



Site 3, Kilnavarra Lane, Cavan, Co. Cavan – Site Investigation

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Client: Comhairle Contae an Chabháin /
Cavan County Council

Client's Representative: Alan Traynor Consulting Engineers Ltd

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Revision	Status	Report prepared by:	Report reviewed by:	Report approved by:	Issue date
003	Draft Interpretative	Mark Nyhan	Glen Byrne	Michael O'Connell	5th July 2024

The works were conducted in accordance with:

Engineers Ireland (Geotechnical Society of Ireland) (2016), Specification and Related Documents for Ground Investigation in Ireland, 2nd edition 2016.

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

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

METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in Section 6 of BS 5930:2015+A1:2020, Code of Practice for Ground Investigations. However, the following terms are used in the description of fine-grained soils, where applicable:

- Soft to Firm: fine-grained soil with consistency description close to the boundary between soft and firm soil (Table 7 of BS5930).
- Firm to Stiff: fine-grained soil with consistency description close to the boundary between firm and stiff soil (Table 7 of BS5930).

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample
P	Nominal 100mm diameter undisturbed piston sample
B	Bulk disturbed sample
D	Small disturbed sample
W	Water sample
ES / EW	Soil sample for environmental testing / Water sample for environmental testing
SPT	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,x	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length. The length achieved is stated (mm) for any test increment less than 75mm
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm)
N=X/Z	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given test length 'Z' (mm)
V VR	Shear vane test (borehole) Hand vane test (trial pit) Shear strength stated in kPa V: undisturbed vane shear strength VR: remoulded vane shear strength
dd/mm/yy: 1.0 dd/mm/yy: dry	Date & water level at the borehole depth at the end of shift and the start of the following shift
Abbreviations relating to rock core	
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.



Site 3, Kilnavara Lane, Kilnavara, Cavan, Co. Cavan

1 AUTHORITY

On the instructions of Alan Traynor Consulting Engineers Ltd, acting on the behalf of the Comhairle Contae an Chabháin / Cavan County Council, a ground investigation was undertaken at the above location to provide geotechnical information for input to the design and construction of proposed housing development at Kilnavara Lane, Kilnavara, Cavan, Co. Cavan.

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.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those measured during the investigation.

This report was prepared by OCB Geotechnical Ltd for the use of the Comhairle Contae an Chabháin / Cavan County Council and Alan Traynor Consulting Engineers Ltd in response to particular 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 Alan Traynor Consulting Engineers Ltd, included dynamic windowless sampling, dynamic probes, a dynamic cone penetrometer (indirect CBR) test, a trial pit, laboratory testing, and the preparation of an interpretative report on the findings.

3 DESCRIPTION OF SITE

The site is located on the east to southeast side of a bend in Kilnavara Lane (Local Road L2540), approximately 0.65 kilometres south-southwest of Cavan town centre in Co. Cavan. The property is located at the northeast portion of Kilnavara townland.

The site consists of an elongate curved property along the outer east side a bend in Kilnavarra Lane where it changes from a north-south orientation to more northeast-southwest orientation heading south. The site measures approximately 120 metres long by 20 to 27 metres wide. At the time of the site investigation, the site was occupied by four agricultural shed buildings with adjacent concrete yards and fringing grassland in the north and a detached residential property containing a derelict bungalow, rear sheds, a concrete driveway and grass lawn areas in the southwest.

Ground surface in the site vicinity slopes from the crest of a drumlin towards the east and southeast in the direction of the Cavan River, which flows to the northeast and north at approximately 300 to 350 metres to the east of the site. Swellan Lough is located to the northwest on the other side of the drumlin. Ground surface slopes more gently to the east within the site and then more steeply immediately east of the site down towards the Cavan River. Ground elevations at the exploratory hole locations ranged from 91.0m MSL to 92.1m MSL.

The site is bordered by sloping agricultural land to the north, east and south, detached residential properties along the southeast side of Kilnavarra Lane to the southwest and by Kilnavarra Crescent / Kilnavarra Heights housing estate on the hillside above to the northwest. The Royal School Cavan is located at a lower elevation in the Cavan River valley to the east at approximately 100 metres to the east of the site.

The existing site is presented on the site and exploratory hole location plans in Appendix A.

4 SITE OPERATIONS

Site operations, which were conducted between 22nd March and 8th May 2024, included:

- One (1) Dynamic Windowless Sampling Probe
- Six (6) Dynamic Probes, including an offset location
- One (1) Dynamic Cone Penetrometer (Indirect CBR) Test
- One (1) Trial Pit

The exploratory holes were located as instructed by Alan Traynor Consulting Engineers Ltd as shown on the exploratory hole location plans in Appendix A.

4.1 Dynamic Sampling and Probing

One (1) windowless sample probe (WS3-4) was put down to refusal using a Dando Terrier rig. The hammer weight and fall height was the same as that used for the dynamic probe heavy method: a 50kg hammer falling 500mm onto the windowless sampling probe. Windowless sampling was conducted from ground surface to a depth of 3.0m BGL in WS3-4.

Six (6) dynamic probes (DP3-1, DP3-1(2), DP3-2, DP3-2A, DP3-4 and DP3-4(2)) were completed using a Dando Terrier rig using the DPH method as described in BSEN ISO 22476-2. This method entails a 50kg hammer falling 500mm onto a 90° cone of 50.5mm diameter. Proposed dynamic probe DP3-3 could not be completed because a concrete surface was present below vegetation at this area and access to the grass field at the rear of this area was blocked by remnants of a wall and collapsed roofing materials.

Dynamic probing was conducted from ground surface to a depth of 5.0m BGL in both DP3-1 and DP3-4 where soil with a strength equivalent to stiff to very stiff was encountered and was conducted to refusal at 6.5m BGL in a second attempt at DP3-1(2). The second attempt at DP3-4(2) met refusal at a shallower depth of 3.3m BGL. Dynamic probing at DP3-2 and offset probe DP3-2A met shallow refusal on subsurface obstructions at depths of 0.4m BGL and 0.9m BGL.

Appendix B provides the dynamic probe logs in the form of plots, against depth, of the number of blows per 100mm penetration as well as logs of the soils encountered by window sampling.

4.2 Dynamic Cone Penetrometer (Indirect CBR) Tests

An Indirect CBR tests (DCP2-1) was conducted using a Dynamic Cone Penetrometer (DCP). This equipment was developed in conjunction with the UK Transport Research Laboratory, is used widely throughout the world and is referred to in the UK Highway Agency Interim Advice Note 73/06: Design Guidance for Road Pavement Foundations. The DCP equipment incorporates an 8kg steel drop weight that falls vertically through a height of 575mm to strike a steel anvil that is rigidly attached via steel rods to a 20mm diameter 60-degree steel cone, which is driven vertically into the ground.

The test result is presented in Appendix C together with a plot of the variation with depth of the cumulative blow count. A CBR value has been estimated for the 50th percentile penetration rate in millimetres per blow between 50mm and 550mm of penetration from top of subgrade level at each test location using the following relationship, as proposed by the Interim Advice Note 73/06:

$$\text{Log}_{10} (\text{CBR}) = 2.48 - 1.057 * \text{Log}_{10} (\text{mm/blow})$$

4.3 Trial Pit

One (1) trial pit (TP3-1) was excavated at the bungalow garden at the south end of the site on 28th March 2024 using a 3-tonne Kubota U27-4 excavator, fitted with 600mm wide bucket, to a depth of 2.4m BGL.

Disturbed (small tub and bulk bag) samples were taken at standard depth intervals and at changes of strata. Any water strikes encountered during excavation were recorded along with any changes in their levels as the excavation proceeded. The stability of the trial pit walls was noted on completion. The trial pit was backfilled with arisings and compacted using the excavator.

Appendix D presents the trial pit log with photographs of the pit and arisings provided in Appendix E.

4.4 Surveying

A broad survey of the site using a handheld CAT scanner to identify any existing buried services or old foundations/obstructions to excavation was carried out before commencement of excavation works.

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from OCB Geotechnical. Surveying was carried out using a Trimble R6 GPS system employing VRS and real time kinetic (RTK) techniques.

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

5 LABORATORY WORK

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

5.1 Geotechnical Laboratory Testing of Soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement and Atterberg Limit tests;
- **soil chemistry:** pH and water-soluble sulphate content.

Laboratory testing of soils samples was carried out in accordance with I.S. EN 1997-2:2007: *Eurocode 7: Geotechnical design - Part 2 Ground investigation and testing* and British Standards Institute (2022) *BS 1377-2, Methods of test for soils for civil engineering purposes – Part 2: Classification tests and determination of geotechnical properties*.

The geotechnical soil test results are presented in Appendix F.

6 GROUND CONDITIONS

6.1 General Geology of the Area

The Geological Survey of Ireland (GSI) database indicates that the site is located in an area with a drumlin and ribbed moraine topography that is underlain mainly by Glacial Till derived from limestones. Cut-over raised peat and alluvium also occur locally in the more low-lying areas around Cavan town. The poorly sorted Glacial Till (diamict) in the site vicinity was deposited under and at the margins of an ice sheet mainly during the last (c. 70,000 to 13,000 years ago) of multiple glacial periods in the Pleistocene epoch (2.58 Ma

to 11.7 Ka). Subglacial lineations such as drumlin axes and striae in the vicinity of Cavan town mostly have NNW-SSE orientations.

The GSI bedrock geology database indicates that the overburden soils in the site vicinity are underlain by the early Carboniferous (Tournaisian-age, c. 359-347 Ma) Cooldaragh Formation which consists of pale brown-grey siltstones and mudstones, algal, evaporitic and argillaceous micrites and muddy siltstones. The thickness of the Cooldaragh Formation is unknown but it is estimated to be up to 125m thick in places; the palaeoenvironment of the formation is thought to be marginal marine and periodically sub-aerial (Geraghty, 1997).

The bedrock strata were subjected to deformation (folding and faulting) during subsequent tectonic events including an extensional phase during the Early Carboniferous (prior to 323Ma), a compressional/shear phase during the Variscan Orogeny (mountain building event) in Late Carboniferous and Early Permian times (c. 318-297 Ma) as well as north-south Alpine-Pyrenean compression and North Atlantic extension during the Paleogene period (c. 66-23 Ma) of the Cenozoic era.

Cavan town is located at the inner southeast edge of a horseshoe-shaped embayment along the northwest margin of the southwest-northeast trending Longford-Down Massif where an early Carboniferous (Tournaisian-age, c. 359-347 Ma) transgressive sequence of marginal marine to marine bedrock strata unconformably overlie Upper Ordovician-age (c. 458-443 Ma) sedimentary bedrock to the southeast. The unconformable contact is offset by a northeast-southwest trending stepped segmented array of normal faults down throwing to the northwest and with a dextral (right-lateral) component of displacement. The predominant northeast-southwest structural fabric is locally offset by northwest-southeast to north-south strike-slip faults. The Upper Ordovician-age strata commonly dip at steep angles to the southeast, while the unconformably overlying early Carboniferous-age strata generally dip at shallow angles (less than 15 degrees) in directions between north and west. In addition to displacement faults, the bedrock strata are also pervaded by a network of tectonic joints, brittle fractures across which there is no discernible displacement parallel to the fracture plane.

The sedimentary bedrock strata in Co. Cavan were subsequently locally intruded by northwest-southeast to west-east trending linear igneous dykes of the Erne and Donegal-Kingscourt dyke swarms, two of the five dyke swarms emplaced across the north of Ireland during igneous activity in the Palaeogene period (c. 66-23 Ma) of the Cenozoic era (Anderson, Walsh & Cooper, 2016).

The Cooldaragh Formation is classified by the GSI as a locally important aquifer consisting of bedrock which is moderately productive only in local zones. The site is located on a drumlin and has a low to moderate groundwater vulnerability index.

6.2 Ground Types Encountered During Investigation of the Site

Beneath a surficial cover of Topsoil, the trial pit excavated at the southern portion of the Kilnavarra site encountered cohesive soils. At the northern end of the site, a window sample encountered topsoil and possible Made Ground or disturbed native soil over soft cohesive soil and firm Glacial Till. A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- TOPSOIL consisting of very soft dark greyish brown slightly sandy slightly gravelly silty CLAY with frequent rootlet was present in the upper 300mm at trial pit TP3-1.
- Topsoil over Possible Made Ground or Disturbed Native Soil consisting of yellowish brown and grey slightly sandy gravelly silty Clay was encountered to a depth of around 1.1m BGL at window sample WS3-4 near the northern end of the site.
- Shallow Cohesive Soils: Very soft to soft brown to yellowish brown mottled light brownish grey silty CLAY with occasional gravel, a trace of white ceramic fragments and occasional rootlets was from 0.3m BGL to 0.8m BGL at trial pit TP3-1 near the southern end of the site. Soft greyish brown to brownish grey slightly sandy silty CLAY with occasional gravel and occasional dark greyish brown possible organic material was encountered from 1.1m to 2.4m BGL at window sample WS3-4 near the northern end of the site.
- GLACIAL TILL: Soft brown with a little dark brownish grey and orange slightly sandy slightly gravelly silty CLAY with low cobble to small boulder content was encountered from 0.8m BGL to 2.1m BGL over firm to stiff greyish brown slightly sandy slightly gravelly silty CLAY with medium cobble to small boulder content between 2.1m BGL and the penetrated depth of 2.4m BGL at trial pit TP3-1 near the southern end of the site. Firm yellowish brown mottled light grey slightly sandy slightly gravelly silty CLAY (possibly also with cobble and boulder content) was encountered from 2.4m to the penetrated depth of 3.0m BGL at window sample WS3-4 near the northern end of the site.
- Dynamic probe blow counts at DP3-1/DP3-1(2) in the south indicate that soils with a strength equivalent to firm were present below depths of 2.1m to 2.2m BGL and that soils became stiff below about 2.7m to 3.4m BGL and very stiff below 3.3m to 4.2m BGL. Dynamic probe blow counts at DP3-4/DP3-4(2) in the north south indicate that soils with a strength equivalent to firm were present below depths of 2.4m to 2.6m BGL and that soils became stiff below about 2.9m to 3.3m BGL. Dynamic probing at DP3-2 and offset probe DP3-2A met shallow refusal on subsurface obstructions at depths of 0.4m BGL and 0.9m BGL.

6.3 Groundwater

Groundwater was observed trickling from the sides and pooling at the base of trial pit TP3-1 at the southern portion of the Kilnavarra site.

It should be noted that groundwater conditions are subject to change seasonally and in response to local weather events.

7 DISCUSSION

7.1 Proposed Construction

It is proposed to construct a new housing development at Kilnavara Lane, Kilnavara, Cavan, Co. Cavan.

No further details were available to OCB Geotechnical at the time of preparing this report.

7.2 Recommendations for construction

Dynamic probing at DP3-1/DP3-1(2) in the south and DP3-4/DP3-4(2) in the north encountered soils with strengths equivalent to firm or firm to stiff below depths of 2.1m BGL to 2.5m BGL and equivalent to stiff below a depth of about 3.0m to 3.5m BGL. Beneath Topsoil, very soft to soft shallow cohesive soils and soft upper more weathered Glacial Till, trial pit TP3-1 at the southern portion of the site encountered firm to stiff Glacial Till between 2.1m BGL and the penetrated depth of 2.4m BGL.

It is recommended that excavations for building foundations and associated infrastructure be taken to below Topsoil and very soft to soft shallow soils in order to minimize the possibility of excessive settlement. The structures could be founded on deep strip or raft foundations within soil with a strength equivalent to firm or firm to stiff at depths of 2.1m BGL to 2.5m BGL. Based on the information available, a maximum allowable bearing capacity of 75kPa is recommended for firm material with a maximum anticipated settlement of 25mm. Alternatively, the structures could be founded on short-bored piles taken to soils with a strength equivalent to stiff below 3.5m BGL with a maximum allowable bearing capacity of 150kPa. Additional investigation may be warranted to confirm that ground conditions at the middle of the site are similar to those encountered at the northern and southern portions of the site.

The base of foundation excavations should be thoroughly inspected by an experienced engineer and the required bearing capacity verified in-situ. Any soft/loose soils should be removed with the resultant void backfilled with leanmix concrete or granular engineering fill (Class 6 or similar approved material). A consistent bearing stratum should be provided across each structure in order to limit differential settlements.

Given the generally fine grained/cohesive nature of the soils at most of the proposed formation levels, excavations for foundations and drainage devices are likely to be relatively stable. However, any instability can be minimised by battering the side slopes at two vertical to one horizontal (2:1) and by limiting the duration that the excavation is open. This slope should be reduced to one vertical to two horizontal (1:2) in areas of granular material. Groundwater control, if required, should be possible by pumping from sumps formed in the base of excavations.

The use of ground bearing floor slabs is considered appropriate for deep strip foundations following the removal of any loose/soft material 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 loose/soft soils is greater than 600mm. If structures are founded on short-bored piles, it is recommended that the ground floor be constructed on reinforced concrete ground beams cast over the piles with suspended floor slabs. Pile capacities should be verified in-situ using both static and dynamic pile tests. The advice of a specialist piling contractor should be sought to determine the most suitable pile type, spacing and proportion of pile tests required.

7.2.1 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 (2005).

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 development and not perceived as containing pyrite;
- Sites not subjected to previous 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 a developed brownfield site and generally not perceived as containing pyrite.

The results of chemical tests on soil samples indicate Design Sulphate Class DS-1 and ACEC Class AC-1 – 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

Anderson, H., Walsh, J.J. and Cooper, M.R., 2016. 'Faults, intrusions and flood basalts: the Cenozoic structure of the north of Ireland' in M.E. Young (ed.), *Unearthed: impacts of the Tellus survey of the north of Ireland*. Dublin. Royal Irish Academy.

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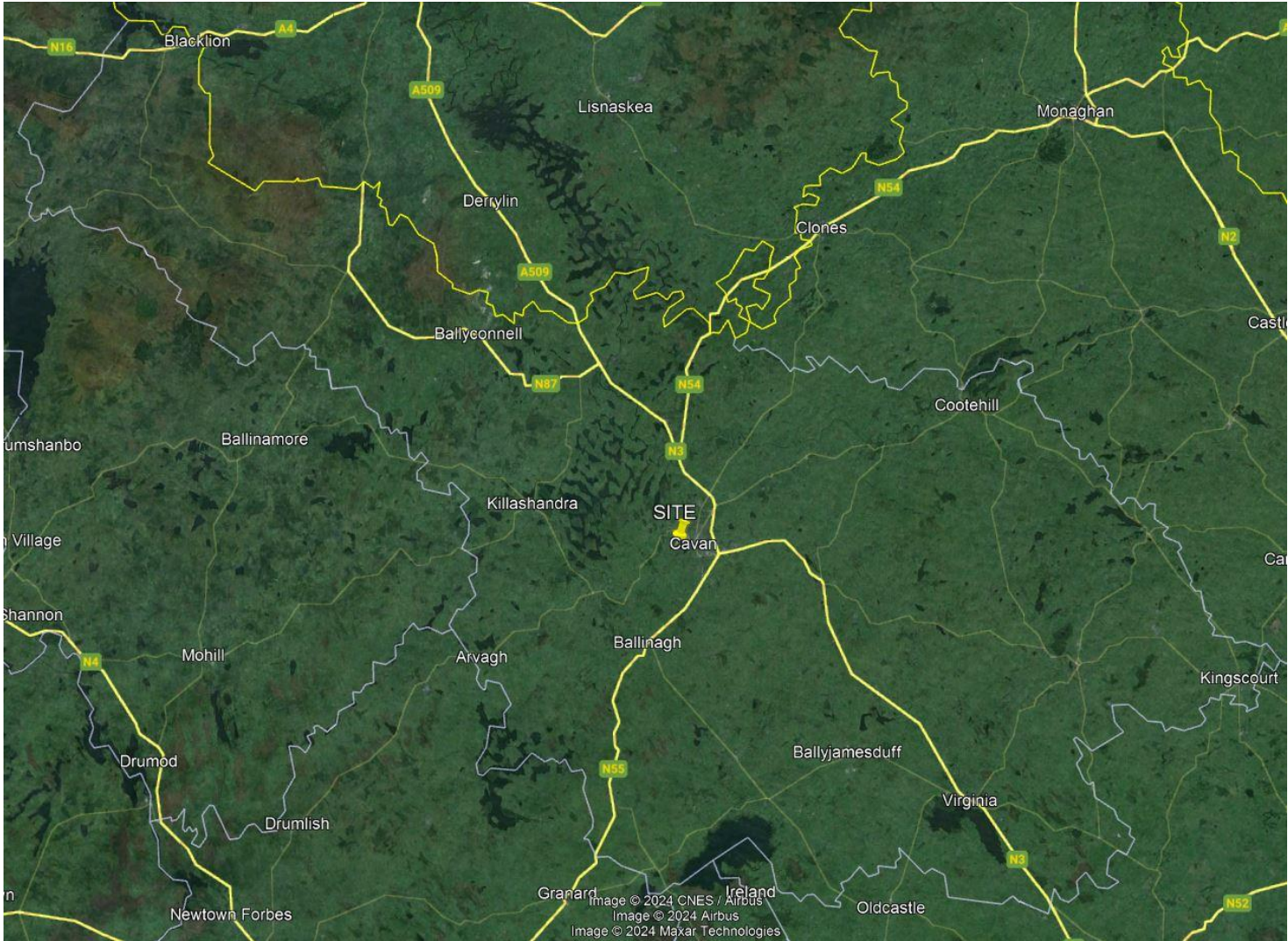
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Geraghty, M. 1997. Geology of Monaghan - Carlingford: A geological description to accompany the bedrock geology 1:100,000 scale map series, Sheet 8/9, Monaghan - Carlingford. Geological Survey of Ireland.

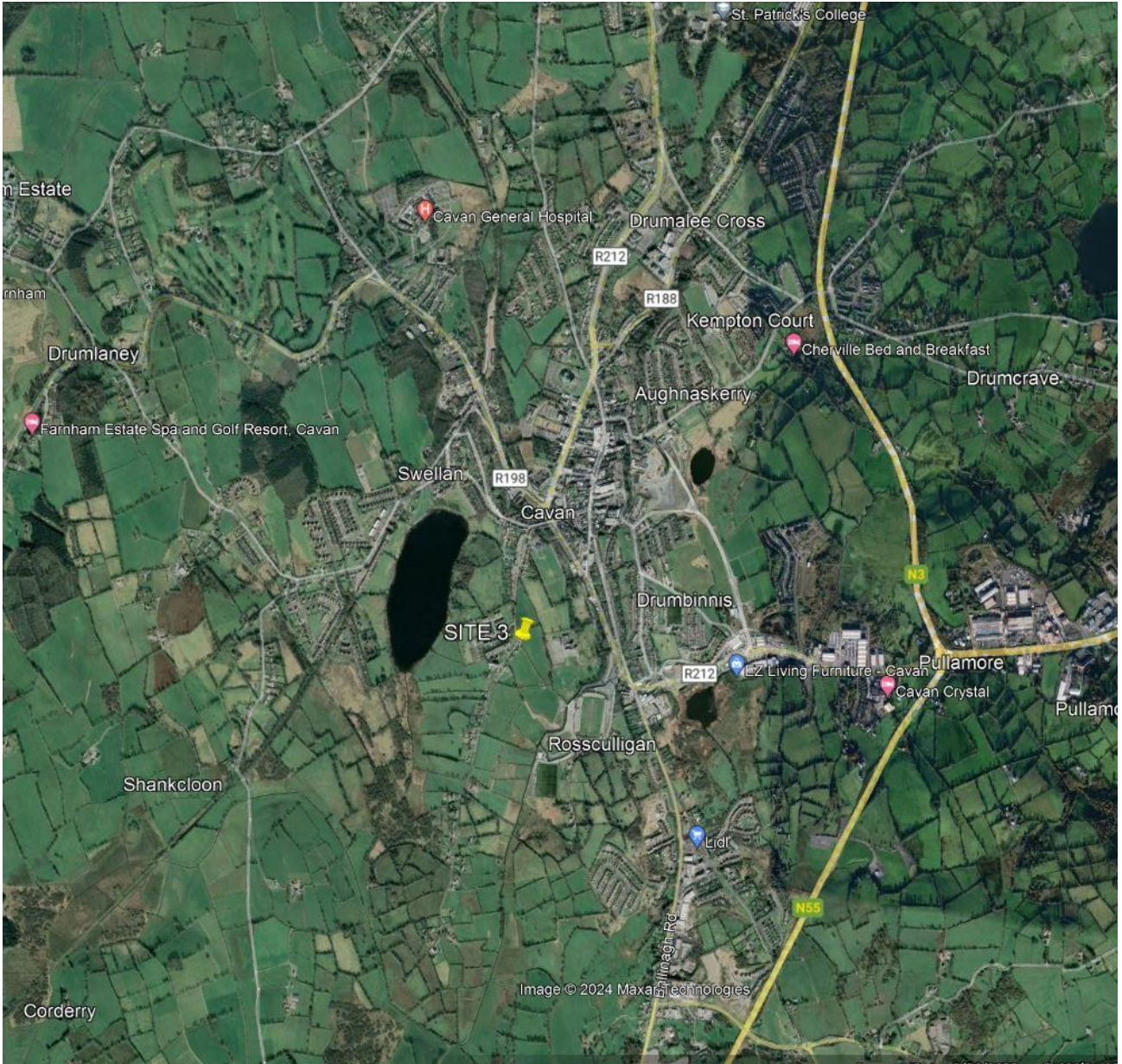
Appendix A Site and Exploratory Hole Location Plans



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Site Location Plan

CLIENT Cavan County Council / Comhairle Contae an Chabháin	
ENGINEER Alan Traynor Consulting Engineers Ltd	
DATE	May 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Site Location Plan

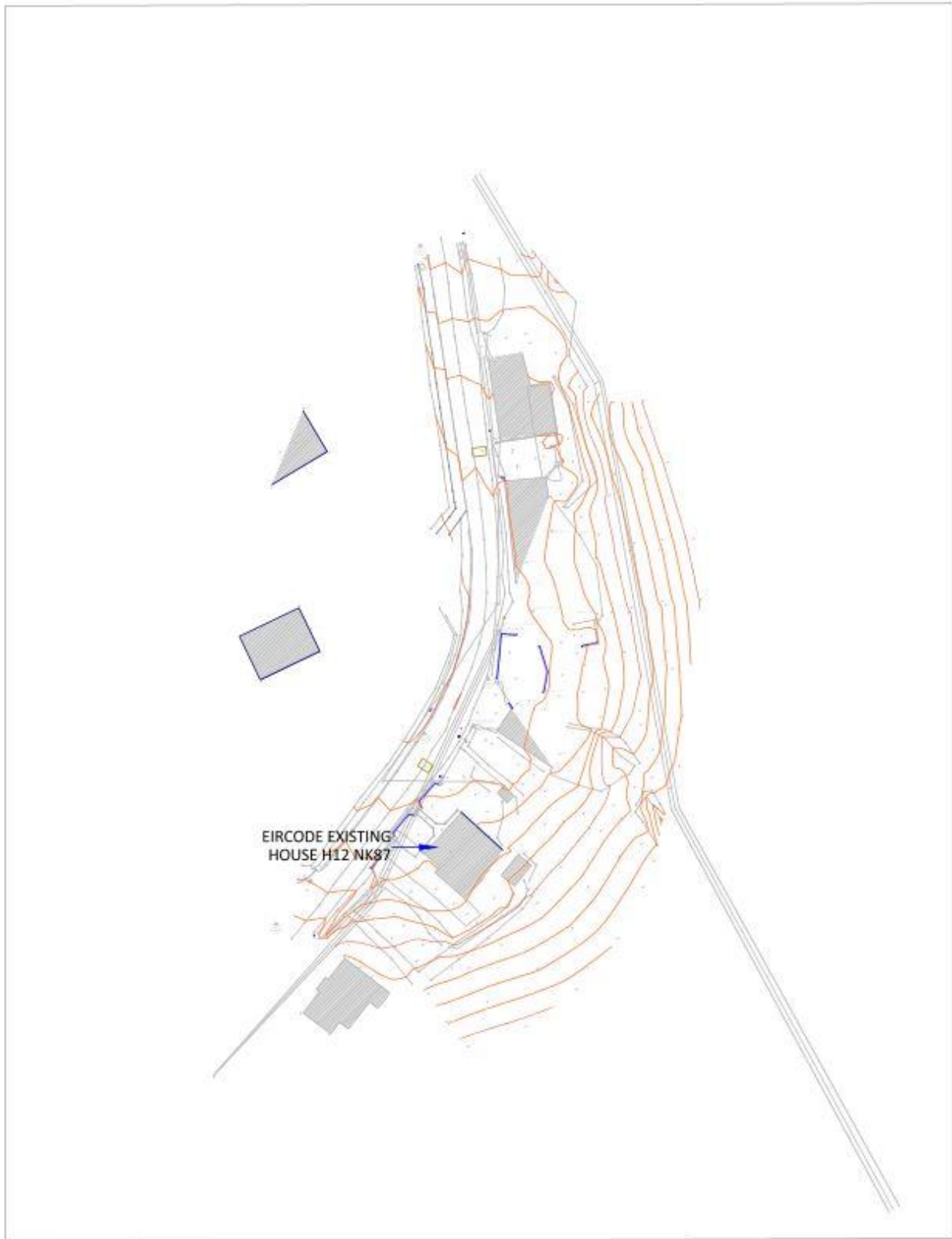
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ENGINEER Alan Traynor Consulting Engineers Ltd	
DATE	May 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Site Location Plan

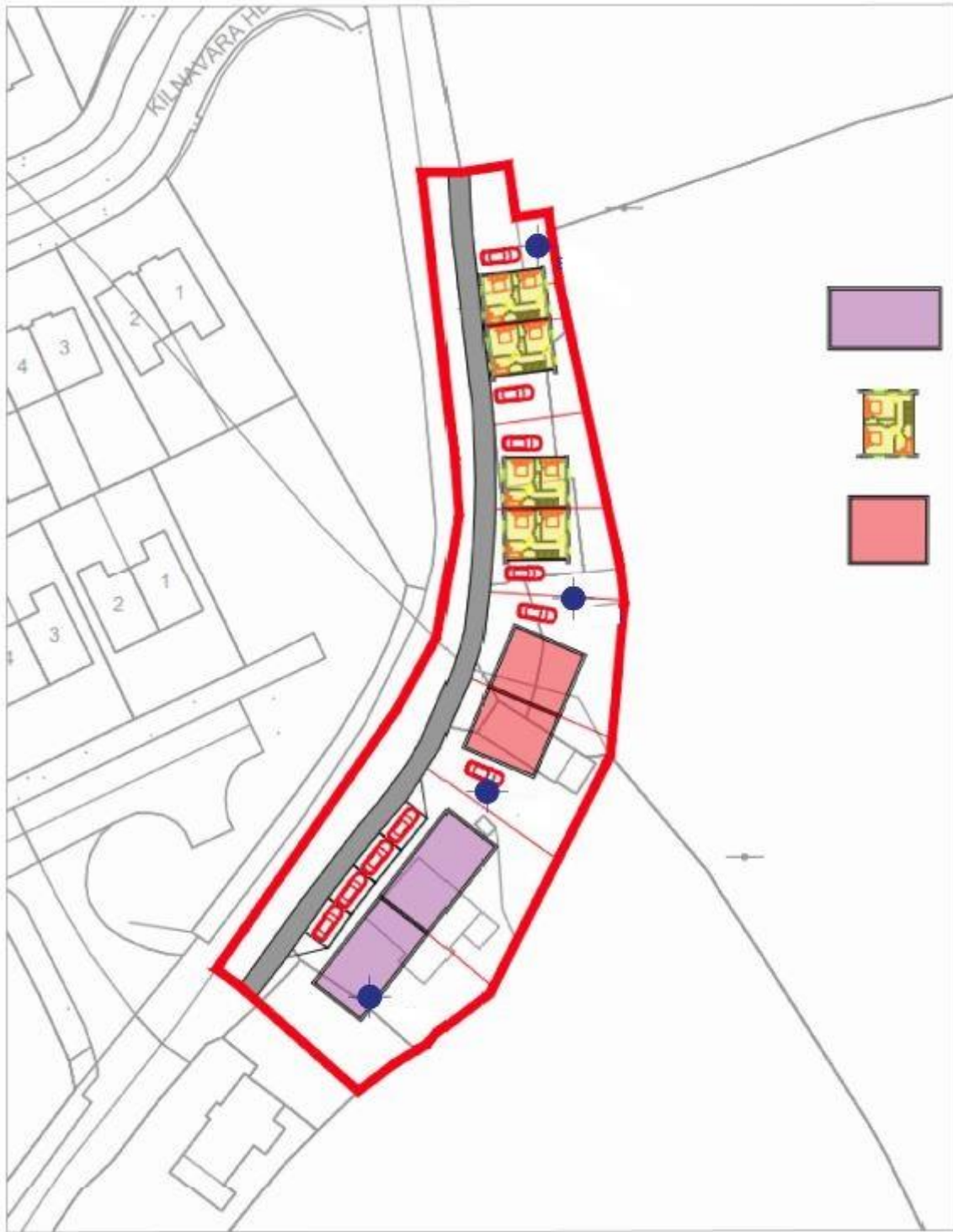
CLIENT Cavan County Council / Comhairle Contae an Chabháin	
ENGINEER Alan Traynor Consulting Engineers Ltd	
DATE	May 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Site Survey Plan

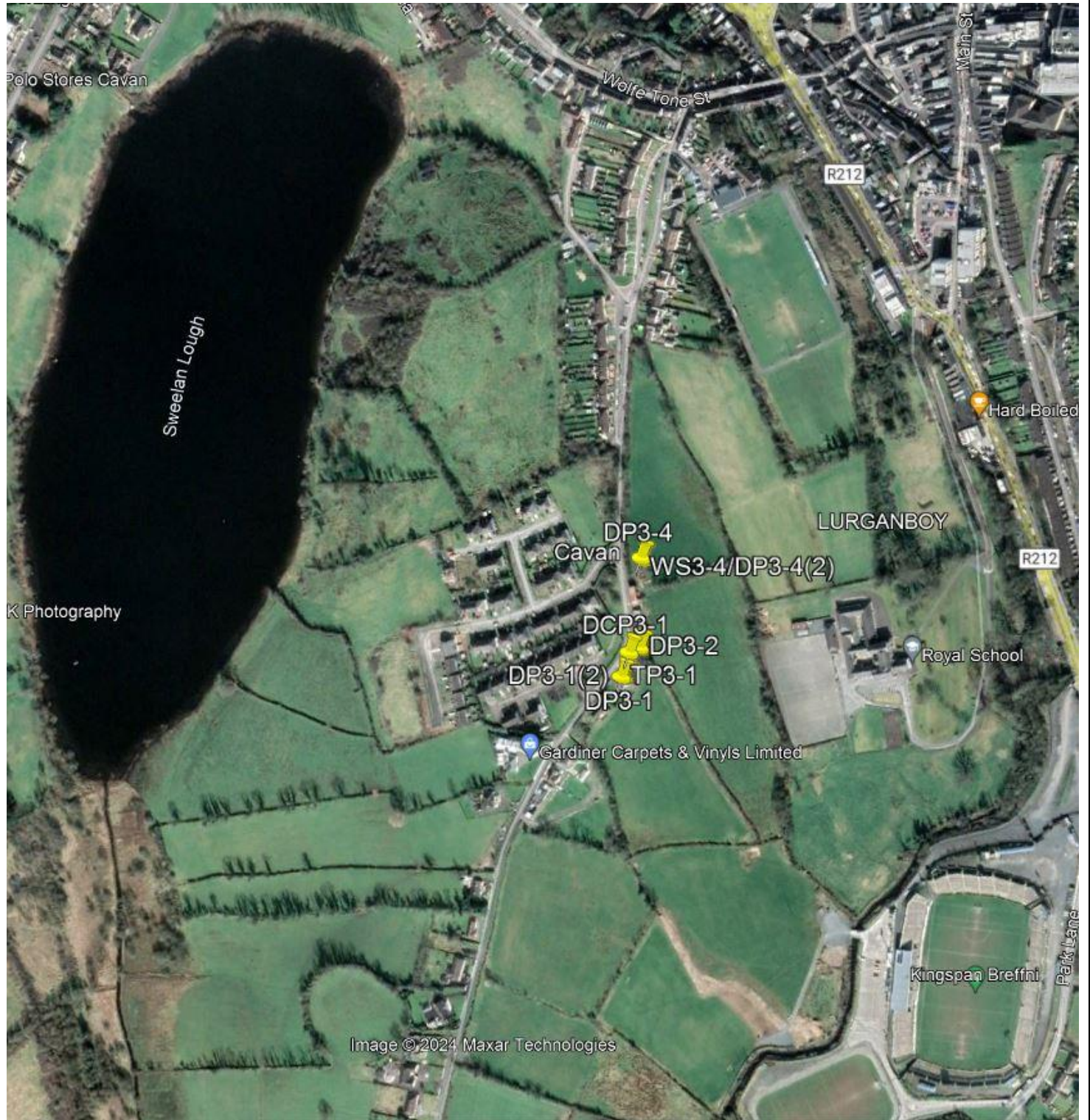
CLIENT Cavan County Council / Comhairle Contae an Chabháin	
ENGINEER Alan Traynor Consulting Engineers Ltd	
DATE	May 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Proposed Site Layout

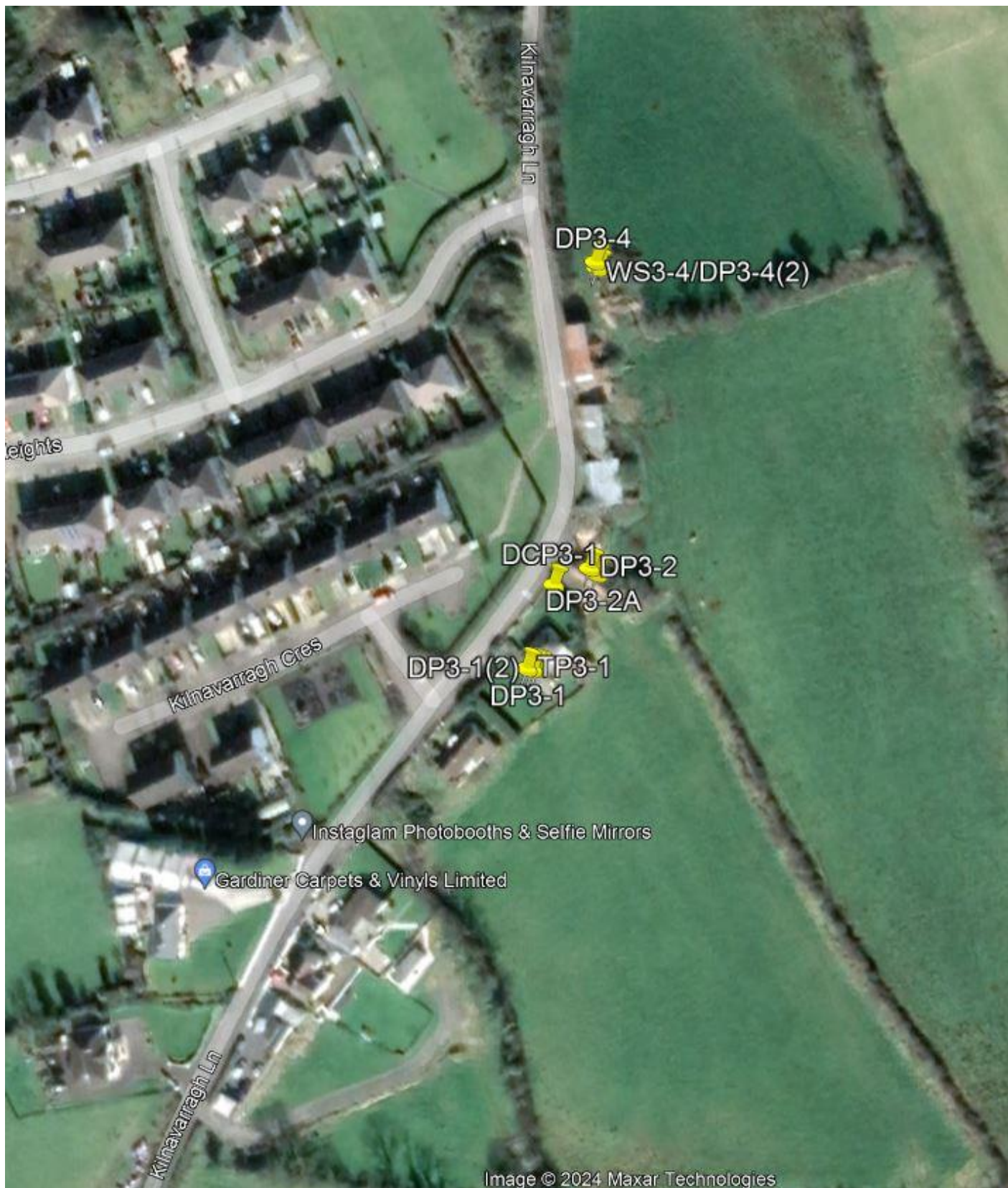
CLIENT Cavan County Council / Comhairle Contae an Chabháin	
ENGINEER Alan Traynor Consulting Engineers Ltd	
DATE	May 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Site Location Plan

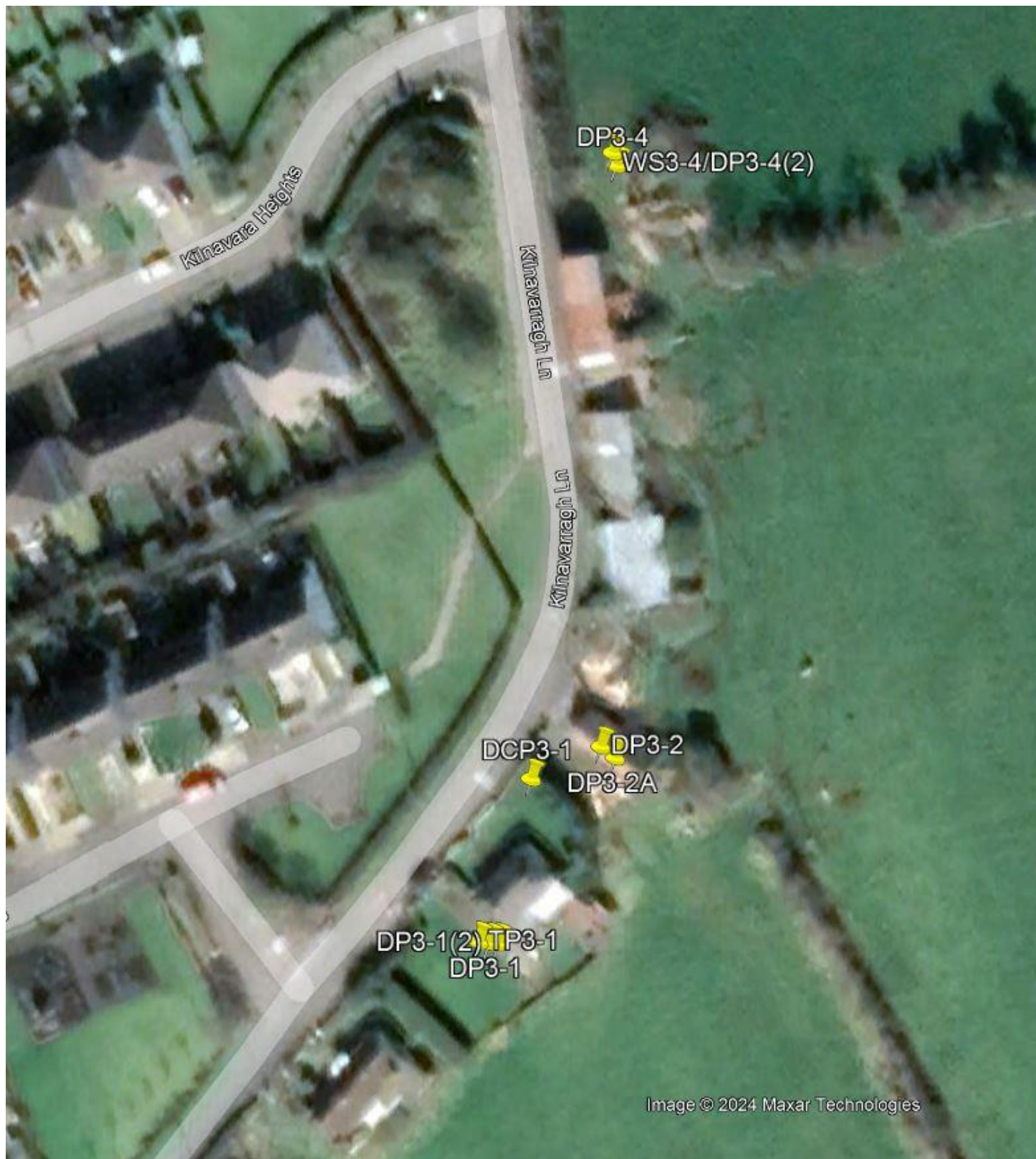
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DATE	May 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Exploratory Hole Locations Plan

CLIENT Cavan County Council / Comhairle Contae an Chabháin	
ENGINEER Alan Traynor Consulting Engineers Ltd	
DATE	May 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

Exploratory Hole Locations Plan

CLIENT Cavan County Council / Comhairle Contae an Chabháin	
ENGINEER Alan Traynor Consulting Engineers Ltd	
DATE	May 2024

Appendix B

Dynamic Sampling and Probing Logs



Probe Log

Borehole No.

DP3-1

Sheet 1 of 1

Project Name: Site 3, Kilnavara Lane, Cavan

Project No.	23-142-3
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Co-ords: 641612.99 - 804065.12

Hole Type	DP
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Location: Kilnavara Lane, Cavan, Co. Cavan

Level:	91.02
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Scale
1:25

Client: Cavan County Council / Comhairle Contae an Chabháin

Dates: 22/03/2024 -

Logged By

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	0				
	0				
	0				
	0				
	0				
	0				
	1				
	0				
	0				
	0				
2	1				
	1				
	0				
	1				
	0				
	2				
	0				
	1				
	2				
	1				
3	2				
	3				
	9				
	6				
	4				
	5				
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	7				
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	7				
	9				
	16				
5	7				
	10				
	12				
	12				
	12				
	12				
	12				
	13				
	12				
	13				

Remarks

Fall Height	500
-------------	-----

Cone Base Diameter	50
--------------------	----

Hammer Wt	50
-----------	----

Final Depth	5.00
-------------	------

Probe Type	DPH
------------	-----

Log Scale	1:25
-----------	------





Probe Log

Borehole No.

DP3-1(2)

Sheet 1 of 2

Project Name: Site 3, Kilnavara Lane, Cavan

Project No.
23-142-3

Co-ords: 641614.25 - 804065.04

Hole Type
DP

Location: Kilnavara Lane, Cavan, Co. Cavan

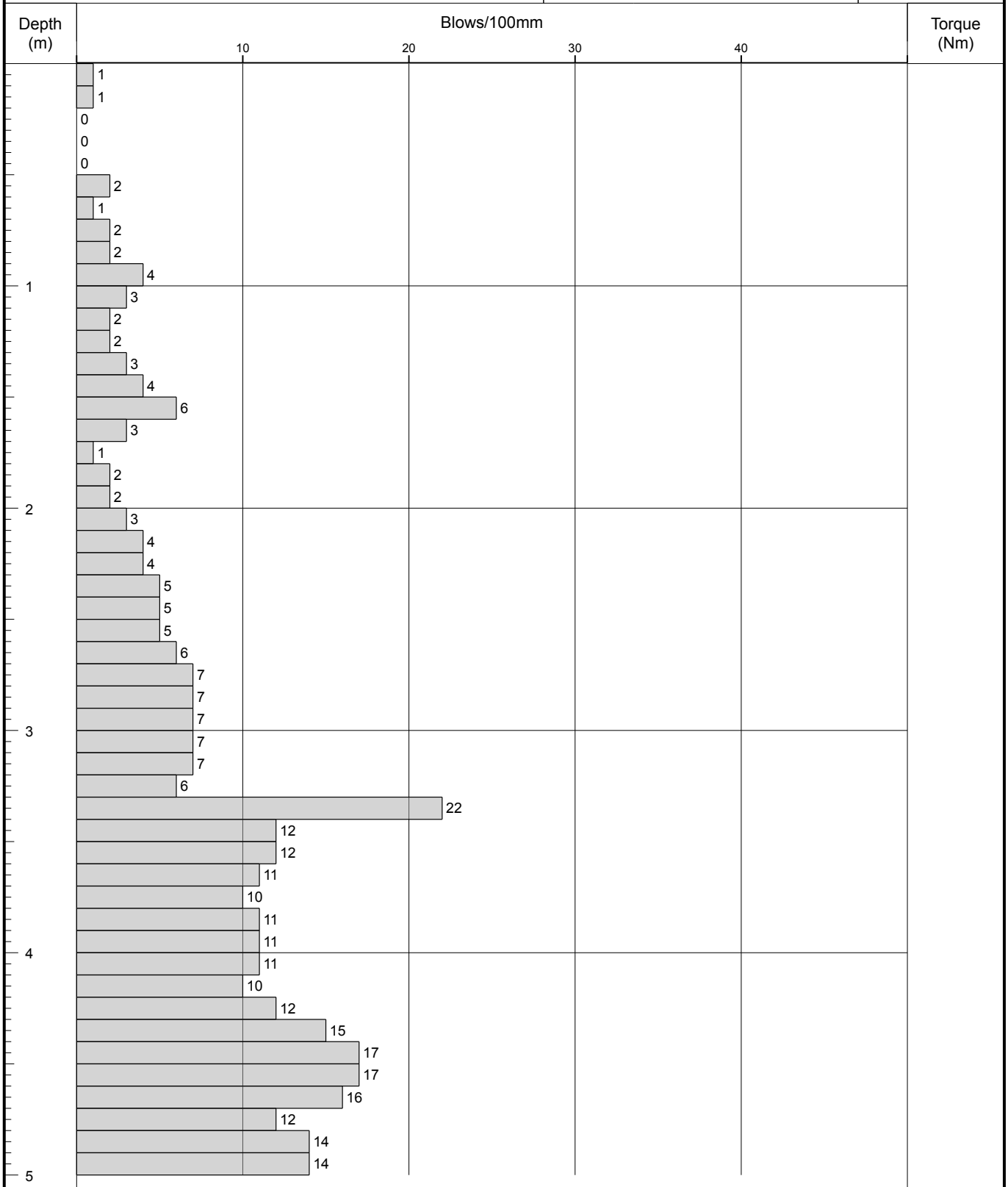
Level: 91.03

Scale
1:25

Client: Cavan County Council / Comhairle Contae an Chabháin

Dates: 08/05/2024 -

Logged By



Remarks

Fall Height 500

Cone Base Diameter 50

Hammer Wt 50

Final Depth 6.50

Probe Type DPH

Log Scale 1:25





Probe Log

Borehole No.

DP3-1(2)

Sheet 2 of 2

Project Name: Site 3, Kilnavara Lane, Cavan

Project No.
23-142-3

Co-ords: 641614.25 - 804065.04

Hole Type
DP

Location: Kilnavara Lane, Cavan, Co. Cavan

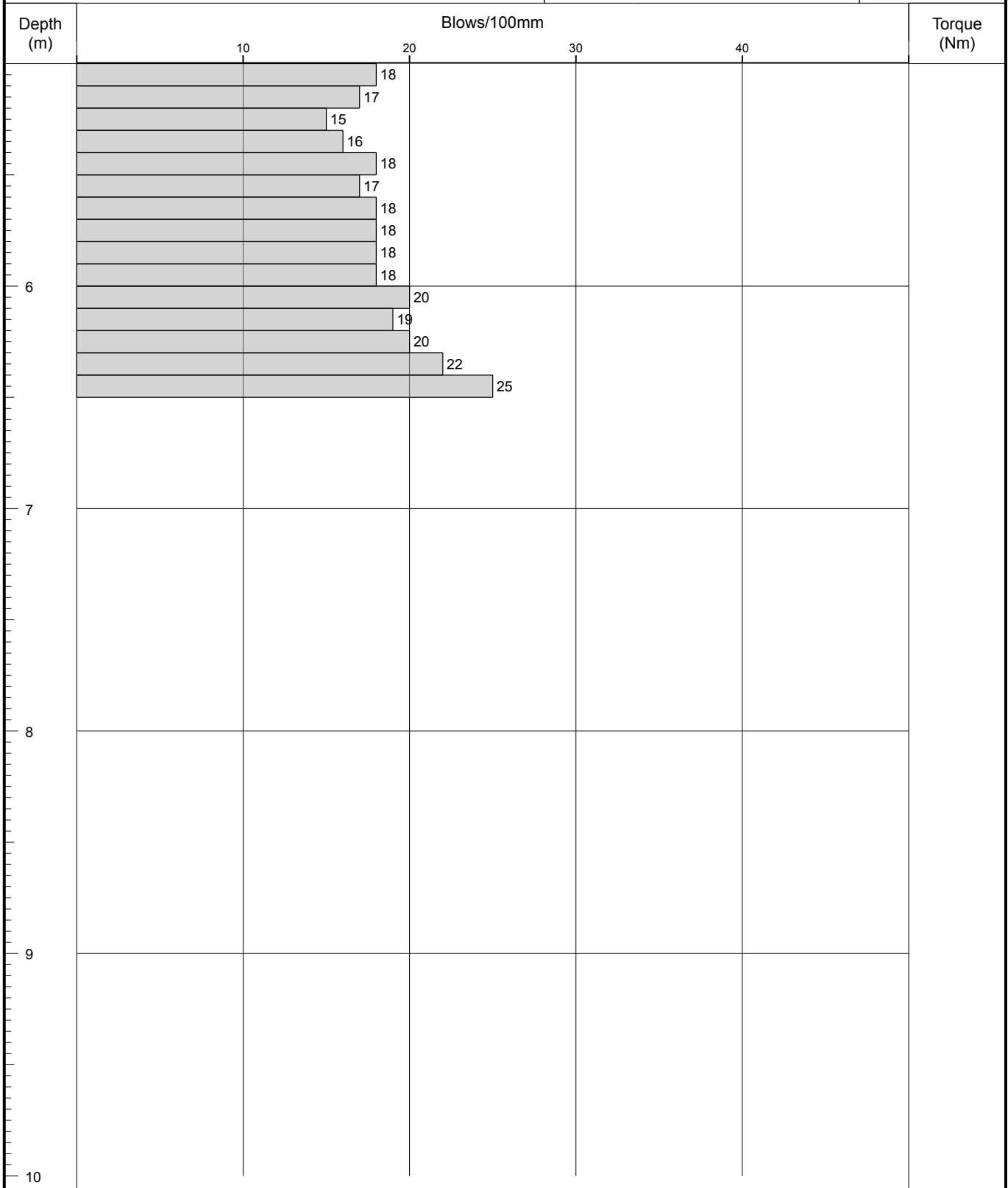
Level: 91.03

Scale
1:25

Client: Cavan County Council / Comhairle Contae an Chabháin

Dates: 08/05/2024 -

Logged By



Remarks

Fall Height 500

Cone Base Diameter 50

Hammer Wt 50

Final Depth 6.50

Probe Type DPH

Log Scale 1:25





Probe Log

Borehole No.

DP3-2

Sheet 1 of 1

Project Name: Site 3, Kilnavara Lane, Cavan

Project No.
23-142-3

Co-ords: 641628.42 - 804092.81

Hole Type
DP

Location: Kilnavara Lane, Cavan, Co. Cavan

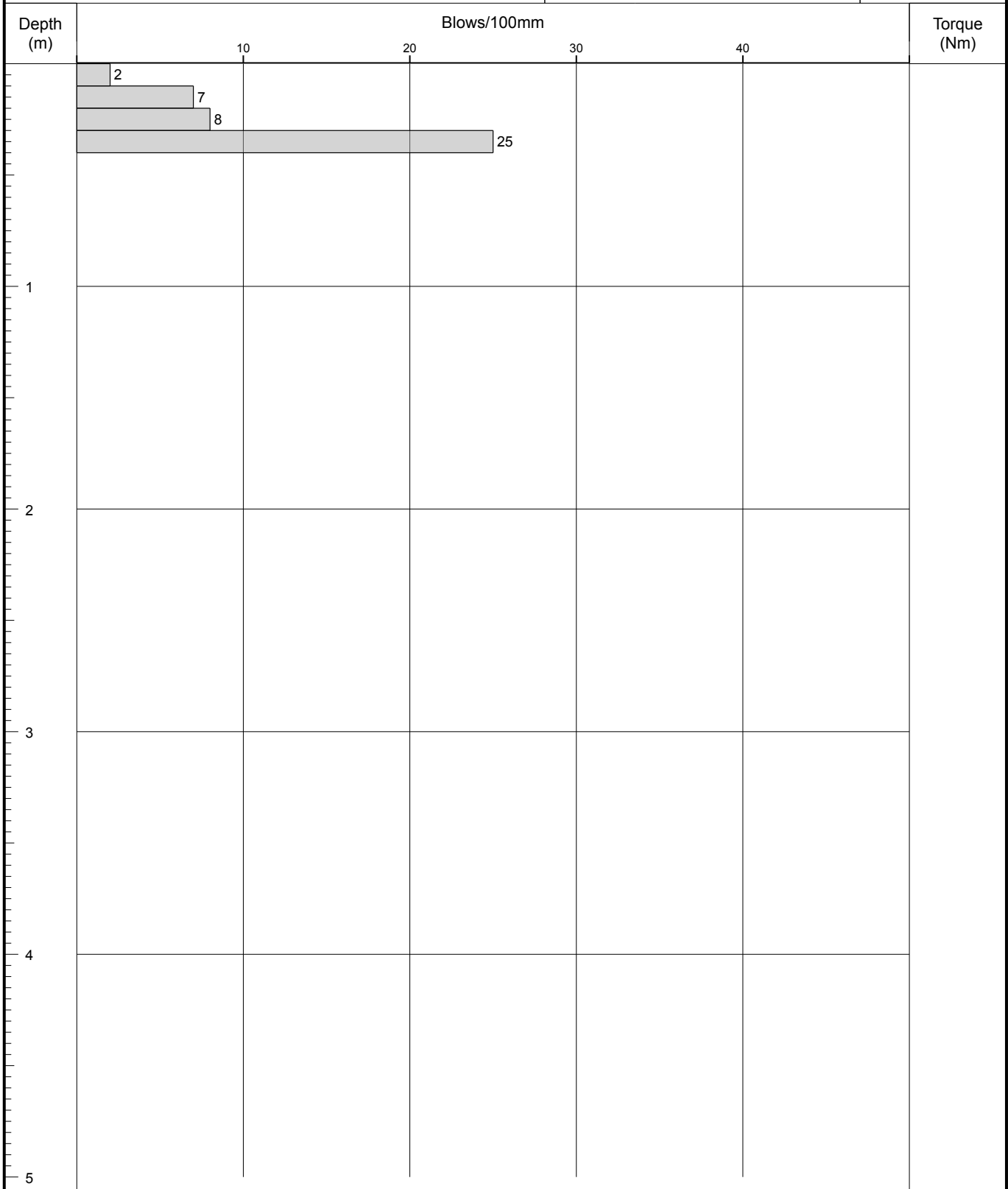
Level: 92.14

Scale
1:25

Client: Cavan County Council / Comhairle Contae an Chabháin

Dates: 22/03/2024 -

Logged By



Remarks

Fall Height 500

Cone Base Diameter 50

Hammer Wt 50

Final Depth 0.40

Probe Type DPH

Log Scale 1:25





Probe Log

Borehole No.

DP3-2A

Sheet 1 of 1

Project Name: Site 3, Kilnavara Lane, Cavan

Project No.
23-142-3

Co-ords: 641630.45 - 804091.21

Hole Type
DP

Location: Kilnavara Lane, Cavan, Co. Cavan

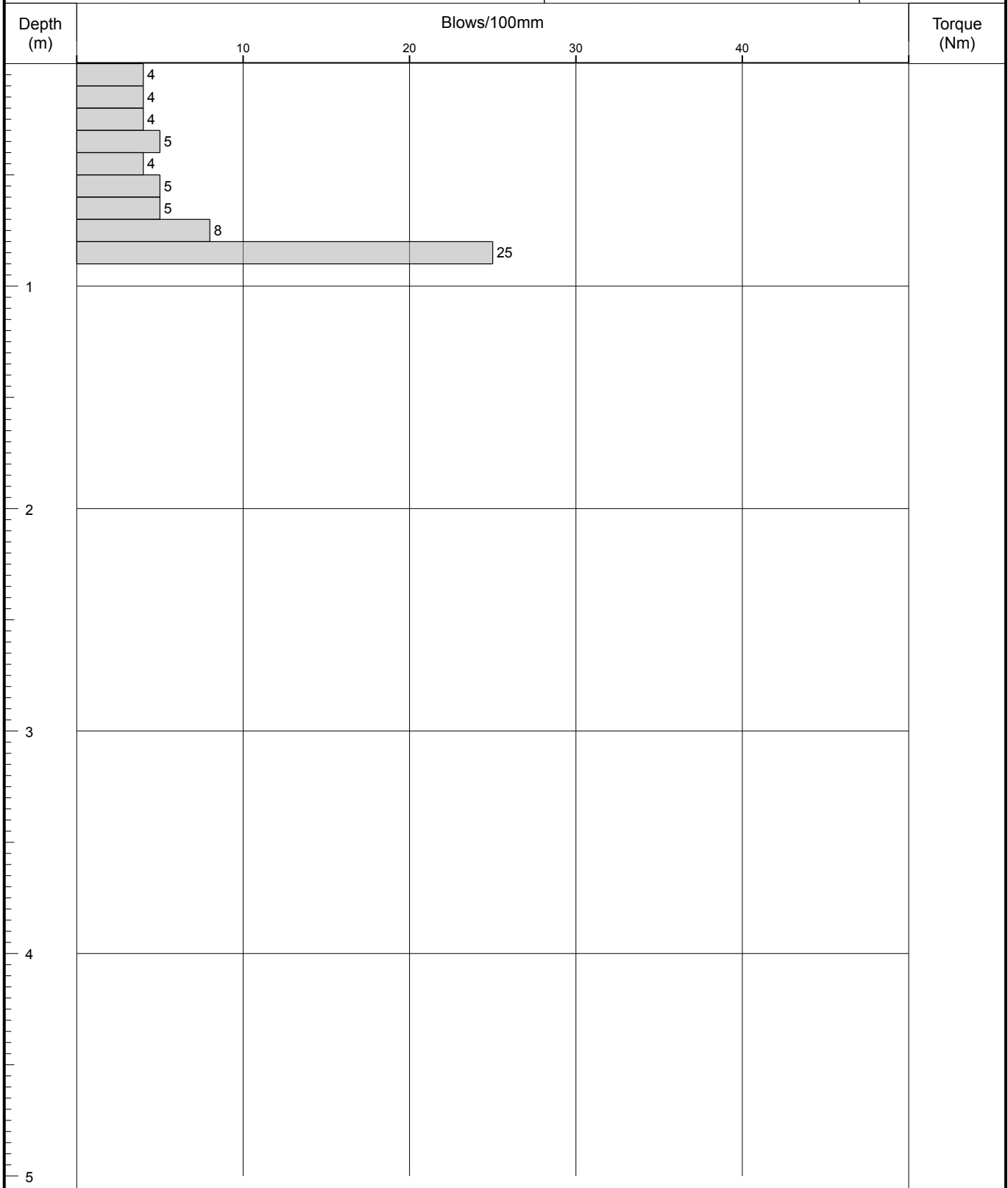
Level: 92.09

Scale
1:25

Client: Cavan County Council / Comhairle Contae an Chabháin

Dates: 22/03/2024 -

Logged By



Remarks

Fall Height 500

Cone Base Diameter 50

Hammer Wt 50

Final Depth 0.90

Probe Type DPH

Log Scale 1:25





Probe Log

Borehole No.

DP3-4

Sheet 1 of 1

Project Name: Site 3, Kilnavara Lane, Cavan

Project No.
23-142-3

Co-ords: 641629.74 - 804175.07

Hole Type
DP

Location: Kilnavara Lane, Cavan, Co. Cavan

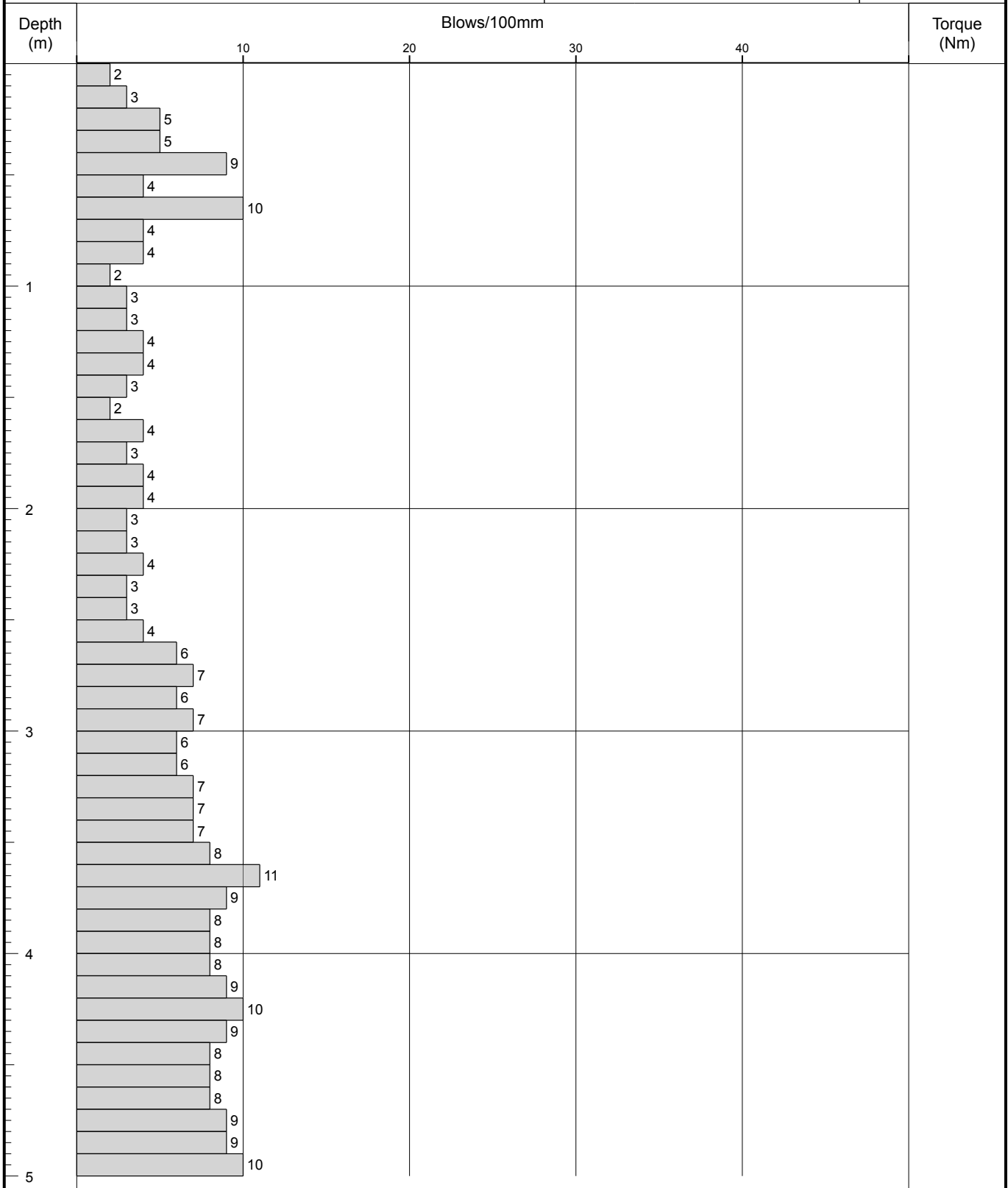
Level: 91.02

Scale
1:25

Client: Cavan County Council / Comhairle Contae an Chabháin

Dates: 22/03/2024 -

Logged By



Remarks

Fall Height 500

Cone Base Diameter 50

Hammer Wt 50

Final Depth 5.00

Probe Type DPH

Log Scale 1:25





Probe Log

Borehole No.

DP3-4(2)

Sheet 1 of 1

Project Name: Site 3, Kilnavara Lane, Cavan

Project No.
23-142-3

Co-ords: 641629.21 - 804176.82

Hole Type
DP

Location: Kilnavara Lane, Cavan, Co. Cavan

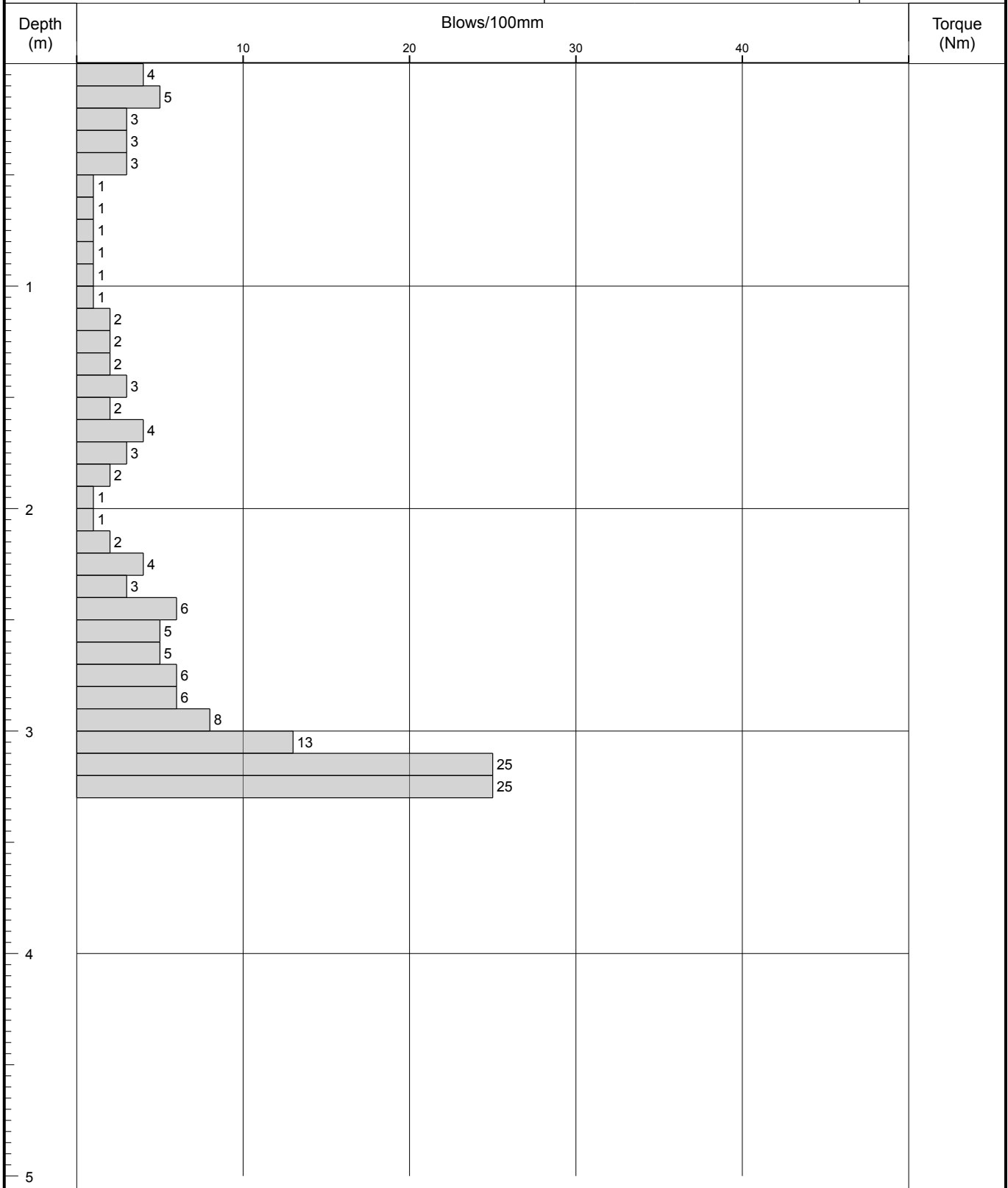
Level: 90.93

Scale
1:25

Client: Cavan County Council / Comhairle Contae an Chabháin

Dates: 08/05/2024 -

Logged By



Remarks

Fall Height 500

Cone Base Diameter 50

Hammer Wt 50

Final Depth 3.30

Probe Type DPH

Log Scale 1:25





Project No.:

23-142-3

Project Name:

Site 3. Kilnavara Lane. Cavan

Borehole No.:	
----------------------	--

WS3-4

Coordinates:

641629.21 F

Client:	
----------------	--

Cavan County Council / Comhairle Contae an Chabháin

Sheet 1 of 1

Method:

Dynamic Windowless Sampling

804176.82 N

Client's Representative:

Alan Traynor Consulting Engineers Ltd

Scale: 1:50

Driller: SOC

Plant:

Dando Terrier DPH Rig

Ground Level:

90.93 mOD

Dates:

08/05/2024 -

Logger: MN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Topsoil over Possible Made Ground or Disturbed Native Soil: Yellowish brown and grey slightly sandy gravelly silty Clay, wet. Sand fine to coarse. Gravel fine to coarse, subangular including dark grey weathering to yellow limestone.		
					89.83	(1.10)				
						1.10		Soft greyish brown to brownish grey slightly sandy silty CLAY with occasional gravel and occasional dark greyish brown possible organic material, moist. Sand fine to coarse. Gravel mostly fine to medium, subangular.		
						(1.30)				
					88.53	2.40		Firm yellowish brown mottled light grey slightly sandy slightly gravelly silty CLAY, moist. Sand fine to coarse. Gravel fine to coarse, subangular including grey limestone. Note: Cobbles and boulders may also be present.		
					87.93	(0.60)				
						3.00		Refusal at 3.0m BGL.		
								End of borehole at 3.000m		

Remarks

Percent Recovery: 0.0m-1.0m 50%, 1.0m-2.0m 65%, 2.0m-3.0m 90%

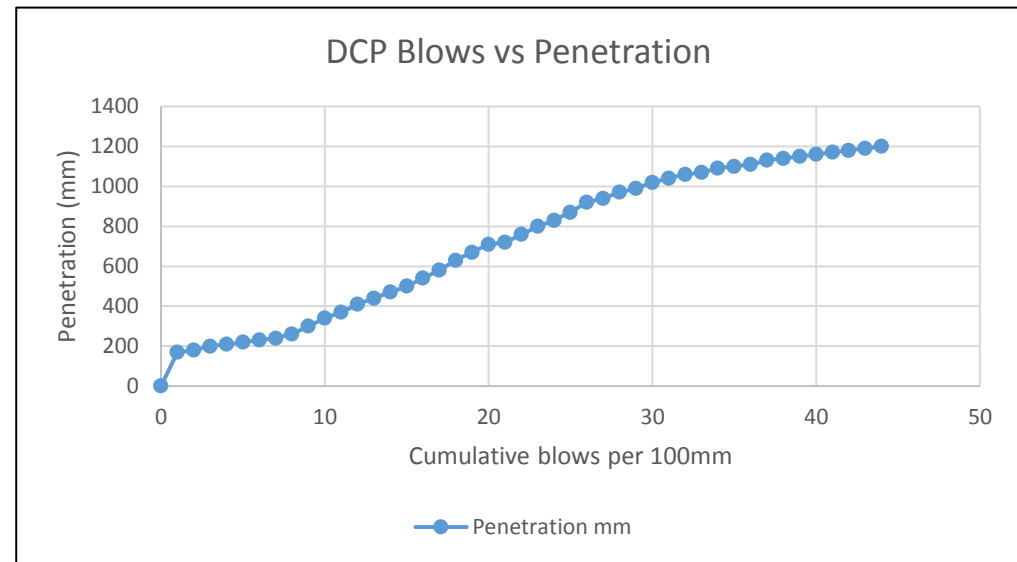
Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
Casing Details		Chiselling Details			
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)	

Appendix C Dynamic Cone Penetrometer (Indirect CBR) Tests

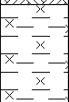
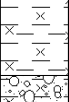
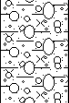
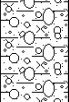
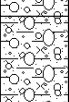
Location: **DCP3-1**

Date: 08/05/24

Blows	Reading	Penetration mm	mm/blow
0	1400	0	0
1	1230	170	170
2	1220	180	90
3	1200	200	67
4	1190	210	53
5	1180	220	44
6	1170	230	38
7	1160	240	34
8	1140	260	33
9	1100	300	33
10	1060	340	34
11	1030	370	34
12	990	410	34
13	960	440	34
14	930	470	34
15	900	500	33
16	860	540	34
17	820	580	34
18	770	630	35
19	730	670	35
20	690	710	36
21	680	720	34
22	640	760	35
23	600	800	35
24	570	830	35
25	530	870	35
26	480	920	35
27	460	940	35
28	430	970	35
29	410	990	34
30	380	1020	34
31	360	1040	34
32	340	1060	33
33	330	1070	32
34	310	1090	32
35	300	1100	31
36	290	1110	31
37	270	1130	31
38	260	1140	30
39	250	1150	29
40	240	1160	29
41	230	1170	29
42	220	1180	28
43	210	1190	28
44	200	1200	27
45	190	1210	27
46	170	1230	27
47	150	1250	27
48	140	1260	26
49	120	1280	26
50	110	1290	26
51	100	1300	25
52	80	1320	25
53	70	1330	25
54	60	1340	25

CBR 7.2 %

Appendix D Trial Pit Logs

			Project No.: 23-142-3		Project Name: Site 3, Kilnavara Lane, Cavan		Trial Pit No.: TP3-1		
			Co-ordinates: 641611.50 E 804065.27 N		Client: Cavan County Council / Comhairle Contae an Chabháin Client's Representative: Alan Traynor Consulting Engineers Ltd		Sheet 1 of 1		
Method: Excavation			Ground Level: 91.09 mOD		Date: 28/03/2024		Scale: 1:22		
Plant: Kubota U27-4							Driver: RG		
							Logger: MN		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water		
0.30 - 0.80 0.30 - 0.80	B1 D2	Trickling from sides	90.79	(0.30) 0.30		TOPSOIL: Very soft dark greyish brown slightly sandy slightly gravelly silty CLAY with frequent rootlets, moist		0.5	
						Very soft to soft brown to yellowish brown mottled light brownish grey silty CLAY with occasional gravel, a trace of white ceramic fragments and occasional rootlets, moist Gravel fine to coarse, subangular to occasionally subrounded.			
						Soft brown with a little dark brownish grey and orange slightly sandy slightly gravelly silty CLAY with low cobble to small boulder content, moist with occasional wet pockets around cobbles and small boulders. Sand fine to coarse. Gravel fine to coarse. Gravel, cobbles and boulders subangular to occasionally subrounded dark grey limestone with less yellow to orange sandstone.			
									
									
1.00 - 1.50 1.00 - 1.50	B3 D4		90.29	0.80 (1.30)				1.0	
2.10 - 2.40 2.10 - 2.40	B5 D6		88.99	2.10 (0.30)		Firm to stiff greyish brown slightly sandy slightly gravelly silty CLAY with medium cobble to small boulder content, moist to locally wet. Sand fine to coarse. Gravel fine to coarse. Gravel, cobbles and boulders subangular to occasionally subrounded dark grey limestone with less yellow to light yellowish brown sandstone.		2.0	
			88.69	2.40		End of trial pit at 2.400m		2.5	
								3.0	
								3.5	
								4.0	
Remarks						Water Strikes:		Stability:	
						Struck at (m):		Remarks:	Slight spalling
						1.60		Trickling from sides	
						Width:		0.70	
						Length:		2.00	

Appendix E Trial Pit Photographs



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT
Cavan County Council /
Comhairle Contae an Chabháin

ENGINEER
Alan Traynor Consulting
Engineers Ltd

DATE
March 2024



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT
Cavan County Council /
Comhairle Contae an Chabháin

ENGINEER
Alan Traynor Consulting
Engineers Ltd

DATE August 2023



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT
Cavan County Council /
Comhairle Contae an Chabháin

ENGINEER
Alan Traynor Consulting
Engineers Ltd

DATE
August 2023



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT
Cavan County Council /
Comhairle Contae an Chabháin

ENGINEER
Alan Traynor Consulting
Engineers Ltd

DATE August 2023



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT
Cavan County Council /
Comhairle Contae an Chabháin

ENGINEER
Alan Traynor Consulting
Engineers Ltd

DATE
August 2023



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT

Cavan County Council /
Comhairle Contae an Chabháin

Alan Traynor Consulting
Engineers Ltd

DATE

August 2023



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT
Cavan County Council /
Comhairle Contae an Chabháin

ENGINEER
Alan Traynor Consulting
Engineers Ltd

DATE August 2023



Site 3, Kilnavara Lane,
Cavan, Co. Cavan

TP3-1

CLIENT
Cavan County Council /
Comhairle Contae an Chabháin

ENGINEER
Alan Traynor Consulting
Engineers Ltd

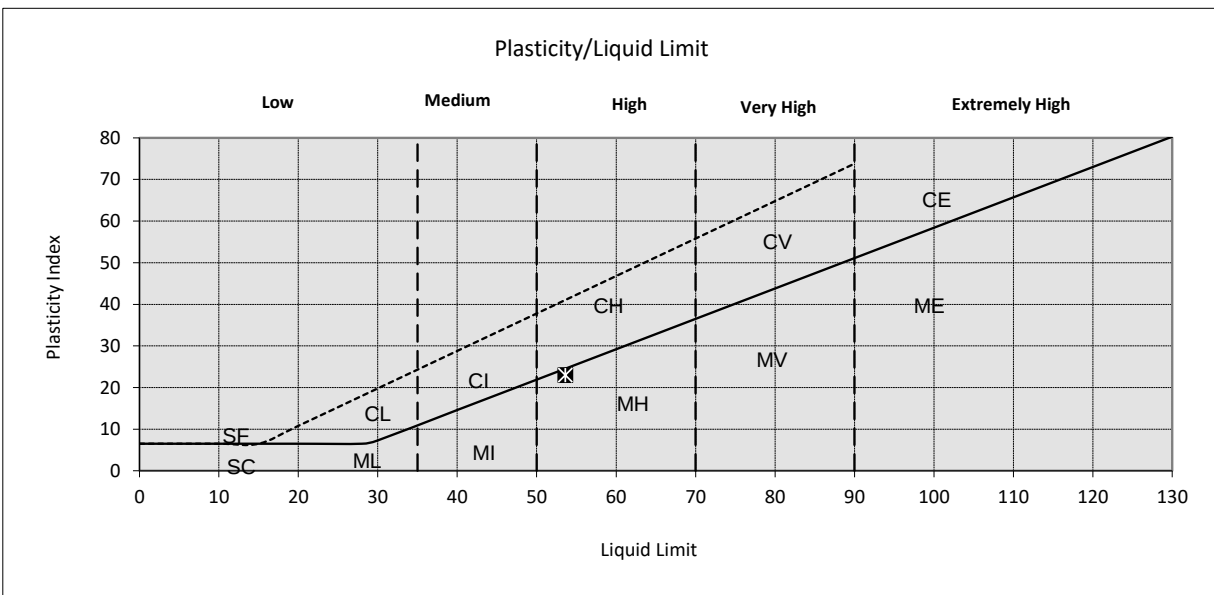
DATE
August 2023

Appendix F Geotechnical Soil Laboratory Test Results

LABORATORY TEST REPORT
LIQUID & PLASTIC LIMIT TESTS BS 1377: Part 2: 1990 CI 4.4,5.3,5.4

Site Ref.:	Site 1 through Site 5, Co.Cavan	Job No.:	23-142
Client:	OCB Geotechnical	Lab Ref No.:	ST 28698
	Unit 1 Carrigogna	Sample Ref.:	TP3-1 0.3-0.8 B1
	Midleton	Date Sampled:	Client Info
	Co. Cork	Date Received:	31/05/2024
Order No:	2405-109	Date Tested:	01/11/2016
Originator:	M Nyhan	Date Reported:	12/06/2024

Sampling Certificate	No
Sampled By	Client
Sample Type	Bulk
Sample Preparation Method	Washed
MATERIAL	Soil
Retained 425 micron (%)	52
Natural Moisture Content (%)	6.4
Liquid Limit (single point)(%)	54
Plastic Limit (%)	31
Plasticity Index	23



The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

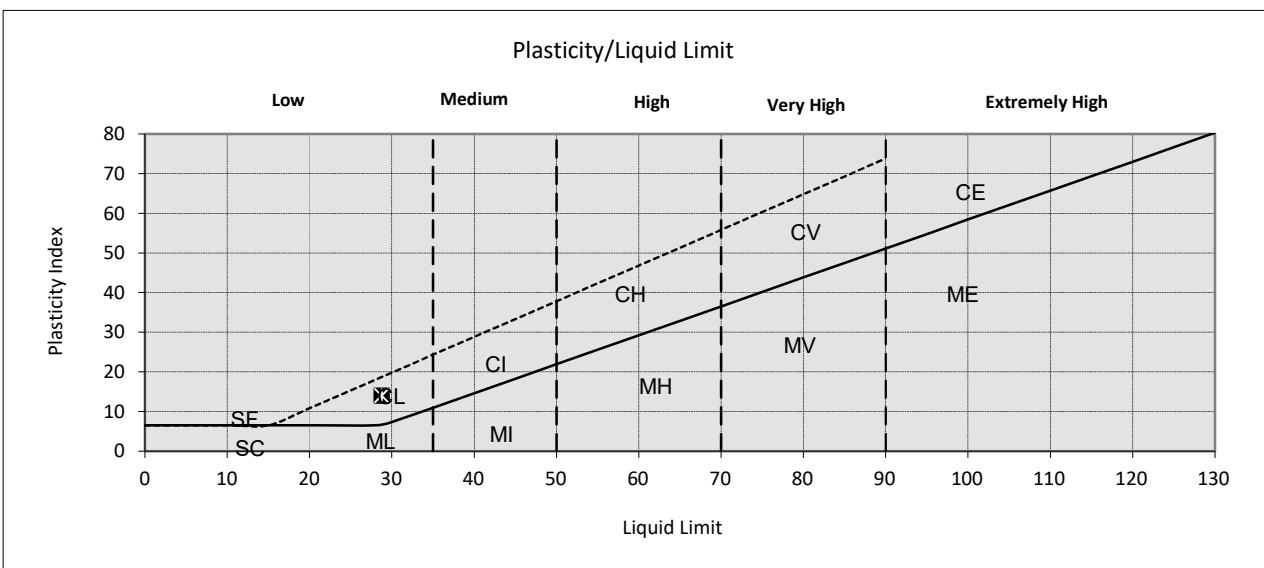
Supplier: Client Info
Source: Client Info
Sample Location: Site 1 through Site 5, Co.Cavan

JR Ward
Approved Signature
CMTL Ireland Limited
James Ward, Operations Manager

LABORATORY TEST REPORT
LIQUID & PLASTIC LIMIT TESTS BS 1377: Part 2: 1990 Cl 4.4,5.3,5.4

Site Ref.:	Site 1 through Site 5, Co.Cavan	Job No.:	23-142
Client:	OCB Geotechnical	Lab Ref No.:	ST 28699
	Unit 1 Carrigogna	Sample Ref.:	TP3-1 1-1.5 B3
	Midleton	Date Sampled:	Client Info
	Co. Cork	Date Received:	31/05/2024
Order No:	2405-109	Date Tested:	05/06/2024
Originator:	M Nyhan	Date Reported:	20/06/2024

Sampling Certificate	No
Sampled By	Client
Sample Type	Bulk
Sample Preparation Method	Washed
MATERIAL	Soil
Retained 425 micron (%)	58
Natural Moisture Content (%)	20
Liquid Limit (single point)(%)	29
Plastic Limit (%)	15
Plasticity Index	14



The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

Supplier: Client Info
Source: Client Info
Sample Location: Site 1 through Site 5, Co.Cavan

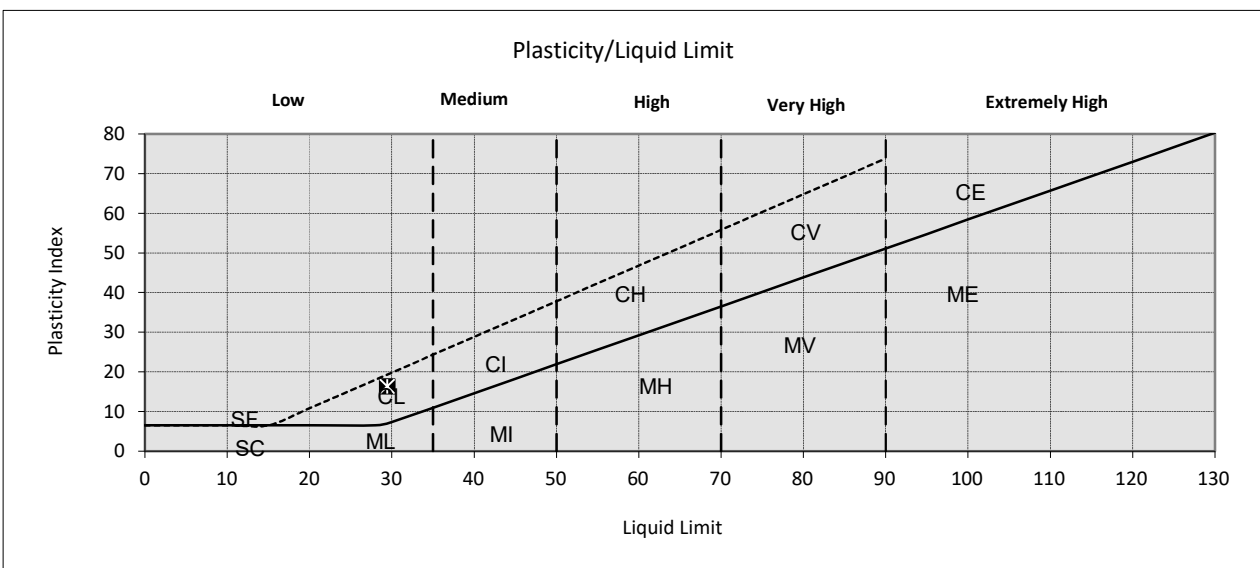
JR Ward

Approved Signature
CMTL Ireland Limited
James Ward, Operations Manager

LABORATORY TEST REPORT
LIQUID & PLASTIC LIMIT TESTS BS 1377: Part 2: 1990 Cl 4.4,5.3,5.4

Site Ref.:	Site 1 through Site 5, Co.Cavan	Job No.:	23-142
Client:	OCB Geotechnical	Lab Ref No.:	ST 28700
	Unit 1 Carrigogna	Sample Ref.:	TP3-1 2.1-2.4 B5
	Midleton	Date Sampled:	Client Info
	Co. Cork	Date Received:	31/05/2024
Order No:	2405-109	Date Tested:	07/06/2024
Originator:	M Nyhan	Date Reported:	20/06/2024

Sampling Certificate	No
Sampled By	Client
Sample Type	Bulk
Sample Preparation Method	Washed
MATERIAL	Soil
Retained 425 micron (%)	68
Natural Moisture Content (%)	12
Liquid Limit (single point)(%)	29
Plastic Limit (%)	13
Plasticity Index	16



The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

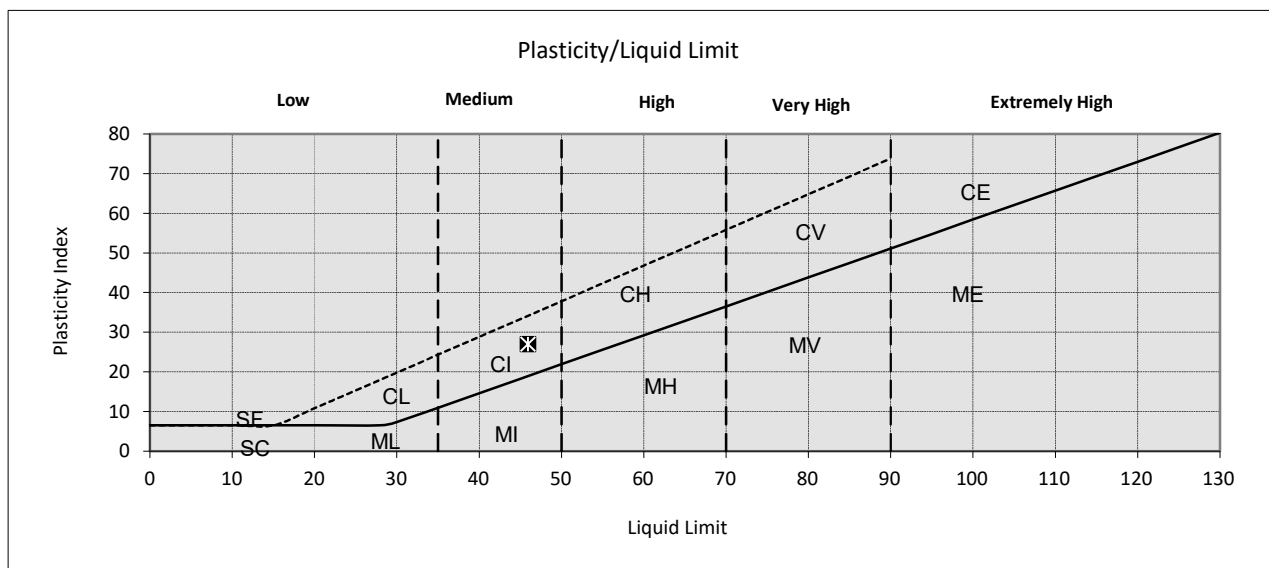
Supplier: Client Info
Source: Client Info
Sample Location: Site 1 through Site 5, Co.Cavan

JR Ward
Approved Signature
CMTL Ireland Limited
James Ward, Operations Manager

LABORATORY TEST REPORT
LIQUID & PLASTIC LIMIT TESTS BS 1377: Part 2: 1990 Cl 4.4,5.3,5.4

Site Ref.:	Site 1 through Site 5, Co.Cavan	Job No.:	23-142
Client:	OCB Geotechnical	Lab Ref No.:	ST 28701
	Unit 1 Carrigogna	Sample Ref.:	WS3-4 2-3 B3
	Midleton	Date Sampled:	Client Info
	Co. Cork	Date Received:	31/05/2024
Order No:	2405-109	Date Tested:	07/06/2024
Originator:	M Nyhan	Date Reported:	20/06/2024

Sampling Certificate	No
Sampled By	Client
Sample Type	Bulk
Sample Preparation Method	Washed
MATERIAL	Soil
Retained 425 micron (%)	33
Natural Moisture Content (%)	27
Liquid Limit (single point)(%)	46
Plastic Limit (%)	19
Plasticity Index	27



The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

Supplier: Client Info
Source: Client Info
Sample Location: Site 1 through Site 5, Co.Cavan

JR Ward

Approved Signature
CMTL Ireland Limited
James Ward, Operations Manager

OCB Geotechnical Services Ltd
Unit 1, Carrigogna, Middleton, Co. Cork
Tel: 021 4638474



LABORATORY TEST REPORT

MOISTURE CONTENT BS 1377 : Part 2 : 1990 Oven Drying Method cl 3.2

Site:	Cavan 5 Sites - Kilnavara Lane	Job No.:	23-142
Client:	Cavan County Council	Lab Ref No.:	
		Date Received:	28/05/2024
		Date Tested:	02/07/2024
		Date Reported:	04/07/2024
Originator:	E.W.	Specification:	Client

Sampled by:	M.N.	Sample Type:	Bulk
Sampling Cert:	NA	Location:	TP3-1
Date Sampled:	28/03/2024	Sample Ref:	TP3-1 0.3-0.8m
Material Type:	Soil		
Supplier/Source:	N/A		

Moisture Content (%): 30.13

Tested in accordance with BS 1377: Part 2: 1990
Sample preparation by cone and quarter

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

A handwritten signature in black ink, appearing to read 'Michael O'Connell'.

Approved Signature
OCB Geotechnical Services Ltd
General Manager

OCB Geotechnical Services Ltd
Unit 1, Carrigogna, Middleton, Co. Cork
Tel: 021 4638474



LABORATORY TEST REPORT

MOISTURE CONTENT BS 1377 : Part 2 : 1990 Oven Drying Method cl 3.2

Site:	Cavan 5 Sites - Kilnavara Lane	Job No.:	23-142
Client:	Cavan County Council	Lab Ref No.:	
		Date Received:	28/05/2024
		Date Tested:	02/07/2024
		Date Reported:	04/07/2024
Originator:	E.W.	Specification:	Client

Sampled by:	M.N.	Sample Type:	Bulk
Sampling Cert:	NA	Location:	TP3-1
Date Sampled:	28/03/2024	Sample Ref:	TP3-1 1.0-1.5m
Material Type:	Soil		
Supplier/Source:	N/A		

Moisture Content (%): 25.35

Tested in accordance with BS 1377: Part 2: 1990
Sample preparation by cone and quarter

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

A handwritten signature in black ink, appearing to read 'Michael O'Connell', written over a horizontal line.

Approved Signature
OCB Geotechnical Services Ltd
General Manager

OCB Geotechnical Services Ltd
Unit 1, Carrigogna, Middleton, Co. Cork
Tel: 021 4638474



LABORATORY TEST REPORT

MOISTURE CONTENT BS 1377 : Part 2 : 1990 Oven Drying Method cl 3.2

Site:	Cavan 5 Sites - Kilnavara Lane	Job No.:	23-142
Client:	Cavan County Council	Lab Ref No.:	
		Date Received:	28/05/2024
		Date Tested:	02/07/2024
		Date Reported:	04/07/2024
Originator:	E.W.	Specification:	Client

Sampled by:	M.N.	Sample Type:	Bulk
Sampling Cert:	NA	Location:	TP3-1
Date Sampled:	28/03/2024	Sample Ref:	TP3-1 2.1-2.4m
Material Type:	Soil		
Supplier/Source:	N/A		

Moisture Content (%): **17.43**

Tested in accordance with BS 1377: Part 2: 1990
Sample preparation by cone and quarter

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

A handwritten signature in black ink, appearing to read 'Michael O'Connell', written over a horizontal line.

Approved Signature
OCB Geotechnical Services Ltd
General Manager

OCB Geotechnical Services Ltd
Unit 1,
Carrigogna,
Midleton,
Co. Cork



LABORATORY TEST REPORT

To determine the pH Value of Soils in accordance with BS 1377 : Part3 : 2018 - Clause 12, Electrometric Method

Project: Cavan Five Sites - Kilnavara Lane
Client Cavan County Council
Originator E.W.

Jon Nr: 23-142
Lab Ref nr: ph24-035
Date Received: 28/05/2024
Date Reported: 04/07/2024
Material: Soil
Date Tested: 02/07/2024
Specification: Client

Sample Details:	Soil	Date of Sampling:	28/03/2024
Source:	TP3-1	Sampled by:	MN
Sample depth:	0.3-0.8m	Sampling reason:	Request

Results

Parameter	Result	
pH Value	7.39	

Comments:

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

Tested in accordance with the above specifications

A handwritten signature in black ink, appearing to read 'Michael O'Connell'.

Approved Signature
Michael O'Connell, General Manager
OCB Geotechnical Services Ltd

OCB Geotechnical Services Ltd
Unit 1,
Carrigogna,
Midleton,
Co. Cork



LABORATORY TEST REPORT

To determine the pH Value of Soils in accordance with BS 1377 : Part3 : 2018 - Clause 12, Electrometric Method

Project: Cavan Five Sites - Kilnavara Lane
Client Cavan County Council
Originator E.W.

Jon Nr: 23-142
Lab Ref nr: ph24-036
Date Received: 28/05/2024
Date Reported: 04/07/2024
Material: Soil
Date Tested: 02/07/2024
Specification: Client

Sample Details:	Soil	Date of Sampling:	28/03/2024
Source:	TP3-1	Sampled by:	MN
Sample depth:	1.0-1.5m	Sampling reason:	Request

Results

Parameter	Result	
pH Value	7.91	

Comments:

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

Tested in accordance with the above specifications

A handwritten signature in black ink, appearing to read 'Michael O'Connell'.

Approved Signature
Michael O'Connell, General Manager
OCB Geotechnical Services Ltd

OCB Geotechnical Services Ltd
Unit 1,
Carrigogna,
Midleton,
Co. Cork



LABORATORY TEST REPORT

To determine the pH Value of Soils in accordance with BS 1377 : Part3 : 2018 - Clause 12, Electrometric Method

Project: Cavan Five Sites - Kilnavara Lane
Client Cavan County Council
Originator E.W.

Jon Nr: 23-142
Lab Ref nr: ph24-037
Date Received: 28/05/2024
Date Reported: 04/07/2024
Material: Soil
Date Tested: 02/07/2024
Specification: Client

Sample Details:	Soil	Date of Sampling:	28/03/2024
Source:	TP3-1	Sampled by:	MN
Sample depth:	2.1-2.4m	Sampling reason:	Request

Results

Parameter	Result	
pH Value	8.49	

Comments:

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

Tested in accordance with the above specifications

A handwritten signature in black ink, appearing to read 'Michael O'Connell'.

Approved Signature
Michael O'Connell, General Manager
OCB Geotechnical Services Ltd

OCB Geotechnical Services Ltd
Unit 1,
Carrigogna,
Midleton,
Co. Cork



LABORATORY TEST REPORT

To determine the pH Value of Soils in accordance with BS 1377 : Part3 : 2018 - Clause 12, Electrometric Method

Project: Cavan Five Sites - Kilnavara Lane
Client Cavan County Council
Originator E.W.

Jon Nr: 23-142
Lab Ref nr: ph24-049
Date Received: 13/05/2024
Date Reported: 04/07/2024
Material: Soil
Date Tested: 03/07/2024
Specification: Client

Sample Details:	Soil	Date of Sampling:	08/05/2024
Source:	WS3-4	Sampled by:	S.O'C.
Sample depth:	1.30-1.80m	Sampling reason:	Request

Results

Parameter	Result	
pH Value	7.29	

Comments:

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.

Tested in accordance with the above specifications

A handwritten signature in black ink, appearing to read 'Michael O'Connell'.

Approved Signature
Michael O'Connell, General Manager
OCB Geotechnical Services Ltd



CERTIFICATE OF ANALYSIS

Work Order	: PR2472213	Issue Date	: 27-Jun-2024
Customer	: ALS Life Sciences Ltd	Laboratory	: ALS Czech Republic, s.r.o.
Contact	: Thomas O'Sullivan	Contact	: Client Service
Address	: Carrigeen Business Park Clonmel Co. Tipperary Tipperary Ireland	Address	: Na Harfe 336/9 Prague 9 - Vysocany 190 00 Czech Republic
E-mail	: Thomas.OSullivan@alsglobal.com	E-mail	: customer.support@alsglobal.com
Telephone	: ----	Telephone	: +420 226 226 228
Project	: KIDE-835130624	Page	: 1 of 4
Order number	: ----	Date Samples	: 19-Jun-2024
		Received	
		Quote number	: PR2012ALSLI-IE0002 (CZ-200-12-0931_V3)
Site	: ----	Date of test	: 20-Jun-2024 - 27-Jun-2024
Sampled by	: customer	QC Level	: ALS CR Standard Quality Control Schedule

General Comments

This report shall not be reproduced except in full, without prior written approval from the laboratory. The laboratory is not responsible for the sample data supplied by the customer and their impact on the validity of the result.

The laboratory declares that the test results relate only to the listed samples. If "ALS" is not included in the test report in the "Sampled by" section, then the results refer to the sample as received.

All results highlighted in Bold indicate a reading above the Limit of Reporting (LOR) only for that test, and are not compared with any parametric value.

Responsible for accuracy

Testing Laboratory No. 1163
Accredited by CAI according to
CSN EN ISO/IEC 17025:2018

Signatories

Lubomír Pokorný

Position

Country Manager



The company is certified according to ČSN EN ISO 14001 (Environmental management systems) and ČSN ISO 45001 (Occupational health and safety management systems)



Analytical Results

Sub-Matrix: SOIL				Client sample ID		6183023 23-142 TP1-1 1.6-1.9		6183024 23-142 TP1-1 1.9-2.25		6183025 23-142 TP1-2 0.7-1.2	
				Laboratory sample ID		PR2472213001		PR2472213002		PR2472213003	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	85.6	± 5.0%	80.3	± 5.0%	80.6	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		6183026 23-142 TP1-2 1.8-2.3		6183027 23-142 TP1-3 0.8-1.3		6183028 23-142 TP1-3 1.7-2.2	
				Laboratory sample ID		PR2472213004		PR2472213005		PR2472213006	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	87.7	± 5.0%	84.7	± 5.0%	85.4	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		6183029 23-142 TP1-4 0.8-1.3		6183030 23-142 TP1-4 1.7-2.2		6183031 23-142 TP1-5 1.5-1.9	
				Laboratory sample ID		PR2472213007		PR2472213008		PR2472213009	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	86.2	± 5.0%	87.3	± 5.0%	80.4	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		3183032 23-142 TP1-5 1.9-2.3		6183033 23-142 TP1-6 1.5-2.0		6183034 23-142 TP1-7 1.6-2.1	
				Laboratory sample ID		PR2472213010		PR2472213011		PR2472213012	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	87.3	± 5.0%	87.1	± 5.0%	76.6	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		6183035 23-142 WS1-11 3.0-3.5		6183036 23-142 WS1-12 2.0-2.5		6183037 23-142 TP2-1 2.0-2.5	
				Laboratory sample ID		PR2472213013		PR2472213014		PR2472213015	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											



Sub-Matrix: SOIL				Client sample ID		6183035 23-142 WS1-11 3.0-3.5		6183036 23-142 WS1-12 2.0-2.5		6183037 23-142 TP2-1 2.0-2.5	
				Laboratory sample ID		PR2472213013		PR2472213014		PR2472213015	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters - Continued											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	87.8	± 5.0%	78.0	± 5.0%	85.2	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		6183038 23-142 WS2-2 3.0-4.0		6183039 23-142 TP3-1 0.3-0.8		6183040 23-142 TP3-1 1.0-1.5	
				Laboratory sample ID		PR2472213016		PR2472213017		PR2472213018	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	84.4	± 5.0%	74.1	± 5.0%	81.5	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		6183041 23-142 TP3-1 2.1-2.4		6183042 23-142 WS3-4 2.0-3.0		6183123 23-142 TP4-1 0.8-1.3	
				Laboratory sample ID		PR2472213019		PR2472213020		PR2472213021	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	86.1	± 5.0%	79.8	± 5.0%	81.5	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		6183124 23-142 TP4-1 2.1-2.4		6183125 23-142 TP4-2 1.1-1.6		6183126 23-142 TP4-2.18-2.3	
				Laboratory sample ID		PR2472213022		PR2472213023		PR2472213024	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	87.7	± 5.0%	84.5	± 5.0%	87.9	± 5.0%		
Nonmetallic Inorganic Parameters											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

Sub-Matrix: SOIL				Client sample ID		6183127 23-142 WS4-2 2.0-2.2		6183128 23-142 TP5-1 1.5-2.0		6183129 23-142 WS5-2 GL-1.0	
				Laboratory sample ID		PR2472213025		PR2472213026		PR2472213027	
				Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU	Result	MU
Physical Parameters											
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	88.6	± 5.0%	87.2	± 5.0%	83.2	± 5.0%		
Nonmetallic Inorganic Parameters											



Sub-Matrix: SOIL				Client sample ID		6183127		6183128		6183129	
						23-142 WS4-2		23-142 TP5-1		23-142 WS5-2	
				2.0-2.2		1.5-2.0		GL-1.0			
				Laboratory sample ID		PR2472213025		PR2472213026		PR2472213027	
Client sampling date / time		[18-Jun-2024]		[18-Jun-2024]		[18-Jun-2024]					
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU		
Nonmetallic Inorganic Parameters - Continued											
Sulphate as SO4 2-	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		
Sulphate as SO3	S-SO4-GR	0.10	% DW	<0.10	---	<0.10	---	<0.10	---		

When sampling date is not provided by the client, the laboratory determines it for procedural reasons, then it is equal to the date of receipt of the sample to the laboratory and is displayed in brackets. Measurement uncertainty is expressed as expanded measurement uncertainty with coverage factor k = 2, representing 95% confidence level.

Key: LOR = Limit of reporting; MU = Measurement Uncertainty. The MU does not include sampling uncertainty.

Brief Method Summaries

Analytical Methods	Method Descriptions
Location of test performance: Bendlova 1687/7 Ceska Lipa Czech Republic 470 01	
S-DRY-GRCI	CZ_SOP_D06_01_045 (CSN ISO 11465, CSN EN 12880, CSN EN 14346:2007), CZ_SOP_D06_07_046 (CSN ISO 11465, CSN EN 12880, CSN EN 14346:2007, CSN 46 5735) Determination of dry matter by gravimetry and determination of moisture by calculation from measured values.
*S-SO4-GR	CSN 72 0117 Basic analysis of silicates - Determination of sulphate by gravimetry.
Preparation Methods	Method Descriptions
Location of test performance: Bendlova 1687/7 Ceska Lipa Czech Republic 470 01	
*S-PPHOM.07	CZ_SOP_D06_07_P01 Preparation of solid samples for analysis (crushing, milling and pulverizing).
*S-PPHOM0.3	CZ_SOP_D06_07_P01 Preparation of solid samples for analysis (crushing, milling and pulverizing).

The symbol "*" for the method indicates a test outside the scope of accreditation of the laboratory or subcontractor. If the UNICO-SUB code is stated in the method table, this only informs that the tests have been performed by a subcontractor and the results are given in an annex to the test report, including information on test accreditation. If the lab used for matrix outside the scope of accreditation or non-standard sample matrix procedure specified in the accredited method and issues non-accredited results, this fact is stated on the title page of this protocol in the section "Notes". If the test report shows the results of subcontracting, the place of performance of the test is outside the laboratories of ALS Czech Republic, s.r.o.

The method for calculating of the summation parameters is available on request in the customer service.

The end of the certificate of analysis