

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 4

Causeway Geotechnical Report



Galway Historic Landfills – New Inn Ground Investigation

Client: Galway County Council

Client's Representative: Feehily Timoney

Report No.: 19-1465C

Date: August 2020

Status: Final for Issue

Causeway Geotech Ltd

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Document Control Sheet

Report No.:		19-1465C							
Project Title:		Galway Historic Landfills – New Inn							
Client:		Galway County	Council						
Client's Repres	entative:	Feehily Timoney	y						
Revision:	A00	Status:	Final for Issue	Issue Date:	14 August 2020				
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Sean Ross	Ross.	Colm K	lux Of any other use.	Darren O'Mahor	luoj.				
BSc MSc MIEI		BSc FGS PGeo	uposcifed,	BSc MSc MIEI EurGeol PGeo					

The works were conducted in accordance with the British Standards Inc.

British Standards Institute (2015) BS \$30:2015, Code of practice for site investigations.

BS EN 1997-2: 2007: Eurocode CGeotechnical 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 use	ed 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.
В	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
С	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 result (HVP). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa. V: undisturbed 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 bore of elogs – a median relationship of Nx5=Cu 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.
$\overline{}$	Water strike: initial depth of strike.
•	Water strike: depth water rose to.
Abbreviations relating	g 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.



Galway Historic Landfills - New Inn

1 **AUTHORITY**

On the instructions of Feehily Timoney Consulting Engineers, ("the Client's Representative"), acting on the behalf of Galway County Council ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the remediation of an historic landfill site in Galway.

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. A discussion on the recommendations for construction is also provided.

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 explaratory 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 Geottech 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, 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 a site in New Inn, Co. Galway. The site is located 500m south west of Sarsfields GAA Club and is accessed to the north of the R348 and is bounded to the north, east and west by agricultural fields and to the south by the R348.



4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted between 29th June and 10th July 2020, comprised:

- two boreholes by rotary drilling methods
- a standpipe installation in each borehole
- eight machine dug trial pits; and
- two variable head tests

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

Two boreholes (GW01 and GW02) were put to their completion by rotary drilling techniques only. The boreholes were completed using a Hanjin D8 tracked ariting rig.

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

Appendix B presents the borehole logss condition

4.3 Standpipe installations

A groundwater monitoring standpipe was installed in all boreholes. Each borehole was also installed with waterra tubing and foot valve to allow future groundwater sampling.

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

Eight trial pits (TP01–TP08) were excavated using a 13t tracked excavator fitted with a 600mm wide bucket, to a maximum depth of 4.50m.

Environmental samples and bulk samples were taken at depths specified by the Client's Representative.





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 Falling head permeability testing

In-situ permeability tests were carried out in GW01 and GW02 by falling head permeability methods, following development of the wells. Testing was carried out in accordance with the guidance as set out in BS EN ISO 22282-2: 2012

The results are presented in Appendix E.

4.6 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 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 accordance 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.
- **shear strength** (total stress): unconsolidated undrained triaxial tests
- compaction related: Moisture Condition Value/moisture content relationship

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 F.

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.

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

Results of environmental laboratory testing are presented in Appendix G.

6 GROUND CONDITIONS

6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise fluvioglacial sands and gravels. These deposits are underlain by limestones 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:

- **Topsoil:** topsoil or reworked topsoil was encountered at all trial pit locations except TP05 with a thickness range of 50-100mm.
- Made Ground (fill): reworked sandy clayey gravel or gravelly silty sand generally encountered above landfill material in TP01-TP04 with a maximum thickness of 0.90m in TP03. Varying amounts of plastic, glass, steel wire, brick was encountered in TP01 and TP02. The strata were also encountered in TP05, GW01 and GW02 to a maximum extent of 2.80m in GW01 overlying natural ground or bedrock. It should be noted that borehole descriptions were based off driller descriptions of drilling returns.
- Made Ground (landfill): encountered in TP01 to TP04 to a maximum depth of 4.50m in TP02, although the full extent was not bottomed out due to the maximum reach of the excavator. Material encountered comprised varying amounts of plywood, plastic bags, aluminium, plastic pipes, timer, polystyrene, glass bottles, paper, clothing, tin, brick, tyres, steel wire, bicycle frames, rope, steel drums and cardboard, food packaging and nappies in a black clayey sand matrix.
- **Fluvioglacial sands and gravels:** gravelly silty sand or sandy silty gravel with lenses of sandy gravelly clay/silt encountered beneath landfill material in TP01 and TP03 and in TP05-TP08 to



depths of 4.00m in TP03 likely overlying bedrock, although not proven due to instability of the trial pits or maximum extent of the excavator.

• **Bedrock (limestone)**: Bedrock was encountered at depths of 1.00m in GW02 to 2.80m in GW01.

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

Table 1: Groundwater strikes encountered during the ground investigation

GI Location	Water Level (mbgl)	Comments
GW01	6.00	
TP02	0.60	Slow seepage
TP03	3.40	Slow seepagenet
TP05	1.80	Rapid inflow
TP06	2.20	Steady seepage, rose to 2.10m after 20 mins
TP07	2.30	ourgarite
TP08	1.80	Strong inflow

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

Seasonal variation in groundwater levels should also be factored into design considerations and continued monitoring of the two installed standpipes will give an indication of the seasonal variation.

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

BS 5930: 2015: 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, dentification and classification of rock. Identification and description.

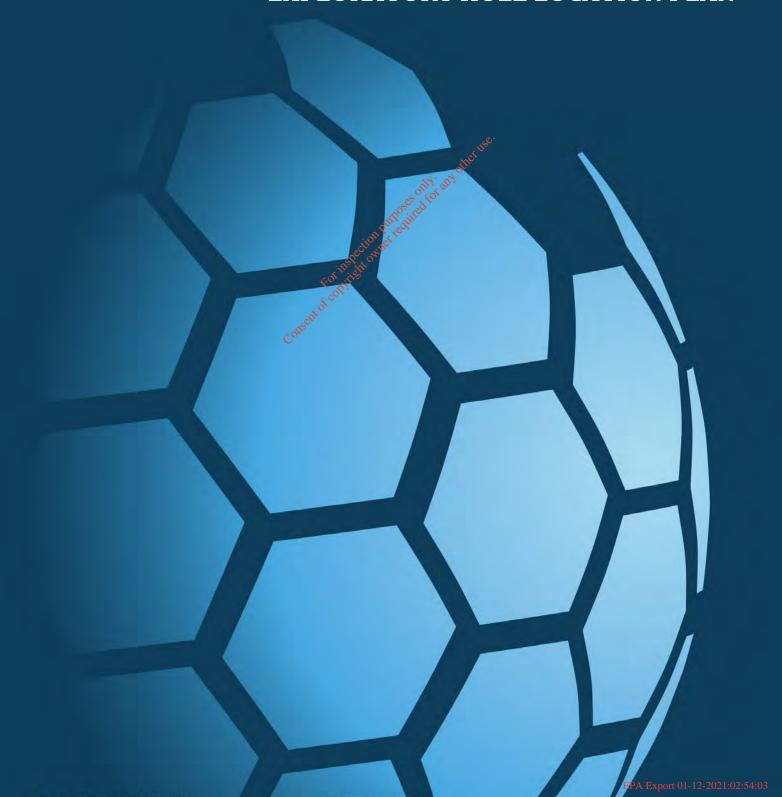
BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.

BS EN ISO 22282-2: 2012: Geotechnical investigation and testing. Geohydraulic testing – Part 2: Water

permeability tests in a borehole using open systems.



APPENDIX A EXPLORATORY HOLE LOCATION PLAN





Project No.: 19-1465C

Client: Galway County Council

Project Name:

Galway Historical Landfills - New Inn

Client's Representative:

Feehily Timoney

Legend Key



Title:

Site Location Plan

Last Revised: 13/08/2020

Scale:

1:10000



Project No.: 19-1465C

Client: Galway County Council

Project Name:

Galway Historical Landfills - New Inn

Client's Representative:

Feehily Timoney

Legend Key

O Locations By Type - RO

Locations By Type - TP



Title:

Exploratory Hole Location Plan

Last Revised: Scale: 13/08/2020 1:2500



APPENDIX B BOREHOLE LOGS



	C	CAUSEN	AY ECH		Project No. Project Name: Galway Historical Landfills - New Inn 19-1465C Client: Galway County Council Client's Rep: Feehily Timoney		19-1465C		Borehole I GW01
Metho		Plant Used		Base (m)	Coord	linates	Final Depth: 8.50 m Start Date: 29/06/2020 Drill	Sheet 1 of 2	
otary Dri	lling	Comacchio 405	0.00	8.50		0.92 E 8.98 N		Scale: 1:40 Ser: CH FINAL	
Depth (m)	Sample / Tests	Field Records		Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	हें इस अ	
		Water strike at 6.00m			78.42 76.42 73.12	2.60	MADE GROUND: Brownish grey gravelly clayey SAND (Didescription) MADE GROUND: Grey sandy GRAVEL with high cobble a content and black plastic bags (Driller's description) Grey sandy GRAVEL with cobbles and boulders (Driller's description) Grey sandy GRAVEL with cobbles and boulders (Driller's description) Grey weathered LIMESTONE (Driller's description)	nd boulder	
		Strikes	Remai	ks					
k at (m) Cas	6.00	Water Added From (m) To (m)							
	am (mm)								
	ani (iiiii)	, , ,		Barrel	Flush	Tuna	Termination Reason Last	Updated	

	CAUSEV	VAY			ct No. 465C	Project Name: Galway Historical Landfills - New Inn Client: Galway County Council	Borehole ID GW01
			Paca (m)	Coore	linatos	Client's Rep: Feehily Timoney	Ch+ 2 - f 2
Method Rotary Drilling	Plant Used Comacchio 405	Top (m) E	8.50	Coord	linates	Final Depth: 8.50 m Start Date: 29/06/2020 Driller: TA	Sheet 2 of 2 Scale: 1:40
					0.92 E		
				72713	8.98 N	Elevation: 79.02 mOD End Date: 29/07/2020 Logger: CH	FINAL
Depth Samp		is l	Casing Water Depth Depth	Level	Depth	Legend Description	ਬ Backfill
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				71.42	- - 7.60		7.5
					-	Grey LIMESTONE (Driller's description)	
					-		8.0
					-		
					-		
				70.52	- 8.50 -	End of Borehole at 8.50m	8.5 —
					-		
					-		9.0 —
					-		
							9.5
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					-	ation that goes outh any other use.	
					-	ي.	10.0 —
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Struck at (m) Casing to 6.00 6.00 Casing Details			s				
		Core	Barrel	Flush	Type 1	Termination Reason Last Updated	
						Ferminated at scheduled depth. 13/08/2020	\\AGS

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Second S					Coord	linates	Final Donth: 10.00 m Start Date: 20/06/2020 Driller: T	Sheet 1 of 2
Water Strikes Water Strikes Water Added W	otary Drilling	Comacchio 405	0.00	10.00				Scale: 1:40
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at (m) Casing to (m) Time (min) Rose to (m) No groundwater encountered. asing Details Water Added (m) Diam (mm) From (m) To (m) Core Barrel Flush Type Termination Reason					75.12	0.40	and plastic (Driller's description) MADE GROUND: Grey sandy GRAVEL with cobbles and fragment plastic (Driller's description) Grey sandy GRAVEL with high cobble content (Driller's description)	ats of
at (m) Casing to (m) Time (min) Rose to (m) No groundwater encountered. asing Details Water Added (m) Diam (mm) From (m) To (m) Core Barrel Flush Type Termination Reason	Wate	er Strikes	Remar	rks			1	1 1
Core Rarrel Flush Type Termination Reason Last Undated	ck at (m) Casing to (r	n) Time (min) Rose to	(m) No grou	 undwater e	ncountere	ed.		
Core Barrel Hush Type Termination Reason Last Updated	Casing Details	n) From (m) To (m)					
Terminated at scheduled depth. 13/08/2020		n) From (m) To (m						

CAUSEWAY ——GEOTECH							Project		Project Client: Client's	•	County Cou		v Inn	В	orehole I
Metho		Plant Used		Top (m)			Coordi	nates	Final Da	nth. 10.00 m	Start Date:	20/06/2020	Drillers TA	S	Sheet 2 of
otary Dr	illing	Comacchio 4	105	0.00	10.0	0	566234	4.14 E	Final De	ptn: 10.00 m	Start Date:	30/06/2020	Driller: TA		Scale: 1:40
							727271		Elevatio	n: 78.32 mOD	End Date:	30/07/2020	Logger: CH		FINAL
Depth (m)	Sample / Tests	Field Ro	ecords		Casing V Depth D (m)	Vater epth (m)	Level mOD	Depth (m)	Legend	Grey LIMESTONE (D		cription		Water	Backfill
k at (m) Ca	Water asing to (m)	Strikes Time (min) Ros	se to (m	Remar) No grou	ks		Çonise.		ida pila pila pila pila pila pila pila pil	ases only any other equired for any other eq					
Casing D		Water Add		1											
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				Core	Barre	1	Flush T	уре	Terminati	on Reason			Last Updated		AG
1		1		1		- 1				at scheduled depth.			13/08/2020		• /\ / *



APPENDIX C TRIAL PIT LOGS



0-0			Proie	ect No.	Projec	t Name:		1	rial Pit ID
	CALIC	EVAVAV		1465C	1	/ Historical Landfills - New Inn			
CAUSEWAY ——GEOTECH		Coore	dinates	Client:	TP01				
	G	LOTECTI	56610	97.27 E		County Council			
/lethod:				15.83 N		s Representative:		S	heet 1 of 1
rial Pitting						Timoney		5	Scale: 1:25
lant:	a ant: 3t Tracked Excavator			vation) mOD	Date:	2000	Logger: JG		FINAL
Depth Depth	Sample /		Level	Depth	06/07/		J.G	-	<u> </u>
(m)	Tests	Field Records	(mOD)	(m)	Legend	•		Water	
1.00	ES ES1		79.45	0.05		Reworked TOPSOIL MADE GROUND: Light grey and greyish brown grave SAND with low cobble content and fragments of plusine. Gravel is subangular to subrounded fine to collithologies. Cobbles are subrounded of mixed lithologies. Cobbles are subrounded of mixed lithologies. Cobbles are subrounded of mixed lithologies. Sand with low cobble content with fragments of paluminum, plastic pipes, timber, polystyrene, glass and brick. Gravel is subangular to subrounded fine lithologies. Cobbles are subrounded of mixed lithologies. Cobbles are subrounded of mixed lithologies. Apply and the subrounded of mixed lithologies.	astic, glass, and steel barse of mixed logies. ly silty fine to coarse lywood, plastic bags, bottles, clothing, tin to coarse of mixed		1.0
			76.90 76.10	2.60 co	MXXXXXX	Light grey slightly gravelly silty fine to coarse SAND boulder content. Gravel is subangular to subround mixed lithologies. Cobbles and boulders are subroulithologies.	ed fine to coarse of		3.0
									4.0
				- -					
	r Strikes	Depth: 3.40	Rema		odour f	rom 0.60 to 2.60m.			
Struck at (m)	Remarks	Width: 1.20		oundwate					
		Length: 3.20							
		Stability:	Te	ination Re	2000		lact lladeted		
			ierm	mation Ke	:สรบท:		Last Updated		AG:
		Unstable	Termi	inated due	e to insta	bility.	13/08/2020		NAG

		Project No.		Projec	t Name:	Trial Pit ID			
CAUSEWAY		19-1465C		Galway		TP02			
H)	CAU	GEOTECH	Coord	Coordinates		Client:			
		5662	566220.10 E		/ County Council				
Method:				45.96 N		s Representative:		heet 1 of 1	
Frial Pitting Plant:			Flox	ation	Date:	Timoney		Scale: 1:25	
riant: L3t Tracked E	xcavator			mOD	06/07/	Logger: 2020 JG		FINAL	
Depth	Sample /	Field December	Level	Depth			re.		
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description Reworked TOPSOIL	Water	_	
0.10 - 0.30	B1		87.34	0.10		MADE GROUND: Light grey very gravelly silty fine to coarse SAND with	_		
0.30 - 0.60	B2					low cobble content and fragments of glass, plastic, and brick fragments. Gravel is subangular to subrounded fine to coarse of mixed lithologies.			
7.30 - 0.00	BZ					Cobbles are subrounded of mixed lithologies.			
				: -				0.5	
		Slow seepage at 0.60m	86.84	0.60		MADE GROUND: Dark grey and grey gravelly silty fine to coarse SAND	_		
				: -		with fragments of plastic bags, glass bottles, clothing, tyres, steel wire, plastic pipes, bicycle, rope, timber, steel drum, and cardboard. Gravel is			
				- -		subangular to subrounded fine to coarse of mixed lithologies.			
				- -				1.0 -	
				• •					
				- -					
				-				1.5	
				• •					
						at lise.			
				· ·		but tedited for any other use.			
				-		ORLY ARTY		2.0	
						Se Stor			
						Duff Edit			
				· -		Res.			
					48XXXXXX			2.5	
				For					
				. of co					
				sent of co					
			Co	* -				3.0	
				• •					
								3.5	
				- - -					
				- -				4.0 -	
				: -					
				• •					
			82.94	4.50		End of trial pit at 4.50m	4	4.5	
						End of that pit at 4.30fff			
				: - -					
				-	-		\perp		
Wate	er Strikes	B 150	Rema	rks:	1	<u> </u>			
Struck at (m)	Remark		Stron	g pungent	odour fr	om 0.60 to 4.50m.			
0.60	Slow seepa 0.60m	ige at							
	0.00111	Stability:	Torm	ination Re	ason.	Last Updated			
							7/	AGS	
		Slightly Unstable	Iermi	nated at s	chedule	d depth 13/08/2020			

				Proi	ect No.	Projec	Trial Pit ID				
CAUSEWAY ——GEOTECH		MANAY	19-1465C Coordinates		Galway Historical Landfills - New Inn Client: Galway County Council						
		VVAI							TP03		
/lethod:					77.11 E 55.13 N		s Representative:		S	heet 1 of 1	
rial Pitting							Timoney		Scale: 1:		
lant:					<i>r</i> ation	Date:		Logger:		FINAL	
3t Tracked Ex	1	_			l mOD	06/07/	2020	JG	_	TINAL	
Depth (m)	Sample / Tests		Field Records	Level (mOD)	Depth (m)	Legend	·		Water		
				78.49	0.05		Reworked TOPSOIL MADE GROUND: Light greyish brown and brown very	gravelly silty fine to			
							coarse SAND. Gravel is subangular to subrounded fine				
				78.24	0.30		lithologies. MADE GROUND: Light grey very sandy subangular to	subrounded fine to			
					-		coarse GRAVEL of mixed lithologies with high cobble of to coarse. Cobbles are subrounded of mixed lithologies		:	0.5	
							to course, cossics are sustrained or times introduced			0.5	
					-						
					-						
				77.64	0.90		MADE GROUND: Black gravelly clayey fine to coarse S.	AND with	-		
					-		fragments of plastic bags, timber, glass, food waste, st cardboard, plastic pipes, aluminum cans, and nails. Gr			1.0	
							to subrounded fine to coarse of mixed lithologies.	lavei is subaligulai			
					-						
					-						
										1.5	
					-						
					-		nse.				
							butloses outh, sund outer ties.				
					-		24. 24°			2.0	
					-		es often a				
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					-		Ret.			2.5	
										2.3	
					For						
					. of co						
					isent of co						
				ර	-					3.0	
					-						
		Seepa	age at 3.40m	75.14	3.40		Light grey gravelly silty fine to coarse SAND with low o	cobble content and			
						× × ×	lenses of soft light grey and grey SILT. Gravel is subang	gular to subrounded		3.5	
					-	× × ×	fine to coarse of mixed lithologies. Cobbles are subroulithologies.	unded of mixed			
					-	× × ×					
						* × × ×					
				74.54	- - 4.00	× × ×	End of trial pit at 4.00m		4	4.0	
							End of that pit at 4.00III				
					-						
					-					4.5	
					-						
					-						
					-						
	a:	Ι,		D	arke:						
	er Strikes Remark	/c	Depth: 4.00	Rema Stron		odour fr	rom 0.90 to 3.40m.				
Struck at (m) 3.40	Seepage		Width: 1.20	25.011	J 1 100111	11					
-	3.40m		Length: 3.20								
		+	Stability:	Term	ination Re	ason:		Last Updated			
			Unstable	Termi	inated due	e to instal	bility.	13/08/2020		\AG	
					Terminated due to instability. 13/08/2020						

		Proie	ect No.	Projec	Trial Pit ID					
CAUSEWAY ——GEOTECH		19-1465C		Galway Historical Landfills - New Inn				mar icib		
			Coordinates		Client:					
					County Council					
lethod:				79.70 E 80.23 N		s Representative:		SI	heet 1 of 1	
rial Pitting						Timoney		Scale: 1:2		
lant:	veavata.			vation	Date:	2020	Logger:		FINAL	
3t Tracked Ex	scavator Sample /		/8.24	mOD Depth	06/07/		JG	in in	·	
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description		Water		
			78.19	0.05		Reworked TOPSOIL MADE GROUND: Light grey fine to coarse SAND wit	h underlying	1		
			78.04	0.20		geotextile membrane. MADE GROUND: Black clayey fine to coarse SAND w	vith fragments of	-		
						plastic, timber, glass, oil drums, polystyrene, clothir steel wire, plastic cables, nappies, cardboard and pa	ng, aluminum cans,			
				-		subangular to subrounded fine to coarse of mixed li			0.5	
				-						
00	ES			<u>-</u>					1.0	
00	ES1									
				-						
				-					1.5	
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				-		114. 814 ₀			2.0	
				-		Purposes only any other use.				
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			رخ	sent of co					3.0	
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				-						
				-					3.5	
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				-						
				-					4.0	
			74.04	- - 4.20						
			74.04	- 7.20		End of trial pit at 4.20m				
				-					4.5	
				-						
				-						
				arke:				\pm		
Wate Struck at (m)	er Strikes Remarks	Depth: 4.20	Rema Stron		t odour fr	om 0.20 to 4.20m.				
den de (III)	il iliaiks	Width: 1.30		oundwate						
		Length: 3.40								
		Stability:	Term	ination Re	eason:		Last Updated		AG	
		Unstable	Termi	inated due	e to insta	bility.	13/08/2020		\AG	

		Proie	Project No.		t Name:		Trial Pit ID			
CAUSEWAY GEOTECH					Galway Historical Landfills - New Inn Client:					
		Coor								
		5663	33.27 E		Galway County Council					
Method:				13.91 N		s Representative:		Sheet 1 of 1		
rial Pitting						Timoney		Scale: 1:25		
Plant: .3t Tracked Ex	(cavator			ration . mOD	Date: 06/07/	2020	Logger: JG		FINAL	
Depth	Sample /	Field Records	Level	Depth],0	ře		
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description		Water		
		Rapid water strike at 1.80m	73.31	1.50		Orangish brown and brown sandy silty subangular coarse GRAVEL of mixed lithologies with low cobbles and is fine to coarse. Cobbles and boulders are sulithologies. End of trial pit at 2.10m	to subrounded fine to e and boulder content.	Y	1.0 · 1.5 · 2.0 · 3.5 · 3.5 · 4.0 ·	
				- -						
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				- -					4.5	
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Wate	r Strikes	Depth: 2.10	Rema		1	ı			ı	
Struck at (m)	Remark	S 1 20	Stron	g pungent	odour fr	om 1.50 to 2.10m.				
1.80	Rapid war	lei ei								
	Suike at 1.						· · · · · · · · · · · · · · · · · · ·			
		Stability:		ination Re			Last Updated		AG	
		Unstable	Termi	inated due	e to insta	bility and water inflow.	13/08/2020	17	MA	

4.3			Proie	ect No.	Projec	Trial Pit ID					
CAUSEWAY GEOTECH		CEVA/AV	19-1465C Coordinates		Galway Historical Landfills - New Inn Client:				TP06		
		GEOTECH									
		56639	32.79 E	1	County Council						
/lethod:				39.38 N		s Representative:			neet 1 of 1		
rial Pitting						Timoney		Scale: 1:2!			
Plant: .3t Tracked Ex	rcavator		İ	wation mOD	Date: 06/07/		.ogger: G		FINAL		
Depth	Sample /	Field Records	Level	Depth	Legend	Description		Water			
(m)	Tests	Tield Records	(mOD)	(m)	Zegend	MADE GROUND: Light grey very sandy subangular to su	brounded fine to	Š	_		
			73.91	0.10		coarse GRAVEL of mixed lithologies. Sand is fine to coars MADE GROUND: Greyish green and brown sandy suban subrounded fine to coarse GRAVEL of mixed lithologies and boulder content. Sand is fine to coarse. Cobbles and subrounded of mixed lithologies.	se. gular to with high cobble d boulders are	-	0.5		
			73.31	1.80		Coarse GRAVEL of mixed lithologies with high cobble co to coarse. Cobbles are subrounded of mixed lithologies. Light grey and grey sandy clayey subangular to subroun GRAVEL of mixed lithologies with high cobble and bould is fine to coarse. Cobbles and boulders are subrounded lithologies. End of trial pit at 2.20m	ntent. Sand is fine		1.5		
				: - -	a ×	lithologies to the second secon		_			
		Steady flow at 2.20m	72.91	2.20	*1,0,0,00	End of trial pit at 2.20m					
					io	-5					
				: -	spect of				2.5		
				COL	tight						
				For	d.						
			-	entoi							
			رم	sent of co					3.0		
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									3.5		
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	C+!!		Rema	rks.							
Wate Struck at (m)	r Strikes Remarks	Depth: 2.20			t odour fr	om 1.20 to 2.20m.					
2.20	Steady flov	14/2-Jalle 1 20		-							
	2.20m										
		Stability:	Termi	ination Re	eason:	L	ast Updated				
		Unstable	L .	nated due		also.	13/08/2020		AG:		

		Proie	Project No.		Project Name:					
CAUSEWAY GEOTECH			19-1465C Coordinates		Historical Landfills - New Inn		Trial Pit			
		Coor			Client: Galway County Council					
1ethod:				28.37 E 83.80 N		Representative:			heet 1 of 1	
rial Pitting						Timoney	I-	Scale: 1:2		
lant: 3t Tracked Ex	cavator		i	wation mOD	Date: 06/07/	2020	Logger: JG		FINAL	
Depth Depth	Sample /	Field Records	Level	Depth	Legend	Description	10	Water		
(m)	Tests	Field Records	(mOD)	(m)	Legend	TOPSOIL		Wa		
			73.71	0.10		MADE GROUND: Grey and reddish brown slightly s coarse GRAVEL of mixed lithologies. Sand is fine to				
		Water strike at 2.30m	71.51	2.30		Light grey very gravelly silty fine to coarse SAND w boulder content with lenses of orangish brown cla to subrounded fine to coarse of mixed lithologies. are subrounded of mixed lithologies. are subrounded of mixed lithologies. Werk stiff slight grey slightly sandy slightly gravelly cobble and boulder content. Sand is fine to coarse to subrounded fine to coarse of mixed lithologies. are subrounded of mixed lithologies.	y, Gravel is subangular Cobbles and boulders silty CLAY with low Gravel is subangular	•	1.0	
			70.71	sent cod		End of trial pit at 3.10m			3.0	
				: : : -					4.0	
				.						
				• •						
				-					4.	
				• •						
				- -						
18/-4	n Christa		Rema	ırks.						
wate truck at (m)	r Strikes Remarks	Depth: 3.10	nema	NJ.						
2.30	Water strike	14/2-Jale 1 20								
	2.30m	Length: 2.80								
		Stability:	Term	ination Re	eason:		Last Updated			
	1		1.0						AG	

			Project No.		Project Name:				Trial Pit ID		
CAUSEWAY GEOTECH				1465C	1	Historical Landfills - New Inn					
$H \rightarrow H$	CAUS	GEOTECH	Coor	dinates	Client:		TP08				
	`	32012011	5664	68.48 E	Galway						
Method:				35.79 N	Client's	Sł	neet 1 of 1				
Trial Pitting						Timoney		S	icale: 1:25		
Plant:				vation	Date:	202	Logger:		FINAL		
13t Tracked Excavator				73.47 mOD		2020	JG	_			
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description		Water			
			73.36	0.10		TOPSOIL					
			75.50	- 0.20	0 × 0	Light grey very gravelly silty fine to coarse SAND wit boulder content. Gravel is subangular to subrounde			_		
					0 × 70°	mixed lithologies. Cobbles and boulders are subrour			_		
				-	0×0	lithologies.			_		
				-	0×0				0.5		
					0×.0,						
				-	0.00						
				-	0×0				_		
					0,0				1.0		
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				-	0.0				_		
				-	0.0				_		
					0.0				1.5 —		
				-	0.0				_		
				-	λ. Δ Δ Δ	End of trial pit at 2.00m			-		
		Strong inflow at 1.80m			0.0°	et lise		•	_		
				-	× 0.×	othe			_		
			71.46	- 2.00 -	90-50°	End of trial pit at 2.00m			2.0		
						Ses of O					
				-		Durgarite			_		
				-	dior	No.			_		
					Sper of				2.5 —		
				COL	tight				_		
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			~ć	sent of					3.0		
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14/_4	Ctribes		Rema	arks:			·				
Water Struck at (m)	Remarks	Depth: 2.00	Neme	u: NJ:							
1.80	Strong inflo										
	1.80m										
		Stability:	Term	ination Re	ason:		Last Updated	-			
		Unstable	Term	inated due	to instal	oility and high groundwater inflow.	13/08/2020		AGS		



APPENDIX D TRIAL PIT PHOTOGRAPHS





TP01





TP01





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