laboratory Ltd.

SUMMARY OF TEST RESULTS

				Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Lab	
BH/TP	Depth	sample	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	
R14-TP01	2.00	B	5.4		25.8	29	Non Plastic							
R14-TP01	2.90	B	6.0		16.0	32	Non Plastic							

NMTL	Notes :	Job ref No.	NMTL 3326	GII Project ID:	9754-07-20
	1. All BS tests carried out using preferred (definitive) method unless otherwise stated.	Location	Bus Connect Toute 14		

NMTL LTD
Unit 18c, Tullow Industrial Estate
Tullow
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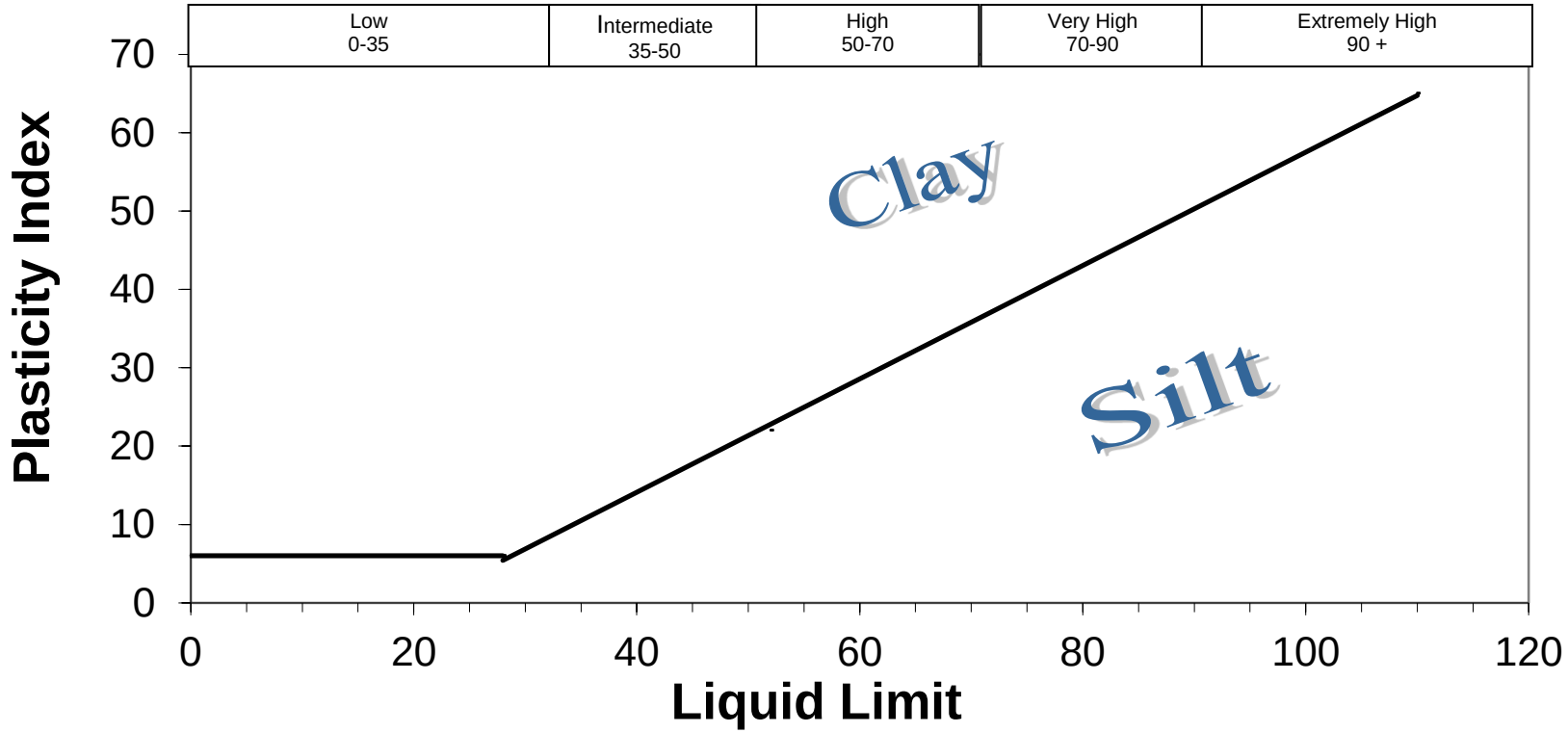
Mob: 00353 872575508
billa@nmtl.ie

Contract:	**Bus Connect Toute 14**
Client:	**Ground Investigations Ireland Ltd**
Engineer:	**Patrick Cochran**
GII Project ID	**9754-07-20**
Date:	**20/11/2020**
Tested By:	**Sb/Tch/Ms** **Checked:** **Bc**
Job ref No.	**NMTL 3326**



NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	83.3
63.000	77.5
50.000	74.0
37.500	70.5
28.000	63.5
20.000	57.9
14.000	49.2
10.000	44.4
6.300	38.2
5.000	37.2
3.350	36.2
2.000	33.1
1.180	28.4
0.600	20.7
0.425	16.0
0.300	11.4
0.212	8.1
0.150	6.0
0.063	3.1
0.055	3.0
0.039	2.7
0.020	2.1
0.011	1.7
0.008	1.5
0.005	1.2
0.004	0.9
0.002	0.4

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
0.4		2.7			30.0			44.4		22.5	0.0

Sample Description	Brown/grey slightly silty very sandy GRAVEL with some cobbles.					Project No.	NMTL 3326
						BH/TP No.	R14-TP01
Project	Bus Connect Route 14			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	18/11/2020	Depth	2.50m

NMTL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	93.6
37.500	86.9
28.000	80.6
20.000	71.6
14.000	63.7
10.000	57.0
6.300	49.5
5.000	47.1
3.350	44.1
2.000	37.6
1.180	30.9
0.600	21.7
0.425	17.0
0.300	13.1
0.212	10.3
0.150	8.5
0.063	5.0
0.055	4.7
0.039	4.3
0.020	3.4
0.011	2.7
0.008	2.3
0.005	1.9
0.004	1.4
0.002	0.7

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
0.7		4.3			32.6			62.4		0.0	0.0

Sample Description	Brown/grey slightly silty very sandy GRAVEL.					Project No.	NMTL 3326
						BH/TP No.	R14-TP01
Project	Bus Connect Route 14			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	18/11/2020	Depth	2.90m

NMTL Ltd

National Materials Testing Laboratory Ltd.

SUMMARY OF TEST RESULTS

				Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Lab	
BH/TP	Depth	sample	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	
R14-TP03	0.5	B	25.0		74.9	44	28	16						
R14-TP03	1.0	B	11.8		55.2	41	24	17						
R14-TP03	1.3	B	12.2		62.3	32	21	11						
NMTL		Notes :									Job ref No.	NMTL 3326	GII Project ID:	9754-07-20
		1. All BS tests carried out using preferred (definitive) method unless otherwise stated.									Location	Bus Connect Routes		

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	98.8
28.000	94.6
20.000	93.0
14.000	91.5
10.000	86.9
6.300	81.0
5.000	77.8
3.350	74.9
2.000	68.8
1.180	63.2
0.600	57.6
0.425	55.2
0.300	52.9
0.212	50.6
0.150	48.3
0.063	42.4
0.053	40.2
0.038	36.8
0.019	31.4
0.010	24.3
0.007	20.8
0.005	17.9
0.004	14.7
0.002	9.6

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
9.6		32.9			26.4			31.2		0.0	0.0

Sample Description	Brown slightly sandy gravelly silty CLAY					Project No.	NMTL 3326
						BH/TP No.	R14-TP03
Project	Bus connect Route 14			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	1.0m
				Date sample tested	15/12/2020		

NMTL Ltd

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

Attention :	John Duggan
Date :	21st October, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/13792 Batch 1
Location :	Bus Connect Route 14
Date samples received :	8th October, 2020
Status :	Final report
Issue :	1

Four samples were received for analysis on 8th October, 2020 of which four 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/13792

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12							LOD/LOR	Units	Method No.
Sample ID	R14-TP03	R14-TP03	R14-TP04	R14-TP04									
Depth	0.50	1.30	0.50	1.30									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	08/10/2020	08/10/2020	08/10/2020	08/10/2020									
Antimony	2	2	3	2							<1	mg/kg	TM30/PM15
Arsenic #	20.5	11.8	18.4	23.0							<0.5	mg/kg	TM30/PM15
Barium #	144	70	116	94							<1	mg/kg	TM30/PM15
Cadmium #	2.8	2.3	2.1	2.6							<0.1	mg/kg	TM30/PM15
Chromium #	70.8	38.1	57.6	51.7							<0.5	mg/kg	TM30/PM15
Copper #	40	35	46	37							<1	mg/kg	TM30/PM15
Lead #	50	20	104	47							<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM30/PM15
Molybdenum #	7.3	4.5	5.3	5.4							<0.1	mg/kg	TM30/PM15
Nickel #	54.3	42.8	44.1	49.7							<0.7	mg/kg	TM30/PM15
Selenium #	1	1	1	<1							<1	mg/kg	TM30/PM15
Zinc #	121	96	144	108							<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.17	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	0.14	<0.03							<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	0.07	<0.05							<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	0.05	<0.04							<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.13	0.20	0.57	0.11							<0.03	mg/kg	TM4/PM8
Anthracene #	0.05	0.05	0.24	<0.04							<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.10	0.04	1.68	0.17							<0.03	mg/kg	TM4/PM8
Pyrene #	0.08	0.04	1.44	0.14							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	0.90	0.11							<0.06	mg/kg	TM4/PM8
Chrysene #	0.05	0.03	0.90	0.10							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	1.98	0.14							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	1.10	0.08							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	<0.04	0.83	0.06							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	0.15	<0.04							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	0.78	0.06							<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	0.12	<0.04							<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	10.95	0.97							<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	1.43	0.10							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	0.55	0.04							<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	92	94	93	101							<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	<30							<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/13792

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12							LOD/LOR	Units	Method No.
Sample ID	R14-TP03	R14-TP03	R14-TP04	R14-TP04									
Depth	0.50	1.30	0.50	1.30									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	08/10/2020	08/10/2020	08/10/2020	08/10/2020									
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26	<26							<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10	<10							<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10	<10	<10							<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	11	<7							<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	75	<7							<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7	12	<7							<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26	98	<26							<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	<52	<52	98	<52							<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10	29	<10							<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	<10	<10	56	<10							<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35							<35	ug/kg	TM17/PM8

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/13792

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12							LOD/LOR	Units	Method No.
Sample ID	R14-TP03	R14-TP03	R14-TP04	R14-TP04									
Depth	0.50	1.30	0.50	1.30									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	08/10/2020	08/10/2020	08/10/2020	08/10/2020									
Natural Moisture Content	19.5	9.8	12.5	10.8							<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	16.3	8.9	11.1	9.8							<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3							<0.3	mg/kg	TM38/PM20
Chromium III	70.8	38.1	57.6	51.7							<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5							<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	2.40	0.58	2.32	0.96							<0.02	%	TM21/PM24
Loss on Ignition #	6.9	2.8	5.7	3.9							<1.0	%	TM22/PM0
pH #	8.26	8.60	8.40	8.59							<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1092	0.0982	0.1033	0.0997								kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09								kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/13792

Report : CEN 10:1 1 Batch

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

EMT Sample No.	1-3	4-6	7-9	10-12							LOD/LOR	Units	Method No.
Sample ID	R14-TP03	R14-TP03	R14-TP04	R14-TP04									
Depth	0.50	1.30	0.50	1.30									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	08/10/2020	08/10/2020	08/10/2020	08/10/2020									
Dissolved Antimony #	<0.002	<0.002	0.003	<0.002							<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	0.03	<0.02							<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025	<0.0025							<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025							<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.004	<0.003	0.007	0.003							<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.04	<0.03	0.07	<0.03							<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005							<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005							<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015							<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015							<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007							<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07							<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005							<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.006	0.006	0.010	0.013							<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.06	0.06	0.10	0.13							<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002							<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02							<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003							<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	0.005	<0.003	0.005	0.003							<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.05	<0.03	0.05	<0.03							<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001							<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	mg/kg	TM61/PM0
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05							<0.05	mg/l	TM26/PM0
Total Phenols HPLC	<0.5	<0.5	<0.5	<0.5							<0.5	mg/kg	TM26/PM0
Fluoride	0.7	0.3	0.4	0.4							<0.3	mg/l	TM173/PM0
Fluoride	7	3	4	4							<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5	0.6	5.8							<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5	6	58							<5	mg/kg	TM38/PM0
Chloride #	0.6	<0.3	1.4	3.3							<0.3	mg/l	TM38/PM0
Chloride #	6	<3	14	33							<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	5	2	6	5							<2	mg/l	TM60/PM0
Dissolved Organic Carbon	50	20	60	50							<20	mg/kg	TM60/PM0
Total Dissolved Solids #	83	62	98	87							<35	mg/l	TM20/PM0
Total Dissolved Solids #	830	620	980	870							<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/13792

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.	1-3	4-6	7-9	10-12							Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	R14-TP03	R14-TP03	R14-TP04	R14-TP04												
Depth	0.50	1.30	0.50	1.30												
COC No / misc																
Containers	V J T	V J T	V J T	V J T												
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020												
Sample Type	Soil	Soil	Soil	Soil												
Batch Number	1	1	1	1												
Date of Receipt	08/10/2020	08/10/2020	08/10/2020	08/10/2020												
Solid Waste Analysis																
Total Organic Carbon #	2.40	0.58	2.32	0.96							3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025							6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035							1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30							500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	<0.64	<0.64	10.95	0.97							100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	<0.025	<0.025							0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.04	<0.03	0.07	<0.03							20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005							0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015							0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07							2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001							0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.06	0.06	0.10	0.13							0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02	<0.02							0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05							0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	0.03	<0.02							0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03							0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	0.05	<0.03	0.05	<0.03							4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	830	620	980	870							4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	50	20	60	50							500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1092	0.0982	0.1033	0.0997							-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	82.2	91.5	86.8	90.3							-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.881	0.892	0.886	0.89							-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8							-	-	-		l	NONE/PM17
pH #	8.26	8.60	8.40	8.59							-	-	-	<0.01	pH units	TM73/PM11
Fluoride	7	3	4	4							-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	<5	6	58							1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	6	<3	14	33							800	15000	25000	<3	mg/kg	TM38/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: Bus Connect Route 14
Contact: John Duggan

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/13792	1	R14-TP03	0.50	2	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stone
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13792	1	R14-TP03	1.30	5	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stone
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13792	1	R14-TP04	0.50	8	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stone
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13792	1	R14-TP04	1.30	11	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stone
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/13792						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/13792

SOILS

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.

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.

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.

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 UKAS requirement 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.

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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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

EMT Job No: 20/13792

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.	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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

EMT Job No: 20/13792

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	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	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	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 re	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 re	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 (comparabl	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 (comparabl	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
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

EMT Job No: 20/13792

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
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
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
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
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	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.			AR	
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	

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

Attention :	John Duggan
Date :	5th November, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/14655 Batch 1
Location :	Bus Connect Route 14
Date samples received :	23rd October, 2020
Status :	Final report
Issue :	1

Three samples were received for analysis on 23rd October, 2020 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/14655

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9									
Sample ID	R14-TP01	R14-TP01	R14-TP01									
Depth	0.50	1.50	2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	21/10/2020	21/10/2020	21/10/2020									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	23/10/2020	23/10/2020	23/10/2020									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Antimony	3	1	<1								<1	mg/kg	TM30/PM15
Arsenic #	29.2	14.1	8.3								<0.5	mg/kg	TM30/PM15
Barium #	95	45	28								<1	mg/kg	TM30/PM15
Cadmium #	1.2	1.0	0.8								<0.1	mg/kg	TM30/PM15
Chromium #	167.7	38.1	65.0								<0.5	mg/kg	TM30/PM15
Copper #	54	19	14								<1	mg/kg	TM30/PM15
Lead #	117	40	11								<5	mg/kg	TM30/PM15
Mercury #	0.6	<0.1	<0.1								<0.1	mg/kg	TM30/PM15
Molybdenum #	2.3	1.5	0.9								<0.1	mg/kg	TM30/PM15
Nickel #	34.4	25.7	16.8								<0.7	mg/kg	TM30/PM15
Selenium #	2	1	<1								<1	mg/kg	TM30/PM15
Zinc #	113	59	48								<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.05	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.33	0.04	<0.03								<0.03	mg/kg	TM4/PM8
Anthracene #	0.06	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.71	0.07	0.04								<0.03	mg/kg	TM4/PM8
Pyrene #	0.65	0.06	0.04								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.60	0.09	<0.06								<0.06	mg/kg	TM4/PM8
Chrysene #	0.53	0.06	0.03								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.96	0.08	<0.07								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.47	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	0.33	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.09	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.37	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Coronene	0.09	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
PAH 17 Total	5.24	<0.64	<0.64								<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.69	0.06	<0.05								<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.27	0.02	<0.02								<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	87	88	84								<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30								<30	mg/kg	TM5/PM8/PM16

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/14655

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9									
Sample ID	R14-TP01	R14-TP01	R14-TP01									
Depth	0.50	1.50	2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	21/10/2020	21/10/2020	21/10/2020									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	23/10/2020	23/10/2020	23/10/2020									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4								<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	22	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
>C25-C35	26	<10	<10								<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4								<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	10	<7	<7								<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	77	<7	<7								<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	10	<7	<7								<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	97	<26	<26								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	97	<52	<52								<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC10-EC25	32	<10	<10								<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	64	<10	<10								<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5								<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5								<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5								<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5								<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5								<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5								<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5								<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35								<35	ug/kg	TM17/PM8

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/14655

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9									
Sample ID	R14-TP01	R14-TP01	R14-TP01									
Depth	0.50	1.50	2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	21/10/2020	21/10/2020	21/10/2020									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	23/10/2020	23/10/2020	23/10/2020									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Natural Moisture Content	22.6	11.9	3.7								<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	18.5	10.7	3.6								<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3								<0.3	mg/kg	TM38/PM20
Chromium III	167.7	38.1	65.0								<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5								<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	3.11	0.72	0.22								<0.02	%	TM21/PM24
Loss on Ignition #	7.3	2.5	<1.0								<1.0	%	TM22/PM0
pH #	8.36	8.51	8.97								<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1094	0.1025	0.0933									kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09									kg	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/14655

Report : CEN 10:1 1 Batch

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

EMT Sample No.	1-3	4-6	7-9									
Sample ID	R14-TP01	R14-TP01	R14-TP01									
Depth	0.50	1.50	2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	21/10/2020	21/10/2020	21/10/2020									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	23/10/2020	23/10/2020	23/10/2020									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Dissolved Antimony #	0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0030	<0.0025	<0.0025								<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.030	<0.025	<0.025								<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005								<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005								<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015								<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015								<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007								<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07								<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005								<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.003	0.006	0.003								<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.03	0.06	0.03								<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	0.00001	<0.00001	<0.00001								<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001								<0.0001	mg/kg	TM61/PM0
Total Phenols HPLC	<0.05	<0.05	<0.05								<0.05	mg/l	TM26/PM0
Total Phenols HPLC	<0.5	<0.5	<0.5								<0.5	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3								<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5	<0.5								<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5	<5								<5	mg/kg	TM38/PM0
Chloride #	<0.3	<0.3	<0.3								<0.3	mg/l	TM38/PM0
Chloride #	<3	<3	<3								<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	3	<2	7								<2	mg/l	TM60/PM0
Dissolved Organic Carbon	30	<20	70								<20	mg/kg	TM60/PM0
Total Dissolved Solids #	58	43	<35								<35	mg/l	TM20/PM0
Total Dissolved Solids #	580	430	<350								<350	mg/kg	TM20/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/14655

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.	1-3	4-6	7-9								Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	R14-TP01	R14-TP01	R14-TP01													
Depth	0.50	1.50	2.50													
COC No / misc																
Containers	V J T	V J T	V J T													
Sample Date	21/10/2020	21/10/2020	21/10/2020													
Sample Type	Soil	Soil	Soil													
Batch Number	1	1	1													
Date of Receipt	23/10/2020	23/10/2020	23/10/2020													
Solid Waste Analysis																
Total Organic Carbon #	3.11	0.72	0.22								3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025								6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035								1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30								500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	5.24	<0.64	<0.64								100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	0.030	<0.025	<0.025								0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03	<0.03								20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005								0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015								0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07								2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001								0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.03	0.06	0.03								0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02								0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05								0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02								0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03								0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	<0.03								4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	580	430	<350								4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	30	<20	70								500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1094	0.1025	0.0933								-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	82.0	88.2	96.4								-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.88	0.888	0.897								-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.85	0.8								-	-	-		l	NONE/PM17
pH #	8.36	8.51	8.97								-	-	-	<0.01	pH units	TM73/PM11
Fluoride	<3	<3	<3								-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	<5	<5								1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	<3								800	15000	25000	<3	mg/kg	TM38/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: Bus Connect Route 14
Contact: John Duggan

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/14655	1	R14-TP01	0.50	2	03/11/2020	**General Description (Bulk Analysis)**	Soil/Stones
					03/11/2020	**Asbestos Fibres**	NAD
					03/11/2020	**Asbestos ACM**	NAD
					03/11/2020	**Asbestos Type**	NAD
					03/11/2020	**Asbestos Level Screen**	NAD
20/14655	1	R14-TP01	1.50	5	03/11/2020	**General Description (Bulk Analysis)**	Soil/Stones
					03/11/2020	**Asbestos Fibres**	NAD
					03/11/2020	**Asbestos ACM**	NAD
					03/11/2020	**Asbestos Type**	NAD
					03/11/2020	**Asbestos Level Screen**	NAD
20/14655	1	R14-TP01	2.50	8	03/11/2020	**General Description (Bulk Analysis)**	Soil/Stone
					03/11/2020	**Asbestos Fibres**	NAD
					03/11/2020	**Asbestos ACM**	NAD
					03/11/2020	**Asbestos Type**	NAD
					03/11/2020	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/14655						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/14655

SOILS

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.

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.

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.

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 UKAS requirement 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.

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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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

EMT Job No: 20/14655

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.	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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

EMT Job No: 20/14655

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	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	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	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 (comparabl	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 (comparabl	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
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

EMT Job No: 20/14655

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
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
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
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
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	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.			AR	
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	

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

Attention :	John Duggan
Date :	17th November, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/15510 Batch 1
Location :	Bus Connect Route 14
Date samples received :	9th November, 2020
Status :	Final report
Issue :	1

One sample was received for analysis on 9th November, 2020 of which one was 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/15510

Report : Solid

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

EMT Sample No.	1										LOD/LOR	Units	Method No.
Sample ID	R14-TP01												
Depth	2.00												
COC No / misc													
Containers	T												
Sample Date	21/10/2020												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	09/11/2020												
Chloride (2:1 Ext BRE) #	0.008										<0.002	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0059										<0.0015	g/l	TM38/PM20
Organic Matter	0.5										<0.2	%	TM21/PM24
pH #	8.74										<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/15510						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/15510

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SURROGATES

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

BLANKS

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NOTE

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#	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.
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NDP	No Determination Possible
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>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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

EMT Job No: 20/15510

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
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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			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 (comparabl	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
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

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

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

Attention :	John Duggan
Date :	4th December, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/16726 Batch 1
Location :	Bus Connect Route 14
Date samples received :	27th November, 2020
Status :	Final report
Issue :	1

One sample was received for analysis on 27th November, 2020 of which one was 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 14
Contact: John Duggan
EMT Job No: 20/16726

Report : Solid

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

EMT Sample No.	1												
Sample ID	R14-TP03												
Depth	1.00												
COC No / misc													
Containers	T												
Sample Date	06/10/2020												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	27/11/2020												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Chloride (2:1 Ext BRE) #	0.009										<0.002	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0200										<0.0015	g/l	TM38/PM20
Organic Matter	1.1										<0.2	%	TM21/PM24
pH #	8.56										<0.01	pH units	TM73/PM11

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland

Reference: 9754-07-20

Location: Bus Connect Route 14

Contact: John Duggan

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
20/16726	1	R14-TP03	1.00	1	Chloride, pH, Sulphate	Sample holding time exceeded prior to receipt

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Ground Investigations Ireland

Bus Connect Detailed Stage 1 Lot 1

Route 15

National Transport Authority

Ground Investigation Report

March 2021

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DOCUMENT CONTROL SHEET

Project Title	Bus Connect Detailed Stage 1 Lot 1
Engineer	Arup
Client	NTA
Project No	9754-07-20 R15
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	J Duggan	J Duggan	A McDonnell	Dublin	21 January 2021
B	Final	P. Cochran	M. Sutton	A. McDonnell	Dublin	19 March 2021

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CONTENTS

APPENDICES

1.0 Preamble

On the instructions of Arup, a site investigation was carried out by Ground Investigations Ireland Ltd., between September and November 2020 at the site of the proposed bus corridor along Route 15: Blackrock to Merrion.

2.0 Overview

2.1. Background

It is proposed to construct a new Bus Connects Core Bus Corridor on several commuter routes into Dublin City Centre. Route 15 is proposed to run between Blackrock and Merrion.

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. Trial Pits to a maximum depth of 2.90m BGL
- Carry out 6 No. Cable Percussion boreholes to a maximum depth of 7.50m BGL
- Installation of 3 No. Groundwater monitoring wells
- Geotechnical & Environmental Laboratory testing
- Factual Report

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 were 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. Trial Pits

The trial pits were excavated using a 3T excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.
The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non-cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata.
Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the ‘N’ value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the

consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 3 of this Report. R15-CP01 was not carried out as permission to access the site was not given.

3.4. Surveying

The exploratory hole locations have been recorded using a Trimble R10 GNSS 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.

3.5. Groundwater Monitoring Installations

Groundwater monitoring installations were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. The standpipe is finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.6. 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 Engineers Ireland Suite E, organic matter content, pH, chloride and sulphate testing was carried out by Element Materials Technology Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer will be carried out in NMTL's Geotechnical Laboratory in Carlow.
The results of the laboratory testing are included in Appendix 4 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 variable across the site and are generally comprised;

- Topsoil
- Surfacing
- Made Ground
- Cohesive Deposits
- Granular Deposits

TOPSOIL: Topsoil was encountered in R15- TP01 and TP02 and in R15-CP04 and CP05 and was present to a maximum depth of 0.6m BGL.

SURFACING: Concrete surfacing was encountered in R15-CP02 to and R15-CP03 to a depth of 0.20m BGL and 0.40m BGL respectively

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil/Surfacing or from ground level in each of the exploratory holes apart from R15-CP04. Where the bottom of the Made Ground was reached it was present to depths of between 1.0m and 2.6m BGL. These deposits were described generally as *brown or greyish brown sandy gravelly CLAY with some cobbles and boulders and occasional pieces of concrete, red brick, glass and plastic etc.* Occasional granular layers were present within these Made Ground deposits.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground or Topsoil and were described typically as *brown slightly sandy gravelly CLAY with occasional cobbles and boulders* overlying a *stiff grey or dark grey sandy gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. A layer of *firm dark greyish brown slightly gravelly sandy clayey SILT with some organics and shell fragments* was also encountered in R15-CP06. The strength of the cohesive deposits varied greatly across the site. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: A layer of *loose greyish brown silty fine to coarse SAND with some shells* was encountered in R15-CP07A. Based on the SPT N values the deposits are loose.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. 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. For this reason, standpipes were installed in R15-CP05, CP06 and CP07A to allow the equilibrium groundwater level to be determined.

4.3. Laboratory Testing

4.3.1. Geotechnical Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low to intermediate plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 58.1% and 49.0% generally with fines contents of 33 to 50.3%.
The Particle Size Distribution tests confirm that generally the granular deposits are well-graded with percentages of silt/clay typically between 7.7% and 36.7% with a gravel/sand content of typically 63.1% to 82%.

4.3.2. 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.

4.3.3. Environmental Laboratory Testing

Twenty-five samples were analysed for a Suite of testing specified by ARUP based on suite E according to Engineers Ireland.
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.

The results from the completed laboratory testing are included in Appendix 4 of this report.

APPENDIX 1 - Site Location Plan

Cable Percussion

Trial Pit

Client:

ARUP

Project Code:

9754-07-20 R15

Project Title:

Bus Connect Route 15

Drawing Title:

Figure 1 Site Location

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0 7 14 21 28 35 m

Drawn By:	Date:
PC	21/01/21

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Figure 2 Site Location

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ARUP

Project Code:

9754-07-20 R15

Project Title:

Bus Connect Route 15

Drawing Title:

Figure 3 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 7 14 21 28 35 m

Drawn By:	Date:
PC	21/01/21

Cable Percussion

Client:

ARUP

Project Code:

9754-07-20 R15

Project Title:

Bus Connect Route 15

Drawing Title:

Figure 4 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 7 14 21 28 35 m

Drawn By:	Date:
PC	21/01/21

Cable Percussion

Client:

ARUP

Project Code:
9754-07-20 R15

Project Title:
Bus Connect Route 15

Drawing Title:
Figure 5 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 7 14 21 28 35 m

Drawn By:	Date:
PC	21/01/21

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd

www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Trial Pit Number** R15-TP01
Machine : 3T Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.60m (L) x 0.30m (W) x 2.30m (D)	**Ground Level (mOD)** 3.88	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 719906 E 730577.2 N	**Dates** 19/11/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.78	(0.10) 0.10	Brown slightly sandy gravelly TOPSOIL with occasional rootlets		
					(0.30)	MADE GROUND: Greyish brown sandy clayey angular to subrounded fine to coarse Gravel with some angular to subrounded cobbles, rootlets and occasional fragments of concrete, fabric, plastic and red brick		
				3.48	0.40			
0.50 0.50	EN T					MADE GROUND: Greyish brown slightly sandy gravelly Clay with some angular to subrounded cobbles, occasional boulders, rootlets and occasional fragments of red brick and wood. Gravel is angular to subangular fine to coarse		
1.00 1.00	B T				(1.40)			
1.50	EN							
			Fast seepage(1) at 1.90m.	2.08	1.80	MADE GROUND: Greyish brown sandy clayey angular to subangular fine to coarse Gravel with frequent angular to subangular cobbles		▽1
2.00 2.00	B T				(0.50)			
2.30	EN			1.58	2.30	Complete at 2.30m		

Plan

Remarks

Trial pit terminated at 2.30m BGL upon encountering of groundwater
Trial pit stable
Groundwater encountered at 1.90m BGL as fast seepage
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	PC	9754-07-20.R15-TP01

Ground Investigations Ireland Ltd

www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Trial Pit Number** R15-TP02
Machine : 3T Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.50m (L) x 0.30m (W) x 2.40m (D)	**Ground Level (mOD)** 5.10	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 720571.1 E 730051.4 N	**Dates** 19/11/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Brown slightly sandy slightly gravelly TOPSOIL with occasional rootlets		
				4.90	0.20	MADE GROUND: Greyish brown slightly sandy gravelly Clay with some angular to subrounded cobbles, occasional boulders, rootlets and occasional fragments of ceramic, glass, plastic, red brick and wood. Gravel is angular to subrounded fine to coarse		
0.50 0.50	EN T				(0.90)			
1.00 1.00	B T			4.00	1.10	MADE GROUND: Grey slightly sandy gravelly Clay with some angular to subrounded cobbles, occasional boulders and occasional fragments of ceramic, glass, metal, plastic, red brick and wood. Gravel is angular to subrounded fine to coarse		
1.50	EN				(1.30)			
2.00 2.00	B T							
2.40	EN			2.70	2.40	Complete at 2.40m		

Plan

Remarks

Trial pit terminated at 2.40m BGL due to side wall collapse
Trial pit unstable; side wall collapse below 1.30m BGL
No groundwater encountered during excavation
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	PC	9754-07-20.R15-TP02

Bus Connects Route 15 – Trial Pit Photographs

TP01

Bus Connects Route 15 – Trial Pit Photographs

TP01

Bus Connects Route 15 – Trial Pit Photographs

TP02

Bus Connects Route 15 – Trial Pit Photographs

TP02

APPENDIX 3 – Cable Percussion Borehole Records

Ground Investigations Ireland Ltd

www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Borehole Number** R15-CP02
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 0.70m	**Ground Level (mOD)** 6.68	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 720747.3 E 729851.9 N	**Dates** 06/11/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					6.48	(0.20) 0.20	CONCRETE.		
						(0.50)	MADE GROUND: Brown sandy gravelly Clay.		
					5.98	0.70	Complete at 0.70m		

Remarks
Borehole terminated at 0.70m BGL due to presence of services.
Borehole cannot be moved to adjacent location due to services, cannot drill in carriageway.
No groundwater encountered.
Borehole backfilled and footpath reinstated

Scale (approx)	Logged By
1:50	Tmcl

Figure No. 9754-07-20.R15-CP02

Ground Investigations Ireland Ltd
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Site Bus Connect Detailed Stage 1 Lot 1			**Borehole Number** R15-CP03
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 4.50m	**Ground Level (mOD)** 10.67	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 720998.3 E 729671.7 N	**Dates** 05/11/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					10.57	0.10	CONCRETE.		
						(0.20)			
					10.37	0.30	MADE GROUND: Grey very sandy angular to sub-angular fine to coarse Gravel.		
					10.27	0.40			
0.50	EN					(0.40)	CONCRETE.		
					9.87	0.80			
1.00-1.45	SPT(C) N=23			2,2/3,4,5,11			MADE GROUND: Grey very sandy angular to sub-angular fine to coarse Gravel.		
1.00	B					(0.90)			
1.00	T						MADE GROUND: Brownish grey slightly sandy gravelly Clay with occasional fragments of glass.		
1.50	EN								
					8.97	1.70	Stiff brown slightly sandy gravelly CLAY with occasional subangular to subrouded cobbles.		
2.00-2.45	SPT(C) N=19			1,3/3,5,5,6					
2.00	B								
2.00	T								
2.50	EN								
						(2.30)			
3.00-3.45	SPT(C) N=17			1,2/3,3,5,6					
3.00	B								
3.00	T								
3.50	EN								
					6.67	4.00			
4.00-4.45	SPT(C) 50/295			2,3/5,6,7,32	6.57	4.10	Very stiff brown slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles. Obstruction: Large boulder or rockhead		
4.00	B								
4.00	T						Refusal at 4.50m		

Remarks
Borehole complete at 4.50mBGL.
No groundwater encountered.
Borehole backfilled and footpath reinstated
Chiselling from 4.50m to 4.50m for 1 hour.

Scale (approx)	Logged By
1:50	Tmcl

Figure No. 9754-07-20.R15-CP03

Ground Investigations Ireland Ltd

www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Borehole Number** R15-CP04
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 4.50m	**Ground Level (mOD)** 22.98	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 721976.2 E 728860.3 N	**Dates** 30/10/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.60)	TOPSOIL		
0.50	EN				22.38	0.60	Stiff brown very gravelly CLAY with angular cobbles of limestone		
1.00-1.15 1.00 1.00	SPT(C) 50/0 B T			19,6/50		(1.50)			
1.50	EN								
2.00-2.15 2.00 2.00	SPT(C) 50/0 B T			25/50	20.88	2.10	Obstruction: Large boulder or rockhead Refusal at 2.10m		

Remarks
Borehole complete at 2.10m BGL.
No groundwater encountered.
Chiselling from 2.00m to 2.10m for 1 hour.

Scale (approx)	Logged By
1:50	JD

Figure No. 9754-07-20.R15-CP04

Ground Investigations Ireland Ltd
www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Borehole Number** R15-CP05
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 4.30m	**Ground Level (mOD)** 3.18	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 719872.2 E 730641.6 N	**Dates** 04/11/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					2.98	(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL.			
0.50	EN					(0.80)	MADE GROUND: Greyish brown slightly sandy slightly gravelly Clay with fragments of red brick.			
1.00-1.45 1.00 1.00	SPT(C) N=3 B T			1,1/2,0,1,0	2.18	1.00	Very soft brownish grey slightly sandy slightly gravelly silty CLAY.			
1.50	EN					(1.80)				
2.00-2.45 2.00 2.00	SPT(C) N=2 B T			1,0/0,1,0,1						
2.50	EN				0.38	2.80	Stiff grey slightly sandy gravelly silty CLAY with occasional angular cobbles.			
3.00-3.45 3.00 3.00	SPT(C) N=27 B T			1,3/3,7,8,9		(1.20)				
3.50	EN									
4.00-4.07 4.00 4.00	SPT(C) 50*/70 B T			50/	-0.82	4.00 (0.30)	Stiff dark grey slightly sandy gravelly CLAY.			
					-1.12	4.30	Obstruction: Large boulder or rockhead Refusal at 4.30m			

Remarks
Borehole completed at 4.30m BGL.
No groundwater encountered.
Standpipe intalled. Slotted pipe withgravel surround from 3.8m BGL to 2.3m BGL. Plain pipe with bentonite surround from 2.3m BGL to GL, finished with a raised cover.
Chiselling from 4.00m to 4.30m for 1.5 hours.

Scale (approx)	Logged By
1:50	Tmcl

Figure No. 9754-07-20.R15-CP05

Ground Investigations Ireland Ltd
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Site Bus Connect Detailed Stage 1 Lot 1			**Borehole Number** R15-CP06
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 3.80m	**Ground Level (mOD)** 3.32	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 719968.6 E 730567.8 N	**Dates** 24/09/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	B						MADE GROUND: Brown slightly sandy gravelly Clay with red brick, yellow brick and mortar fragments			
0.50	EN									
1.00	B									
1.20-1.65	SPT(C) N=4			3,3/1,1,1,1		(2.60)				
1.50	B									
1.50	EN									
2.00-2.45	SPT(C) N=3			1,1/1,1,0,1						
2.00	B									
2.50	B				0.72	2.60			▼1	
2.50	EN						Firm dark greyish brown slightly gravelly sandy clayey SILT with some organics and shell fragments.			
3.00	B			Water strike(1) at 3.00m, rose to 2.50m in 20 mins.					▽1	
3.00-3.45	SPT(C) N=14			1,2/2,3,4,5		(1.20)				
3.50	B									
3.50	EN									
					-0.48	3.80	Obstruction: Large boulder or rockhead			
							Refusal at 3.80m			

Remarks
Standpipe installed. Slotted pipe with pea gravel surround from 3.80m to 2.50m BGL. Plain pipe with bentonite surround from 2.50m BGL to GL, finished with a raised cover.
Borehole completed at 3.80m BGL.
Groundwater encountered at 3.80m BGL.
Chiselling from 3.80m to 3.80m for 1 hour.

Scale (approx)	Logged By
1:50	JS

Figure No. 9754-07-20.R15-CP06

Ground Investigations Ireland Ltd

www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Borehole Number** R15-CP07
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 1.60m	**Ground Level (mOD)** 3.02	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 720007.7 E 730606.6 N	**Dates** 24/09/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	B					(1.10)	MADE GROUND: Brown slightly sandy gravelly Clay with occasional sub-angular to sub-rounded cobbles and mortar, wood, rootlets and red brick fragments		
1.00	B				1.92	1.10			
1.20-1.65	SPT(C) N=17			3,2/4,4,5,5,4		(0.50)	MADE GROUND: Brown slightly sandy gravelly Clay with mortar and red brick fragments.		
1.50	B				1.42	1.60	Obstruction: Large boulder or rockhead		
							Refusal at 1.60m		

Remarks
Borehole completed at 1.60m BGL.
No groundwater encountered.
Chiselling from 1.60m to 1.60m for 1 hour.

Scale (approx)	Logged By
1:50	JS

Figure No. 9754-07-20.R15-CP07

Ground Investigations Ireland Ltd
www.gii.ie

Site Bus Connect Detailed Stage 1 Lot 1			**Borehole Number** R15-CP07A
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 7.50m	**Ground Level (mOD)** 3.07	**Client** National Transport Authority	**Job Number** 9754-07-20
	Location 719997.4 E 730610.1 N	**Dates** 25/09/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	B						MADE GROUND: Brown slightly sandy gravelly Clay with occasional sub-angular cobbles, red brick and mortar fragments.			
0.50	EN					(1.30)				
1.00	B									
1.20-1.65	SPT(C) N=11			1,2/2,2,3,4	1.77	1.30	Soft grey slightly sandy gravelly Clay (possible made ground)			
1.50	B									
1.50	EN					(1.20)				
2.00-2.45	SPT(C) N=6			1,1/1,1,2,2						
2.00	B								▼1	
2.50	B			Water strike(1) at 2.50m, no rise after 20 mins.	0.57	2.50 (0.20)	Soft to firm greyish brown slightly gravelly sandy clayey SILT			
2.50	EN				0.37	2.70	Loose greyish brown silty fine to coarse SAND with some shells.			
3.00-3.45	SPT(C) N=8			2,3/3,2,2,1						
3.00	B					(1.20)				
3.50	B									
3.50	EN				-0.83	3.90	Very stiff grey slightly sandy gravelly CLAY.		▽2	
4.00-4.45	SPT(C) N=35			5,6/7,8,9,11						
4.00	B			Water strike(2) at 4.10m.						
4.50	B									
5.00-5.45	SPT(C) N=50			6,8/11,14,16,9						
5.00	B					(2.60)				
5.50	B									
6.00-6.35	SPT(C) 50/200			9,11/14,17,19						
6.00	B									
6.50	B				-3.43	6.50	Very stiff slightly sandy gravelly CLAY with occasional sub-rounded cobbles and boulders.			
7.00-7.35	SPT(C) 50/200			10,14/18,20,12		(1.00)				
7.00	B									
7.50	B				-4.43	7.50	Obstruction: Large boulder or roackhead			
							Refusal at 7.50m			

Remarks
Slotted standpipe with pea gravel surround from 7.50m to 4.00m BGL, plain pipe with bentonite seal from 2.50m BGL to GL, finished with a raised cover.
Borehole terminated due to boulders at 7.50m BGL.
Groundwater encountered at 2.50m BGL and 4.10m BGL.
Chiselling from 7.50m to 7.50m for 1 hour.

Scale (approx)	Logged By
1:50	JS

Figure No. 9754-07-20.R15-CP07A

APPENDIX 4 – Laboratory Testing

National Materials Testing Laboratory Ltd.

SUMMARY OF TEST RESULTS

				Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Lab	
BH/TP	Depth	sample	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	
R15-CP03	2.0	B	14.5		59.4	33	19	14						
R15-CP03	4.0	B	14.6		63.2	35	18	17						
R15-CP05	2.0	B	16.9		64.0	35	21	14						
R15-CP05	4.0	B	12.8		53.1	31	16	15						
R15-CP06	2.5	B	24.9		54.2	38	28	10						
R15-CP06	3.0	B	42.9		66.8	44	31	13						
R15-CP07A	2.5	B	26.8		67.8	43	30	12						
R15-CP07A	3.5	B	19.1		46.0	28	Non Plastic							
R15-CP07A	4.5	B	10.9		61.0	29	16	13						
R15-CP07A	7.0	B	12.6		43.9	25	15	10						
NMTL		Notes :									Job ref No.	NMTL 3326	GII Project ID:	9754-07-20
		1. All BS tests carried out using preferred (definitive) method unless otherwise stated.									Location	Bus Connect Routes		

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	96.7
28.000	95.3
20.000	93.1
14.000	91.6
10.000	88.4
6.300	85.5
5.000	82.8
3.350	79.6
2.000	73.6
1.180	68.2
0.600	62.2
0.425	59.4
0.300	56.6
0.212	53.7
0.150	50.6
0.063	43.2
0.051	41.4
0.037	37.6
0.019	32.2
0.010	25.7
0.007	23.1
0.005	19.9
0.004	17.0
0.002	11.0

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
11.0		32.2			30.4			26.4		0.0	0.0

Sample Description	Brown slightly gravelly slightly sandy silty CLAY					Project No.	NMTL 3326
						BH/TP No.	R15-CP03
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	2.0m

Date sample tested 15/12/2020

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	99.4
20.000	97.0
14.000	96.3
10.000	93.8
6.300	87.4
5.000	84.4
3.350	81.6
2.000	76.4
1.180	71.3
0.600	65.8
0.425	63.2
0.300	60.5
0.212	57.7
0.150	54.8
0.063	47.2
0.053	45.5
0.038	42.9
0.019	37.7
0.010	30.2
0.007	27.4
0.005	25.1
0.004	21.9
0.002	17.0

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
17.0		30.2			29.1			23.6		0.0	0.0

Sample Description	Brown slightly gravelly slightly sandy silty CLAY					Project No.	NMTL 3326
						BH/TP No.	R15-CP03
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	4.0m

Date sample tested 15/12/2020

NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	92.6
28.000	91.0
20.000	89.7
14.000	89.5
10.000	87.8
6.300	84.1
5.000	82.2
3.350	79.7
2.000	75.3
1.180	70.9
0.600	66.2
0.425	64.0
0.300	61.8
0.212	59.4
0.150	56.9
0.063	50.3
0.052	47.9
0.037	43.9
0.019	37.5
0.010	31.6
0.007	28.1
0.005	24.9
0.004	22.2
0.002	15.8

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
15.8		34.5			24.9			24.7		0.0	0.0

Sample Description	Brown slightly gravelly slightly sandy silty CLAY					Project No.	NMTL 3326
						BH/TP No.	R15-CP05
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	2.0m

Date sample tested 15/12/2020

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	97.3
50.000	90.1
37.500	83.2
28.000	81.0
20.000	80.8
14.000	80.5
10.000	77.9
6.300	72.4
5.000	70.3
3.350	68.4
2.000	64.3
1.180	60.1
0.600	55.4
0.425	53.1
0.300	50.7
0.212	48.1
0.150	44.1
0.063	35.2
0.054	33.7
0.039	30.6
0.020	24.3
0.010	20.1
0.008	17.5
0.005	15.0
0.004	13.3
0.002	10.9

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
10.9		24.3			29.1			32.9		2.7	0.0

Sample Description	Brown/grey slightly sandy slightly gravelly silty CLAY					Project No.	NMTL 3326
						BH/TP No.	R15-CP05
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	4.0m

Date sample tested 15/01/1900

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	91.6
14.000	90.4
10.000	85.0
6.300	79.3
5.000	76.5
3.350	74.3
2.000	69.2
1.180	64.0
0.600	57.7
0.425	54.2
0.300	50.5
0.212	46.8
0.150	42.1
0.063	33.0
0.054	31.4
0.038	29.5
0.020	24.2
0.010	18.6
0.007	15.5
0.005	12.8
0.004	10.0
0.002	7.1

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
7.1		25.9			36.2			30.8		0.0	0.0

Sample Description	Dark grey slightly gravelly slightly sandy silty CLAY					Project No.	NMTL 3326
						BH/TP No.	R15-CP06
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	2.50m
				Date sample tested	16/12/2020		

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	94.4
14.000	93.1
10.000	89.0
6.300	85.2
5.000	83.5
3.350	81.6
2.000	78.5
1.180	74.8
0.600	69.9
0.425	66.8
0.300	62.8
0.212	57.9
0.150	48.8
0.063	35.3
0.055	31.4
0.040	27.4
0.021	19.1
0.011	12.5
0.008	9.8
0.006	7.4
0.004	5.8
0.002	4.0

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
4.0		31.4			43.1			21.5		0.0	0.0

Sample Description	Brown/dark grey slightly gravelly sandy clayey SILT					Project No.	NMTL 3326
						BH/TP No.	R15-CP06
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	3.0m
				Date sample tested	16/12/2020		

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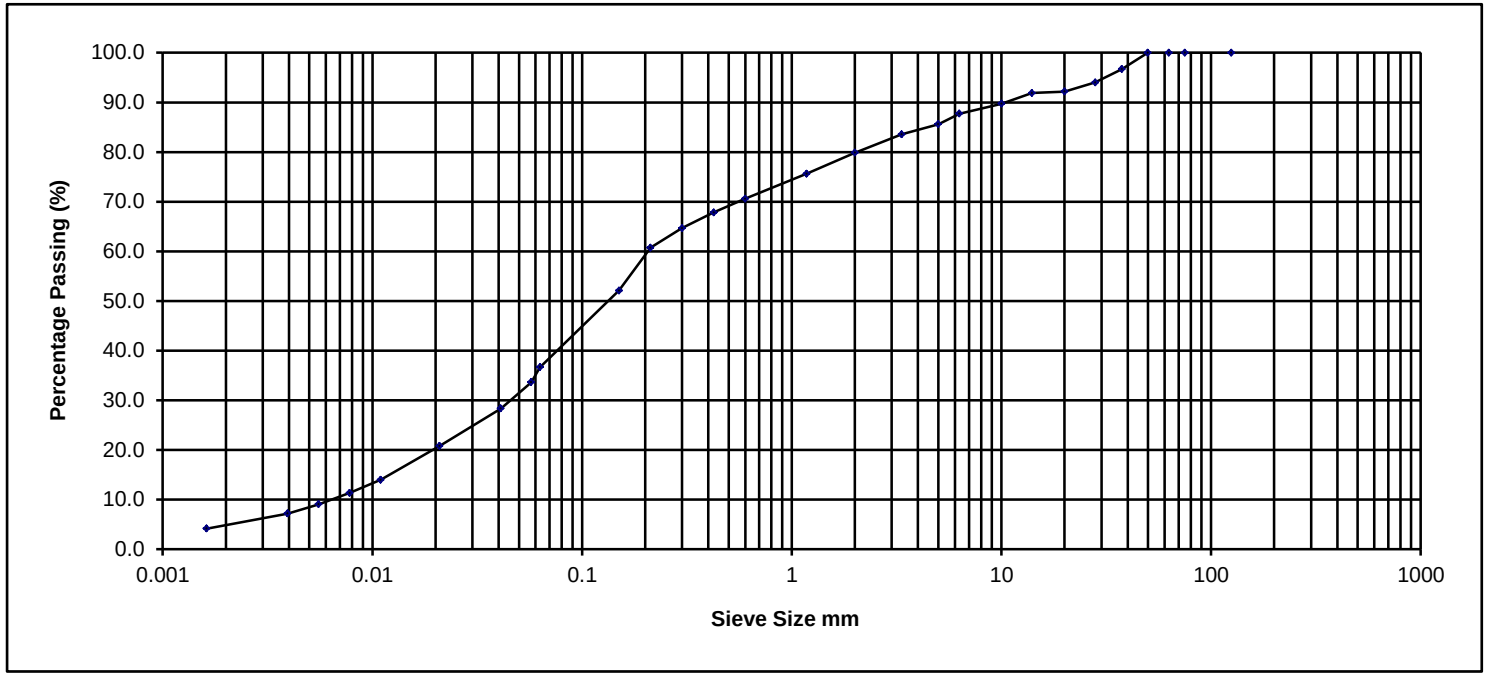
Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	96.7
28.000	94.0
20.000	92.2
14.000	91.9
10.000	89.7
6.300	87.7
5.000	85.6
3.350	83.6
2.000	79.9
1.180	75.6
0.600	70.6
0.425	67.8
0.300	64.7
0.212	60.8
0.150	52.1
0.063	36.7
0.057	33.6
0.041	28.3
0.021	20.8
0.011	14.0
0.008	11.3
0.006	9.1
0.004	7.2
0.002	4.2



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
4.2		32.5			43.2			20.1		0.0	0.0

Sample Description	Dark brown slightly gravelly sandy clayey SILT					Project No.	NMTL 3326
						BH/TP No.	R15-CP07A
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	16/12/2020	Depth	2.50m

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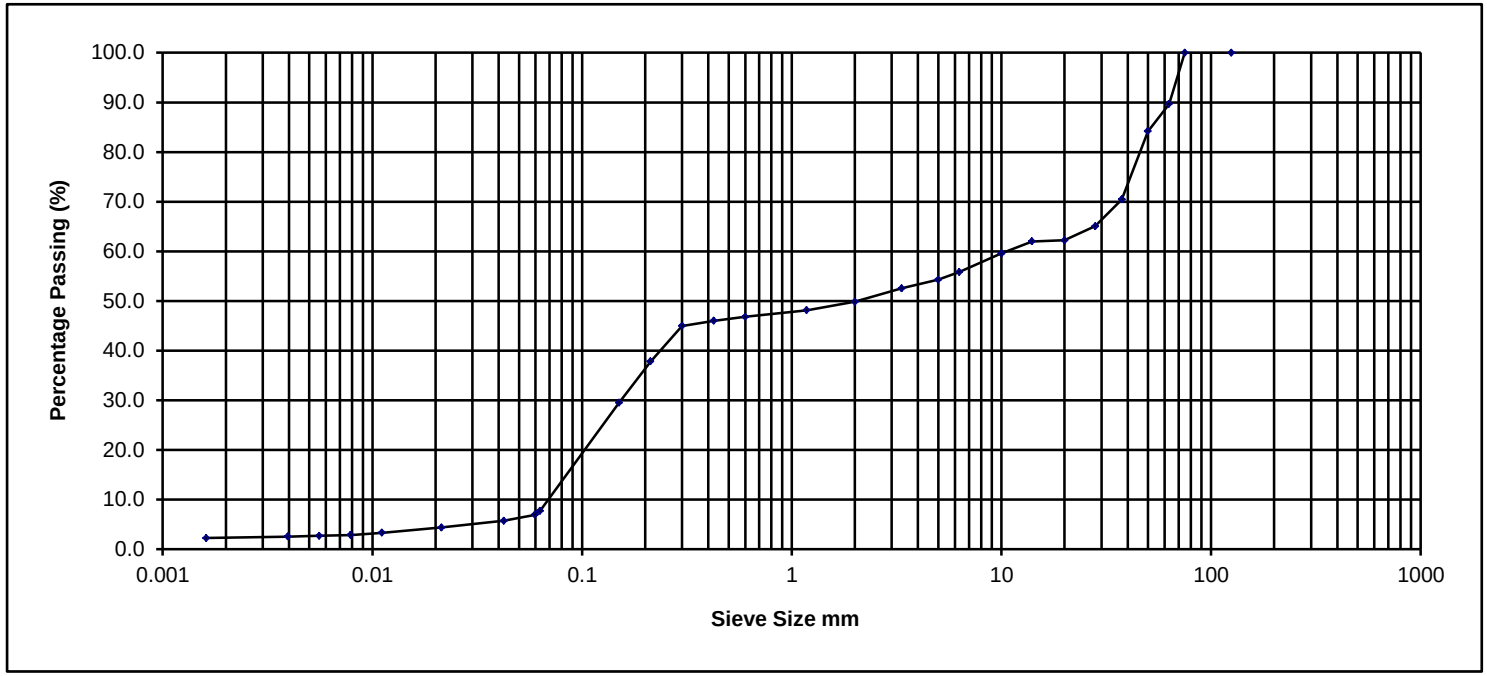
Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	89.7
50.000	84.2
37.500	70.5
28.000	65.1
20.000	62.2
14.000	62.0
10.000	59.6
6.300	55.8
5.000	54.3
3.350	52.5
2.000	49.8
1.180	48.1
0.600	46.8
0.425	46.0
0.300	45.0
0.212	37.8
0.150	29.5
0.063	7.7
0.060	6.9
0.042	5.7
0.021	4.4
0.011	3.3
0.008	2.9
0.006	2.7
0.004	2.6
0.002	2.3



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
2.3		5.4			42.2			39.8		10.3	0.0

Sample Description	Grey silty gravelly SAND					Project No.	NMTL 3326
						BH/TP No.	R15-CP07A
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	3.50m
				Date sample tested	16/12/2020		

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	98.9
28.000	96.3
20.000	94.4
14.000	94.2
10.000	91.6
6.300	85.7
5.000	83.4
3.350	79.4
2.000	74.5
1.180	69.2
0.600	63.7
0.425	61.0
0.300	58.2
0.212	55.3
0.150	51.6
0.063	43.5
0.054	40.3
0.039	35.3
0.020	28.8
0.011	23.0
0.008	20.9
0.005	17.4
0.004	15.0
0.002	11.5

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
11.5		32.1			30.9			25.5		0.0	0.0

Sample Description	Dark grey slightly gravelly slightly sandy silty CLAY.							Project No.	NMTL 3326
								BH/TP No.	R15-CP07A
Project	Bus connect Route 15					GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	16/12/2020	Depth	4.50m

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	91.2
50.000	87.6
37.500	80.8
28.000	73.6
20.000	68.1
14.000	67.9
10.000	66.3
6.300	62.7
5.000	60.3
3.350	57.6
2.000	53.5
1.180	49.7
0.600	45.8
0.425	43.9
0.300	42.2
0.212	40.3
0.150	38.3
0.063	33.0
0.053	31.6
0.038	29.2
0.020	24.5
0.010	18.4
0.007	16.0
0.005	14.8
0.004	13.0
0.002	10.1

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
10.1		22.9			20.5			37.6		8.8	0.0

Sample Description	Dark grey slightly sandy gravelly silty CLAY.					Project No.	NMTL 3326
						BH/TP No.	R15-CP07A
Project	Bus connect Route 15			GII Project ID-9754-07-20		Sample No.	B
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	7.0m
				Date sample tested	16/12/2020		

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Ireland

Attention :	John Duggan
Date :	21st October, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/13374 Batch 1
Location :	Bus Connects Route 15
Date samples received :	30th September, 2020
Status :	Final report
Issue :	1

Eight samples were received for analysis on 30th September, 2020 of which eight 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.

Authorised By:

Bruce Leslie
Project Manager

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/13374

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			LOD/LOR	Units	Method No.
Sample ID	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP07	R15 - CP07	R15 - CP07	R15 - CP07					
Depth	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020					
Antimony	2	2	2	<1	1	3	2	<1			<1	mg/kg	TM30/PM15
Arsenic #	12.5	12.4	12.2	9.5	14.6	15.3	11.2	7.1			<0.5	mg/kg	TM30/PM15
Barium #	97	101	128	60	123	164	62	26			<1	mg/kg	TM30/PM15
Cadmium #	1.8	2.0	1.9	0.7	1.3	1.3	1.5	0.2			<0.1	mg/kg	TM30/PM15
Chromium #	46.9	49.1	55.3	46.4	52.6	46.7	56.5	63.3			<0.5	mg/kg	TM30/PM15
Copper #	43	37	66	13	40	34	27	6			<1	mg/kg	TM30/PM15
Lead #	71	82	100	29	88	226	41	11			<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Molybdenum #	4.9	5.0	4.8	3.5	4.6	4.5	4.9	4.2			<0.1	mg/kg	TM30/PM15
Nickel #	33.7	35.3	30.9	14.5	39.3	29.9	26.6	10.2			<0.7	mg/kg	TM30/PM15
Selenium #	2	1	1	<1	1	<1	1	<1			<1	mg/kg	TM30/PM15
Zinc #	117	118	164	79	118	134	69	26			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.07	0.12	<0.04	<0.04	0.27	0.13	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.05	0.06	<0.03	<0.03	0.17	0.05	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	0.09	0.23	<0.05	<0.05	0.25	0.07	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	0.08	0.18	<0.04	<0.04	0.19	0.06	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.42	1.61	0.20	0.12	2.08	0.62	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	0.14	0.41	0.09	<0.04	0.49	0.15	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.71	1.95	0.88	0.27	3.03	1.06	0.05	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene #	0.60	1.62	0.72	0.22	2.82	0.94	0.04	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.33	0.76	0.56	0.15	1.60	0.82	<0.06	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #	0.33	0.75	0.49	0.15	1.62	0.87	0.04	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.56	1.17	1.00	0.27	3.20	1.87	<0.07	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.32	0.66	0.55	0.12	1.83	1.20	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	0.22	0.41	0.41	0.11	1.37	0.78	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	0.08	0.07	<0.04	0.25	0.19	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.22	0.43	0.39	0.11	1.50	0.68	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Coronene	<0.04	0.06	0.05	<0.04	0.26	0.09	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
PAH 17 Total	4.14	10.50	5.41	1.52	20.93	9.58	<0.64	<0.64			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.40	0.84	0.72	0.19	2.30	1.35	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.16	0.33	0.28	0.08	0.90	0.52	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	94	94	99	100	93	95	99	96			<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	175	32	90	<30	<30	<30			<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/13374

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			LOD/LOR	Units	Method No.
Sample ID	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP07	R15 - CP07	R15 - CP07	R15 - CP07					
Depth	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020					
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	12	<7	11	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	15	22	126	22	64	25	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	37	10	15	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	175	32	90	<26	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	46	<10	17	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
>C25-C35	13	18	102	25	55	24	<10	<10			<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	12	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	16	27	11	10	231	14	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	91	144	176	82	980	105	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	34	27	64	20	142	44	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	141	198	251	112	1365	163	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	141	198	426	144	1455	163	<52	<52			<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	<0.1	<0.1 SV	<0.1 SV	<0.1 SV	<0.1 SV	<0.1	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC25	30	65	42	29	579	38	<10	<10			<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	71	108	155	69	665	87	<10	<10			<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5 SV	<5 SV	<5 SV	<5 SV	<5	<5 SV	<5			<5	ug/kg	TM36/PM12
Benzene #	<5	<5 SV	<5 SV	<5 SV	<5 SV	<5	<5 SV	<5			<5	ug/kg	TM36/PM12
Toluene #	<5	<5 SV	<5 SV	<5 SV	<5 SV	<5	<5 SV	<5			<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5 SV	<5 SV	<5 SV	<5 SV	<5	<5 SV	<5			<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5 SV	<5 SV	<5 SV	<5 SV	<5	<5 SV	<5			<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5 SV	<5 SV	<5 SV	<5 SV	<5	<5 SV	<5			<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35			<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/13374

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			LOD/LOR	Units	Method No.
Sample ID	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP07	R15 - CP07	R15 - CP07	R15 - CP07					
Depth	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020					
Natural Moisture Content	13.9	17.3	24.6	24.6	9.3	17.6	28.9	22.1			<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	12.2	14.7	19.8	19.7	8.5	15.0	22.4	18.1			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Chromium III	46.9	49.1	55.3	46.4	52.6	46.7	56.5	63.3			<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	1.18	1.43	1.68	0.69	1.53	1.68	1.72	0.30			<0.02	%	TM21/PM24
Loss on Ignition #	2.8	3.2	4.5	1.7	3.8	3.7	3.6	<1.0			<1.0	%	TM22/PM0
pH #	7.93	7.89	7.45	7.68	8.28	8.12	7.64	7.84			<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1035	0.1048	0.1154	0.1231	0.099	0.1065	0.1109	0.1118				kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09				kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/13374

Report : CEN 10:1 1 Batch

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			LOD/LOR	Units	Method No.
Sample ID	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP07	R15 - CP07	R15 - CP07	R15 - CP07					
Depth	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020					
Dissolved Antimony #	<0.002	<0.002	0.008	0.005	0.005	0.005	0.009	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	0.08	0.05	0.05	0.05	0.09	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	0.0040	0.0091	0.0057	0.0063	0.0056	0.0038			<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	0.040	0.091	0.057	0.063	0.056	0.038			<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.020	0.031	0.076	0.053	0.011	0.023	0.046	0.013			<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.20	0.31	0.76	0.53	0.11	0.23	0.46	0.13			<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	0.0047	0.0017	<0.0015	<0.0015			<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	0.047	0.017	<0.015	<0.015			<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007			<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.018	0.021	0.036	0.019	0.011	0.007	0.018	0.010			<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.18	0.21	0.36	0.19	0.11	0.07	0.18	0.10			<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	<0.003			<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	0.004	<0.003	0.003	<0.003	<0.003	<0.003			<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	0.04	<0.03	0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001			<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			<0.0001	mg/kg	TM61/PM0
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/l	TM26/PM0
Total Phenols HPLC	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	0.4	0.4	<0.3	<0.3			<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	4	4	<3	<3			<3	mg/kg	TM173/PM0
Sulphate as SO4 #	69.8	29.2	58.3	37.7	1.3	5.2	38.2	21.4			<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	698	292	583	377	13	52	382	214			<5	mg/kg	TM38/PM0
Chloride #	<0.3	<0.3	0.4	2.1	0.8	1.9	0.5	0.4			<0.3	mg/l	TM38/PM0
Chloride #	<3	<3	4	21	8	19	5	4			<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	3	3	5	4	5	4	4	2			<2	mg/l	TM60/PM0
Dissolved Organic Carbon	30	30	50	40	50	40	40	<20			<20	mg/kg	TM60/PM0
Total Dissolved Solids #	170	132	220	143	59	68	172	96			<35	mg/l	TM20/PM0
Total Dissolved Solids #	1700	1320	2199	1430	590	680	1720	960			<350	mg/kg	TM20/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/13374

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.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP06	R15 - CP07	R15 - CP07	R15 - CP07	R15 - CP07								
Depth	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50								
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T								
Sample Date	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020	25/09/2020								
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1	1	1	1								
Date of Receipt	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020	30/09/2020								
Solid Waste Analysis																
Total Organic Carbon #	1.18	1.43	1.68	0.69	1.53	1.68	1.72	0.30			3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025 SV	<0.025 SV	<0.025 SV	<0.025 SV	<0.025	<0.025 SV	<0.025			6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035			1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	175	32	90	<30	<30	<30			500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	4.14	10.50	5.41	1.52	20.93	9.58	<0.64	<0.64			100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	0.040	0.091	0.057	0.063	0.056	0.038			0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.20	0.31	0.76	0.53	0.11	0.23	0.46	0.13			20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	0.047	0.017	<0.015	<0.015			0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.18	0.21	0.36	0.19	0.11	0.07	0.18	0.10			0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	0.08	0.05	0.05	0.05	0.09	<0.02			0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03			0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	0.04	<0.03	0.03	<0.03	<0.03	<0.03			4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	1700	1320	2199	1430	590	680	1720	960			4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	30	30	50	40	50	40	40	<20			500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1035	0.1048	0.1154	0.1231	0.099	0.1065	0.1109	0.1118			-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	87.4	85.6	77.8	73.3	90.6	84.3	80.9	80.4			-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.887	0.885	0.874	0.867	0.891	0.883	0.879	0.878			-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8			-	-	-		l	NONE/PM17
pH #	7.93	7.89	7.45	7.68	8.28	8.12	7.64	7.84			-	-	-	<0.01	pH units	TM73/PM11
Fluoride	<3	<3	<3	<3	4	4	<3	<3			-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	698	292	583	377	13	52	382	214			1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	4	21	8	19	5	4			800	15000	25000	<3	mg/kg	TM38/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: Bus Connects Route 15
Contact: John Duggan

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/13374	1	R15 - CP06	0.50	2	19/10/2020	**General Description (Bulk Analysis)**	soil-stones
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13374	1	R15 - CP06	1.50	5	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stones
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13374	1	R15 - CP06	2.50	8	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stones
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13374	1	R15 - CP06	3.50	11	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stones
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13374	1	R15 - CP07	0.50	14	19/10/2020	**General Description (Bulk Analysis)**	Soil/Stones
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13374	1	R15 - CP07	1.50	17	17/10/2020	**General Description (Bulk Analysis)**	soil-stones
					17/10/2020	**Asbestos Fibres**	NAD
					17/10/2020	**Asbestos ACM**	NAD
					17/10/2020	**Asbestos Type**	NAD
					17/10/2020	**Asbestos Level Screen**	NAD
20/13374	1	R15 - CP07	2.50	20	19/10/2020	**General Description (Bulk Analysis)**	soil-stones
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: Bus Connects Route 15
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/13374	1	R15 - CP07	2.50	20	19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD
20/13374	1	R15 - CP07	3.50	23	19/10/2020	**General Description (Bulk Analysis)**	soil-stones
					19/10/2020	**Asbestos Fibres**	NAD
					19/10/2020	**Asbestos ACM**	NAD
					19/10/2020	**Asbestos Type**	NAD
					19/10/2020	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/13374						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/13374

SOILS

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.

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.

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.

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 UKAS requirement 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.

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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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

EMT Job No: 20/13374

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.	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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

EMT Job No: 20/13374

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	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	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	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 re	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 re	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 (comparabl	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 (comparabl	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
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

EMT Job No: 20/13374

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
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
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
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
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	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.			AR	
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	

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

Attention :	John Duggan
Date :	16th November, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/15137 Batch 1
Location :	Bus Connects Route 15
Date samples received :	2nd November, 2020
Status :	Final report
Issue :	1

Two samples were received for analysis on 2nd November, 2020 of which two 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15137

Report : Solid

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

EMT Sample No.	1-3	4-6									LOD/LOR	Units	Method No.
Sample ID	R15-CP04	R15-CP04											
Depth	0.50	1.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	30/10/2020	30/10/2020											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	02/11/2020	02/11/2020											
Antimony	<1	<1									<1	mg/kg	TM30/PM15
Arsenic #	5.2	5.5									<0.5	mg/kg	TM30/PM15
Barium #	27	27									<1	mg/kg	TM30/PM15
Cadmium #	5.3	0.9									<0.1	mg/kg	TM30/PM15
Chromium #	26.6	38.4									<0.5	mg/kg	TM30/PM15
Copper #	12	13									<1	mg/kg	TM30/PM15
Lead #	5	9									<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1									<0.1	mg/kg	TM30/PM15
Molybdenum #	13.7	2.9									<0.1	mg/kg	TM30/PM15
Nickel #	18.3	18.3									<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1									<1	mg/kg	TM30/PM15
Zinc #	113	49									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03									<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 #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06									<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64									<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02									<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	88	94									<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_Total)	<30	<30									<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15137

Report : Solid

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

EMT Sample No.	1-3	4-6									LOD/LOR	Units	Method No.
Sample ID	R15-CP04	R15-CP04											
Depth	0.50	1.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	30/10/2020	30/10/2020											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	02/11/2020	02/11/2020											
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_1D_AL) #	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_1D_AL) #	<4	<4									<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_1D_AL) #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_1D_AL) #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7									<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10									<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10									<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_1D_AR) #	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_1D_AR) #	<4	<4									<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_1D_AR) #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_1D_AR) #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7									<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52									<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR) #	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10									<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10									<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5									<5	ug/kg	TM36/PM12
Benzene #	20	<5									<5	ug/kg	TM36/PM12
Toluene #	<5	<5									<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5									<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5									<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5									<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

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15137

Report : Solid

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

EMT Sample No.	1-3	4-6											
Sample ID	R15-CP04	R15-CP04											
Depth	0.50	1.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	30/10/2020	30/10/2020											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	02/11/2020	02/11/2020											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Natural Moisture Content	17.0	7.3									<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	14.5	6.8									<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3									<0.3	mg/kg	TM38/PM20
Chromium III	26.6	38.4									<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5									<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.19	0.29									<0.02	%	TM21/PM24
Loss on Ignition #	<1.0	1.1									<1.0	%	TM22/PM0
pH #	8.48	8.82									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1023	0.098										kg	NONE/PM17
Mass of dried test portion	0.09	0.09										kg	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15137

Report : CEN 10:1 1 Batch

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6									LOD/LOR	Units	Method No.
Sample ID	R15-CP04	R15-CP04											
Depth	0.50	1.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	30/10/2020	30/10/2020											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	02/11/2020	02/11/2020											
Dissolved Antimony #	<0.002	0.002									<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	0.02									<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025									<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025									<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03									<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	0.004									<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	0.04									<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 #	0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.03	<0.03									<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
Total Phenols HPLC	<0.05	<0.05									<0.05	mg/l	TM26/PM0
Total Phenols HPLC	<0.5	<0.5									<0.5	mg/kg	TM26/PM0
Fluoride	0.4	<0.3									<0.3	mg/l	TM173/PM0
Fluoride	4	<3									<3	mg/kg	TM173/PM0
Sulphate as SO4 #	0.5	0.7									<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	5	7									<5	mg/kg	TM38/PM0
Chloride #	<0.3	0.7									<0.3	mg/l	TM38/PM0
Chloride #	<3	7									<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	4	3									<2	mg/l	TM60/PM0
Dissolved Organic Carbon	40	30									<20	mg/kg	TM60/PM0
Total Dissolved Solids #	52	<35									<35	mg/l	TM20/PM0
Total Dissolved Solids #	520	<350									<350	mg/kg	TM20/PM0

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15137

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.	1-3	4-6														
Sample ID	R15-CP04	R15-CP04														
Depth	0.50	1.50														
COC No / misc																
Containers	V J T	V J T														
Sample Date	30/10/2020	30/10/2020														
Sample Type	Soil	Soil														
Batch Number	1	1														
Date of Receipt	02/11/2020	02/11/2020														
Solid Waste Analysis											Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Total Organic Carbon #	0.19	0.29									3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025									6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035									1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30									500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	<0.64	<0.64									100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025									0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03									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	0.04									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 #	<0.02	0.02									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 #	0.03	<0.03									4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	520	<350									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	0.1023	0.098									-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	87.9	91.8									-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.888	0.892									-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.6									-	-	-		l	NONE/PM17
pH #	8.48	8.82									-	-	-	<0.01	pH units	TM73/PM11
Fluoride	4	<3									-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	5	7									1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	7									800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: Bus Connects Route 15
Contact: John Duggan

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/15137	1	R15-CP04	0.50	2	12/11/2020	**General Description (Bulk Analysis)**	Soil/Stones
					12/11/2020	**Asbestos Fibres**	NAD
					12/11/2020	**Asbestos ACM**	NAD
					12/11/2020	**Asbestos Type**	NAD
					12/11/2020	**Asbestos Level Screen**	NAD
20/15137	1	R15-CP04	1.50	5	12/11/2020	**General Description (Bulk Analysis)**	Soil/Stones
					12/11/2020	**Asbestos Fibres**	NAD
					12/11/2020	**Asbestos ACM**	NAD
					12/11/2020	**Asbestos Type**	NAD
					12/11/2020	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/15137						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/15137

SOILS

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.

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.

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.

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 UKAS requirement 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.

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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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

EMT Job No: 20/15137

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.	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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

EMT Job No: 20/15137

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	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	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	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 (comparabl	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 (comparabl	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
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

EMT Job No: 20/15137

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
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
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
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
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	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.			AR	
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	

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

Attention :	John Duggan
Date :	16th December, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/15509 Batch 1
Location :	Bus Connects Route 15
Date samples received :	9th November, 2020
Status :	Final report
Issue :	1

Nine samples were received for analysis on 9th November, 2020 of which nine 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15509

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27		LOD/LOR	Units	Method No.
Sample ID	R15-CP02	R15-CP03	R15-CP03	R15-CP03	R15-CP03	R15-CP05	R15-CP05	R15-CP05	R15-CP05				
Depth	0.50	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	06/11/2020	05/11/2020	05/11/2020	05/11/2020	05/11/2020	04/11/2020	04/11/2020	04/11/2020	04/11/2020				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020				
Antimony	1	7	2	2	2	2	2	2	<1		<1	mg/kg	TM30/PM15
Arsenic #	6.4	14.6	12.2	11.2	9.5	9.9	10.6	11.5	7.1		<0.5	mg/kg	TM30/PM15
Barium #	53	65	57	70	53	90	92	83	54		<1	mg/kg	TM30/PM15
Cadmium #	0.7	1.0	2.1	1.8	1.9	1.9	2.2	3.1	1.5		<0.1	mg/kg	TM30/PM15
Chromium #	53.4	46.7	35.5	33.1	35.2	43.5	39.8	38.5	32.8		<0.5	mg/kg	TM30/PM15
Copper #	19	75	32	25	26	28	32	29	18		<1	mg/kg	TM30/PM15
Lead #	10	300	22	16	18	23	20	19	14		<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	mg/kg	TM30/PM15
Molybdenum #	3.1	3.3	4.0	4.2	3.7	4.3	4.7	4.4	3.1		<0.1	mg/kg	TM30/PM15
Nickel #	16.8	28.0	38.6	33.4	30.9	33.7	39.7	37.8	22.4		<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	1	<1	2	1	2	2	2		<1	mg/kg	TM30/PM15
Zinc #	48	73	89	73	92	86	92	82	58		<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.09	0.14	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	0.09	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	0.66	1.10	<0.03	<0.03	0.16	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	0.24	0.35	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	1.65	1.64	<0.03	<0.03	0.31	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	1.69	1.38	<0.03	<0.03	0.26	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	1.02	0.81	<0.06	<0.06	0.21	<0.06	<0.06	<0.06		<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	1.14	0.76	<0.02	<0.02	0.22	<0.02	<0.02	<0.02		<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	2.71	1.18	<0.07	<0.07	0.31	<0.07	<0.07	<0.07		<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	1.69	0.65	<0.04	<0.04	0.17	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	1.25	0.39	<0.04	<0.04	0.09	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	0.19	0.10	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	1.35	0.36	<0.04	<0.04	0.11	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Coronene	<0.04	0.27	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	14.08	9.02	<0.64	<0.64	1.84	<0.64	<0.64	<0.64		<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	1.95	0.85	<0.05	<0.05	0.22	<0.05	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	0.76	0.33	<0.02	<0.02	0.09	<0.02	<0.02	<0.02		<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	91	87	96	87	86	90	89	91	86		<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_Total)	<30	<30	<30	<30	<30	<30	<30	<30	<30		<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15509

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27		LOD/LOR	Units	Method No.
Sample ID	R15-CP02	R15-CP03	R15-CP03	R15-CP03	R15-CP03	R15-CP05	R15-CP05	R15-CP05	R15-CP05				
Depth	0.50	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	06/11/2020	05/11/2020	05/11/2020	05/11/2020	05/11/2020	04/11/2020	04/11/2020	04/11/2020	04/11/2020				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020				
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	<4	<4	<4	<4	<4	<4	<4	<4		<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	<7	26	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	26	<26	<26	<26	<26	<26	<26	<26		<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	25	<10	<10	<10	<10	<10	<10	<10		<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	<4	<4	<4	<4	<4	<4	<4	<4		<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	<7	27	24	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	<7	203	101	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	36	17	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	266	142	<26	<26	<26	<26	<26	<26		<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	292	142	<52	<52	<52	<52	<52	<52		<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV		<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	71	50	<10	<10	<10	<10	<10	<10		<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	161	75	<10	<10	<10	<10	<10	<10		<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	<5	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	9	<5	<5	9 SV		<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5	<5 SV		<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35	<35		<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15509

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27		LOD/LOR	Units	Method No.
Sample ID	R15-CP02	R15-CP03	R15-CP03	R15-CP03	R15-CP03	R15-CP05	R15-CP05	R15-CP05	R15-CP05				
Depth	0.50	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	06/11/2020	05/11/2020	05/11/2020	05/11/2020	05/11/2020	04/11/2020	04/11/2020	04/11/2020	04/11/2020				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020				
Natural Moisture Content	13.1	17.5	13.9	11.7	12.9	11.9	16.3	17.7	17.2		<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	11.6	14.9	12.2	10.5	11.4	10.7	14.0	15.0	14.7		<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	mg/kg	TM38/PM20
Chromium III	53.4	46.7	35.5	33.1	35.2	43.5	39.8	38.5	32.8		<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.21	0.92	0.41	0.30	0.31	0.68	0.57	0.56	0.54		<0.02	%	TM21/PM24
Loss on Ignition #	4.5	2.4	2.3	1.7	1.3	2.8	2.8	2.6	1.2		<1.0	%	TM22/PM0
pH #	11.96	11.13	9.16	8.72	8.76	8.40	8.34	7.89	8.21		<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1017	0.1058	0.104	0.1009	0.1018	0.107	0.1057	0.1061	0.1064			kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09			kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connects Route 15
Contact: John Duggan
EMT Job No: 20/15509

Report : CEN 10:1 1 Batch

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27		LOD/LOR	Units	Method No.
Sample ID	R15-CP02	R15-CP03	R15-CP03	R15-CP03	R15-CP03	R15-CP05	R15-CP05	R15-CP05	R15-CP05				
Depth	0.50	0.50	1.50	2.50	3.50	0.50	1.50	2.50	3.50				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	06/11/2020	05/11/2020	05/11/2020	05/11/2020	05/11/2020	04/11/2020	04/11/2020	04/11/2020	04/11/2020				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020				
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.006		<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06		<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0068	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025		<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.068	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025		<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.007	0.024	<0.003	<0.003	0.005	0.003	0.003	0.032	0.031		<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.07	0.24	<0.03	<0.03	0.05	<0.03	<0.03	0.32	0.31		<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	0.0094	0.0662	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015		<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	0.094	0.662	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015		<0.015	mg/kg	TM30/PM17
Dissolved Copper #	0.032	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007		<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	0.32	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.006	0.002	0.012	0.010	0.018	0.010	0.012	0.011	0.014		<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.06	<0.02	0.12	0.10	0.18	0.10	0.12	0.11	0.14		<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.009		<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.09		<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.003	0.003		<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	0.04	0.04	0.04	0.04	0.04	0.03	<0.03		<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	mg/kg	TM61/PM0
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/l	TM26/PM0
Total Phenols HPLC	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	0.3	<0.3	<0.3	0.4	0.4	0.3	<0.3		<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	<3	4	4	3	<3		<3	mg/kg	TM173/PM0
Sulphate as SO4 #	7.6	16.3	7.1	0.8	2.2	0.9	1.1	11.3	32.5		<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	76	163	71	8	22	9	11	113	325		<5	mg/kg	TM38/PM0
Chloride #	2.7	9.7	1.1	1.2	1.3	<0.3	0.3	0.4	0.8		<0.3	mg/l	TM38/PM0
Chloride #	27	97	11	12	13	<3	<3	4	8		<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	4	<2	3	3	3	3	2	3	3		<2	mg/l	TM60/PM0
Dissolved Organic Carbon	40	<20	30	30	30	30	<20	30	30		<20	mg/kg	TM60/PM0
Total Dissolved Solids #	179	308	68	<35	43	55	47	77	91		<35	mg/l	TM20/PM0
Total Dissolved Solids #	1790	3079	680	<350	430	550	470	770	910		<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	88.2
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**3**			
Client Sample No	**R15-CP02**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.50**			
Sample Date	**06/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.21	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	0.068	0.5	2	25
Barium	0.07	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	0.094	0.5	10	70
Copper	0.32	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.06	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	27	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	76	1000	20000	50000
Total Dissolved Solids	1790	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	40	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	85.1
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**6**			
Client Sample No	**R15-CP03**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.50**			
Sample Date	**05/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.92	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	14.08	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.24	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	0.662	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	97	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	163	1000	20000	50000
Total Dissolved Solids	3079	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	86.9
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**9**			
Client Sample No	**R15-CP03**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**1.50**			
Sample Date	**05/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.41	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	9.02	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.12	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.04	4	50	200
Chloride	11	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	71	1000	20000	50000
Total Dissolved Solids	680	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	88.9
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**12**			
Client Sample No	**R15-CP03**			
Depth/Other	**2.50**	**Inert**	**Stable Non-reactive**	**Hazardous**
Sample Date	**05/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.30	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.10	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.04	4	50	200
Chloride	12	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	8	1000	20000	50000
Total Dissolved Solids	<350	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	88.6
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**15**			
Client Sample No	**R15-CP03**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**3.50**			
Sample Date	**05/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.31	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.05	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.18	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.04	4	50	200
Chloride	13	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	22	1000	20000	50000
Total Dissolved Solids	430	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	84.2
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**18**			
Client Sample No	**R15-CP05**			
Depth/Other	**0.50**	**Inert**	**Stable Non-reactive**	**Hazardous**
Sample Date	**04/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.68	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	1.84	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.10	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.04	4	50	200
Chloride	<3	800	15000	25000
Fluoride	4	10	150	500
Sulphate as SO4	9	1000	20000	50000
Total Dissolved Solids	550	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	85.0
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**21**			
Client Sample No	**R15-CP05**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**1.50**			
Sample Date	**04/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.57	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.12	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.04	4	50	200
Chloride	<3	800	15000	25000
Fluoride	4	10	150	500
Sulphate as SO4	11	1000	20000	50000
Total Dissolved Solids	470	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	84.5
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**24**			
Client Sample No	**R15-CP05**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**2.50**			
Sample Date	**04/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.56	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.32	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.11	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.03	4	50	200
Chloride	4	800	15000	25000
Fluoride	3	10	150	500
Sulphate as SO4	113	1000	20000	50000
Total Dissolved Solids	770	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	84.2
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%		

EMT Job No	**20/15509**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**27**			
Client Sample No	**R15-CP05**			
Depth/Other	**3.50**	**Inert**	**Stable Non-reactive**	**Hazardous**
Sample Date	**04/11/2020**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.54	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_Total)	<30	500	-	-
PAH Sum of 6 (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.31	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.14	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	0.06	0.06	0.7	5
Selenium	0.09	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	8	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	325	1000	20000	50000
Total Dissolved Solids	910	4000	60000	100000
Phenol	-	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: Bus Connects Route 15
Contact: John Duggan

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/15509	1	R15-CP02	0.50	2	11/12/2020	**General Description (Bulk Analysis)**	soil/stones
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP03	0.50	5	11/12/2020	**General Description (Bulk Analysis)**	soil/stones
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP03	1.50	8	11/12/2020	**General Description (Bulk Analysis)**	Soil/Stones
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP03	2.50	11	11/12/2020	**General Description (Bulk Analysis)**	Soil/Stones
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP03	3.50	14	11/12/2020	**General Description (Bulk Analysis)**	Soil/Stones
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP05	0.50	17	11/12/2020	**General Description (Bulk Analysis)**	Soil/Stones
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP05	1.50	20	11/12/2020	**General Description (Bulk Analysis)**	Soil/Stone
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: Bus Connects Route 15
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/15509	1	R15-CP05	1.50	20	11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP05	2.50	23	11/12/2020	**General Description (Bulk Analysis)**	Soil/Stone
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos Fibres (2)**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos ACM (2)**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Type (2)**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD
20/15509	1	R15-CP05	3.50	26	11/12/2020	**General Description (Bulk Analysis)**	Soil/Stones
					11/12/2020	**Asbestos Fibres**	NAD
					11/12/2020	**Asbestos ACM**	NAD
					11/12/2020	**Asbestos Type**	NAD
					11/12/2020	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland

Reference: 9754-07-20

Location: Bus Connects Route 15

Contact: John Duggan

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
20/15509	1	R15-CP02	0.50	1-3	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP03	0.50	4-6	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP03	1.50	7-9	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP03	2.50	10-12	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP03	3.50	13-15	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP05	0.50	16-18	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP05	1.50	19-21	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP05	2.50	22-24	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded
20/15509	1	R15-CP05	3.50	25-27	Cyanide, EPH, GRO, LOI, PAH, PCB, pH, TOC	Sample holding time exceeded

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/15509

SOILS

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.

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.

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.

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 UKAS requirement 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.

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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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 extracted.
#2	EU_Total but with fatty acids extracted.
_	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: 20/15509

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.	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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

EMT Job No: 20/15509

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	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	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	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 (comparabl	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 (comparabl	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
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

EMT Job No: 20/15509

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
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
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
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
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.			AR	
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	

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Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
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Ireland

Attention :	John Duggan
Date :	3rd December, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/16406 Batch 1
Location :	BusConnects Route 15
Date samples received :	23rd November, 2020
Status :	Final report
Issue :	1

Six samples were received for analysis on 23rd November, 2020 of which six 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.

Authorised By:

Bruce Leslie
Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: BusConnects Route 15
Contact: John Duggan
EMT Job No: 20/16406

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18					LOD/LOR	Units	Method No.
Sample ID	R15 TP01	R15 TP01	R15 TP01	R15 TP02	R15 TP02	R15 TP02							
Depth	0.50	1.50	2.30	0.50	1.50	2.40							
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020							
Antimony	2	9	4	3	6	8					<1	mg/kg	TM30/PM15
Arsenic #	11.1	11.4	16.3	19.0	21.5	29.6					<0.5	mg/kg	TM30/PM15
Barium #	89	81	283	240	358	445					<1	mg/kg	TM30/PM15
Cadmium #	2.0	1.8	1.4	1.2	1.2	2.0					<0.1	mg/kg	TM30/PM15
Chromium #	23.8	21.0	32.8	40.2	40.1	39.7					<0.5	mg/kg	TM30/PM15
Copper #	24	26	40	97	114	129					<1	mg/kg	TM30/PM15
Lead #	30	55	381	268	364	508					<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	0.2	0.2	0.4	0.3					<0.1	mg/kg	TM30/PM15
Molybdenum #	2.7	2.4	1.9	2.7	2.4	4.4					<0.1	mg/kg	TM30/PM15
Nickel #	33.3	29.9	27.3	35.3	32.8	43.8					<0.7	mg/kg	TM30/PM15
Selenium #	2	<1	<1	1	1	1					<1	mg/kg	TM30/PM15
Zinc #	104	83	637	230	355	886					<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	0.07	0.30	<0.20 $_{AA}$	0.11					<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.04	<0.03	0.12	0.45	1.17 $_{AA}$	0.58					<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	0.14	0.52	<0.25 $_{AA}$	0.14					<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	0.12	0.40	<0.20 $_{AA}$	0.15					<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.20	0.23	1.21	5.67	0.74 $_{AA}$	1.71					<0.03	mg/kg	TM4/PM8
Anthracene #	0.09	0.08	0.34	1.32	1.30 $_{AA}$	1.18					<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.42	0.38	3.30	10.95	13.84 $_{AA}$	8.21					<0.03	mg/kg	TM4/PM8
Pyrene #	0.39	0.33	3.06	9.16	17.53 $_{AA}$	8.61					<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.25	0.19	1.46	5.03	17.59 $_{AA}$	8.48					<0.06	mg/kg	TM4/PM8
Chrysene #	0.28	0.19	1.95	5.63	15.14 $_{AA}$	7.87					<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.52	0.34	3.06	9.49	29.71 $_{AA}$	14.14					<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.27	0.18	1.58	4.97	13.92 $_{AA}$	7.10					<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	0.22	0.14	1.06	3.38	11.03 $_{AA}$	4.99					<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.05	<0.04	0.29	0.81	2.90 $_{AA}$	1.46					<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.25	0.15	1.23	3.80	11.46 $_{AA}$	5.16					<0.04	mg/kg	TM4/PM8
Coronene	0.04	<0.04	0.19	0.64	2.35 $_{AA}$	0.75					<0.04	mg/kg	TM4/PM8
PAH 17 Total	3.02	2.21	19.18	62.52	138.68 $_{AA}$	70.64					<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.37	0.24	2.20	6.83	21.39 $_{AA}$	10.18					<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.15	0.10	0.86	2.66	8.32 $_{AA}$	3.96					<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	88	74	84	88	87 $_{AA}$	86					<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_Total)	41	70	71	72	184	69					<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: BusConnects Route 15
Contact: John Duggan
EMT Job No: 20/16406

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18					LOD/LOR	Units	Method No.
Sample ID	R15 TP01	R15 TP01	R15 TP01	R15 TP02	R15 TP02	R15 TP02							
Depth	0.50	1.50	2.30	0.50	1.50	2.40							
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020							
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_1D_AL) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_1D_AL) #	<4	<4	<4	<4	<4	<4					<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_1D_AL) #	<7	9	<7	<7	23	10					<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_1D_AL) #	41	51	62	61	143	59					<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	10	9	11	18	<7					<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	41	70	71	72	184	69					<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	18	23	25	21	63	26					<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	30	41	46	48	107	43					<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_1D_AR) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_1D_AR) #	<4	<4	<4	21	19	<4					<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_1D_AR) #	9	9	17	125	251	46					<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_1D_AR) #	41	66	119	421	1285	364					<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	12	22	25	67	151	49					<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	62	97	161	634	1706	459					<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	103	167	232	706	1890	528					<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV					<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	16	19	45	265	652	146					<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	34	57	93	302	902	265					<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	<5	<5 SV					<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5 SV					<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5 SV					<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5 SV					<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5 SV					<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5 SV					<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35					<35	ug/kg	TM17/PM8

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: BusConnects Route 15
Contact: John Duggan
EMT Job No: 20/16406

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18					LOD/LOR	Units	Method No.
Sample ID	R15 TP01	R15 TP01	R15 TP01	R15 TP02	R15 TP02	R15 TP02							
Depth	0.50	1.50	2.30	0.50	1.50	2.40							
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020							
Natural Moisture Content	8.4	14.4	24.4	21.1	26.2	25.5					<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	7.8	12.6	19.6	17.4	20.8	20.3					<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.3	mg/kg	TM38/PM20
Chromium III	23.8	21.0	32.8	40.2	40.1	39.7					<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	1.0	2.1					<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.68	0.91	1.88	5.58	3.57	5.71					<0.02	%	TM21/PM24
Loss on Ignition #	2.3	2.4	4.7	8.4	6.3	7.4					<1.0	%	TM22/PM0
pH #	8.53	8.01	7.88	8.40	8.26	8.38					<0.01	pH units	TM73/PM11
Mass of raw test portion	0.0989	0.1024	0.129	0.1045	0.12	0.1185						kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09						kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: BusConnects Route 15
Contact: John Duggan
EMT Job No: 20/16406

Report : CEN 10:1 1 Batch

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18					LOD/LOR	Units	Method No.
Sample ID	R15 TP01	R15 TP01	R15 TP01	R15 TP02	R15 TP02	R15 TP02							
Depth	0.50	1.50	2.30	0.50	1.50	2.40							
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020							
Dissolved Antimony #	<0.002	0.005	0.014	0.014	0.006	0.012					<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	0.05	0.14	0.14	0.06	0.12					<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	0.0042	0.0059	0.0072	0.0072	0.0054					<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	0.042	0.059	0.072	0.072	0.054					<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.008	0.051	0.063	0.013	0.027	0.014					<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.08	0.51	0.63	0.13	0.27	0.14					<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005					<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	0.0027	0.0107	0.0104					<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	0.027	0.107	0.104					<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	0.008	0.011	<0.007					<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	0.08	0.11	<0.07					<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	0.010	<0.005					<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	0.10	<0.05					<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.012	0.031	0.056	0.004	0.004	0.009					<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.12	0.31	0.56	0.04	0.04	0.09					<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	0.002	<0.002	<0.002	0.002	<0.002					<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02					<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003					<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03					<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	0.003	0.008	0.008	0.011	0.007					<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	0.08	0.08	0.11	0.07					<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	0.00001	0.00004	<0.00001					<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	0.0001	0.0004	<0.0001					<0.0001	mg/kg	TM61/PM0
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					<0.05	mg/l	TM26/PM0
Total Phenols HPLC	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	0.3	0.4	<0.3	<0.3					<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	3	4	<3	<3					<3	mg/kg	TM173/PM0
Sulphate as SO4 #	17.4	10.7	8.0	1.3	8.3	13.6					<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	174	107	80	13	83	136					<5	mg/kg	TM38/PM0
Chloride #	0.8	2.6	2.3	<0.3	0.5	0.6					<0.3	mg/l	TM38/PM0
Chloride #	8	26	23	<3	5	6					<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	4	6	5	4	5					<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	40	60	50	40	50					<20	mg/kg	TM60/PM0
Total Dissolved Solids #	73	114	126	88	95	90					<35	mg/l	TM20/PM0
Total Dissolved Solids #	730	1139	1261	880	950	900					<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: BusConnects Route 15
Contact: John Duggan
EMT Job No: 20/16406

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.	1-3	4-6	7-9	10-12	13-15	16-18					Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	R15 TP01	R15 TP01	R15 TP01	R15 TP02	R15 TP02	R15 TP02										
Depth	0.50	1.50	2.30	0.50	1.50	2.40										
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T										
Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020										
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil										
Batch Number	1	1	1	1	1	1										
Date of Receipt	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020										
Solid Waste Analysis																
Total Organic Carbon #	0.68	0.91	1.88	5.58	3.57	5.71					3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025 SV					6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035					1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	41	70	71	72	184	69					500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	3.02	2.21	19.18	62.52	138.68 BA	70.64					100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	0.042	0.059	0.072	0.072	0.054					0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.08	0.51	0.63	0.13	0.27	0.14					20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005					0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	0.027	0.107	0.104					0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	0.08	0.11	<0.07					2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	0.0001	0.0004	<0.0001					0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.12	0.31	0.56	0.04	0.04	0.09					0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02					0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	0.10	<0.05					0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	0.05	0.14	0.14	0.06	0.12					0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03					0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	0.08	0.08	0.11	0.07					4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	730	1139	1261	880	950	900					4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	40	60	50	40	50					500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.0989	0.1024	0.129	0.1045	0.12	0.1185					-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	90.6	87.8	69.6	86.4	75.1	76.2					-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.891	0.887	0.861	0.886	0.87	0.872					-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8	0.8	0.8					-	-	-		l	NONE/PM17
pH #	8.53	8.01	7.88	8.40	8.26	8.38					-	-	-	<0.01	pH units	TM73/PM11
Fluoride	<3	<3	3	4	<3	<3					-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	174	107	80	13	83	136					1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	8	26	23	<3	5	6					800	15000	25000	<3	mg/kg	TM38/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 20/07/9754
Location: BusConnects Route 15
Contact: John Duggan

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/16406	1	R15 TP01	0.50	2	01/12/2020	**General Description (Bulk Analysis)**	soil/stones
					01/12/2020	**Asbestos Fibres**	NAD
					01/12/2020	**Asbestos ACM**	NAD
					01/12/2020	**Asbestos Type**	NAD
					01/12/2020	**Asbestos Level Screen**	NAD
20/16406	1	R15 TP01	1.50	5	01/12/2020	**General Description (Bulk Analysis)**	soil/stones
					01/12/2020	**Asbestos Fibres**	NAD
					01/12/2020	**Asbestos ACM**	NAD
					01/12/2020	**Asbestos Type**	NAD
					01/12/2020	**Asbestos Level Screen**	NAD
20/16406	1	R15 TP01	2.30	8	01/12/2020	**General Description (Bulk Analysis)**	soil/stones
					01/12/2020	**Asbestos Fibres**	NAD
					01/12/2020	**Asbestos ACM**	NAD
					01/12/2020	**Asbestos Type**	NAD
					01/12/2020	**Asbestos Level Screen**	NAD
20/16406	1	R15 TP02	0.50	11	01/12/2020	**General Description (Bulk Analysis)**	soil/stones
					01/12/2020	**Asbestos Fibres**	NAD
					01/12/2020	**Asbestos ACM**	NAD
					01/12/2020	**Asbestos Type**	NAD
					01/12/2020	**Asbestos Level Screen**	NAD
20/16406	1	R15 TP02	1.50	14	01/12/2020	**General Description (Bulk Analysis)**	soil/stones
					01/12/2020	**Asbestos Fibres**	NAD
					01/12/2020	**Asbestos ACM**	NAD
					01/12/2020	**Asbestos Type**	NAD
					01/12/2020	**Asbestos Level Screen**	NAD
20/16406	1	R15 TP02	2.40	17	01/12/2020	**General Description (Bulk Analysis)**	soil/stones
					01/12/2020	**Asbestos Fibres**	NAD
					01/12/2020	**Asbestos ACM**	NAD
					01/12/2020	**Asbestos Type**	NAD
					01/12/2020	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: BusConnects Route 15
Contact: John Duggan

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/16406						

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/16406

SOILS

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.

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.

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.

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 UKAS requirement 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.

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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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
AA	x5 Dilution

BA	x5 Dilution

EMT Job No: 20/16406

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.	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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

EMT Job No: 20/16406

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	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	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	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 (comparabl	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 (comparabl	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
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

EMT Job No: 20/16406

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
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
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
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
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	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.			AR	
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	

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Ground Investigations Ireland
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Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	John Duggan
Date :	4th December, 2020
Your reference :	9754-07-20
Our reference :	Test Report 20/16727 Batch 1
Location :	Bus Connect Route 15
Date samples received :	27th November, 2020
Status :	Final report
Issue :	1

One sample was received for analysis on 27th November, 2020 of which one was 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9754-07-20
Location: Bus Connect Route 15
Contact: John Duggan
EMT Job No: 20/16727

Report : Solid

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

EMT Sample No.	1												
Sample ID	R15-CP06												
Depth	2.50												
COC No / misc													
Containers	T												
Sample Date	24/09/2020												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	27/11/2020												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Chloride (2:1 Ext BRE) #	0.020										<0.002	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.2184										<0.0015	g/l	TM38/PM20
Organic Matter	2.4										<0.2	%	TM21/PM24
pH #	7.74										<0.01	pH units	TM73/PM11

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland

Reference: 9754-07-20

Location: Bus Connect Route 15

Contact: John Duggan

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
20/16727	1	R15-CP06	2.50	1	Chloride, pH, Sulphate	Sample holding time exceeded prior to receipt

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.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/16727

SOILS

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.

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.

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.

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 UKAS requirement 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.

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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	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

EMT Job No: 20/16727

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
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	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			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 (comparabl	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
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