



**CAUSEWAY**  
— GEOTECH

**APPENDIX D**  
**TRIAL PIT PHOTOGRAPHS**





TP01





TP01



TP01





TP01





TP01





TP01



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TP02





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TP05





**CAUSEWAY**  
— GEOTECH

**APPENDIX E**

**GEOTECHNICAL LABORATORY TEST RESULTS**







**SOIL AND ROCK SAMPLE ANALYSIS  
LABORATORY TEST REPORT**

13 August 2020

<b>Project Name:</b>	Galway Historic Landfills - Tuam
<b>Project No.:</b>	19-1465A
<b>Client:</b>	Galway County Council
<b>Engineer:</b>	Feehily Timoney

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





**Project Name:** Galway Historic Landfills - Tuam

**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	2
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	2
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	2
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	2
SOIL	Moisture Condition Value / Moisture Content Relationship	BS 1377-4: 1990: Cl 5.5	2
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	2




## Summary of Classification Test Results

Project No. 19-1465A	Project Name Galway Historic Landfills - Tuam
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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							
TP01	1	0.10		B	Brown sandy gravelly clayey SILT.			28.0	78	47 -1pt	40	7		MI
TP02	1	0.00		B	Brown sandy gravelly clayey SILT.			26.0	71	47 -1pt	41	6		MI

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>  13/08/2020	<b>Approved By</b>  Stephen.Watson	
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## PARTICLE SIZE DISTRIBUTION

Job Ref **19-1465A**

Borehole/Pit No. **TP01**

Site Name **Galway Historic Landfills - Tuam**

Sample No. **1**

Soil Description **Brown sandy slightly gravelly clayey SILT.**

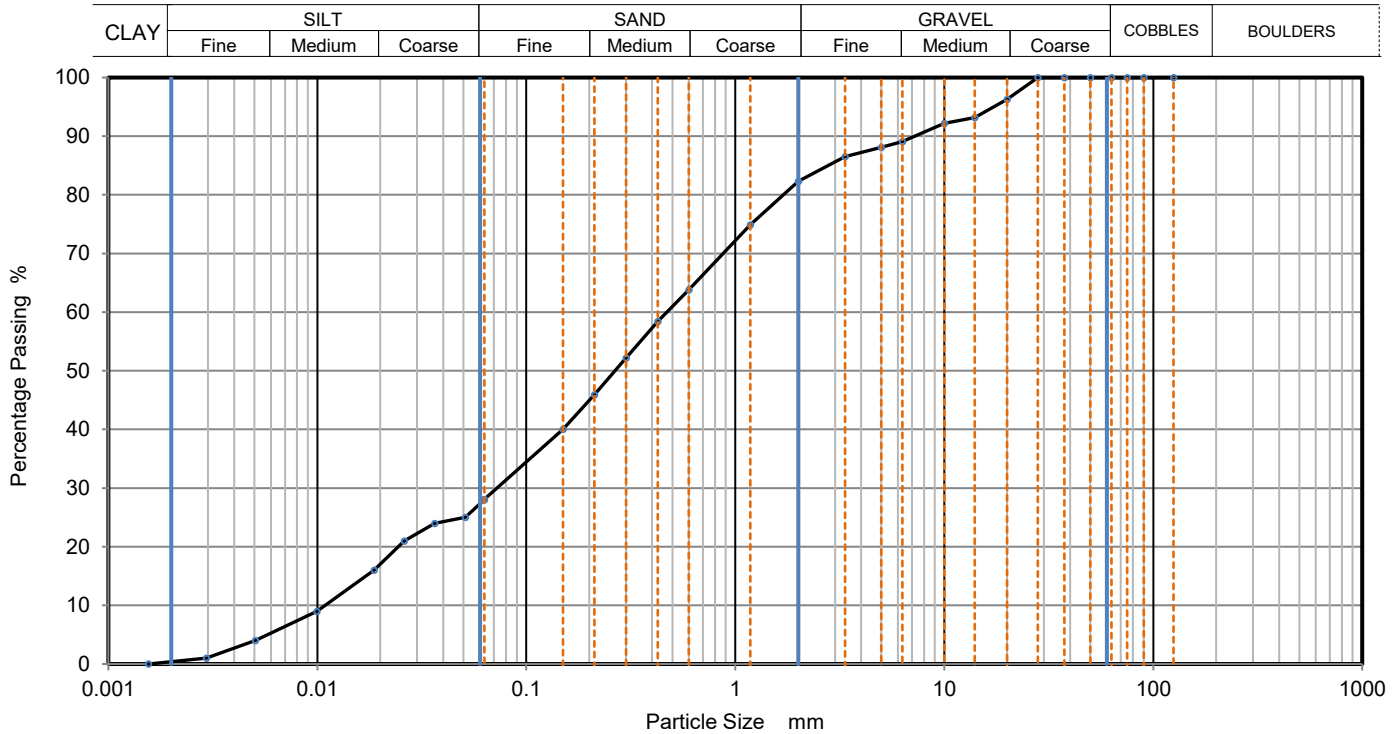
Depth, m **0.10**

Specimen Reference **8** Specimen Depth **0.1** m

Sample Type **B**

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

KeyLAB ID **Caus2020071695**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	28
90	100	0.05114	25
75	100	0.03638	24
63	100	0.02603	21
50	100	0.01872	16
37.5	100	0.00994	9
28	100	0.00505	4
20	96	0.00294	1
14	93	0.00156	0
10	92		
6.3	89		
5	88		
3.35	87		
2	82		
1.18	75		
0.6	64		
0.425	58	Particle density (assumed)	
0.3	52	2.65 Mg/m3	
0.212	46		
0.15	40		
0.063	28		

Dry Mass of sample, g **2130**

Sample Proportions	% dry mass
Cobbles	0
Gravel	18
Sand	54
Silt	28
Clay	1

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	43
Curvature Coefficient	1

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



Approved

Stephen.Watson



# PARTICLE SIZE DISTRIBUTION

Job Ref **19-1465A**

Borehole/Pit No. **TP02**

Site Name **Galway Historic Landfills - Tuam**

Sample No. **1**

Soil Description **Brown sandy slightly gravelly clayey SILT.**

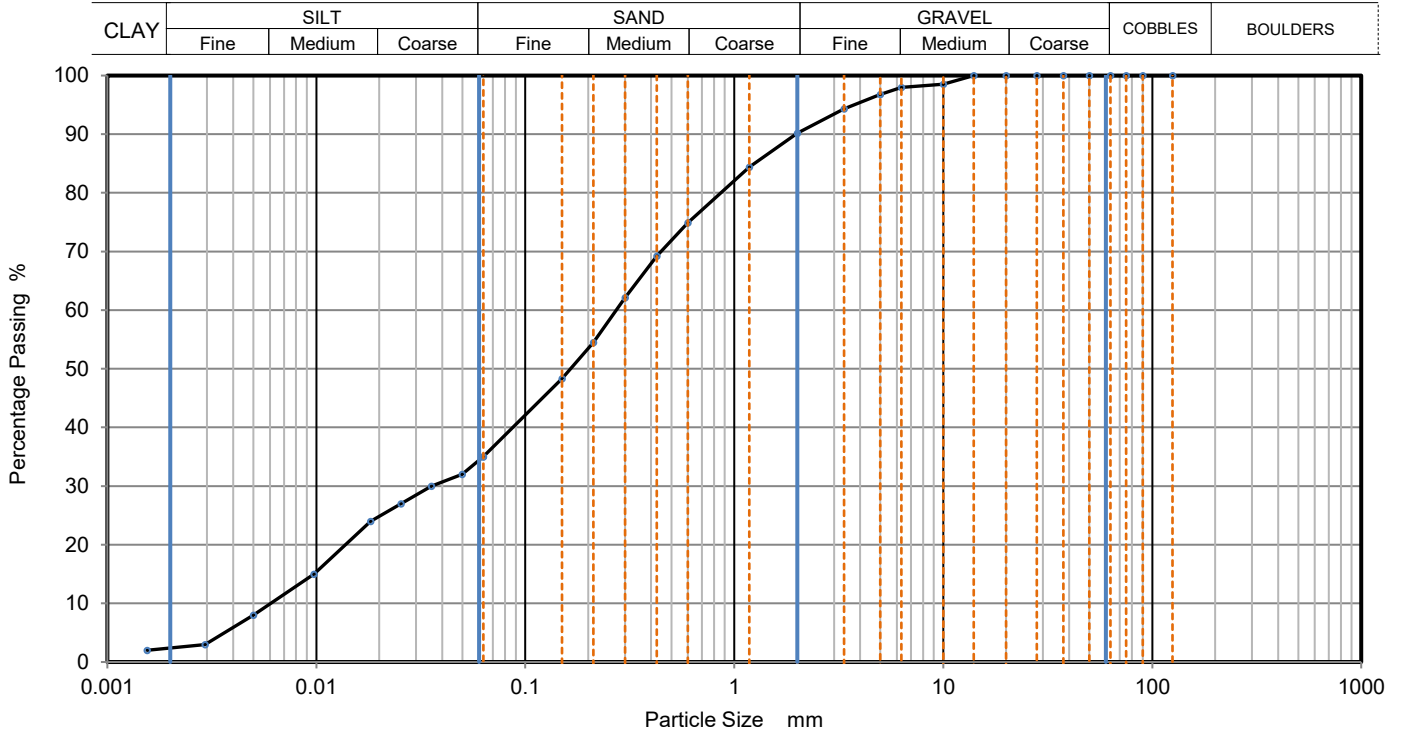
Depth, m **0.00**

Specimen Reference **8** Specimen Depth **0** m

Sample Type **B**

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

KeyLAB ID **Caus2020071696**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	35
90	100	0.04990	32
75	100	0.03551	30
63	100	0.02542	27
50	100	0.01819	24
37.5	100	0.00972	15
28	100	0.00499	8
20	100	0.00293	3
14	100	0.00155	2
10	99		
6.3	98		
5	97		
3.35	94		
2	90		
1.18	84		
0.6	75		
0.425	69	Particle density (assumed)	
0.3	62	2.65	Mg/m3
0.212	55		
0.15	48		
0.063	35		

Dry Mass of sample, g **232**

Sample Proportions	% dry mass
Cobbles	0
Gravel	10
Sand	55
Silt	33
Clay	2

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	44
Curvature Coefficient	0.68

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

Approved  
  
Stephen.Watson









### Moisture Condition Value / Moisture Content Relationship

Job Ref	19-1465A
Borehole/Pit No.	TP02
Sample No.	1
Depth	0
Sample Type	B
KeyLAB ID	Caus2020071696
Date started	01/08/2020

Site Name	Galway Historic Landfills - Tuam	
Soil Description	Brown sandy slightly gravelly clayey SILT.	
Specimen Reference	9	Specimen Depth m
Specimen Description	Brown sandy slightly gravelly clayey SILT.	
Test Method	BS1377:Part4:1990:clause 5.5	

**Sample preparation**

Amount of material larger than 20mm sieve removed                      5                      %

Natural Moisture Content of sample    25.3                      %

Initial Moisture Content of test sample below 20mm                      26.9                      %

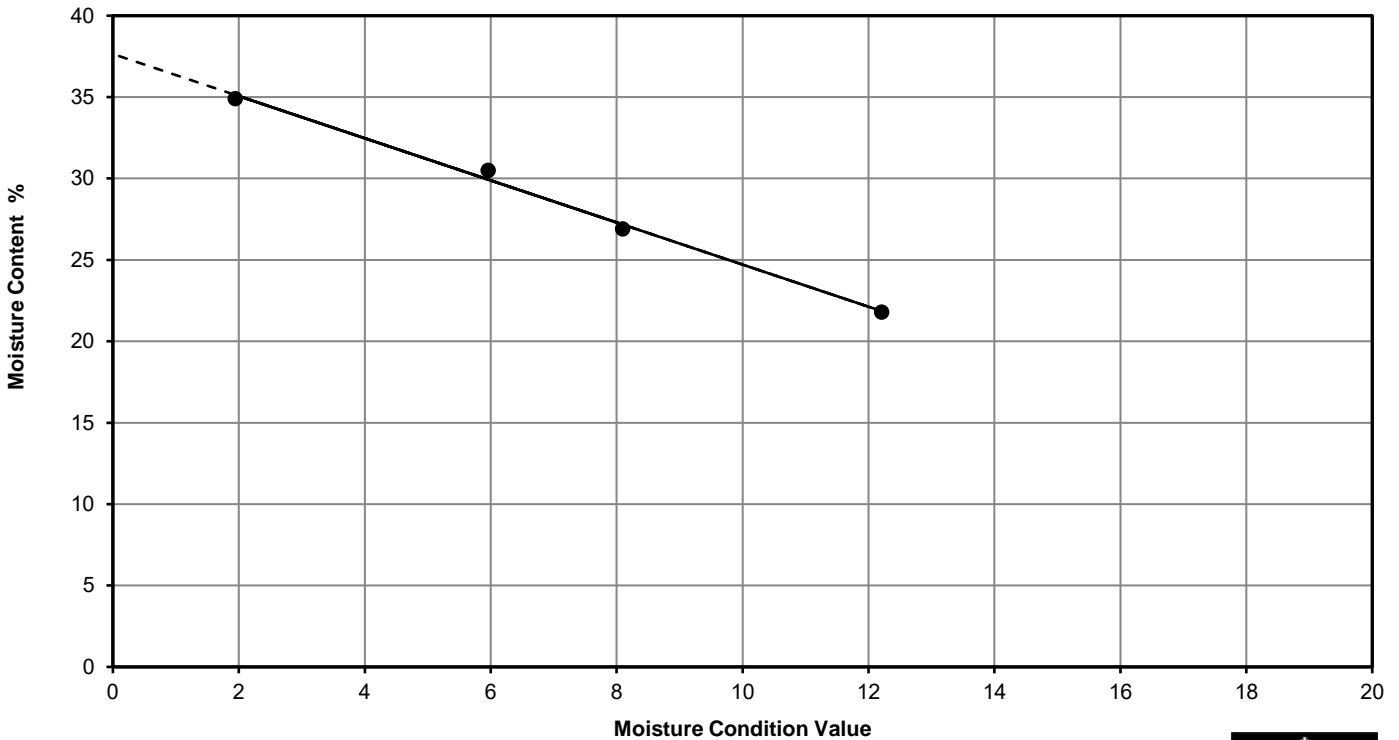
Separate specimens tested

#### General remarks

#### Table of results

MCV Test Number	1	2	3	4	
Moisture Content, %	26.9	30.5	34.9	21.8	
Moisture Condition Value	8.1	6.0	1.9	12.2	
MCV report	8.1	6	1.9	12.2	
Effective / Valid data point	YES	YES	YES	YES	
Specimen remarks					

● valid points      × invalid points      - - - - extended regression      — linear regression



Approved

Stephen.Watson

LAB 11R Version 4







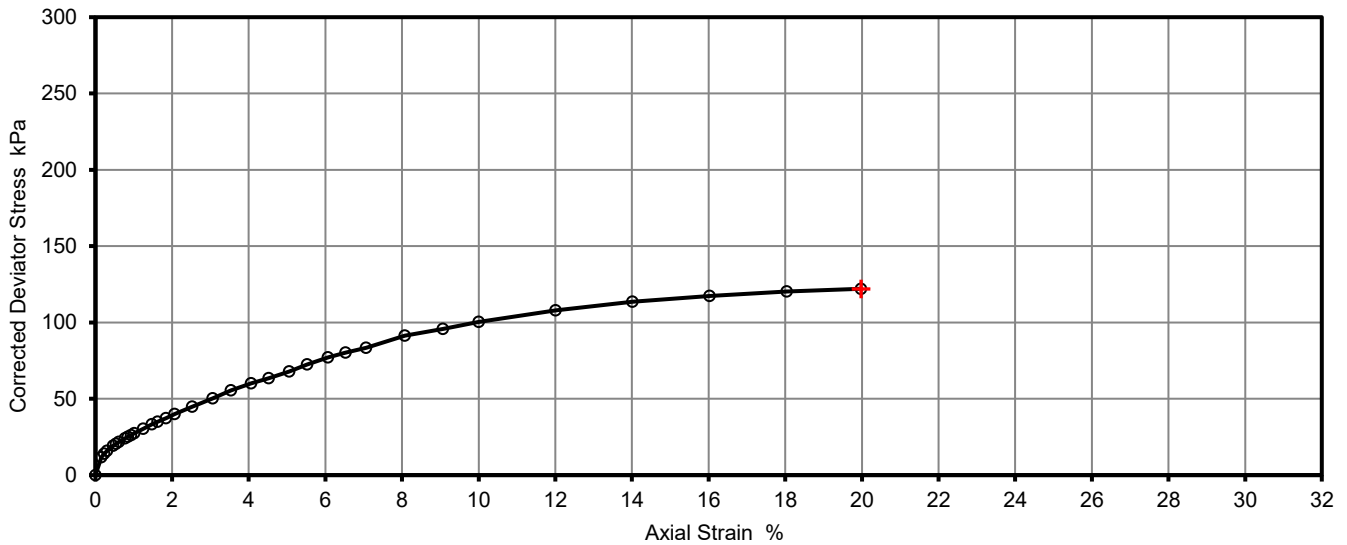
**Unconsolidated Undrained Triaxial  
Compression Test without measurement  
of pore pressure - single specimen**

Job Ref	19-1465A
Borehole/Pit No.	TP01
Sample No.	1
Depth	0.10
Sample Type	B
KeyLAB ID	Caus2020071695
Date of test	11/04/2020

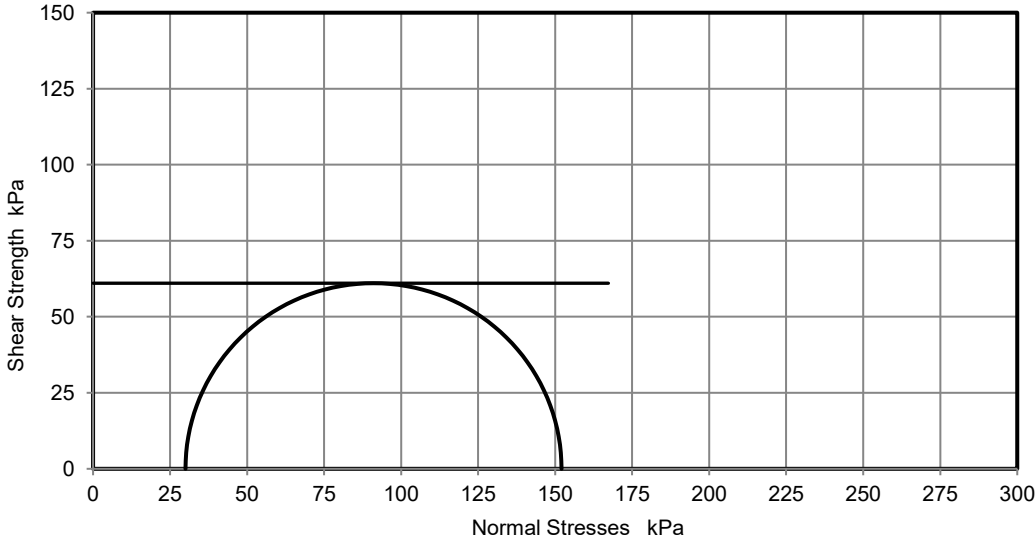
Site Name	Galway Historic Landfills - Tuam		
Soil Description	Brown sandy slightly gravelly clayey SILT.		
Specimen Reference	10	Specimen Depth	0.10 m
Specimen Description	Firm brown sandy slightly gravelly clayey SILT.		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Test Number	1	
Length	210.9	mm
Diameter	105.4	mm
Bulk Density	1.82	Mg/m <sup>3</sup>
Moisture Content	28.5	%
Dry Density	1.42	Mg/m <sup>3</sup>
Rate of Strain	1.0	%/min
Cell Pressure	30	kPa
At failure	20.0	%
Axial Strain	122	kPa
Deviator Stress, ( $\sigma_1 - \sigma_3$ ) <sub>f</sub>	61	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$
Undrained Shear Strength, $c_u$		
Mode of Failure		

**Deviator Stress v Axial Strain**



**Mohr Circles**



Deviator stress corrected for area change and membrane effects based on Fig 11 BS1377-7:1990

Mohr circles and their interpretation is not covered by BS1377-7. This is provided for information only.

**Remarks**

Recompacted from bulk sample using 4.5kg rammer. Testing terminated at 20% axial strain.

**Approved**

Stephen.Watson

**Printed**

13/08/2020 08:48





**Unconsolidated Undrained Triaxial  
Compression Test without measurement  
of pore pressure - single specimen**

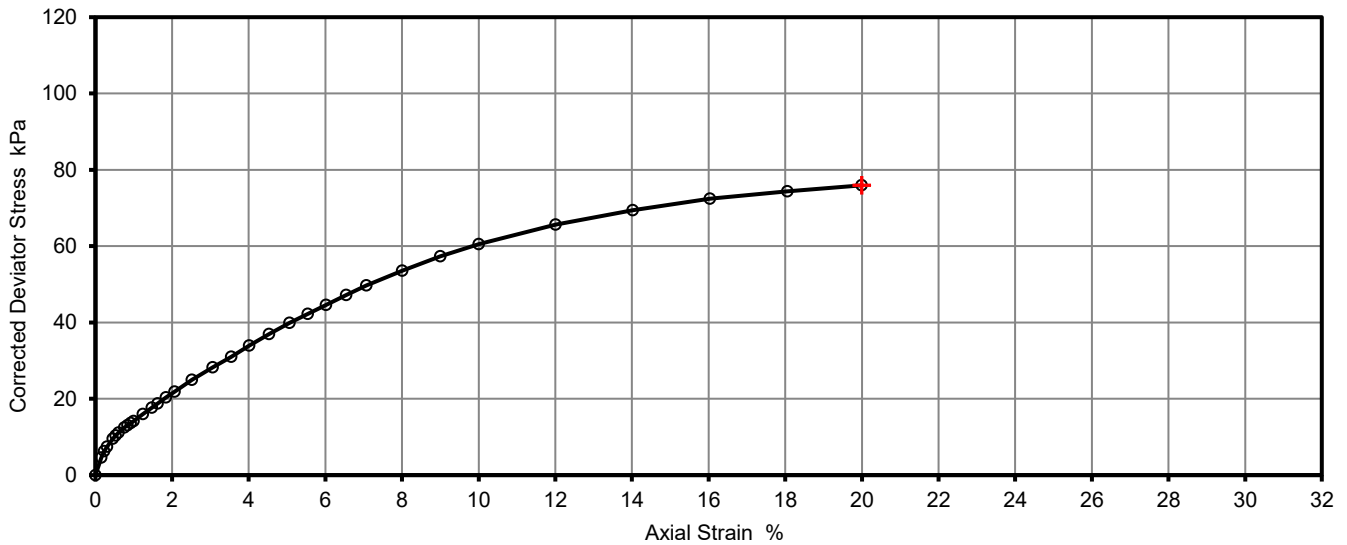
Job Ref	19-1465A
Borehole/Pit No.	TP02
Sample No.	1
Depth	0.00
Sample Type	B
KeyLAB ID	Caus2020071696
Date of test	11/08/2020

Site Name	Galway Historic Landfills - Tuam		
Soil Description	Brown sandy slightly gravelly clayey SILT.		
Specimen Reference	10	Specimen Depth	0.00 m
Specimen Description	Soft brown sandy slightly gravelly clayey SILT.		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

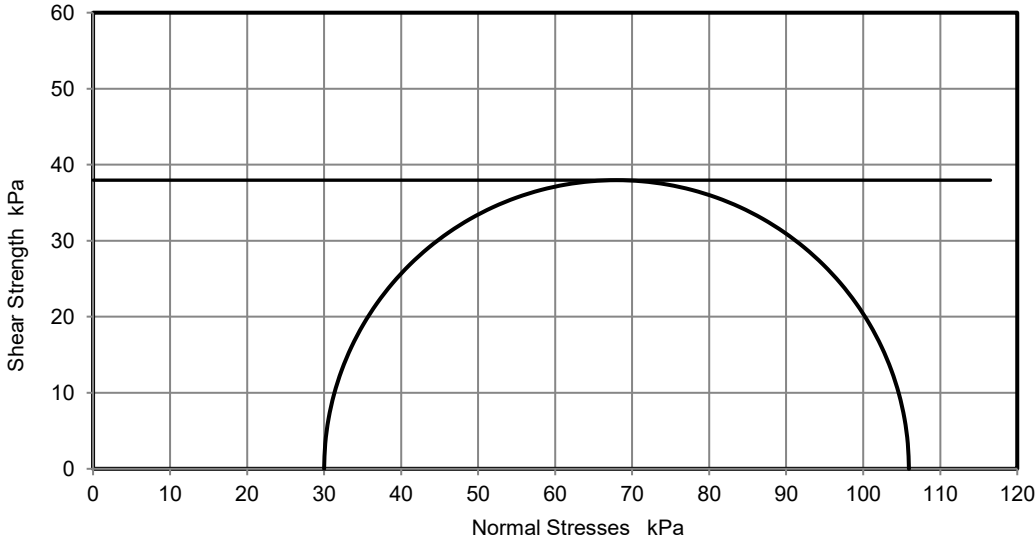
Test Number	1	
Length	210.8	mm
Diameter	105.6	mm
Bulk Density	1.87	Mg/m <sup>3</sup>
Moisture Content	25.0	%
Dry Density	1.50	Mg/m <sup>3</sup>

Rate of Strain	1.0	%/min
Cell Pressure	30	kPa
At failure	20.0	%
Axial Strain	76	kPa
Deviator Stress, ( $\sigma_1 - \sigma_3$ ) <sub>f</sub>	38	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$
Undrained Shear Strength, cu		
Mode of Failure		

**Deviator Stress v Axial Strain**



**Mohr Circles**



Deviator stress corrected for area change and membrane effects based on Fig 11 BS1377-7:1990

Mohr circles and their interpretation is not covered by BS1377-7. This is provided for information only.

**Remarks**

Recompacted from bulk sample using 4.5kg rammer. Testing terminated at 20% axial strain.

**Approved**

Stephen.Watson

**Printed**

13/08/2020 08:48

