

Appendix 13A  
Ground Investigation Report

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**CAUSEWAY**  
— GEOTECH

## Tynagh North – Ground Investigation

Client: EP UK Investments

Client's Representative: AECOM Ireland Ltd

Report No.: 22-0181

Date: 5<sup>th</sup> April 2022

Status: Final for Issue

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Document Control Sheet




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## Document Control Sheet

<b>Report No.:</b>		22-0181			
<b>Project Title:</b>		Tynagh North – Ground Investigation			
<b>Client:</b>		EP UK Investments			
<b>Client's Representative:</b>		AECOM Ireland Ltd			
<b>Revision:</b>	A01	<b>Status:</b>	Final for Issue	<b>Issue Date:</b>	5 <sup>th</sup> April 2022
<b>Prepared by:</b>		<b>Reviewed by:</b>		<b>Approved by:</b>	
 Alistair McQuat BSc Geology		 Neil Haggan BSc (Hons) MSc FGS		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

The works were conducted in accordance with:

UK Specification for Ground Investigation 2<sup>nd</sup> Edition, published by ICE Publishing (2012)

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for site investigations.

EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9

## METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Site Investigation.

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa. V: undisturbed vane shear strength      VR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of $N \times 5 = C_u$ is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015+A1:2020	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.

## Tynagh North

### 1 AUTHORITY

On the instructions of AECOM Ireland Ltd Consulting Engineers, (“the Client’s Representative”), acting on the behalf of EP UK Investments (“the Client”), a ground investigation was undertaken at the above location to provide environmental information for input to the design and construction of a proposed Open Cycle Gas Turbine development

This report details the work carried out both on site and in the chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client’s Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

### 2 SCOPE

The extent of the investigation, as instructed by the Client’s Representative, included trial pits, soil sampling and laboratory testing, and the preparation of a factual report on the findings.

### 3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the site is situated in Derryfrench, Loughrea, Co. Galway, Ireland. The site is bordered to the north and east by the former Tynagh Mine workings (a former lead/zinc mine with both open pit and sub-surface workings) and to the immediate south by Tynagh Power Station. Sperrin Galvanisers Ltd is located adjacent to the western boundary of the site.

## **4 SITE OPERATIONS**

### **4.1 Summary of site works**

Site operations, which were conducted on 28<sup>th</sup> February 2022, comprised:

- Four machine excavated trial pits

The exploratory holes were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

### **4.2 Trial Pits**

Four trial pits (TP-22-01 to TP-22-04) were excavated using an 8t tracked excavator fitted with a 600mm wide bucket, to depths of 3.30m.

Environmental samples were taken as directed by the Investigation Supervisor in each trial pit. Disturbed (small jar and large bulk bag) samples were taken at standard depth intervals and at change of strata.

Any water strikes encountered during excavation were recorded along with any changes in their levels as the excavation proceeded. The stability of the trial pit walls was noted on completion.

Appendix B presents the trial pit logs with photographs of the pits and arisings provided in Appendix C.

### **4.3 Surveying**

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish Transverse Mercator) and ground elevation (mOD Malin) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these as-built positions.

## **5 LABORATORY WORK**

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.



## 5.1 Environmental laboratory testing of soils

Environmental testing, as specified by the Client's Representative was conducted on selected environmental soil samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out for a range of determinants, including:

- Heavy Metals (As, B, Be, Cd, Cr, Cr III, Cr VI, Cu, Se, Pb, Hg, Ni, V, Zn)
- Speciated total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)
- BTEX including MTBE
- Polycyclic Biphenyls (PCBs)
- Cyanide (total)
- Phenol
- Asbestos screen
- pH. organic matter content

Waste acceptance criteria (WAC) testing was carried out on eight samples.

Results of environmental laboratory testing are presented in Appendix C.

## 6 GROUND CONDITIONS

### 6.1 General geology of the area

Published geological mapping and previous ground investigations completed by Causeway in 2021 indicate the site is underlain by Made Ground comprising of gravel, cobbles and boulders of limestone and sandstone. This is underlain by superficial deposits of Glacial Till. These deposits are underlain by limestone of the Lucan Formation.

### 6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Made Ground (fill):** reworked gravel and sandy gravelly clay fill extending to a depth of 2.90m.
- **Glacial Till:** soft sandy gravelly clay, frequently with low cobble content encountered beneath the fill in TP-22-01 and TP-22-04 to a maximum depth of 3.30m where both pits terminated.

## 7 REFERENCES

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

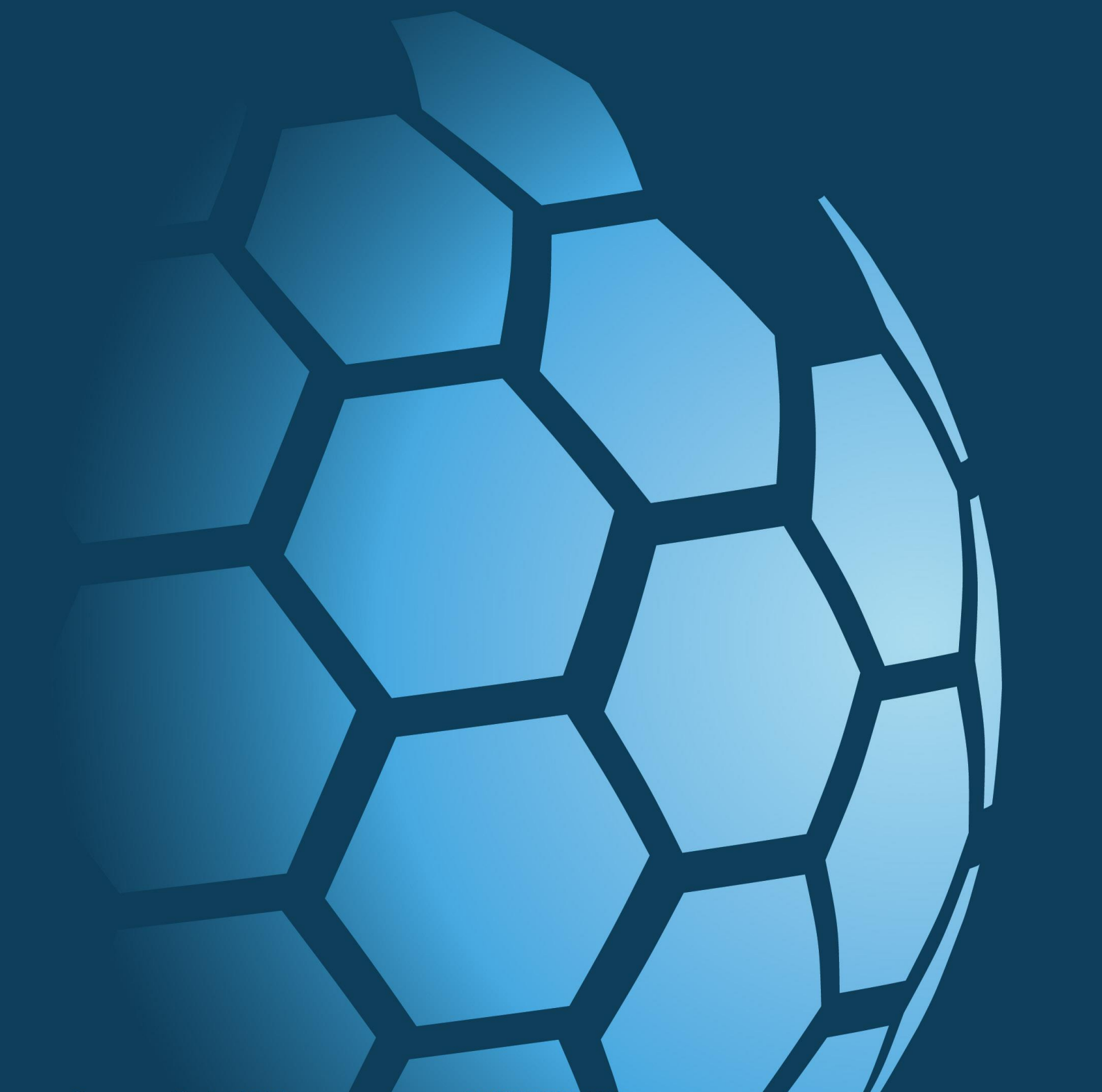
BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.



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**APPENDIX A**  
**SITE AND EXPLORATORY HOLE LOCATION PLANS**





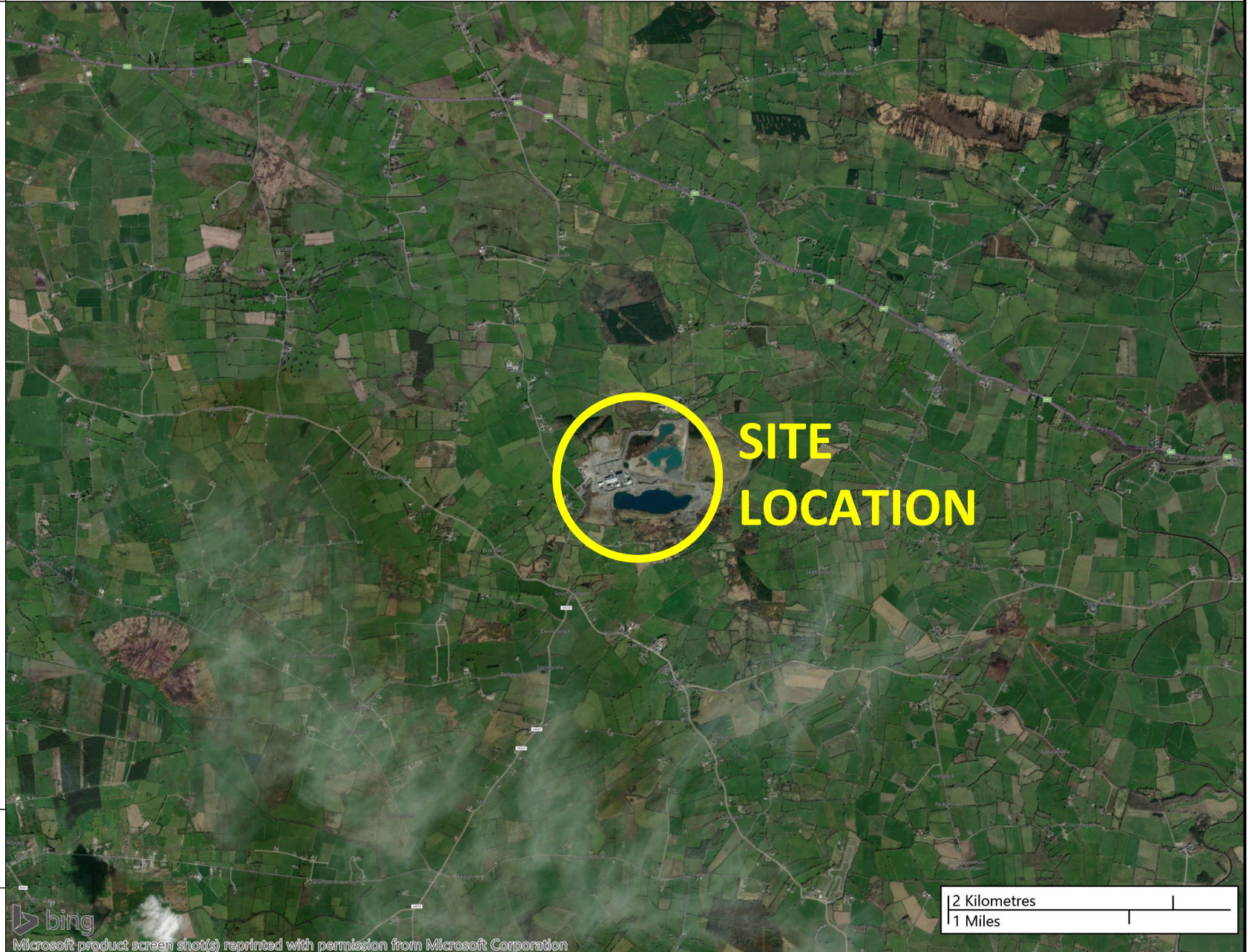
**Project No.:** 22-0181

**Client:** EP UK Investments

**Project Name:** Tynagh 2 Power Station – Open Cycle Gas Turbine (OCGT)  
Ground Investigation

**Client's Representative:** AECOM Ireland Ltd

Legend Key

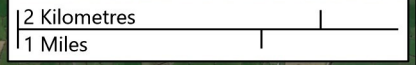


**Title:**  
Site Location Plan

**Last Revised:**  
17/09/2021

**Scale:**  
1:50000

 Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation






**Project No.:** 22-0181

**Client:** EP UK Investments

**Project Name:** Tynagh 2 Power Station – Open Cycle Gas Turbine (OCGT)  
Ground Investigation

**Client's Representative:** AECOM Ireland Ltd

**Legend Key**

 Trial Pits - TP



**Title:**  
Site Location Plan

**Last Revised:**  
02/03/2022

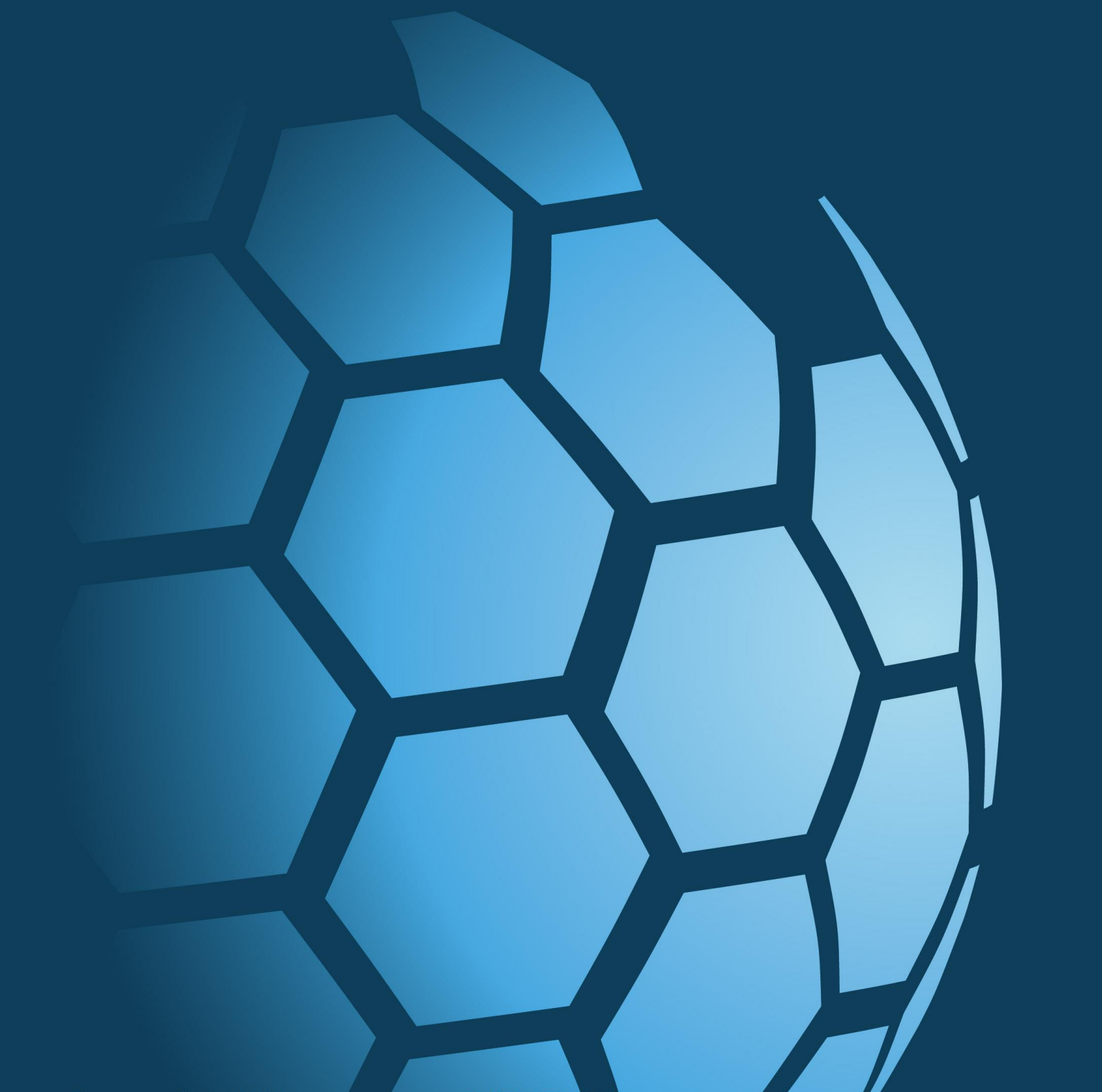
**Scale:**  
1:500

20 Metres  
80 Feet



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**APPENDIX B**  
**TRIAL PIT LOGS**





<b>Project No.</b> 22-0181	<b>Project Name:</b> Tynagh North – Ground Investigation	<b>Trial Pit ID</b> <b>TP-22-01</b>
<b>Coordinates</b> 574279.59 E 713117.95 N	<b>Client:</b> EP UK Investments	Sheet 1 of 1 Scale: 1:25
	<b>Client's Representative:</b> AECOM Ireland Ltd	
<b>Method:</b> Trial Pitting	<b>Elevation</b> 66.00 mOD	<b>Date:</b> 28/02/2022
<b>Plant:</b> 8T Tracked Excavator		<b>Logger:</b> NP
<b>FINAL</b>		

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.15	B8	Slow water seepage at 1.60m	65.80	0.20		MADE GROUND: Light grey slightly sandy subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.	▼
0.15	B9					MADE GROUND: Firm brown sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.	
0.15	D18		65.30	0.70		MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY with low cobble content and numerous fragments of plastic pipe. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.	
0.20	ES1					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
0.50	B10		64.30	1.70		MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
0.50	B11					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
0.50	D19					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
0.50	ES2		63.20	2.80		MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
1.00	ES3					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
1.20	B12					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
1.20	B13		62.70	3.30		MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
1.20	D20					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
1.50	ES4					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
2.00	ES5		63.20	2.80		MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
2.50	B14					MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.	
2.50	B15	MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.					
2.50	D21	MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.					
2.50	ES6	62.70	3.30		MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.		
3.00	ES7				MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.		
3.20	B16				MADE GROUND: Soft grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobble are subangular.		
3.20	B17	End of trial pit at 3.30m					
3.20	D22	End of trial pit at 3.30m					

<b>Water Strikes</b>		<b>Depth:</b> 3.30 <b>Width:</b> 1.10 <b>Length:</b> 2.60	<b>Remarks:</b>
Struck at (m)	Remarks		
1.60	Slow water seepage at 1.60m	<b>Stability:</b> Stable	<b>Termination Reason</b> Terminated due to maximum reach of excavator
			<b>Last Updated</b> 05/04/2022



<b>Project No.</b> 22-0181	<b>Project Name:</b> Tynagh North – Ground Investigation		<b>Trial Pit ID</b>  <b>TP-22-02</b>
<b>Coordinates</b> 574300.94 E 713145.35 N	<b>Client:</b> EP UK Investments		Sheet 1 of 1 Scale: 1:25
	<b>Client's Representative:</b> AECOM Ireland Ltd		
<b>Method:</b> Trial Pitting	<b>Elevation</b> 65.93 mOD	<b>Date:</b> 28/02/2022	<b>Logger:</b> NP
<b>Plant:</b> 8T Tracked Excavator			
<b>FINAL</b>			

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.10	B3	Water strike at 0.40m	65.73	0.20		MADE GROUND: Light grey slightly sandy angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.	▼
0.10	B4					MADE GROUND: Grey sandy gravelly CLAY with low boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse. Boulders are subangular.	
0.10	D7		65.33	0.60		End of trial pit at 0.60m	
0.20	ES1						
0.50	B5						
0.50	B6						
0.50	D8						
0.50	ES2						

<b>Water Strikes</b>		<b>Depth:</b> 0.60 <b>Width:</b> 1.10 <b>Length:</b> 2.30	<b>Remarks:</b>
<b>Struck at (m)</b> 0.40	<b>Remarks</b> Water strike at 0.40m		
<b>Stability:</b> Stable	<b>Termination Reason</b> Terminated due to water ingress	<b>Last Updated</b> 05/04/2022	





<b>Project No.</b> 22-0181	<b>Project Name:</b> Tynagh North – Ground Investigation	<b>Trial Pit ID</b> <b>TP-22-03</b>
<b>Coordinates</b> 574356.07 E 713139.61 N	<b>Client:</b> EP UK Investments	Sheet 1 of 1 Scale: 1:25
	<b>Client's Representative:</b> AECOM Ireland Ltd	
<b>Method:</b> Trial Pitting	<b>Elevation</b> 64.63 mOD	<b>Date:</b> 28/02/2022
<b>Plant:</b> 8T Tracked Excavator		<b>Logger:</b> NP
		<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.20	B6	Only tubs - too granular	64.38	0.25		MADE GROUND: Light brown slightly gravelly fine to coarse SAND with rootlets. Gravel is subangular fine to coarse.	
0.20	B7						
0.20	D12						
0.20	ES1						
0.50	B8						
0.50	B9						
0.50	D13						
0.50	ES2						
1.00	ES3						
1.50	B10					Only tubs - too granular Water strike at 1.60m	
1.50	B11						
1.50	D14						
1.50	ES4						
1.65	ES5						
			62.93	1.70		End of trial pit at 1.70m	

<b>Water Strikes</b>		<b>Depth:</b> 1.70 <b>Width:</b> 1.10 <b>Length:</b> 2.40	<b>Remarks:</b>
<b>Struck at (m)</b> 1.60	<b>Remarks</b> Water strike at 1.60m		
<b>Stability:</b> Stable		<b>Termination Reason</b> Terminated due to water ingress	<b>Last Updated</b> 05/04/2022





<b>Project No.</b> 22-0181	<b>Project Name:</b> Tynagh North – Ground Investigation	<b>Trial Pit ID</b>  <b>TP-22-04</b>
<b>Coordinates</b> 574307.94 E 713121.66 N	<b>Client:</b> EP UK Investments	Sheet 1 of 1 Scale: 1:25
	<b>Client's Representative:</b> AECOM Ireland Ltd	
<b>Method:</b> Trial Pitting	<b>Elevation</b> 65.74 mOD	<b>Date:</b> 28/02/2022
<b>Plant:</b> 8T Tracked Excavator		<b>Logger:</b> NP
		<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.20	ES1		65.64	0.10		MADE GROUND: Light grey slightly sandy angular to subangular fine to coarse GRAVEL. Sand is fine to coarse. MADE GROUND: Stiff brown sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.	
0.50 0.50 0.50 0.50	B8 B9 D16 ES2		65.09	0.65			MADE GROUND: Soft dark brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.
1.00	ES3						
1.50 1.50 1.50 1.50	B10 B11 D17 ES4						
2.00	ES5		63.74	2.00			MADE GROUND: Soft brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.
2.50 2.50 2.50 2.50	B12 B13 D18 ES6						
3.00	ES7	Slow seepage at 2.90m	62.84	2.90			Soft bluish grey slightly sandy gravelly CLAY with low cobble content and rootlets. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.
3.20 3.20 3.20	B14 B15 D19		62.44	3.30			End of trial pit at 3.30m
							4.5

<b>Water Strikes</b>		<b>Depth:</b> 3.30 <b>Width:</b> 1.10 <b>Length:</b> 2.50	<b>Remarks:</b>
Struck at (m)	Remarks		
2.90	Slow seepage at 2.90m		
<b>Stability:</b> Stable		<b>Termination Reason</b> Terminated due to maximum reach of excavator	<b>Last Updated</b> 05/04/2022

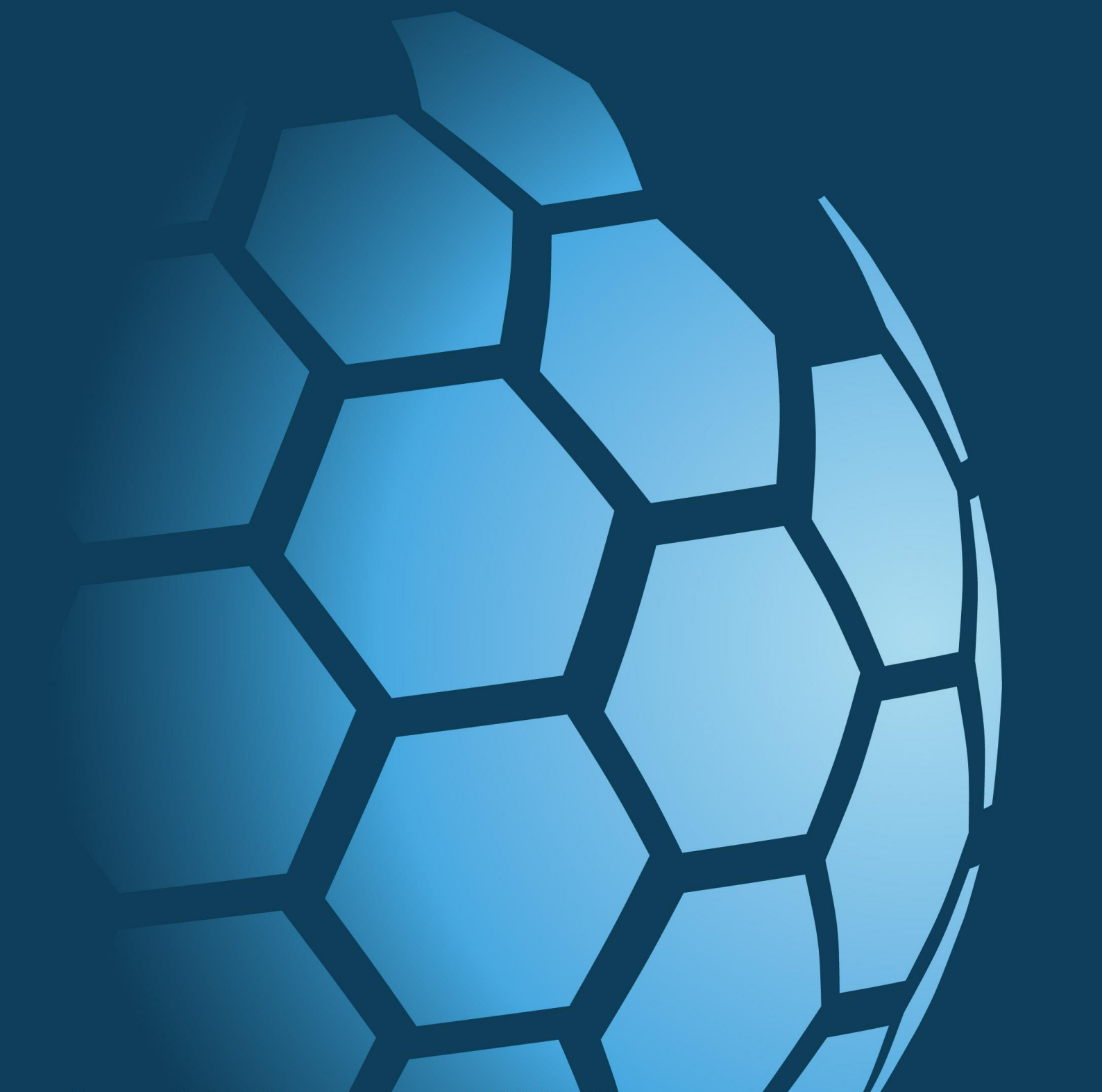




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**APPENDIX C**

**TRIAL PIT PHOTOGRAPHS**





**Trial Pit: TP-22-01**



Trial Pit: TP-22-01



Trial Pit: TP-22-01



Trial Pit: TP-22-01



Trial Pit: TP-22-01





Trial Pit: TP-22-01



**Trial Pit: TP-22-01**



**Trial Pit: TP-22-02**



**Trial Pit: TP-22-02**



**Trial Pit: TP-22-02**



Trial Pit: TP-22-02



Trial Pit: TP-22-02



**Trial Pit: TP-22-02**





Trial Pit: TP-22-02



**Trial Pit: TP-22-03**



Trial Pit: TP-22-03



Trial Pit: TP-22-03



Trial Pit: TP-22-03



**Trial Pit: TP-22-03**



**Trial Pit: TP-22-03**



**Trial Pit: TP-22-03**





**Trial Pit: TP-22-04**



**Trial Pit: TP-22-04**



**Trial Pit: TP-22-04**



Trial Pit: TP-22-04



Trial Pit; TP-22-04



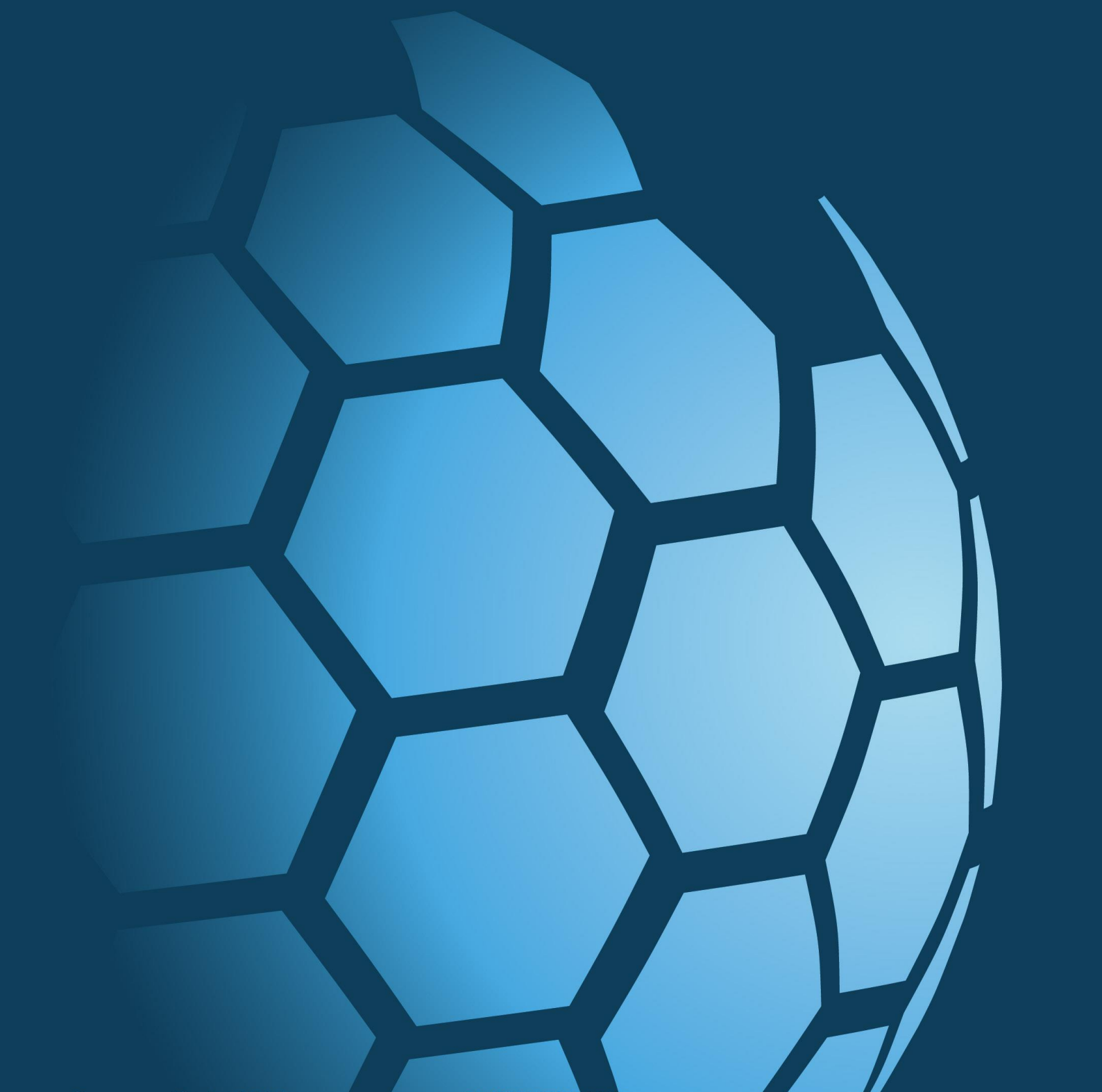
Trial Pit: TP-22-04



**CAUSEWAY**  
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**APPENDIX D**

**ENVIRONMENTAL LABORATORY TEST RESULTS**





# Final Report

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**Report No.:** 22-07762-1  
**Initial Date of Issue:** 11-Mar-2022  
**Client** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllister

**Project** 22-0181 Tynagh 2 Power Plant OCGT

**Quotation No.:** Q22-26876 **Date Received:** 02-Mar-2022

**Order No.:** **Date Instructed:** 03-Mar-2022

**No. of Samples:** 8

**Turnaround (Wkdays):** 7 **Results Due:** 11-Mar-2022

**Date Approved:** 11-Mar-2022

**Approved By:**

**Details:** Stuart Henderson, Technical  
Manager

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## Results - Soil

**Project: 22-0181 Tynagh 2 Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762
Quotation No.: Q22-26876		Chemtest Sample ID.:		1382683	1382767	1382769	1382771	1382773	1382776	1382778	1382782	
Order No.:		Client Sample Ref.:		3	5	7	2	2	5	2	6	
		Sample Location:		TP-22-01	TP-22-01	TP-22-01	TP-22-02	TP-22-03	TP-22-03	TP-22-04	TP-22-04	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	0.50	0.50	1.65	0.50	2.50	
		Date Sampled:		28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	18	14	20	12	6.0	12	7.6	12
pH	M	2010		4.0	8.2	8.0	8.5	7.6	8.1	8.4	8.0	7.7
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	< 0.40	0.78	< 0.40	< 0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	0.50	0.90	0.70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	9.6	190	73	330	440	80	200	310
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	1.1	130	12	73	92	20	39	78
Chromium	M	2450	mg/kg	1.0	11	9.3	13	240	56	54	10	82
Copper	M	2450	mg/kg	0.50	15	560	200	1500	1200	200	450	1300
Mercury	M	2450	mg/kg	0.10	< 0.10	4.3	1.9	8.2	10	1.7	2.9	8.8
Nickel	M	2450	mg/kg	0.50	46	51	39	86	59	45	47	97
Lead	M	2450	mg/kg	0.50	170	18000	5400	2700	32000	5000	14000	4000
Selenium	M	2450	mg/kg	0.20	< 0.20	0.85	0.22	3.0	0.65	0.37	0.46	3.5
Vanadium	U	2450	mg/kg	5.0	18	12	13	< 5.0	12	11	11	7.1
Zinc	M	2450	mg/kg	0.50	95	22000	1000	14000	20000	3800	6700	14000
Chromium (Trivalent)	N	2490	mg/kg	1.0	11	9.3	13	240	56	54	10	82
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	0.69	0.74	0.79	1.1	1.2	0.47	0.64	1.3
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	420	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	4600	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	7400	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	3700	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	16000	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	670	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	1600	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	950	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

## Results - Soil

**Project: 22-0181 Tynagh 2 Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762
Quotation No.: Q22-26876		Chemtest Sample ID.:		1382683	1382767	1382769	1382771	1382773	1382776	1382778	1382782	
Order No.:		Client Sample Ref.:		3	5	7	2	2	5	2	6	
		Sample Location:		TP-22-01	TP-22-01	TP-22-01	TP-22-02	TP-22-03	TP-22-03	TP-22-04	TP-22-04	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	0.50	0.50	1.65	0.50	2.50	
		Date Sampled:		28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD								
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	3200	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	19000	< 10	< 10	< 10	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

# Results - Soil

**Project: 22-0181 Tynagh 2 Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762
Quotation No.: Q22-26876		Chemtest Sample ID.:		1382683	1382767	1382769	1382771	1382773	1382776	1382778	1382782	
Order No.:		Client Sample Ref.:		3	5	7	2	2	5	2	6	
		Sample Location:		TP-22-01	TP-22-01	TP-22-01	TP-22-02	TP-22-03	TP-22-03	TP-22-04	TP-22-04	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	0.50	0.50	1.65	0.50	2.50	
		Date Sampled:		28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD								
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

## Results - Soil

**Project: 22-0181 Tynagh 2 Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762
Quotation No.: Q22-26876		Chemtest Sample ID.:		1382683	1382767	1382769	1382771	1382773	1382776	1382778	1382782	
Order No.:		Client Sample Ref.:		3	5	7	2	2	5	2	6	
		Sample Location:		TP-22-01	TP-22-01	TP-22-01	TP-22-02	TP-22-03	TP-22-03	TP-22-04	TP-22-04	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	0.50	0.50	1.65	0.50	2.50	
		Date Sampled:		28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD								
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

## Results - Soil

**Project: 22-0181 Tynagh 2 Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762	22-07762
Quotation No.: Q22-26876		Chemtest Sample ID.:		1382683	1382767	1382769	1382771	1382773	1382776	1382778	1382782	
Order No.:		Client Sample Ref.:		3	5	7	2	2	5	2	6	
		Sample Location:		TP-22-01	TP-22-01	TP-22-01	TP-22-02	TP-22-03	TP-22-03	TP-22-04	TP-22-04	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	0.50	0.50	1.65	0.50	2.50	
		Date Sampled:		28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	28-Feb-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD								
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

## Results - Single Stage WAC

Chemtest Job No: 22-07762				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1382683							
Sample Ref: 3							
Sample ID:							
Sample Location: TP-22-01							
Top Depth(m): 1.00							
Bottom Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.40	3	5	6
Loss On Ignition	2610	M	%	2.5	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.028	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0039	0.039	0.5	2	25
Barium	1455	U	0.016	0.16	20	100	300
Cadmium	1455	U	0.055	0.55	0.04	1	5
Chromium	1455	U	0.0017	0.017	0.5	10	70
Copper	1455	U	0.010	0.10	2	50	100
Mercury	1455	U	0.00013	0.0013	0.01	0.2	2
Molybdenum	1455	U	0.0059	0.059	0.5	10	30
Nickel	1455	U	0.023	0.23	0.4	10	40
Lead	1455	U	0.087	0.87	0.5	10	50
Antimony	1455	U	0.018	0.18	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	3.8	38	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.38	3.8	10	150	500
Sulphate	1220	U	1400	14000	1000	20000	50000
Total Dissolved Solids	1020	N	1400	14000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.9	89	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	18

### Waste Acceptance Criteria

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

## Results - Single Stage WAC

Chemtest Job No: 22-07762				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1382767							
Sample Ref: 5							
Sample ID:							
Sample Location: TP-22-01							
Top Depth(m): 2.00							
Bottom Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.43	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.021	--	To evaluate	To evaluate
Eluate Analysis				10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg	
Arsenic	1455	U	0.0031	0.031	0.5	2	25
Barium	1455	U	0.049	0.49	20	100	300
Cadmium	1455	U	0.0018	0.018	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0008	0.0084	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0042	0.042	0.5	10	30
Nickel	1455	U	0.0013	0.013	0.4	10	40
Lead	1455	U	0.058	0.58	0.5	10	50
Antimony	1455	U	0.026	0.26	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.057	0.57	4	50	200
Chloride	1220	U	1.3	13	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	120	1200	1000	20000	50000
Total Dissolved Solids	1020	N	210	2100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	13	130	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

### Waste Acceptance Criteria

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



## Results - Single Stage WAC

Chemtest Job No: 22-07762				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1382769							
Sample Ref: 7							
Sample ID:							
Sample Location: TP-22-01							
Top Depth(m): 3.00							
Bottom Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.46	3	5	6
Loss On Ignition	2610	M	%	2.4	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.015	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0014	0.014	0.5	2	25
Barium	1455	U	0.029	0.29	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0009	0.0095	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0016	0.016	0.5	10	30
Nickel	1455	U	0.0006	0.0060	0.4	10	40
Lead	1455	U	0.0084	0.083	0.5	10	50
Antimony	1455	U	0.011	0.11	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.22	2.2	10	150	500
Sulphate	1220	U	18	180	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	17	170	500	800	1000

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

### Waste Acceptance Criteria

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

## Results - Single Stage WAC

Chemtest Job No: 22-07762				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1382771							
Sample Ref: 2							
Sample ID:							
Sample Location: TP-22-02							
Top Depth(m): 0.50							
Bottom Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.61	3	5	6
Loss On Ignition	2610	M	%	4.9	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	19000	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.021	--	To evaluate	To evaluate
Eluate Analysis				10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg	
Arsenic	1455	U	0.0022	0.022	0.5	2	25
Barium	1455	U	0.022	0.22	20	100	300
Cadmium	1455	U	0.044	0.44	0.04	1	5
Chromium	1455	U	0.0037	0.037	0.5	10	70
Copper	1455	U	0.013	0.13	2	50	100
Mercury	1455	U	0.00035	0.0035	0.01	0.2	2
Molybdenum	1455	U	0.0036	0.036	0.5	10	30
Nickel	1455	U	0.035	0.35	0.4	10	40
Lead	1455	U	0.11	1.1	0.5	10	50
Antimony	1455	U	0.012	0.12	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	3.7	37	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.44	4.4	10	150	500
Sulphate	1220	U	790	7900	1000	20000	50000
Total Dissolved Solids	1020	N	920	9200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.5	85	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

### Waste Acceptance Criteria

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

## Results - Single Stage WAC

Chemtest Job No: 22-07762				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1382773							
Sample Ref: 2							
Sample ID:							
Sample Location: TP-22-03							
Top Depth(m): 0.50				Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Bottom Depth(m):							
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.70	3	5	6
Loss On Ignition	2610	M	%	2.7	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.017	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0052	0.052	0.5	2	25
Barium	1455	U	0.053	0.53	20	100	300
Cadmium	1455	U	0.0021	0.021	0.04	1	5
Chromium	1455	U	0.031	0.31	0.5	10	70
Copper	1455	U	0.0060	0.060	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0050	0.050	0.5	10	30
Nickel	1455	U	0.0010	0.010	0.4	10	40
Lead	1455	U	0.041	0.40	0.5	10	50
Antimony	1455	U	0.031	0.30	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.16	1.6	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.15	1.5	10	150	500
Sulphate	1220	U	99	990	1000	20000	50000
Total Dissolved Solids	1020	N	180	1800	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	12	120	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.0

### Waste Acceptance Criteria

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

## Results - Single Stage WAC

Chemtest Job No: 22-07762				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1382776							
Sample Ref: 5							
Sample ID:							
Sample Location: TP-22-03							
Top Depth(m): 1.65				Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Bottom Depth(m):							
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.27	3	5	6
Loss On Ignition	2610	M	%	2.4	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.019	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0024	0.024	0.5	2	25
Barium	1455	U	0.072	0.72	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.037	0.37	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0070	0.070	0.5	10	30
Nickel	1455	U	0.0007	0.0070	0.4	10	40
Lead	1455	U	0.0027	0.027	0.5	10	50
Antimony	1455	U	0.018	0.18	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.037	0.37	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.36	3.6	10	150	500
Sulphate	1220	U	24	240	1000	20000	50000
Total Dissolved Solids	1020	N	98	970	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	23	230	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

### Waste Acceptance Criteria

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

## Results - Single Stage WAC

Chemtest Job No: 22-07762				Landfill Waste Acceptance Criteria			
Chemtest Sample ID: 1382778				Limits			
Sample Ref: 2					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID: TP-22-04							
Sample Location: 0.50							
Top Depth(m): 0.50							
Bottom Depth(m):							
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.37	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0020	0.020	0.5	2	25
Barium	1455	U	0.025	0.25	20	100	300
Cadmium	1455	U	0.0012	0.012	0.04	1	5
Chromium	1455	U	0.0011	0.011	0.5	10	70
Copper	1455	U	0.0042	0.042	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0052	0.052	0.5	10	30
Nickel	1455	U	0.0005	0.0053	0.4	10	40
Lead	1455	U	0.036	0.36	0.5	10	50
Antimony	1455	U	0.012	0.12	0.06	0.7	5
Selenium	1455	U	0.0008	0.0079	0.1	0.5	7
Zinc	1455	U	0.096	0.96	4	50	200
Chloride	1220	U	1.2	12	800	15000	25000
Fluoride	1220	U	0.36	3.6	10	150	500
Sulphate	1220	U	250	2500	1000	20000	50000
Total Dissolved Solids	1020	N	270	2700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.2	92	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.6

### Waste Acceptance Criteria

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

## Results - Single Stage WAC

Chemtest Job No: 22-07762				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1382782							
Sample Ref: 6							
Sample ID:							
Sample Location: TP-22-04							
Top Depth(m): 2.50							
Bottom Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Sampling Date: 28-Feb-2022							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.77	3	5	6
Loss On Ignition	2610	M	%	0.85	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.021	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0049	0.049	0.5	2	25
Barium	1455	U	0.017	0.17	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0016	0.016	0.5	10	70
Copper	1455	U	0.0041	0.041	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0018	0.018	0.5	10	30
Nickel	1455	U	0.0055	0.055	0.4	10	40
Lead	1455	U	0.0030	0.030	0.5	10	50
Antimony	1455	U	0.0027	0.027	0.06	0.7	5
Selenium	1455	U	0.0008	0.0084	0.1	0.5	7
Zinc	1455	U	0.004	0.042	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	0.63	6.3	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	29	290	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

### Waste Acceptance Criteria

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

## Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

## Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge



## **Report Information**

### **Key**

---

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



**CAUSEWAY**  
— GEOTECH

# Tynagh Power Station Open Cycle Gas Turbine (OCGT)

## – Ground Investigation

Client: EP UK Investments

Client's Representative: AECOM Ireland Ltd

Report No.: 21-0937

Date: 11<sup>th</sup> October 2021

Status: Final for Issue

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Document Control Sheet

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## Document Control Sheet

<b>Report No.:</b>		21-0937			
<b>Project Title:</b>		Tynagh Power Station Open Cycle Gas Turbine (OCGT) – Ground Investigation			
<b>Client:</b>		EP UK Investments			
<b>Client's Representative:</b>		AECOM Ireland Ltd			
<b>Revision:</b>	A02	<b>Status:</b>	Final for Issue	<b>Issue Date:</b>	11 <sup>th</sup> October 2021
<b>Prepared by:</b>		<b>Reviewed by:</b>		<b>Approved by:</b>	
 Carin Cornwall BSc MSc PhD		 Neil Haggan BSc (Hons) MSc FGS		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

The works were conducted in accordance with:

Engineers Ireland / Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for site investigations.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9

## METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Site Investigation.

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa. V: undisturbed vane shear strength      VR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of $N \times 5 = C_u$ is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.

## **Tynagh Power Station**

### **1 AUTHORITY**

On the instructions of AECOM Ireland Ltd, (“the Client’s Representative”), acting on the behalf of EP UK Investments (“the Client”), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the design and construction of a proposed new Open Cycle Gas Turbine (OCGT).

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client’s Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

### **2 SCOPE**

The extent of the investigation, as instructed by the Client’s Representative, included boreholes, trial pits, soil and rock core sampling, environmental sampling, groundwater and ground gas monitoring, in-situ and laboratory testing, and the preparation of a factual report on the findings.

### **3 DESCRIPTION OF SITE**

As shown on the site location plan in Appendix A, the works were conducted on the site of the existing Tynagh Power Station in the Derryfrench region of Co. Galway. The site is bordered by old quarry to the south, old mine workings to the east, lands previously used for industrial purposes to the north, and lands currently used for industrial purposes to the west. The site is generally flat across the works area.

## 4 SITE OPERATIONS

### 4.1 Summary of site works

Site operations, which were conducted between 9<sup>th</sup> and 20<sup>th</sup> August 2021, comprised:

- nine boreholes by dynamic sampling with rotary core follow-on
- three boreholes by rotary open-hole techniques only
- one borehole by dynamic sampling techniques only
- one hand dug starter pit
- a standpipe installation in six boreholes
- five machine dug trial pits
- indirect CBR tests at the five trial pit locations.

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

### 4.2 Boreholes

A total of thirteen boreholes were put down in a minimum diameter of 150mm through soils and rock strata to their completion depths by a combination of methods, including dynamic sampling, rotary drilling and rotary coring by a Comacchio GEO 601 tracked drilling rig.

The borehole logs state the methodology and plant used for each, as well as the appropriate depth ranges.

A summary of the boreholes, subdivided by category in accordance with the methods employed for their completion, is presented in the following sub-sections.

#### 4.2.1 Boreholes by combined dynamic sampling and rotary follow-on drilling

Nine boreholes (BH01-BH03, and BH05-BH10) were put down by a combination of dynamic sampling boring and rotary follow-on drilling techniques with core recovery in bedrock. Where the dynamic sampler had not been advanced onto bedrock, rotary percussive methods were employed to advance the borehole to completion/bedrock. Symmetrix cased full-hole drilling was used, with SPTs carried out at standard intervals as required.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions.



Disturbed (bulk bag) samples were taken within the encountered strata. Undisturbed (UT100) samples were taken where appropriate and as directed within fine soils. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

Standard penetration tests carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals throughout the overburden using split spoon sampler (SPT<sub>(s)</sub>) or solid cone attachment (SPT<sub>(c)</sub>). The penetrations are stated for those tests which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected, no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix J.

Where coring was carried out within bedrock strata, Geobor S Coring was used. The core was extracted in up to 1.5m lengths using a SK6L core barrel, which produced core of nominal 102mm diameter, and was placed in single channel wooden core boxes.

The core was subsequently photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with *BS 5930: 2015: Code of practice for ground investigations*.

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

#### **4.2.2 Rotary drilled boreholes**

Three boreholes (BH02A, BH05A and BH09A) were put to their completion by rotary drilling techniques only. The boreholes were completed using a Comacchio GEO 601 tracked drilling rig.

Symmetrix-cased full hole rotary percussive drilling techniques were employed to advance the boreholes to termination depths of between 2.00-3.00m. The boreholes were completed to allow installation of shallow ground gas monitoring standpipes. No sampling or in-situ testing was carried out.

Appendix B presents the borehole logs.

#### **4.2.3 Dynamic sampled boreholes**

One borehole (BH04) was put down to completion by dynamic sampling techniques using a Comacchio GEO 601 tracked rig. The borehole was put down initially in 150mm diameter, until the sampler refused. When the borehole was attempted to be advanced by rotary open hole techniques, as happened in other parts of the site, the ground was noticed to be vibrating significantly. Due to the proximity of the BH04 location to the gas main it was decided to terminate the hole at a depth of 2.00m rather than continue with the open hole drilling.

A hand dug inspection pit was carried out between ground level and 1.20m depth to ensure the borehole were put down clear of services or subsurface obstructions.

Disturbed (bulk bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

Standard penetration tests carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals throughout the overburden using split spoon sampler (SPT<sub>(s)</sub>) or solid cone attachment (SPT<sub>(c)</sub>). The penetrations are stated for those tests which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected, no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix J.

Appendix B presents the borehole logs.

### **4.3 Standpipe installations**

A groundwater monitoring standpipe was installed in boreholes BH02, BH05 and BH09. A ground gas monitoring standpipe was installed in boreholes BH02A, BH05A and BH09A.

Details of the installations, including the depth range of the response zone, are provided in Appendix B on the individual borehole logs.

### **4.4 Trial Pits**

Five trial pits (TP01–TP05) were excavated using an 8t tracked excavator fitted with a 600mm wide bucket, to depths of 0.40-3.00m.

Environmental samples were taken at standard depths in each trial pit. Disturbed (bulk bag) samples were taken at standard depth intervals and at change of strata.

Any water strikes encountered during excavation were recorded along with any changes in their levels as the excavation proceeded. The stability of the trial pit walls was noted on completion.

Appendix C presents the trial pit logs with photographs of the pits and arising provided in Appendix D.

### **4.5 Inspection pit**

A single inspection pit (BH11) was excavated by hand to determine whether a borehole could be put down in this location adjacent to known gas and water mains. It was excavated to a maximum depth of 0.50m where it was terminated due to loose granular fill material preventing the pit being progressed any further. Following discussions with the Investigation Supervisor it was decided to terminate the location; rotary open-hole techniques could not be used to progress the borehole due to the proximity with the gas main.

An environmental sample was taken at depth of 0.50m in the pit. A disturbed (bulk bag) sample was taken at a depth of 0.20m in the pit.

The inspection pit log is presented in Appendix B.

#### 4.6 PID tests

PID (Photo ionizing detection) testing was undertaken on small, disturbed samples recovered from all boreholes and trial pits using a hand-held PID meter, to determine if any volatile organic compound contamination was present in the overburden.

Results of the PID tests are presented on the individual borehole and trial pit logs in Appendix B and Appendix D respectively.

#### 4.7 Indirect CBR tests (DCP)

An indirect CBR test was conducted at five locations (DCP @ TP01 – DCP @ TP05) using a Dynamic Cone Penetrometer (DCP). The equipment, which was developed in conjunction with the UK Transport Research Laboratory, is used widely throughout the world, and is referred to in the UK Highway Agency Interim Advice Note 73/06.

The test results are presented in Appendix F in the form of plots of the variation with depth of the penetration per blow. Straight lines have been fitted to the plots and the CBR for each depth range estimated using the following relationship, which is derived from Kleyn & Van Heerden (1983):

$$\text{Log CBR} = 2.48 - 1.057 \text{ Log (mm/blow)}$$

The frequently elevated CBR values are a consequence of the coarse-grained content of the penetrated soils and are often not representative of the soil matrix.

#### 4.8 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish National Grid) and ground elevation (mOD Malin (Irl) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these as-built positions.

#### 4.9 Groundwater and ground gas monitoring

Following completion of site works, groundwater and ground gas monitoring was conducted over two subsequent monitoring rounds. Ground water monitoring was carried out using a water interface probe. Ground gas measurements were carried out using a GA5000 gas meter.

The monitoring records are presented in Appendix G.

## 5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.

### 5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.
- **soil chemistry:** pH, water-soluble sulphate content, organic matter content, BRE Suite D (Brownfield – pyrite present)

Laboratory testing of soils samples was carried out in accordance with British Standards Institute: *BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (2016), and Parts 2-9 (1990)*.

The test results are presented in Appendix H.

### 5.2 Geotechnical laboratory testing of rock

Laboratory testing of rock sub-samples comprised:

- point load index
- unconfined compressive strength (UCS) tests

Test	Test carried out in accordance with
Point load index	ISRM Suggested Methods (1985) Suggested method for determining point-load strength. Int. J. Rock Mech. Min. Sci. Geomech. Abstr. 22, pp. 53–60
Uniaxial compression strength tests	ISRM Suggested Methods (1981) Suggested method for determining deformability of rock materials in uniaxial compression, Part 2, and ISRM (2007) Ulusay R, Hudson JA (eds) The complete ISRM suggested methods for rock characterization, testing and monitoring, 2007

The test results are presented in Appendix H.

### 5.3 Environmental laboratory testing of soils

Environmental testing, as specified by the Client’s Representative was conducted on selected environmental soil and water samples by Chemtest at its laboratory in Newmarket, Suffolk.

The RILTA suite of analysis was carried out on ten samples for landfill disposal criteria.

Testing was carried out for a range of determinants, including:

- Metals (As, B, Be, Cd, Total Cr, Cr III (trivalent), Cr VI (hexavalent) (Cu, Se, Pb, Hg, Ni, V, Zn)
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)
- BTEX inc MTBE
- Speciated total petroleum hydrocarbons (TPH-CWG)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- Polychlorinated Biphenyls (PCBs)
- Phenols
- Total Cyanide
- Asbestos screen
- pH, organic matter content
- Hardness testing, sulphate, BRE Suite D (waters only)

Results of environmental laboratory testing are presented in Appendix I.

## 6 GROUND CONDITIONS

### 6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise Glacial Till. These deposits are immediately underlain by limestones and shales of the Lucan Formation in northern site areas. The southernmost extent of the site is underlain by crudely bedded to massive Waulsortian Limestone.

### 6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Paved surface:** boreholes BH07, BH09, BH09A and BH10 encountered 150mm of macadam surfacing.
- **Made Ground (granular fill):** encountered in all boreholes and trial pits, general at or just below surface. Typically, reworked sandy silty gravel fill often with low cobble and boulder content; extending to a maximum depth of 6.50m in BH05.
- **Made Ground (cohesive fill):** encountered in a number of boreholes and trial pits beneath the upper granular fill and on top of the natural strata. Typically, reworked sandy gravelly silty clay fill often with low cobble and boulder content; extending to a depth of 4.00m in BH01, BH02 and BH06.

- **Recent deposits (peat):** encountered across the middle of the site in BH06 (600mm), BH07 (700mm) and BH08 (300mm) between depths ranging from 2.80-4.60m. Typically plastic fibrous occasionally with silt/clay content; encountered up to a maximum depth of 4.60m in BH06.
- **Fluvioglacial deposits:** encountered in BH01, BH05, BH06, BH07 and BH09 at depth, generally on top of the limestone bedrock. Typically, medium dense to dense sands and gravels; encountered to a maximum depth of 8.00m in BH05.
- **Glacial Till:** encountered in BH02, BH03, BH06 and BH08 directly beneath the made ground or peat deposits. Typically, firm to stiff/very stiff sandy gravelly silty clay often with low cobble and boulder content; encountered to a maximum depth of 6.00m in BH03.
- **Bedrock (Limestone):** Rockhead was encountered in all deep boreholes at depths ranging from 1.80m in BH10 to 7.80m in BH05; found to a maximum depth of 11.70m in BH08. The surface of the bedrock strata shows a trend of dipping gently to the north/north-east.

### 6.3 Groundwater

Groundwater was encountered during boring as water strikes in BH02 (2.50m), BH02A (2.50m), BH05 (6.50m), BH06 (6.40m), and in BH08 (5.50m). Generally, the water strikes were coincident with the lower parts of the overburden where it met the limestone bedrock. Groundwater was also encountered in a number of trial pits at the site; strong flow in TP01 (0.20m) and seepage in TP02 (2.00m and 2.90m).

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Groundwater was not noted during drilling at a number of the borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out.

It should be noted that any groundwater strikes within bedrock may have been masked by the fluid used as the drilling flush medium.

Continued monitoring of the six installed standpipes will give an indication of the seasonal variation in groundwater level which should be factored into design considerations.

Details of further groundwater monitoring and results of the gas monitoring, are presented in Appendix G.

## 7 REFERENCES

Engineers Ireland / Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

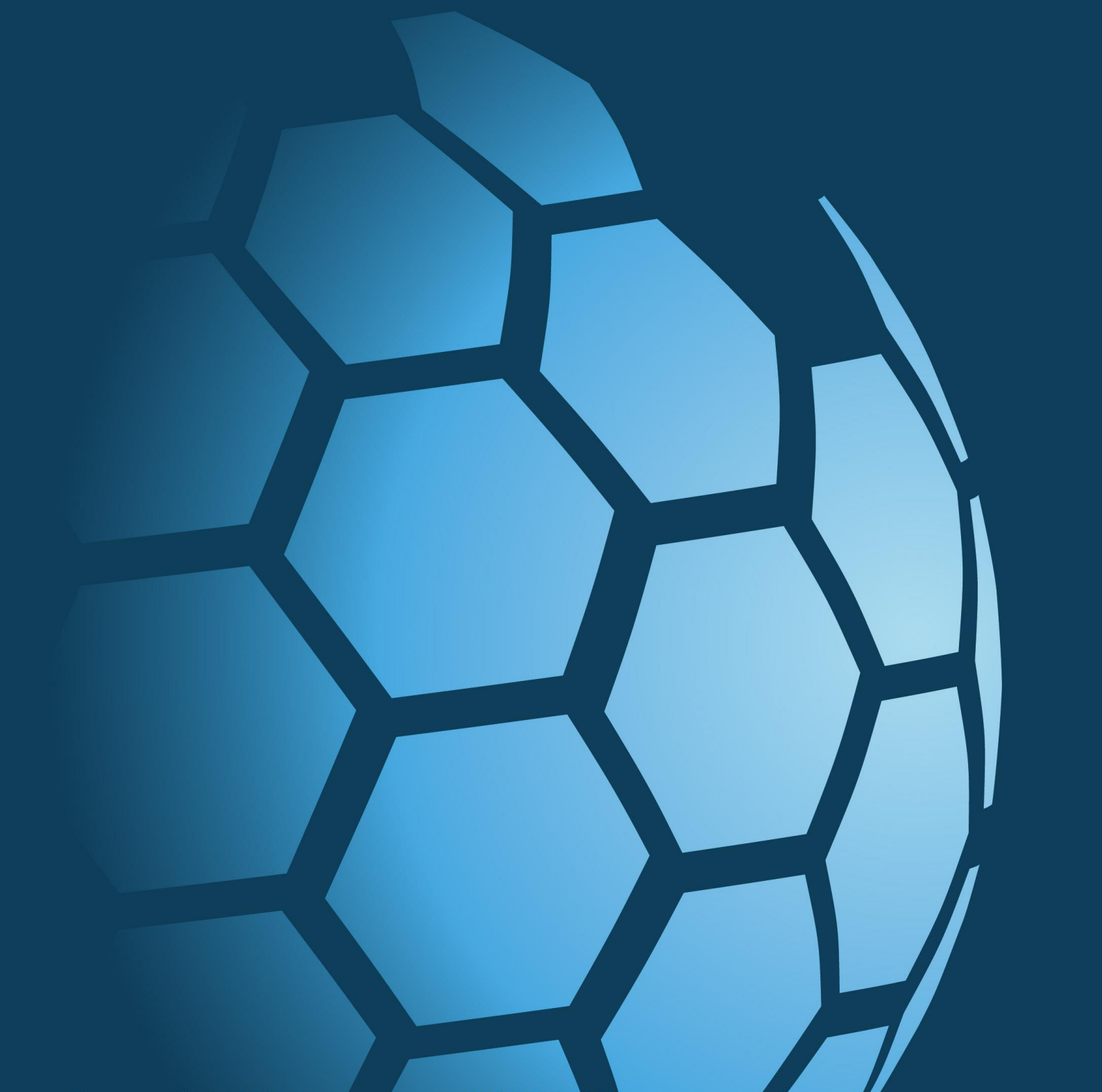
BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description.

BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.



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**APPENDIX A**  
**SITE AND EXPLORATORY HOLE LOCATION PLAN**







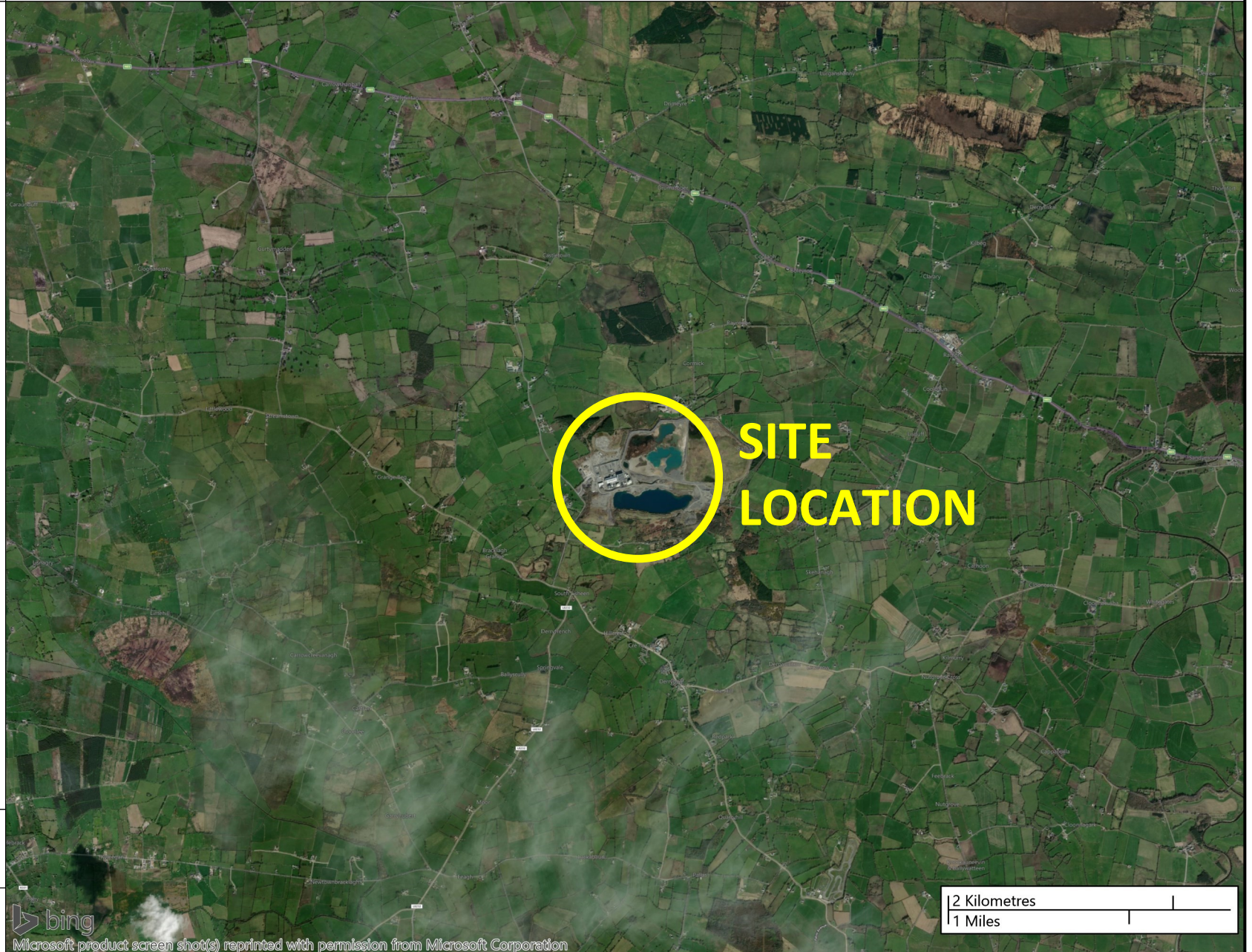
**Project No.:** 21-0937

**Client:** EP UK Investments

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT)  
Ground Investigation

**Client's Representative:** AECOM Ireland Ltd

Legend Key



**Title:**  
Site Location Plan

**Last Revised:**  
17/09/2021

**Scale:**  
1:50000

 Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

2 Kilometres  
1 Miles



**Project No.:** 21-0937

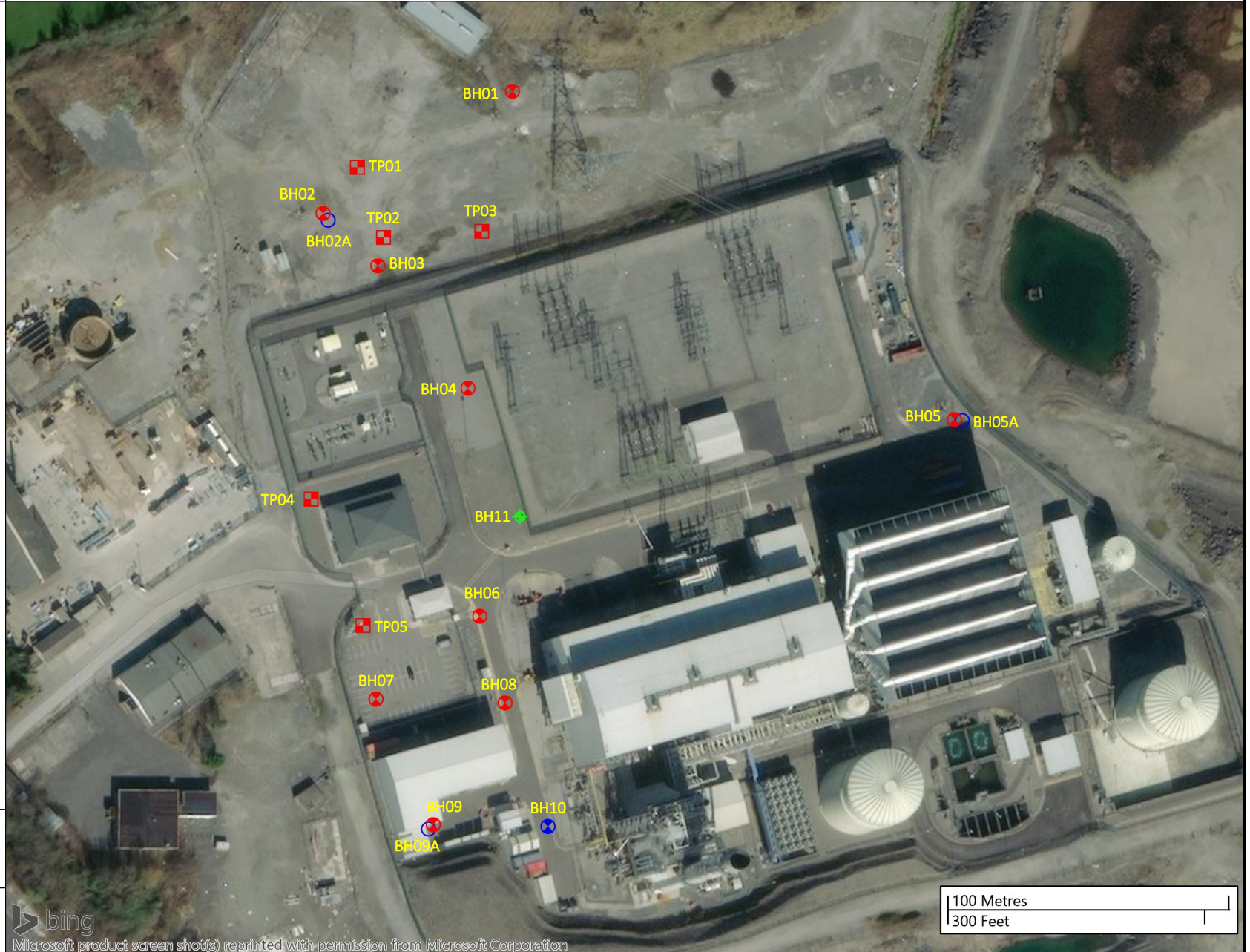
**Client:** EP UK Investments

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT)  
Ground Investigation

**Client's Representative:** AECOM Ireland Ltd

**Legend Key**

- ◆ Locations By Type - DS
- ⊗ Locations By Type - DS+RC
- ⊗ Locations By Type - RC
- Locations By Type - RO
- ⊠ Locations By Type - TP



**Title:**  
Site Location Plan

**Last Revised:**  
02/09/2021

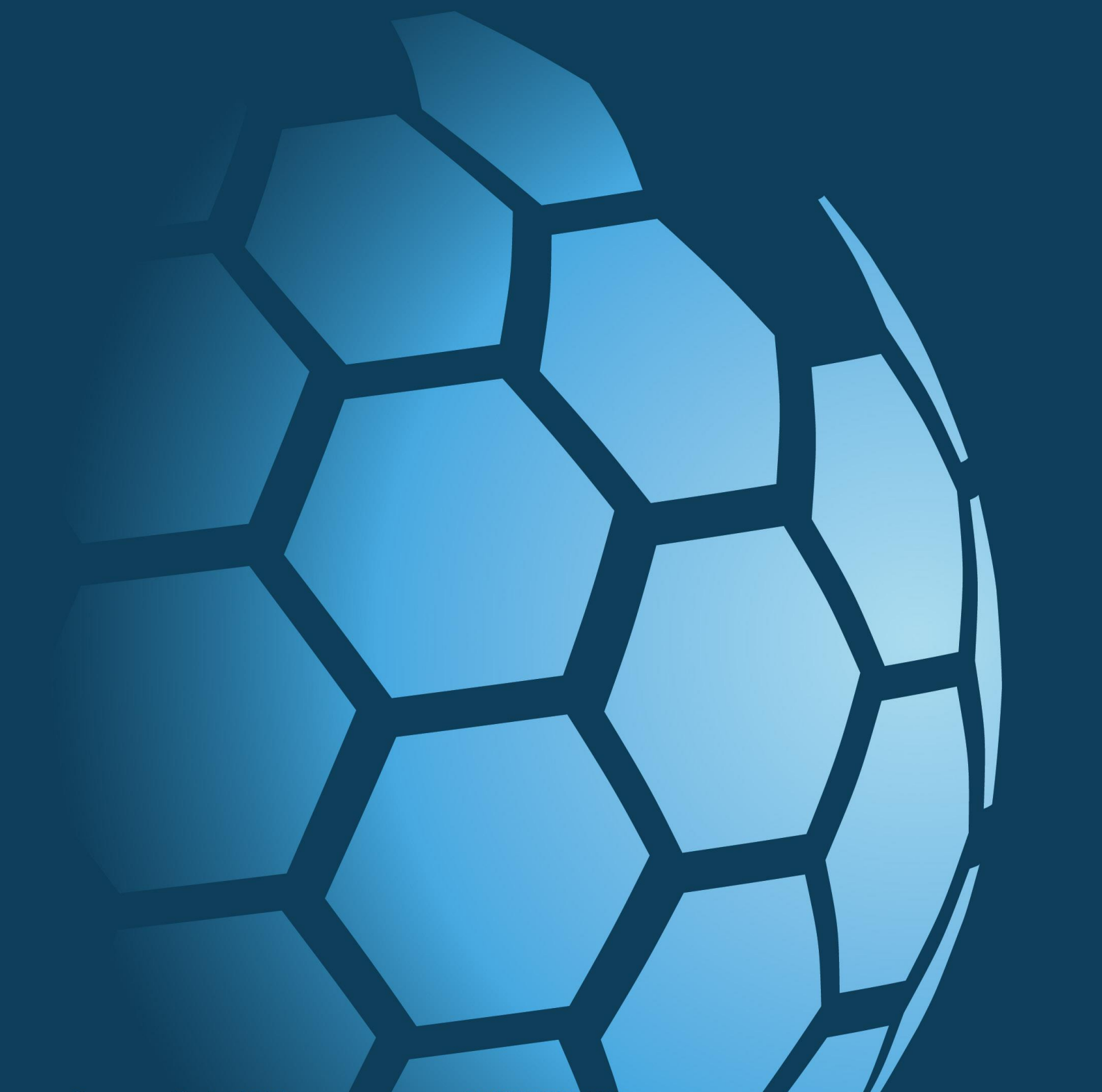
**Scale:**  
1:2000

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**APPENDIX B**  
**BOREHOLE LOGS**





**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
BH01

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 1
Dynamic Sampling	Comacchio 601	0.00	4.00	174400.05 E	8.50 m	09/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	4.00	5.50	213096.59 N				
Rotary Coring	Comacchio 601	5.50	8.50		Elevation: 64.42 mOD	End Date: 09/08/2021	Logger: JG+TH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.50	B9	PID = 0.50ppm			63.42	1.00		MADE GROUND: Compacted grey sandy silty angular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.		
0.50	ES1									
0.50										
1.00	B10	PID = 0.30ppm			62.42	2.00		MADE GROUND: Medium dense brown and greyish brown slightly sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.		
1.00	ES2									
1.20 - 1.65	SPT (C)	N=18 (3,3/4,4,4,6) Hammer SN = 0209	1.20	Dry						
1.50	ES3	PID = 0.20ppm			61.92	2.50		MADE GROUND: Dark grey slightly sandy silty angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
1.50										
2.00	B11	PID = 0.50ppm			61.42	3.00		MADE GROUND: Loose dark grey and grey sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.		
2.00	ES4									
2.00										
2.50	ES5	PID = 1.90ppm			61.42	3.00		Possible MADE GROUND: Stiff brownish grey slightly sandy gravelly silty CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium.		
2.50										
2.50 - 2.95	SPT (C)	N=6 (2,2/1,1,2,2) Hammer SN = 0209	2.50	2.40						
2.50	EW100	PID = 1.40ppm			59.92	4.50		Very dense grey silty fine to medium SAND.		
2.56	ES6									
3.00	B12	PID = 1.80ppm			58.92	5.50		Weathered LIMESTONE (Drillers description)		
3.00	ES7									
3.50										
3.50	B13	N=50 (25 for 140mm/50 for 110mm) Hammer SN = 0209			57.42	7.00		Weak, locally medium strong, thin interbedded dark grey LIMESTONE and light grey PACKSTONE. Partially weathered: slightly reduced strength, closer fracture spacing.		
4.00	ES8									
4.00 - 4.25	SPT (C)	PID = 1.50ppm	4.00	Dry						
4.00										
6.75	C	100	95	57	10	(1.50)		Discontinuities: 1. 5 to 15 degree bedding fractures, closely spaced (10/115/320), undulating, rough. 2. 60 to 70 degree joints at 5.56m to 5.67m, 5.85m to 5.90m, and 6.20m to 6.28m, undulating, rough.		
7.00	C							Weak, locally medium strong, indistinctly thin laminated dark grey LIMESTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing.		
7.35	C	100	100	83	11	(1.50)		Discontinuities: 1. 10 to 20 degree bedding fractures, closely spaced (5/100/370) planar, smooth. 2. 60 to 70 degree joint at 7.28m to 7.33m and 7.65m to 7.90m, undulating, rough.		
7.90	C									
8.50						55.92	8.50	End of Borehole at 8.50m		

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
							Hand dug inspection pit to 1.20m
Casing Details		Water Added					
To (m)	Diam (mm)	From (m)	To (m)				
5.50	200						
				Core Barrel	Flush Type	Termination Reason	Last Updated
						Terminated on recovery of 3m competent core	11/10/2021





**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
BH02

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 1
Dynamic Sampling	Comacchio 601	0.00	4.00	174332.09 E	8.50 m	11/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	4.00	5.50	213053.28 N				
Rotary Coring	Comacchio 601	5.50	8.50		Elevation: 65.75 mOD	End Date: 11/08/2021	Logger: JG+TH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.00	B9							MADE GROUND: Medium dense grey and light grey slightly sandy silty angular to subangular fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular.		
0.50	ES1	PID = 0.30ppm								
1.00	ES2									
1.00 - 2.00	B10	PID = 0.30ppm						MADE GROUND: Firm greyish brown slightly sandy gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse. Cobbles are subangular.		
1.20 - 1.65	SPT (C)	N=27 (4,4/6,7,7,7) Hammer SN = 0209	1.20	Dry						
1.50	ES3	PID = 0.50ppm								
1.50	EW101				63.75	2.00				
1.60	EW102									
1.65	ES4									
2.00 - 3.00	B11	PID = 11.40ppm						Possible MADE GROUND: Light grey and grey sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to medium. Cobbles are subangular to subrounded.		
2.00	ES5									
2.50	EW100				62.75	3.00				
2.50 - 2.95	SPT (C)	N=15 (3,3/2,3,4,6) Hammer SN = 0209	2.50	2.45						
2.50		PID = 16.10ppm Water strike from 2.50m to 3.00m								
3.00	ES6									
3.00 - 4.00	B12	PID = 2.70ppm						Very stiff grey slightly sandy slightly gravelly silty CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular to subrounded.		
3.00	ES7									
3.50	ES7	PID = 1.80ppm								
4.00	ES8									
4.00 - 5.50	B13									
4.00 - 4.45	SPT (C)	N=47 (4,7/11,13,11,12) Hammer SN = 0209	4.00	3.70						
4.00		PID = 0.10ppm								
5.50	C		5.50	5.30	60.25	5.50		Weak indistinctly thinly bedded black LIMESTONE. Partially weathered: reduced strength, closer fracture spacing, orangish brown discolouration on some joint surfaces.		
5.50 - 5.82	SPT(C) N=50 (6,10/50 for 170mm) Hammer SN = 0209					(1.20)		Discontinuities: 1. 0 to 10 degree bedding fractures, closely spaced (2/63/140) planar to undulating, smooth. 2. 80 to 90 degree joints at 5.50m to 6.10m (incipient from 5.50m to 5.68m) and 6.25m to 6.55m, undulating, rough, dark grey gravelly clay infill on joint surfaces (5 to 15mm thick) and orangish brown patchy staining on joint surfaces.		
6.72	C				59.05	6.70		Weak, locally medium strong, very thinly bedded dark grey LIMESTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing.		
7.00								Discontinuities: 1. 0 to 10 degree bedding fractures, closely spaced (8/95/230) planar to undulating, smooth, clean. 2. 80 to 90 degree joints at 6.70m to 6.88m, 7.38m to 7.42m and 7.85m to 7.96m, undulating, smooth, faint orangish brown staining on some joint surfaces.		
7.42	C					(1.80)				
8.02	C									
8.50					57.25	8.50		End of Borehole at 8.50m		

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
2.50	2.50						Hand dug inspection pit to 1.20m Groundwater Monitoring Standpipe Installation
Casing Details		Water Added					
To (m)	Diam (mm)	From (m)	To (m)				
5.50	200						
				Core Barrel	Flush Type	Termination Reason	Last Updated
						Terminated on recovery of 3m competent core	11/10/2021





**CAUSEWAY**  
GEOTECH

**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
BH02A

<b>Method</b> Rotary Drilling	<b>Plant Used</b> Comacchio 601	<b>Top (m)</b> 0.00	<b>Base (m)</b> 3.00	<b>Coordinates</b> 174334.00 E 213050.83 N	<b>Final Depth:</b> 3.00 m	<b>Start Date:</b> 11/08/2021	<b>Driller:</b> JG	Sheet 1 of 1 Scale: 1:40
					<b>Elevation:</b> 65.76 mOD	<b>End Date:</b> 11/08/2021	<b>Logger:</b> JG	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
1.10	EW100	Water strike at 2.50m to 3.00m			64.56	1.20		MADE GROUND: Broken ROCK and sandy GRAVEL. (Drillers description)		
					63.76	2.00		MADE GROUND: Grey sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.		
					62.76	3.00		MADE GROUND: Firm greyish brown slightly sandy gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse. Cobbles are subangular.		
								End of Borehole at 3.00m		

<b>Water Strikes</b>				<b>Remarks</b>							
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	Hand dug inspection pit to 1.20m Gas Monitoring Standpipe Installation							
2.50	3.00										
<b>Casing Details</b>				<b>Water Added</b>							
To (m)	Diam (mm)	From (m)	To (m)								
3.00	200										
				<b>Core Barrel</b>	<b>Flush Type</b>	<b>Termination Reason</b>			<b>Last Updated</b>		
						Terminated at scheduled depth			11/10/2021		



**CAUSEWAY**  
GEOTECH

**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
BH03

<b>Method</b>	<b>Plant Used</b>	<b>Top (m)</b>	<b>Base (m)</b>	<b>Coordinates</b>	<b>Final Depth:</b> 9.00 m	<b>Start Date:</b> 10/08/2021	<b>Driller:</b> JG	Sheet 1 of 1 Scale: 1:50
Dynamic Samplin Rotary Drilling Rotary Coring	Comacchio 601 Comacchio 601 Comacchio 601	0.00 4.00 6.00	4.00 6.00 9.00	174351.54 E 213034.47 N	<b>Elevation:</b> 65.20 mOD	<b>End Date:</b> 10/08/2021	<b>Logger:</b> JG+TH	<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.00	B10							MADE GROUND: Medium dense grey and brown slightly sandy angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.		
0.50	ES1	PID = 51.90ppm								
1.00	ES2									
1.00 - 2.00	B11	PID = 57.80ppm								
1.20 - 1.65	SPT (C)	N=28 (3,5/5,6,6,11) Hammer SN = 0209	1.20	Dry						
1.50	ES3	PID = 63.10ppm			63.20	2.00				
2.00	ES4									
2.00 - 3.00	B12	PID = 34.50ppm						MADE GROUND: Stiff greyish brown and light grey slightly sandy slightly gravelly silty CLAY with low cobble content and lenses of soft light brown CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium. Cobbles are subangular.		
2.50	ES5									
2.50 - 2.95	SPT (C)	N=21 (4,4/3,4,5,9) Hammer SN = 0209	2.50	Dry						
2.50	ES6	PID = 27.20ppm								
3.00	ES7									
3.00 - 4.00	B13	PID = 26.90ppm								
3.50	ES8									
3.50	ES9	PID = 15.70ppm								
4.00	ES10									
4.00 - 5.00	B14									
4.00 - 4.17	SPT (C)	N=50 (25 for 100mm/50 for 70mm) Hammer SN = 0209	4.00	3.90				Very stiff light grey slightly sandy slightly gravelly silty CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular to subrounded.		
4.00	ES11	PID = 0.30ppm								
5.00	ES12									
5.00 - 6.00	B15	PID = 0.10ppm								
5.00	ES13									
5.50 - 5.62	SPT (C)	N=50 (25 for 75mm/50 for 50mm) Hammer SN = 0209	5.50	5.10						
5.50	ES14									
6.27	C				59.20	6.00		Medium strong, locally strong, indistinctly very thinly bedded black LIMESTONE. Partially weathered: reduced strength, closer fracture spacing. Discontinuities: 1. 10 to 20 degree bedding fractures, closely spaced (10/78/190) planar to undulating, smooth. 2. 40 to 50 degree joints a 6.00m to 6.12m and 7.00m to 7.15m, undulating, rough, patchy orangish brown staining on joint surfaces. 3. 80 to 90 degree joints at 7.80m to 7.90m, 8.13m to 8.25m and 8.70m to 8.95m, undulating, rough patchy orangish brown staining on some joint surfaces.		
7.50		100 95 63								
7.50	C					(3.00)				
8.00	C									
		97 97 52								
9.00					56.20	9.00				
								End of Borehole at 9.00m		
		TCR SCR RQD FI								

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
<b>Casing Details</b>				<b>Water Added</b>			
To (m)	Diam (mm)	From (m)	To (m)				
6.00	200						
				<b>Core Barrel</b>	<b>Flush Type</b>	<b>Termination Reason</b>	<b>Last Updated</b>
						Terminated on recovery of 3m competent core	11/10/2021





**CAUSEWAY**  
GEOTECH

**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
**BH04**

<b>Method</b> Rotary Drilling	<b>Plant Used</b> Comacchio 601	<b>Top (m)</b> 0.00	<b>Base (m)</b> 2.00	<b>Coordinates</b> 174383.74 E 212990.51 N	<b>Final Depth:</b> 2.00 m	<b>Start Date:</b> 20/08/2021	<b>Driller:</b> JG	Sheet 1 of 1 Scale: 1:50
					<b>Elevation:</b> 67.50 mOD	<b>End Date:</b> 20/08/2021	<b>Logger:</b> JG	<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 0.10	B4							MADE GROUND: Grey angular fine to coarse GRAVEL.		
0.50	ES1	PID = 0.00ppm								
0.50										
1.00	ES2				66.50	1.00				
1.00 - 2.00	B5	PID = 0.00ppm						MADE GROUND: Dense grey sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.		
1.00										
1.20 - 1.65	SPT (C)	N=33 (3,5/7,7,9,10) Hammer SN = 0209	1.20	Dry						
1.50	ES3	PID = 0.00ppm								
1.50					65.50	2.00		End of Borehole at 2.00m		

<b>Water Strikes</b>				<b>Chiselling Details</b>			<b>Remarks</b> Hand dug inspection pit to 1.20m When switching to open hole hammer ground at works area visibly vibrating Proximity to gas main precludes further use of rotary open hole techniques
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
<b>Casing Details</b>		<b>Water Added</b>					
To (m)	Diam (mm)	From (m)	To (m)				
2.00	200						
				<b>Core Barrel</b>	<b>Flush Type</b>	<b>Termination Reason</b> Terminated at 2.00m by Investigation Supervisor due to proximity to gas main	<b>Last Updated</b> 11/10/2021







**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
**BH05**

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 2
Dynamic Sampling	Comacchio 601	0.00	4.00	174557.94 E	11.50 m	17/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	4.00	8.50	212978.45 N				
Rotary Coring	Comacchio 601	8.50	11.50		Elevation: 66.47 mOD	End Date: 17/08/2021	Logger: JG+TH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.00	B8							MADE GROUND: Light grey sandy silty angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.		
0.50	ES1	PID = 0.00ppm								
1.00	ES2	PID = 0.00ppm								
1.20 - 1.65	SPT (C)	N=25 (5,6/5,7,7,6) Hammer SN = 0209	1.20	Dry	65.17	1.30		Possible MADE GROUND: Medium dense grey sandy silty angular to subangular fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular. [LOW RECOVERY]		
1.30 - 2.00	B9									
1.50	ES3	PID = 0.10ppm								
2.00	ES4	PID = 0.00ppm								
2.50 - 2.95	SPT (C)	N=16 (3,3/4,3,5,4) Hammer SN = 0209	2.50	Dry						
4.00	ES5									
4.00 - 4.45	SPT (C)	N=16 (2,2/3,2,4,7) Hammer SN = 0209	4.00	Dry						
4.00		PID = 0.30ppm								
5.02	EW101									
5.28	EW102									
5.50 - 5.95	SPT (C)	N=21 (2,4/4,8,5,4) Hammer SN = 0209	5.50	Dry						
5.65	EW100									
6.50	ES6	PID = 0.80ppm			59.97	6.50		Medium dense light brown silty angular to subangular fine to coarse GRAVEL with low cobble and boulder content. Cobbles and boulders are subangular to subrounded.		
6.50		Water strike at 6.50m								
7.00 - 7.50	B10									
7.00 - 7.45	SPT (C)	N=23 (1,2/2,3,8,10) Hammer SN = 0209	7.00	Dry						
7.50	ES7	PID = 0.12ppm			58.67	7.80		LIMESTONE (Drillers description)		
7.50										
9.00	C	100 95 89			57.97	8.50		Medium strong, locally weak, indistinctly thickly laminated black LIMESTONE with widely spaced thin dark grey fossiliferous bed. Largely unweathered. Discontinuities: 1. 10-20 degree bedding fractures, closely spaced (10/154/510),		
		TCR SCR RQD FI								

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
6.50	6.50	20	5.65				Hand dug inspection pit to 1.20m Groundwater Monitoring Standpipe Installation
Casing Details		Water Added					
To (m)	Diam (mm)	From (m)	To (m)				
8.50	200						
				Core Barrel	Flush Type	Termination Reason	Last Updated
						Terminated on recovery of 3m competent core	11/10/2021





<b>Method</b>	<b>Plant Used</b>	<b>Top (m)</b>	<b>Base (m)</b>	<b>Coordinates</b>	<b>Final Depth:</b> 11.50 m	<b>Start Date:</b> 17/08/2021	<b>Driller:</b> JG	Sheet 2 of 2 Scale: 1:50
Dynamic Sampling	Comacchio 601	0.00	4.00	174557.94 E 212978.45 N	Elevation: 66.47 mOD	End Date: 17/08/2021	Logger: JG+TH	FINAL
Rotary Drilling	Comacchio 601	4.00	8.50					
Rotary Coring	Comacchio 601	8.50	11.50					

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
9.46	C										Medium strong, locally weak, indistinctly thickly laminated black LIMESTONE with widely spaced thin dark grey fossiliferous bed. Largely unweathered. Discontinuities: 1. 10-20 degree bedding fractures, closely spaced (10/154/510), planar, smooth, patchy light brownish grey calcite mineralisation on some fracture surfaces. 2. 40-50 degree joints, at 8.70-8.83m and 8.75-8.85m, undulating, rough, clean. 3. 75-90 degree joint, at 10..85-11.10m, undulating, smooth, patchy light brown calcite mineralisation on joint surfaces.		
10.00													
10.35	C	100	100	97	7			(3.00)					
11.45	C							54.97	11.50		End of Borehole at 11.50m		
11.50													

<b>Water Strikes</b>				<b>Chiselling Details</b>			<b>Remarks</b> Hand dug inspection pit to 1.20m Groundwater Monitoring Standpipe Installation
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
6.50	6.50	20	5.65				
<b>Casing Details</b>		<b>Water Added</b>					
To (m)	Diam (mm)	From (m)	To (m)				
8.50	200						
				<b>Core Barrel</b>	<b>Flush Type</b>	<b>Termination Reason</b>	<b>Last Updated</b>
						Terminated on recovery of 3m competent core	11/10/2021



**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
**BH05A**

<b>Method</b> Rotary Drilling	<b>Plant Used</b> Comacchio 601	<b>Top (m)</b> 0.00	<b>Base (m)</b> 3.00	<b>Coordinates</b> 174560.89 E 212978.02 N	<b>Final Depth:</b> 3.00 m	<b>Start Date:</b> 17/08/2021	<b>Driller:</b> JG	Sheet 1 of 1 Scale: 1:40
					<b>Elevation:</b> 66.46 mOD	<b>End Date:</b> 17/08/2021	<b>Logger:</b> JG	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					65.76	0.70		MADE GROUND: Grey sandy angular fine to coarse GRAVEL. Sand is fine to coarse. (Drillers description)		
					63.46	3.00		MADE GROUND: Medium dense sandy silty angular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular of limestone.		
								End of Borehole at 3.00m		

<b>Water Strikes</b>				<b>Remarks</b> Hand dug inspection pit to 1.20m Gas Monitoring Standpipe Installation
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	
<b>Casing Details</b>		<b>Water Added</b>		
To (m)	Diam (mm)	From (m)	To (m)	
3.00	200			
<b>Core Barrel</b>	<b>Flush Type</b>	<b>Termination Reason</b>	<b>Last Updated</b>	
		Terminated at scheduled depth	11/10/2021	





**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
BH06

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 2
Dynamic Sampling	Comacchio 601	0.00	5.70	174387.45 E	13.00 m	19/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	5.70	7.00	212909.01 N	Elevation: 66.53 mOD	End Date: 19/08/2021	Logger: JG+TH	FINAL
Rotary Coring	Comacchio 601	7.00	13.00					

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.50	ES1				66.33	0.20		MADE GROUND: Compacted grey angular fine to coarse GRAVEL.		
0.50 - 1.20	B10	PID = 0.30ppm			66.03	0.50		MADE GROUND: Lean mix CONCRETE.		
0.50								MADE GROUND: Medium dense light grey slightly sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.		
1.00	ES2	PID = 0.10ppm								
1.20 - 2.00	B11									
1.20 - 1.65	SPT (C)	N=30 (5,5/6,8,7,9) Hammer SN = 0209	1.20	Dry						
1.50	ES3	PID = 0.00ppm								
1.50					64.53	2.00		MADE GROUND: Soft greyish brown with black mottling slightly sandy slightly gravelly silty CLAY with low cobble content, fragments of concrete and lenses of dark brown spongy peat. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium. Cobbles are subangular.		
2.00	ES4	PID = 0.00ppm								
2.00 - 3.00	B12									
2.00										
2.50	ES5	PID = 0.20ppm								
2.50 - 2.95	SPT (C)	N=8 (1,1/1,2,2,3) Hammer SN = 0209	2.50	Dry						
2.50										
2.50	ES6	PID = 0.20ppm								
3.00	B13	PID = 0.20ppm								
3.00 - 4.00										
3.00										
3.10	W17									
3.50	ES7	PID = 0.00ppm								
3.50										
4.00	ES8	PID = 0.00ppm			62.53	4.00		Plastic dark brown spongy fibrous PEAT.		
4.00 - 4.60	B14									
4.00 - 4.45	SPT (C)	N=5 (1,0/1,0,2,2) Hammer SN = 0209	4.00	Dry						
4.00					61.93	4.60		Firm light grey and grey with light brown mottling slightly sandy slightly gravelly silty CLAY with lenses of soft light brown clay. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
4.00										
5.00	ES9	PID = 0.00ppm								
5.00 - 5.80	B15									
5.00										
5.50 - 5.95	SPT (C)	N=24 (3,3/3,5,7,9) Hammer SN = 0209	5.50	Dry						
5.50										
5.80 - 6.40	B16				60.73	5.80		Medium dense grey slightly sandy silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
5.80										
		Water strike at 6.40m			60.13	6.40		LIMESTONE (Drillers description)		
					59.53	7.00		Medium strong, locally weak, indistinctly thickly laminated dark grey LIMESTONE. Partially weathered: slightly reduced strength, closer fracture spacing, patchy orangish brown discolouration on some joint surfaces. Discontinuities: 1. 10-20 degree bedding fractures, closely spaced (15/96/220), planar to undulating, smooth, faint and patchy orangish brown staining on some fracture surfaces, dark grey clay infill on some fracture surfaces (1-30mm thick). 2. Approximately 50 degree joint, at 7.28-7.40m, undulating, smooth. 3. 70-90 degree joints, at 7.55-7.95m and 8.50-8.72m, undulating, smooth, dark orangish brown staining on some joint surfaces, clean.		
7.46	C		99	83	65					
8.10	C									12
8.50										
8.80	C		100	100	77					
			TCR	SCR	RQD	FI				

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
6.40	6.40	20	3.10				Hand dug inspection pit to 1.20m
<b>Casing Details</b>				<b>Water Added</b>			
To (m)	Diam (mm)	From (m)	To (m)				
7.00	200						
				<b>Core Barrel</b>	<b>Flush Type</b>	<b>Termination Reason</b>	<b>Last Updated</b>
						Terminated on recovery of 6m competent core	11/10/2021





Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 2 of 2
Dynamic Sampling	Comacchio 601	0.00	5.70	174387.45 E	13.00 m	19/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	5.70	7.00	212909.01 N	Elevation: 66.53 mOD	End Date: 19/08/2021	Logger: JG+TH	FINAL
Rotary Coring	Comacchio 601	7.00	13.00					

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill	
9.32	C							57.13	9.40		<p>Medium strong, locally weak, indistinctly thickly laminated dark grey LIMESTONE. Partially weathered: slightly reduced strength, closer fracture spacing, patchy orangish brown discolouration on some joint surfaces.</p> <p>Discontinuities:</p> <ol style="list-style-type: none"> <li>1. 10-20 degree bedding fractures, closely spaced (15/96/220), planar to undulating, smooth, faint and patchy orangish brown staining on some fracture surfaces, dark grey clay infill on some fracture surfaces (1-30mm thick).</li> <li>2. Approximately 50 degree joint, at 7.28-7.40m, undulating, smooth.</li> <li>3. 70-90 degree joints, at 7.55-7.95m and 8.50-8.72m, undulating, smooth, dark orangish brown staining on some joint surfaces, clean.</li> </ol> <p>Medium strong thickly laminated reddish brown LIMESTONE. Largely unweathered.</p> <p>Discontinuities:</p> <ol style="list-style-type: none"> <li>1. 20-25 degree bedding fractures, closely spaced (40/150/90), planar to undulating, smooth, patchy yellowish grey calcite mineralisation on some joint surfaces.</li> </ol> <p>Medium strong indistinctly thickly laminated dark grey LIMESTONE with medium spaced thin fossiliferous beds.</p> <p>Discontinuities:</p> <ol style="list-style-type: none"> <li>1. 15-20 degree bedding fractures, closely spaced (55/125/332), planar, smooth, patchy calcite mineralisation on some joint surfaces.</li> <li>2. 70-90 degree joint, at 11.10-11.88m, undulating, smooth, clean.</li> </ol>		9.5	
10.00								56.53	(0.60)				10.0	
10.00	C								10.00				10.5	
10.69	C	95	95	82									11.0	
10.97	C												11.5	
11.50									(3.00)				12.0	
12.05	C	95	95	95									12.5	
12.60	C												13.0	
13.00								53.53	13.00			End of Borehole at 13.00m		13.5
														14.0
													14.5	
													15.0	
													15.5	
													16.0	
													16.5	
													17.0	
													17.5	
													18.0	
													18.5	

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
6.40	6.40	20	3.10				
Casing Details		Water Added		Core Barrel	Flush Type	Termination Reason	Last Updated
To (m)	Diam (mm)	From (m)	To (m)				
7.00	200					Terminated on recovery of 6m competent core	11/10/2021



**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
**BH07**

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 2
Dynamic Sampling	Comacchio 601	0.00	4.00	174349.98 E	11.50 m	12/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	4.00	5.50	212879.58 N	Elevation: 66.36 mOD	End Date: 12/08/2021	Logger: JG+TH	FINAL
Rotary Coring	Comacchio 601	5.50	11.50					

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.15 - 1.00	B10				66.21	0.15	MADE GROUND: BITMAC			
0.50	ES1	PID = 0.30ppm					MADE GROUND: Very dense grey very sandy angular fine to coarse GRAVEL. Sand is fine to coarse.			
1.00	ES2	PID = 0.10ppm								
1.00 - 1.70	B11									
1.20 - 1.65	SPT (C)	N=51 (8,8/10,13,13,15) Hammer SN = 0209	1.20	Dry						
1.50	ES3	PID = 0.50ppm			64.66	1.70	MADE GROUND: Medium dense light grey and light brown sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular of limestone.			
1.50	ES4									
2.00 - 2.80	B15	PID = 1.40ppm								
2.00	ES5									
2.50 - 2.95	SPT (C)	N=21 (4,4/5,4,6,6) Hammer SN = 0209	2.50	Dry	63.56	2.80	Plastic spongy greyish brown slightly sandy slightly gravelly clayey PEAT with occasional roots and rootlets. Sand is fine. Gravel is subangular to subrounded fine to coarse.			
2.50	ES6	PID = 1.00ppm								
3.00 - 3.50	B12	PID = 0.70ppm								
3.00	ES7				62.86	3.50	Medium dense grey sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.			
3.50 - 4.00	B13	PID = 0.80ppm								
3.50	ES8									
4.00 - 4.50	B14									
4.00 - 4.45	SPT (C)	N=16 (3,4/3,3,5,5) Hammer SN = 0209	4.00	Dry						
4.00	ES9	PID = 0.40ppm			61.36	5.00	LIMESTONE (Drillers description)			
4.00	ES9	PID = 0.10ppm								
5.00										
5.50 - 5.64	SPT(C) N=50 (25 for 75mm/50 for 65mm) Hammer SN = 0209		5.50	5.40	60.86	5.50	Weak indistinctly thinly bedded grey fossiliferous LIMESTONE. Partially weathered: slightly reduced strength, closer fracture spacing at 5.50m to 5.85m. Discontinuities:			
5.60	C	100 91 83					1. 10to 20 degree bedding fractures, closely spaced (10/1117/950), undulating, smooth to rough, faint and patchy orangish brown staining on some fracture surfaces.			
6.30	C					(2.45)	2. 35 degree joint at 7.32m to 7.38m, undulating, rough, clean.			
7.00	C						3. 80 to 90 degree joints at 5.55m to 5.75m, undulating, rough, faint and patchy orangish brown staining on joint surface.			
7.00	C									
7.85	C	100 100 93					Medium strong crudely bedded grey fossiliferous LIMESTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing. Discontinuities:			
8.50	C				58.41	7.95	1. 20 to 30m degree bedding fractures, medium spaced (200/355/800) planar to undulating, rough, clean.			
8.50	C	100 100 94								
		TCR SCR RQD FI								

Water Strikes				Chiselling Details			Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)	
							Hand dug inspection pit to 1.20m
Casing Details		Water Added					
To (m)	Diam (mm)	From (m)	To (m)				
5.50	200						
				Core Barrel	Flush Type	Termination Reason	Last Updated
						Terminated on recovery of 6m competent core	11/10/2021





**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Borehole ID**  
BH07

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 2 of 2
Dynamic Sampling	Comacchio 601	0.00	4.00	174349.98 E 212879.58 N	11.50 m	12/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	4.00	5.50		Elevation: 66.36 mOD	End Date: 12/08/2021	Logger: JG+TH	FINAL
Rotary Coring	Comacchio 601	5.50	11.50					

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill	
9.50	C										Medium strong crudely bedded grey fossiliferous LIMESTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing. Discontinuities: 1. 20 to 30m degree bedding fractures, medium spaced (200/355/800) planar to undulating, rough, clean.		9.5	
10.00 10.00	C				3				(3.55)					10.0
10.72	C	100	100	100										10.5
11.50								54.86	11.50		End of Borehole at 11.50m		11.5	

Water Strikes				Chiselling Details			Remarks		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)			
								Hand dug inspection pit to 1.20m	
Casing Details		Water Added							
To (m)	Diam (mm)	From (m)	To (m)						
5.50	200			Core Barrel		Flush Type	Termination Reason	Last Updated	
							Terminated on recovery of 6m competent core	11/10/2021	



**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Borehole ID**  
BH08

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 2 Scale: 1:50
Dynamic Sampling	Comacchio 601	0.00	4.00	174396.39 E	11.70 m	18/08/2021	JG	FINAL
Rotary Drilling	Comacchio 601	4.00	5.70	212878.00 N	66.44 mOD	18/08/2021	JG+TH	
Rotary Coring	Comacchio 601	5.70	11.70					

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.10	B8							MADE GROUND: Light grey sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.		
0.50	ES1	PID = 0.00ppm								
1.00	ES2	PID = 0.00ppm			65.34	1.10				
1.10 - 2.00	B9							MADE GROUND: Very soft brown and greyish brown with light grey mottling slightly sandy slightly gravelly silty organic CLAY (reworked) with roots and rootlets. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
1.20 - 1.65	SPT (C)	N=7 (1,1/2,1,2,2) Hammer SN = 0209	1.20	Dry						
1.50	ES3	PID = 0.30ppm								
1.50	ES4									
2.00	B10									
2.00 - 2.70	SPT (C)	N=2 (1,0/1,0,1,0) Hammer SN = 0209	2.00	Dry						
2.00 - 2.45	SPT (C)	N=2 (1,0/1,0,1,0) Hammer SN = 0209	2.00	Dry						
2.50	ES5	PID = 0.50ppm			63.74	2.70		Plastic dark brown spongy fibrous silty PEAT.		
2.50	ES5	PID = 0.40ppm			63.44	3.00				
2.70 - 3.30	B11									
3.00	ES6									
3.00 - 3.45	UT12	Ublow=40 80% PID = 0.10ppm	3.00	Dry				Stiff light grey and light brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to medium. Cobbles are subangular to subrounded.		
3.00	UT12	Ublow=40 80% PID = 0.10ppm	3.00	Dry						
3.30 - 4.00	B13									
4.00	ES7									
4.00 - 5.00	B14									
4.00 - 4.45	SPT (C)	N=30 (3,7/8,7,7,8) Hammer SN = 0209	4.00	Dry						
4.00	SPT (C)	N=30 (3,7/8,7,7,8) Hammer SN = 0209	4.00	Dry						
4.00	SPT (C)	PID = 0.00ppm								
5.00 - 5.45	SPT (C)	N=36 (5,8/8,9,9,10) Hammer SN = 0209	5.00	Dry						
5.00 - 5.45	SPT (C)	N=36 (5,8/8,9,9,10) Hammer SN = 0209	5.00	Dry						
		Water strike at 5.50m			60.94	5.50		LIMESTONE (Drillers description)		
					60.74	5.70		Medium strong, locally weak, thinly bedded dark grey LIMESTONE with medium spaced medium beds of grey fossiliferous limestone. Partially weathered: slightly closer fracture spacing, orangish brown discolouration on some fracture surfaces. Discontinuities: 1. 10-20 degree bedding fractures, medium spaced (20/222/550), planar, smooth, strong orangish brown staining on some fracture surfaces. 2. 65-80 degree joints, at 9.75-9.88m and 10.20-10.25m, undulating, smooth, strong patchy dark orangish brown staining on some joint surfaces, (joint at 10.20-10.25m possibly drilling induced).		
6.10	C									
6.80	C									
7.20										
7.60	C									
8.47	C									
8.70	C									
9.10	C									

Water Strikes				Chiselling Details			Remarks	
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)		
5.50	5.50	20	2.65				Hand dug inspection pit to 1.20m	
Casing Details		Water Added						
To (m)	Diam (mm)	From (m)	To (m)					
5.70	200							
				Core Barrel	Flush Type	Termination Reason	Last Updated	
						Terminated on recovery of 6m competent core	11/10/2021	







**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
**BH08**

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 2 of 2
Dynamic Sampling	Comacchio 601	0.00	4.00	174396.39 E 212878.00 N	11.70 m	18/08/2021	JG	Scale: 1:50
Rotary Drilling	Comacchio 601	4.00	5.70		Elevation: 66.44 mOD	End Date: 18/08/2021	Logger: JG+TH	FINAL
Rotary Coring	Comacchio 601	5.70	11.70					

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
9.90	C	98	98	98						<p>Medium strong, locally weak, thinly bedded dark grey LIMESTONE with medium spaced medium beds of grey fossiliferous limestone. Partially weathered: slightly closer fracture spacing, orangish brown discolouration on some fracture surfaces.</p> <p>Discontinuities:</p> <ol style="list-style-type: none"> <li>10-20 degree bedding fractures, medium spaced (20/222/550), planar, smooth, strong orangish brown staining on some fracture surfaces.</li> <li>65-80 degree joints, at 9.75-9.88m and 10.20-10.25m, undulating, smooth, strong patchy dark orangish brown staining on some joint surfaces, (joint at 10.20-10.25m possibly drilling induced).</li> </ol>			
10.20													
10.48	C												
10.85	C	100	100	83									
11.57	C							54.74	11.70				
11.70											End of Borehole at 11.70m		

Water Strikes				Chiselling Details			Remarks	
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)		
5.50	5.50	20	2.65					
Casing Details		Water Added		Core Barrel	Flush Type	Termination Reason	Last Updated	
To (m)	Diam (mm)	From (m)	To (m)					
5.70	200							
Terminated on recovery of 6m competent core							11/10/2021	



**Project No.**  
21-0937

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
BH09

Method	Plant Used	Top (m)	Base (m)	Coordinates	Final Depth:	Start Date:	Driller:	Sheet 1 of 1 Scale: 1:50
Dynamic Sampling	Comacchio 601	0.00	1.00	174370.44 E	8.50 m	13/08/2021	JG	FINAL
Rotary Drilling	Comacchio 601	1.00	2.50	212834.58 N	Elevation: 66.36 mOD	End Date: 13/08/2021	Logger: JG+TH	
Rotary Coring	Comacchio 601	2.50	8.50					

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.15 - 1.00	B4	PID = 0.20ppm			66.21	0.15	MADE GROUND: BITMAC	MADE GROUND: Grey sandy silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
0.50	ES1									
0.50	ES1	PID = 0.00ppm			65.36	1.00	Medium dense light grey with yellow brown mottling very sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.	LIMESTONE (Drillers description)		
1.00	ES2									
1.00 - 2.00	B5	N=25 (5,5/5,7,6,7) Hammer SN = 0209	1.20	Dry	64.36	2.00		Weak crudely bedded grey LIMESTONE. Partially weathered: reduced strength, closer fracture spacing, orangish brown discolouration on most joint surfaces. Discontinuities: 1. 20-30 degree bedding fractures, closely spaced (10/64/200), planar, rough, patchy orangish brown staining on some fracture surfaces, orangish grey clay infill on some fracture surfaces (1-5mm thick). 2. 40-50 degree joints, at 2.50-2.72m and 2.88-3.00m, undulating, rough, orangish brown staining on joint surfaces.		
1.20 - 1.65	SPT (C)									
1.56	EW101	PID = 0.00ppm			63.86	2.50		Weak, locally medium strong, crudely bedded grey LIMESTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing, orangish brown discolouration on fracture surfaces. Discontinuities: 1. 20-30 degree bedding fractures, medium spaced (30/400/1050), undulating, rough, patchy orangish brown staining on some fracture surfaces, grey clay infill on some fracture surfaces (1-5mm thick). 2. 40-50 degree joints, widely spaced (200/1000/1300), undulating, rough, strong orangish brown staining on most joint surfaces. 3. 75-85 degree joints at, 5.25-5.50m and 7.10-7.67m (incipient from 7.47-7.67m), undulating, rough, strong orangish brown staining on joint surfaces.		
1.75	EW100									
2.00	ES3				63.16	3.20		End of Borehole at 8.50m		
2.00 - 2.50	B6									
2.00										
3.18	C	100	93	56	18					
3.82	C									
4.00	C									
4.33	C	100	100	98						
5.05	C									
5.50	C									
5.73	C				5					
5.90	C	100	100	100						
6.65	C									
7.00	C									
7.68	C	100	100	87						
8.10	C									
8.50						57.86	8.50			

Water Strikes				Chiselling Details			Remarks	
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)		
								Hand dug inspection pit to 1.20m Groundwater Monitoring Standpipe Installation
Casing Details		Water Added		Core Barrel	Flush Type	Termination Reason	Last Updated	
To (m)	Diam (mm)	From (m)	To (m)					
2.50	200					Terminated on recovery of 6m competent core	11/10/2021	





**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
**BH09A**

<b>Method</b> Rotary Drilling	<b>Plant Used</b> Comacchio 601	<b>Top (m)</b> 0.00	<b>Base (m)</b> 2.00	<b>Coordinates</b> 174368.76 E 212833.06 N	<b>Final Depth:</b> 2.00 m	<b>Start Date:</b> 16/08/2021	<b>Driller:</b> JG	Sheet 1 of 1 Scale: 1:40
					<b>Elevation:</b> 66.38 mOD	<b>End Date:</b> 16/08/2021	<b>Logger:</b> JG	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
1.00 - 2.00	B1				66.22	0.15		MADE GROUND: BITMAC		
					65.47	0.90		MADE GROUND: Grey sandy silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
					64.38	2.00		Dense light grey with yellow brown mottling very sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.		
								End of Borehole at 2.00m		

<b>Water Strikes</b>				<b>Remarks</b> Hand dug inspection pit to 1.20m Gas Monitoring Standpipe Installation							
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)								
<b>Casing Details</b>				<b>Water Added</b>				<b>Core Barrel</b>			
To (m)	Diam (mm)	From (m)	To (m)	From (m)	To (m)	To (m)					
2.00	200										
							<b>Flush Type</b>	<b>Termination Reason</b>	<b>Last Updated</b>		
								Terminated at scheduled depth	11/10/2021		



**CAUSEWAY**  
GEOTECH

**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep** AECOM Ireland Ltd

**Borehole ID**  
**BH10**

<b>Method</b> Rotary Drilling Rotary Coring	<b>Plant Used</b> Comacchio 601 Comacchio 601	<b>Top (m)</b> 0.00 2.50	<b>Base (m)</b> 2.50 8.50	<b>Coordinates</b> 174411.47 E 212833.74 N	<b>Final Depth:</b> 8.50 m	<b>Start Date:</b> 18/08/2021	<b>Driller:</b> JG	Sheet 1 of 2 Scale: 1:40
					<b>Elevation:</b> 66.47 mOD	<b>End Date:</b> 18/08/2021	<b>Logger:</b> JG+TH	<b>FINAL</b>

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.50	ES1							66.32	0.15	MADE GROUND: BITMAC			
0.50 - 1.00	B4							65.97	0.50	MADE GROUND: Grey angular fine to coarse GRAVEL.			
1.00	ES2									MADE GROUND: Light grey and light brown very sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.			
1.00 - 1.80	B5												
1.50	ES3							64.67	1.80	LIMESTONE (Driller's description)			
2.57	C							63.97	2.50	Medium strong, locally strong, crudely bedded grey fossiliferous LIMESTONE. Largely unweathered: orangish brown discolouration on some joint surfaces. Discontinuities: 1. 20-30 degree bedding fractures, medium spaced (10/316/670), undulating, smooth, strong dark orangish brown staining on some fracture surfaces. 2. 60-70 degree joint, at 6.65-6.80m, undulating, rough. strong patchy orangish red and dark brown staining on joint surface.			
3.74	C	100	100	94									
4.00	C												
4.35	C	98	98	98	3								
5.36	C												
5.50	C												
5.50	C												
6.00	C	99	99	99									
6.73	C												
7.00	C												
		TCR	SCR	RQD	FI								

<b>Water Strikes</b>				<b>Remarks</b>			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	Hand dug inspection pit to 1.20m			
<b>Casing Details</b>		<b>Core Barrel</b>					
To (m)	Diam (mm)						
2.50	200						
		<b>Flush Type</b>		<b>Termination Reason</b>		<b>Last Updated</b>	
				Terminated on recovery of 6m competent core		11/10/2021	





**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep** AECOM Ireland Ltd

**Borehole ID**  
**BH10**

<b>Method</b>	<b>Plant Used</b>	<b>Top (m)</b>	<b>Base (m)</b>	<b>Coordinates</b>	<b>Final Depth:</b> 8.50 m	<b>Start Date:</b> 18/08/2021	<b>Driller:</b> JG	Sheet 2 of 2 Scale: 1:40
Rotary Drilling Rotary Coring	Comacchio 601 Comacchio 601	0.00 2.50	2.50 8.50	174411.47 E 212833.74 N	<b>Elevation:</b> 66.47 mOD	<b>End Date:</b> 18/08/2021	<b>Logger:</b> JG+TH	

Depth (m)	Samples / Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
7.40	C										Medium strong, locally strong, crudely bedded grey fossiliferous LIMESTONE. Largely unweathered: orangish brown discolouration on some joint surfaces. Discontinuities: 1. 20-30 degree bedding fractures, medium spaced (10/316/670), undulating, smooth, strong dark orangish brown staining on some fracture surfaces. 2. 60-70 degree joint, at 6.65-6.80m, undulating, rough. strong patchy orangish red and dark brown staining on joint surface.		
8.25	C	100	97	97				57.97	8.50				
8.50											End of Borehole at 8.50m		

<b>Water Strikes</b>				<b>Remarks</b>			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	Hand dug inspection pit to 1.20m			
<b>Casing Details</b>		<b>Core Barrel</b>					
To (m)	Diam (mm)						
2.50	200						
		<b>Flush Type</b>		<b>Termination Reason</b>		<b>Last Updated</b>	
				Terminated on recovery of 6m competent core		11/10/2021	





**CAUSEWAY**  
GEOTECH

**Project No.**  
**21-0937**

**Project Name:** Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Client:** EP UK Investments

**Client's Rep:** AECOM Ireland Ltd

**Borehole ID**  
**BH11**

<b>Method</b> Dynamic Sampling	<b>Plant Used</b> Comacchio 601	<b>Top (m)</b> 0.00	<b>Base (m)</b> 0.60	<b>Coordinates</b> 174401.98 E 212944.49 N	<b>Final Depth:</b> 0.60 m	<b>Start Date:</b> 20/08/2021	<b>Driller:</b> JG	Sheet 1 of 1 Scale: 1:50
					<b>Elevation:</b> 67.34 mOD	<b>End Date:</b> 20/08/2021	<b>Logger:</b> JG	<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill	
0.00 - 1.60	B2	PID = 0.20ppm			66.74	0.60		MADE GROUND: Grey angular fine to coarse GRAVEL.			
0.50	ES1								End of Borehole at 0.60m		
0.50											

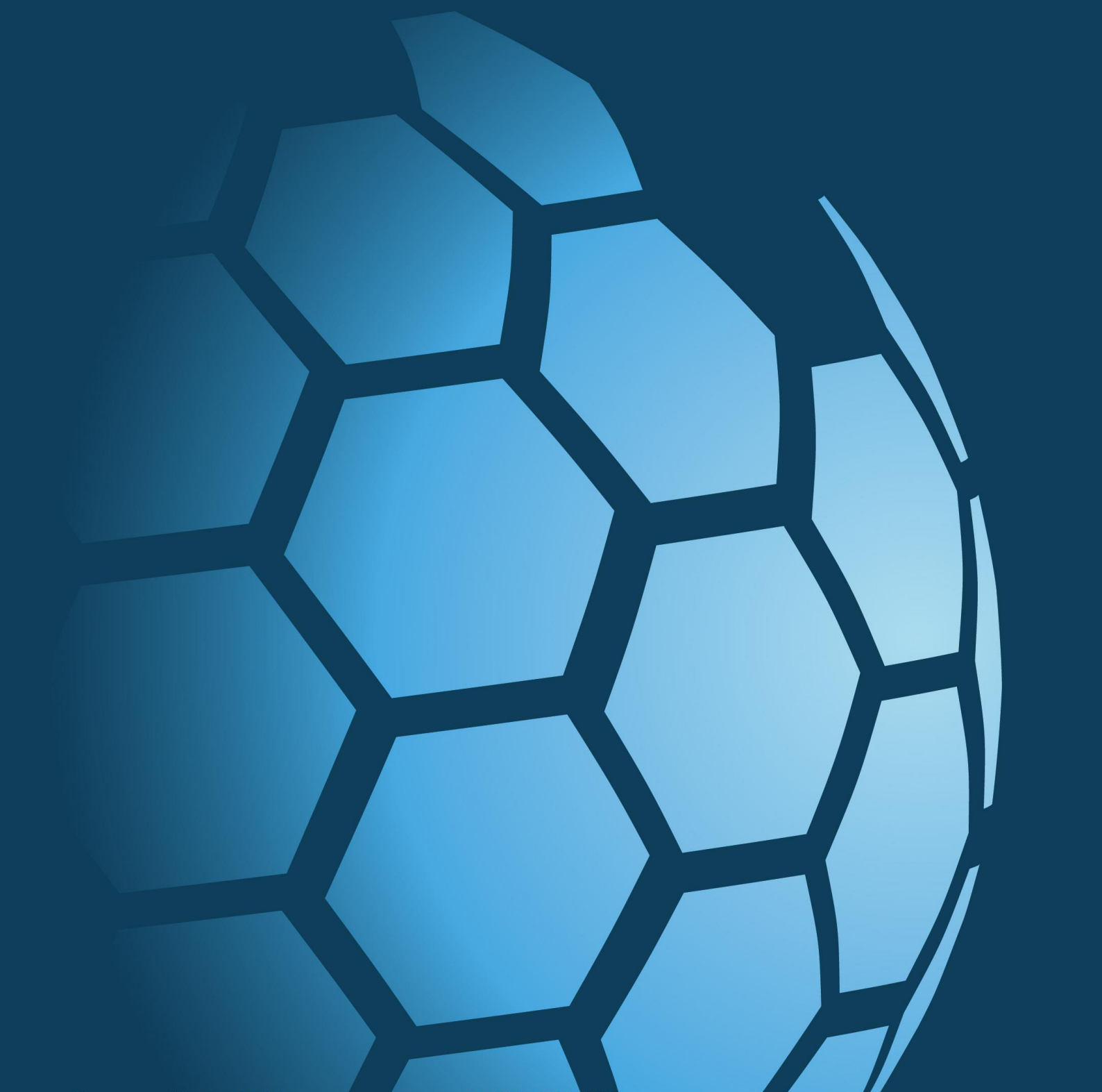
Water Strikes				Casing Details		Remarks
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	To (m)	Diameter	
						Hand dug inspection pit to 0.60m Ground too loose to continue by hand digging - arisings spalling into pit Proximity to gas and water mains precludes use of rotary open hole techniques
<b>Termination Reason</b>						<b>Last Updated</b>
Terminated at 0.60m by Investigation Supervisor due to proximity to gas main						11/10/2021

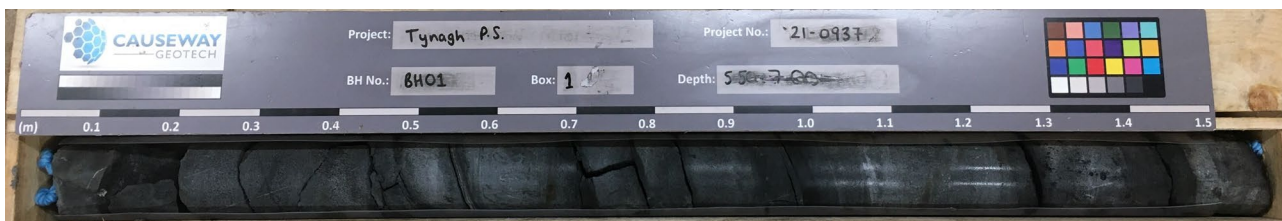




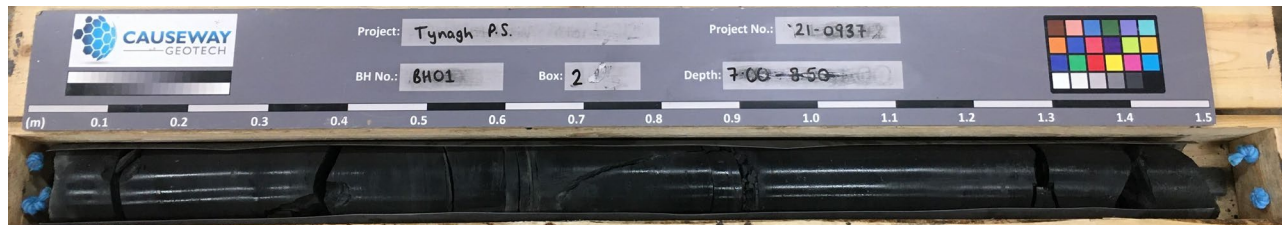
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**APPENDIX C**  
**CORE PHOTOGRAPHS**

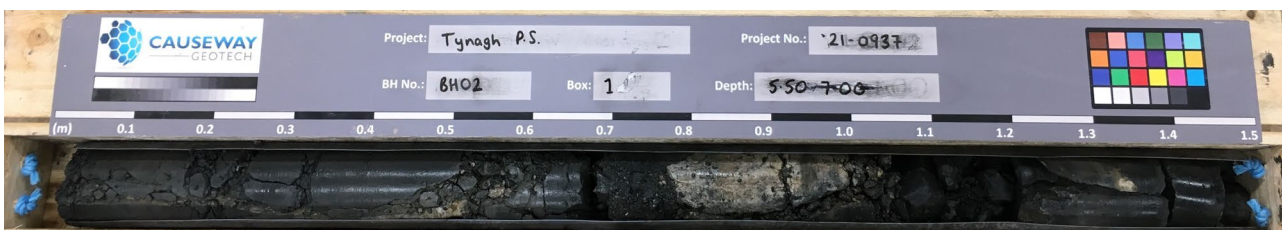




BH01 Box 1 5.50-7.00m



BH01 Box 2 7.00-8.50m



BH02 Box 1 5.50-7.00m

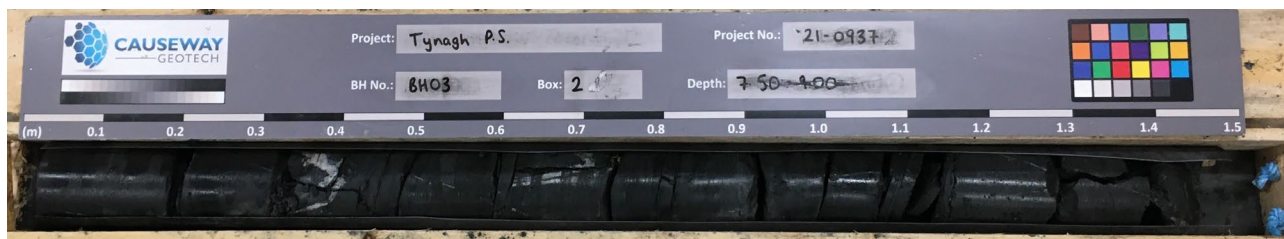


BH02 Box 2 7.00-8.50m

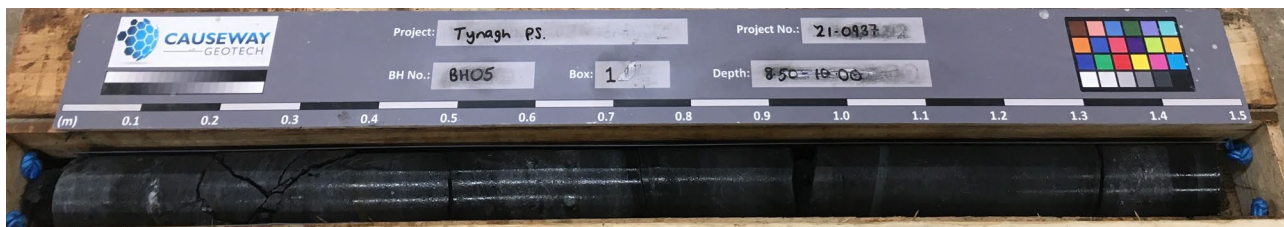




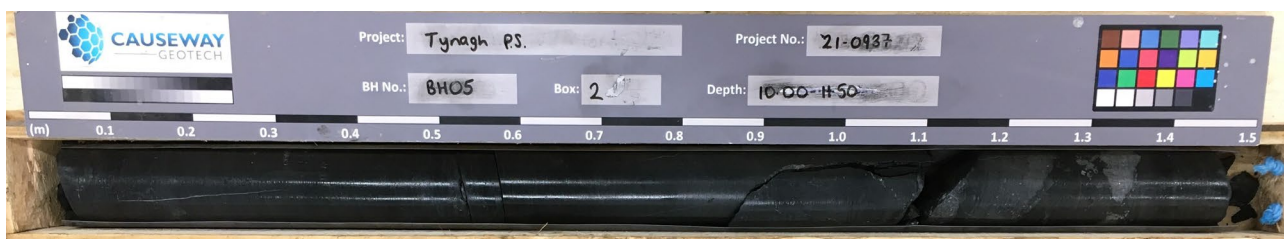
**BH03 Box 1 6.00-7.50m**



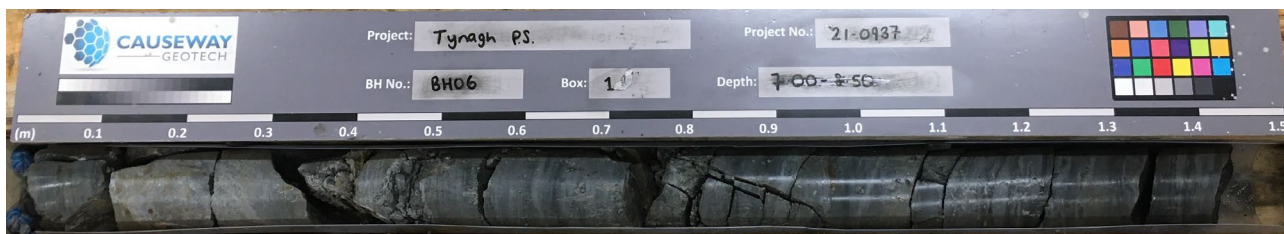
**BH03 Box 2 7.50-9.00m**



**BH05 Box 1 8.50-10.00m**



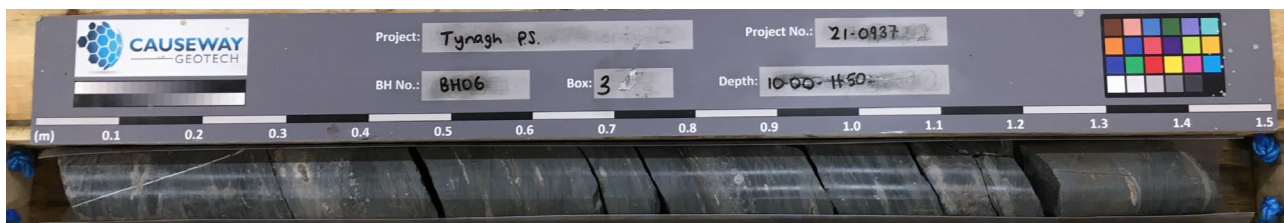
**BH05 Box 2 10.00-11.50m**



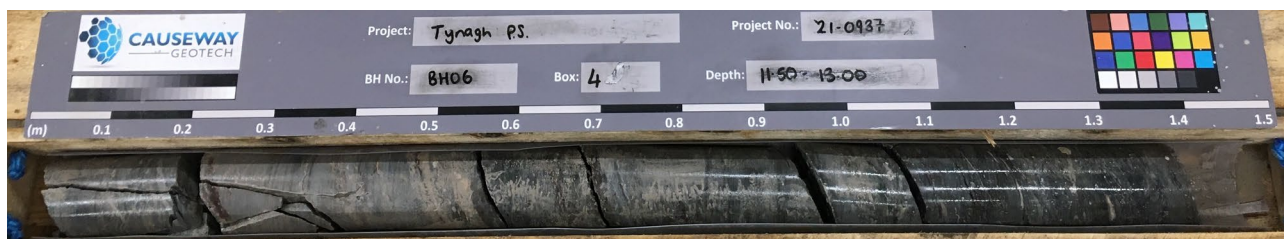
**BH06 Box 1 7.00-8.50m**



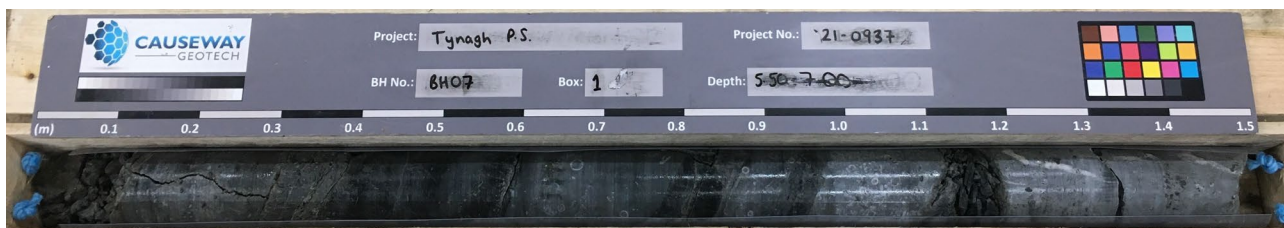
**BH06 Box 2 8.50-10.00m**



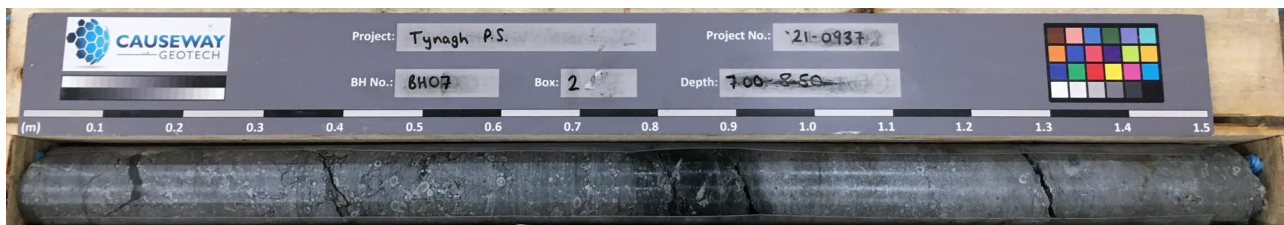
**BH06 Box 3 10.00-11.50m**



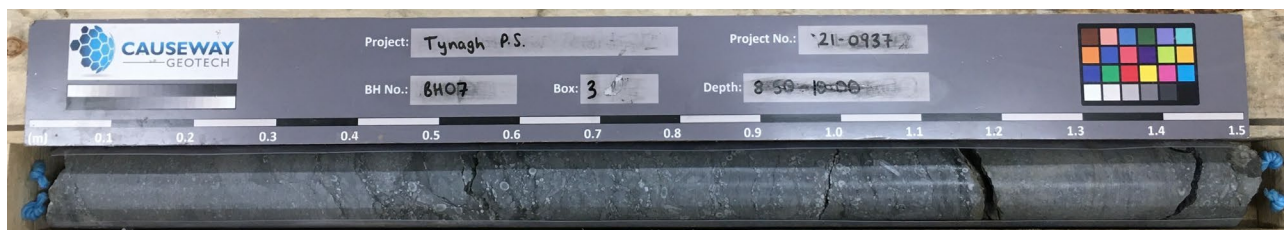
**BH06 Box 4 11.50-13.00m**



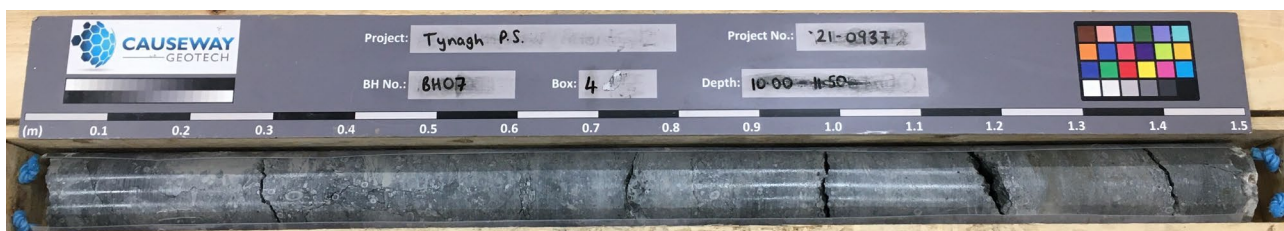
**BH07 Box 1 5.50-7.00m**



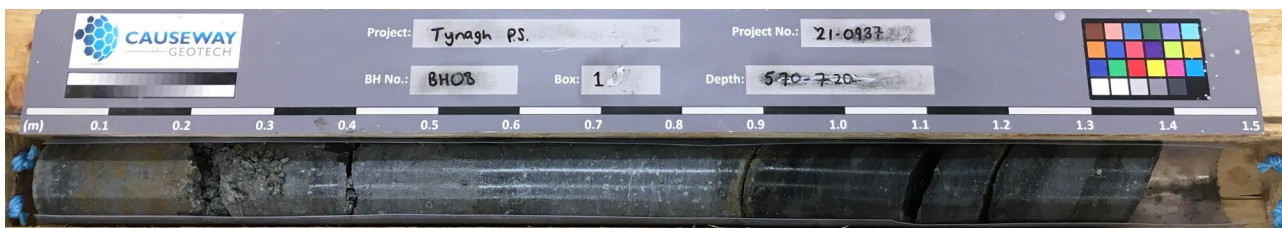
**BH07 Box 2 7.00-8.50m**



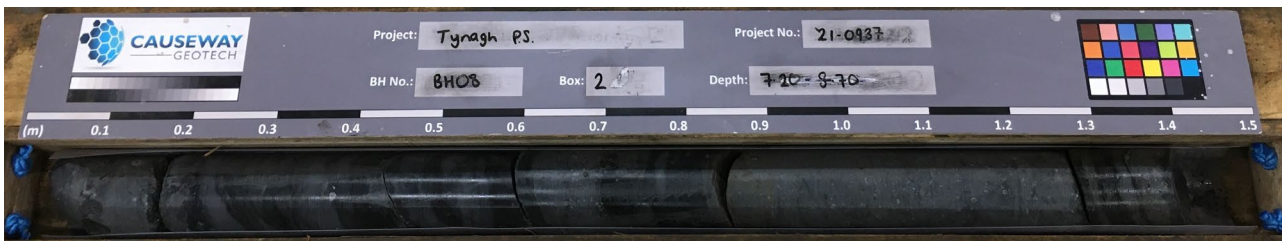
**BH07 Box 3 8.50-10.00m**



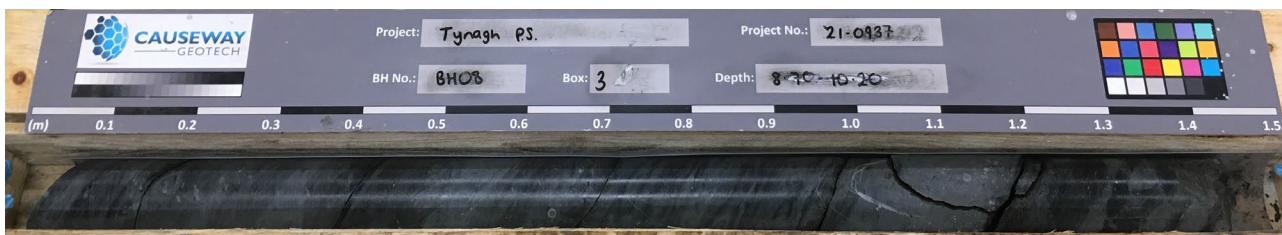
**BH07 Box 4 10.00-11.50m**



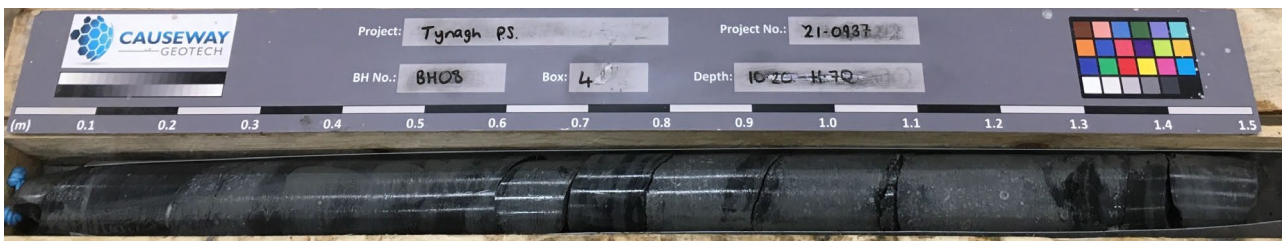
**BH08 Box 1 5.20-7.20m**



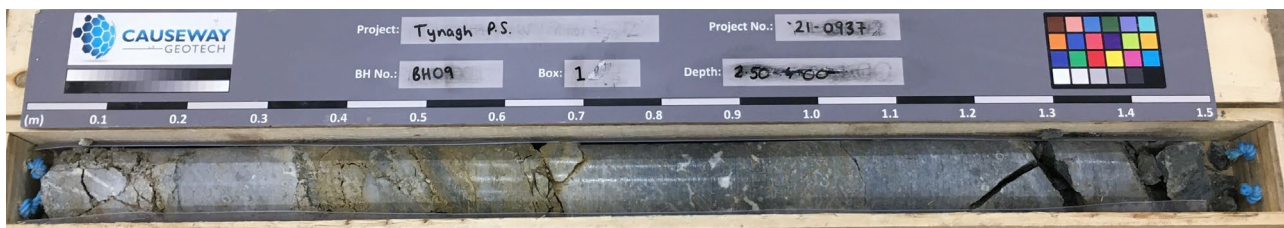
**BH08 Box 2 7.20-8.70m**



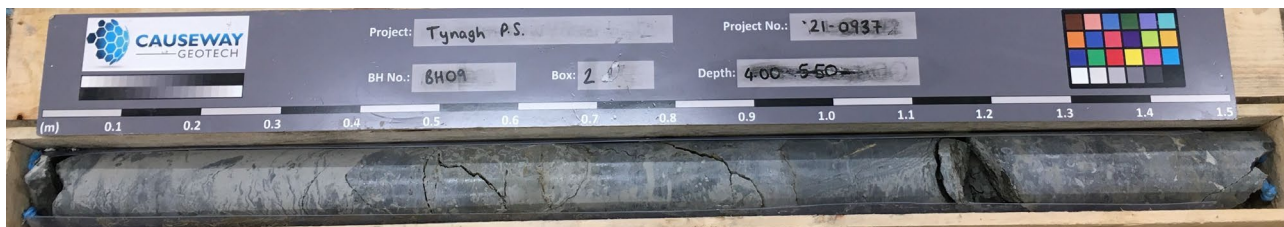
**BH08 Box 3 8.70-10.20m**



**BH08 Box 4 10.20-11.70m**



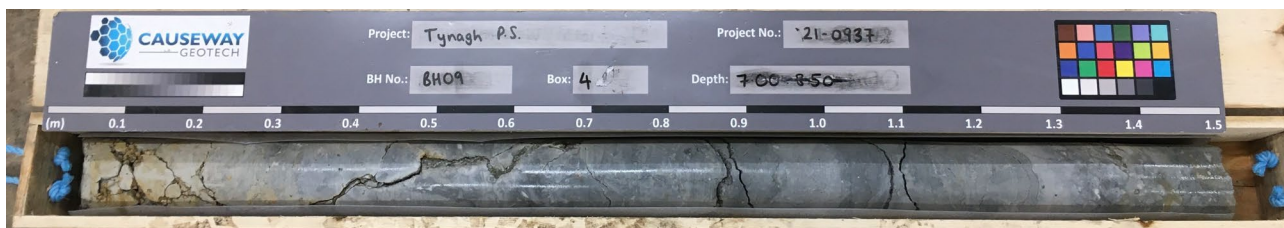
BH09 Box 1 2.50-4.00m



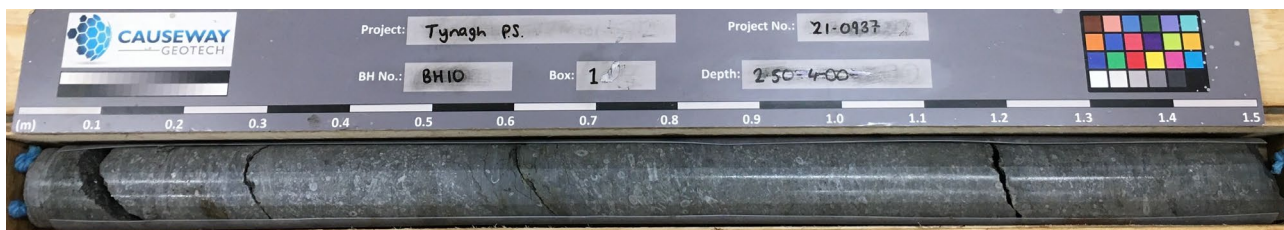
BH09 Box 2 4.00-5.50m



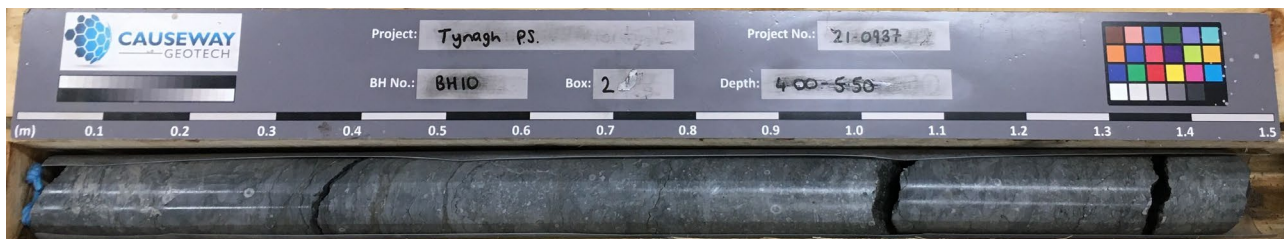
BH09 Box 3 5.50-7.00m



BH09 Box 4 7.00-8.50m



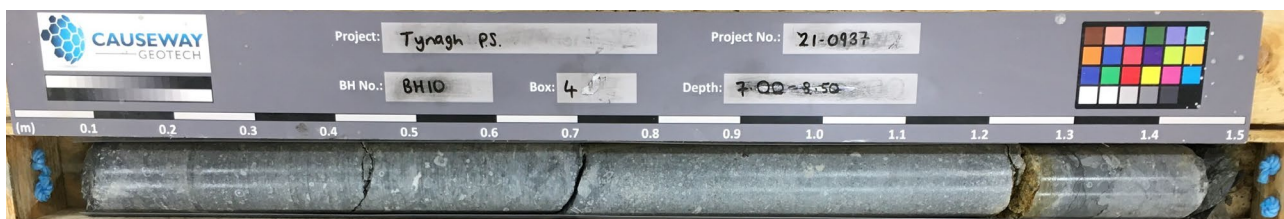
BH10 Box 1 2.50-4.00m



BH10 Box 2 4.00-5.50m



BH10 Box 3 5.50-7.00m

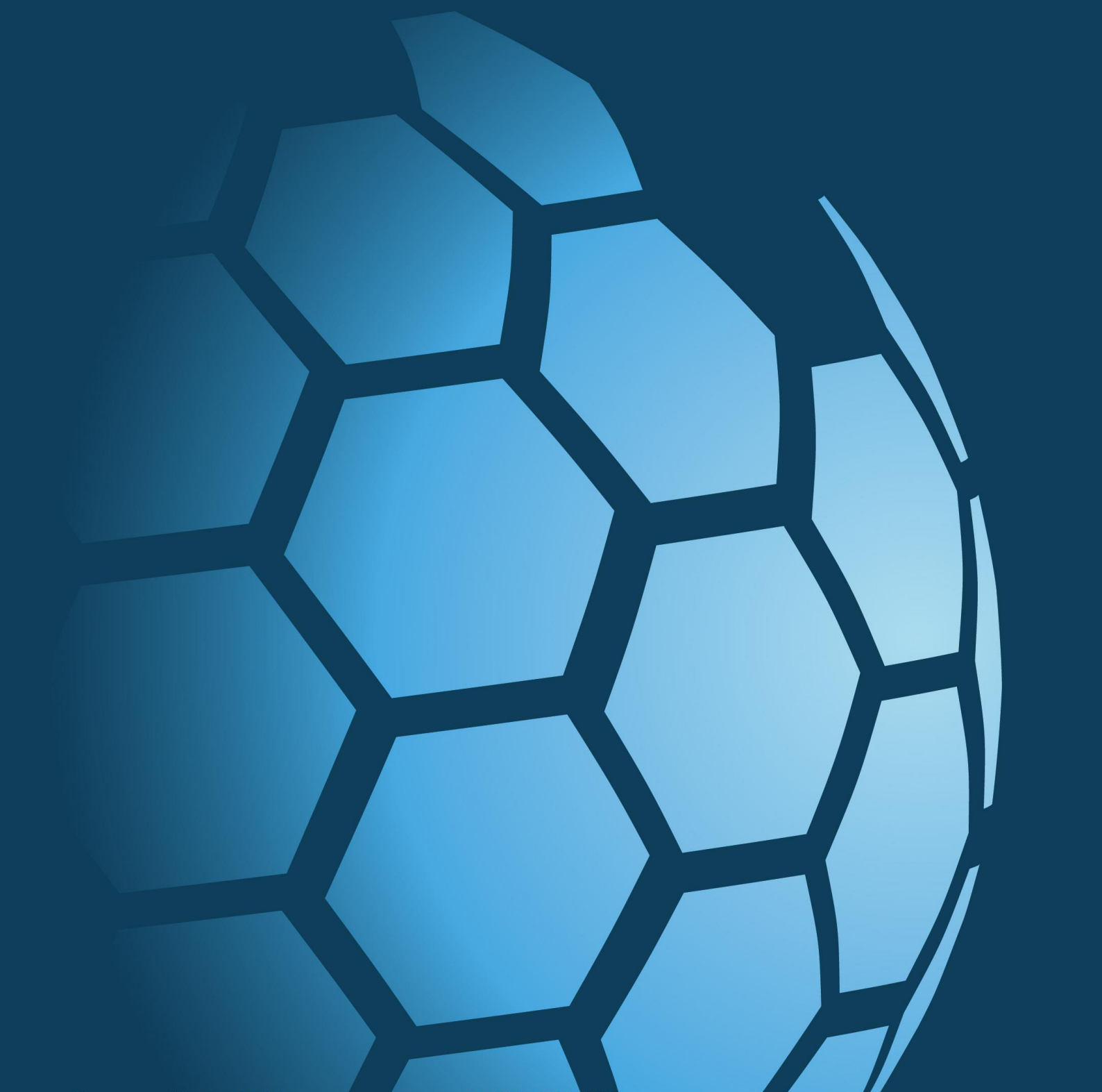


BH10 Box 4 7.00-8.50m



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**APPENDIX D**  
**TRIAL PIT LOGS**





<b>Project No.</b> 21-0937	<b>Project Name:</b> Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation		<b>Trial Pit ID</b>  TP01
<b>Coordinates</b> 174344.41 E 213069.71 N	<b>Client:</b> EP UK Investments		
<b>Method:</b> Trial Pitting	<b>Client's Representative:</b> AECOM Ireland Ltd		Sheet 1 of 1 Scale: 1:25
<b>Plant:</b> 8T Tracked Excavator	<b>Elevation</b> 65.46 mOD	<b>Date:</b> 11/08/2021	<b>Logger:</b> JG

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.10	B2	Strong flow at 0.20m  PID = 0.20ppm	64.96	0.50		MADE GROUND: Grey sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.	
0.30	ES1					End of trial pit at 0.50m	
0.30							

<b>Water Strikes</b>		<b>Depth:</b> 0.50 <b>Width:</b> 1.00 <b>Length:</b> 2.80	<b>Remarks:</b>
<b>Struck at (m)</b> 0.20	<b>Remarks</b> Strong flow at 0.20m		
<b>Stability:</b> Unstable		<b>Termination Reason:</b> Terminated due to water inflow	<b>Last Updated</b> 11/10/2021







<b>Project No.</b> 21-0937	<b>Project Name:</b> Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation	<b>Trial Pit ID</b>  <b>TP02</b>
<b>Coordinates</b> 174353.61 E 213044.63 N	<b>Client:</b> EP UK Investments	
<b>Method:</b> Trial Pitting	<b>Client's Representative:</b> AECOM Ireland Ltd	Sheet 1 of 1 Scale: 1:25
<b>Plant:</b> 8T Tracked Excavator	<b>Elevation</b> 65.07 mOD	<b>Date:</b> 11/08/2021
		<b>Logger:</b> JG
		<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.30 - 0.70	B6	PID = 0.30ppm	64.97	0.10	[Pattern]	MADE GROUND: Grey angular fine to coarse GRAVEL.	
			64.77	0.30		MADE GROUND: Compacted angular fine to coarse GRAVEL.	
0.50 0.50	ES1	PID = 0.50ppm	64.37	0.70	[Pattern]	MADE GROUND: Light grey slightly sandy clayey angular to subangular fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular.	0.5
0.70 - 1.20	B7						
1.00 1.00	ES2	PID = 0.50ppm	63.37	1.70	[Pattern]	MADE GROUND: Stiff dark grey slightly sandy slightly gravelly silty CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular.	1.0
1.20 - 1.70	B8						
1.50 1.50	ES3	PID = 1.80ppm	63.07	2.00	[Pattern]	MADE GROUND: Soft light brown and light grey slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular.	2.0
1.70 - 2.00	B9						
2.00 2.00 - 3.00 2.00	ES4 B10	PID = 139.20ppm Seepage at 2.00m	62.07	3.00	[Pattern]	MADE GROUND: Firm light brown with dark grey mottling slightly sandy slightly gravelly silty CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular.	2.0
2.50 2.50	ES5						
		Groundwater encountered at 2.90m					3.0
						End of trial pit at 3.00m	

<b>Water Strikes</b>		<b>Depth:</b> 3.00 <b>Width:</b> 1.00 <b>Length:</b> 4.30	<b>Remarks:</b>
Struck at (m)	Remarks		
2.00	Seepage at 2.00m	<b>Stability:</b> Stable	<b>Termination Reason:</b> Terminated due to restricted space
2.90	Groundwater encountered at 2.90m		
		<b>Last Updated</b> 11/10/2021	



<b>Project No.</b> 21-0937	<b>Project Name:</b> Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation	<b>Trial Pit ID</b>  <b>TP03</b>
<b>Coordinates</b> 174388.99 E 213046.63 N	<b>Client:</b> EP UK Investments	
<b>Method:</b> Trial Pitting	<b>Client's Representative:</b> AECOM Ireland Ltd	Sheet 1 of 1 Scale: 1:25
<b>Plant:</b> 8T Tracked Excavator	<b>Elevation</b> 65.01 mOD	<b>Date:</b> 11/08/2021
		<b>Logger:</b> JG
		<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.30	ES1	PID = 0.60ppm	64.71	0.30		MADE GROUND: Grey angular fine to coarse GRAVEL.	
0.30 - 0.50	B5					MADE GROUND: Brown sandy clayey subangular fine to coarse GRAVEL with fragments of steel. Sand is fine to coarse.	
0.30							
0.50	ES2	PID = 1.50ppm	64.51	0.50		MADE GROUND: Dark grey and grey sandy silty angular to subangular fine to coarse GRAVEL with medium cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular.	0.5
0.50 - 1.00	B6						
0.50							
1.00	ES3	PID = 2.60ppm					1.0
1.00 - 1.50	B7						
1.00							
1.50	ES4	PID = 1.20ppm					1.5
1.50 - 1.90	B8						
1.50							
2.00		HVP=89, HVR=27	63.11	1.90		End of trial pit at 1.90m	2.0
							2.5
							3.0
							3.5
							4.0
							4.5

<b>Water Strikes</b>		<b>Depth:</b> 1.90 <b>Width:</b> 1.10 <b>Length:</b> 3.60	<b>Remarks:</b> No groundwater encountered	<b>Last Updated</b> 11/10/2021	
Struck at (m)	Remarks				
		<b>Stability:</b> Unstable	<b>Termination Reason:</b> Terminated due to sidewall instability		



<b>Project No.</b> 21-0937	<b>Project Name:</b> Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation	<b>Trial Pit ID</b>  <b>TP04</b>
<b>Coordinates</b> 174327.33 E 212951.18 N	<b>Client:</b> EP UK Investments	
<b>Method:</b> Trial Pitting	<b>Client's Representative:</b> AECOM Ireland Ltd	Sheet 1 of 1 Scale: 1:25
<b>Plant:</b> 8T Tracked Excavator	<b>Elevation</b> 66.49 mOD	<b>Date:</b> 11/08/2021
	<b>Logger:</b> JG	<b>FINAL</b>

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.10 - 0.50	B5		66.39	0.10		MADE GROUND: Grey angular fine to coarse GRAVEL.	
						MADE GROUND: Light grey sandy angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.	
0.50 0.50 - 1.00 0.50	ES1 B6	PID = 0.10ppm	65.99	0.50		MADE GROUND: Brown sandy clayey angular to subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular.	0.5
1.00 1.00 - 1.50 1.00	ES2 B7	PID = 14.70ppm					1.0
1.50 1.50 - 2.00 1.50	ES3 B8	PID = 47.30ppm					1.5
2.00 2.00 - 2.10 2.00	ES4 B9	PID = 6.40ppm	64.49 64.39	2.00 2.10		MADE GROUND: Stiff light brown slightly sandy slightly gravelly silty CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular.	2.0
						End of trial pit at 2.10m	2.5 3.0 3.5 4.0 4.5

<b>Water Strikes</b>		<b>Depth:</b> 2.10 <b>Width:</b> 0.60 <b>Length:</b> 3.80	<b>Remarks:</b> No groundwater encountered
Struck at (m)	Remarks		
		<b>Stability:</b> Unstable	<b>Termination Reason:</b> Terminated on possible large boulders
			<b>Last Updated</b> 11/10/2021



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**Project No.**  
21-0937

**Project Name:**  
Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation

**Trial Pit ID**  
**TP05**

**Coordinates**  
174345.58 E  
212905.94 N

**Client:**  
EP UK Investments  
**Client's Representative:**  
AECOM Ireland Ltd

Sheet 1 of 1  
Scale: 1:25

**Method:**  
Ttrial Pitting

**Plant:**  
8T Tracked Excavator

**Elevation**  
66.49 mOD

**Date:**  
11/08/2021

**Logger:**  
MG

FINAL

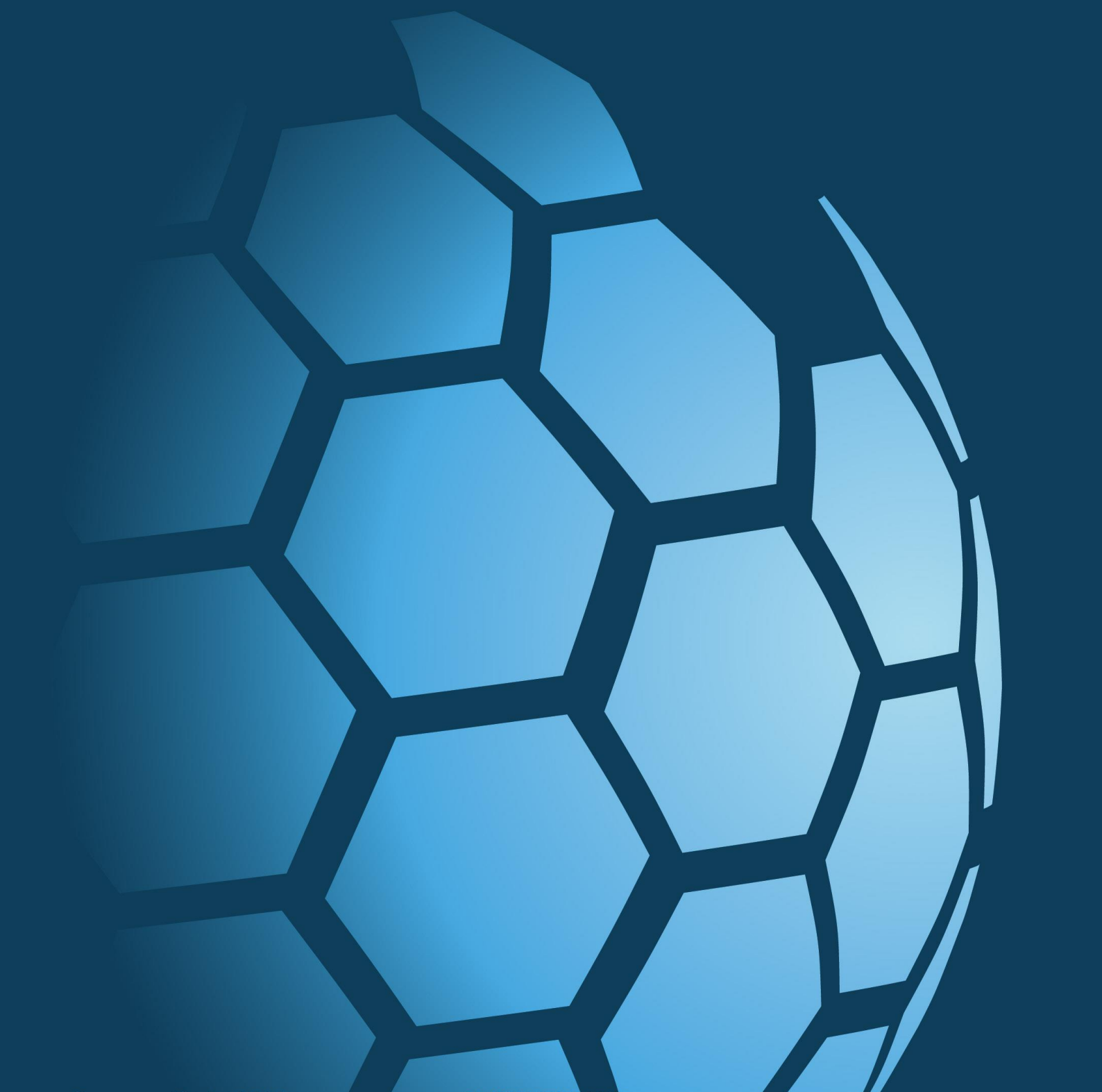
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
0.20	B2	PID = 0.00ppm	66.29	0.20		MADE GROUND: Grey angular fine to coarse GRAVEL.	
0.20	ES1					MADE GROUND: Light grey sandy silty angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.	
0.20			66.09	0.40		End of trial pit at 0.40m	
							0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

<b>Water Strikes</b>		<b>Depth:</b> 0.40 <b>Width:</b> 0.50 <b>Length:</b> 3.70	<b>Remarks:</b> No groundwater encountered	<b>Last Updated</b> 11/10/2021	
Struck at (m)	Remarks				
		<b>Stability:</b> Stable	<b>Termination Reason:</b> Terminated on reinforced concrete slab		



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**APPENDIX E**  
**TRIAL PIT PHOTOGRAPHS**





**Trial Pit: TP01**



**Trial Pit: TP01**



**Trial Pit: TP01**



**Trial Pit: TP01**





Trial Pit: TP01



Trial Pit: TP01



**Trial Pit: TP01**



Trial Pit: TP02



Trial Pit: TP02



Trial Pit: TP02



Trial Pit: TP02



Trial Pit: TP02





**Trial Pit: TP02**



**Trial Pit: TP02**



**Trial Pit: TP02**



Trial Pit: TP02



Trial Pit: TP02



**Trial Pit: TP03**



**Trial Pit: TP03**



**Trial Pit: TP03**



Trial Pit: TP03





Trial Pit: TP03



**Trial Pit: TP03**



**Trial Pit: TP03**



**Trial Pit: TP03**



**Trial Pit: TP04**



Trial Pit: TP04



**Trial Pit: TP04**



**Trial Pit: TP04**



**Trial Pit: TP04**





Trial Pit: TP04



**Trial Pit: TP04**



**Trial Pit: TP04**



**Trial Pit: TP04**



**Trial Pit: TP04**



Trial Pit: TP05



Trial Pit: TP05



Trial Pit: TP05



Trial Pit: TP05





**Trial Pit: TP05**



**Trial Pit: TP05**



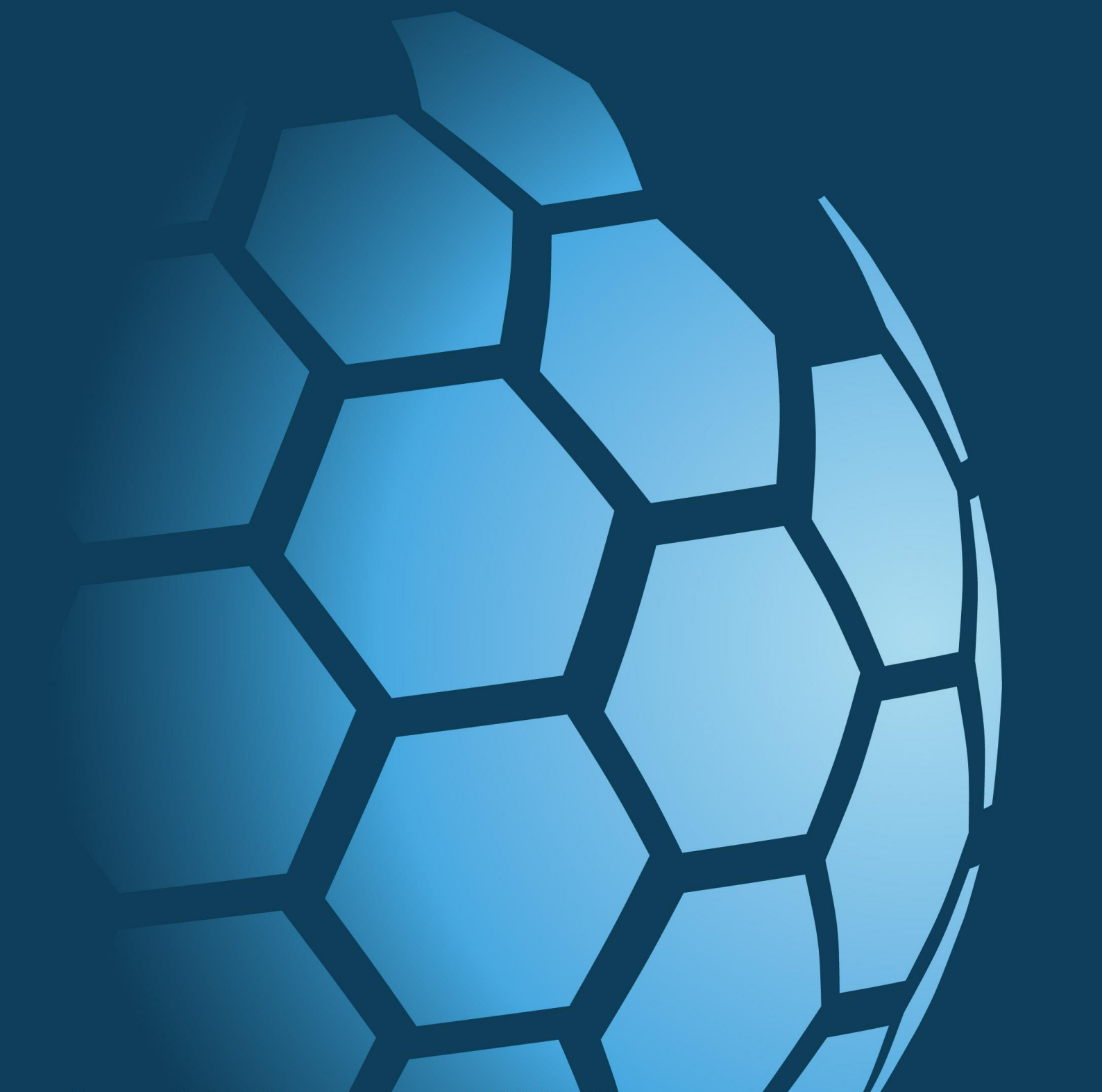
**Trial Pit: TP05**



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**APPENDIX F**

**INDIRECT IN-SITU CBR TEST RESULTS**







### Dynamic Cone Penetrometer (DCP) test results and estimated CBR

Project Number	21-0937
Project Name	Tynagh Power Station OCGT
Site Location	Tynagh, Galway

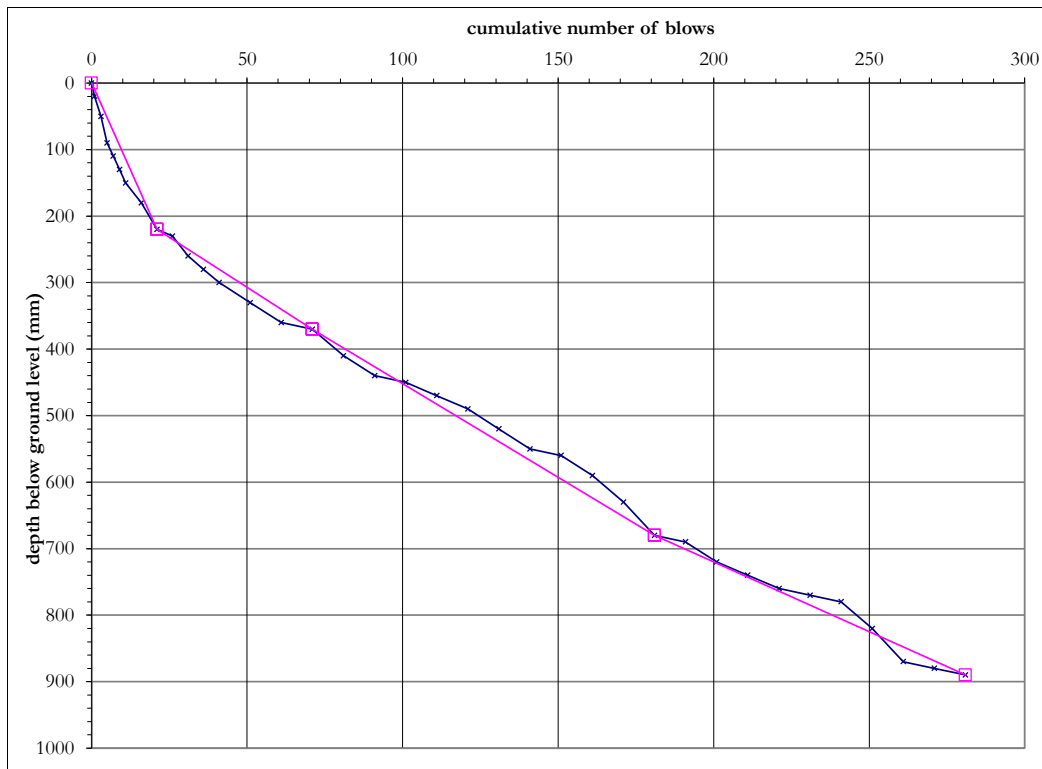


Test Number	DCP @ TP03
Depth bgl (m)	0.00

Date Tested	11/08/2021
Weather	Dry

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4.  
 CBR calculated using the TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{mm/blow})$  iaw IAN 73/06 Rev 1 2009.

<b>Surface preparation</b>	<b>Description of surface material at test depth</b>
N/A	Imported Gravel fill




top / base of layer (mm)	mm/ blow	CBR (%)
0 / 220	10	25
220 / 370	3	95
370 / 680	2.8	>100
680 / 890	2.1	>100

<b>CBR Range</b>	Min: 25	The selection of layers is based on visual interpretation of the data. The insitu DCP reading (mm/blow) and CBR values are valid at the time of testing; variation in moisture content or other factors may affect the insitu value.
	Max: >100	

<b>Deviation(s) from standard procedure</b>	None
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<b>Observations and comments</b>	
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Approved Name and Appointment		
Darren O'Mahony Director		August 2021



**Dynamic Cone Penetrometer (DCP) test results and estimated CBR**

<b>Project Number</b>	21-0937
<b>Project Name</b>	Tynagh Power Station OCGT
<b>Site Location</b>	Tynagh, Galway

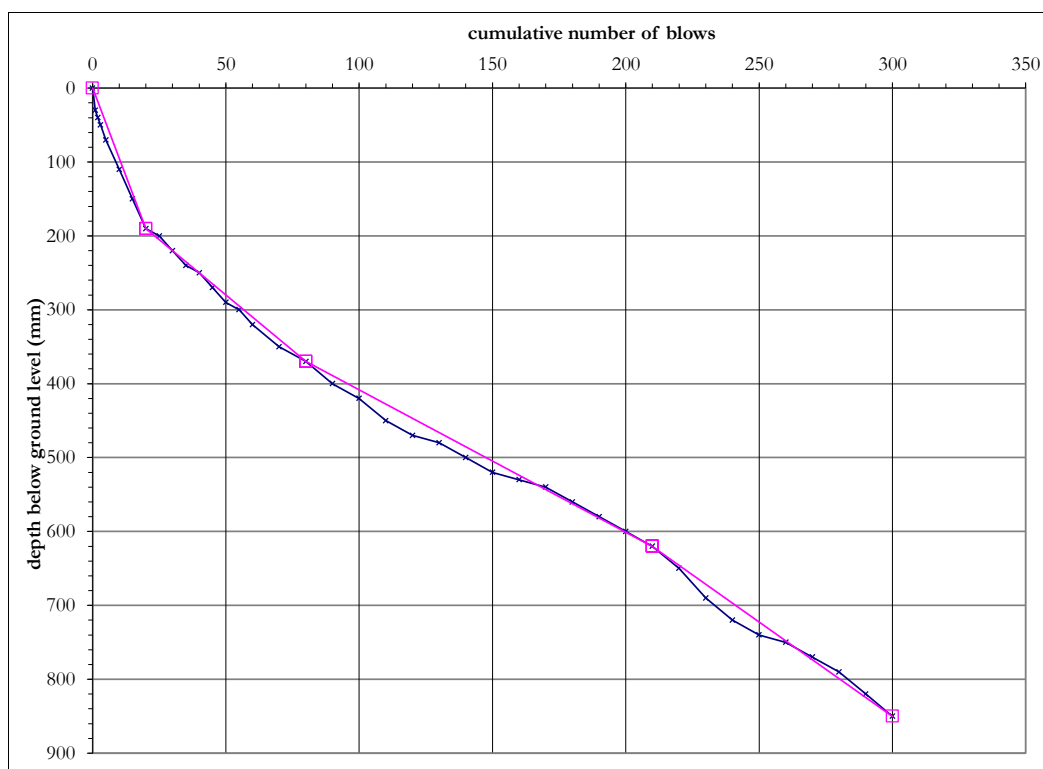


<b>Test Number</b>	DCP @ TP04
<b>Depth bgl (m)</b>	0.00

<b>Date Tested</b>	11/08/2021
<b>Weather</b>	Dry

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4.  
 CBR calculated using the TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{mm/blow})$  iaw IAN 73/06 Rev 1 2009.

Surface preparation	Description of surface material at test depth
N/A	Imported Gravel fill



top / base of layer (mm)	mm/blow	CBR (%)
0 / 190	9.5	28
190 / 370	3	95
370 / 620	1.9	>100
620 / 850	2.6	>100

<b>CBR Range</b>	Min: 28 Max: >100	The selection of layers is based on visual interpretation of the data. The insitu DCP reading (mm/blow) and CBR values are valid at the time of testing; variation in moisture content or other factors may affect the insitu value.
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<b>Deviation(s) from standard procedure</b>	None
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<b>Observations and comments</b>	
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Approved Name and Appointment		
Darren O'Mahony Director		August 2021



**Dynamic Cone Penetrometer (DCP) test results and estimated CBR**

<b>Project Number</b>	21-0937
<b>Project Name</b>	Tynagh Power Station OCGT
<b>Site Location</b>	Tynagh, Galway

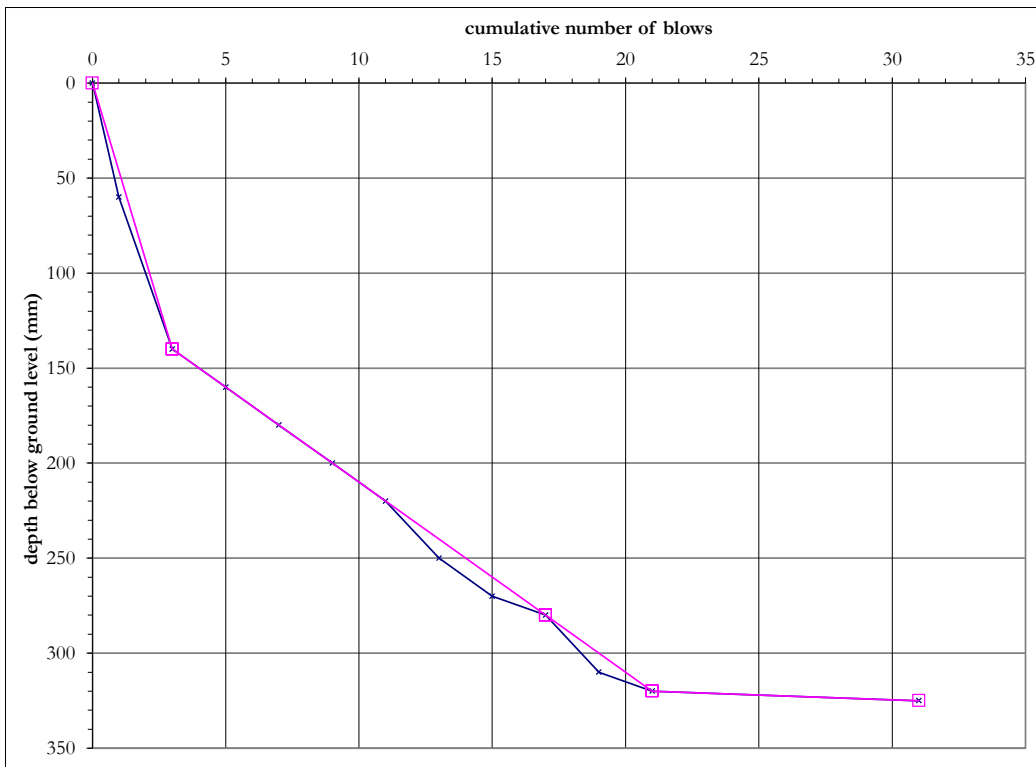


<b>Test Number</b>	DCP @ TP05
<b>Depth bgl (m)</b>	0.00

<b>Date Tested</b>	11/08/2021
<b>Weather</b>	Dry

Test conducted in accordance with Documented In-House Technical Procedure IMS TP7-4.  
 CBR calculated using the TRL equation:  $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{mm/blow})$  iaw IAN 73/06 Rev 1 2009.

<b>Surface preparation</b>	<b>Description of surface material at test depth</b>
N/A	Imported Gravel fill



top / base of layer (mm)	mm/blow	CBR (%)
0 / 140	47	5.2
140 / 280	10	26
280 / 320	10	26
320 / 325	0.5	>100

<b>CBR Range</b>	Min: 5.2 Max: >100	The selection of layers is based on visual interpretation of the data. The insitu DCP reading (mm/blow) and CBR values are valid at the time of testing; variation in moisture content or other factors may affect the insitu value.
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<b>Deviation(s) from standard procedure</b>	None
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<b>Observations and comments</b>	
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Approved Name and Appointment		
Darren O'Mahony Director		August 2021

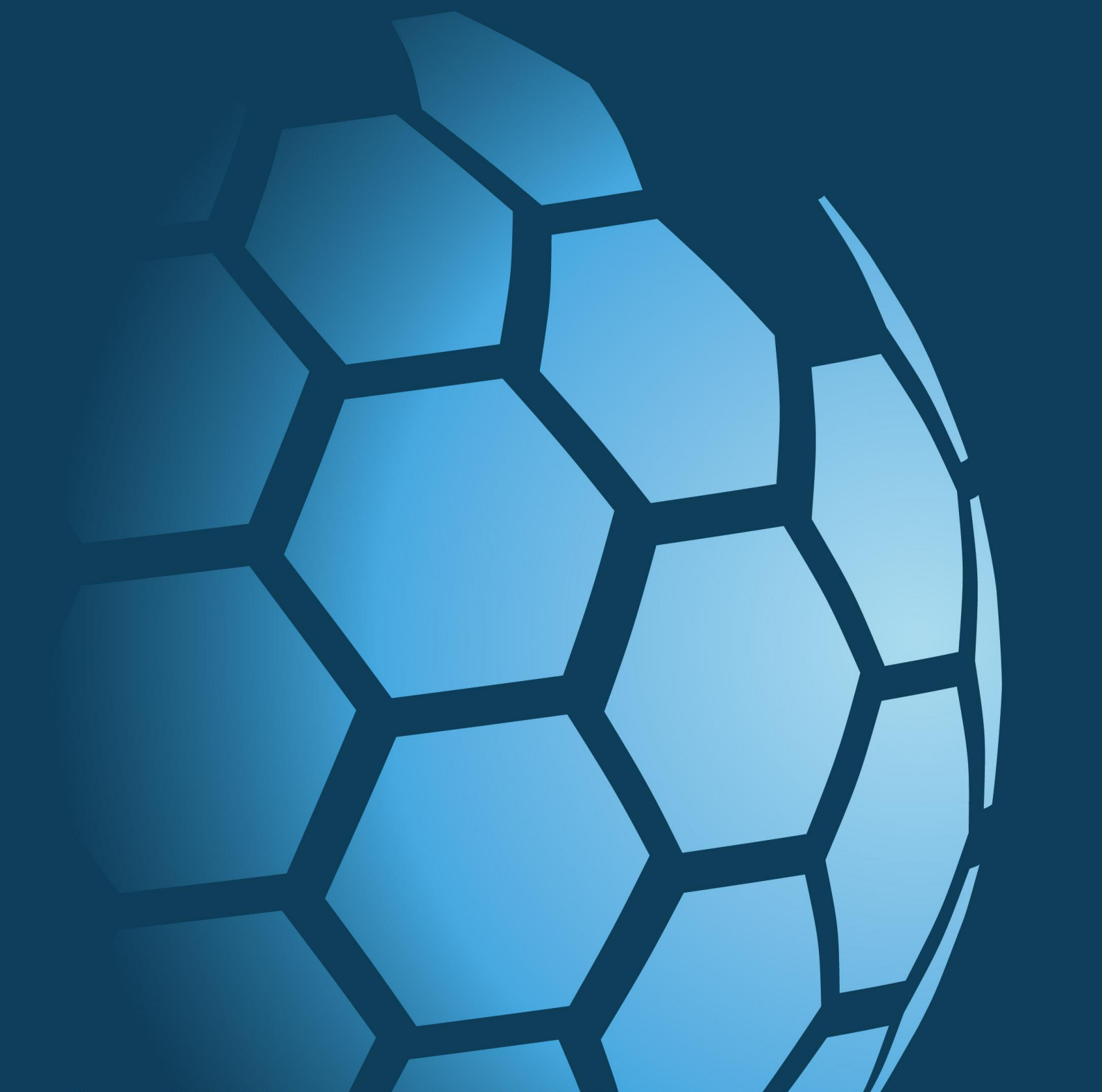






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**APPENDIX G**  
**GROUNDWATER AND GAS MONITORING RECORDS**



Job No: 21-0937

Job Name: Tynagh Power Station OCGT - Ground Investigation

Ground Water Monitoring Results



EH No:	Depth to base at end of fieldwork (mbgl)	Water Level (mbgl)		
		ROUND 0 (EW sample) 23.08.2021	ROUND 1 01.09.2021	ROUND 2 (EW sample) 15.09.2021
BH02 (rz 7.50-8.40mbgl)	8.40m	1.18m	1.33m	1.65m
BH02A (rz 1.50-3.00mbgl)	3.00m	1.09m (H/C odour)	1.31m	1.55m
BH05 (rz 10.50-11.40mbgl)	11.40m	5.15m	5.20m	5.28m
BH05A (rz 1.50-2.90mbgl)	2.90m	DRY	DRY	DRY
BH09 (rz 7.50-8.40mbgl)	8.40m	1.15m	1.29m	1.56m
BH09A (rz 1.00-1.90mbgl)	1.90m	1.35m	1.32m	1.30m

Site:	Tynagh Power Station OCGT
Project No.:	21-0937
Date:	23/08/2021
Weather:	Wet, Overcast
Engineer:	JG

Equipment:		Geotechnical Instruments GA5000				
Ambient Conditions	Barometric Pressure	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
Before:	1023	0.0	0.1	20.9	0	0
After:	1023	0.0	0.1	20.9	0	0

BH02	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	2.6	0.4	15.8	4	0
60	2.0	0.4	16.6	4	0
90	1.5	0.3	17.4	3	0
120	1.2	0.3	17.9	3	0
150	1.0	0.3	18.3	3	0
180	0.9	0.2	18.5	3	0
240	0.7	0.2	18.8	1	0
300	0.6	0.2	19.1	0	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.1
60	0.1
90	0.1
120	0.1
150	0.1
180	0.1
240	0.1
300	0.1

Groundwater monitoring	mbgl
Depth to top of water	1.60
Depth to bottom of BH	7.60
Sample collected (Y/N)	Y
Sample depth	1.60

BH02A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.0	0.1	20.0	10	0
60	0.0	0.1	20.4	4	0
90	0.0	0.1	20.5	4	0
120	0.0	0.1	20.7	1	0
150	0.0	0.1	20.7	0	0
180	0.0	0.1	20.7	0	0
240	0.0	0.1	20.8	0	0
300	0.0	0.1	20.8	0	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.1
60	0.0
90	0.0
120	0.0
150	0.0
180	0.0
240	0.0
300	0.0

Groundwater monitoring	mbgl
Depth to top of water	1.10
Depth to bottom of BH	3.00
Sample collected (Y/N)	Y
Sample depth	1.10

BH05	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.0	0.1	20.4	9	0
60	0.0	0.1	20.3	9	0
90	0.0	0.1	20.3	9	0
120	0.0	0.1	20.3	9	0
150	0.0	0.1	20.3	8	0
180	0.0	0.1	20.3	8	0
240	0.0	0.1	20.3	8	0
300	0.0	0.1	20.3	7	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.1
60	0.1
90	0.1
120	0.1
150	0.1
180	0.1
240	0.1
300	0.1

Groundwater monitoring	mbgl
Depth to top of water	5.02
Depth to bottom of BH	11.50
Sample collected (Y/N)	Y
Sample depth	5.02

BH05A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.0	0.1	20.8	1	0
60	0.0	0.1	20.8	0	0
90	0.0	0.1	20.8	0	0
120	0.0	0.1	20.8	0	0
150	0.0	0.1	20.7	0	0
180	0.0	0.1	20.7	0	0
240	0.0	0.1	20.7	0	0
300	0.0	0.1	20.7	0	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.1
60	0.1
90	0.1
120	0.1
150	0.1
180	0.1
240	0.1
300	0.1

Groundwater monitoring	mbgl
Depth to top of water	Dry
Depth to bottom of BH	2.90
Sample collected (Y/N)	N
Sample depth	N/A

BH09	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.0	0.2	20.6	7	0
60	0.0	0.2	20.3	5	0
90	0.0	0.2	20.2	4	0
120	0.0	0.2	20.2	4	0
150	0.0	0.2	20.2	4	0
180	0.0	0.2	20.2	4	0
240	0.0	0.2	20.2	3	0
300	0.0	0.2	20.2	3	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.1
60	0.1
90	0.1
120	0.1
150	0.1
180	0.1
240	0.1
300	0.1

Groundwater monitoring	mbgl
Depth to top of water	1.75
Depth to bottom of BH	7.60
Sample collected (Y/N)	Y
Sample depth	1.75

BH09A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.0	0.3	16.8	11	0
60	0.0	0.3	15.8	7	0
90	0.0	0.3	15.7	7	0
120	0.0	0.3	15.7	7	0
150	0.0	0.3	15.7	7	0
180	0.0	0.3	15.7	7	0
240	0.0	0.3	15.7	7	0
300	0.0	0.3	15.7	7	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.1
60	0.1
90	0.1
120	0.1
150	0.1
180	0.1
240	0.1
300	0.1

Groundwater monitoring	mbgl
Depth to top of water	1.20
Depth to bottom of BH	1.90
Sample collected (Y/N)	N
Sample depth	N/A



Site:	Tynagh Power Station OCGT
Project No.:	21-0937
Date:	01/09/2021
Weather:	Dry, sunny, warm
Engineer:	Joe Gervin

Equipment:		Geotechnical Instruments GA5000				
Ambient Conditions	Barometric Pressure	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
Before:	1033	0.0	0.1	21.0	0	0
After:	1032	0.0	0.1	21.1	0	0

BH02A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.1	0.1	20.9	0	0
60	0.1	0.1	20.9	0	0
90	0.1	0.1	20.9	0	0
120	0.1	0.1	20.9	0	0
150	0.1	0.1	20.9	0	0
180	0.1	0.1	20.9	0	0
240	0.1	0.1	20.9	0	0
300	0.1	0.1	20.9	0	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.2
60	0.2
90	0.2
120	0.2
150	0.2
180	0.2
240	0.2
300	0.2

Groundwater monitoring	mbgl
Depth to top of water	1.31m
Depth to bottom of BH	3.00m
Sample collected (Y/N)	N
Sample depth	N/A

BH05A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.1	0.1	20.8	0	0
60	0.1	0.1	20.8	0	0
90	0.1	0.1	20.8	0	0
120	0.1	0.1	20.8	0	0
150	0.1	0.1	20.8	0	0
180	0.1	0.1	20.8	0	0
240	0.1	0.1	20.8	0	0
300	0.1	0.1	20.8	0	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.2
60	0.2
90	0.2
120	0.2
150	0.2
180	0.2
240	0.2
300	0.2

Groundwater monitoring	mbgl
Depth to top of water	Dry
Depth to bottom of BH	2.90m
Sample collected (Y/N)	N
Sample depth	N/A

BH09A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.1	0.2	16.7	2	1
60	0.1	0.2	16.6	2	1
90	0.1	0.2	16.4	2	1
120	0.1	0.2	16.4	1	1
150	0.1	0.2	16.4	1	1
180	0.1	0.3	16.4	1	0
240	0.1	0.3	16.3	1	0
300	0.1	0.3	16.3	1	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.2
60	0.2
90	0.2
120	0.2
150	0.2
180	0.2
240	0.2
300	0.2

Groundwater monitoring	mbgl
Depth to top of water	1.32m
Depth to bottom of BH	1.90m
Sample collected (Y/N)	N
Sample depth	N/A



Site:	Tynagh Power Station OCGT
Project No.:	21-0937
Date:	15/09/2021
Weather:	Cloudy, showers, mild
Engineer:	Connor Norton

BH02A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.1	0.2	20.6	0	0
60	0.1	0.2	20.6	0	0
90	0.1	0.2	20.6	0	0
120	0.1	0.2	20.6	0	0
150	0.1	0.2	20.6	0	0
180	0.1	0.2	20.6	0	0
240	0.1	0.2	20.6	0	0
300	0.1	0.2	20.6	0	0

BH05A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.1	0.1	20.7	0	0
60	0.1	0.1	20.7	0	0
90	0.1	0.1	20.7	0	0
120	0.1	0.1	20.7	0	0
150	0.1	0.1	20.7	0	0
180	0.1	0.1	20.7	0	0
240	0.1	0.1	20.7	0	0
300	0.1	0.1	20.7	0	0

BH09A	Gas readings				
Time (sec)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
30	0.1	0.3	17.3	0	1
60	0.1	0.4	16.9	0	0
90	0.1	0.4	16.9	0	1
120	0.1	0.4	16.9	0	1
150	0.1	0.4	16.9	0	1
180	0.1	0.4	16.9	0	1
240	0.1	0.4	16.9	0	1
300	0.1	0.4	16.8	0	1

Equipment:		Geotechnical Instruments GA5000				
Ambient Conditions	Barometric Pressure	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	CO (ppm)	H <sub>2</sub> S (ppm)
Before:	1008	0.2	0.1	20.7	0	0
After:	1008	0.2	0.1	20.6	0	0

Flow rates	
Time (sec)	Flow (l/h)
30	0.3
60	0.3
90	0.3
120	0.3
150	0.3
180	0.3
240	0.3
300	0.3

Groundwater monitoring		mbgl
Depth to top of water		1.55m
Depth to bottom of BH		3.00m
Sample collected (Y/N)		N
Sample depth		N/A

Flow rates	
Time (sec)	Flow (l/h)
30	0.3
60	0.3
90	0.3
120	0.3
150	0.3
180	0.3
240	0.3
300	0.3

Groundwater monitoring		mbgl
Depth to top of water		3.15m
Depth to bottom of BH		3.15m
Sample collected (Y/N)		N
Sample depth		N/A

Flow rates	
Time (sec)	Flow (l/h)
30	0.2
60	0.3
90	0.3
120	0.3
150	0.3
180	0.3
240	0.3
300	0.3

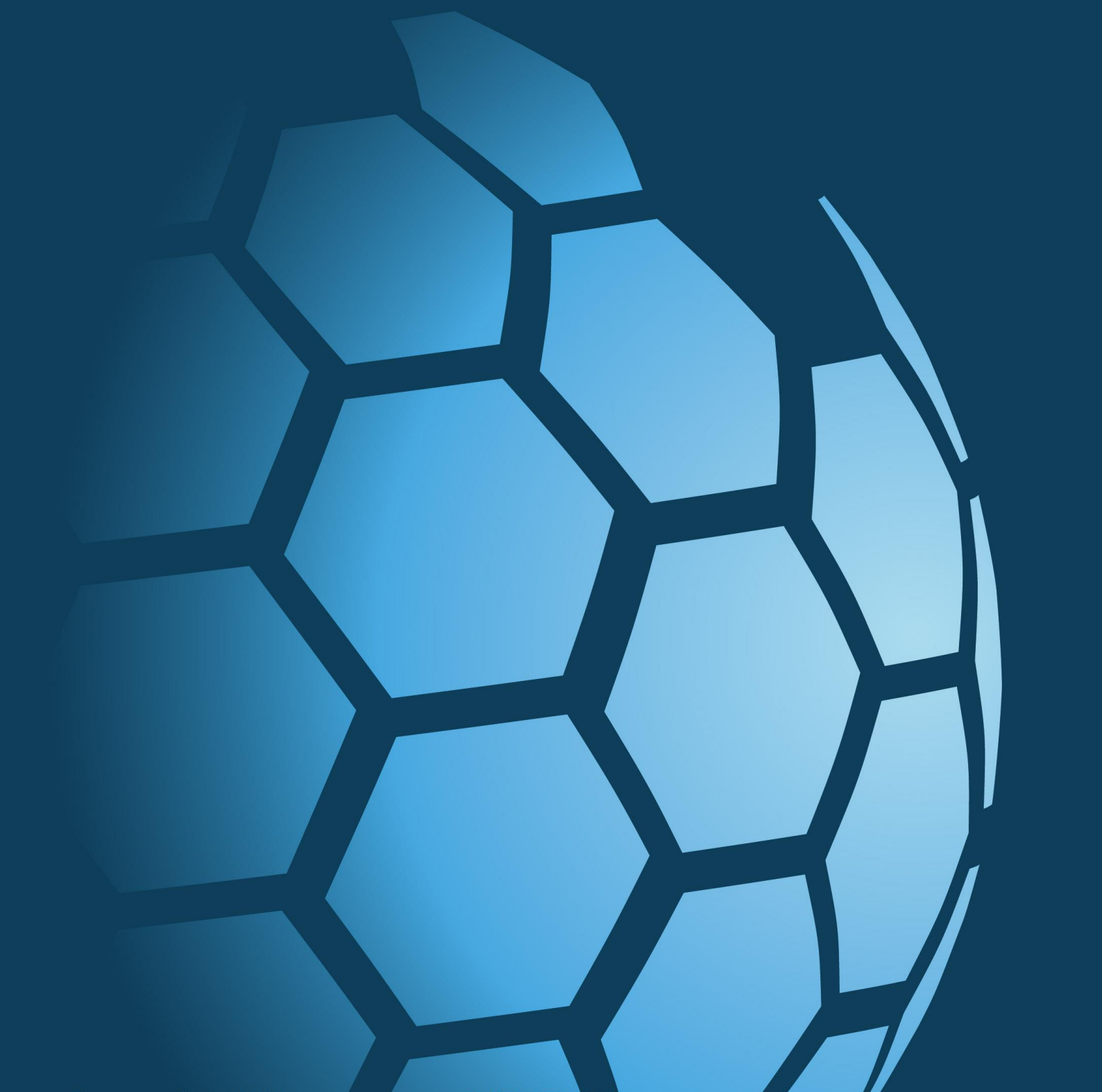
Groundwater monitoring		mbgl
Depth to top of water		1.30m
Depth to bottom of BH		1.90m
Sample collected (Y/N)		N
Sample depth		N/A





**CAUSEWAY**  
— GEOTECH

**APPENDIX H**  
**GEOTECHNICAL LABORATORY TEST RESULTS**





# CAUSEWAY GEOTECH

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## SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

16 September  
2021

<b>Project Name:</b>	Tynagh Power Station Open Cycle Gas Turbine (OCGT)
<b>Project No.:</b>	21-0937
<b>Client:</b>	EP UK Investments
<b>Engineer:</b>	AECOM Ireland Ltd

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s).

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd



1



**Project Name:** Tynagh Power Station Open Cycle Gas Turbine (OCGT)

**Report Reference:** Schedule 1

The table below details the tests carried out, the specifications used, and the number of tests included in this report.

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

<b>Material tested</b>	<b>Type of test/Properties measured/Range of measurement</b>	<b>Standard specifications</b>	<b>No. of results included in the report</b>
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	23
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	7
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	13
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	8

### **SUB-CONTRACTED TESTS**

In agreement with Client, the following tests were conducted by an approved sub-contractor. All sub-contracting laboratories used are UKAS accredited.

<b>Material tested</b>	<b>Type of test/Properties measured/Range of measurement</b>	<b>Standard specifications</b>	<b>No. of results included in the report</b>
SOIL – Subcontracted to Eurofins Chemtest Ltd ( <i>UKAS 2183</i> )	pH Value of Soil		17
SOIL – Subcontracted to Eurofins Chemtest Ltd ( <i>UKAS 2183</i> )	Sulphate Content water extract		17
SOIL – Subcontracted to Eurofins Chemtest Ltd ( <i>UKAS 2183</i> )	Organic Matter Content		1
SOIL – Subcontracted to Eurofins Chemtest Ltd ( <i>UKAS 2183</i> )	BRE Test – Suite D		8




## Summary of Classification Test Results

Project No. 21-0937	Project Name Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation
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Hole No.	Sample				Soil Description	Density		w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
	Ref	Top	Base	Type		bulk Mg/m3	dry							
BH02	13	4.00	5.50	B	Greyish brown sandy slightly gravelly silty CLAY.			7.7	94	22	13	9		CL
BH03	11	1.00	2.00	B	Greyish brown sandy slightly gravelly silty CLAY.			9.1						
BH03	12	2.00	3.00	B	Greyish brown sandy gravelly silty CLAY.			12.0	58	28	14	14		CL
BH03	13	3.00	4.00	B	Greyish brown sandy slightly gravelly silty CLAY.			11.0						
BH03	14	4.00	5.00	B	Greyish brown sandy slightly gravelly silty CLAY.			7.3	67	21	10	11		CL
BH03	15	5.00	6.00	B	Greyish brown sandy slightly gravelly silty CLAY.			13.0						
BH05	8	0.00	1.00	B	Light grey sandy silty subangular fine to coarse GRAVEL.			5.7						
BH05	9	1.30	2.00	B	Light grey sandy silty subangular fine to coarse GRAVEL.			6.4						
BH06	11	1.20	2.00	B	Greenish grey sandy silty subangular fine to coarse GRAVEL.			7.2						
BH06	13	3.00	4.00	B	Grey sandy gravelly silty CLAY.			26.0						
BH06	14	4.00	4.60	B	Dark brown fibrous PEAT.			105.0						
BH06	15	5.00	5.80	B	Grey sandy silty CLAY.			21.0	59	34	23	11		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 4

<b>Key</b>  Density test                      Liquid Limit                      Particle density  Linear measurement unless :    4pt cone unless :                      sp - small pyknometer  wd - water displacement        cas - Casagrande method            gj - gas jar  wi - immersion in water        1pt - single point test	<b>Date Printed</b>  16/09/2021	<b>Approved By</b>  Stephen.Watson	 10122
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## Summary of Classification Test Results

Project No. 21-0937	Project Name Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation
------------------------	---

Hole No.	Sample				Soil Description	Density		w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
	Ref	Top	Base	Type		bulk Mg/m3	dry							
BH07	11	1.00	1.70	B	Grey gravelly silty fine to coarse SAND.			7.0						
BH07	12	3.00	3.50	B	Dark brown fibrous PEAT.			28.0						
BH08	9	1.10	2.00	B	Brown sandy slightly gravelly silty CLAY.			30.0						
BH08	10	2.00	2.70	B	Brown sandy slightly gravelly silty CLAY.			99.0						
BH08	11	2.70	3.30	B	Dark brown sandy organic clayey SILT.			43.0						
BH08	12	3.00	3.45	UT	Dark grey sandy slightly gravelly silty CLAY.			42.0						
BH08	13	3.30	4.00	B	Brown sandy slightly gravelly silty CLAY.			17.0						
BH08	14	4.00	5.00	B	Brown sandy gravelly silty CLAY.			12.0	44	28	19	9		CL
BH10	4	0.50	1.00	B	Greenish grey gravelly silty fine to coarse SAND.			5.7						
TP02	7	0.70	1.20	B	Grey sandy gravelly silty CLAY.			9.3	54	26	16	10		CL
TP02	10	2.00	3.00	B	Grey sandy silty CLAY.			10.0	59	23	14	9		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 4

<b>Key</b>  Density test                      Liquid Limit                      Particle density  Linear measurement unless :    4pt cone unless :                      sp - small pyknometer  wd - water displacement            cas - Casagrande method            gj - gas jar  wi - immersion in water              1pt - single point test	<b>Date Printed</b>  <p style="text-align: center;">16/09/2021</p>	<b>Approved By</b>  <p style="text-align: center;">Stephen.Watson</p>	 <b>10122</b>
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## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH01**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **9**

Soil Description **Brown sandy subangular fine to coarse GRAVEL.**

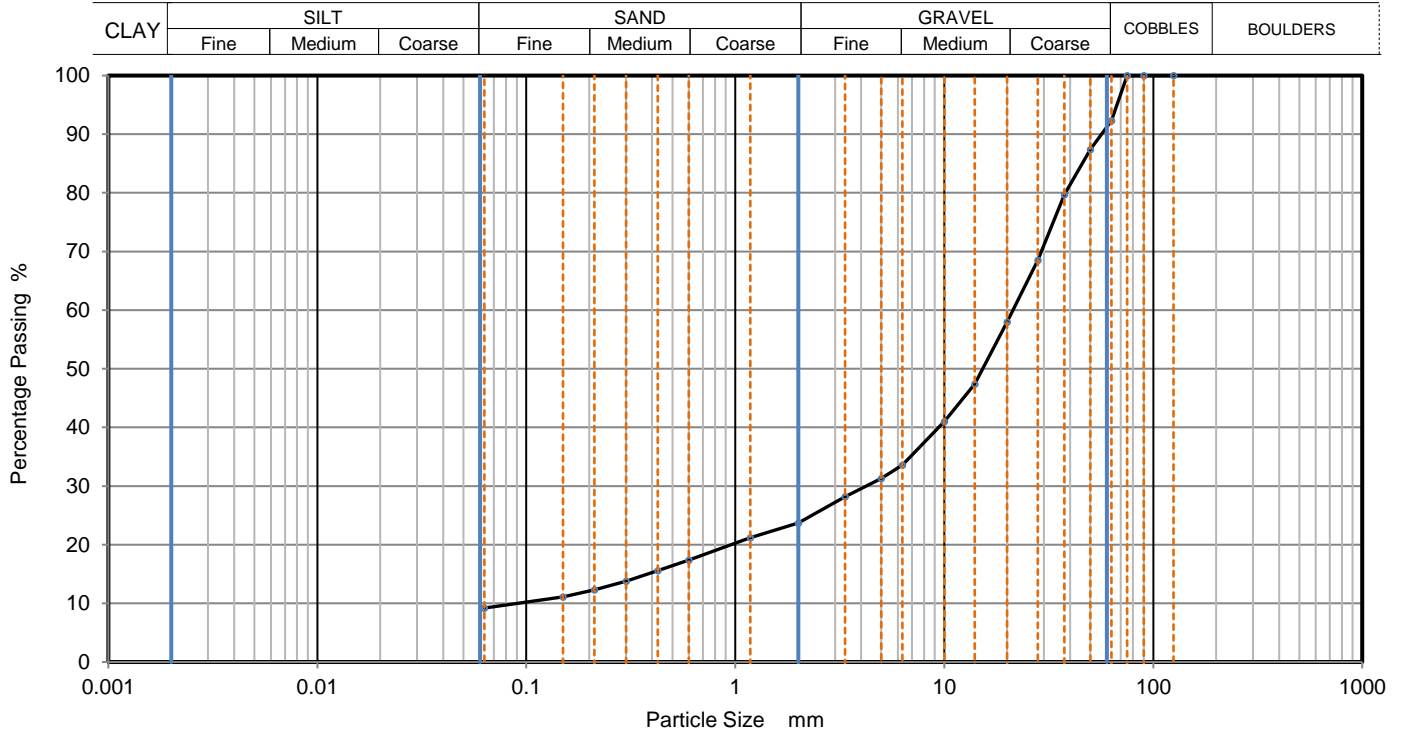
Depth, m **0.50**

Specimen Reference **2** Specimen Depth **0.5** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clause 9.2**

KeyLAB ID **Caus202108260**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	92		
50	87		
37.5	80		
28	69		
20	58		
14	47		
10	41		
6.3	34		
5	31		
3.35	28		
2	24		
1.18	21		
0.6	17		
0.425	16		
0.3	14		
0.212	12		
0.15	11		
0.063	9		

Dry Mass of sample, g

**6745**

Sample Proportions	% dry mass
Cobbles	7.7
Gravel	68.7
Sand	14.5
Fines <0.063mm	9.0

Grading Analysis	
D100	mm
D60	mm 21.3
D30	mm 4.21
D10	mm 0.0911
Uniformity Coefficient	230
Curvature Coefficient	9.1

**Remarks**

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved  
  
Stephen.Watson





## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH01**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **12**

Soil Description **Dark grey sandy gravelly silty CLAY.**

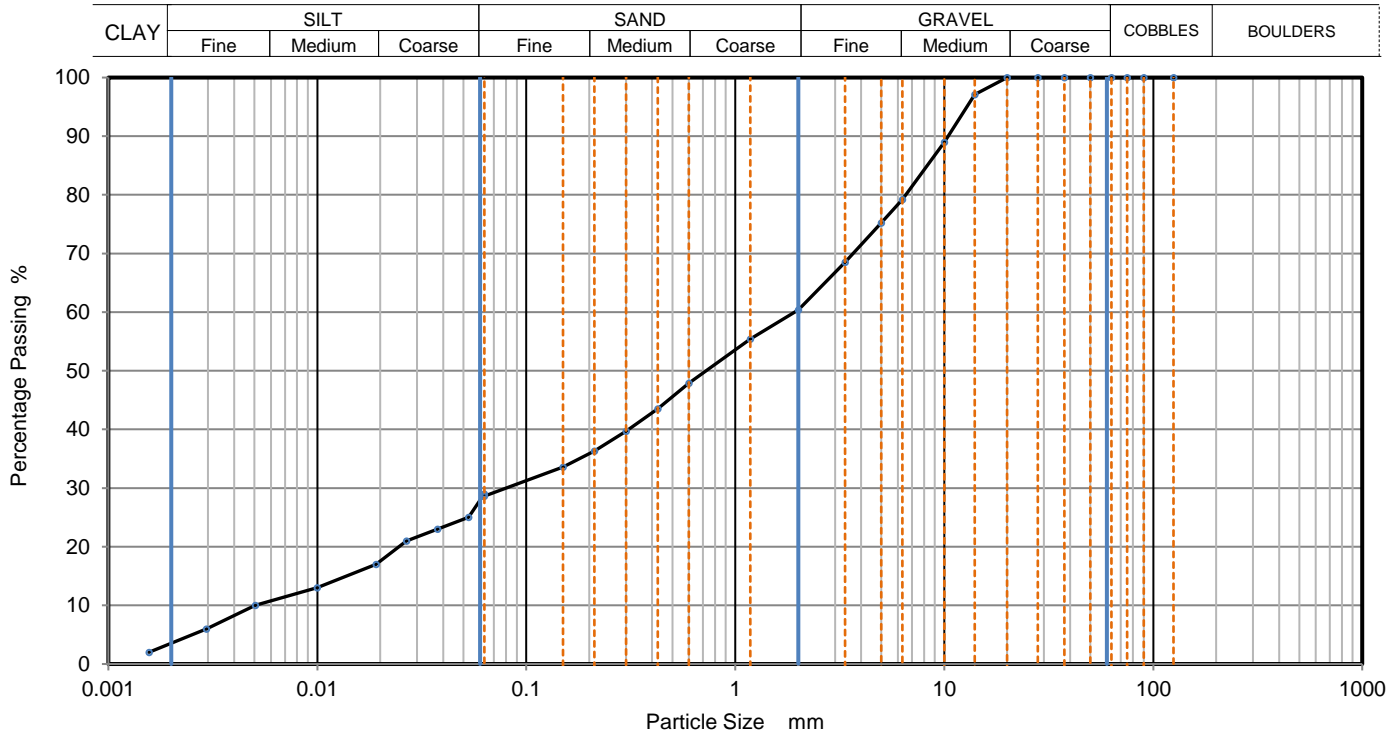
Depth, m **3.50**

Specimen Reference **2** Specimen Depth **3.5** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **Caus202108262**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	29
90	100	0.05284	25
75	100	0.03758	23
63	100	0.02672	21
50	100	0.01911	17
37.5	100	0.00998	13
28	100	0.00504	10
20	100	0.00294	6
14	97	0.00156	2
10	89		
6.3	79		
5	75		
3.35	69		
2	60		
1.18	55		
0.6	48		
0.425	44	Particle density (assumed) 2.65 Mg/m3	
0.3	40		
0.212	36		
0.15	34		
0.063	29		

Dry Mass of sample, g **206**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	39.6
Sand	31.8
Silt	25.2
Clay	3.4

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	350
Curvature Coefficient	0.62

**Remarks**

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved  
  
Stephen.Watson





## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH02**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **9**

Soil Description **Greyish brown sandy very gravelly silty CLAY.**

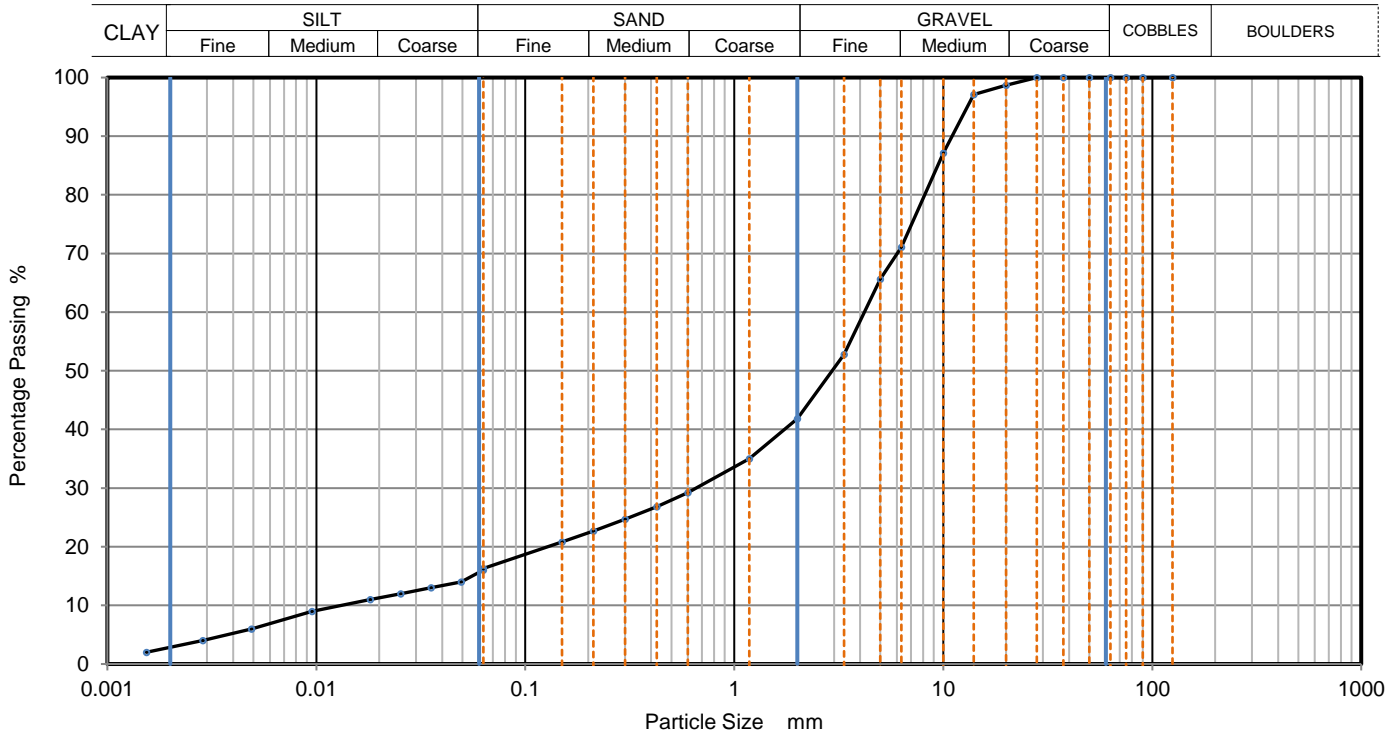
Depth, m **0.00**

Specimen Reference **2** Specimen Depth **0** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **Caus202108263**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	16
90	100	0.04939	14
75	100	0.03537	13
63	100	0.02532	12
50	100	0.01813	11
37.5	100	0.00953	9
28	100	0.00490	6
20	99	0.00286	4
14	97	0.00154	2
10	87		
6.3	71		
5	66		
3.35	53		
2	42		
1.18	35		
0.6	29		
0.425	27	Particle density (assumed)	
0.3	25	2.65	Mg/m3
0.212	23		
0.15	21		
0.063	16		

Dry Mass of sample, g

**3562**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	58.2
Sand	25.5
Silt	13.4
Clay	2.9

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	290
Curvature Coefficient	7.1

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved  
  
Stephen.Watson





## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH02**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **11**

Soil Description **Greyish brown sandy gravelly silty CLAY.**

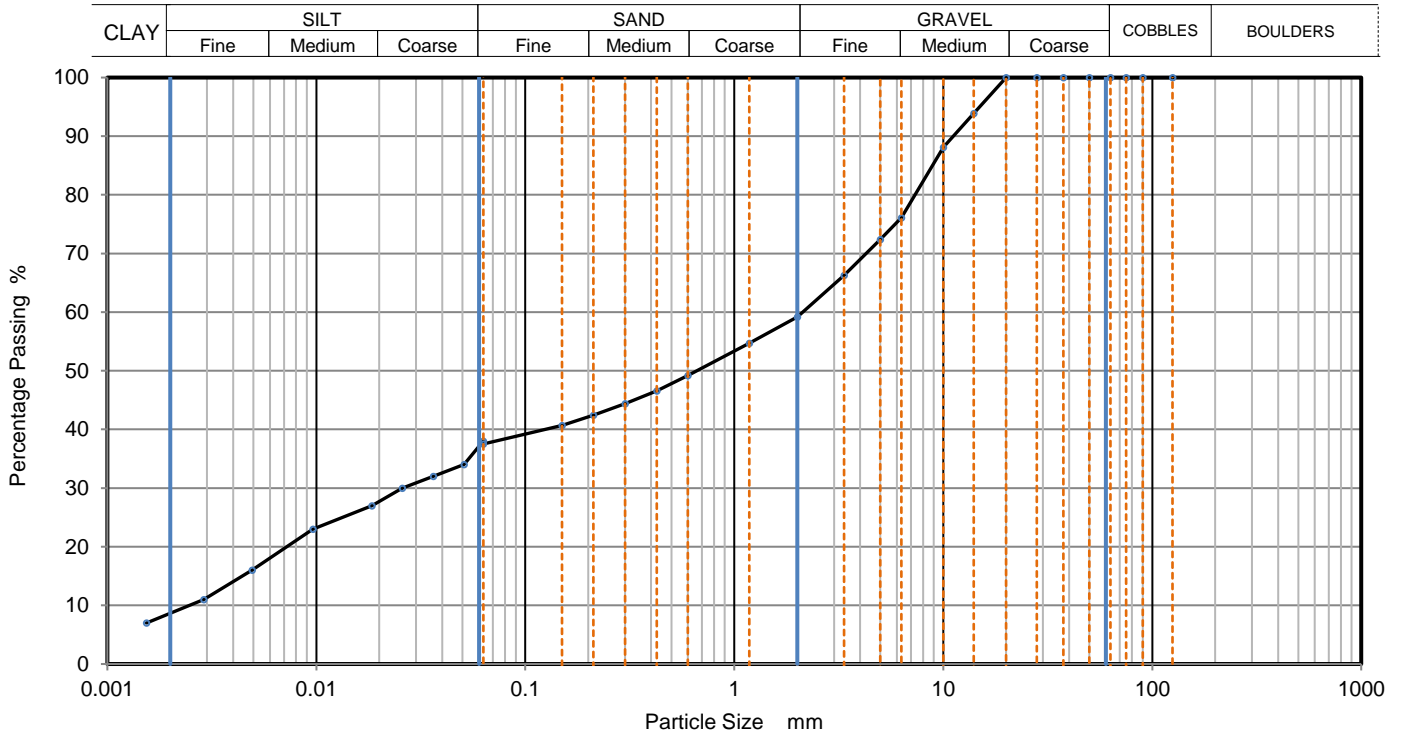
Depth, m **2.00**

Specimen Reference **2** Specimen Depth **2** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **Caus202108264**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	38
90	100	0.05097	34
75	100	0.03627	32
63	100	0.02580	30
50	100	0.01846	27
37.5	100	0.00965	23
28	100	0.00493	16
20	100	0.00290	11
14	94	0.00154	7
10	88		
6.3	76		
5	72		
3.35	66		
2	59		
1.18	55		
0.6	49		
0.425	47	Particle density (assumed) 2.65 Mg/m3	
0.3	44		
0.212	42		
0.15	41		
0.063	38		

Dry Mass of sample, g **216**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	40.8
Sand	21.7
Silt	28.9
Clay	8.6

Grading Analysis	
D100	mm
D60	mm 2.13
D30	mm 0.025
D10	mm 0.00255
Uniformity Coefficient	830
Curvature Coefficient	0.11

**Remarks**

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved  
  
Stephen.Watson





## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH03**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **12**

Soil Description **Greyish brown sandy gravelly silty CLAY.**

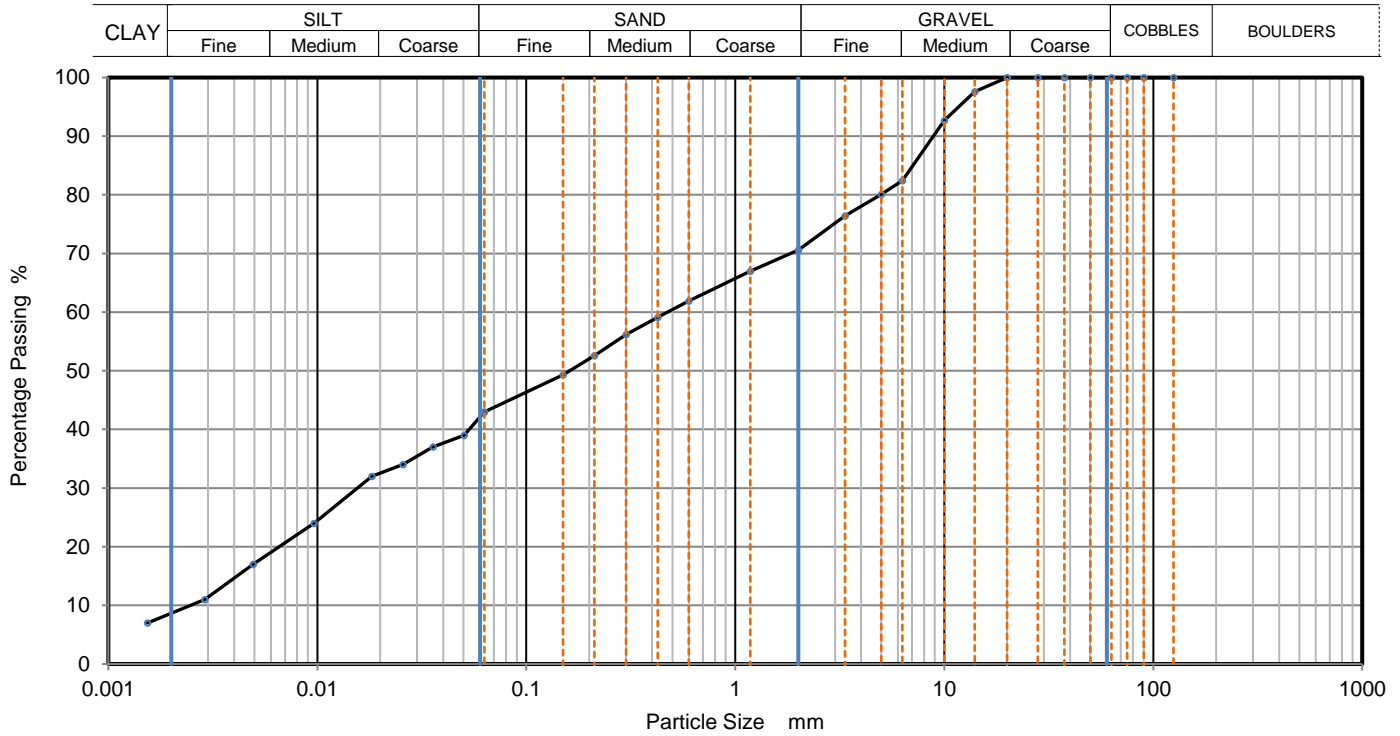
Depth, m **2.00**

Specimen Reference **4** Specimen Depth **2** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **Caus202108267**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	43
90	100	0.05033	39
75	100	0.03582	37
63	100	0.02564	34
50	100	0.01824	32
37.5	100	0.00965	24
28	100	0.00493	17
20	100	0.00290	11
14	98	0.00154	7
10	93		
6.3	82		
5	80		
3.35	76		
2	71		
1.18	67		
0.6	62		
0.425	59	Particle density (assumed) 2.65 Mg/m3	
0.3	56		
0.212	53		
0.15	49		
0.063	43		

Dry Mass of sample, g **204**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	29.4
Sand	27.6
Silt	34.0
Clay	9.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	200
Curvature Coefficient	0.22

Remarks  
Preparation and testing in accordance with BS1377-2 :1990 unless noted below



Approved

Stephen.Watson



## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH04**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **5**

Soil Description **Greenish grey gravelly silty fine to coarse SAND.**

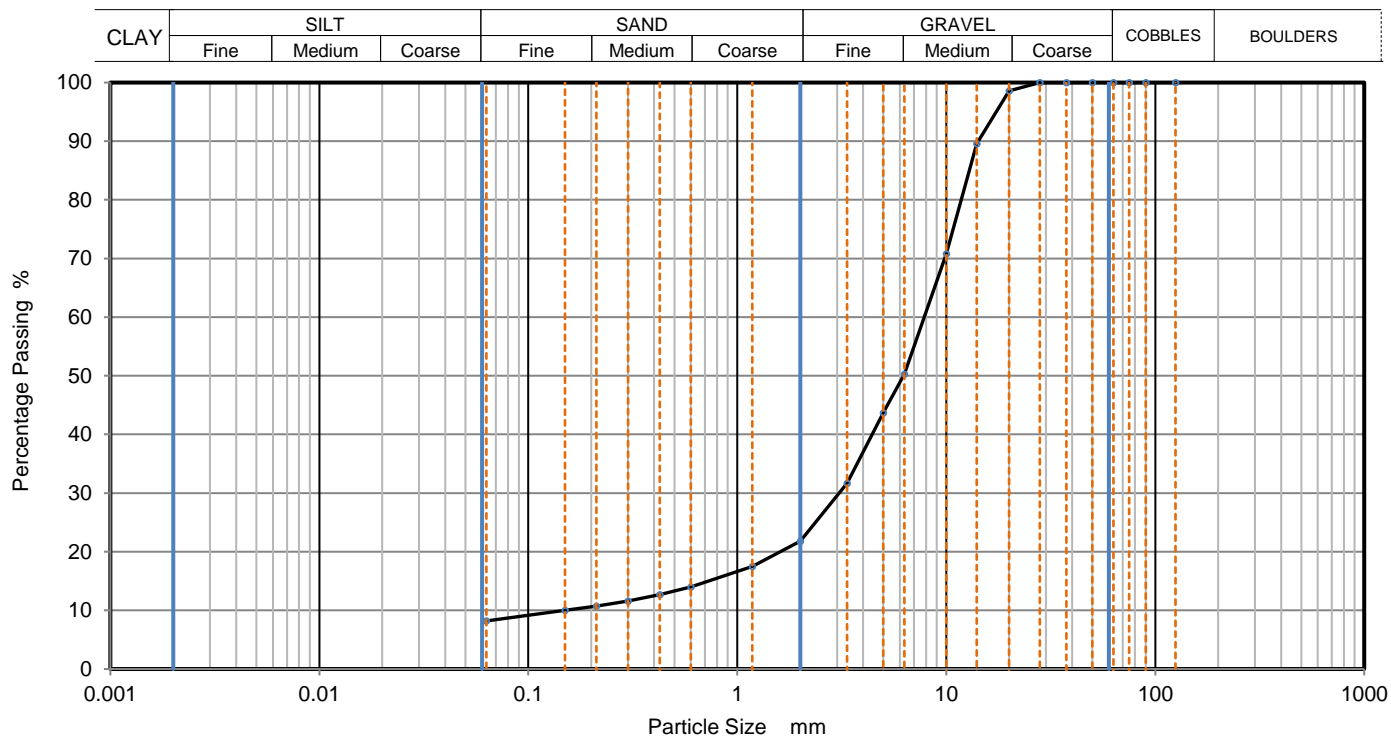
Depth, m **1.00**

Specimen Reference **2** Specimen Depth **1** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clause 9.2**

KeyLAB ID **Caus2021082611**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	90		
10	71		
6.3	50		
5	44		
3.35	32		
2	22		
1.18	18		
0.6	14		
0.425	13		
0.3	12		
0.212	11		
0.15	10		
0.063	8		

Dry Mass of sample, g **2984**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	78.2
Sand	13.6
Fines <0.063mm	8.0

Grading Analysis	
D100	mm
D60	mm 7.83
D30	mm 3.07
D10	mm 0.153
Uniformity Coefficient	51
Curvature Coefficient	7.8

Remarks  
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved

Stephen.Watson



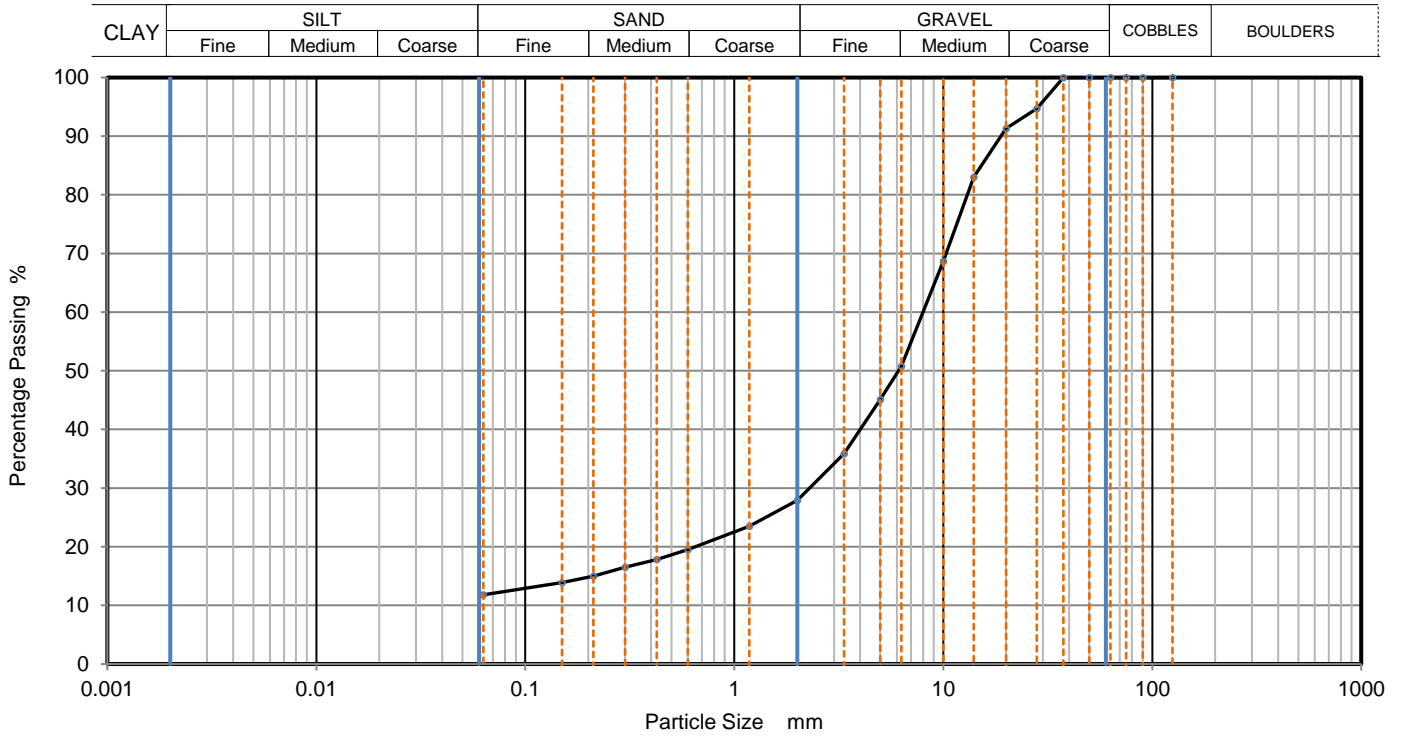




## PARTICLE SIZE DISTRIBUTION

Job Ref	21-0937
Borehole/Pit No.	BH05
Sample No.	9
Depth, m	1.30
Sample Type	B
KeyLAB ID	Caus2021082613

Site Name	Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation		
Soil Description	Light grey sandy silty subangular fine to coarse GRAVEL.		
Specimen Reference	3	Specimen Depth	1.3 m
Test Method	BS1377:Part 2:1990, clause 9.2		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	91		
14	83		
10	69		
6.3	51		
5	45		
3.35	36		
2	28		
1.18	24		
0.6	20		
0.425	18		
0.3	17		
0.212	15		
0.15	14		
0.063	12		

Dry Mass of sample, g 2609

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	72.1
Sand	16.1
Fines <0.063mm	12.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson





## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH06**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **13**

Soil Description **Grey sandy gravelly silty CLAY.**

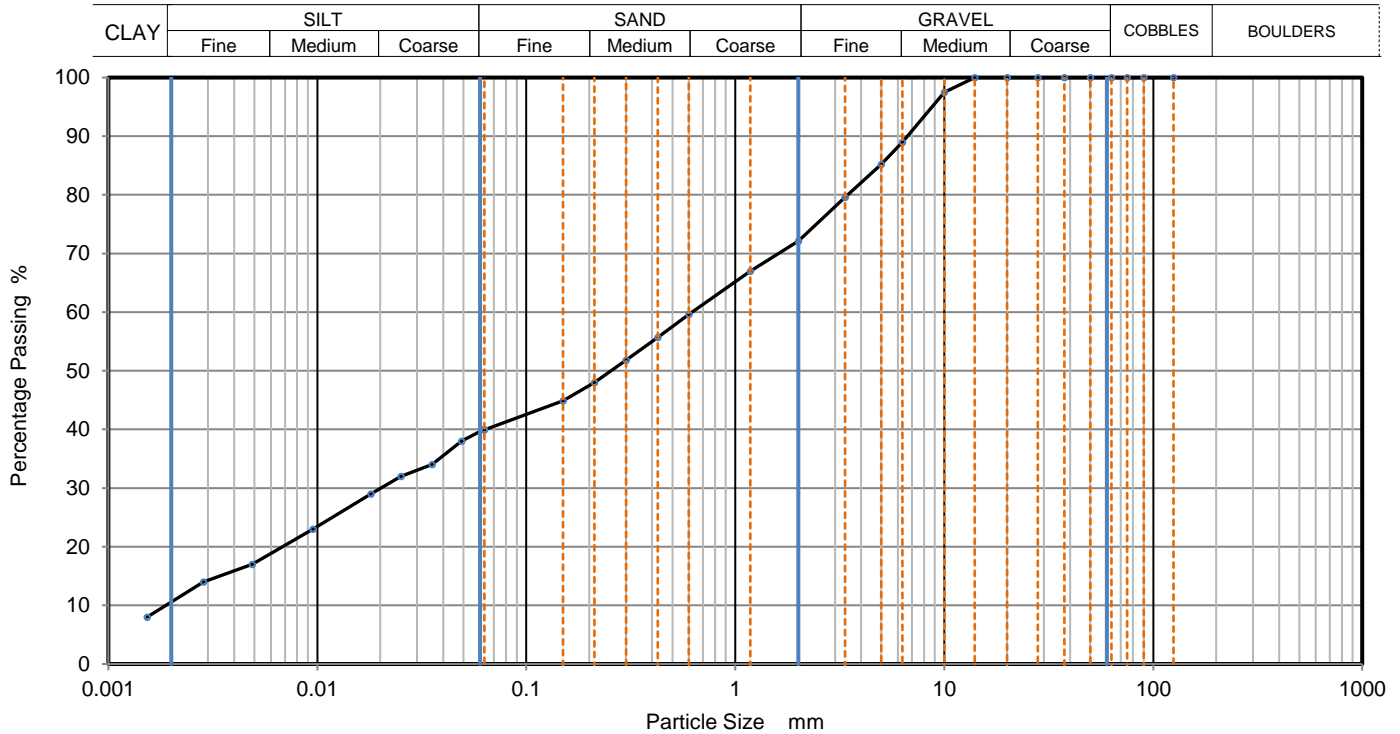
Depth, m **3.00**

Specimen Reference **3** Specimen Depth **3** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **Caus2021082615**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	40
90	100	0.04903	38
75	100	0.03536	34
63	100	0.02517	32
50	100	0.01802	29
37.5	100	0.00953	23
28	100	0.00488	17
20	100	0.00285	14
14	100	0.00153	8
10	98		
6.3	89		
5	85		
3.35	80		
2	72		
1.18	67		
0.6	60		
0.425	56	Particle density (assumed)	
0.3	52	2.65 Mg/m3	
0.212	48		
0.15	45		
0.063	40		

Dry Mass of sample, g

**201**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	27.9
Sand	32.2
Silt	29.6
Clay	10.3

Grading Analysis		
D100	mm	
D60	mm	0.624
D30	mm	0.0198
D10	mm	0.00194
Uniformity Coefficient		320
Curvature Coefficient		0.32

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved

Stephen.Watson

LAB 05R Version 4



10122



## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH07**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **14**

Soil Description **Brown sandy very gravelly silty CLAY.**

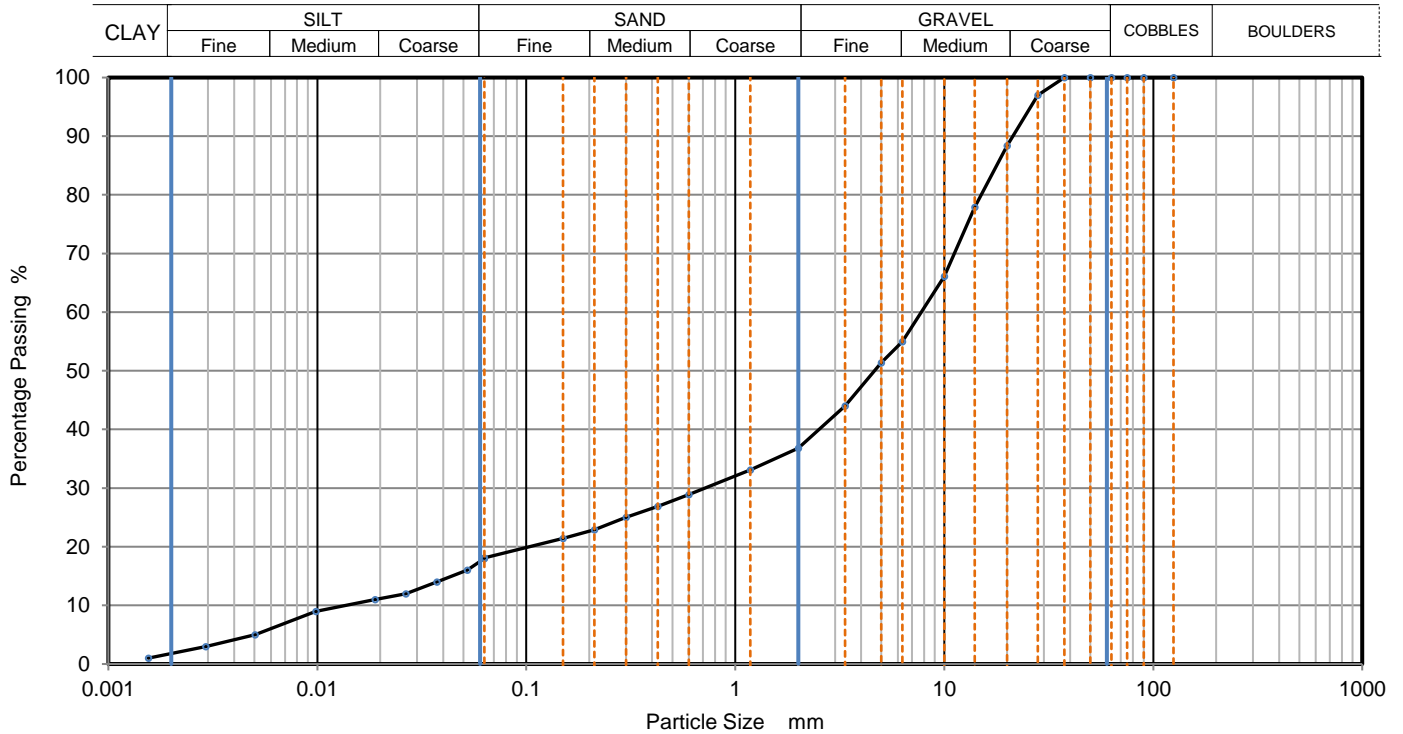
Depth, m **4.00**

Specimen Reference **2** Specimen Depth **4** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **Caus2021082620**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	18
90	100	0.05218	16
75	100	0.03732	14
63	100	0.02654	12
50	100	0.01887	11
37.5	100	0.00985	9
28	97	0.00503	5
20	88	0.00292	3
14	78	0.00155	1
10	66		
6.3	55		
5	51		
3.35	44		
2	37		
1.18	33		
0.6	29		
0.425	27	Particle density (assumed) 2.65 Mg/m3	
0.3	25		
0.212	23		
0.15	21		
0.063	18		

Dry Mass of sample, g

**2562**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	63.2
Sand	18.6
Silt	16.2
Clay	2.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	600
Curvature Coefficient	5.1

Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved

Stephen.Watson

LAB 05R Version 4



10122



## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **BH08**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **14**

Soil Description **Brown sandy gravelly silty CLAY.**

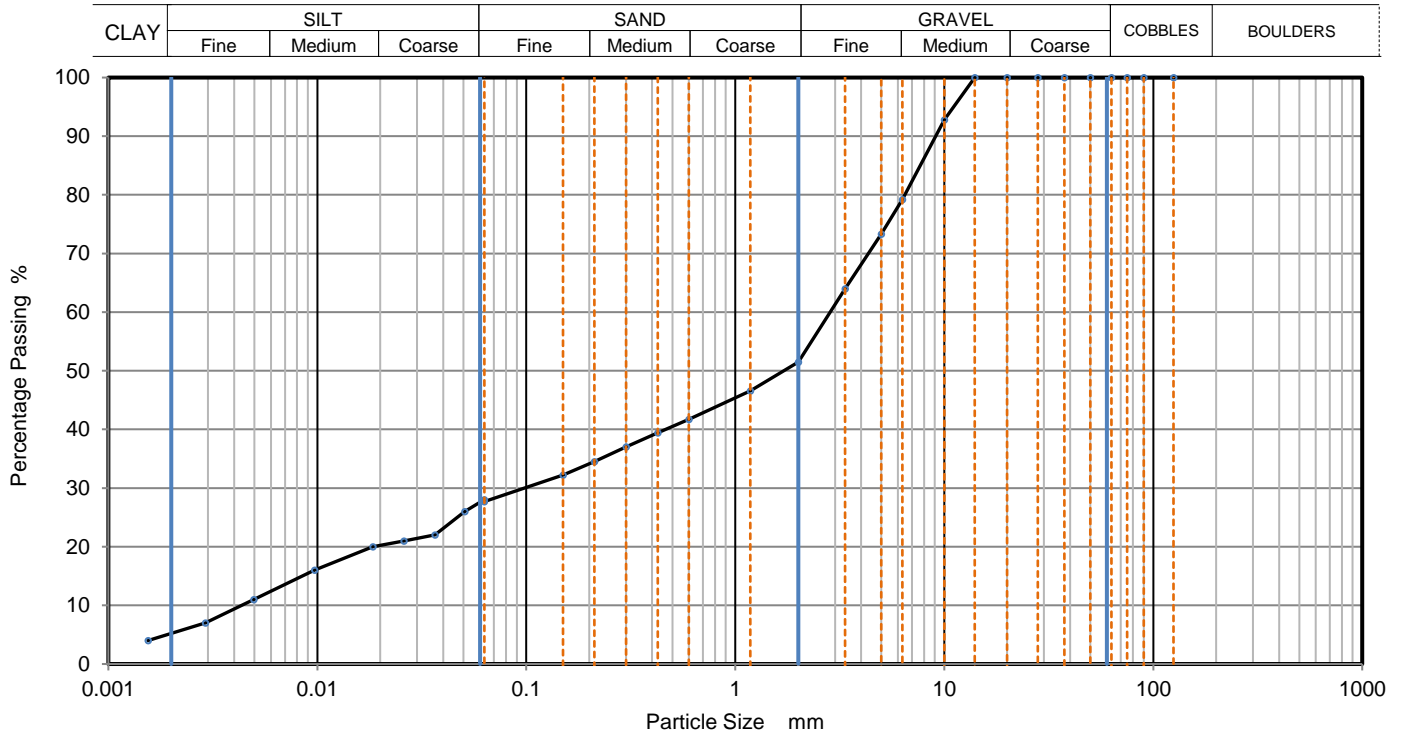
Depth, m **4.00**

Specimen Reference **4** Specimen Depth **4** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **Caus2021082626**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	28
90	100	0.05065	26
75	100	0.03649	22
63	100	0.02596	21
50	100	0.01846	20
37.5	100	0.00970	16
28	100	0.00496	11
20	100	0.00291	7
14	100	0.00155	4
10	93		
6.3	79		
5	73		
3.35	64		
2	52		
1.18	47		
0.6	42		
0.425	39	Particle density (assumed)	
0.3	37	2.65 Mg/m3	
0.212	35		
0.15	32		
0.063	28		

Dry Mass of sample, g **204**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	48.5
Sand	23.8
Silt	22.7
Clay	5.0

Grading Analysis	
D100	mm
D60	mm 2.84
D30	mm 0.098
D10	mm 0.00461
Uniformity Coefficient	620
Curvature Coefficient	0.73

Remarks  
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved  
  
Stephen.Watson

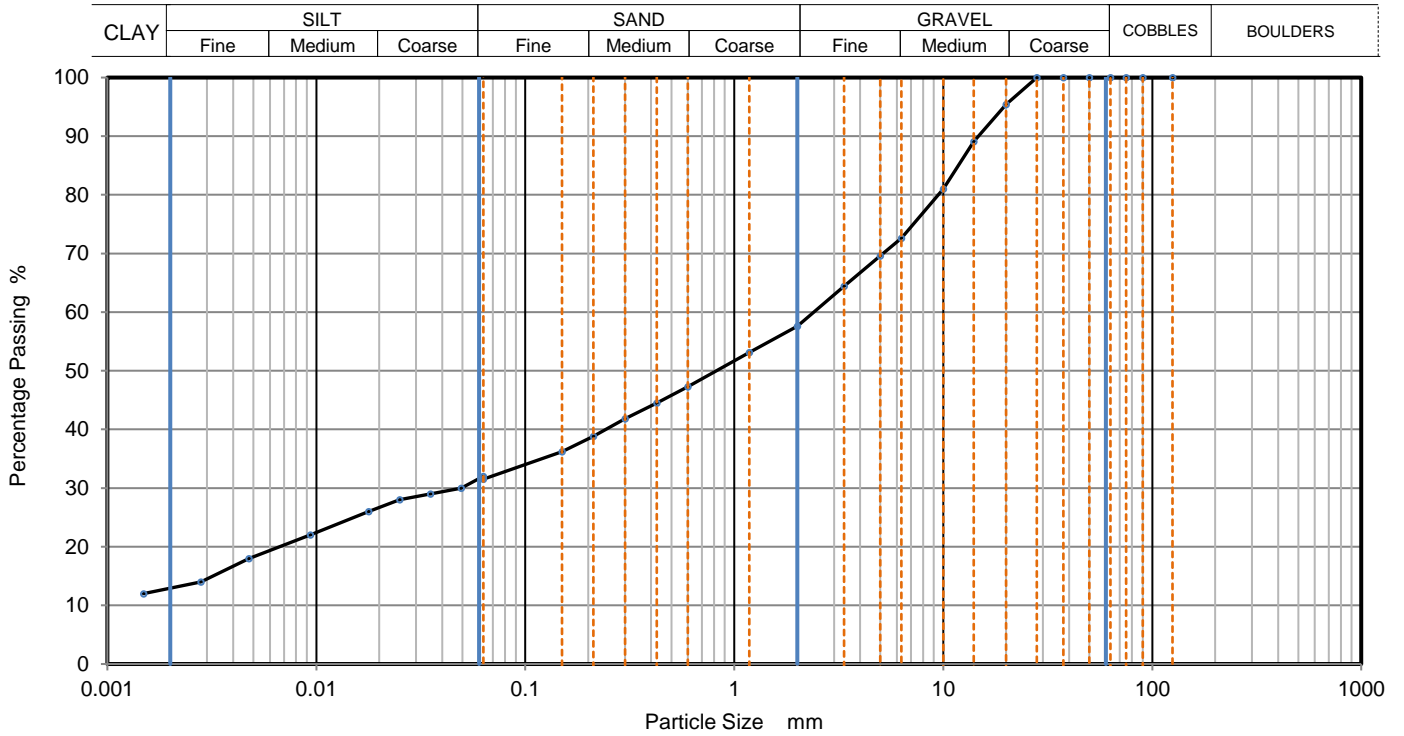




## PARTICLE SIZE DISTRIBUTION

Job Ref	<b>21-0937</b>
Borehole/Pit No.	TP02
Sample No.	7
Depth, m	0.70
Sample Type	B
KeyLAB ID	Caus2021082629

Site Name	Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation		
Soil Description	Grey sandy gravelly silty CLAY.		
Specimen Reference	4	Specimen Depth	0.7 m
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	32
90	100	0.04939	30
75	100	0.03515	29
63	100	0.02501	28
50	100	0.01780	26
37.5	100	0.00936	22
28	100	0.00476	18
20	95	0.00280	14
14	89	0.00149	12
10	81		
6.3	73		
5	70		
3.35	64		
2	58		
1.18	53		
0.6	47		
0.425	45	Particle density (assumed) 2.65 Mg/m <sup>3</sup>	
0.3	42		
0.212	39		
0.15	36		
0.063	32		

Dry Mass of sample, g 2549

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	42.4
Sand	26.1
Silt	18.5
Clay	13.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved
Stephen.Watson





## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **TP03**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **7**

Soil Description **Grey sandy slightly silty subangular fine to coarse GRAVEL.**

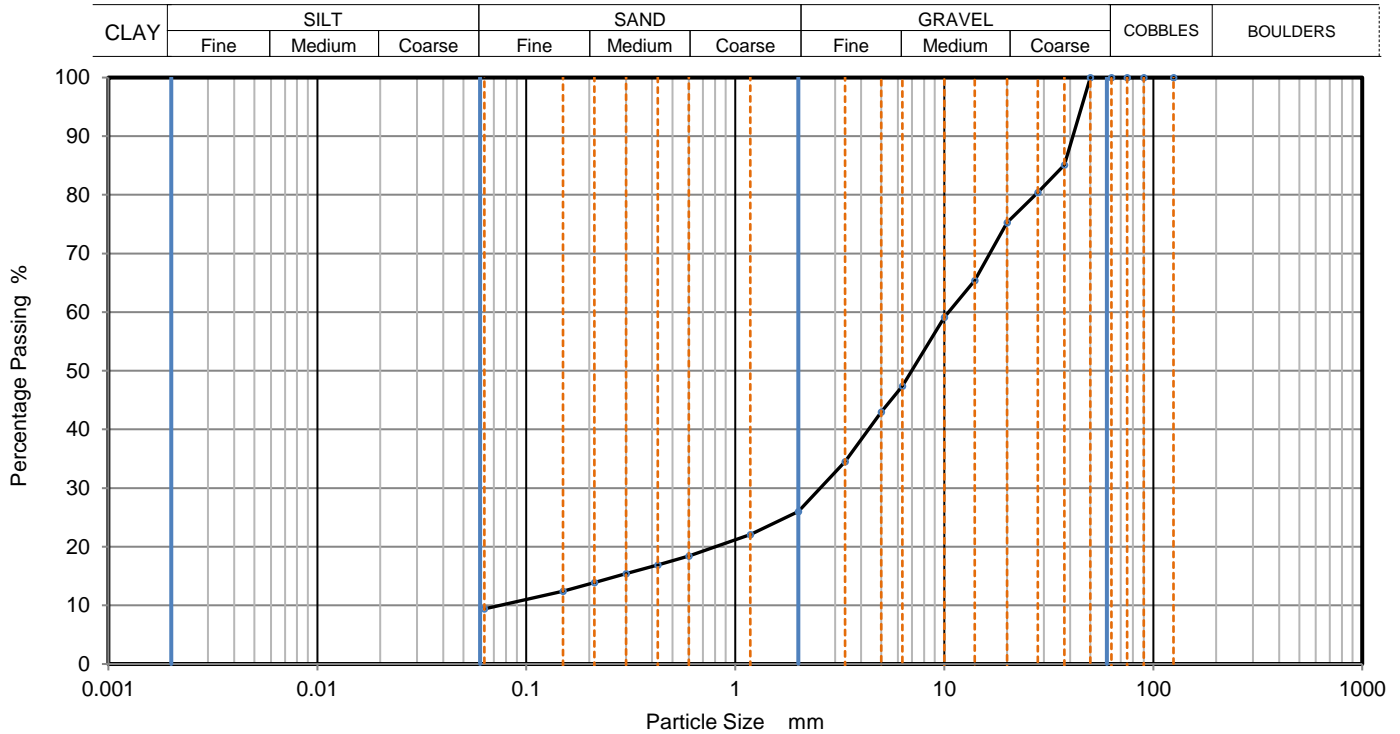
Depth, m **1.00**

Specimen Reference **2** Specimen Depth **1** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clause 9.2**

KeyLAB ID **Caus2021082632**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	85		
28	80		
20	75		
14	65		
10	59		
6.3	47		
5	43		
3.35	35		
2	26		
1.18	22		
0.6	18		
0.425	17		
0.3	15		
0.212	14		
0.15	12		
0.063	9		

Dry Mass of sample, g

**3178**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	74.0
Sand	16.6
Fines <0.063mm	9.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	140
Curvature Coefficient	8.3

**Remarks**

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved  
  
Stephen.Watson





## PARTICLE SIZE DISTRIBUTION

Job Ref **21-0937**

Borehole/Pit No. **TP04**

Site Name **Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation**

Sample No. **7**

Soil Description **Greyish brown sandy silty subangular fine to coarse GRAVEL.**

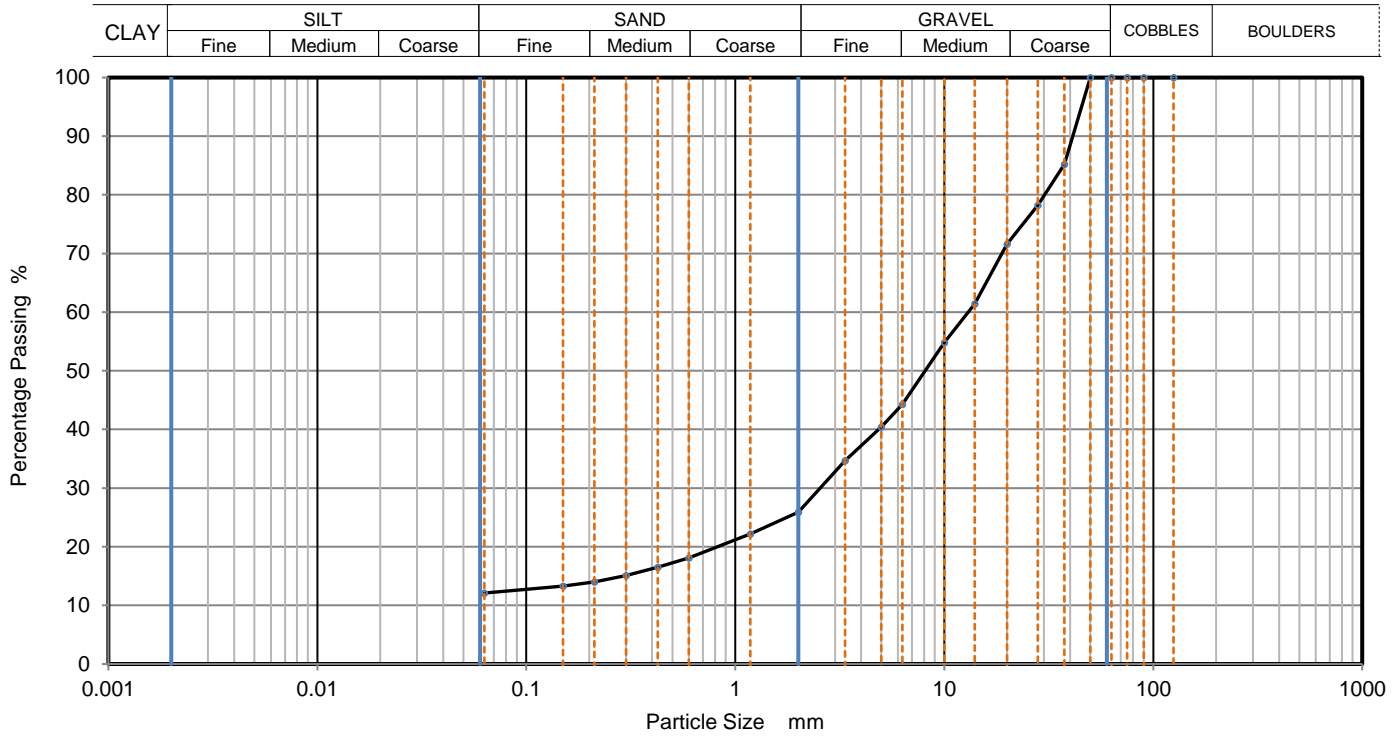
Depth, m **1.00**

Specimen Reference **2** Specimen Depth **1** m

Sample Type **B**

Test Method **BS1377:Part 2:1990, clause 9.2**

KeyLAB ID **Caus2021082633**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	85		
28	78		
20	72		
14	61		
10	55		
6.3	44		
5	40		
3.35	35		
2	26		
1.18	22		
0.6	18		
0.425	17		
0.3	15		
0.212	14		
0.15	13		
0.063	12		

Dry Mass of sample, g

**3096**

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	74.1
Sand	13.8
Fines <0.063mm	12.0

Grading Analysis	
D100	mm
D60	mm 13.1
D30	mm 2.55
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

**Remarks**

Preparation and testing in accordance with BS1377-2 :1990 unless noted below

Approved  
  
Stephen.Watson





# Final Report

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**Report No.:** 21-30780-1  
**Initial Date of Issue:** 14-Sep-2021  
**Client** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL  
**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist  
**Project** 21-0937 Tynagh Power Plant OCGT

<b>Quotation No.:</b>		<b>Date Received:</b>	06-Sep-2021
<b>Order No.:</b>		<b>Date Instructed:</b>	06-Sep-2021
<b>No. of Samples:</b>	25		
<b>Turnaround (Wkdays):</b>	7	<b>Results Due:</b>	14-Sep-2021
<b>Date Approved:</b>	14-Sep-2021		

**Approved By:**

**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780
Quotation No.:		<b>Chemtest Sample ID.:</b>		1273248	1273249	1273250	1273251	1273252	1273253	1273254	1273255	1273256	
Order No.:		Client Sample Ref.:		10	12	9	11	13	11	13	15	8	
		Sample Location:		BH01	BH01	BH02	BH02	BH02	BH03	BH03	BH03	BH05	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1	3.5	0	2	4	1	3	5	0	
		Date Sampled:		03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>									
Moisture	N	2030	%	0.020	11	11	6.8	12	5.7	7.8	9.5	6.1	6.3
pH	U	2010		4.0		8.4		8.7	8.9		8.8	8.7	8.8
pH (2.5:1)	N	2010		4.0	8.2		8.3			8.6			
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.44	0.20	0.31	0.048	0.013	0.069	< 0.010	0.057	0.029
Total Sulphur	U	2175	%	0.010	1.8		5.3			0.43			
Sulphate (Acid Soluble)	U	2430	%	0.010	0.37		0.65			0.075			
Organic Matter	U	2625	%	0.40									

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780
Quotation No.:		<b>Chemtest Sample ID.:</b>		1273257	1273258	1273259	1273260	1273261	1273262	1273263	1273264	1273265	
Order No.:		Client Sample Ref.:		11	13	14	11	12	14	9	10	11	
		Sample Location:		BH06	BH06	BH06	BH07	BH07	BH07	BH08	BH08	BH08	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.2	3	4	1	3	4	1.1	2	2.7	
		Date Sampled:		03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>									
Moisture	N	2030	%	0.020	6.1	16	40	6.2	15	7.8	14	30	36
pH	U	2010		4.0		8.2	7.7		8.2	8.5		8.0	7.6
pH (2.5:1)	N	2010		4.0				8.5				8.5	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.35	0.26	0.30	0.34	0.25	0.099	0.052	0.097	0.061
Total Sulphur	U	2175	%	0.010	0.32			0.67			0.15		
Sulphate (Acid Soluble)	U	2430	%	0.010	0.23			0.12			0.054		
Organic Matter	U	2625	%	0.40								5.2	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	21-30780	
Quotation No.:		<b>Chemtest Sample ID.:</b>		1273266	1273267	1273268	1273269	1273270	1273271	1273272	
Order No.:		Client Sample Ref.:		13	1	4	8	10	7	7	
		Sample Location:		BH08	BH09A	BH10	TP02	TP02	TP03	TP04	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		3.3	1	0.5	1.2	2	1	1	
		Date Sampled:		03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	03-Sep-2021	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>							
Moisture	N	2030	%	0.020	11	6.7	5.0	8.6	8.0	5.1	5.5
pH	U	2010		4.0	8.6	8.6		8.3	8.8		8.8
pH (2.5:1)	N	2010		4.0			9.0			8.6	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.023	0.24	0.093	0.63	0.037	0.24	0.067
Total Sulphur	U	2175	%	0.010			0.14			0.21	
Sulphate (Acid Soluble)	U	2430	%	0.010			0.036			0.080	
Organic Matter	U	2625	%	0.40							

## Test Methods

<b>SOP</b>	<b>Title</b>	<b>Parameters included</b>	<b>Method summary</b>
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

## **Report Information**

### **Key**

---

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# CAUSEWAY GEOTECH

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**ROI: +353 (0)1 526 7465**

Registered in Ireland.  
Company Number: 633786

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## SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

27 September  
2021

<b>Project Name:</b>	Tynagh Power Station Open Cycle Gas Turbine (OCGT)
<b>Project No.:</b>	21-0937
<b>Client:</b>	EP UK Investments
<b>Engineer:</b>	AECOM Ireland Ltd

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s).

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd



1



**Project Name:** Tynagh Power Station Open Cycle Gas Turbine (OCGT)

**Report Reference:** Schedule 1 - ROCK

The table below details the tests carried out, the specifications used, and the number of tests included in this report.

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

<b>Material tested</b>	<b>Type of test/Properties measured/Range of measurement</b>	<b>Standard specifications</b>	<b>No. of results included in the report</b>
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	42

#### **SUB-CONTRACTED TESTS**

In agreement with Client, the following tests were conducted by an approved sub-contractor. All sub-contracting laboratories used are UKAS accredited.

<b>Material tested</b>	<b>Type of test/Properties measured/Range of measurement</b>	<b>Standard specifications</b>	<b>No. of results included in the report</b>
ROCK	Unconfined Compressive Strength (UCS)*	ASTM D7012 - 14	17

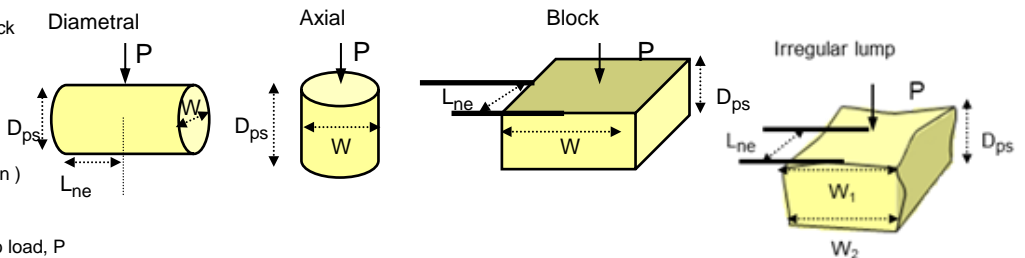


## Point Load Strength Index Tests Summary of Results

Project No.  21-0937	Project Name  Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation
----------------------------	---

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, D <sub>e</sub> mm	Point Load Strength Index		Remarks (including water content if measured)
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)		L <sub>ne</sub> mm	W mm	D <sub>ps</sub> mm	D <sub>ps'</sub> mm			I <sub>s</sub> MPa	I <sub>s</sub> (50) MPa	
BH01	6.75		C	1	6.75	LIMESTONE	D	U	NO	94.7	100.7	100.7	99.0	12.9	99.8	1.3	1.8	
BH01	7.35		C	2	7.35	LIMESTONE	A	U	NO		100.9	78.0	75.0	10.7	98.2	1.1	1.5	
BH02	5.50		C	1	5.50	LIMESTONE	D	U	YES	88.7	101.4	101.4	97.0	5.2	99.2	0.5	0.7	
BH02	6.72		C	2	6.72	LIMESTONE	D	U	YES	94.8	101.4	101.4	96.0	7.5	98.7	0.8	1.0	
BH02	7.42		C	3	7.42	LIMESTONE	A	U	YES		101.2	77.0	73.0	12.9	97.0	1.4	1.8	
BH02	8.02		C	4	8.02	LIMESTONE	D	U	NO	122.3	101.5	101.5	96.0	21.4	98.7	2.2	3.0	
BH03	6.27		C	1	6.27	LIMESTONE	A	U	NO		101.1	74.0	72.0	18.2	96.3	2.0	2.6	
BH03	7.50		C	2	7.50	LIMESTONE	D	U	NO	111.7	101.5	101.5	99.0	19.6	100.2	2.0	2.7	
BH03	8.00		C	3	8.00	LIMESTONE	A	U	NO		101.6	103.0	94.0	10.8	110.3	0.9	1.3	
BH05	9.00		C	1	9.00	LIMESTONE	D	U	NO	109.4	101.4	98.0	98.0	19.3	99.7	1.9	2.6	
BH05	10.35		C	2	10.35	LIMESTONE	D	U	NO	98.7	101.2	101.2	100.0	18.1	100.6	1.8	2.4	
BH05	11.45		C	3	11.45	LIMESTONE	A	U	NO		101.2	57.0	55.0	2.9	84.2	0.4	0.5	
BH06	7.46		C	1	7.46	LIMESTONE	A	U	YES		101.7	79.0	76.0	14.9	99.2	1.5	2.1	
BH06	8.10		C	2	8.10	LIMESTONE	D	U	NO	96.2	101.2	101.2	98.0	24.3	99.6	2.5	3.3	
BH06	8.80		C	3	8.80	LIMESTONE	D	U	YES	104.3	101.4	101.4	100.0	8.6	100.7	0.8	1.2	
BH06	10.69		C	4	10.69	LIMESTONE	A	U	NO		101.8	64.0	59.0	33.2	87.4	4.3	5.6	
BH06	10.97		C	5	10.97	LIMESTONE	A	U	NO		101.5	81.0	77.0	18.4	99.8	1.8	2.5	
BH06	12.05		C	6	12.05	LIMESTONE	D	U	YES	84.3	101.3	101.3	97.0	17.3	99.1	1.8	2.4	

Test Type  
D - Diametral, A - Axial, I - Irregular Lump, B - Block  
Direction  
L - parallel to planes of weakness  
P - perpendicular to planes of weakness  
U - unknown or random  
Dimensions  
D<sub>ps</sub> - Distance between platens ( platen separation )  
D<sub>ps'</sub> - at failure ( see ISRM note 6 )  
L<sub>ne</sub> - Length from platens to nearest free end  
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise  
Detailed legend for test and dimensions, based on ISRM, is shown above.  
Size factor, F = (De/50)0.45 for all tests.  
LAB 17R Version 4

Date Printed  
23/09/2021

Approved By  
Stephen.Watson

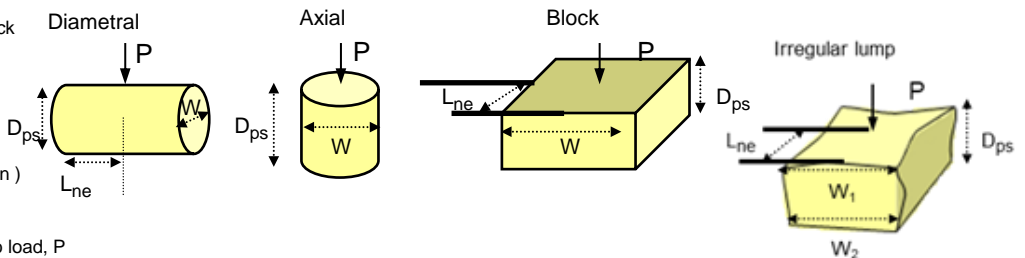


## Point Load Strength Index Tests Summary of Results

Project No. <b>21-0937</b>	Project Name <b>Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation</b>
-------------------------------	--

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, D <sub>e</sub> mm	Point Load Strength Index		Remarks (including water content if measured)
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)		L <sub>ne</sub> mm	W mm	D <sub>ps</sub> mm	D <sub>ps'</sub> mm			I <sub>s</sub> MPa	I <sub>s</sub> (50) MPa	
BH07	5.60		C	1	5.60	LIMESTONE	D	U	NO	78.2	101.4	101.4	98.0	19.0	99.7	1.9	2.6	
BH07	6.30		C	2	6.30	LIMESTONE	A	U	YES		101.3	78.0	72.0	4.8	96.4	0.5	0.7	
BH07	7.85		C	3	7.85	LIMESTONE	A	U	NO		101.4	77.0	71.0	4.5	95.7	0.5	0.7	
BH07	8.50		C	4	8.50	LIMESTONE	D	U	NO	124.1	101.3	101.3	98.0	12.3	99.6	1.2	1.7	
BH07	9.50		C	5	9.50	LIMESTONE	D	U	NO	102.4	101.5	101.5	98.0	14.3	99.7	1.4	2.0	
BH07	10.72		C	6	10.72	LIMESTONE	D	U	NO	108.1	101.4	101.4	99.0	13.1	100.2	1.3	1.8	
BH08	6.80		C	1	6.80	LIMESTONE	A	U	YES		101.4	80.0	77.0	16.0	99.7	1.6	2.2	
BH08	7.60		C	2	7.60	LIMESTONE	D	U	NO	95.3	101.3	101.3	98.0	18.2	99.6	1.8	2.5	
BH08	8.47		C	3	8.47	LIMESTONE	A	U	YES		101.1	65.0	61.0	15.2	88.6	1.9	2.5	
BH08	9.90		C	4	9.90	LIMESTONE	D	U	YES	111.8	101.4	101.4	98.0	13.6	99.7	1.4	1.9	
BH08	10.85		C	5	10.85	LIMESTONE	A	U	NO		101.5	90.0	85.0	6.9	104.8	0.6	0.9	
BH08	11.57		C	6	11.57	LIMESTONE	A	U	NO		101.3	71.0	65.0	14.2	91.6	1.7	2.2	
BH09	3.82		C	1	3.82	LIMESTONE	A	U	YES		101.5	91.0	87.0	2.5	106.0	0.2	0.3	
BH09	4.33		C	2	4.33	LIMESTONE	D	U	NO	78.4	101.3	101.1	98.0	19.6	99.6	2.0	2.7	
BH09	5.05		C	3	5.05	LIMESTONE	D	U	NO	97.3	101.5	101.5	97.0	16.7	99.2	1.7	2.3	
BH09	5.73		C	4	5.73	LIMESTONE	D	U	NO	109.2	101.3	101.3	96.0	17.4	98.6	1.8	2.4	
BH09	6.65		C	5	6.65	LIMESTONE	A	U	NO		101.3	78.0	75.0	3.9	98.4	0.4	0.5	
BH09	7.68		C	6	7.68	LIMESTONE	A	U	NO		101.6	57.0	54.0	9.0	83.6	1.3	1.6	

**Test Type**  
D - Diametral, A - Axial, I - Irregular Lump, B - Block  
**Direction**  
L - parallel to planes of weakness  
P - perpendicular to planes of weakness  
U - unknown or random  
**Dimensions**  
D<sub>ps</sub> - Distance between platens ( platen separation )  
D<sub>ps'</sub> - at failure ( see ISRM note 6 )  
L<sub>ne</sub> - Length from platens to nearest free end  
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise  
Detailed legend for test and dimensions, based on ISRM, is shown above.  
Size factor, F = (De/50)0.45 for all tests.

LAB 17R Version 4

Date Printed  
23/09/2021

Approved By  
  
Stephen.Watson



### Point Load Strength Index Tests Summary of Results

Project No. 21-0937	Project Name Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation
------------------------	---

Borehole No.	Sample			Specimen		Rock Type	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, D <sub>de</sub> mm	Point Load Strength Index		Remarks (including water content if measured)		
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)		L <sub>ne</sub> mm	W mm	D <sub>ps</sub> mm	D <sub>ps'</sub> mm			I <sub>s</sub> MPa	I <sub>s(50)</sub> MPa			
																			BH10	2.57
BH10	3.74		C	2	3.74	LIMESTONE	D	U	NO	159.7	101.5	101.5	99.0	10.8	100.2	1.1	1.5			
BH10	5.36		C	3	5.36	LIMESTONE	A	U	NO		101.3	69.0	67.0	15.7	93.0	1.8	2.4			
BH10	6.00		C	4	6.00	LIMESTONE	D	U	NO	113.2	101.6	101.6	97.0	12.7	99.3	1.3	1.8			
BH10	6.73		C	5	6.73	LIMESTONE	A	U	YES		101.2	83.0	80.0	15.7	101.5	1.5	2.1			
BH10	8.25		C	6	8.25	LIMESTONE	D	U	NO	124.2	101.4	101.4	99.0	18.2	100.2	1.8	2.5			

**Test Type**  
 D - Diametral, A - Axial, I - Irregular Lump, B - Block

**Direction**  
 L - parallel to planes of weakness  
 P - perpendicular to planes of weakness  
 U - unknown or random

**Dimensions**  
 D<sub>ps</sub> - Distance between platens ( platen separation )  
 D<sub>ps'</sub> - at failure ( see ISRM note 6 )  
 L<sub>ne</sub> - Length from platens to nearest free end  
 W - Width of shortest dimension perpendicular to load, P

Diametral

Axial

Block

Irregular lump

## LABORATORY TEST CERTIFICATE

10 Queenslie Point  
Queenslie Industrial Estate  
120 Stepps Road  
Glasgow  
G33 3NQ

**Certificate No :** 21/1113 - 01  
**To :** Stephen Watson  
**Client :** Causeway Geotech Limited  
8 Drumahiskey Road  
Ballymoney  
Co. Antrim  
BT53 7QL

Tel: 0141 774 4032

email: info@mattest.org  
Website: www.mattest.org

### LABORATORY TESTING OF ROCK

#### Introduction

We refer to samples taken from Tynagh Power Station – Open Cycle Gas Turbine (OCGT) Ground Investigation and delivered to our laboratory on 16th September 2021.

#### Material & Source

Sample Reference : See Report Plates  
Sampled By : Client  
Sampling Certificate : Not Supplied  
Location : See Report Plates  
Description : Rock Cores  
Date Sampled : Not Supplied  
Date Tested : 16th September 2021 Onwards  
Source : 21-0937 - Tynagh Power Station – Open Cycle Gas Turbine (OCGT) GI

#### Test Results

As Detailed On Page 2 to Page 9 inclusive


#### Comments

The results contained in this report relate to the sample(s) as received  
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation  
This report should not be reproduced except in full without the written approval of the laboratory  
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

#### Remarks

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#### Approved for Issue

  
\_\_\_\_\_  
T McLelland (Director)

Date 27/09/2021



BOREHOLE		<b>BH01</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>7.90-8.26</b>	
SAMPLE DIAMETER	mm	<b>101.57</b>	
SAMPLE HEIGHT	mm	<b>202.18</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.7</b>	
TEST DURATION	min.sec	<b>3.35</b>	
DATE OF TESTING		<b>24/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>137.4</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>17.0</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.1</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.66</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.66</b>	

BOREHOLE			<b>SAMPLE FAILURE SHAPES</b>	
SAMPLE				
DEPTH	m			
SAMPLE DIAMETER	mm			
SAMPLE HEIGHT	mm			
TEST CONDITION				
RATE OF LOADING	kN/s			
TEST DURATION	min.sec			
DATE OF TESTING				
LOAD FRAME USED				
LOAD DIRECTION WITH RESPECT TO LITHOLOGY				
FAILURE LOAD	kN			
UNCONFINED COMPRESSIVE STRENGTH	MPa			
WATER CONTENT (ISRM Suggested Methods)	%			
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			

BOREHOLE			<b>SAMPLE FAILURE SHAPES</b>	
SAMPLE				
DEPTH	m			
SAMPLE DIAMETER	mm			
SAMPLE HEIGHT	mm			
TEST CONDITION				
RATE OF LOADING	kN/s			
TEST DURATION	min.sec			
DATE OF TESTING				
LOAD FRAME USED				
LOAD DIRECTION WITH RESPECT TO LITHOLOGY				
FAILURE LOAD	kN			
UNCONFINED COMPRESSIVE STRENGTH	MPa			
WATER CONTENT (ISRM Suggested Methods)	%			
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

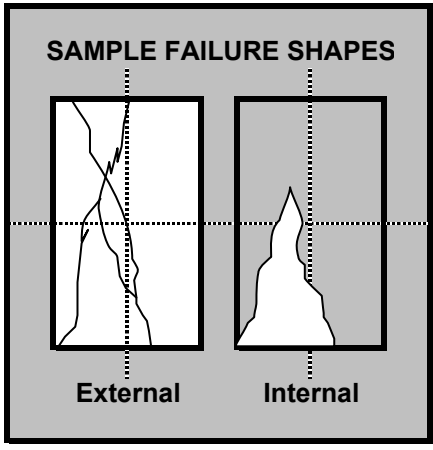
BOREHOLE		<b>BH05</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>9.46-9.83</b>	
SAMPLE DIAMETER	mm	<b>101.19</b>	
SAMPLE HEIGHT	mm	<b>206.18</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>7.20</b>	
DATE OF TESTING		<b>24/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>399.7</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>49.7</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.2</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	

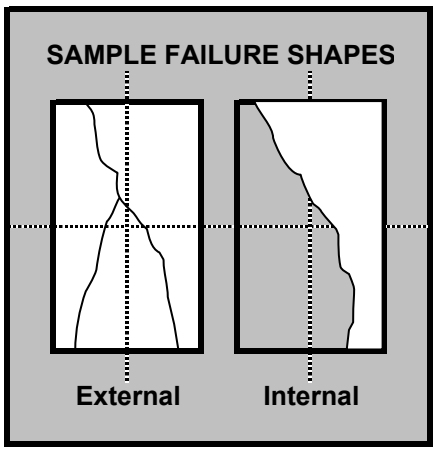
BOREHOLE			<b>SAMPLE FAILURE SHAPES</b>
SAMPLE			
DEPTH	m		
SAMPLE DIAMETER	mm		
SAMPLE HEIGHT	mm		
TEST CONDITION			
RATE OF LOADING	kN/s		
TEST DURATION	min.sec		
DATE OF TESTING			
LOAD FRAME USED			
LOAD DIRECTION WITH RESPECT TO LITHOLOGY			
FAILURE LOAD	kN		
UNCONFINED COMPRESSIVE STRENGTH	MPa		
WATER CONTENT (ISRM Suggested Methods)	%		
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		

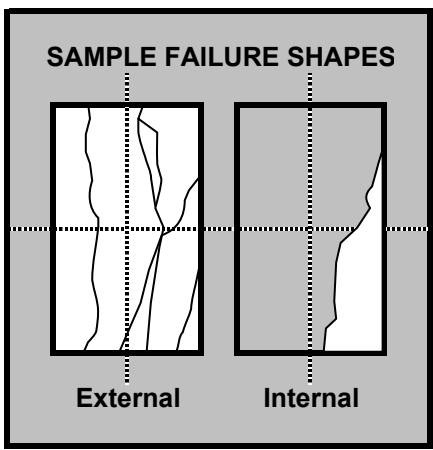
BOREHOLE			<b>SAMPLE FAILURE SHAPES</b>
SAMPLE			
DEPTH	m		
SAMPLE DIAMETER	mm		
SAMPLE HEIGHT	mm		
TEST CONDITION			
RATE OF LOADING	kN/s		
TEST DURATION	min.sec		
DATE OF TESTING			
LOAD FRAME USED			
LOAD DIRECTION WITH RESPECT TO LITHOLOGY			
FAILURE LOAD	kN		
UNCONFINED COMPRESSIVE STRENGTH	MPa		
WATER CONTENT (ISRM Suggested Methods)	%		
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

BOREHOLE		<b>BH06</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>9.32-9.74</b>	
SAMPLE DIAMETER	mm	<b>101.60</b>	
SAMPLE HEIGHT	mm	<b>204.07</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.8</b>	
TEST DURATION	min.sec	<b>6.26</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>309.4</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>38.2</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.1</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.99</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.98</b>	

BOREHOLE		<b>BH06</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>10.00-10.29</b>	
SAMPLE DIAMETER	mm	<b>101.60</b>	
SAMPLE HEIGHT	mm	<b>206.17</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>4.03</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>211.0</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>26.0</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.1</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.79</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.78</b>	

BOREHOLE		<b>BH06</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>12.60-12.92</b>	
SAMPLE DIAMETER	mm	<b>101.61</b>	
SAMPLE HEIGHT	mm	<b>206.64</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.8</b>	
TEST DURATION	min.sec	<b>8.10</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>382.5</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>47.2</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.3</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.96</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.95</b>	

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

BOREHOLE		<b>BH07</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>7.00-7.40</b>	
SAMPLE DIAMETER	mm	<b>101.70</b>	
SAMPLE HEIGHT	mm	<b>205.82</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>1.0</b>	
TEST DURATION	min.sec	<b>3.11</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>184.9</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>22.8</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.4</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.68</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.68</b>	

BOREHOLE		<b>BH07</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>10.00-10.26</b>	
SAMPLE DIAMETER	mm	<b>101.40</b>	
SAMPLE HEIGHT	mm	<b>203.92</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>4.16</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>226.3</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>28.0</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.2</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.68</b>	

BOREHOLE			<b>SAMPLE FAILURE SHAPES</b>	
SAMPLE				
DEPTH	m			
SAMPLE DIAMETER	mm			
SAMPLE HEIGHT	mm			
TEST CONDITION				
RATE OF LOADING	kN/s			
TEST DURATION	min.sec			
DATE OF TESTING				
LOAD FRAME USED				
LOAD DIRECTION WITH RESPECT TO LITHOLOGY				
FAILURE LOAD	kN			
UNCONFINED COMPRESSIVE STRENGTH	MPa			
WATER CONTENT (ISRM Suggested Methods)	%			
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**



BOREHOLE		<b>BH08</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>6.10-6.60</b>	
SAMPLE DIAMETER	mm	<b>101.19</b>	
SAMPLE HEIGHT	mm	<b>208.35</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>7.01</b>	
DATE OF TESTING		<b>24/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>366.0</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>45.5</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.1</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.72</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.72</b>	

BOREHOLE		<b>BH08</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>9.10-9.40</b>	
SAMPLE DIAMETER	mm	<b>101.61</b>	
SAMPLE HEIGHT	mm	<b>202.16</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>6.52</b>	
DATE OF TESTING		<b>24/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>341.0</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>42.1</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.4</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.70</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	

BOREHOLE		<b>BH08</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>10.48-10.75</b>	
SAMPLE DIAMETER	mm	<b>101.61</b>	
SAMPLE HEIGHT	mm	<b>203.33</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>5.16</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>267.4</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>33.0</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.4</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.70</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

BOREHOLE		<b>BH09</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>3.18-3.58</b>	
SAMPLE DIAMETER	mm	<b>101.53</b>	
SAMPLE HEIGHT	mm	<b>206.42</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>6.15</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>331.5</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>40.9</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.3</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.68</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.67</b>	

BOREHOLE		<b>BH09</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>4.00-4.33</b>	
SAMPLE DIAMETER	mm	<b>101.51</b>	
SAMPLE HEIGHT	mm	<b>205.92</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>3.50</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>196.8</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>24.3</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.4</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.68</b>	

BOREHOLE		<b>BH09</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>5.90-6.22</b>	
SAMPLE DIAMETER	mm	<b>101.41</b>	
SAMPLE HEIGHT	mm	<b>207.47</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>3.05</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>171.8</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>21.3</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.3</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.67</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.67</b>	

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

BOREHOLE		<b>BH09</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>8.10-8.40</b>	
SAMPLE DIAMETER	mm	<b>101.52</b>	
SAMPLE HEIGHT	mm	<b>201.42</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>5.43</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>279.2</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>34.5</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.6</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.68</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.66</b>	

BOREHOLE			<b>SAMPLE FAILURE SHAPES</b>	
SAMPLE				
DEPTH	m			
SAMPLE DIAMETER	mm			
SAMPLE HEIGHT	mm			
TEST CONDITION				
RATE OF LOADING	kN/s			
TEST DURATION	min.sec			
DATE OF TESTING				
LOAD FRAME USED				
LOAD DIRECTION WITH RESPECT TO LITHOLOGY				
FAILURE LOAD	kN			
UNCONFINED COMPRESSIVE STRENGTH	MPa			
WATER CONTENT (ISRM Suggested Methods)	%			
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			

BOREHOLE			<b>SAMPLE FAILURE SHAPES</b>	
SAMPLE				
DEPTH	m			
SAMPLE DIAMETER	mm			
SAMPLE HEIGHT	mm			
TEST CONDITION				
RATE OF LOADING	kN/s			
TEST DURATION	min.sec			
DATE OF TESTING				
LOAD FRAME USED				
LOAD DIRECTION WITH RESPECT TO LITHOLOGY				
FAILURE LOAD	kN			
UNCONFINED COMPRESSIVE STRENGTH	MPa			
WATER CONTENT (ISRM Suggested Methods)	%			
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>			

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

BOREHOLE		<b>BH10</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>4.35-4.76</b>	
SAMPLE DIAMETER	mm	<b>101.39</b>	
SAMPLE HEIGHT	mm	<b>206.36</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>6.08</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>327.2</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>40.5</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.1</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.73</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.72</b>	

BOREHOLE		<b>BH10</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>5.50-5.83</b>	
SAMPLE DIAMETER	mm	<b>101.37</b>	
SAMPLE HEIGHT	mm	<b>201.79</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.8</b>	
TEST DURATION	min.sec	<b>6.30</b>	
DATE OF TESTING		<b>24/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>313.9</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>38.9</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.2</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	

BOREHOLE		<b>BH10</b>	<b>SAMPLE FAILURE SHAPES</b>
SAMPLE		<b>C</b>	
DEPTH	m	<b>7.40-7.67</b>	
SAMPLE DIAMETER	mm	<b>101.44</b>	
SAMPLE HEIGHT	mm	<b>201.44</b>	
TEST CONDITION		<b>As Received</b>	
RATE OF LOADING	kN/s	<b>0.9</b>	
TEST DURATION	min.sec	<b>8.42</b>	
DATE OF TESTING		<b>23/09/2021</b>	
LOAD FRAME USED		<b>2000kN</b>	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		<b>Unknown</b>	
FAILURE LOAD	kN	<b>440.9</b>	
UNCONFINED COMPRESSIVE STRENGTH	MPa	<b>54.6</b>	
WATER CONTENT (ISRM Suggested Methods)	%	<b>0.2</b>	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.70</b>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	<b>2.69</b>	

Tested in accordance with ASTM D7012 - 14

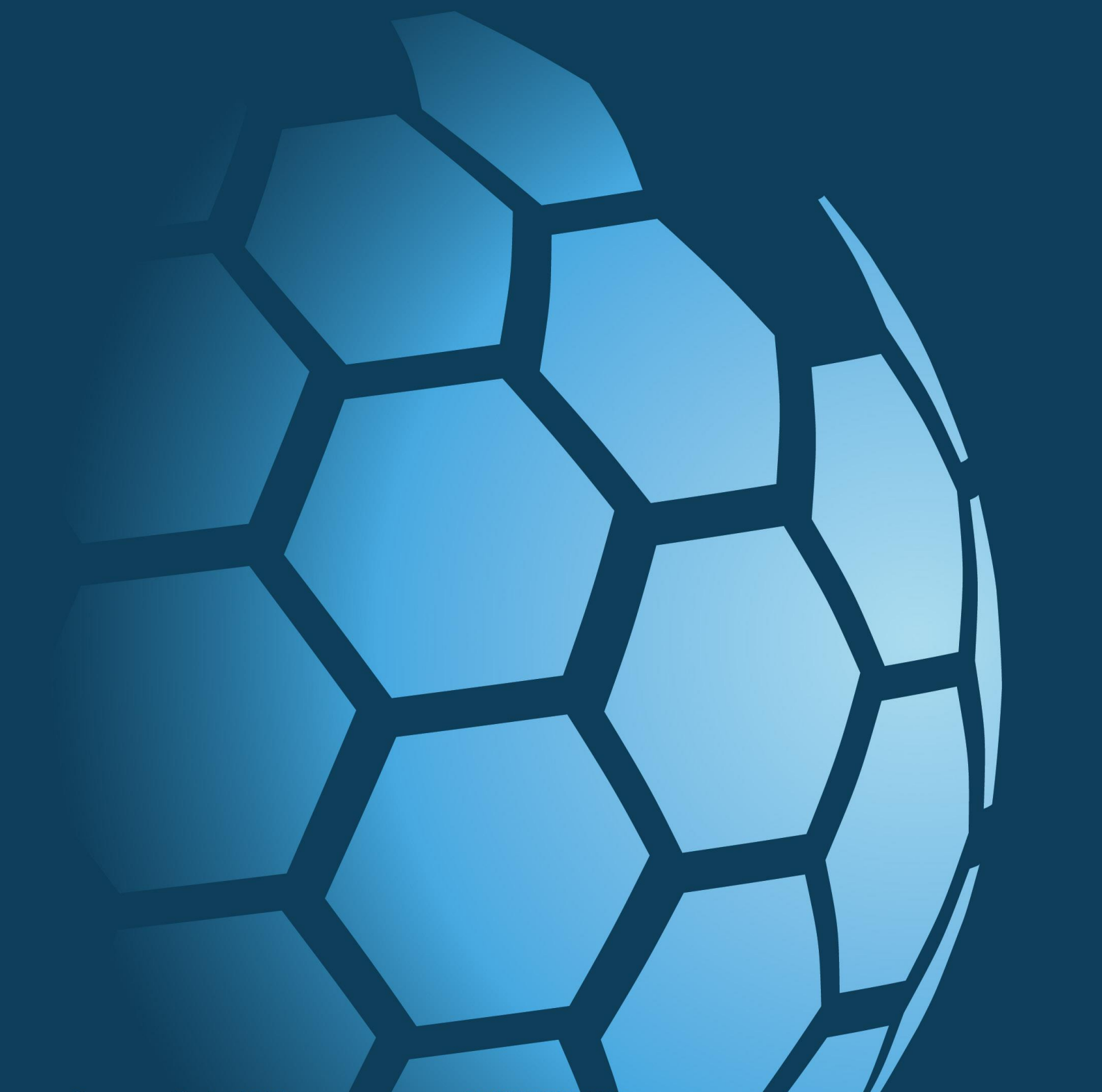
**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**



**CAUSEWAY**  
— GEOTECH

**APPENDIX I**

**ENVIRONMENTAL LABORATORY TEST RESULTS**





# Final Report

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**Report No.:** 21-28360-1

**Initial Date of Issue:** 01-Sep-2021

**Client** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Joe Gervin  
Neil Haggan  
Carin Cornwall  
Colm Hurley  
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Gabiella Horan  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project** 21-0937 Tynagh Power Plant OCGT


**Quotation No.:** Q21-25002

**Order No.:**

**No. of Samples:** 2

**Turnaround (Wkdays):** 7

**Date Approved:** 01-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager

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**Date Received:** 16-Aug-2021

**Date Instructed:** 23-Aug-2021

**Results Due:** 01-Sep-2021



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28360	21-28360
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261448	1261451
Order No.:		Client Sample Ref.:		2	5
		Sample Location:		BH01	BH01
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	2.50
		Date Sampled:		09-Aug-2021	09-Aug-2021
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	11 14
pH	M	2010		4.0	8.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.42
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	780
Beryllium	U	2450	mg/kg	1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	170
Chromium	M	2450	mg/kg	1.0	41
Copper	M	2450	mg/kg	0.50	1800
Mercury	M	2450	mg/kg	0.10	9.8
Nickel	M	2450	mg/kg	0.50	90
Lead	M	2450	mg/kg	0.50	24000
Selenium	M	2450	mg/kg	0.20	1.6
Vanadium	U	2450	mg/kg	5.0	15
Zinc	M	2450	mg/kg	0.50	20000
Chromium (Trivalent)	N	2490	mg/kg	1.0	41
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	0.81
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0 < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0 < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0 < 1.0



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28360	21-28360	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261448	1261451	
Order No.:		Client Sample Ref.:		2	5	
		Sample Location:		BH01	BH01	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		1.00	2.50	
		Date Sampled:		09-Aug-2021	09-Aug-2021	
		Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28360	21-28360
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261448	1261451
Order No.:		Client Sample Ref.:		2	5
		Sample Location:		BH01	BH01
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	2.50
		Date Sampled:		09-Aug-2021	09-Aug-2021
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28360	21-28360
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261448	1261451
Order No.:		Client Sample Ref.:		2	5
		Sample Location:		BH01	BH01
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	2.50
		Date Sampled:		09-Aug-2021	09-Aug-2021
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28360	21-28360
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261448	1261451
Order No.:		Client Sample Ref.:		2	5
		Sample Location:		BH01	BH01
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	2.50
		Date Sampled:		09-Aug-2021	09-Aug-2021
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	0.078
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	0.034
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	0.11
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage


If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

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**Report No.:** 21-28361-1  
**Initial Date of Issue:** 01-Sep-2021  
**Client** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL  
**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist  
**Project** 21-0937 Tynagh Power Plant OCGT  
**Quotation No.:** Q21-25002  
**Order No.:**  
**No. of Samples:** 1  
**Turnaround (Wkdays):** 7  
**Date Approved:** 01-Sep-2021  
**Approved By:**  
  
**Details:** Glynn Harvey, Technical Manager

**Date Received:** 16-Aug-2021

**Date Instructed:** 23-Aug-2021

**Results Due:** 01-Sep-2021





## Results - Water

### Project: 21-0937 Tynagh Power Plant OCGT

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b> 21-28361				
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b> 1261455				
Order No.:	Client Sample Ref.: 100				
	Sample Location: BH01				
	Sample Type: WATER				
	Top Depth (m): 2.56				
	Date Sampled: 10-Aug-2021				
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
pH	U	1010		N/A	7.9
Sulphate	U	1220	mg/l	1.0	460

## Test Methods

<b>SOP</b>	<b>Title</b>	<b>Parameters included</b>	<b>Method summary</b>
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.

## **Report Information**

### **Key**

---

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

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### **Sample Deviation Codes**

---

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

**Report No.:** 21-28858-1  
**Initial Date of Issue:** 02-Sep-2021  
**Client** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002 **Date Received:** 19-Aug-2021

**Order No.:** **Date Instructed:** 23-Aug-2021

**No. of Samples:** 2

**Turnaround (Wkdays):** 7 **Results Due:** 01-Sep-2021

**Date Approved:** 01-Sep-2021

**Approved By:**

**Details:** Glynn Harvey, Technical Manager



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28858	21-28858
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263758	1263761
		Client Sample ID.:		2	5
		Sample Location:		BH02	BH02
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	2.50
		Date Sampled:		11-Aug-2021	11-Aug-2021
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	3.2 11
pH	M	2010		4.0	8.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	200
Beryllium	U	2450	mg/kg	1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	9.3
Chromium	M	2450	mg/kg	1.0	12
Copper	M	2450	mg/kg	0.50	320
Mercury	M	2450	mg/kg	0.10	1.6
Nickel	M	2450	mg/kg	0.50	38
Lead	M	2450	mg/kg	0.50	2500
Selenium	M	2450	mg/kg	0.20	4.1
Vanadium	U	2450	mg/kg	5.0	< 5.0
Zinc	M	2450	mg/kg	0.50	1600
Chromium (Trivalent)	N	2490	mg/kg	1.0	12
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	1.6
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0 < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0 < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0 < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0 < 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28858	21-28858	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263758	1263761	
		Client Sample ID.:		2	5	
		Sample Location:		BH02	BH02	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		1.00	2.50	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0

# Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28858	21-28858	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263758	1263761	
		Client Sample ID.:		2	5	
		Sample Location:		BH02	BH02	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		1.00	2.50	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD		
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28858	21-28858	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263758	1263761	
		Client Sample ID.:		2	5	
		Sample Location:		BH02	BH02	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		1.00	2.50	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD		
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28858	21-28858
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263758	1263761
		Client Sample ID.:		2	5
		Sample Location:		BH02	BH02
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	2.50
		Date Sampled:		11-Aug-2021	11-Aug-2021
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage


If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

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**Report No.:** 21-29100-1  
**Initial Date of Issue:** 27-Aug-2021  
**Client** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL  
**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist  
**Project** 21-0937 Tynagh Power Plant OCGT  
**Quotation No.:** Q21-25002  
**Order No.:**  
**No. of Samples:** 1  
**Turnaround (Wkdays):** 7  
**Date Approved:** 27-Aug-2021  
**Approved By:**  
  
**Details:** Glynn Harvey, Technical Manager

**Date Received:** 20-Aug-2021

**Date Instructed:** 20-Aug-2021

**Results Due:** 31-Aug-2021



## Results - Water

### Project: 21-0937 Tynagh Power Plant OCGT

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b> 21-29100				
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b> 1264994				
Order No.:	Client Sample Ref.: 100				
	Sample Location: BH02				
	Sample Type: WATER				
	Top Depth (m): 2.50				
	Date Sampled: 11-Aug-2021				
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
pH	U	1010		N/A	8.4
Sulphate	U	1220	mg/l	1.0	230

## Test Methods

<b>SOP</b>	<b>Title</b>	<b>Parameters included</b>	<b>Method summary</b>
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.



## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

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Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

---

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

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E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

---

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

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**Report No.:** 21-28353-1  
**Initial Date of Issue:** 01-Sep-2021  
**Client** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL  
**Contact(s):** Joe Gervin  
Neil Haggan  
**Project** 21-0937 Tynagh Power Plant OCGT  
**Quotation No.:** Q21-25002 **Date Received:** 16-Aug-2021  
**Order No.:** **Date Instructed:** 23-Aug-2021  
**No. of Samples:** 2  
**Turnaround (Wkdays):** 7 **Results Due:** 01-Sep-2021  
**Date Approved:** 01-Sep-2021

**Approved By:**

**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28353	21-28353	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261380	1261385	
Order No.:		Client Sample Ref.:		2	7	
		Sample Location:		BH03	BH03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		1.00	3.50	
		Date Sampled:		10-Aug-2021	10-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	6.5	9.6
pH	M	2010		4.0	8.5	8.6
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	52	58
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	1.8	1.2
Chromium	M	2450	mg/kg	1.0	3.9	4.0
Copper	M	2450	mg/kg	0.50	30	29
Mercury	M	2450	mg/kg	0.10	0.31	0.37
Nickel	M	2450	mg/kg	0.50	14	21
Lead	M	2450	mg/kg	0.50	620	590
Selenium	M	2450	mg/kg	0.20	0.27	< 0.20
Vanadium	U	2450	mg/kg	5.0	< 5.0	< 5.0
Zinc	M	2450	mg/kg	0.50	150	120
Chromium (Trivalent)	N	2490	mg/kg	1.0	3.9	4.0
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	8.4	5.4
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	140	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	750	97
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	740	64
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	230	10
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	1900	170
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	27	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	400	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	170	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28353	21-28353	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261380	1261385	
Order No.:		Client Sample Ref.:		2	7	
		Sample Location:		BH03	BH03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		1.00	3.50	
		Date Sampled:		10-Aug-2021	10-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	600	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	2500	170
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28353	21-28353
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261380	1261385
Order No.:		Client Sample Ref.:		2	7
		Sample Location:		BH03	BH03
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	3.50
		Date Sampled:		10-Aug-2021	10-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28353	21-28353
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261380	1261385
Order No.:		Client Sample Ref.:		2	7
		Sample Location:		BH03	BH03
		Sample Type:		SOIL	SOIL
		Top Depth (m):		1.00	3.50
		Date Sampled:		10-Aug-2021	10-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	0.66
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	0.87
Anthracene	M	2790	mg/kg	0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28353	21-28353	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1261380	1261385	
Order No.:		Client Sample Ref.:		2	7	
		Sample Location:		BH03	BH03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		1.00	3.50	
		Date Sampled:		10-Aug-2021	10-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	0.29	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	0.11	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	0.68	< 0.10
Fluorene	M	2800	mg/kg	0.10	0.41	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	0.71	< 0.10
Anthracene	M	2800	mg/kg	0.10	0.12	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	0.12	< 0.10
Pyrene	M	2800	mg/kg	0.10	0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	2.5	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.



## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

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**Report No.:** 21-29459-1

**Initial Date of Issue:** 13-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

<b>Quotation No.:</b> Q21-25002	<b>Date Received:</b> 24-Aug-2021
<b>Order No.:</b>	<b>Date Instructed:</b> 25-Aug-2021
<b>No. of Samples:</b> 4	
<b>Turnaround (Wkdays):</b> 7	<b>Results Due:</b> 03-Sep-2021
<b>Date Approved:</b> 13-Sep-2021	

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29459	21-29459	21-29459	21-29459
Quotation No.: Q21-25002		Chemtest Sample ID.:		1266661	1266666	1266670	1266672
Order No.:		Client Sample Ref.:		1	3	7	9
		Sample Location:		BH04	BH06	BH06	BH06
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.5	1.5	3.5	5
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	4.5	4.3	15
pH	M	2010		4.0	8.7	8.2	8.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	67	120	37
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	8.2	15	3.8
Chromium	M	2450	mg/kg	1.0	3.2	6.4	11
Copper	M	2450	mg/kg	0.50	72	160	47
Mercury	M	2450	mg/kg	0.10	0.41	1.6	0.20
Nickel	M	2450	mg/kg	0.50	24	31	62
Lead	M	2450	mg/kg	0.50	1600	2400	360
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	0.58
Vanadium	U	2450	mg/kg	5.0	9.9	9.0	26
Zinc	M	2450	mg/kg	0.50	3600	2800	670
Chromium (Trivalent)	N	2490	mg/kg	1.0	3.2	6.4	11
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	< 0.40	< 0.40	1.8
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29459	21-29459	21-29459	21-29459
Quotation No.: Q21-25002		Chemtest Sample ID.:		1266661	1266666	1266670	1266672
Order No.:		Client Sample Ref.:		1	3	7	9
		Sample Location:		BH04	BH06	BH06	BH06
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.5	1.5	3.5	5
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0		< 1.0	
Chloromethane	M	2760	µg/kg	1.0		< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0		< 1.0	
Bromomethane	M	2760	µg/kg	20		< 20	
Chloroethane	U	2760	µg/kg	2.0		< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0		< 1.0	
1,1-Dichloroethene	M	2760	µg/kg	1.0		< 1.0	
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0		< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0		< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0		< 5.0	
Trichloromethane	M	2760	µg/kg	1.0		< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0		< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0		< 1.0	
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0		< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0		< 1.0	
Dibromomethane	M	2760	µg/kg	1.0		< 1.0	
Bromodichloromethane	M	2760	µg/kg	5.0		< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10		< 10	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10		< 10	
1,1,2-Trichloroethane	M	2760	µg/kg	10		< 10	
Tetrachloroethene	M	2760	µg/kg	1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10		< 10	
1,2-Dibromoethane	M	2760	µg/kg	5.0		< 5.0	
Chlorobenzene	M	2760	µg/kg	1.0		< 1.0	
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0		< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0		< 1.0	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29459	21-29459	21-29459	21-29459
Quotation No.: Q21-25002		Chemtest Sample ID.:		1266661	1266666	1266670	1266672
Order No.:		Client Sample Ref.:		1	3	7	9
		Sample Location:		BH04	BH06	BH06	BH06
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.5	1.5	3.5	5
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
Isopropylbenzene	M	2760	µg/kg	1.0		< 1.0	
Bromobenzene	M	2760	µg/kg	1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0		< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0		< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0		< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50		< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0		< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50		< 0.50	
Phenol	M	2790	mg/kg	0.50		< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50		< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50		< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50		< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50		< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50		< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50		< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50		< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50		< 0.50	
Isophorone	M	2790	mg/kg	0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50		< 0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50		< 0.50	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29459	21-29459	21-29459	21-29459
Quotation No.: Q21-25002		Chemtest Sample ID.:		1266661	1266666	1266670	1266672
Order No.:		Client Sample Ref.:		1	3	7	9
		Sample Location:		BH04	BH06	BH06	BH06
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.5	1.5	3.5	5
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50		< 0.50	
Naphthalene	M	2790	mg/kg	0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50		< 0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50		< 0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50		< 0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50		< 0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50		< 0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50		< 0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50		< 0.50	
2-Nitroaniline	M	2790	mg/kg	0.50		< 0.50	
Acenaphthylene	M	2790	mg/kg	0.50		< 0.50	
Dimethylphthalate	M	2790	mg/kg	0.50		< 0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50		< 0.50	
Acenaphthene	M	2790	mg/kg	0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50		< 0.50	
Dibenzofuran	M	2790	mg/kg	0.50		< 0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50		< 0.50	
2,4-Dinitrotoluene	M	2790	mg/kg	0.50		< 0.50	
Fluorene	M	2790	mg/kg	0.50		< 0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50		< 0.50	
4-Nitroaniline	M	2790	mg/kg	0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50		< 0.50	
Azobenzene	M	2790	mg/kg	0.50		< 0.50	
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50		< 0.50	
Hexachlorobenzene	M	2790	mg/kg	0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50		< 0.50	
Phenanthrene	M	2790	mg/kg	0.50		< 0.50	
Anthracene	M	2790	mg/kg	0.50		< 0.50	
Carbazole	M	2790	mg/kg	0.50		< 0.50	
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50		< 0.50	
Fluoranthene	M	2790	mg/kg	0.50		< 0.50	
Pyrene	M	2790	mg/kg	0.50		< 0.50	
Butylbenzyl Phthalate	M	2790	mg/kg	0.50		< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50		< 0.50	
Chrysene	M	2790	mg/kg	0.50		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50		< 0.50	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29459	21-29459	21-29459	21-29459
Quotation No.: Q21-25002		Chemtest Sample ID.:		1266661	1266666	1266670	1266672
Order No.:		Client Sample Ref.:		1	3	7	9
		Sample Location:		BH04	BH06	BH06	BH06
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.5	1.5	3.5	5
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD			
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50		< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50		< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50		< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50		< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50		< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50		< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50		< 0.50	
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10



## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Amended Report

**Report No.:** 21-29289-2

**Initial Date of Issue:** 07-Sep-2021      **Date of Re-Issue:** 14-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002      **Date Received:** 23-Aug-2021

**Order No.:** NEIL HAGGAN      **Date Instructed:** 24-Aug-2021

**No. of Samples:** 2

**Turnaround (Wkdays):** 6      **Results Due:** 07-Sep-2021

**Date Approved:** 07-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager



## Results - Leachate

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b> 21-29289					
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b> 1265789					
	Client Sample ID.: 6.5					
	Sample Location: BH05					
	Sample Type: SOIL					
	Date Sampled: 16-Aug-2021					
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Type</b>	<b>Units</b>	<b>LOD</b>	
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10	0.52

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29289	21-29289	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265788	1265789	
		Client Sample ID.:		4.0	6.5	
		Sample Location:		BH05	BH05	
		Sample Type:		SOIL	SOIL	
		Date Sampled:		16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	4.0	6.6
pH	M	2010		4.0	9.9	9.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Sulphur (Elemental)	M	2180	mg/kg	1.0		4.3
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50		18
Sulphate (Total)	M	2430	%	0.010		1.2
Arsenic	M	2450	mg/kg	1.0	66	37
Barium	M	2450	mg/kg	10		250
Beryllium	U	2450	mg/kg	1.0	< 1.0	
Cadmium	M	2450	mg/kg	0.10	6.9	7.4
Chromium	M	2450	mg/kg	1.0	4.1	< 1.0
Molybdenum	M	2450	mg/kg	2.0		< 2.0
Antimony	N	2450	mg/kg	2.0		6.7
Copper	M	2450	mg/kg	0.50	88	30
Mercury	M	2450	mg/kg	0.10	0.94	0.76
Nickel	M	2450	mg/kg	0.50	26	22
Lead	M	2450	mg/kg	0.50	940	1100
Selenium	M	2450	mg/kg	0.20	0.22	< 0.20
Vanadium	U	2450	mg/kg	5.0	5.2	
Zinc	M	2450	mg/kg	0.50	1000	1200
Chromium (Trivalent)	N	2490	mg/kg	1.0	4.1	< 1.0
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	5.2	
Total Organic Carbon	M	2625	%	0.20		3.7
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10		< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	36	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	36	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29289	21-29289	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265788	1265789	
		Client Sample ID.:		4.0	6.5	
		Sample Location:		BH05	BH05	
		Sample Type:		SOIL	SOIL	
		Date Sampled:		16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	87	89
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	87	89
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	120	89
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	
Chloromethane	M	2760	µg/kg	1.0	< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	
Bromomethane	M	2760	µg/kg	20	< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10	
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29289	21-29289	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265788	1265789	
		Client Sample ID.:		4.0	6.5	
		Sample Location:		BH05	BH05	
		Sample Type:		SOIL	SOIL	
		Date Sampled:		16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	
Phenol	M	2790	mg/kg	0.50	< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29289	21-29289
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265788	1265789
		Client Sample ID.:		4.0	6.5
		Sample Location:		BH05	BH05
		Sample Type:		SOIL	SOIL
		Date Sampled:		16-Aug-2021	16-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Isophorone	M	2790	mg/kg	0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29289	21-29289	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265788	1265789	
		Client Sample ID.:		4.0	6.5	
		Sample Location:		BH05	BH05	
		Sample Type:		SOIL	SOIL	
		Date Sampled:		16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	
Chrysene	M	2790	mg/kg	0.50	< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10		< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	
Total Of 17 PAH's	N	2800	mg/kg	2.0		< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-29289				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1265789							
Sample Ref:							
Sample ID: 6.5							
Sample Location: BH05							
Top Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Bottom Depth(m):							
Sampling Date: 16-Aug-2021							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	3.7	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	89	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		9.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0060	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0028	0.028	0.5	2	25
Barium	1455	U	0.28	2.8	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0012	0.012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0034	0.034	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	0.0027	0.027	0.5	10	50
Antimony	1455	U	0.0075	0.075	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	2.2	22	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	8.8	88	1000	20000	50000
Total Dissolved Solids	1020	N	91	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

### **Solid Information**

Dry mass of test portion/kg	0.090
Moisture (%)	6.6

### **Waste Acceptance Criteria**

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

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

## Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Amended Report

**Report No.:** 21-29292-2

**Initial Date of Issue:** 07-Sep-2021      **Date of Re-Issue:** 14-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002      **Date Received:** 23-Aug-2021

**Order No.:** NEIL HAGGAN      **Date Instructed:** 24-Aug-2021

**No. of Samples:** 2

**Turnaround (Wkdays):** 6      **Results Due:** 07-Sep-2021

**Date Approved:** 07-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager





## Results - Leachate

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b> 21-29292				
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b> 1265806				
	Sample Location: BH05				
	Sample Type: SOIL				
	Top Depth (m): 1.0				
	Date Sampled: 16-Aug-2021				
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Type</b>	<b>Units</b>	<b>LOD</b>
Ammonium	U	1220	10:1	mg/l	0.050
Ammonium	N	1220	10:1	mg/kg	0.10

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29292	21-29292	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265805	1265806	
		Sample Location:		BH05	BH05	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.5	1.0	
		Date Sampled:		16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	1.7	1.1
pH	M	2010		4.0	9.8	10.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	0.53
Sulphur (Elemental)	M	2180	mg/kg	1.0		16
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50		36
Sulphate (Total)	M	2430	%	0.010		0.33
Arsenic	M	2450	mg/kg	1.0	39	22
Barium	M	2450	mg/kg	10		260
Beryllium	U	2450	mg/kg	1.0	< 1.0	
Cadmium	M	2450	mg/kg	0.10	4.6	2.8
Chromium	M	2450	mg/kg	1.0	2.3	1.9
Molybdenum	M	2450	mg/kg	2.0		< 2.0
Antimony	N	2450	mg/kg	2.0		4.1
Copper	M	2450	mg/kg	0.50	42	24
Mercury	M	2450	mg/kg	0.10	0.26	0.17
Nickel	M	2450	mg/kg	0.50	19	11
Lead	M	2450	mg/kg	0.50	730	280
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	< 5.0	
Zinc	M	2450	mg/kg	0.50	590	490
Chromium (Trivalent)	N	2490	mg/kg	1.0	2.3	1.9
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	3.6	
Total Organic Carbon	M	2625	%	0.20		3.4
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10		76
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	25	8.1
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	51	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	76	8.1
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29292	21-29292
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265805	1265806
		Sample Location:		BH05	BH05
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.5	1.0
		Date Sampled:		16-Aug-2021	16-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	100
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	100
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	180
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29292	21-29292	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265805	1265806	
		Sample Location:		BH05	BH05	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.5	1.0	
		Date Sampled:		16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	
Phenol	M	2790	mg/kg	0.50	< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29292	21-29292
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265805	1265806
		Sample Location:		BH05	BH05
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.5	1.0
		Date Sampled:		16-Aug-2021	16-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Isophorone	M	2790	mg/kg	0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29292	21-29292	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1265805	1265806	
		Sample Location:		BH05	BH05	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.5	1.0	
		Date Sampled:		16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	
Chrysene	M	2790	mg/kg	0.50	< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10		< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	
Total Of 17 PAH's	N	2800	mg/kg	2.0		< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-29292				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1265806							
Sample Ref:							
Sample ID:							
Sample Location: BH05							
Top Depth(m): 1.0				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Bottom Depth(m):							
Sampling Date: 16-Aug-2021							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	3.4	3	5	6
Loss On Ignition	2610	M	%	2.1	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	94	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		10.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.014	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0042	0.042	0.5	2	25
Barium	1455	U	0.18	1.8	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0008	0.0076	0.5	10	70
Copper	1455	U	0.0028	0.028	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0057	0.057	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	0.0042	0.042	0.5	10	50
Antimony	1455	U	0.0091	0.091	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.9	19	800	15000	25000
Fluoride	1220	U	0.17	1.7	10	150	500
Sulphate	1220	U	13	130	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

### Solid Information

Dry mass of test portion/kg	0.090
Moisture (%)	1.1

### Waste Acceptance Criteria

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

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection



## Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

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**Report No.:** 21-29330-1  
**Initial Date of Issue:** 08-Sep-2021  
**Client:** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL  
**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist  
**Project:** 21-0937 Tynagh Power Plant OCGT  
**Quotation No.:** Q21-25002  
**Order No.:**  
**No. of Samples:** 1  
**Turnaround (Wkdays):** 7  
**Date Approved:** 08-Sep-2021

**Date Received:** 23-Aug-2021

**Date Instructed:** 31-Aug-2021

**Results Due:** 08-Sep-2021

**Approved By:**

**Details:** Glynn Harvey, Technical Manager

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## Results - Water

### Project: 21-0937 Tynagh Power Plant OCGT

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b> 21-29330				
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b> 1266109				
	Sample Location: BH05				
	Sample Type: WATER				
	Top Depth (m): 5.65				
	Date Sampled: 17-Aug-2021				
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
pH	U	1010		N/A	7.9
Sulphate	U	1220	mg/l	1.0	270

## Test Methods

<b>SOP</b>	<b>Title</b>	<b>Parameters included</b>	<b>Method summary</b>
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.

## **Report Information**

### **Key**

---

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

---

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Amended Report

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**Report No.:** 21-28466-2

**Initial Date of Issue:** 13-Sep-2021      **Date of Re-Issue:** 16-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002      **Date Received:** 17-Aug-2021

**Order No.:**      **Date Instructed:** 25-Aug-2021

**No. of Samples:** 6

**Turnaround (Wkdays):** 17      **Results Due:** 17-Sep-2021

**Date Approved:** 16-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28466	21-28466	21-28466	21-28466	21-28466	21-28466
Quotation No.: Q21-25002		Chemtest Sample ID.:		1262042	1262044	1262046	1262047	1262049	1262050
Order No.:		Client Sample Ref.:		1	1	1	1	1	1
		Sample Location:		BH07	BH07	BH07	BH07	BH09	BH09
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00	4.00	0.50	1.00
		Date Sampled:		16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM			DURHAM	
Determinand	Accred.	SOP	Units	LOD					
ACM Type	U	2192		N/A	-	-		-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	
Moisture	N	2030	%	0.020	5.2	7.2	14	9.9	5.7
pH	M	2010		4.0	9.2	8.9	8.7	8.7	11.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	0.46	< 0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	0.60	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	66	70	40	14	160
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	7.4	3.0	4.3	1.1	37
Chromium	M	2450	mg/kg	1.0	3.9	4.6	7.0	5.2	17
Copper	M	2450	mg/kg	0.50	48	17	32	11	520
Mercury	M	2450	mg/kg	0.10	11	2.6	1.8	1.7	2.8
Nickel	M	2450	mg/kg	0.50	33	43	34	27	37
Lead	M	2450	mg/kg	0.50	940	290	320	69	4100
Selenium	M	2450	mg/kg	0.20	0.21	0.34	1.6	0.61	0.44
Vanadium	U	2450	mg/kg	5.0	8.7	12	15	12	12
Zinc	M	2450	mg/kg	0.50	1200	910	2100	750	5100
Chromium (Trivalent)	N	2490	mg/kg	1.0	3.9	4.6	7.0	5.2	17
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	3.5	1.6	9.1	2.2	1.7
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	94	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	95	< 1.0	< 1.0	< 1.0	7.5
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	55	< 1.0	670	340	370
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	49	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	240	< 5.0	720	340	370
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	360	160	150
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	41	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28466	21-28466	21-28466	21-28466	21-28466	21-28466	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1262042	1262044	1262046	1262047	1262049	1262050	
Order No.:		Client Sample Ref.:		1	1	1	1	1	1	
		Sample Location:		BH07	BH07	BH07	BH07	BH09	BH09	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	4.00	0.50	1.00	
		Date Sampled:		16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM			DURHAM		
Determinand	Accred.	SOP	Units	LOD						
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	410	160	150	47
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	240	< 10	1100	500	530	88
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Bromomethane	M	2760	µg/kg	20	< 20	< 20			< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0			< 5.0	
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0			< 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10			< 10	
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10			< 10	
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10			< 10	
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0	
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10			< 10	
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0			< 5.0	
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0			< 2.0	
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0			< 1.0	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28466	21-28466	21-28466	21-28466	21-28466	21-28466
Quotation No.: Q21-25002		Chemtest Sample ID.:		1262042	1262044	1262046	1262047	1262049	1262050
Order No.:		Client Sample Ref.:		1	1	1	1	1	1
		Sample Location:		BH07	BH07	BH07	BH07	BH09	BH09
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00	4.00	0.50	1.00
		Date Sampled:		16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM			DURHAM	
Determinand	Accred.	SOP	Units	LOD					
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50		< 50	
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0		< 2.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28466	21-28466	21-28466	21-28466	21-28466	21-28466
Quotation No.: Q21-25002		Chemtest Sample ID.:		1262042	1262044	1262046	1262047	1262049	1262050
Order No.:		Client Sample Ref.:		1	1	1	1	1	1
		Sample Location:		BH07	BH07	BH07	BH07	BH09	BH09
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00	4.00	0.50	1.00
		Date Sampled:		16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM			DURHAM	
Determinand	Accred.	SOP	Units	LOD					
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50		< 0.50	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28466	21-28466	21-28466	21-28466	21-28466	21-28466	21-28466
Quotation No.: Q21-25002		Chemtest Sample ID.:		1262042	1262044	1262046	1262047	1262049	1262050	
Order No.:		Client Sample Ref.:		1	1	1	1	1	1	
		Sample Location:		BH07	BH07	BH07	BH07	BH09	BH09	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	4.00	0.50	1.00	
		Date Sampled:		16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	16-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM			DURHAM		
Determinand	Accred.	SOP	Units	LOD						
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50	
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50	
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50	
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50	
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50	
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50	
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50			< 0.50	
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	0.25	< 0.10	< 0.10	0.14	< 0.10	0.12
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	0.41	< 0.10	< 0.10	0.14	< 0.10	0.16
Pyrene	M	2800	mg/kg	0.10	0.35	< 0.10	< 0.10	0.12	< 0.10	0.13
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	0.011	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.011	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010	1.3	0.23	0.011	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.011	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010	0.44	0.11	0.021	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10	1.8	0.36	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)





# Amended Report

**Report No.:** 21-29590-2

**Initial Date of Issue:** 03-Sep-2021      **Date of Re-Issue:** 14-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002      **Date Received:** 25-Aug-2021

**Order No.:** NEIL HAGGAN      **Date Instructed:** 25-Aug-2021

**No. of Samples:** 3

**Turnaround (Wkdays):** 14      **Results Due:** 14-Sep-2021

**Date Approved:** 14-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager



## Results - Leachate

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b> 21-29590				
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b> 1267142				
Order No.: NEIL HAGGAN	Client Sample Ref.: 2				
	Sample Location: BH08				
	Sample Type: SOIL				
	Top Depth (m): 1.00				
	Date Sampled: 18-Aug-2021				
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Type</b>	<b>Units</b>	<b>LOD</b>
Ammonium	U	1220	10:1	mg/l	0.050
Ammonium	N	1220	10:1	mg/kg	0.10

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29590	21-29590	21-29590
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267142	1267144	1267146
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	4	7
		Sample Location:		BH08	BH08	BH08
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00
		Date Sampled:		18-Aug-2021	18-Aug-2021	18-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	4.9	14
pH	M	2010		4.0	8.8	8.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	0.51
Sulphur (Elemental)	M	2180	mg/kg	1.0	< 1.0	
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	0.90	
Sulphate (Total)	M	2430	%	0.010	0.30	
Arsenic	M	2450	mg/kg	1.0	41	58
Barium	M	2450	mg/kg	10	290	
Beryllium	U	2450	mg/kg	1.0		< 1.0
Cadmium	M	2450	mg/kg	0.10	6.0	5.8
Chromium	M	2450	mg/kg	1.0	8.2	9.4
Molybdenum	M	2450	mg/kg	2.0	< 2.0	
Antimony	N	2450	mg/kg	2.0	16	
Copper	M	2450	mg/kg	0.50	81	70
Mercury	M	2450	mg/kg	0.10	1.0	0.29
Nickel	M	2450	mg/kg	0.50	19	54
Lead	M	2450	mg/kg	0.50	1300	990
Selenium	M	2450	mg/kg	0.20	< 0.20	0.66
Vanadium	U	2450	mg/kg	5.0		17
Zinc	M	2450	mg/kg	0.50	1200	3100
Chromium (Trivalent)	N	2490	mg/kg	1.0	8.2	9.4
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40		3.4
Total Organic Carbon	M	2625	%	0.20	1.5	
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29590	21-29590	21-29590
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267142	1267144	1267146
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	4	7
		Sample Location:		BH08	BH08	BH08
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00
		Date Sampled:		18-Aug-2021	18-Aug-2021	18-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10		< 0.10
Acenaphthylene	M	2700	mg/kg	0.10		< 0.10
Acenaphthene	M	2700	mg/kg	0.10		< 0.10
Fluorene	M	2700	mg/kg	0.10		< 0.10
Phenanthrene	M	2700	mg/kg	0.10		6.6
Anthracene	M	2700	mg/kg	0.10		1.8
Fluoranthene	M	2700	mg/kg	0.10		1.9
Pyrene	M	2700	mg/kg	0.10		1.5
Benzo[a]anthracene	M	2700	mg/kg	0.10		0.22
Chrysene	M	2700	mg/kg	0.10		1.1
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0		13
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29590	21-29590	21-29590
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267142	1267144	1267146
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	4	7
		Sample Location:		BH08	BH08	BH08
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00
		Date Sampled:		18-Aug-2021	18-Aug-2021	18-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0

# Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29590	21-29590	21-29590
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267142	1267144	1267146
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	4	7
		Sample Location:		BH08	BH08	BH08
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00
		Date Sampled:		18-Aug-2021	18-Aug-2021	18-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	0.71
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50

# Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29590	21-29590	21-29590
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267142	1267144	1267146
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	4	7
		Sample Location:		BH08	BH08	BH08
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		1.00	2.00	3.00
		Date Sampled:		18-Aug-2021	18-Aug-2021	18-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	2.8
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	1.5
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50	2.5
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	6.7
Anthracene	M	2790	mg/kg	0.50	< 0.50	3.5
Carbazole	M	2790	mg/kg	0.50	< 0.50	1.1
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	2.1
Pyrene	M	2790	mg/kg	0.50	< 0.50	1.4
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	2.9
Anthracene	M	2800	mg/kg	0.10	< 0.10	1.0



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29590	21-29590	21-29590	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267142	1267144	1267146	
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	4	7	
		Sample Location:		BH08	BH08	BH08	
		Sample Type:		SOIL	SOIL	SOIL	
		Top Depth (m):		1.00	2.00	3.00	
		Date Sampled:		18-Aug-2021	18-Aug-2021	18-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM		
Determinand	Accred.	SOP	Units	LOD			
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	1.5	0.13
Pyrene	M	2800	mg/kg	0.10	< 0.10	1.0	0.13
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	0.19	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	0.21	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10		
Total Of 16 PAH's	N	2800	mg/kg	2.0		6.8	< 2.0
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0		
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-29590					<b>Landfill Waste Acceptance Criteria Limits</b>		
Chemtest Sample ID: 1267142					<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>
Sample Ref: 2							
Sample ID:							
Sample Location: BH08							
Top Depth(m): 1.00							
Bottom Depth(m):							
Sampling Date: 18-Aug-2021							
<b>Determinand</b>	<b>SOP</b>	<b>Accred.</b>	<b>Units</b>				
Total Organic Carbon	2625	M	%	1.5	3	5	6
Loss On Ignition	2610	M	%	0.67	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0 < 2.0	100	--	--
pH	2010	M		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.025	--	To evaluate	To evaluate
<b>Eluate Analysis</b>			<b>10:1 Eluate mg/l</b>	<b>10:1 Eluate mg/kg</b>	<b>Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg</b>		
Arsenic	1455	U	0.0033	0.033	0.5	2	25
Barium	1455	U	0.22	2.2	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.011	0.11	0.5	10	70
Copper	1455	U	0.0014	0.014	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0032	0.032	0.5	10	30
Nickel	1455	U	0.0054	0.054	0.4	10	40
Lead	1455	U	0.0079	0.079	0.5	10	50
Antimony	1455	U	0.016	0.16	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.003	0.028	4	50	200
Chloride	1220	U	2.2	22	800	15000	25000
Fluoride	1220	U	0.19	1.9	10	150	500
Sulphate	1220	U	12	120	1000	20000	50000
Total Dissolved Solids	1020	N	48	470	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	19	190	500	800	1000

### **Solid Information**

Dry mass of test portion/kg	0.175
Moisture (%)	4.9

### **Waste Acceptance Criteria**

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

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

## Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Amended Report

**Report No.:** 21-30204-2

**Initial Date of Issue:** 10-Sep-2021      **Date of Re-Issue:** 14-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002      **Date Received:** 23-Aug-2021

**Order No.:** NEIL HAGGAN      **Date Instructed:** 24-Aug-2021

**No. of Samples:** 2

**Turnaround (Wkdays):** 7      **Results Due:** 09-Sep-2021

**Date Approved:** 10-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-30204	21-30204	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1270217	1270218	
Order No.: NEIL HAGGAN		Client Sample Ref.:		1	3	
		Sample Location:		BH10	BH10	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.50	1.50	
		Date Sampled:		17-Aug-2021	17-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	1.9	2.3
pH	M	2010		4.0	9.0	9.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	1.3
Arsenic	M	2450	mg/kg	1.0	94	94
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	6.2	7.2
Chromium	M	2450	mg/kg	1.0	5.4	3.1
Copper	M	2450	mg/kg	0.50	39	16
Mercury	M	2450	mg/kg	0.10	0.22	0.12
Nickel	M	2450	mg/kg	0.50	32	31
Lead	M	2450	mg/kg	0.50	640	290
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	12	12
Zinc	M	2450	mg/kg	0.50	1300	2100
Chromium (Trivalent)	N	2490	mg/kg	1.0	5.4	3.1
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	110	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	110	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	350	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	350	< 5.0



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-30204	21-30204	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1270217	1270218	
Order No.: NEIL HAGGAN		Client Sample Ref.:		1	3	
		Sample Location:		BH10	BH10	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.50	1.50	
		Date Sampled:		17-Aug-2021	17-Aug-2021	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	460	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	
Chloromethane	M	2760	µg/kg	1.0	< 1.0	
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	
Bromomethane	M	2760	µg/kg	20	< 20	
Chloroethane	U	2760	µg/kg	2.0	< 2.0	
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-30204	21-30204
Quotation No.: Q21-25002		Chemtest Sample ID.:		1270217	1270218
Order No.: NEIL HAGGAN		Client Sample Ref.:		1	3
		Sample Location:		BH10	BH10
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.50	1.50
		Date Sampled:		17-Aug-2021	17-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-30204	21-30204
Quotation No.: Q21-25002		Chemtest Sample ID.:		1270217	1270218
Order No.: NEIL HAGGAN		Client Sample Ref.:		1	3
		Sample Location:		BH10	BH10
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.50	1.50
		Date Sampled:		17-Aug-2021	17-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-30204	21-30204
Quotation No.: Q21-25002		Chemtest Sample ID.:		1270217	1270218
Order No.: NEIL HAGGAN		Client Sample Ref.:		1	3
		Sample Location:		BH10	BH10
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.50	1.50
		Date Sampled:		17-Aug-2021	17-Aug-2021
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50
PCB 28	U	2815	mg/kg	0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Amended Report

**Report No.:** 21-30200-3

**Initial Date of Issue:** 09-Sep-2021      **Date of Re-Issue:** 23-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002      **Date Received:** 23-Aug-2021

**Order No.:** NEIL HAGGAN      **Date Instructed:** 15-Aug-2021

**No. of Samples:** 1

**Turnaround (Wkdays):** 29      **Results Due:** 23-Sep-2021

**Date Approved:** 23-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager





## Results - Leachate

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b> 21-30200				
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b> 1270211				
Order No.: NEIL HAGGAN	Client Sample Ref.: 2				
	Sample Location: BH10				
	Sample Type: SOIL				
	Top Depth (m): 1.00				
	Date Sampled: 17-Aug-2021				
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Type</b>	<b>Units</b>	<b>LOD</b>
Ammonium	U	1220	10:1	mg/l	0.050
Ammonium	N	1220	10:1	mg/kg	0.10

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-30200	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1270211	
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	
		Sample Location:		BH10	
		Sample Type:		SOIL	
		Top Depth (m):		1.00	
		Date Sampled:		17-Aug-2021	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	2.9
pH	M	2010		4.0	8.8
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40
Sulphur (Elemental)	M	2180	mg/kg	1.0	< 1.0
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	6.4
Sulphate (Total)	M	2430	%	0.010	0.25
Arsenic	M	2450	mg/kg	1.0	61
Barium	M	2450	mg/kg	10	420
Cadmium	M	2450	mg/kg	0.10	4.8
Chromium	M	2450	mg/kg	1.0	3.5
Molybdenum	M	2450	mg/kg	2.0	< 2.0
Antimony	N	2450	mg/kg	2.0	5.6
Copper	M	2450	mg/kg	0.50	33
Mercury	M	2450	mg/kg	0.10	0.15
Nickel	M	2450	mg/kg	0.50	24
Lead	M	2450	mg/kg	0.50	680
Selenium	M	2450	mg/kg	0.20	< 0.20
Zinc	M	2450	mg/kg	0.50	1100
Chromium (Trivalent)	N	2490	mg/kg	1.0	3.5
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20	6.1
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-30200	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1270211	
Order No.: NEIL HAGGAN		Client Sample Ref.:		2	
		Sample Location:		BH10	
		Sample Type:		SOIL	
		Top Depth (m):		1.00	
		Date Sampled:		17-Aug-2021	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10
Benzene	M	2760	µg/kg	1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0
Naphthalene	M	2800	mg/kg	0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	0.18
Pyrene	M	2800	mg/kg	0.10	0.15
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010

## Results - Soil

### Project: 21-0937 Tynagh Power Plant OCGT

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b>		21-30200		
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b>		1270211		
Order No.: NEIL HAGGAN	Client Sample Ref.:		2		
	Sample Location:		BH10		
	Sample Type:		SOIL		
	Top Depth (m):		1.00		
	Date Sampled:		17-Aug-2021		
	Asbestos Lab:		DURHAM		
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-30200					<b>Landfill Waste Acceptance Criteria Limits</b>		
Chemtest Sample ID: 1270211							
Sample Ref: 2							
Sample ID:							
Sample Location: BH10							
Top Depth(m): 1.00							
Bottom Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Sampling Date: 17-Aug-2021							
<b>Determinand</b>	<b>SOP</b>	<b>Accred.</b>	<b>Units</b>				
Total Organic Carbon	2625	M	%	6.1	3	5	
Loss On Ignition	2610	M	%	2.3	--	10	
Total BTEX	2760	M	mg/kg	< 0.010	6	--	
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	
TPH Total WAC	2670	M	mg/kg	< 10	500	--	
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0 < 2.0	100	--	
pH	2010	M		8.8	--	>6	
Acid Neutralisation Capacity	2015	N	mol/kg	0.011	--	To evaluate	
<b>Eluate Analysis</b>			<b>10:1 Eluate mg/l</b>	<b>10:1 Eluate mg/kg</b>	<b>Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg</b>		
Arsenic	1455	U	0.0017	0.017	0.5	2	
Barium	1455	U	0.14	1.4	20	100	
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	
Copper	1455	U	0.0013	0.013	2	50	
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	
Molybdenum	1455	U	0.0021	0.021	0.5	10	
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	
Lead	1455	U	0.0011	0.011	0.5	10	
Antimony	1455	U	0.0022	0.022	0.06	0.7	
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	
Zinc	1455	U	< 0.003	< 0.003	4	50	
Chloride	1220	U	2.7	27	800	15000	
Fluoride	1220	U	0.15	1.5	10	150	
Sulphate	1220	U	7.1	71	1000	20000	
Total Dissolved Solids	1020	N	120	1200	4000	60000	
Phenol Index	1920	U	< 0.030	< 0.30	1	-	
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	

### **Solid Information**

Dry mass of test portion/kg	0.175
Moisture (%)	2.9

### **Waste Acceptance Criteria**

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

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

## Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)





# Final Report

**Report No.:** 21-28860-1  
**Initial Date of Issue:** 03-Sep-2021  
**Client** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
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Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002 **Date Received:** 19-Aug-2021

**Order No.:** **Date Instructed:** 25-Aug-2021

**No. of Samples:** 3

**Turnaround (Wkdays):** 7 **Results Due:** 03-Sep-2021

**Date Approved:** 03-Sep-2021

**Approved By:**

**Details:** Glynn Harvey, Technical Manager



## Results - Leachate

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b>					21-28860	21-28860
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b>					1263768	1263769
Order No.:	Client Sample Ref.:					1	2
	Sample Location:					TP02	TP02
	Sample Type:					SOIL	SOIL
	Top Depth (m):					0.50	1.00
	Date Sampled:					11-Aug-2021	11-Aug-2021
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Type</b>	<b>Units</b>	<b>LOD</b>		
Ammonium	U	1220	10:1	mg/l	0.050	0.26	0.64
Ammonium	N	1220	10:1	mg/kg	0.10	2.7	7.7

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28860	21-28860	21-28860
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263768	1263769	1263771
Order No.:		Client Sample Ref.:		1	2	4
		Sample Location:		TP02	TP02	TP02
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		0.50	1.00	2.00
		Date Sampled:		11-Aug-2021	11-Aug-2021	11-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	5.5	4.7
pH	M	2010		4.0	7.9	8.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Sulphur (Elemental)	M	2180	mg/kg	1.0	380	85
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	80	26
Sulphate (Total)	M	2430	%	0.010	17	0.90
Arsenic	M	2450	mg/kg	1.0	1000	100
Barium	M	2450	mg/kg	10	< 10	890
Beryllium	U	2450	mg/kg	1.0		< 1.0
Cadmium	M	2450	mg/kg	0.10	610	17
Chromium	M	2450	mg/kg	1.0	11	6.1
Molybdenum	M	2450	mg/kg	2.0	13	2.7
Antimony	N	2450	mg/kg	2.0	210	25
Copper	M	2450	mg/kg	0.50	1500	85
Mercury	M	2450	mg/kg	0.10	12	1.9
Nickel	M	2450	mg/kg	0.50	140	30
Lead	M	2450	mg/kg	0.50	24000	1800
Selenium	M	2450	mg/kg	0.20	3.3	0.35
Vanadium	U	2450	mg/kg	5.0		11
Zinc	M	2450	mg/kg	0.50	90000	2500
Chromium (Trivalent)	N	2490	mg/kg	1.0	11	6.1
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40		2.1
Total Organic Carbon	M	2625	%	0.20	0.95	4.5
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	380	290
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	1.6	1.8
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	1.5	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	12	37
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	72	93
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	300	160
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	380	290

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28860	21-28860	21-28860	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263768	1263769	1263771	
Order No.:		Client Sample Ref.:		1	2	4	
		Sample Location:		TP02	TP02	TP02	
		Sample Type:		SOIL	SOIL	SOIL	
		Top Depth (m):		0.50	1.00	2.00	
		Date Sampled:		11-Aug-2021	11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD			
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	13
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	140	130	44
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	140	130	58
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	520	420	580
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28860	21-28860	21-28860
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263768	1263769	1263771
Order No.:		Client Sample Ref.:		1	2	4
		Sample Location:		TP02	TP02	TP02
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		0.50	1.00	2.00
		Date Sampled:		11-Aug-2021	11-Aug-2021	11-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50

# Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28860	21-28860	21-28860
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263768	1263769	1263771
Order No.:		Client Sample Ref.:		1	2	4
		Sample Location:		TP02	TP02	TP02
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		0.50	1.00	2.00
		Date Sampled:		11-Aug-2021	11-Aug-2021	11-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28860	21-28860	21-28860	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263768	1263769	1263771	
Order No.:		Client Sample Ref.:		1	2	4	
		Sample Location:		TP02	TP02	TP02	
		Sample Type:		SOIL	SOIL	SOIL	
		Top Depth (m):		0.50	1.00	2.00	
		Date Sampled:		11-Aug-2021	11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD			
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	
Total Of 16 PAH's	N	2800	mg/kg	2.0			< 2.0
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010	< 0.010



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b>		21-28860	21-28860	21-28860
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b>		1263768	1263769	1263771
Order No.:	Client Sample Ref.:		1	2	4
	Sample Location:		TP02	TP02	TP02
	Sample Type:		SOIL	SOIL	SOIL
	Top Depth (m):		0.50	1.00	2.00
	Date Sampled:		11-Aug-2021	11-Aug-2021	11-Aug-2021
	Asbestos Lab:		DURHAM	DURHAM	DURHAM
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-28860					<b>Landfill Waste Acceptance Criteria Limits</b>		
Chemtest Sample ID: 1263768					<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>
Sample Ref: 1							
Sample ID:							
Sample Location: TP02							
Top Depth(m): 0.50							
Bottom Depth(m):							
Sampling Date: 11-Aug-2021							
<b>Determinand</b>	<b>SOP</b>	<b>Accred.</b>	<b>Units</b>				
Total Organic Carbon	2625	M	%	0.95	3	5	6
Loss On Ignition	2610	M	%	2.2	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	520	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.059	--	To evaluate	To evaluate
<b>Eluate Analysis</b>			<b>10:1 Eluate mg/l</b>	<b>10:1 Eluate mg/kg</b>	<b>Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg</b>		
Arsenic	1455	U	0.0011	0.011	0.5	2	25
Barium	1455	U	0.024	0.24	20	100	300
Cadmium	1455	U	0.023	0.23	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0031	0.031	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0022	0.022	0.5	10	30
Nickel	1455	U	0.0057	0.058	0.4	10	40
Lead	1455	U	0.10	1.0	0.5	10	50
Antimony	1455	U	0.0095	0.096	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.37	3.7	4	50	200
Chloride	1220	U	11	110	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	450	4500	1000	20000	50000
Total Dissolved Solids	1020	N	720	7100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.0	< 50	500	800	1000

### **Solid Information**

Dry mass of test portion/kg	0.090
Moisture (%)	5.5

### **Waste Acceptance Criteria**

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

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-28860				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1263769							
Sample Ref: 2							
Sample ID:							
Sample Location: TP02							
Top Depth(m): 1.00							
Bottom Depth(m):				<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>	
Sampling Date: 11-Aug-2021							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	4.5	3	5	6
Loss On Ignition	2610	M	%	1.5	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	420	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.032	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0004	0.0045	0.5	2	25
Barium	1455	U	0.067	0.67	20	100	300
Cadmium	1455	U	0.00012	0.0012	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0012	0.012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0079	0.080	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	0.0037	0.037	0.5	10	50
Antimony	1455	U	0.0033	0.033	0.06	0.7	5
Selenium	1455	U	0.0007	0.0067	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	12	120	800	15000	25000
Fluoride	1220	U	0.60	6.0	10	150	500
Sulphate	1220	U	46	460	1000	20000	50000
Total Dissolved Solids	1020	N	160	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.9	59	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	4.7

### Waste Acceptance Criteria

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

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

## Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)







## Results - Leachate

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b>					21-28864	21-28864
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b>					1263791	1263793
Order No.:	Client Sample Ref.:					1	3
	Sample Location:					TP03	TP03
	Sample Type:					SOIL	SOIL
	Top Depth (m):					0.30	1.00
	Date Sampled:					11-Aug-2021	11-Aug-2021
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Type</b>	<b>Units</b>	<b>LOD</b>		
Ammonium	U	1220	10:1	mg/l	0.050	0.096	0.091
Ammonium	N	1220	10:1	mg/kg	0.10	1.1	1.1

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-28864	21-28864	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1263791	1263793	
Order No.:		Client Sample Ref.:		1	3	
		Sample Location:		TP03	TP03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.30	1.00	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	4.2	3.0
pH	M	2010		4.0	8.1	8.6
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Sulphur (Elemental)	M	2180	mg/kg	1.0	5.4	2.7
Cyanide (Total)	M	2300	mg/kg	0.50	0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	2.2	1.2
Sulphate (Total)	M	2430	%	0.010	1.1	0.60
Arsenic	M	2450	mg/kg	1.0	230	240
Barium	M	2450	mg/kg	10	1000	760
Cadmium	M	2450	mg/kg	0.10	29	12
Chromium	M	2450	mg/kg	1.0	11	7.5
Molybdenum	M	2450	mg/kg	2.0	3.0	< 2.0
Antimony	N	2450	mg/kg	2.0	89	32
Copper	M	2450	mg/kg	0.50	830	320
Mercury	M	2450	mg/kg	0.10	4.7	1.7
Nickel	M	2450	mg/kg	0.50	39	34
Lead	M	2450	mg/kg	0.50	7300	1800
Selenium	M	2450	mg/kg	0.20	0.50	0.66
Zinc	M	2450	mg/kg	0.50	5300	1500
Chromium (Trivalent)	N	2490	mg/kg	1.0	11	7.5
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20	1.6	0.33
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28864	21-28864	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263791	1263793	
Order No.:		Client Sample Ref.:		1	3	
		Sample Location:		TP03	TP03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.30	1.00	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	1.5
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	6.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28864	21-28864	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263791	1263793	
Order No.:		Client Sample Ref.:		1	3	
		Sample Location:		TP03	TP03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.30	1.00	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28864	21-28864	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263791	1263793	
Order No.:		Client Sample Ref.:		1	3	
		Sample Location:		TP03	TP03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.30	1.00	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Isophorone	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28864	21-28864	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263791	1263793	
Order No.:		Client Sample Ref.:		1	3	
		Sample Location:		TP03	TP03	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.30	1.00	
		Date Sampled:		11-Aug-2021	11-Aug-2021	
		Asbestos Lab:		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD		
Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10	< 0.10

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b>		21-28864	21-28864	
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b>		1263791	1263793	
Order No.:	Client Sample Ref.:		1	3	
	Sample Location:		TP03	TP03	
	Sample Type:		SOIL	SOIL	
	Top Depth (m):		0.30	1.00	
	Date Sampled:		11-Aug-2021	11-Aug-2021	
	Asbestos Lab:		DURHAM	DURHAM	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-28864					<b>Landfill Waste Acceptance Criteria Limits</b>		
Chemtest Sample ID: 1263791					<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>
Sample Ref: 1							
Sample ID:							
Sample Location: TP03							
Top Depth(m): 0.30							
Bottom Depth(m):							
Sampling Date: 11-Aug-2021							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	1.6	3	5	6
Loss On Ignition	2610	M	%	3.7	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.030	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0016	0.016	0.5	2	25
Barium	1455	U	0.083	0.83	20	100	300
Cadmium	1455	U	0.0017	0.017	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0048	0.048	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0052	0.052	0.5	10	30
Nickel	1455	U	0.0008	0.0081	0.4	10	40
Lead	1455	U	0.032	0.32	0.5	10	50
Antimony	1455	U	0.013	0.13	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.12	1.2	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	66	660	1000	20000	50000
Total Dissolved Solids	1020	N	180	1800	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.2	72	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	4.2

### Waste Acceptance Criteria

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



## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-28864					<b>Landfill Waste Acceptance Criteria Limits</b>		
Chemtest Sample ID: 1263793					<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>
Sample Ref: 3							
Sample ID:							
Sample Location: TP03							
Top Depth(m): 1.00							
Bottom Depth(m):							
Sampling Date: 11-Aug-2021							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	0.33	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.045	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.040	0.39	0.5	2	25
Barium	1455	U	0.072	0.72	20	100	300
Cadmium	1455	U	0.00019	0.0019	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0012	0.012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0093	0.093	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	0.0012	0.012	0.5	10	50
Antimony	1455	U	0.0083	0.083	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.17	1.7	10	150	500
Sulphate	1220	U	21	210	1000	20000	50000
Total Dissolved Solids	1020	N	72	720	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.0	50	500	800	1000

### **Solid Information**

Dry mass of test portion/kg	0.090
Moisture (%)	3.0

### **Waste Acceptance Criteria**

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

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

## Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Amended Report

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**Report No.:** 21-28862-2

**Initial Date of Issue:** 07-Sep-2021      **Date of Re-Issue:** 14-Sep-2021

**Client:** Causeway Geotech Ltd

**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL

**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002      **Date Received:** 19-Aug-2021

**Order No.:** NEIL HAGGAN      **Date Instructed:** 24-Aug-2021

**No. of Samples:** 1

**Turnaround (Wkdays):** 7      **Results Due:** 08-Sep-2021

**Date Approved:** 07-Sep-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-28862	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1263789	
Order No.: NEIL HAGGAN		Client Sample Ref.:		4	
		Sample Location:		TP04	
		Sample Type:		SOIL	
		Top Depth (m):		2.00	
		Date Sampled:		11-Aug-2021	
		Asbestos Lab:		COVENTRY	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	6.5
pH	M	2010		4.0	9.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50
Arsenic	M	2450	mg/kg	1.0	32
Beryllium	U	2450	mg/kg	1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	5.9
Chromium	M	2450	mg/kg	1.0	5.0
Copper	M	2450	mg/kg	0.50	49
Mercury	M	2450	mg/kg	0.10	0.51
Nickel	M	2450	mg/kg	0.50	27
Lead	M	2450	mg/kg	0.50	970
Selenium	M	2450	mg/kg	0.20	0.26
Vanadium	U	2450	mg/kg	5.0	5.4
Zinc	M	2450	mg/kg	0.50	700
Chromium (Trivalent)	N	2490	mg/kg	1.0	5.0
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	0.97
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-28862	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1263789	
Order No.: NEIL HAGGAN		Client Sample Ref.:		4	
		Sample Location:		TP04	
		Sample Type:		SOIL	
		Top Depth (m):		2.00	
		Date Sampled:		11-Aug-2021	
		Asbestos Lab:		COVENTRY	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-28862	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1263789	
Order No.: NEIL HAGGAN		Client Sample Ref.:		4	
		Sample Location:		TP04	
		Sample Type:		SOIL	
		Top Depth (m):		2.00	
		Date Sampled:		11-Aug-2021	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	< 0.50
Phenol	M	2790	mg/kg	0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-28862	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1263789	
Order No.: NEIL HAGGAN		Client Sample Ref.:		4	
		Sample Location:		TP04	
		Sample Type:		SOIL	
		Top Depth (m):		2.00	
		Date Sampled:		11-Aug-2021	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50	< 0.50
Carbazole	M	2790	mg/kg	0.50	< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Fluoranthene	M	2790	mg/kg	0.50	< 0.50
Pyrene	M	2790	mg/kg	0.50	< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50	< 0.50
Chrysene	M	2790	mg/kg	0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>		<b>Chemtest Job No.:</b>		21-28862	
Quotation No.: Q21-25002		<b>Chemtest Sample ID.:</b>		1263789	
Order No.: NEIL HAGGAN		Client Sample Ref.:		4	
		Sample Location:		TP04	
		Sample Type:		SOIL	
		Top Depth (m):		2.00	
		Date Sampled:		11-Aug-2021	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50	< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50	< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50	< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50	< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

**Report No.:** 21-28865-1  
**Initial Date of Issue:** 03-Sep-2021  
**Client:** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
 Balnamore  
 Ballymoney  
 County Antrim  
 BT53 7QL

**Contact(s):** Carin Cornwall  
 Colm Hurley  
 Darren O'Mahony  
 Gabriella Horan  
 Joe Gervin  
 John Cameron  
 Lucy Newland  
 Martin Gardiner  
 Matthew Gilbert  
 Michelle Gaffney  
 Neil Haggan  
 Paul Dunlop  
 Sean Ross  
 Stephen Franey  
 Stephen Watson  
 Stuart Abraham  
 Thomas McAllist

**Project:** 21-0937 Tynagh Power Plant OCGT

**Quotation No.:** Q21-25002 **Date Received:** 19-Aug-2021

**Order No.:** **Date Instructed:** 25-Aug-2021

**No. of Samples:** 3

**Turnaround (Wkdays):** 7 **Results Due:** 03-Sep-2021

**Date Approved:** 03-Sep-2021

**Approved By:**

**Details:** Glynn Harvey, Technical Manager



## Results - Leachate

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b>					21-28865	21-28865
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b>					1263795	1263797
Order No.:	Client Sample Ref.:					1	2
	Sample Location:					TP05	TP04
	Sample Type:					SOIL	SOIL
	Top Depth (m):					0.20	1.00
	Date Sampled:					17-Aug-2021	17-Aug-2021
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Type</b>	<b>Units</b>	<b>LOD</b>		
Ammonium	U	1220	10:1	mg/l	0.050	0.069	0.078
Ammonium	N	1220	10:1	mg/kg	0.10	1.4	1.3



## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28865	21-28865	21-28865
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263795	1263796	1263797
Order No.:		Client Sample Ref.:		1	1	2
		Sample Location:		TP05	TP04	TP04
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		0.20	0.50	1.00
		Date Sampled:		17-Aug-2021	17-Aug-2021	17-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	1.8	6.1
pH	M	2010		4.0	8.8	8.7
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Sulphur (Elemental)	M	2180	mg/kg	1.0	16	5.7
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	14	8.4
Sulphate (Total)	M	2430	%	0.010	0.91	0.71
Arsenic	M	2450	mg/kg	1.0	67	160
Barium	M	2450	mg/kg	10	730	1200
Beryllium	U	2450	mg/kg	1.0		< 1.0
Cadmium	M	2450	mg/kg	0.10	11	29
Chromium	M	2450	mg/kg	1.0	4.4	7.0
Molybdenum	M	2450	mg/kg	2.0	< 2.0	5.2
Antimony	N	2450	mg/kg	2.0	29	30
Copper	M	2450	mg/kg	0.50	130	260
Mercury	M	2450	mg/kg	0.10	0.88	1.6
Nickel	M	2450	mg/kg	0.50	56	61
Lead	M	2450	mg/kg	0.50	1400	4500
Selenium	M	2450	mg/kg	0.20	< 0.20	0.65
Vanadium	U	2450	mg/kg	5.0		14
Zinc	M	2450	mg/kg	0.50	2700	4500
Chromium (Trivalent)	N	2490	mg/kg	1.0	4.4	7.0
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40		0.62
Total Organic Carbon	M	2625	%	0.20	< 0.20	< 0.20
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28865	21-28865	21-28865
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263795	1263796	1263797
Order No.:		Client Sample Ref.:		1	1	2
		Sample Location:		TP05	TP04	TP04
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		0.20	0.50	1.00
		Date Sampled:		17-Aug-2021	17-Aug-2021	17-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:			21-28865	21-28865	21-28865
Quotation No.: Q21-25002		Chemtest Sample ID.:			1263795	1263796	1263797
Order No.:		Client Sample Ref.:			1	1	2
		Sample Location:			TP05	TP04	TP04
		Sample Type:			SOIL	SOIL	SOIL
		Top Depth (m):			0.20	0.50	1.00
		Date Sampled:			17-Aug-2021	17-Aug-2021	17-Aug-2021
		Asbestos Lab:			DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
1,2-Dibromoethane	M	2760	µg/kg	5.0		< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0		< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0		< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0		< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50		< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0		< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0		< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0		< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50		< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0		< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0		< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0		< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	M	2790	mg/kg	0.50		< 0.50	< 0.50
Phenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
2-Chlorophenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50		< 0.50	< 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50		< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50		< 0.50	< 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50		< 0.50	< 0.50
2-Methylphenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50		< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50		< 0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:			21-28865	21-28865	21-28865
Quotation No.: Q21-25002		Chemtest Sample ID.:			1263795	1263796	1263797
Order No.:		Client Sample Ref.:			1	1	2
		Sample Location:			TP05	TP04	TP04
		Sample Type:			SOIL	SOIL	SOIL
		Top Depth (m):			0.20	0.50	1.00
		Date Sampled:			17-Aug-2021	17-Aug-2021	17-Aug-2021
		Asbestos Lab:			DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50		< 0.50	< 0.50
4-Methylphenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
Nitrobenzene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Isophorone	M	2790	mg/kg	0.50		< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50		< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50		< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50		< 0.50	< 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Naphthalene	M	2790	mg/kg	0.50		< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50		< 0.50	< 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50		< 0.50	< 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50		< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50		< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50		< 0.50	< 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50		< 0.50	< 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50		< 0.50	< 0.50
2-Nitroaniline	M	2790	mg/kg	0.50		< 0.50	< 0.50
Acenaphthylene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Dimethylphthalate	M	2790	mg/kg	0.50		< 0.50	< 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Acenaphthene	M	2790	mg/kg	0.50		< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50		< 0.50	< 0.50
Dibenzofuran	M	2790	mg/kg	0.50		< 0.50	< 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50		< 0.50	< 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Fluorene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50		< 0.50	< 0.50
4-Nitroaniline	M	2790	mg/kg	0.50		< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50		< 0.50	< 0.50
Azobenzene	M	2790	mg/kg	0.50		< 0.50	< 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50		< 0.50	< 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50		< 0.50	< 0.50
Phenanthrene	M	2790	mg/kg	0.50		< 0.50	< 0.50
Anthracene	M	2790	mg/kg	0.50		< 0.50	< 0.50

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-28865	21-28865	21-28865
Quotation No.: Q21-25002		Chemtest Sample ID.:		1263795	1263796	1263797
Order No.:		Client Sample Ref.:		1	1	2
		Sample Location:		TP05	TP04	TP04
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		0.20	0.50	1.00
		Date Sampled:		17-Aug-2021	17-Aug-2021	17-Aug-2021
		Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Carbazole	M	2790	mg/kg	0.50		< 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50		< 0.50
Fluoranthene	M	2790	mg/kg	0.50		< 0.50
Pyrene	M	2790	mg/kg	0.50		< 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50		< 0.50
Benzo[a]anthracene	M	2790	mg/kg	0.50		< 0.50
Chrysene	M	2790	mg/kg	0.50		< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50		< 0.50
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50		< 0.50
Benzo[b]fluoranthene	M	2790	mg/kg	0.50		< 0.50
Benzo[k]fluoranthene	M	2790	mg/kg	0.50		< 0.50
Benzo[a]pyrene	M	2790	mg/kg	0.50		< 0.50
Indeno(1,2,3-c,d)Pyrene	M	2790	mg/kg	0.50		< 0.50
Dibenz(a,h)Anthracene	M	2790	mg/kg	0.50		< 0.50
Benzo[g,h,i]perylene	M	2790	mg/kg	0.50		< 0.50
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	0.10
Pyrene	M	2800	mg/kg	0.10	0.11	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0		< 2.0
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010	< 0.010

## Results - Soil

**Project: 21-0937 Tynagh Power Plant OCGT**

<b>Client: Causeway Geotech Ltd</b>	<b>Chemtest Job No.:</b>		21-28865	21-28865	21-28865
Quotation No.: Q21-25002	<b>Chemtest Sample ID.:</b>		1263795	1263796	1263797
Order No.:	Client Sample Ref.:		1	1	2
	Sample Location:		TP05	TP04	TP04
	Sample Type:		SOIL	SOIL	SOIL
	Top Depth (m):		0.20	0.50	1.00
	Date Sampled:		17-Aug-2021	17-Aug-2021	17-Aug-2021
	Asbestos Lab:		DURHAM	DURHAM	DURHAM
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>	
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	< 0.10
Total Phenols	M	2920	mg/kg	0.10	< 0.10

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-28865				<b>Landfill Waste Acceptance Criteria Limits</b>			
Chemtest Sample ID: 1263795							
Sample Ref: 1							
Sample ID:							
Sample Location: TP05							
Top Depth(m): 0.20							
Bottom Depth(m):				Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sampling Date: 17-Aug-2021							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	< 0.20	3	5	6
Loss On Ignition	2610	M	%	0.14	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0046	0.046	0.5	2	25
Barium	1455	U	0.35	3.5	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0018	0.018	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0091	0.091	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	0.0083	0.083	0.5	10	50
Antimony	1455	U	0.011	0.11	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.012	0.12	4	50	200
Chloride	1220	U	3.6	36	800	15000	25000
Fluoride	1220	U	0.11	1.1	10	150	500
Sulphate	1220	U	5.4	54	1000	20000	50000
Total Dissolved Solids	1020	N	46	460	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.3	< 50	500	800	1000

### Solid Information

Dry mass of test portion/kg	0.090
Moisture (%)	1.8

### Waste Acceptance Criteria

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

## Results - Single Stage WAC

Project: 21-0937 Tynagh Power Plant OCGT

Chemtest Job No: 21-28865					<b>Landfill Waste Acceptance Criteria Limits</b>		
Chemtest Sample ID: 1263797					<b>Inert Waste Landfill</b>	<b>Stable, Non-reactive hazardous waste in non-hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>
Sample Ref: 2							
Sample ID:							
Sample Location: TP04							
Top Depth(m): 1.00							
Bottom Depth(m):							
Sampling Date: 17-Aug-2021							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	< 0.20	3	5	6
Loss On Ignition	2610	M	%	2.0	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.014	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	0.0022	0.022	0.5	2	25
Barium	1455	U	0.28	2.8	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0018	0.018	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0058	0.058	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	0.015	0.15	0.5	10	50
Antimony	1455	U	0.0083	0.083	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.017	0.17	4	50	200
Chloride	1220	U	2.2	22	800	15000	25000
Fluoride	1220	U	0.13	1.3	10	150	500
Sulphate	1220	U	9.0	90	1000	20000	50000
Total Dissolved Solids	1020	N	56	560	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.4	< 50	500	800	1000

### Solid Information

Dry mass of test portion/kg	0.090
Moisture (%)	6.3

### Waste Acceptance Criteria

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



## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

## Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage


If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

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**Report No.:** 21-29642-1  
**Initial Date of Issue:** 03-Sep-2021  
**Client:** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL  
**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist  
**Project:** 21-0937 Tynagh Power Plant OCGT  
**Quotation No.:** Q21-25002  
**Order No.:**  
**No. of Samples:** 4  
**Turnaround (Wkdays):** 7  
**Date Approved:** 03-Sep-2021  
**Approved By:**  
  
**Details:** Glynn Harvey, Technical Manager

**Date Received:** 25-Aug-2021  
**Date Instructed:** 26-Aug-2021  
**Results Due:** 06-Sep-2021



## Results - Water

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29642	21-29642	21-29642	21-29642	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267339	1267340	1267341	1267342	
		Sample Location:		BH02	BH02A	BH05	BH09	
		Sample Type:		WATER	WATER	WATER	WATER	
		Top Depth (m):		1.60	1.10	5.02	1.75	
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021	
Determinand	Accred.	SOP	Units	LOD				
pH	U	1010		N/A	7.8	7.7	7.8	7.7
Sulphate	U	1220	mg/l	1.0	480			260
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	0.090	< 0.050	< 0.050
Total Hardness as CaCO3	U	1270	mg/l	15	430	460	480	1200
Arsenic (Dissolved)	U	1455	µg/l	0.20	1.5	2.3	2.1	9.8
Boron (Dissolved)	U	1455	µg/l	10.0	44	27	35	600
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11	1.0	0.36
Chromium (Dissolved)	U	1455	µg/l	0.50	0.84	1.4	7.2	6.1
Copper (Dissolved)	U	1455	µg/l	0.50	0.79	< 0.50	6.0	5.7
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	14	4.9	66	16
Lead (Dissolved)	U	1455	µg/l	0.50	4.3	< 0.50	29	20
Selenium (Dissolved)	U	1455	µg/l	0.50	8.3	< 0.50	1.8	6.3
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	48	4.5	740	3100
Chromium (Trivalent)	N	1490	µg/l	20	< 20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	330	< 0.10	35
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	1700	< 0.10	770
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	1800	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	940	< 0.10	69
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	4800	< 5.0	870
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	51
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	1200	< 0.10	260
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	980	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	980	< 0.10	620
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	3100	< 5.0	930
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	7900	< 10	1800
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0

## Results - Water

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29642	21-29642	21-29642	21-29642
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267339	1267340	1267341	1267342
		Sample Location:		BH02	BH02A	BH05	BH09
		Sample Type:		WATER	WATER	WATER	WATER
		Top Depth (m):		1.60	1.10	5.02	1.75
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
Determinand	Accred.	SOP	Units	LOD			
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	55
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0

## Results - Water

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29642	21-29642	21-29642	21-29642
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267339	1267340	1267341	1267342
		Sample Location:		BH02	BH02A	BH05	BH09
		Sample Type:		WATER	WATER	WATER	WATER
		Top Depth (m):		1.60	1.10	5.02	1.75
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
Determinand	Accred.	SOP	Units	LOD			
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50



## Results - Water

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29642	21-29642	21-29642	21-29642
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267339	1267340	1267341	1267342
		Sample Location:		BH02	BH02A	BH05	BH09
		Sample Type:		WATER	WATER	WATER	WATER
		Top Depth (m):		1.60	1.10	5.02	1.75
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
Determinand	Accred.	SOP	Units	LOD			
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10

## Results - Water

**Project: 21-0937 Tynagh Power Plant OCGT**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-29642	21-29642	21-29642	21-29642
Quotation No.: Q21-25002		Chemtest Sample ID.:		1267339	1267340	1267341	1267342
		Sample Location:		BH02	BH02A	BH05	BH09
		Sample Type:		WATER	WATER	WATER	WATER
		Top Depth (m):		1.60	1.10	5.02	1.75
		Date Sampled:		23-Aug-2021	23-Aug-2021	23-Aug-2021	23-Aug-2021
Determinand	Accred.	SOP	Units	LOD			
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	0.045	< 0.030

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5-C6, >C6-C8, >C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35-C44 Aromatics: >C5-C7, >C7-C8, >C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35-C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



# Final Report

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**Report No.:** 21-32431-1  
**Initial Date of Issue:** 23-Sep-2021  
**Client** Causeway Geotech Ltd  
**Client Address:** 8 Drumahiskey Road  
Balnamore  
Ballymoney  
County Antrim  
BT53 7QL  
**Contact(s):** Carin Cornwall  
Colm Hurley  
Darren O'Mahony  
Gabiella Horan  
Joe Gervin  
John Cameron  
Lucy Newland  
Martin Gardiner  
Matthew Gilbert  
Michelle Gaffney  
Neil Haggan  
Paul Dunlop  
Sean Ross  
Stephen Franey  
Stephen Watson  
Stuart Abraham  
Thomas McAllist

**Project** 21-0937 Tynagh Power Plant

**Quotation No.:** Q21-25002

**Date Received:** 17-Sep-2021

**Order No.:**

**Date Instructed:** 17-Sep-2021

**No. of Samples:** 3

**Turnaround (Wkdays):** 5

**Results Due:** 23-Sep-2021

**Date Approved:** 23-Sep-2021

**Approved By:**

**Details:** Glynn Harvey, Technical Manager

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## Results - Water

**Project: 21-0937 Tynagh Power Plant**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-32431	21-32431	21-32431	
Quotation No.: Q21-25002		Chemtest Sample ID.:		1281560	1281561	1281562	
		Sample Location:		BH02	BH05	BH09	
		Sample Type:		WATER	WATER	WATER	
		Top Depth (m):		1.65	5.28	1.56	
		Date Sampled:		15-Sep-2021	15-Sep-2021	15-Sep-2021	
Determinand	Accred.	SOP	Units	LOD			
pH	U	1010		N/A	7.7	7.4	7.4
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Total Hardness as CaCO3	U	1270	mg/l	15	500	600	530
Arsenic (Dissolved)	U	1455	µg/l	0.20	2.0	1.0	2.0
Boron (Dissolved)	U	1455	µg/l	10.0	40	40	110
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	1.7	0.30
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	0.56	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	1.8	7.8	3.2
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	0.07
Nickel (Dissolved)	U	1455	µg/l	0.50	8.4	130	20
Lead (Dissolved)	U	1455	µg/l	0.50	7.4	9.7	16
Selenium (Dissolved)	U	1455	µg/l	0.50	< 0.50	1.9	1.2
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	3.5	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	50	1100	700
Chromium (Trivalent)	N	1490	µg/l	20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5

## Results - Water

**Project: 21-0937 Tynagh Power Plant**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-32431	21-32431	21-32431
Quotation No.: Q21-25002		Chemtest Sample ID.:		1281560	1281561	1281562
		Sample Location:		BH02	BH05	BH09
		Sample Type:		WATER	WATER	WATER
		Top Depth (m):		1.65	5.28	1.56
		Date Sampled:		15-Sep-2021	15-Sep-2021	15-Sep-2021
Determinand	Accred.	SOP	Units	LOD		
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0



## Results - Water

**Project: 21-0937 Tynagh Power Plant**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-32431	21-32431	21-32431
Quotation No.: Q21-25002		Chemtest Sample ID.:		1281560	1281561	1281562
		Sample Location:		BH02	BH05	BH09
		Sample Type:		WATER	WATER	WATER
		Top Depth (m):		1.65	5.28	1.56
		Date Sampled:		15-Sep-2021	15-Sep-2021	15-Sep-2021
Determinand	Accred.	SOP	Units	LOD		
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50

## Results - Water

**Project: 21-0937 Tynagh Power Plant**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-32431	21-32431	21-32431
Quotation No.: Q21-25002		Chemtest Sample ID.:		1281560	1281561	1281562
		Sample Location:		BH02	BH05	BH09
		Sample Type:		WATER	WATER	WATER
		Top Depth (m):		1.65	5.28	1.56
		Date Sampled:		15-Sep-2021	15-Sep-2021	15-Sep-2021
Determinand	Accred.	SOP	Units	LOD		
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50
Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10

## Results - Water

**Project: 21-0937 Tynagh Power Plant**

Client: Causeway Geotech Ltd		Chemtest Job No.:		21-32431	21-32431	21-32431
Quotation No.: Q21-25002		Chemtest Sample ID.:		1281560	1281561	1281562
		Sample Location:		BH02	BH05	BH09
		Sample Type:		WATER	WATER	WATER
		Top Depth (m):		1.65	5.28	1.56
		Date Sampled:		15-Sep-2021	15-Sep-2021	15-Sep-2021
Determinand	Accred.	SOP	Units	LOD		
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030

## Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5-C6, >C6-C8, >C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35-C44 Aromatics: >C5-C7, >C7-C8, >C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35-C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

## **Report Information**

### **Key**

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

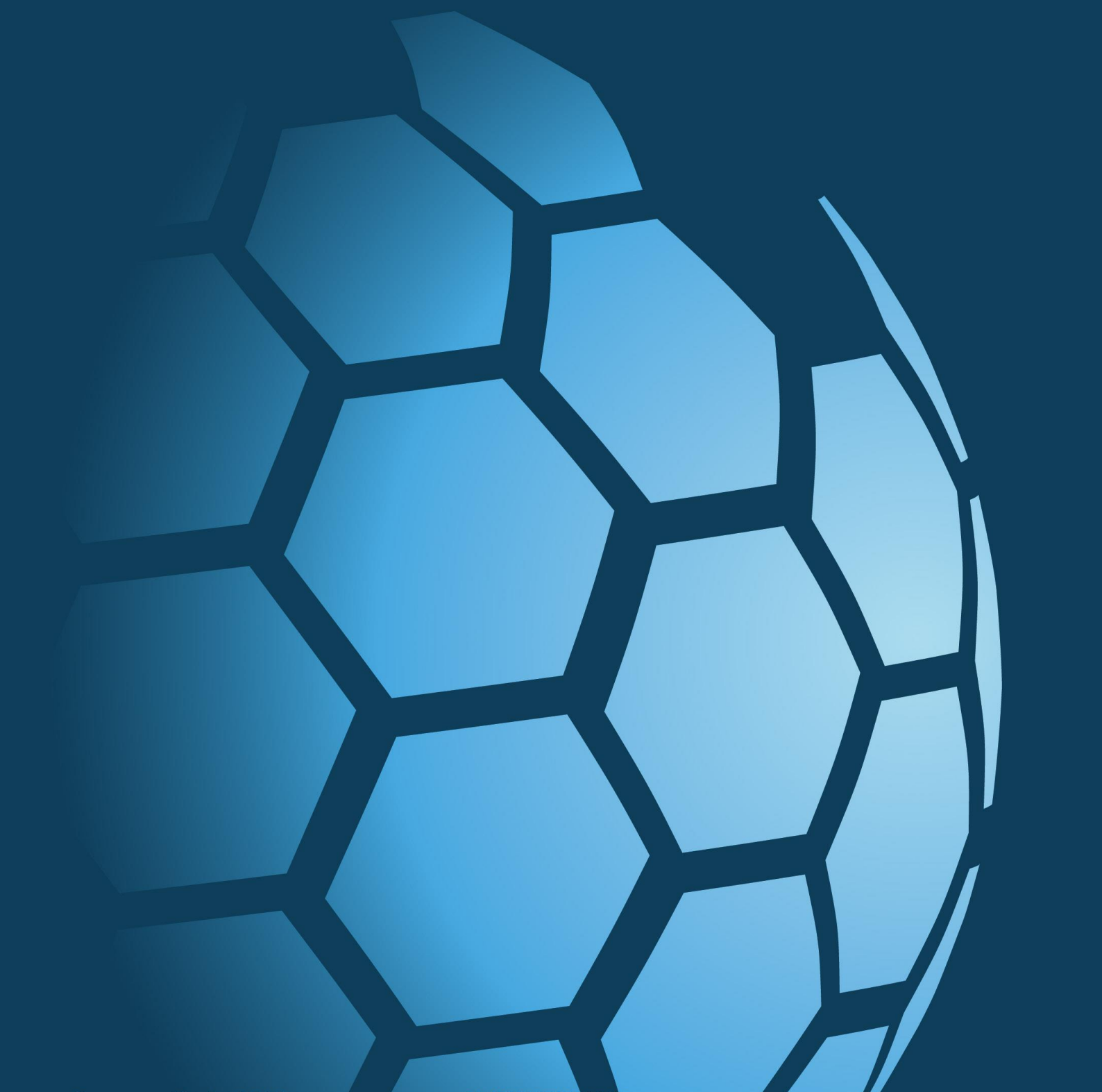
[customerservices@chemtest.com](mailto:customerservices@chemtest.com)



**CAUSEWAY**  
— GEOTECH

**APPENDIX J**

**SPT HAMMER ENERGY MEASUREMENT REPORT**



# SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

**Southern Testing**  
**Unit 11**  
**Charlwood Road**  
**East Grinstead**  
**West Sussex**  
**RH19 2HU**

SPT Hammer Ref: 0209  
Test Date: 27/02/2021  
Report Date: 01/03/2021  
File Name: 0209.spt  
Test Operator: NPB

## Instrumented Rod Data

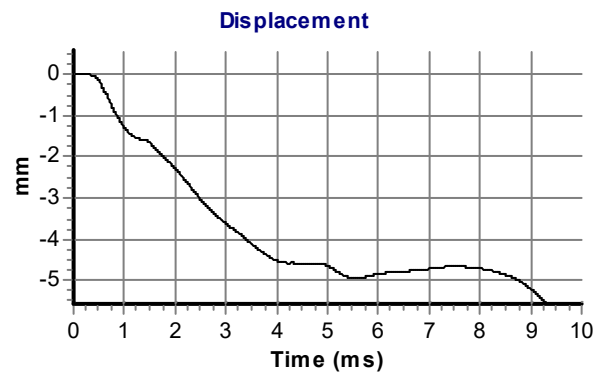
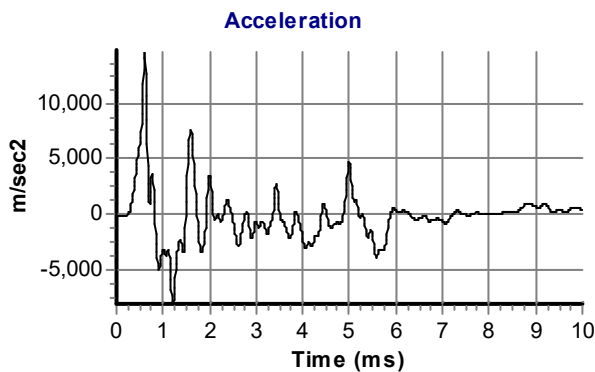
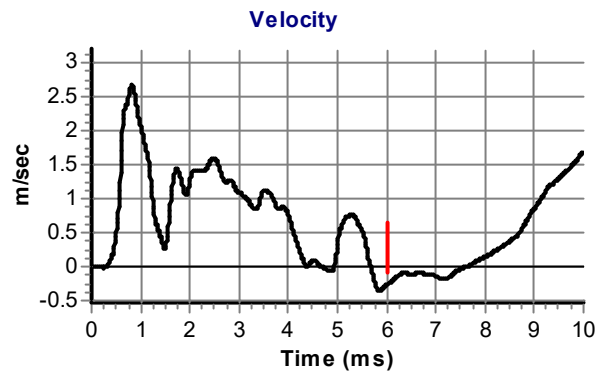
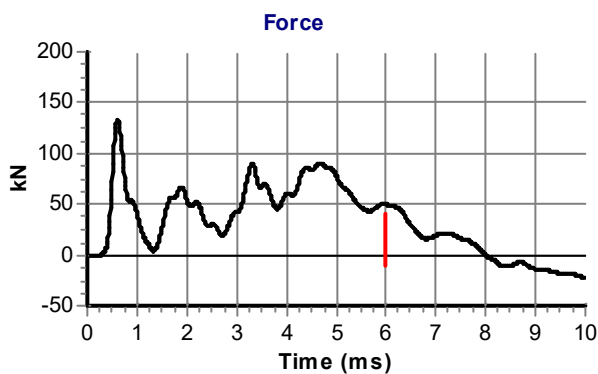
Diameter  $d_r$  (mm): 54  
Wall Thickness  $t_r$  (mm): 6.3  
Assumed Modulus  $E_a$  (GPa): 208  
Accelerometer No.1: 6458  
Accelerometer No.2: 9607

## SPT Hammer Information

Hammer Mass  $m$  (kg): 63.5  
Falling Height  $h$  (mm): 760  
SPT String Length  $L$  (m): 11.0

## Comments / Location

BALLYMONEY



## Calculations

Area of Rod A ( $\text{mm}^2$ ): 944  
Theoretical Energy  $E_{\text{theor}}$  (J): 473  
Measured Energy  $E_{\text{meas}}$  (J): 282

**Energy Ratio  $E_r$  (%):** **60**

Signed: N P Burrows

Title: Field Operations Manager

The recommended calibration interval is 12 months