# Monksland, Co. Roscommon – Ground Investigation

| | |
|---|---|
| Client: | Sweeney Architects |
| Report No.: | 22-0410 |
| Date: | December 2022 |
| Status: | Final for Issue |

**Causeway Geotech Ltd**
8 Drumahiskey Road, Ballymoney
Co. Antrim, N. Ireland, BT53 7QL

+44 (0)28 2766 6640
info@causewaygeotech.com
www.causewaygeotech.com

Registered in Northern Ireland. Company Number: NI610766
Approved: ISO 9001 • ISO 14001 • OHSAS 18001

## CONTENTS



## APPENDICES

## Document Control Sheet

| | | | | | |
|---|---|---|---|---|---|
| **Report No.:** | | 22-0410 | | | |
| **Project Title:** | | Monksland, Co. Roscommon | | | |
| **Client:** | | Sweeney Architects | | | |
| **Revision:** | A00 | **Status:** | Final for issue | **Issue Date:** | 16th December 2022 |
| **Prepared by:** | | **Reviewed by:** | | **Approved by:** | |
|  Lucy Newland BSc FGS | |  Stuart Abraham MEng MIEI | |  Darren O'Mahony BSc MSc MIEI EurGeol PGeo | |

The works were conducted in accordance with:

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

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for ground 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+A1:2020, The Code of Practice for Ground 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<br>VR | Shear vane test (borehole). Shear strength stated in kPa.<br>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 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. |
| ▽ | 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. |

# Monksland, Co. Roscommon

## 1 AUTHORITY

On the instructions of Sweeney Architects ("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 residential development.

This report details the work carried out both on site and in the geotechnical testing laboratory; 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 ground 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 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, included boreholes, soil sampling, in-situ and laboratory testing, and the preparation of a report on the findings including recommendations for construction.

## 3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted on a green field site off Sli An Coiste Road, Monksland, Co, Roscommon. The site is bordered by residential properties to the east and south and agricultural land to the west and north. The site is largely flat.

# 4 SITE OPERATIONS

## 4.1 Summary of site works

Site operations, which were conducted between 8th November and 10th November 2022, comprised:

- thirteen boreholes by dynamic (windowless) sampling

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

## 4.2 Boreholes

Thirteen boreholes (BH01-BH12 & BH09A) were put down to completion by light percussion boring techniques using a Dando Terrier dynamic sampling rig. The boreholes were put down initially in 150mm diameter, reducing in diameter with depth as required, down to 50mm by use of the smallest sampler.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down clear of services or subsurface obstructions. The boreholes were taken to depths ranging between 0.85m and 2.98m where they were terminated on encountering virtual refusal on obstructions.

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

Disturbed (bulk and small bag) samples were taken within the encountered strata.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded. Details of the water strikes are presented on the individual borehole logs.

Appendix B presents the borehole logs.

# 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 and water soluble sulphate content

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 C.

## 6 GROUND CONDITIONS

### 6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise fluvioglacial deposits. These deposits are underlain by limestone of the Visean Limestone 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:** encountered typically in 100-400mm thickness across the site.
- **Fluvioglacial deposits:** typically very soft or soft sandy gravelly clay and silt interspersed with layers of loose to medium dense sands and gravels.

### 6.3 Groundwater

Groundwater was encountered during percussion boring through soil as a water strike at 2.3m in borehole BH01, all other boreholes were dry.

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.

Seasonal variation in groundwater levels should also be factored into design considerations.

# 7 DISCUSSION

## 7.1 Proposed construction

It is proposed to construct a new housing development on the site.

No further details were available to Causeway Geotech at the time of preparing this report and any designs based on the recommendations or conclusions within this report should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory holes. Causeway Geotech were commissioned to provide a geotechnical report, and it is outwith our remit to advise on structure design.

## 7.2 Recommendations for construction

### 7.2.1 Summary

Based on the presence of stiff fluvioglacial deposits at relatively shallow depths across the footprint of the proposed building, the implementation of traditional shallow (spread) foundations (strip/pad and trench fill) are considered suitable.

### 7.2.2 Soil strength parameters

When estimating the shear strength of fine soils (silt/clay), reference is made to the results of Standard Penetration Tests (SPT's) carried out within the boreholes. The undrained shear strength of fine soils can be estimated using the correlation developed by Stroud & Butler:

$$C_u = f_1 \times N$$

where $f_1$ is typically in the range 4 to 6. A median $f_1$ value of 5 is adopted for this report.

For granular soils (sand/gravel), a graphical relationship between SPT "N" value and angle of shearing resistance, φ, has been developed by Peck, Hanson and Thorburn. This is published in *Foundation Design and Construction* (Tomlinson, 2001) and is referenced in this report when deriving angles of shearing resistance for the gravel soils.

### 7.2.3 Foundations and ground floor construction

Foundations should transfer loading to below any Made Ground or subsoil. The recommended foundation construction and allowable bearing pressure (ABP) at the borehole locations are presented in Table 1.

**Table 1: Construction recommendations**

| Borehole | Depth below EGL* to suitable bearing stratum | Estimated ABP (kPa) | Strata description | Foundation type | Ground floor construction | Groundwater |
|---|---|---|---|---|---|---|
| BH01 | 2.50m | >250 | Possible bedrock | Trench fill (with trench support) | Ground bearing | 2.30mbgl |
| BH02 | 1.80m | >250 | Possible bedrock | Trench fill (with trench support) | Ground bearing | Not encountered |
| BH03 | 0.70m | >250 | Possible bedrock | Strip & pad | Ground bearing | Not encountered |
| BH04 | 1.20m | >250 | Possible bedrock | Strip & pad | Ground bearing | Not encountered |
| BH05 | 2.00m | >250 | Possible bedrock | Trench fill (with trench support) | Suspended | Not encountered |
| BH06 | 1.00m | >2.50 | Possible bedrock | Strip & pad | Ground bearing | Not encountered |
| BH07 | 1.20m | 210 | Stiff fluvioglacial | Strip & pad | Ground bearing | Not encountered |
| BH08 | 2.00m | 250 | Medium dense sand | Trench fill (with trench support) | Ground bearing | Not encountered |
| BH09 | 1.20m | >250 | Very stiff fluvioglacial | Strip & pad | Ground bearing | Not encountered |
| BH10 | 1.20m | >250 | Stiff fluvioglacial | Strip & pad | Ground bearing | Not encountered |
| BH11 | 2.00m | 250 | Medium dense sand | Trench fill (with trench support) | Suspended | Not encountered |
| BH12 | 2.45m | >250 | Very dense gravel | Trench fill (with trench support) | Suspended | Not encountered |

*Existing Ground Level

Based on the findings of the ground investigation, spread foundations (strip/pad and trench fill) are considered suitable with estimated allowable bearing pressures between 210kPa and >250kPa at depths between 0.70m and 2.50m on stiff to very stiff fluvioglacial, medium dense sand, very dense gravel or possible bedrock.

The base of foundation excavations should be thoroughly inspected in accordance with the Earthworks Specification; any soft soils should be removed with the resultant void backfilled with ST1 concrete. A consistent bearing stratum should be provided for any building unit to limit differential settlements.

Given the predominance of the silt and granular strata, excavations for foundations are not likely to be stable. Where space allows, instability can be minimised by battering the side slopes at 2 vertical to 1 horizontal and by limiting the duration that the excavation is open.

### 7.2.4 Floor slabs

Floor slabs should not bear directly onto Made Ground or soft soils. Consequently, the use of ground bearing floor slabs is considered appropriate following the removal of any surface Made Ground and soft clay layers and their replacement using well-graded well-compacted granular fill. However, a suspended floor slab should be adopted where the difference in levels of the proposed floor and the base of Made Ground/soft soils is greater than 600mm.

Therefore, given the relative low strength of upper soil layers, a suspended floor slab may be required over parts of the site. The use of intermediate lines of support stub walls would reduce the spans required for flooring units.

### 7.2.5 Excavations for services

For the installation of services ducts/trenches, it is suggested that open trenching will be the most practicable construction method. Generally speaking, the ground conditions should render the use of open trenching by backhoe excavator possible, with some trench support required for the uppermost granular stratum.

Where working in open trenches, it is thought that trench support systems, by way of a trench box (or possibly sheet piles), will be required to maintain trench stability and safe working conditions. Groundwater control at these locations should be possible by means of sump pumping.

To preclude the eventuality of differential settlements in pipes, they should be laid on a consistent stratum of appropriate allowable bearing capacity and protected with appropriate fill cover.

Where ducts and chambers must be installed in areas where localised soft spots are encountered, the use of geogrid reinforcement along the base of the excavation is recommended. This will stiffen the base of the trench and help control longitudinal differential settlement.

Backfilling of trenches may be completed by using compacted Cl 804 granular fill and reinstated as appropriate.

### 7.2.6 Soil aggressivity

An assessment of the Aggressive Chemical Environment for Concrete (ACEC) was undertaken through reference to the Building Research Establishment (BRE) Special Digest 1 (2017).

As noted by BRE Special Digest 1, sulphates in the soil and groundwater are the chemical agents most likely to attack concrete. The extent to which sulphates affect concrete is linked to their concentrations, the type of ground, the presence of groundwater, the type of concrete and the form of construction in which concrete is used.

BRE Special Digest 1 identifies four different categories of site which require specific procedures for investigation for aggressive ground conditions:

- Sites not subjected to previous industrial development and not perceived as containing pyrite;
- Sites not subjected to previous industrial development and perceived as containing pyrite;
- Brownfield sites not perceived as containing pyrite;
- Brownfield sites perceived as containing pyrite.

For the purposes of this report the site was classified as not having been subject to previous industrial development and not perceived as containing pyrite.

The results of chemical tests (pH and water soluble sulphate contents) on soil samples indicate Design Sulphate Class DS-1 and ACEC Class AC-1s – reference Table C1 of BRE Special Digest 1 (Building Research Establishment, 2005). The Special Digest does not require any measures to protect underground concrete elements greater than 140mm thick.

## 8 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+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 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.

CAUSEWAY GEOTECH

# APPENDIX A

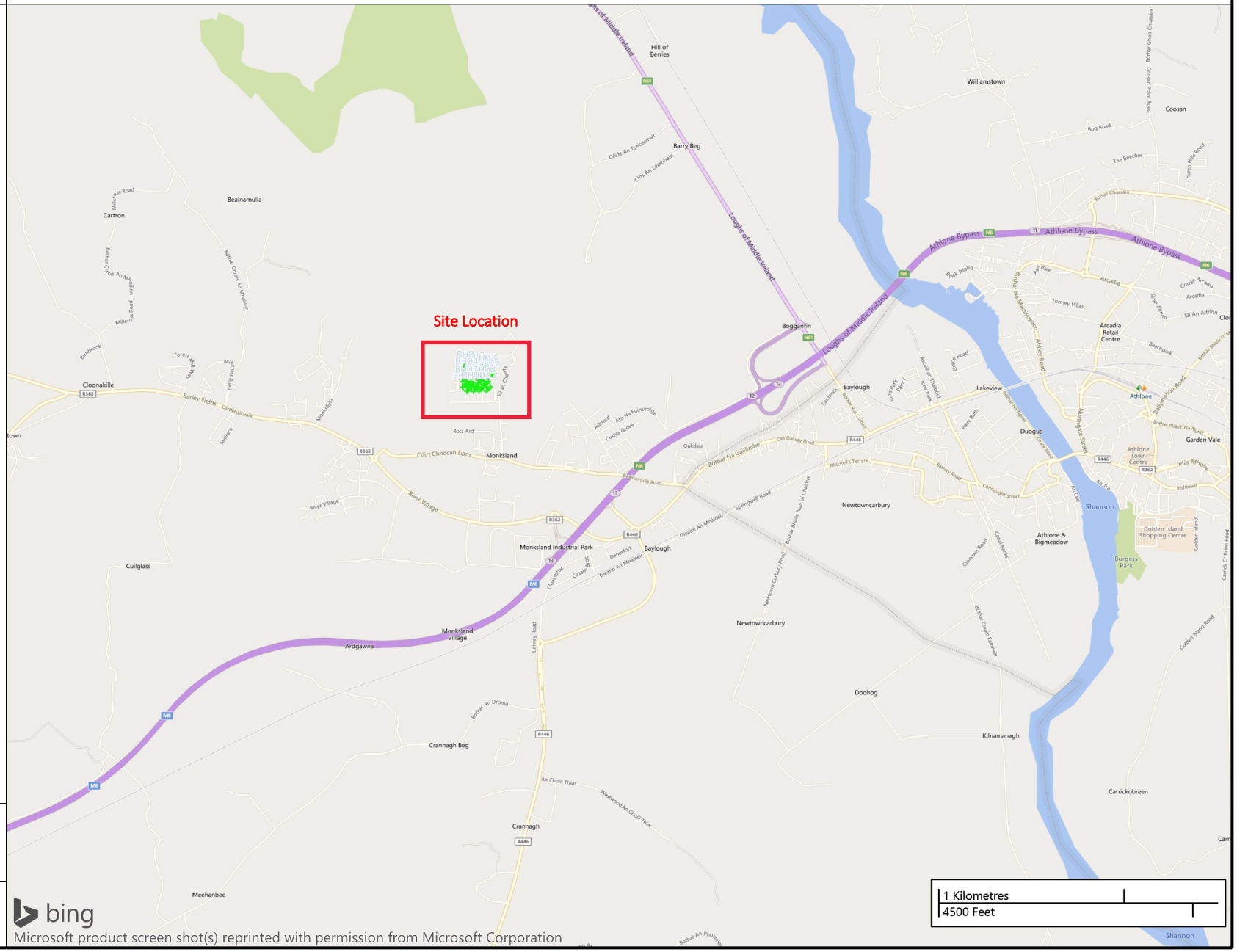
# SITE AND EXPLORATORY HOLE LOCATION PLANS

CAUSEWAY GEOTECH

| | | | |
|---|---|---|---|
| **Project No.:** | 22-0410 | **Client:** | Sweeney Architects |
| **Project Name:** | Monksland, Co. Roscommon | **Client's Representative:** | |

Legend Key

- Locations By Type - DS






**Title:**

Site Location Plan

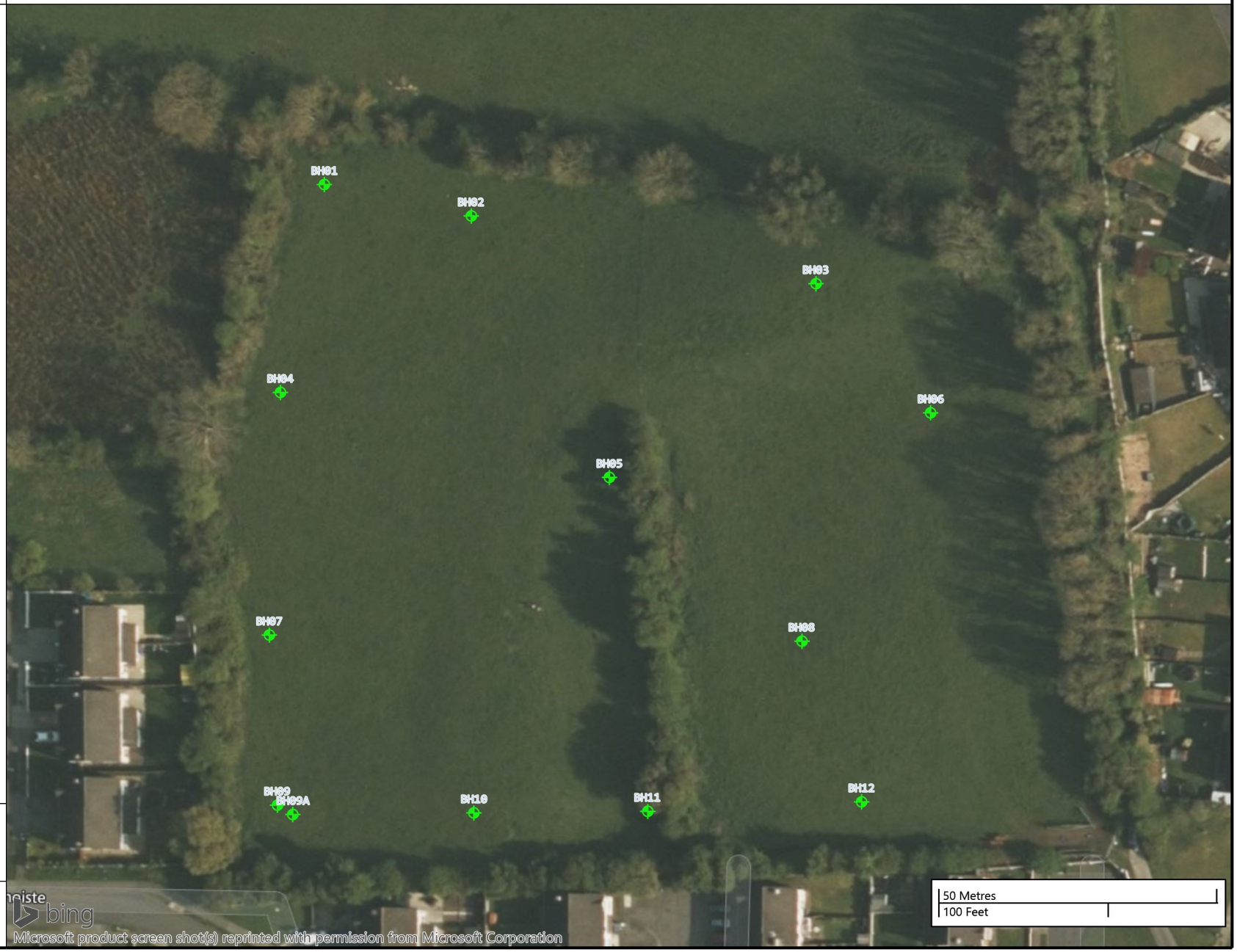
| **Last Revised:** | **Scale:** |
|---|---|
| 13/12/2022 | 1:30000 |

CAUSEWAY GEOTECH

| | | | |
|---|---|---|---|
| **Project No.:** | 22-0410 | **Client:** | Sweeney Architects |
| **Project Name:** | Monksland, Co. Roscommon | **Client's Representative:** | |

Legend Key

Locations By Type - DS




**Title:**

Exploratory Hole Location Plan

| **Last Revised:** | **Scale:** |
|---|---|
| 13/12/2022 | 1:1000 |

CAUSEWAY GEOTECH

# APPENDIX B

# BOREHOLE LOGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH01 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 2.50 | 200679.36 E<br>241978.91 N |

| Final Depth: | 2.50 m | Start Date: | 09/11/2022 | Driller: | JMcK | Sheet 1 of 1<br>Scale: 1:50 |
|---|---|---|---|---|---|---|
| Elevation: | mOD | End Date: | 09/11/2022 | Logger: | SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.40 | | TOPSOIL | | |
| 0.50 | B1 | | | | | | | Firm to stiff brown slightly sandy CLAY. Sand is fine to coarse. | | |
| 0.50 | D2 | | | | | | | | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | 1.20 | | Loose brown clayey fine SAND | | |
| 1.20 | D6 | | | | | | | | | |
| 1.20 - 1.65 | SPT (S) | N=7 (1,1/2,2,1,2) Hammer SN = D130 | 0.00 | 0.00 | | | | | | |
| 2.00 | B7 | | | | | | | | | |
| 2.00 | D8 | | | | | 2.00 | | Very loose brown gravelly fine to coarse SAND. Gravel is angular fine to coarse. | ▼ | |
| 2.00 - 2.45 | SPT (S) | N=1 (0,0/0,0,0,1) Hammer SN = D130<br>Water strike at 2.30m | 0.00 | Dry | | | | | | |
| 2.50 - 2.52 | SPT (S) | N=50 (25 for 10mm/50 for 5mm) Hammer SN = D130 | 0.00 | 0.00 | | 2.50 | | End of Borehole at 2.50m | | |

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| 2.30 | 2.30 | 20 | 2.30 |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH02 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 1.95 | 200705.89 E<br>241973.24 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 1.95 m | 09/11/2022 | JMcK | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 09/11/2022 | **Logger:** SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | TOPSOIL | | |
| 0.50 | B1 | | | | | | | Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse | | |
| 0.50 | D2 | | | | | 0.70 | | Firm to stiff brown sandy CLAY. Sand is fine to coarse. | | |
| 1.00 | B3 | | | | | 1.10 | | Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium. | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 | D6 | | | | | | | | | |
| 1.20 - 1.65 | SPT (S) | N=6 (1,2/1,2,2,1) Hammer SN = D130 | 0.00 | 0.00 | | | | | | |
| 1.80 - 1.96 | SPT (S) | N=50 (18,7/50 for 5mm) Hammer SN = D130 | 0.00 | 0.00 | | 1.95 | | End of Borehole at 1.95m | | |

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH03 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 0.85 | 200768.37 E<br>241961.02 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 0.85 m | 09/11/2022 | JMcK | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 09/11/2022 | **Logger:** SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.30 | | TOPSOIL | | |
| 0.50 | B1 | | | | | 0.50 | | Greyish brown slightly sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. | | |
| 0.50 | D2 | | | | | | | Very stiff greyish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies including possible weathered bedrock. | | |
| 0.70 | B3 | | | | | 0.85 | | End of Borehole at 0.85m | | |
| 0.70 | D4 | | | | | | | | | |
| 0.70 - 0.86 | SPT (C) | 50 (14,10/50 for 10mm)<br>Hammer SN = D130 | 0.00 | 0.00 | | | | | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

Hand dug inspection pit excavated to 0.85m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH04 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 1.65 | 200671.37 E<br>241941.35 N |

| Final Depth: | 1.65 m | Start Date: | 09/11/2022 | Driller: | JMcK | Sheet 1 of 1<br>Scale: 1:50 |
|---|---|---|---|---|---|---|
| Elevation: | mOD | End Date: | 09/11/2022 | Logger: | SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.30 | | TOPSOIL | | |
| 0.50 | B1 | | | | | | | Stiff brown sandy CLAY. Sand is fine to coarse. | | |
| 0.50 | D2 | | | | | | | | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 | D6 | | | | | | | | | |
| 1.20 - 1.65 | SPT (S) | N=30 (1,1/1,2,12,15) Hammer SN = D130 | 0.00 | Dry | | 1.50 | | | | |
| 1.65 - 1.66 | SPT (C) | N=50 (25 for 5mm/50 for 5mm) Hammer SN = D130 | 0.00 | Dry | | 1.65 | | Dense brownish grey slightly clayey slightly sandy angular fine to coarse GRAVEL. Sand is fine to coarse. (Possible weathered bedrock)<br>End of Borehole at 1.65m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

Hand dug inspection pit excavated to 1.65m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: Monksland, Co. Roscommon | Borehole ID |
|---|---|---|
| 22-0410 | Client: Sweeney Architects | BH05 |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 2.30 | 200731.00 E<br>241926.00 N |

| Final Depth: | 2.30 m | Start Date: | 08/11/2022 | Driller: | JMcK | Sheet 1 of 1<br>Scale: 1:50 |
|---|---|---|---|---|---|---|
| Elevation: | mOD | End Date: | 08/11/2022 | Logger: | CH | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.40 | | TOPSOIL | | |
| 0.50 | B1 | | | | | | | Very soft brown sandy CLAY. Sand is fine to coarse. | | |
| 0.50 | D2 | | | | | | | | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 | D6 | | | | | | | | | |
| 1.20 - 1.65 | SPT (S) | N=3 (1,0/1,0,1,1) Hammer SN = D130 | 0.00 | Dry | | | | | | |
| 2.00 - 2.30 | SPT (C) | N=50 (3,8/50 for 150mm) Hammer SN = D130 | 0.00 | Dry | | 2.00 | | Dense brownish grey slightly clayey slightly sandy angular fine to coarse GRAVEL. Sand is fine to coarse. (Possible weathered bedrock) | | |
| | | | | | | 2.30 | | End of Borehole at 2.30m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: Monksland, Co. Roscommon | Borehole ID |
|---|---|---|
| 22-0410 | Client: Sweeney Architects | BH06 |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 1.00 | 200789.20 E<br>241937.68 N |

| Final Depth: | 1.00 m | Start Date: | 09/11/2022 | Driller: | JMcK | Sheet 1 of 1<br>Scale: 1:50 |
|---|---|---|---|---|---|---|
| Elevation: | mOD | End Date: | 09/11/2022 | Logger: | SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 - 1.01 | SPT (C) | N=50 (25 for 10mm/50 for 5mm) Hammer SN = D130 | 0.00 | Dry | | 0.30<br>0.90<br>1.00 | | TOPSOIL<br>Firm greyish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies including weathered bedrock.<br>Dense greyish brown sandy angular fine to coarse GRAVEL . Sand is fine to coarse. (Possible weathered bedrock)<br>End of Borehole at 1.00m | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

Hand dug inspection pit excavated to 1.00m

| Termination Reason | Last Updated |
|---|---|
| Terminated on refusal | 13/12/2022 |

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH07 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 1.65 | 200669.38 E<br>241897.52 N |

| Final Depth: | 1.65 m | Start Date: | 08/11/2022 | Driller: | JMcK | Sheet 1 of 1<br>Scale: 1:50 |
|---|---|---|---|---|---|---|
| Elevation: | mOD | End Date: | 08/11/2022 | Logger: | SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | TOPSOIL | | |
| 0.50 | B1 | | | | | | | Stiff brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. | | |
| 0.50 | D2 | | | | | | | | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 | D6 | | | | | 1.40 | | | | |
| 1.20 - 1.65 | SPT (S) | N=21 (1,2/2,4,8,7) Hammer SN = D130 | 0.00 | Dry | | | | Medium dense grey sandy angular fine to coarse GRAVEL. Sand is fine to coarse. (Possible weathered bedrock) | | |
| 1.40 | B7 | | | | | 1.65 | | End of Borehole at 1.65m | | |
| 1.65 - 1.66 | SPT (C) | N=50 (25 for 5mm/50 for 5mm) Hammer SN = D130 | 0.00 | Dry | | | | | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH08 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 2.45 | 200765.81 E<br>241896.41 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 2.45 m | 10/11/2022 | JMcK | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 10/11/2022 | **Logger:** SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.35 | | TOPSOIL | | |
| 0.50 | B1 | | | | | | | Soft brown sandy CLAY. Sand is fine to coarse. | | |
| 0.50 | D2 | | | | | 0.90 | | | | |
| 1.00 | B3 | | | | | | | Firm greyish brown slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Sand is fine to coarse. | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 - 1.65 | SPT (C) | N=11 (1,1/3,3,3,2) Hammer SN = D130 | 0.00 | 0.00 | | 1.60 | | | | |
| 1.60 | B6 | | | | | | | Medium dense brown clayey slightly gravelly fine to coarse SAND. Gravel is angular fine to coarse. | | |
| 2.00 | B7 | | | | | | | | | |
| 2.00 - 2.45 | SPT (C) | N=25 (1,2/2,3,9,11) Hammer SN = D130 | 0.00 | Dry | | | | | | |
| 2.45 - 2.46 | SPT (C) | N=50 (25 for 5mm/50 for 5mm) Hammer SN = D130 | 0.00 | Dry | | 2.45 | | End of Borehole at 2.45m | | |

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH09 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 1.35 | 200670.81 E<br>241866.78 N |

| Final Depth: | 1.35 m | Start Date: | 08/11/2022 | Driller: | JMcK | Sheet 1 of 1<br>Scale: 1:50 |
|---|---|---|---|---|---|---|
| Elevation: | mOD | End Date: | 08/11/2022 | Logger: | SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | TOPSOIL | | |
| | | | | | | 0.40 | | Soft brown sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse | | |
| 0.50 | B1 | | | | | | | | | |
| 0.50 | D2 | | | | | | | Stiff brown sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | D5 | | | | | | | | | |
| 1.20 - 1.36 | SPT (S) | N=50 (1,2/50 for 5mm) Hammer SN = D130 | 0.00 | Dry | | 1.35 | | End of Borehole at 1.35m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH09A |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 1.40 | 200673.67 E<br>241865.09 N |

| Final Depth: | 1.40 m | Start Date: | 08/11/2022 | Driller: | JMcK | Sheet 1 of 1<br>Scale: 1:50 |
|---|---|---|---|---|---|---|
| Elevation: | mOD | End Date: | 08/11/2022 | Logger: | SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | TOPSOIL | | |
| 0.50 | B1 | | | | | 0.40 | | Soft brown sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse | | |
| 0.50 | D2 | | | | | | | Very stiff brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | D5 | | | | | | | | | |
| 1.20 - 1.42 | SPT (S) | N=50 (1,3/50 for 75mm)<br>Hammer SN = D130 | 0.00 | Dry | | 1.40 | | End of Borehole at 1.40m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH10 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 1.80 | 200706.48 E<br>241865.38 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 1.80 m | 08/11/2022 | JMcK | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 08/11/2022 | **Logger:** SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.10 | | TOPSOIL | | |
| | | | | | | 0.30 | | Soft brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse | | |
| 0.50 | B1 | | | | | | | Stiff grey slightly sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. | | |
| 0.50 | D2 | | | | | | | | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 - 1.65 | SPT (C) | N=30 (3,5/7,8,8,7) Hammer SN = D130 | 0.00 | 0.00 | | 1.80 | | End of Borehole at 1.80m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

| Termination Reason | Last Updated |
|---|---|
| Terminated on refusal. | 13/12/2022 |

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 22-0410 | Monksland, Co. Roscommon | BH11 |
| | Client: Sweeney Architects | |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 2.45 | 200737.86 E<br>241865.67 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 2.45 m | 08/11/2022 | JMcK | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 08/11/2022 | **Logger:** SA | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | TOPSOIL | | |
| 0.50 | B1 | | | | | 0.45 | | Soft brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse | | |
| 0.50 | D2 | | | | | | | Soft brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 | D6 | | | | | | | | | |
| 1.20 - 1.65 | SPT (S) | N=5 (1,0/1,0,2,2) Hammer SN = D130 | 0.00 | 0.00 | | | | | | |
| 1.80 | B7 | | | | | 1.80 | | Medium dense brown fine SAND | | |
| 2.00 | B9 | | | | | | | | | |
| 2.00 | D8 | | | | | | | | | |
| 2.00 - 2.45 | SPT (S) | N=25 (1,3/7,6,6,6) Hammer SN = D130 | 0.00 | Dry | | 2.35 | | | | |
| 2.45 - 2.46 | SPT (C) | N=50 (25 for 5mm/50 for 10mm) Hammer SN = D130 | 0.00 | 0.00 | | 2.45 | | Dense greyish brown sandy angular fine to coarse GRAVEL. Sand is fine to coarse. (Possible weathered bedrock) | | |
| | | | | | | | | End of Borehole at 2.45m | | |

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: Monksland, Co. Roscommon | Borehole ID |
|---|---|---|
| 22-0410 | Client: Sweeney Architects | BH12 |
| | Client's Rep: | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates | Final Depth: 2.98 m | Start Date: 10/11/2022 | Driller: JMcK | Sheet 1 of 1 |
|---|---|---|---|---|---|---|---|---|
| Dynamic Sampling | Premier 110 | 0.00 | 2.98 | 200776.65 E<br>241867.38 N | Elevation: mOD | End Date: 10/11/2022 | Logger: SA | Scale: 1:50<br>FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.30 | | TOPSOIL | | |
| 0.50 | B1 | | | | | 0.45 | | Soft brown very sandy CLAY. Sand is fine to coarse. | | |
| 0.50 | D2 | | | | | | | Very soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. | | |
| 1.00 | B3 | | | | | | | | | |
| 1.00 | D4 | | | | | | | | | |
| 1.20 | B5 | | | | | | | | | |
| 1.20 - 1.65 | SPT (S) | N=2 (0,1/0,1,0,1) | 0.00 | Dry | | 1.35 | | Very loose becoming loose greyish brown sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse. | | |
| 1.35 | B7 | | | | | | | | | |
| 2.00 | B8 | | | | | | | | | |
| 2.00 | D6 | | | | | | | | | |
| 2.00 - 2.45 | SPT (S) | N=6 (0,0/0,2,2,2) | 0.00 | 0.00 | | | | | | |
| 2.45 - 2.75 | SPT (C) | N=50 (19,6/50 for 150mm) | 0.00 | Dry | | 2.98 | | End of Borehole at 2.98m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |

**Remarks**

Hand dug inspection pit excavated to 1.20m

**Termination Reason**

Terminated on refusal.

**Last Updated**

13/12/2022

AGS

CAUSEWAY GEOTECH

# APPENDIX C

# GEOTECHNICAL LABORATORY TEST RESULTS

HEAD OFFICE
Causeway Geotech Ltd
8 Drumahiskey Road
Ballymoney
Co. Antrim, N. Ireland, BT53 7QL
NI: +44 (0)28 276 66640
Registered in Northern Ireland.
Company Number: NI610766

REGIONAL OFFICE
Causeway Geotech (IRL) Ltd
Unit 1 Fingal House
Stephenstown Industrial Estate
Balbriggan, Co Dublin, Ireland, K32 VR66
ROI: +353 (0)1 526 7465
Registered in Ireland.
Company Number: 633786

www.causewaygeotech.com

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

6 December 2022

| | |
|---|---|
| **Project Name:** | Monksland, Co. Roscommon |
| **Project No.:** | 22-0410 |
| **Client:** | Sweeney Architects |

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). This testing was performed between 22/11/2022 and 06/12/2022.

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:** Monksland, Co. Roscommon

**Report Reference:** Schedule 1

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

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.

| Material tested | Type of test/Properties measured/Range of measurement | Standard specifications | No. of results included in the report |
|---|---|---|---|
| SOIL | Moisture Content of Soil | BS 1377-2: 1990: Cl 3.2 | 11 |
| SOIL | Liquid and Plastic Limits of soil-1 point cone penetrometer method | BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4 | 11 |
| SOIL | Particle size distribution - wet sieving | BS 1377-2: 1990: Cl 9.2 | 7 |
| SOIL | Particle size distribution - sedimentation hydrometer method | BS 1377-2: 1990: Cl 9.5 | 5 |

## 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.

| Material tested | Type of test/Properties measured/Range of measurement | Standard specifications | No. of results included in the report |
|---|---|---|---|
| SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)* | pH Value of Soil | | 11 |
| SOIL – Subcontracted to Eurofins Chemtest Ltd *(UKAS 2183)* | Sulphate Content water extract | | 11 |

CAUSEWAY GEOTECH

# Summary of Classification Test Results

| Project No. | Project Name |
|---|---|
| 22-0410 | Monksland, Co. Roscommon |

| Hole No. | Sample | | | | Specimen Description | Density bulk | Density dry | w | Passing 425µm | LL | PL | PI | Particle density | Casagrande Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ref | Top | Base | Type | | Mg/m3 | | % | % | % | % | % | Mg/m3 | |
| BH01 | 2 | 0.50 | | D | Light brown slightly sandy silty CLAY. | | | 27 | 99 | 48 -1pt | 22 | 26 | | CI |
| BH02 | 6 | 1.20 | | D | Light brown slightly sandy silty CLAY. | | | 21 | 94 | 33 -1pt | 18 | 15 | | CL |
| BH03 | 1 | 0.50 | | B | Light brown sandy slightly gravelly silty CLAY. | | | 11 | 35 | 30 -1pt | 21 | 9 | | CL |
| BH04 | 4 | 1.00 | | D | Light brown sandy slightly gravelly silty CLAY. | | | 32 | 94 | 51 -1pt | 24 | 27 | | CH |
| BH05 | 2 | 0.50 | | D | Light brown sandy slightly gravelly silty CLAY. | | | 28 | 98 | 37 -1pt | 18 | 19 | | CI |
| BH07 | 4 | 1.00 | | D | Light brown sandy slightly gravelly silty CLAY. | | | 26 | 94 | 52 -1pt | 23 | 29 | | CH |
| BH08 | 4 | 1.00 | | D | Brown slightly gravelly clayey fine to coarse SAND. | | | 7.1 | 18 | 23 -1pt | 16 | 7 | | CL |
| BH09A | 2 | 0.50 | | D | Brown sandy slightly gravelly clayey SILT. | | | 15 | 85 | 21 -1pt | 16 | 5 | | ML |
| BH10 | 2 | 0.50 | | D | Brown gravelly silty fine to coarse SAND. | | | 11 | 28 | 50 -1pt | 37 | 13 | | MI/MH |
| BH11 | 4 | 1.00 | | D | Light brown sandy slightly gravelly clayey SILT. | | | 18 | 92 | 21 -1pt | 18 | 3 | | ML |
| BH12 | 2 | 0.50 | | D | Light brown sandy slightly gravelly silty CLAY. | | | 20 | 80 | 28 -1pt | 21 | 7 | | CL |
| | | | | | | | | | | | | | | |

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

LAB 01R Version 6

Key

| | | |
|---|---|---|
| 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 | |

Date Printed

12/06/2022 00:00

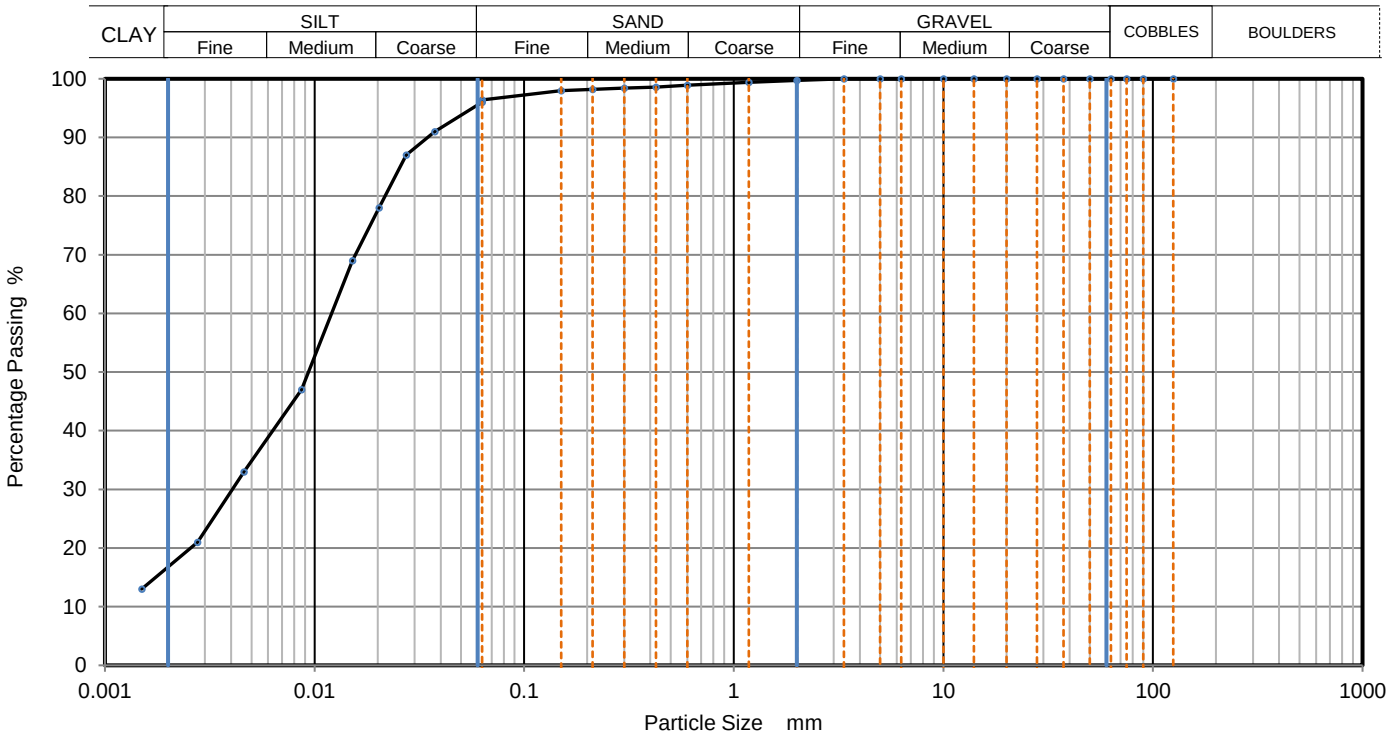
Approved By

Stephen Watson

UKAS TESTING

10122

| CAUSEWAY GEOTECH | PARTICLE SIZE DISTRIBUTION | | | | Job Ref | | 22-0410 |
|---|---|---|---|---|---|---|---|
| | | | | | Borehole/Pit No. | | BH01 |
| Site Name | Monksland, Co. Roscommon | | | | Sample No. | | 1 |
| Specimen Description | Light brown slightly sandy silty CLAY. | | | | Sample Depth (m) | Top | 0.50 |
| | | | | | | Base | |
| Specimen Reference | 3 | Specimen Depth | 0.5 | m | Sample Type | | B |
| Test Method | BS1377:Part 2:1990, clauses 9.2 and 9.5 | | | | KeyLAB ID | | Caus2022112249 |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | 0.06300 | 96 |
| 90 | 100 | 0.03743 | 91 |
| 75 | 100 | 0.02734 | 87 |
| 63 | 100 | 0.02033 | 78 |
| 50 | 100 | 0.01517 | 69 |
| 37.5 | 100 | 0.00866 | 47 |
| 28 | 100 | 0.00460 | 33 |
| 20 | 100 | 0.00277 | 21 |
| 14 | 100 | 0.00150 | 13 |
| 10 | 100 | | |
| 6.3 | 100 | | |
| 5 | 100 | | |
| 3.35 | 100 | | |
| 2 | 100 | | |
| 1.18 | 99 | | |
| 0.6 | 99 | Particle density | (assumed) |
| 0.425 | 99 | 2.65 | Mg/m3 |
| 0.3 | 98 | | |
| 0.212 | 98 | | |
| 0.15 | 98 | | |
| 0.063 | 96 | | |

Dry Mass of sample, g: 302

| Sample Proportions | % dry mass |
|---|---|
| Cobbles | 0.0 |
| Gravel | 0.3 |
| Sand | 3.3 |
| Silt | 79.5 |
| Clay | 16.9 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 0.0121 |
| D30 | mm | 0.00408 |
| D10 | mm | |
| Uniformity Coefficient | | |
| Curvature Coefficient | | |

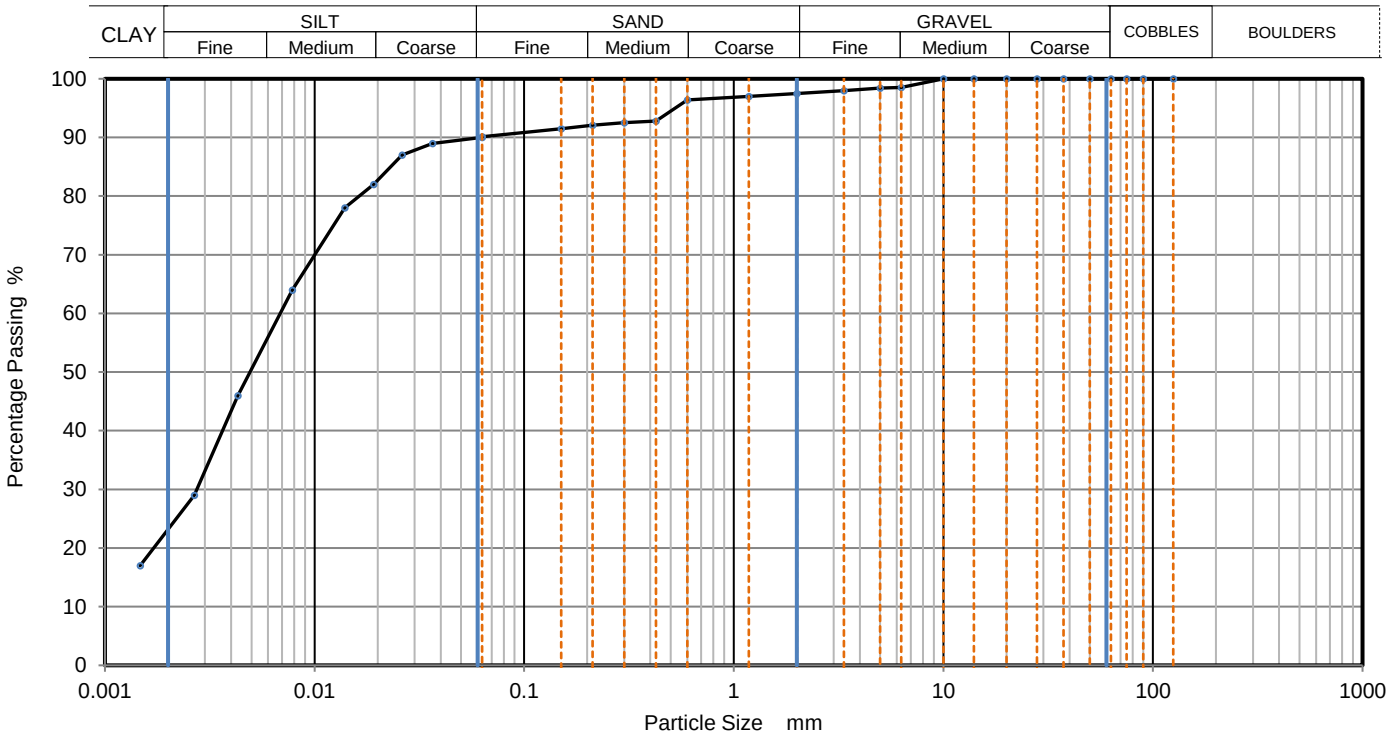
Remarks

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

| Approved |
|---|
| Stephen Watson |

# PARTICLE SIZE DISTRIBUTION

| | | | | | |
|---|---|---|---|---|---|
| Job Ref | | | | | **22-0410** |
| Borehole/Pit No. | | | | | BH02 |
| Site Name | Monksland, Co. Roscommon | | | Sample No. | 5 |
| Specimen Description | Light brown slightly sandy silty CLAY. | | | Sample Depth (m) Top | 1.20 |
| | | | | Base | |
| Specimen Reference | 3 | Specimen Depth | 1.2 m | Sample Type | B |
| Test Method | BS1377:Part 2:1990, clauses 9.2 and 9.5 | | | KeyLAB ID | Caus2022112251 |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | 0.06300 | 90 |
| 90 | 100 | 0.03658 | 89 |
| 75 | 100 | 0.02617 | 87 |
| 63 | 100 | 0.01913 | 82 |
| 50 | 100 | 0.01396 | 78 |
| 37.5 | 100 | 0.00783 | 64 |
| 28 | 100 | 0.00430 | 46 |
| 20 | 100 | 0.00267 | 29 |
| 14 | 100 | 0.00147 | 17 |
| 10 | 100 | | |
| 6.3 | 99 | | |
| 5 | 98 | | |
| 3.35 | 98 | | |
| 2 | 98 | | |
| 1.18 | 97 | | |
| 0.6 | 96 | Particle density | (assumed) |
| 0.425 | 93 | 2.65 | Mg/m3 |
| 0.3 | 93 | | |
| 0.212 | 92 | | |
| 0.15 | 92 | | |
| 0.063 | 90 | | |

Dry Mass of sample, g: 256

| **Sample Proportions** | % dry mass |
|---|---|
| Cobbles | 0.0 |
| Gravel | 2.5 |
| Sand | 7.4 |
| Silt | 67.0 |
| Clay | 23.1 |

| **Grading Analysis** | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 0.00684 |
| D30 | mm | 0.00275 |
| D10 | mm | |
| Uniformity Coefficient | | |
| Curvature Coefficient | | |

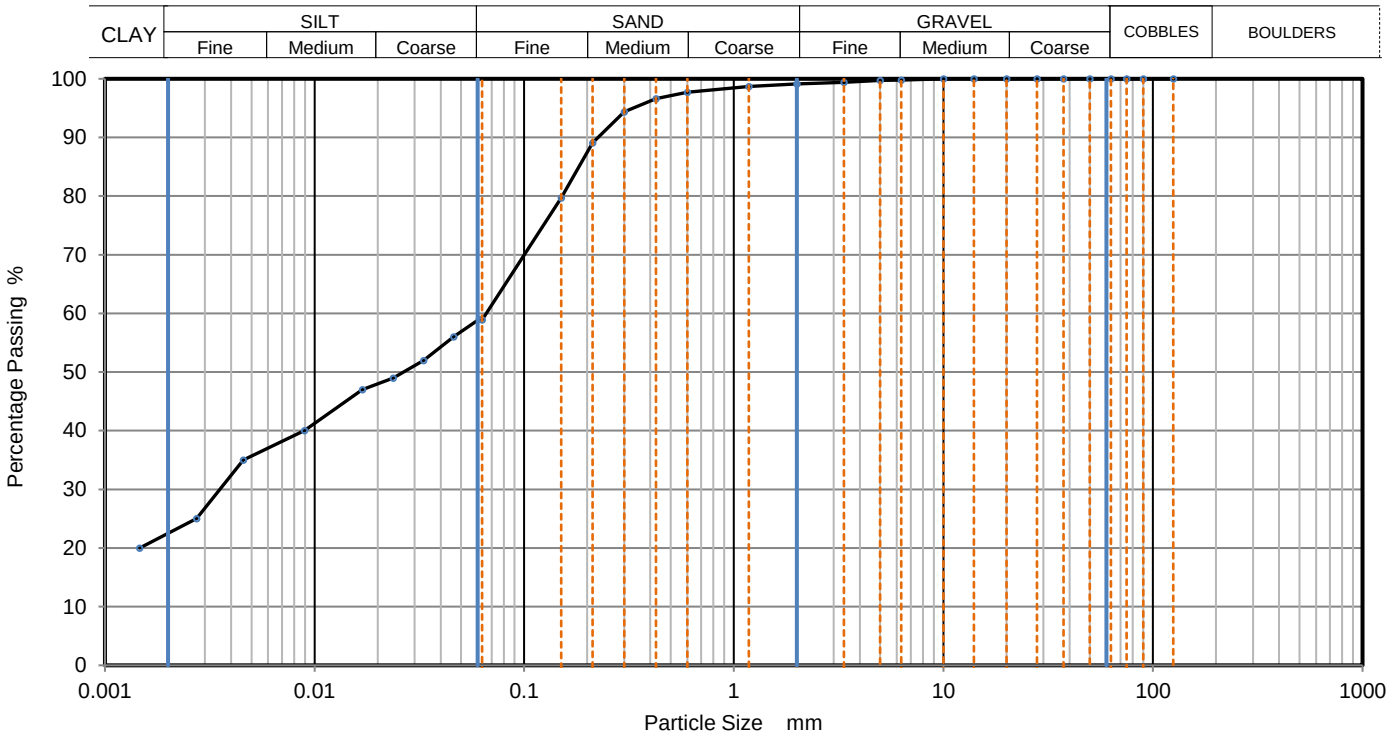
Remarks

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

| Approved |
|---|
| Stephen Watson |

# PARTICLE SIZE DISTRIBUTION

| | | | | | |
|---|---|---|---|---|---|
| Job Ref | | | | | 22-0410 |
| Borehole/Pit No. | | | | | BH05 |
| Site Name | Monksland, Co. Roscommon | | | Sample No. | 1 |
| Specimen Description | Light brown sandy slightly gravelly silty CLAY. | | | Sample Depth (m) Top | 0.50 |
| | | | | Base | |
| Specimen Reference | 3 | Specimen Depth | 0.5 m | Sample Type | B |
| Test Method | BS1377:Part 2:1990, clauses 9.2 and 9.5 | | | KeyLAB ID | Caus2022112255 |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | 0.06107 | 59 |
| 90 | 100 | 0.04609 | 56 |
| 75 | 100 | 0.03307 | 52 |
| 63 | 100 | 0.02372 | 49 |
| 50 | 100 | 0.01689 | 47 |
| 37.5 | 100 | 0.00896 | 40 |
| 28 | 100 | 0.00457 | 35 |
| 20 | 100 | 0.00273 | 25 |
| 14 | 100 | 0.00146 | 20 |
| 10 | 100 | | |
| 6.3 | 100 | | |
| 5 | 100 | | |
| 3.35 | 99 | | |
| 2 | 99 | | |
| 1.18 | 99 | | |
| 0.6 | 98 | Particle density | (assumed) |
| 0.425 | 97 | 2.65 | Mg/m3 |
| 0.3 | 94 | | |
| 0.212 | 89 | | |
| 0.15 | 80 | | |
| 0.063 | 59 | | |

Dry Mass of sample, g: 286

| Sample Proportions | % dry mass |
|---|---|
| Cobbles | 0.0 |
| Gravel | 0.9 |
| Sand | 40.2 |
| Silt | 36.2 |
| Clay | 22.7 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 0.066 |
| D30 | mm | 0.00348 |
| D10 | mm | |
| Uniformity Coefficient | | |
| Curvature Coefficient | | |

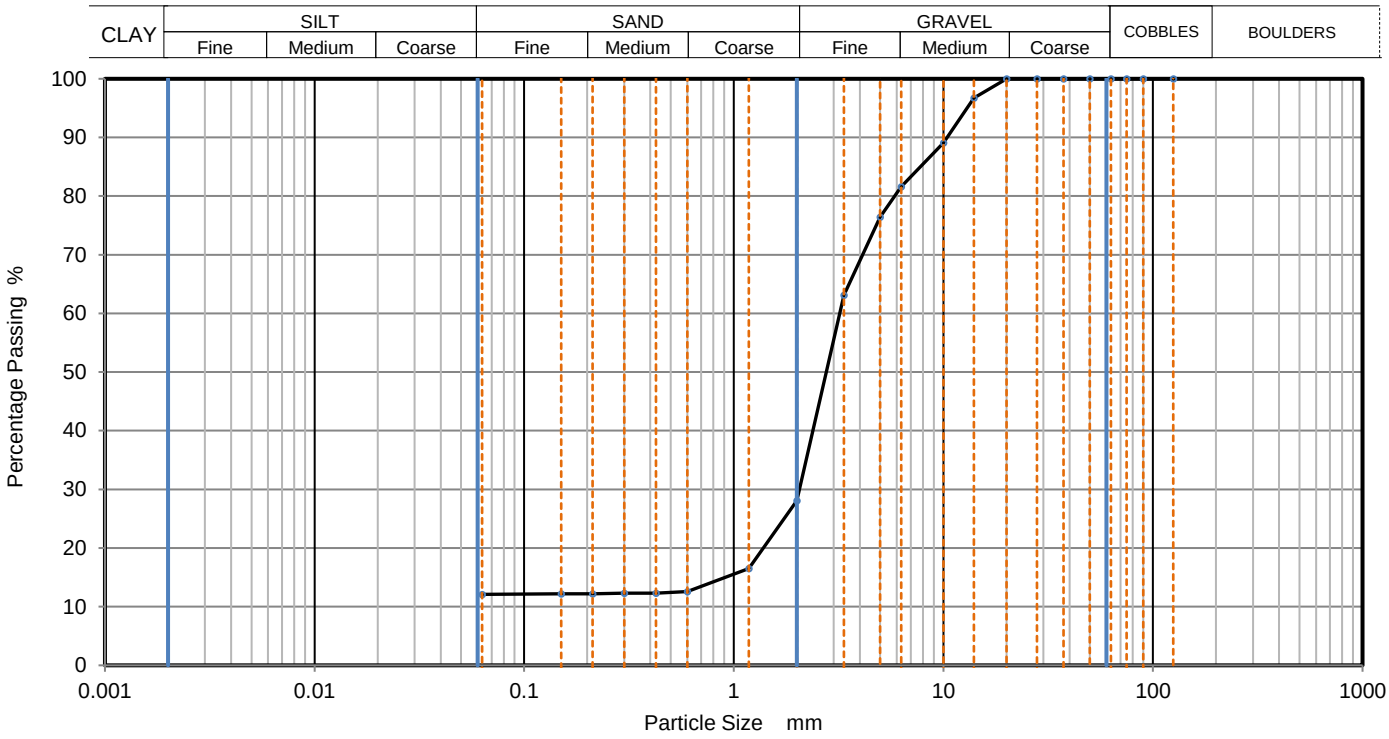
Remarks

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

| Approved |
|---|
| Stephen Watson |

# PARTICLE SIZE DISTRIBUTION

| | | | | | |
|---|---|---|---|---|---|
| Job Ref | | | | | 22-0410 |
| Borehole/Pit No. | | | | | BH08 |
| Site Name | Monksland, Co. Roscommon | | | Sample No. | 3 |
| Specimen Description | Brown slightly gravelly clayey fine to coarse SAND. | | | Sample Depth (m) Top | 1.00 |
| | | | | Base | |
| Specimen Reference | 3 | Specimen Depth | 1 m | Sample Type | B |
| Test Method | BS1377:Part 2:1990, clause 9.2 | | | KeyLAB ID | Caus2022112257 |




| 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 | 100 | | |
| 14 | 97 | | |
| 10 | 89 | | |
| 6.3 | 82 | | |
| 5 | 76 | | |
| 3.35 | 63 | | |
| 2 | 28 | | |
| 1.18 | 17 | | |
| 0.6 | 13 | | |
| 0.425 | 12 | | |
| 0.3 | 12 | | |
| 0.212 | 12 | | |
| 0.15 | 12 | | |
| 0.063 | 12 | | |

Dry Mass of sample, g: 572

| Sample Proportions | % dry mass |
|---|---|
| Cobbles | 0.0 |
| Gravel | 71.9 |
| Sand | 15.9 |
| | |
| Fines <0.063mm | 12.0 |

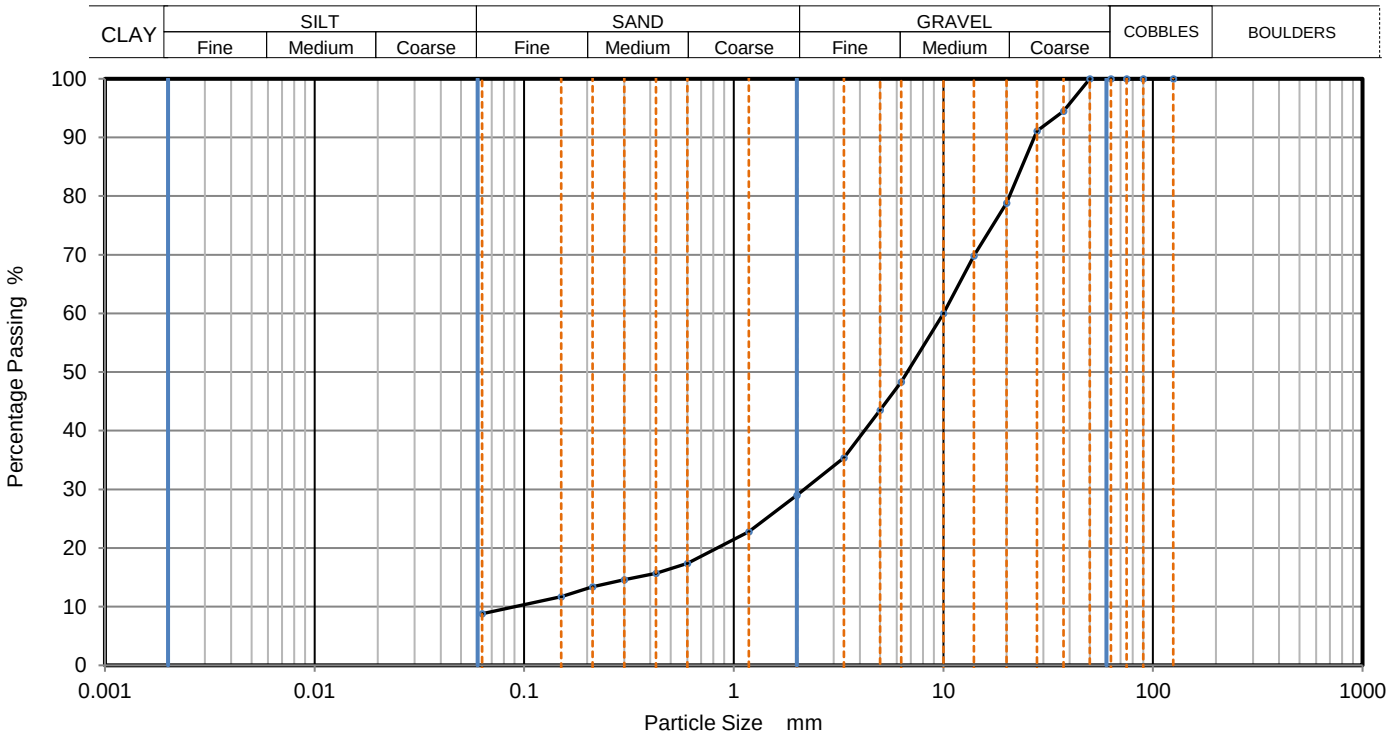
| Grading Analysis | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 3.2 |
| D30 | mm | 2.06 |
| D10 | mm | |
| Uniformity Coefficient | | |
| Curvature Coefficient | | |

Remarks

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

| Approved |
|---|
| Stephen Watson |

| CAUSEWAY GEOTECH | PARTICLE SIZE DISTRIBUTION | | | | Job Ref | | 22-0410 |
|---|---|---|---|---|---|---|---|
| | | | | | Borehole/Pit No. | | BH10 |
| Site Name | Monksland, Co. Roscommon | | | | Sample No. | | 1 |
| Specimen Description | Brown gravelly silty fine to coarse SAND. | | | | Sample Depth (m) | Top | 0.50 |
| | | | | | | Base | |
| Specimen Reference | 3 | Specimen Depth | 0.5 | m | Sample Type | | B |
| Test Method | BS1377:Part 2:1990, clause 9.2 | | | | KeyLAB ID | | Caus2022112260 |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | | |
| 90 | 100 | | |
| 75 | 100 | | |
| 63 | 100 | | |
| 50 | 100 | | |
| 37.5 | 95 | | |
| 28 | 91 | | |
| 20 | 79 | | |
| 14 | 70 | | |
| 10 | 60 | | |
| 6.3 | 48 | | |
| 5 | 44 | | |
| 3.35 | 35 | | |
| 2 | 29 | | |
| 1.18 | 23 | | |
| 0.6 | 17 | | |
| 0.425 | 16 | | |
| 0.3 | 15 | | |
| 0.212 | 13 | | |
| 0.15 | 12 | | |
| 0.063 | 9 | | |

| Dry Mass of sample, g | 3314 |
|---|---|

| Sample Proportions | % dry mass |
|---|---|
| Cobbles | 0.0 |
| Gravel | 71.0 |
| Sand | 20.2 |
| | |
| Fines <0.063mm | 9.0 |

| Grading Analysis | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 9.99 |
| D30 | mm | 2.17 |
| D10 | mm | 0.0899 |
| Uniformity Coefficient | | 110 |
| Curvature Coefficient | | 5.3 |

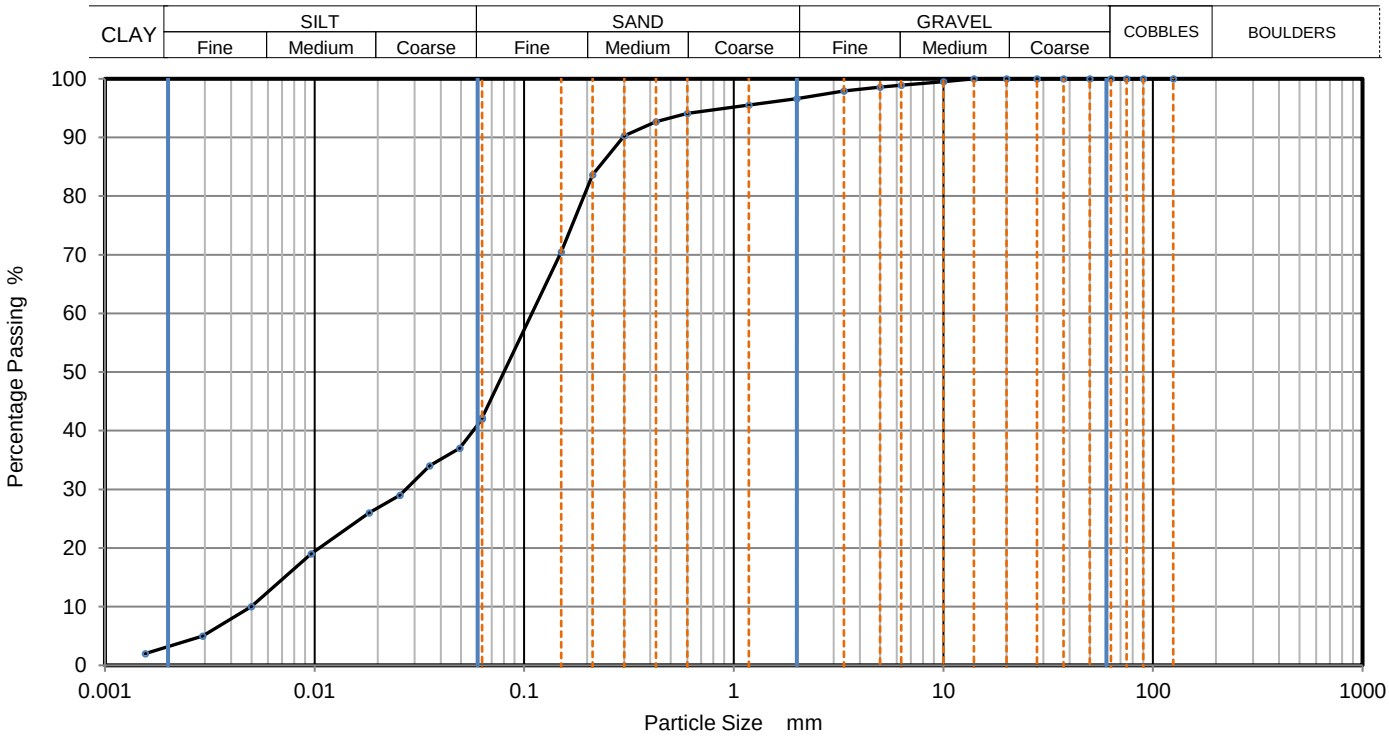
Remarks

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

| Approved |
|---|
| Stephen Watson |

# PARTICLE SIZE DISTRIBUTION

| | | | | | |
|---|---|---|---|---|---|
| Job Ref | | | | | 22-0410 |
| Borehole/Pit No. | | | | | BH11 |
| Site Name | Monksland, Co. Roscommon | | | Sample No. | 3 |
| Specimen Description | Light brown sandy slightly gravelly clayey SILT. | | | Sample Depth (m) Top | 1.00 |
| | | | | Base | |
| Specimen Reference | 3 | Specimen Depth | 1 m | Sample Type | B |
| Test Method | BS1377:Part 2:1990, clauses 9.2 and 9.5 | | | KeyLAB ID | Caus2022112262 |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | 0.06300 | 42 |
| 90 | 100 | 0.04935 | 37 |
| 75 | 100 | 0.03536 | 34 |
| 63 | 100 | 0.02548 | 29 |
| 50 | 100 | 0.01824 | 26 |
| 37.5 | 100 | 0.00965 | 19 |
| 28 | 100 | 0.00499 | 10 |
| 20 | 100 | 0.00293 | 5 |
| 14 | 100 | 0.00156 | 2 |
| 10 | 100 | | |
| 6.3 | 99 | | |
| 5 | 99 | | |
| 3.35 | 98 | | |
| 2 | 97 | | |
| 1.18 | 96 | | |
| 0.6 | 94 | Particle density 2.65 | (assumed) Mg/m3 |
| 0.425 | 93 | | |
| 0.3 | 90 | | |
| 0.212 | 84 | | |
| 0.15 | 71 | | |
| 0.063 | 42 | | |

Dry Mass of sample, g: 579

| Sample Proportions | % dry mass |
|---|---|
| Cobbles | 0.0 |
| Gravel | 3.4 |
| Sand | 54.3 |
| Silt | 39.4 |
| Clay | 2.9 |

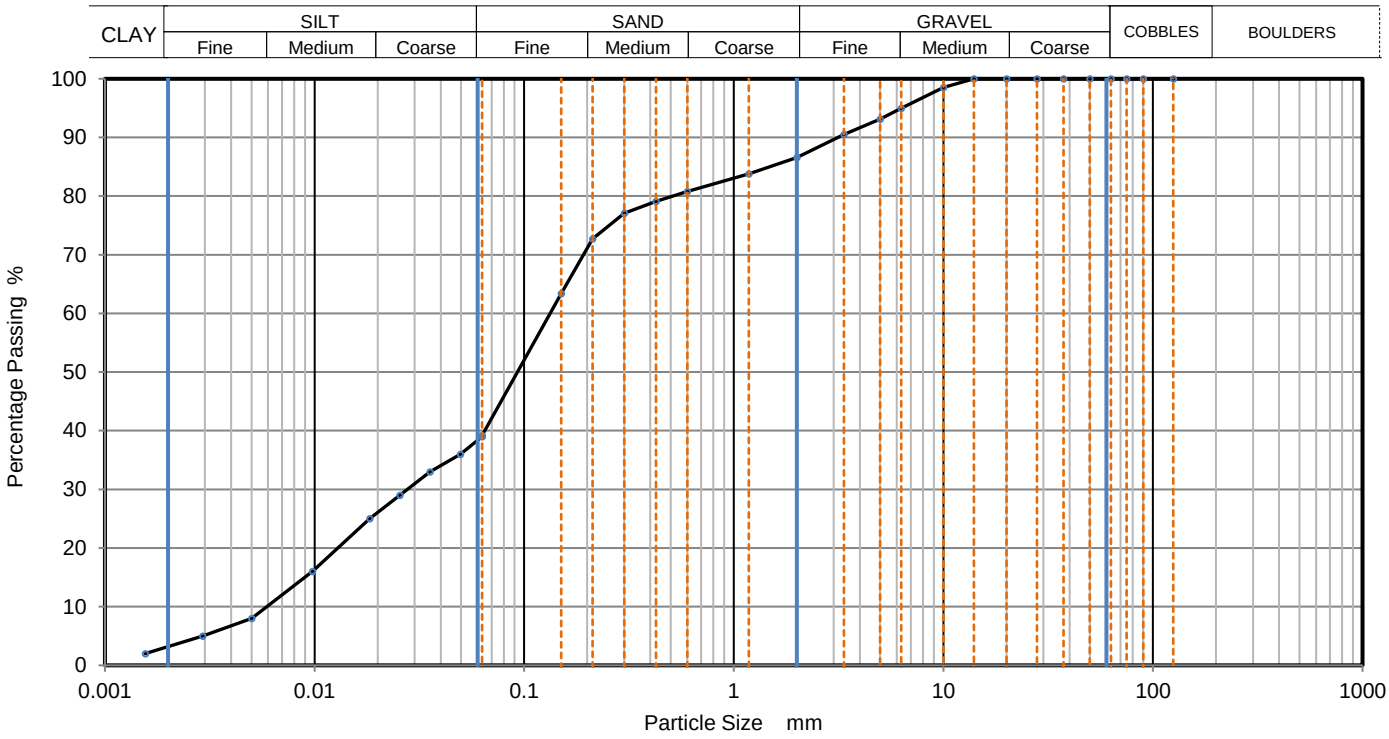
| Grading Analysis | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 0.109 |
| D30 | mm | 0.0269 |
| D10 | mm | 0.00508 |
| Uniformity Coefficient | | 21 |
| Curvature Coefficient | | 1.3 |

Remarks

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

| Approved |
|---|
| Stephen Watson |

| | | | | | |
|---|---|---|---|---|---|
| CAUSEWAY GEOTECH | **PARTICLE SIZE DISTRIBUTION** | | | Job Ref | **22-0410** |
| | | | | Borehole/Pit No. | BH12 |
| Site Name | Monksland, Co. Roscommon | | | Sample No. | 1 |
| Specimen Description | Light brown sandy slightly gravelly silty CLAY. | | | Sample Depth (m) Top | 0.50 |
| | | | | Sample Depth (m) Base | |
| Specimen Reference | 3 | Specimen Depth | 0.5 m | Sample Type | B |
| Test Method | BS1377:Part 2:1990, clauses 9.2 and 9.5 | | | KeyLAB ID | Caus2022112265 |




| Sieving | | Sedimentation | |
|---|---|---|---|
| Particle Size mm | % Passing | Particle Size mm | % Passing |
| 125 | 100 | 0.06300 | 39 |
| 90 | 100 | 0.04968 | 36 |
| 75 | 100 | 0.03559 | 33 |
| 63 | 100 | 0.02548 | 29 |
| 50 | 100 | 0.01835 | 25 |
| 37.5 | 100 | 0.00976 | 16 |
| 28 | 100 | 0.00501 | 8 |
| 20 | 100 | 0.00293 | 5 |
| 14 | 100 | 0.00156 | 2 |
| 10 | 99 | | |
| 6.3 | 95 | | |
| 5 | 93 | | |
| 3.35 | 91 | | |
| 2 | 87 | | |
| 1.18 | 84 | | |
| 0.6 | 81 | Particle density | (assumed) |
| 0.425 | 79 | 2.65 | Mg/m3 |
| 0.3 | 77 | | |
| 0.212 | 73 | | |
| 0.15 | 63 | | |
| 0.063 | 39 | | |

Dry Mass of sample, g: 503

| **Sample Proportions** | % dry mass |
|---|---|
| Cobbles | 0.0 |
| Gravel | 13.4 |
| Sand | 47.5 |
| Silt | 36.2 |
| Clay | 2.9 |

| **Grading Analysis** | | |
|---|---|---|
| D100 | mm | |
| D60 | mm | 0.133 |
| D30 | mm | 0.0271 |
| D10 | mm | 0.00582 |
| Uniformity Coefficient | | 23 |
| Curvature Coefficient | | 0.95 |

Remarks

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

| Approved |
|---|
| Stephen Watson |

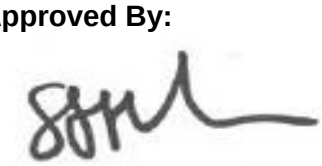
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

# Final Report

| | |
|---|---|
| **Report No.:** | 22-45728-1 |
| **Initial Date of Issue:** | 30-Nov-2022 |
| **Client** | Causeway Geotech Ltd |
| **Client Address:** | 8 Drumahiskey Road<br>Balnamore<br>Ballymoney<br>County Antrim<br>BT53 7QL |
| **Contact(s):** | Alistair McQuat<br>Carin Cornwall<br>Celine Rooney<br>Colm Hurley<br>Darren O'Mahony<br>Gabriella Horan<br>Joe Gervin<br>John Cameron<br>Lucy Newland<br>Martin Gardiner<br>Matthew Gilbert<br>Neil Haggan<br>Paul Dunlop<br>Sean Ross<br>Stephen Franey<br>Stephen McCracken<br>Stephen Watson |
| **Project** | 22-0410 Monksland, Co Roscommon |

| | | | |
|---|---|---|---|
| **Quotation No.:** | | **Date Received:** | 28-Nov-2022 |
| **Order No.:** | | **Date Instructed:** | 28-Nov-2022 |
| **No. of Samples:** | 11 | | |
| **Turnaround (Wkdays):** | 7 | **Results Due:** | 06-Dec-2022 |
| **Date Approved:** | 30-Nov-2022 | | |

**Approved By:**



**Details:** Stuart Henderson, Technical Manager

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

# Results - Soil

**Project: 22-0410 Monksland, Co Roscommon**

| **Client: Causeway Geotech Ltd** | | | **Chemtest Job No.:** | | 22-45728 | 22-45728 | 22-45728 | 22-45728 | 22-45728 | 22-45728 | 22-45728 | 22-45728 | 22-45728 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quotation No.: | | | **Chemtest Sample ID.:** | | 1554092 | 1554093 | 1554094 | 1554095 | 1554096 | 1554097 | 1554098 | 1554099 | 1554100 |
| Order No.: | | | Client Sample Ref.: | | 2 | 6 | 1 | 4 | 2 | 4 | 4 | 2 | 2 |
| | | | Sample Location: | | BH01 | BH02 | BH03 | BH04 | BH05 | BH07 | BH08 | BH09A | BH10 |
| | | | Sample Type: | | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | | Top Depth (m): | | 0.50 | 1.20 | 0.50 | 1.00 | 0.50 | 1.00 | 1.00 | 0.50 | 0.50 |
| | | | Date Sampled: | | 25-Nov-2022 | 25-Nov-2022 | 25-Nov-2022 | 25-Nov-2022 | 25-Nov-2022 | 25-Nov-2022 | 25-Nov-2022 | 25-Nov-2022 | 25-Nov-2022 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | | | | | | | |
| Moisture | N | 2030 | % | 0.020 | 17 | 16 | 6.8 | 17 | 15 | 14 | 6.5 | 13 | 11 |
| pH | U | 2010 | | 4.0 | 8.0 | 8.2 | 8.1 | 8.0 | 7.4 | 7.2 | 8.3 | 6.3 | 8.0 |
| Sulphate (2:1 Water Soluble) as SO4 | U | 2120 | g/l | 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |

# Results - Soil

**Project: 22-0410 Monksland, Co Roscommon**

| **Client: Causeway Geotech Ltd** | | | **Chemtest Job No.:** | | 22-45728 | 22-45728 |
|---|---|---|---|---|---|---|
| Quotation No.: | | | **Chemtest Sample ID.:** | | 1554101 | 1554102 |
| Order No.: | | | Client Sample Ref.: | | 4 | 2 |
| | | | Sample Location: | | BH11 | BH12 |
| | | | Sample Type: | | SOIL | SOIL |
| | | | Top Depth (m): | | 1.00 | 0.50 |
| | | | Date Sampled: | | 25-Nov-2022 | 25-Nov-2022 |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | |
| Moisture | N | 2030 | % | 0.020 | 13 | 14 |
| pH | U | 2010 | | 4.0 | 7.5 | 6.9 |
| Sulphate (2:1 Water Soluble) as SO4 | U | 2120 | g/l | 0.010 | < 0.010 | < 0.010 |

# 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 |

## 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**

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

CAUSEWAY GEOTECH

# APPENDIX D

# SPT HAMMER ENERGY MEASUREMENT REPORT

# Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

**Dynamic Sampling Uk Ltd**
**Unit 8 Victory Park**
**Victory Road**
**Derby**
**DE24 8ZF**

| | |
|---|---|
| Hammer Ref: | D130 **(Asset No. 1411)** |
| Test Date: | 25/04/2022 |
| Report Date: | 25/04/2022 |
| File Name: | D130.spt |
| Test Operator: | B.HUNTER |

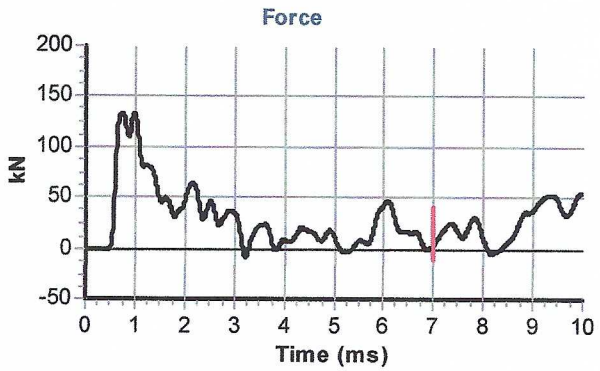
## Instrumented Rod Data

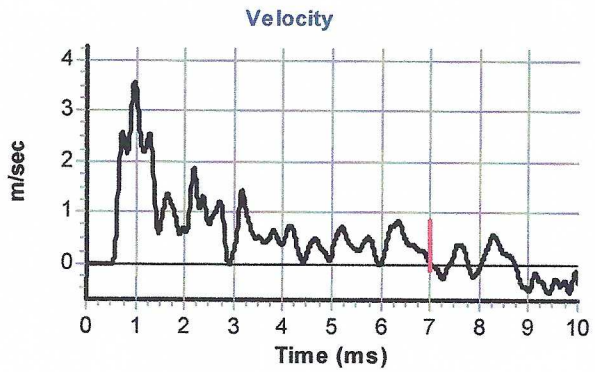
| | |
|---|---|
| Diameter $d_r$ (mm): | 54 |
| Wall Thickness $t_r$ (mm): | 6.5 |
| Assumed Modulus $E_a$ (GPa): | 208 |
| Accelerometer No.1: | 62901 |
| Accelerometer No.2: | 62902 |

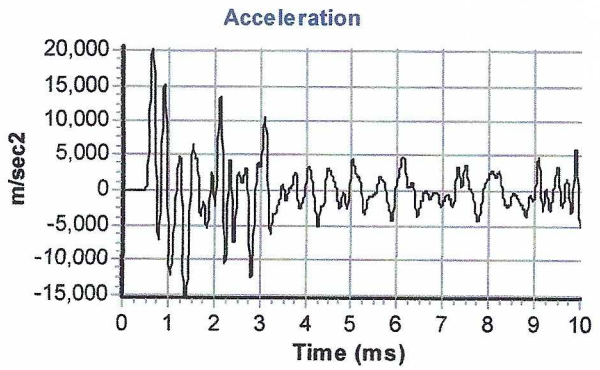
## Hammer Information

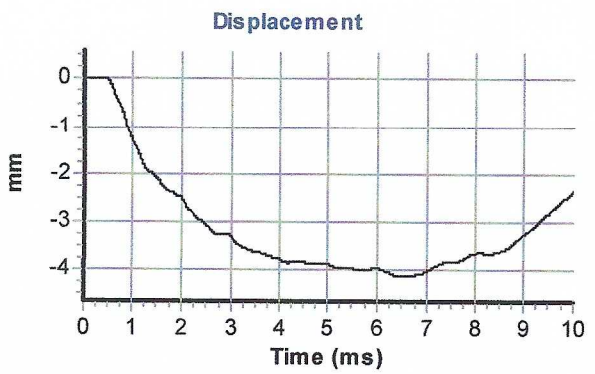
| | |
|---|---|
| Hammer Mass m (kg): | 63.5 |
| Falling Height h (mm): | 760 |
| String Length L (m): | 10.0 |

**Comments / Location**




## Calculations

| | |
|---|---|
| Area of Rod A (mm2): | 970 |
| Theoretical Energy $E_{theor}$ (J): | 473 |
| Measured Energy $E_{meas}$ (J): | 318 |

**Energy Ratio $E_r$ (%):** **67**

Signed: B.Hunter

Title: Operations Manager

The recommended calibration interval is 12 months