

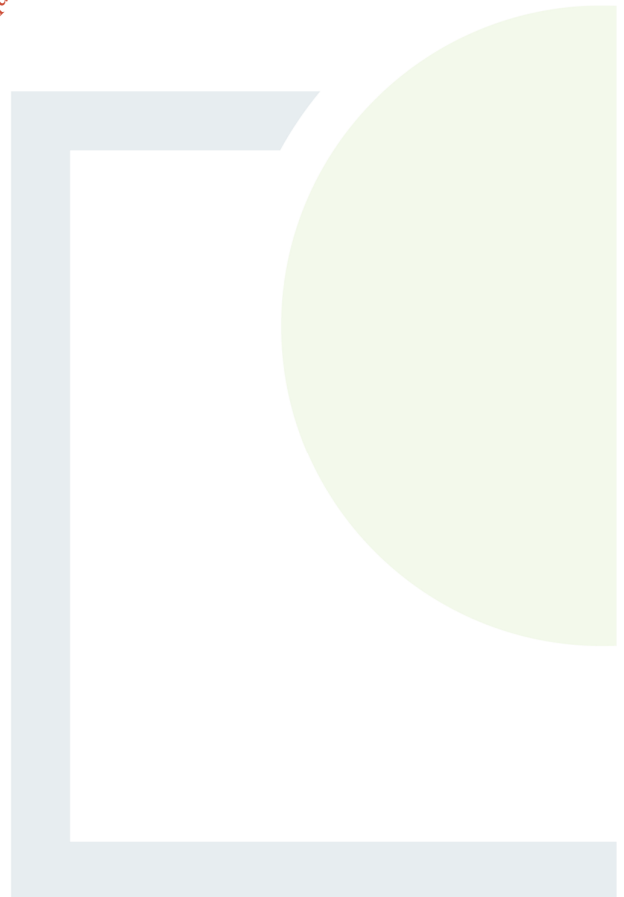


CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 3

Causeway Geotechnical Report

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CAUSEWAY
— GEOTECH

Historical Landfills in North Kerry - Leanamore

Client: Kerry County Council

Client's Representative: Feehily Timoney

Report No.: 18-1068a

Date: September 2019

Status: Final for Issue

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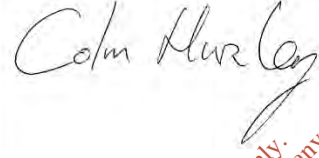

Note on: Methods of describing soils and rocks & abbreviations used on exploratory hole logs

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Document Control Sheet

Report No.:		18-1068a			
Project Title:		Historical Landfills in North Kerry - Leanamore			
Client:		Kerry County Council			
Client's Representative:		Fehily Timoney			
Revision:	A00	Status:	Final for Issue	Issue Date:	23 September 2019
Prepared by:		Reviewed by:		Approved by:	
 Sean Ross BSc MSc		 Colm Hurley BSc FGS		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

The works were conducted in accordance with:

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

BS 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, 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. The length achieved is stated (mm) for any test increment less than 75mm
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm)
N=X/Z	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given test length 'Z' (mm)
V VR	Shear vane test (borehole) and vane test (trial pit) Shear strength stated in kPa V: undisturbed vane shear strength VR: remoulded vane shear strength
dd/mm/yy: 1.0 dd/mm/yy: dry	Date & water level at the borehole depth at the end of shift and the start of the following shift
▽	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).

Historical Landfills in North Kerry - Leanamore

1 AUTHORITY

On the instructions of Fehily Timoney Consulting Engineers, ("the Client's Representative"), acting on the behalf of Kerry County Council ("the Client"), a ground investigation was undertaken at the above location to allow the geotechnical and environmental assessment of the historical landfill present on site. The information will input into the Tier 2 and 3 reports being compiled by the Client's Representative.

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 sampling, environmental sampling, 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 a site located 4.75km south west of Tarbert, Co.Kerry, in the townland of Leanamore. The site is located 2km west of the N69 which runs from Tarbert to Listowel and is covered in forestry. The site is surrounded on all side by agricultural lands.

4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between 6th and 22nd June 2019, comprised:

- one borehole by rotary drilling methods;
- one standpipe installation; and
- four machine dug trial pits.

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

One borehole (BH01) was put to its completion by rotary drilling techniques only. The borehole was completed using a Hanjin 8D tracked rotary drilling rig.

Symmetrix-cased full hole rotary percussive drilling techniques was employed to advance the borehole to scheduled depth.

Appendix B presents the borehole logs.

4.3 Standpipe installations

A groundwater monitoring standpipe was installed in BH01.

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

Four trial pits (TP01-TP02, TP04-TP05) were excavated using a JCB 3CX excavator fitted with a 600mm wide bucket, to a maximum depth of 2.60m. A suitable location for TP03 was unable to found.

Environmental samples were taken at various depths of 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 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 R6 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish National Grid) 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 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **permeability testing:** permeability by triaxial compression

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 E.

5.2 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 according to Engineer's Ireland Suite E which comprises a single stage waste acceptance criteria (WAC) test.

Results of environmental laboratory testing are presented in Appendix F.

6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprises peat and glacial till. These deposits are underlain by mudstone, siltstone and sandstone of the Shannon Group,

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:

- **Topsoil:** encountered in TP01, TP04 and TP05 with a thickness range of 400-600mm.
- **Made Ground (fill):** reworked sandy gravelly clay fill with pieces of plastic, rubbish, plastic bottles and pieces of metal encountered in TP04 to a depth of 2.50m.
- **Recent deposits (peat):** 1.50m of peat was encountered in BH01
- **Fluvioglacial deposits:** sandy clayey gravel encountered in BH01 to a depth of 8.50m.
- **Glacial Till:** sandy gravelly clay, frequently with low cobble content, typically firm or stiff in upper horizons, becoming very stiff with increasing depth.

6.3 Groundwater

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 encountered during drilling and trial pit excavation as water strikes as shown in Table 1 below.

Table 1 Groundwater strikes encountered during the ground investigation

GI Ref.	Water level (mbgl)	Comments
BH01	5.80	Rose to 3.00 after 20 mins
TP04	2.30	Seepage

It should be noted that the casing used in supporting the borehole walls during drilling may have sealed out additional groundwater strikes and the possibility of encountering groundwater at other depths should not be ruled out.

Groundwater was not noted during excavation of any of the other trial pits.

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.

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

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

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. 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 EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description

BS EN ISO 22282-2: 2012: Geotechnical investigation and testing. Geohydraulic testing – Part 2: Water permeability tests in a borehole using open systems.

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APPENDIX A

SITE AND EXPLORATORY HOLE LOCATION PLANS

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Project No.: 18-1068a
Project Name: Historical Landfills in North Kerry - Leanamore

Client: Kerry County Council
Client's Representative: Fehily Timoney

Legend Key



Title:
Site Location Plan

Last Revised:
16/08/2019

Scale:
1:10000





Project No.: 18-1068a

Client: Kerry County Council

Project Name: Historical Landfills in North Kerry - Leanamore

Client's Representative: Fehily Timoney

Legend Key

-  Locations By Type - RO
-  Locations By Type - TP



Title:

Exploratory Hole Location Plan

Last Revised:

16/08/2019

Scale:

1:1000






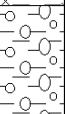
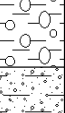
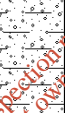
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APPENDIX B

BOREHOLE LOGS

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 CAUSEWAY GEOTECH				Project No.: 18-1068a		Project Name: Historical Landfills in North Kerry - Leanamore		Borehole No.: BH01	
				Coordinates: 104173.73 E 143561.65 N		Client: Kerry County Council		Sheet 1 of 1	
Method Rotary Drilling	Plant Used Hanjin 8D	Top 0.00	Base 8.50	Ground Level: 64.40 mOD		Client's Representative: Fehily Timoney		Scale: 1:50	
						Dates: 22/06/2019 - 22/06/2019		Driller: KW	
								Logger: PF	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						(1.50)		PEAT. (Driller's description)		
					62.90	1.50		Firm grey silty CLAY. (Driller's description)		
					61.90	2.50		Grey sandy gravelly CLAY. (Driller's description)		
					60.60	3.80		Greyish brown sandy slightly clayey GRAVEL. (Driller's description)		
				Water strike at 5.80m		(4.70)				
					55.90	8.50		End of Borehole at 8.50m		


Remarks	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	5.80	5.80	20	3.00			
Terminated at scheduled depth.	Water Added		Casing Details				
	From (m)	To (m)	To (m)	Diam (mm)			
			8.50	200			


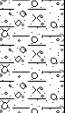


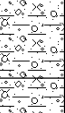


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APPENDIX C TRIAL PIT LOGS






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 CAUSEWAY GEOTECH		Project No.: 18-1068a		Project Name: Historical Landfills in North Kerry - Leanamore		Trial Pit No.: TP01	
		Co-ordinates: 104176.44 E 143609.48 N		Client: Kerry County Council Client's Representative: Fehily Timoney		Sheet 1 of 1	
Method: Trial Pitting		Ground Level: 64.52 mOD		Date: 06/06/2019		Scale: 1:25 Logger: PF	
Plant: JCB Excavator							


Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.30	B2		64.12	(0.40)		TOPSOIL: Firm dark brown CLAY with rootlets.	
			63.72	0.40 (0.40) 0.80 (1.10)		Light orangish brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are subrounded of mixed lithologies including sandstone and limestone.	0.5
			62.62	1.90 (0.60)		Firm bluish grey slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles subrounded are of sandstone and limestone.	1.0
						Firm greyish brown sandy gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of mixed lithologies. Cobbles are subrounded of sandstone and limestone.	1.5
2.50	ES1		62.02	2.50		End of trial pit at 2.50m	2.0
							2.5
							3.0
							3.5
							4.0
							4.5




Remarks No groundwater encountered. No waste encountered.	Water Strikes:		Stability: Stable
	Struck at (m):	Remarks:	
			Width: 1.20 Length: 3.90

		Project No.: 18-1068a		Project Name: Historical Landfills in North Kerry - Leanamore		Trial Pit No.: TP02	
		Co-ordinates: 104177.50 E 143586.49 N		Client: Kerry County Council Client's Representative: Fehily Timoney		Sheet 1 of 1	
Method: Trial Pitting		Ground Level: 64.22 mOD		Date: 06/06/2019		Scale: 1:25 Logger: PF	
Plant: JCB Excavator							


Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.30	B2			(0.50)		TOPSOIL: Firm dark brown CLAY with rootlets.	
			63.72	0.50		Soft light orangish brown slightly sandy slightly gravelly silty CLAY with low cobble content and roots. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are subrounded of sandstone and limestone.	0.5
			63.32	0.90		Firm bluish grey slightly sandy slightly gravelly silty CLAY with low to medium cobble content. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of mixed lithologies. Cobbles are subrounded of sandstone and limestone.	1.0
				(0.80)		Firm greyish brown sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies. Cobbles and boulders subangular to subrounded of sandstone and limestone.	1.5
			62.52	1.70		Firm greyish brown sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies. Cobbles and boulders subangular to subrounded of sandstone and limestone.	2.0
				(0.80)			
2.50	ES1		61.72	2.50		End of trial pit at 2.50m	2.5
							3.0
							3.5
							4.0
							4.5



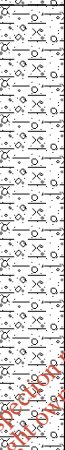
Remarks No groundwater encountered. Terminated on obstruction.	Water Strikes:		Stability: Stable
	Struck at (m):	Remarks:	
			Width: 1.50 Length: 4.50

 CAUSEWAY GEOTECH		Project No.: 18-1068a		Project Name: Historical Landfills in North Kerry - Leanamore		Trial Pit No.: TP04	
		Co-ordinates: 104188.90 E 143568.35 N		Client: Kerry County Council Client's Representative: Fehily Timoney		Sheet 1 of 1	
Method: Trial Pitting		Ground Level: 63.98 mOD		Date: 06/06/2019		Scale: 1:25	
Plant: JCB Excavator						Logger: PF	

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	
0.30	B2		63.58	(0.40)		MADE GROUND: Firm dark greyish brown slightly sandy slightly gravelly silty CLAY with low cobble content and few small pieces of white plastic. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are of sandstone and limestone.		
				0.40			MADE GROUND: Soft locally firm orangish brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are subrounded of sandstone and limestone.	0.5
				(0.70)				1.0
			62.88	1.10		MADE GROUND: Firm dark bluish grey sandy gravelly silty CLAY with low cobble content and rubbish, including plastic bags, plastic bottled and cylindrical metal bars. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of mixed lithologies. Cobbles are subrounded of sandstone and limestone.	1.5	
				(1.40)			2.0	
2.50	ES1	Water encountered at 2.30m	61.48	2.50		End of trial pit at 2.50m	2.5	
							3.0	
							3.5	
							4.0	
							4.5	

Remarks Terminated due to pit walls collapsing.	Water Strikes:		Stability: Unstable
	Struck at (m):	Remarks:	
	2.30	Water encountered at 2.30m	Width: 1.30 Length: 3.40

 CAUSEWAY GEOTECH		Project No.: 18-1068a		Project Name: Historical Landfills in North Kerry - Leanamore		Trial Pit No.: TP05	
		Co-ordinates: 104242.62 E 143573.57 N		Client: Kerry County Council		Sheet 1 of 1	
Method: Trial Pitting		Ground Level: 62.84 mOD		Client's Representative: Fehily Timoney		Scale: 1:25	
Plant: JCB Excavator		Date: 06/06/2019		Logger: PF			

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
0.50	B3		62.24	0.60		TOPSOIL: Firm dark brown CLAY with rootlets.	0.5
1.00	ES2		61.74	1.10		Light orangish brown slightly sandy slightly gravelly silty CLAY with low cobble content and roots. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are of mixed lithologies including sandstone and limestone.	1.0
2.50	ES1		60.24	2.60		Firm bluish grey slightly sandy gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of mixed lithologies. Cobbles are subrounded of mixed lithologies including sandstone and limestone.	2.5
						End of trial pit at 2.60m	3.0
							3.5
							4.0
							4.5

Remarks No groundwater encountered. Terminated due to pit walls collapsing.	Water Strikes:		Stability: Unstable
	Struck at (m):	Remarks:	
			Width: 1.20 Length: 3.90



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APPENDIX D

TRIAL PIT PHOTOGRAPHS

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TP01 – NW Face



TP01 – NE Face



TP01 – SE Face



TP01 – SW Face



TP01 – Base



TP01 – Spoil heap



TP01 – Spoil heap



TP02 – SSW Face



TP02 – WNW Face



TP02 – NNE Face



TP02 – ESE Face



TP02 – Base



TP02 – Spoil heap



TP04 – SSW Face



TP04 – WNW Face



TP04 – NNE Face



TP04 – ESE Face



TP04 - Base



TP04 - Spoil heap



TP04 – Spoil heap

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TP05 – WSW Face



TP05 – NNW Face



TP05 – ENE Face



TP05 – SSE Face



TP05 - Base



TP05 - Spoil heap



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APPENDIX E

GEOTECHNICAL LABORATORY TEST RESULTS

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LABORATORY REPORT



4043

Contract Number: PSL19/4108

Report Date: 09 August 2019
Client's Reference: 18-1068a
Client Name: Causeway Geotech
8 Drumahiskey Road
Ballymoney
Co. Antrim
BT53 7QL

For the attention of: Stephen Watson

Contract Title: Leanamore
Date Received: 5/7/2019
Date Commenced: 5/7/2019
Date Completed: 9/8/2019

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

S Royle
(Laboratory Manager)

A Watkins
(Director)

S Eyre
(Senior Technician)

R Berriman
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Page 1 of

PERMEABILITY IN A TRIAXIAL CELL

BS 1377 : Part 6 : 1990: Clause 6

Hole Number: TP04 Top Depth (m) : 0.30

Sample Number: 1 Base Depth (m) :

Sample Type: B Lift Number:

Date Grid Reference:

Description of Specimen
Brown slightly gravelly slightly sandy CLAY with some organic material.
Remarks
Remoulded with 4.5kg rammer

Initial Specimen Conditions		
Height	mm	101.73
Diameter	mm	101.59
Area	mm ²	8105.72
Volume	cm ³	824.60
Mass	g	1456
Dry Mass	g	1066
Bulk Density	Mg/m ³	1.77
Dry Density	Mg/m ³	1.29
Moisture Content	%	37
Voids Ratio	-	1.051
Specific Gravity	Mg/m ³	2.65
(assumed/measured)	-	assumed

Final Specimen Conditions		
Moisture Content	%	31
Bulk Density	Mg/m ³	1.70
Dry Density	Mg/m ³	1.29

Test Setup		
Date Started		03/08/2019
Date Finished		07/08/2019
Top Drain Used		Y
Base Drain Used		Y
Method of Saturation		By back pressure
Direction Of Flow		Vertically Downwards
Saturation Time	Days	1
Consolidation Time	Days	2
Permeability Time	Days	1



PSL
Professional Soils Laboratory

Leanamore

Contract No.

PSL19/4108

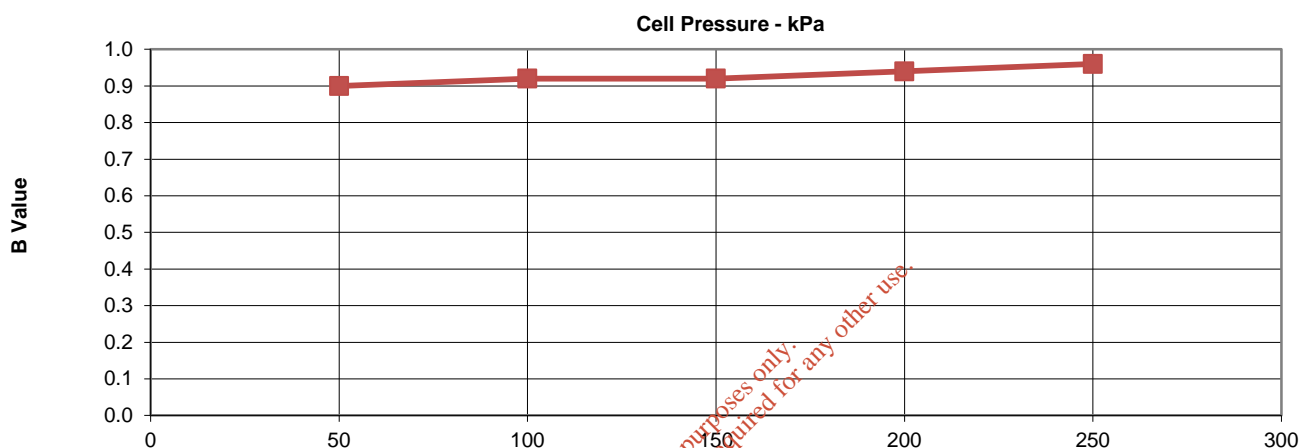
Client Ref

18-1068a

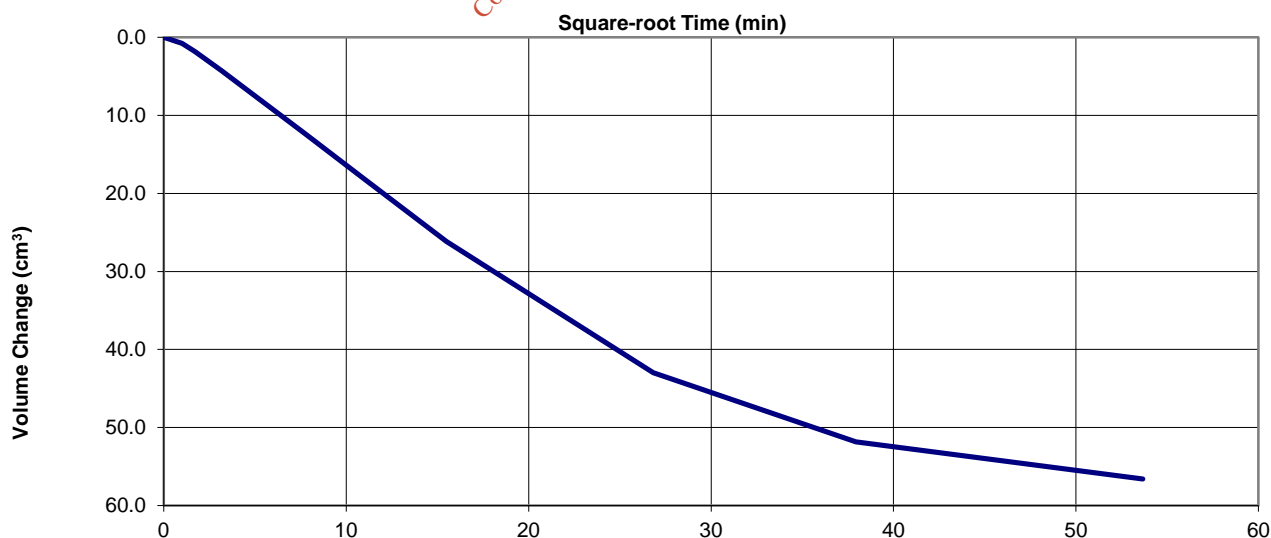
PERMEABILITY IN A TRIAXIAL CELL

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details		
Hole Number		TP04
Sample Depth	m	0.30
Sample No.		1
Grid Reference		
Lift Number		
Saturation		
Cell Pressure Incr.	kPa	50
Back Pressure Incr.	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	250
Final B Value	-	0.96



Consolidation		
Effective Pressure	kPa	100
Cell Pressure	kPa	400
Back Pressure	kPa	300
Final PWP	kPa	305
PWP dissipation	%	97



PSL
Professional Soils Laboratory

Leanamore

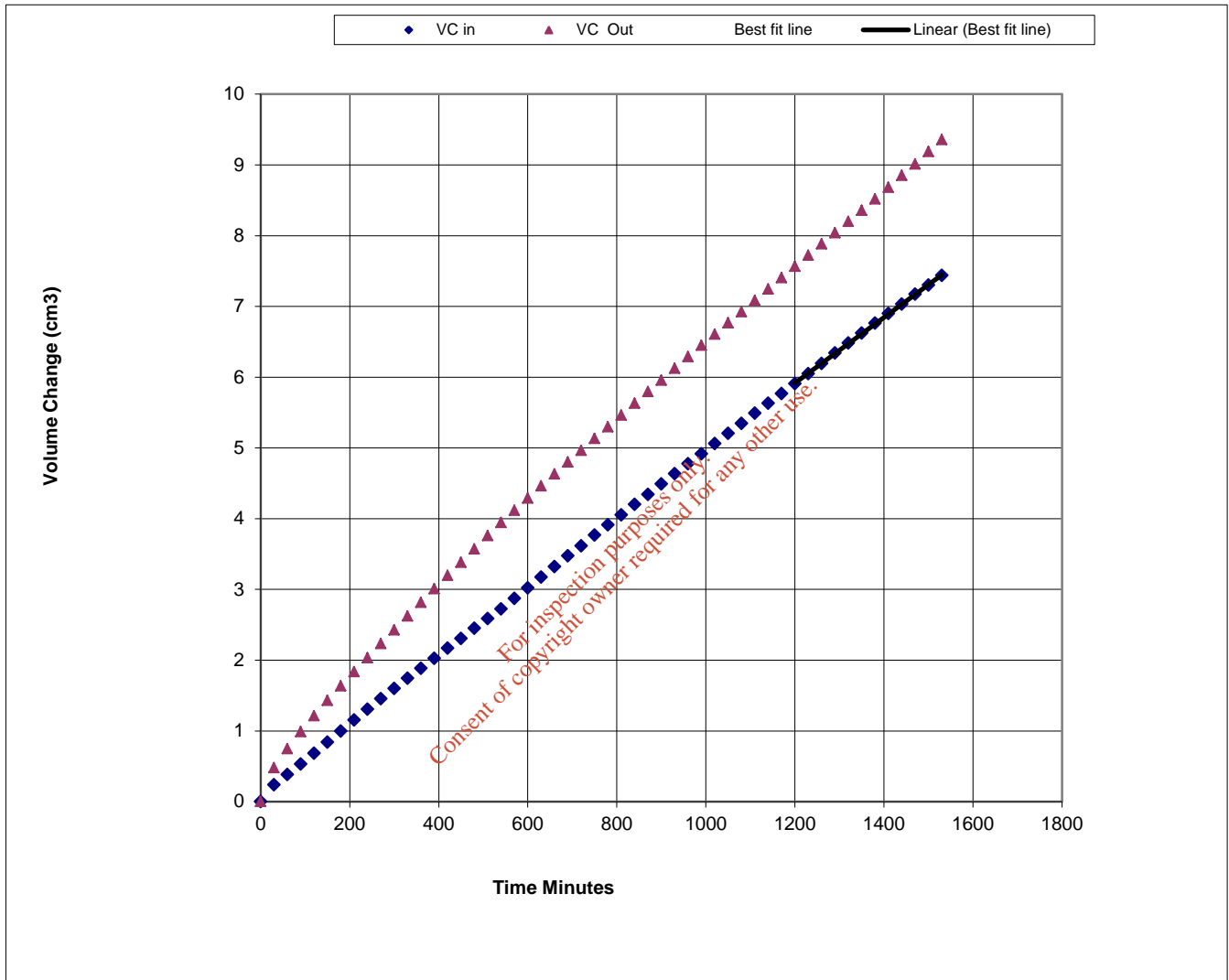
Contract No.
PSL19/4108
Client Ref
18-1068a

PERMEABILITY IN A TRIAXIAL CELL

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details		
Hole Number		TP04
Sample Depth	m	0.30
Sample No.		1
Grid Reference		
Lift Number		

Permeability Stage



Permeability Stage		
Cell Pressure	kPa	400
Mean Effective Stress	kPa	100
Back Pressure Diff.	kPa	20
Mean Rate of Flow	ml/min	0.0046
Average Temperature	'C	20
Vertical Permeability Kv	m/s	4.7E-10



Leanamore

Contract No.
PSL19/4108
Client Ref
18-1068a



CAUSEWAY
— GEOTECH

APPENDIX F

ENVIRONMENTAL LABORATORY TEST RESULTS

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2183

Final Report

Report No.: 19-19647-1

Initial Date of Issue: 09-Jul-2019

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
Matthew Gilbert
Neil Haggan
Paul Dunlop
Paul McNamara
Sean Ross
Stephen Franey
Stephen McCracken
Stephen Watson
Stuart Abraham

Project 18-1068a Leanamore

Quotation No.: Q18-13245

Date Received: 12-Jun-2019

Order No.:

Date Instructed: 03-Jul-2019

No. of Samples: 1

Turnaround (Wkdays): 5

Results Due: 09-Jul-2019

Date Approved: 09-Jul-2019

Approved By:

Details:

Robert Monk, Technical Manager

Chemtest Ltd.

Depot Road

Newmarket

CB8 0AL

Tel: 01638 606070

Email: info@chemtest.com

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Results - Single Stage WAC

Project: 18-1068a Leanamore

Chemtest Job No: 19-19647 Chemtest Sample ID: 841122 Sample Ref: Sample ID: Sample Location: TP04 Top Depth(m): 2.50 Bottom Depth(m): Sampling Date: 06-Jun-2019					Landfill Waste Acceptance Criteria Limits		
					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	1.1	3	5	6
Loss On Ignition	2610	U	%	3.9	--	--	10
Total BTEX	2760	U	mg/kg	[B] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[B] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.075	--	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	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.029	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0011	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0049	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0016	0.016	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0039	< 0.50	4	50	200
Chloride	1220	U	1.9	19	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	45	450	1000	20000	50000
Total Dissolved Solids	1020	N	260	2600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.0	80	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.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
841122			TP04	06-Jun-2019	B	Amber Glass 250ml
841122			TP04	06-Jun-2019	B	Amber Glass 60ml
841122			TP04	06-Jun-2019	B	Plastic Tub 500g

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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"

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

All soil samples will be retained for a period of 45 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