PROPOSED HOUSING DEVELOPMENT AT PAIRC NA HABHAINN, CO.GALWAY

SERVICES DESIGN REPORT

CLIENT.	GALWAY COUNTY COUNCIL
PROJECT NO.	25156-B
DOCUMENT NO.	25156-B-SDS-XX-RP-C-0001-01
DATE	NOVEMBER 19TH, 2025

REV. 01

DOCUMENT TITLE SHEET

Client:	Galway County Council, Galway, Co. Galway. H91 H6KX.
Project Description:	The proposed development at Pairc na hAbhainn, Athenry, Co. Galway. The construction of 16no. units (compromising; 8no 2-Bedroom Dwellings; & 8no 3-Bedroom Dwellings) and connection to existing services together with all ancillary site development works.
Project. No.	25156-B

DISCLAIMER

DOCUMENT CONTROL SHEET

PROJECT No:	25156				
PROJECT NAME:	Proposed Housing Development at Pairc na hAbhainn, Athenry, Co. Galway.				
DOCUMENT REF:	"P:\2025\25156 - PKA - Raheen & Pairc na hAbhainn Housing\Design\2 - Civil Design\05. Service Design Report - 14.11.2025"				
REVISION	**DATE**	**DESCRIPTION**	Services Design Report		
01	27/09/2025		PREPARED	CHECKED	ISSUED
		INITIALS:	AS	CD	CD
		DATE:	19/11/2025	19/11/2025	
02	07/10/2025		PREPARED	CHECKED	ISSUED
		INITIALS:			
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1 INSTRUCTION

SDS Design Engineers have been appointed by the Client Galway County Council, to prepare a Services Design Report to accompany a Planning Application to Galway County Council for the proposed development, Pairc na hAbhainn, Athenry, Co. Galway.

2 PROJECT DETAILS

The proposed development at Pairc na hAbhainn, Athenry, Co. Galway comprises of the development of residential dwellings

The proposed development comprises of the following:

- Formation of one new development entrance
- The construction of 16no. units (compromising; 8no 2-Bedroom Dwellings; 8no 3-Bedroom Dwellings)
- All ancillary site development works

Figure 2.1 shows the proposed site layout plan for the new development.

Figure 2.1 – Proposed Site Layout Plan

3 SITE LOCATION, SITE DESCRIPTION

The application site is a greenfield site located in the townland of Pairc na hAbhainn, Athenry, Co. Galway. (Figure 3.1). The site is located to the south of the Pairc na hAbhainn estate. The site has an area of approximately 0.651 hectares (6510m2 | 1.61 acres). This application includes all the required drawings for the drainage and Sustainable urban Drainage Design Systems (SuDS), foul, and watermain works.

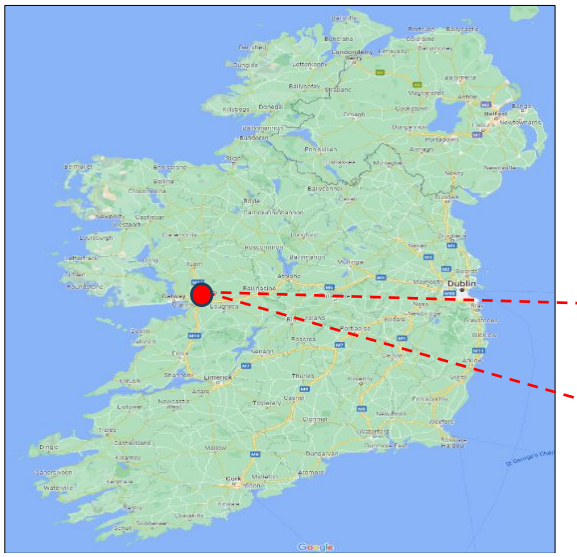


Figure 3.1 - Site Location *(image courtesy of Google Maps)*

Figure 3.2 – Site location at Pairc nah Abhainn, Athenry, Co. Galway. *(image courtesy of Google Maps)*

Figure 3.3 – Areal view of proposed site *(image courtesy of Google Maps)*

4 BACKGROUND SURVEYS

4.1.1 SITE TOPOGRAPHY

A topographical survey was conducted by KGSS in July 2025. The proposed runoff from the site will mimic the existing topography of the site. Topographical survey of the existing site is presented in Appendix A.

4.1.2 GROUND CONDITIONS

In order to assertain the existing ground counditions a site investigation was carried out by Causeway Geotech (CGL) on the June 2025. The site invesigation includes the following elements:

- 5 No. Trial Pits
- 5 No. Boreholes
- 5 No. Plate Tests
- 2 No. Infiltration Tests

Figure 4.1 below shows the extend of the site investigation. Refer to site investigation report by Causeway Geotech (CGL) presented in Appendix B

Figure 4.1 Site investigation locations (Source: Causeway Geotech (CGL))

5 FLOOD RISK

To establish if there is a risk of flooding to the proposed development and its location a desktop-based flood risk study was undertaken. As part of this study, several informative reports, studies, and records were reviewed to determine if risk of flooding was an issue. The following sources of information was used in order to determine if the proposed site poses a flood risk:

- Historic flood maps and reports from OPW (www.floodinfo.ie)
- Western Catchment Flood Risk Assessment and Management (CFRAM)
- Galway County Council Development Plan 2022-2028.

5.1 HISTORIC FLOODING

Figure 5.1 below shows past flood events within a 2.0 km zone of Athenry. Flooding was noted in December 2015; the extent of the flooding is unknown.

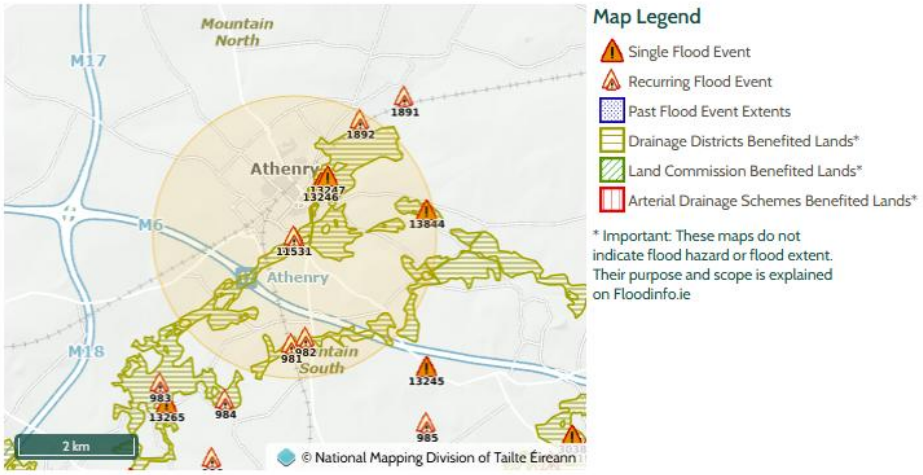


Figure 5.1 – Past flood events within 2.0Km of proposed site (Source: www.floodinfo.ie)

5.2 FLOOD MAPS

Based on a review of the Western Catchment Flood Risk Assessment and Management (CFRAM) study it can be noted that the proposed site is located in flood zone C (where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding)). Figure 5.2 below shows the flood map for the proposed site.

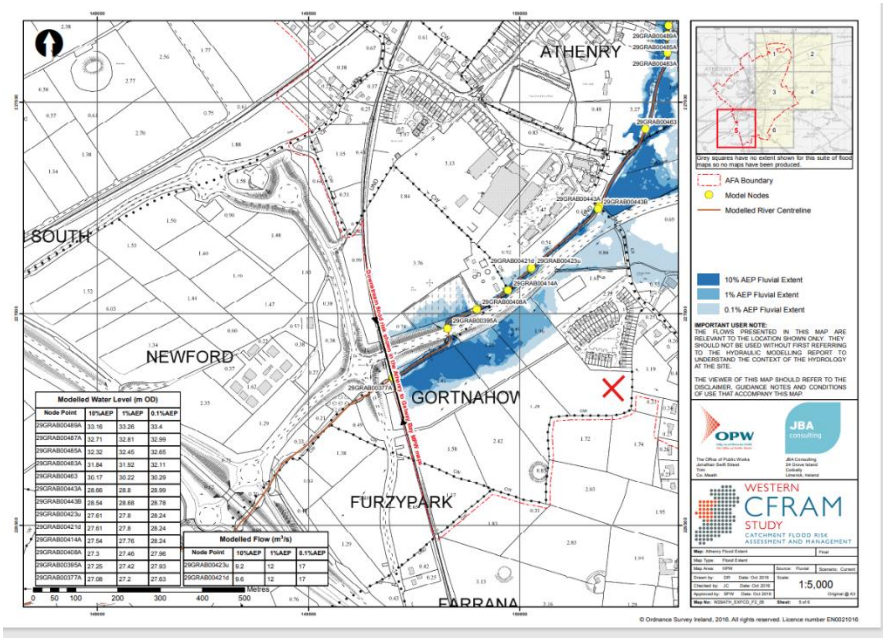


Figure 5.2 – Flood Map (Source: www.floodinfo.ie)

5.3 MITIGATING RISKS

The proposed storm network strategy should not pose a flood risk to the proposed site and surrounding area, as the following mitigating measures will be employed:

- The proposed drainage network will include SuDS features which will be maintained on a regular basis to reduce the risk of a blockage.
- The runoff from the site is discharged to the existing surface water network with a hydrobrake at a restricted flow rate of 1.3l/s.
- SuDS features are designed in accordance with Greater Dublin Strategic Drainage Study recommendations (1 in 100-year flood event plus 30% climate change due to global warming**).**

6 LOCAL AUTHORITY

Galway County Council will be provided with the relevant drawings and the associated design calculations for the services proposed for this development for consideration.

7 SURFACE WATER STRAGETY

The following section outlines the hierarchy of options when considering the removal and disposal of surface water from site, before outlining a host of potential sustainable urban drainage system (SuDS) techniques considered when designing the surface water collection system for the proposed site. The proposed surface strategy was designed in accordance with the following guidelines/polices:

- The SUDS Manual (C754,2015)
- Galway Development Plan 2022-2028.
- Greater Dublin Strategic Drainage Study (GDSDS)

It is proposed that SuDS techniques are implemented wherever possible to manage surface water runoff from the development. Surface water management proposals for the site have been articulated to mimic the natural drainage patterns of the existing site.

7.1 HIERARCHY OF DISPOSAL

Generally, when designing a proposed surface water collection system, the philosophy of the design should be to prioritise the below methods of discharging surface water run off as much as reasonably practicable, from 1 (most desirable) to 5 (least desirable):

1. Collect for Re-Use
2. into the ground (infiltration),
3. To a surface waterbody,
4. To a surface water sewer, highway drain, or other drainage systems,
5. To a combined sewer.

Table 6.1 below shows a summary of the hierarchy of disposal for the proposed development. The surface water hierarchy of disposal will be based on a priority level 4 due to site constraints.

Table 6.1: Hierarchy of Disposal

Hierarchy	Priority Level	Discharge Location	Availability Y/N	Comments
	1	Collect for Use	N	Rainwater harvesting is deemed unpracticable due to the low water demand.
	2	Into the ground - Infiltration	N	Infiltration testing was carried out and results show that the poor infiltration rates and therefore infiltration has been disregarded.
	3	To a Surface Waterbody	N	There are no surface waterbodies close to this site and therefore discharge to a surface waterbody has been disregarded
	4	Discharge to a surface water sewer, highway drain, or another drainage system	Y	Discharge to an existing local Authority storm network.
	5	Discharge to a combined sewer	N	According to Uisce Eireann records a combined sewer is not present.

1. COLLECT FOR Re-USE

The low water demand for the proposed development does not warrant rain harvesting system as it would involve pumping of water which would outweigh the cost saving and therefore the scheme does not include collection for reuse.

2. INTO THE GROUND - INFILTRATION

Infiltration testing was carried out on 3 no. trial pits in accordance with BRE Digest 365 and yielded poor Infiltration rates. As a result of this, such findings consequently make infiltration an unviable option for the surface water treatment of the proposed development, therefore making controlled discharge and storage the proposed treatment option.

3. TO A SURFACE WATERBODY

There are no surface water bodies located in close proximity to this site therefore, this scheme does not include discharge to a surface waterbody in its scheme.

4. DISCHARGE TO A SURFACE WATER, HIGHWAY DRAIN, OR ANOTHER DRAINAGE SYSTEM

An existing surface water network runs in the existing Pairc na hAbhainn estate road at the north of the proposed site. This existing network will be utilised to serve the proposed development.

5. DISCHARGE TO A COMBINED SEWER

According to Uisce Eireann records a combined sewer is not present near the site and there is no intention to connect to a combined sewer.

7.2 COMPLINACE WITH SuDS PRINCIPLES

7.2.1 COMPLIANCE WITH C573 SuDS MANUAL

The C573 SuDS Manual explains that the primary function of SuDS measures is to protect watercourses from any impact due to the new development. However, SuDS can also improve the quality of life in a new development and urban spaces by making them more vibrant, visually attractive, sustainable and more resilient to change. This document explains the wider social context of SuDS and how SuDS can deliver high quality drainage while supporting urban areas to cope better with sever rainfall both now and in the future. There four pillars of SuDS include:

1. Water Quantity (mitigate flood risk & protect natural water cycle)
2. Water Quality (manage the quality of the runoff to prevent pollution)
3. Amenity (create and sustain better places for people)
4. Biodiversity (create and sustain better places for nature)

7.2.2 SuDS MANAGEMENT TRAIN

The SuDS measures proposed are usually linked in series, and this is commonly known as a SuDS Management Train, (SMT). The SMT ensures that surface runoff is captured, conveyed, stored, intercepted, and removed of pollutant correctly and efficiently before it is discharged back into the surrounding watercourse/network. This approach will ensure that the most effective measures are utilised in the correct

sequence throughout the site. Table 26.7 (Figure 7.1) (CIRIA, SuDS Manual 2015) demonstrates the effectiveness of each SuDS measure along the SMT.

TABLE 26.7 Indicative suitability of SuDS components within the Management Train

SuDS component	Interception[1]	Close to source/ primary treatment	Secondary treatment	Tertiary treatment
Rainwater harvesting	Y			
Filter strip	Y	Y		
Swale	Y	Y	Y	
Filter drain	Y		Y	
Permeable pavement	Y	Y		
Bioretention	Y	Y	Y	
Green roof	Y	Y		
Detention basin	Y	Y	Y	
Pond	[3]	Y[2]	Y	Y
Wetland	[3]	Y[2]	Y	Y
Infiltration system (soakaways/ trenches/ blankets/basins)	Y	Y	Y	Y
Attenuation storage tanks	Y[4]			
Catchpits and gullies		Y		
Proprietary treatment systems		Y[5]	Y[5]	Y[5]

Figure 7.1 CIRIA C573 SuDS Manual Table (Source: The SUDS Manual C754,2015)

7.3 SUSTAINABLE DRAINAGE SYSTEMS (SuDS)

The following section outlines the potential SuDS techniques considered for the proposed site, with proposals such as green roofs, Soakaways, swales, and modular systems all being discussed herein.

7.3.1 RAINWATER HARVESTING

Rainwater harvesting (RWH) is the collection of rainwater runoff for use. Runoff can be collected from roofs and other impermeable areas, stored, treated (where required) and then used as a supply water for domestic, commercial and/or institutional properties. As previously discussed RWH will be disproportionate in terms of cost and function with regards to the proposed development features (toilet, sinks etc.) Therefore, rainwater harvesting has been disregarded for this design.

7.3.2GREEN ROOFS

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover, over a drainage layer. They are designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows. Due to the A-frame roof for the proposed dwellings green roofs have been disregarded.

7.3.3SOAKAWAYS

Soakaways are square or circular excavations either filled with rubble or lined with brickwork, precast concrete or polyethylene rings/perforated storage structures surrounded by granular backfill. They can be grouped and linked together to drain large areas including highways. The supporting structure and backfill can be substituted by modular geo-cellular units. Soakaways provide storm water attenuation, storm water treatment and groundwater recharge. Soakaways have been disregarded due to poor infiltration rates encountered during site testing.

7.3.4 SWALES

Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate. They should promote low flow velocities to allow much of the suspended particulate load in the storm water runoff to settle out, thus providing effective pollutant removal. Swales have not been considered for this development.

7.3.5 TREE PITS

Tree pits are beneficial for bioretention as they intercept precipitation, allow water to evaporate from relief surfaces, facilitate infiltration and groundwater recharge due to their root systems, provide shade, and provide further amenity and biodiversity benefits. However, with alternative methods of surface water treatment being proposed site-wide, tree pits have been disregarded for this development.

7.3.6 PERVIOUS PAVEMENTS

Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored between infiltration to the ground, reuse or discharge to a watercourse or other drainage system. Pavements with aggregate sub-bases can provide good water quality treatment. When permeable paving for car parking bays is used, the stone sub-base not only stores and slows down the rate of discharge, but also raises the water quality. Pervious pavements has been disregarded due to maintenance and the high cost involved.

7.3.7 GEO-CELLULAR / MODULAR SYSTEMS

Modular plastic geo-cellular systems with a high void ratio can be used to create a below ground storage structure. Modular tanks can be used for runoff attenuation but require silt trap protection and a suitable means of access for cleaning and inspection. A geo-cellular system has been adopted as an attenuation system with an attenuation tank of 142m3 and this will provide adequate storage for the proposed site.

7.3.8 PONDS / RAIN GARDENS / INFILTRATION BASINS

Ponds can provide both storm water attenuation and treatment. They are designed to support emergent and submerged aquatic vegetation along their shoreline. Runoff from each rain event is detained and treated in the pool. The retention time promotes removal of silt through sedimentation and the opportunity for biological uptake mechanisms to reduce nutrient concentrations. As the proposed site is residential and ponds have not been considered as it would pose a risk of drowning.

7.3.9 EXISTING SURFACE WATER

Currently, there is existing surface water infrastructure serving the existing site to the north of the proposed development. Refer to Appendix A for Topographical Survey showing existing services in existing Pairc na hAbhainn estate. The surface water from the proposed site will be discharged to this existing network.

7.4 PROPOSED SURFACE WATER COLLECTION SYSTEM

The proposal for this development is to provide a new surface water collection network, collecting surface water run-off from houses through roof gutters, & downpipes. Surface water from roads will be collected through roadside gullies and adjacent filter strip/swale/filter drain. A series of SUDS features will be incorporated as outlined in Section 7.3.

The surface water is routed through the site to proposed manhole SW 4.0, from there it will pass through a Klargester NSBE010 Bypass Petrol and Oil separator before entering the proposed attenuation tank in the green space in the middle of the site. A hydrobrake is to be located in proposed manhole SW 6.0 which will restrict the outflow from the site, limiting the surface water flow from the site to a discharge of 1.3 l/s.

7.4.1 OUTFLOW FROM SITE

A HydroBrake Optimum by Hydro International (or similar equivalent) will be provided within proposed surface water manhole SW 6.0 to limit the outflow as outlined above. Refer to drawing no drawing 25156-B-3021-PL.4 for proposed discharge location.

7.4.2 SURFACE WATER ATTENUATION SYSTEM

As previously mentioned, the surface water attenuation system includes a Graf EcoBloc attenuation system. In total, this SuDS feature provides a cumulative surface water storage volume of approx. 142m3. This has been designed to provide storage for the surface water generated in a 1 in 100-year rainfall event. The rainfall generated in such an event will be increased by an allowance of 30% to cater for predicted climate change due to global warming as per GDSDS requirements. This storage volume of 142m3 will be adequate in terms of treating and storing surface water in the event of the aforementioned rainfall event. For calculations regarding surface water attenuation system design, please see appendix C, where a maximum rainfall volume to treat of 139m3 is calculated. Whilst carrying out the surface water attenuation design, rainfall return period data was utilised from Met Eireann, which is viewable in Appendix D.

PROPOSED SUDS STRATEGY

The proposed SuDS features will be integrated into the surface water drainage network for the proposed development, with the main objective of controlling the quantity of surface water runoff, managing the quality of runoff to prevent pollution, and creating sustaining local ecosystems. The proposed SuDS strategy for the site include the following:

- 1 No. Graf EcoBloc Attenuation Tank – The proposed attenuation tank shall assist with providing optimal surface water storage on site.
- 1 No. Hydrobrake – The proposed hydrobrake shall restrict the discharge from the site into the existing surface water network.
- 1 No. Petrol Interceptor – The proposed class 1 petrol interceptors shall cleanse the surface water prior to discharging into the existing surface water network.

8 PROPOSED WASTEWATER SEWER SYSTEM

The proposed wastewater sewer and sewer diversion will be constructed in accordance with the following:

- BS EN 752:2008 – Drain & Sewer Systems Outside Buildings,
- Building Regulations - TGD Part H – Drainage and Wastewater Disposal.
- Uisce Eireann Standard Details & Code of Practice.

A new 150mm diameter uPVC wastewater sewer will be laid within the site to accommodate the wastewater from the new housing development. This sewer and accompanying manholes will be built in accordance with Uisce Eireann standard details and code of practice. This sewer will be connected to an existing 150mm diameter Uisce Eireann sewer pipe which is located to the northern area of the site.

For further detail of the proposed foul network and the connections to the existing foul network please see drawing 25156-B-3021-PL4.

8.1 WASTEWATER LOADING RATES

The following table 8.1 shows the wastewater discharge rates from the proposed residential development. The population of 2.7 persons/dwelling is from the Uisce Eireann Code of Practice. Daily Demand per person is 150 l/day.

Table 8.1 - Estimated Foul Demand

Residential Wastewater Demand							
Use	No. of Units	Occupancy Rate (persons/ dwelling)	Population (P)	Daily Demand per Population (l/day)	Average daily domestic demand (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential	16	2.7	43.2	150	7,128	0.083	0.458

The overall daily wastewater loading is 7,128 litres/day or 7.128m^3 day. As mentioned above, the proposed foul sewer system will be connected to the existing foul sewer network to the north of the proposed development. A pre-connection enquiry was submitted to Irish Water for the proposed development (CDS25006844). Refer to Appendix E for pre-connection enquiry application. A confirmation of feasibility was issued by Uisce Eireann (see Appendix E).

9 POTABLE WATER SUPPLY

9.1 EXISTING WATER SUPPLY

Following the review of the Topo survey completed by KGSS there is an existing 100mm uPVC watermain situated in the footpath which runs along the front of existing houses in Pairc nah Abhainn estate to the north boundary of the development.

9.2 PROPOSED WATER SUPPLY

A new 100mm diameter watermain will be constructed within the proposed site to serve all units. This new watermain will connect to an existing watermain to the northern part of the site.

The water demand is calculated in accordance with Code of Practice for Water Infrastructure, Connections and Developer Services, Design & Construction Requirements for Self-Lay Developments, July 2020 (Revision 2)', Section 3.7.2. The total peak average flow for the residential use will be 0.075 l/s with a peak flow of 0.469 l/s.

The proposed connection for the proposed development will be made in accordance with Irish Water Standard Details for Non-Mechanical Meter Chamber (40-250mm diameter): Ref. STD-W-26-Rev 03. Please refer to drawing 25156-B-3022-PL3 for the location and details of the proposed watermains network and fire hydrants proposed for this new site layout. A pre-connection application was submitted to Uisce Eireann for this proposed development, and a Confirmation of Feasibility was issued by UE. Reference number CDS25006844.

Table 9.1 - Estimated Water Demand

Residential/Commercial Water Demand							
Use	No. of Units	Occupancy Rate (persons/ dwelling)	Population (P)	Daily Demand per Population (l/day)	Average daily domestic demand (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential	16	2.7	43.2	150	6,480	0.075	0.469

9.3 FIRE HYDRANTS

It is proposed to provide 2 No. fire hydrant on the new watermain. Hydrants shall comply with the requirements of BS 750:2012 and shall be installed in accordance with Irish Waters Code of Practice and Standard Details.

10 SUMMARY AND CONCLUSIONS

SURFACE WATER SYSTEM

The proposed surface water network on site will consists of gutters, pipework, gullies, various SUDS features and a Graf EcoBloc Attenuation Tank. These SuDS features and attenuation tank are to work in tandem to provide a cumulative surface water storage capacity of circa 142m^3. A HydroBrake flow control device will reduce the outflow from the proposed application site to a maximum of 1.3l/s. This proposed design achieves compliance with all previously stated regulations whilst considering the constraints of the site.

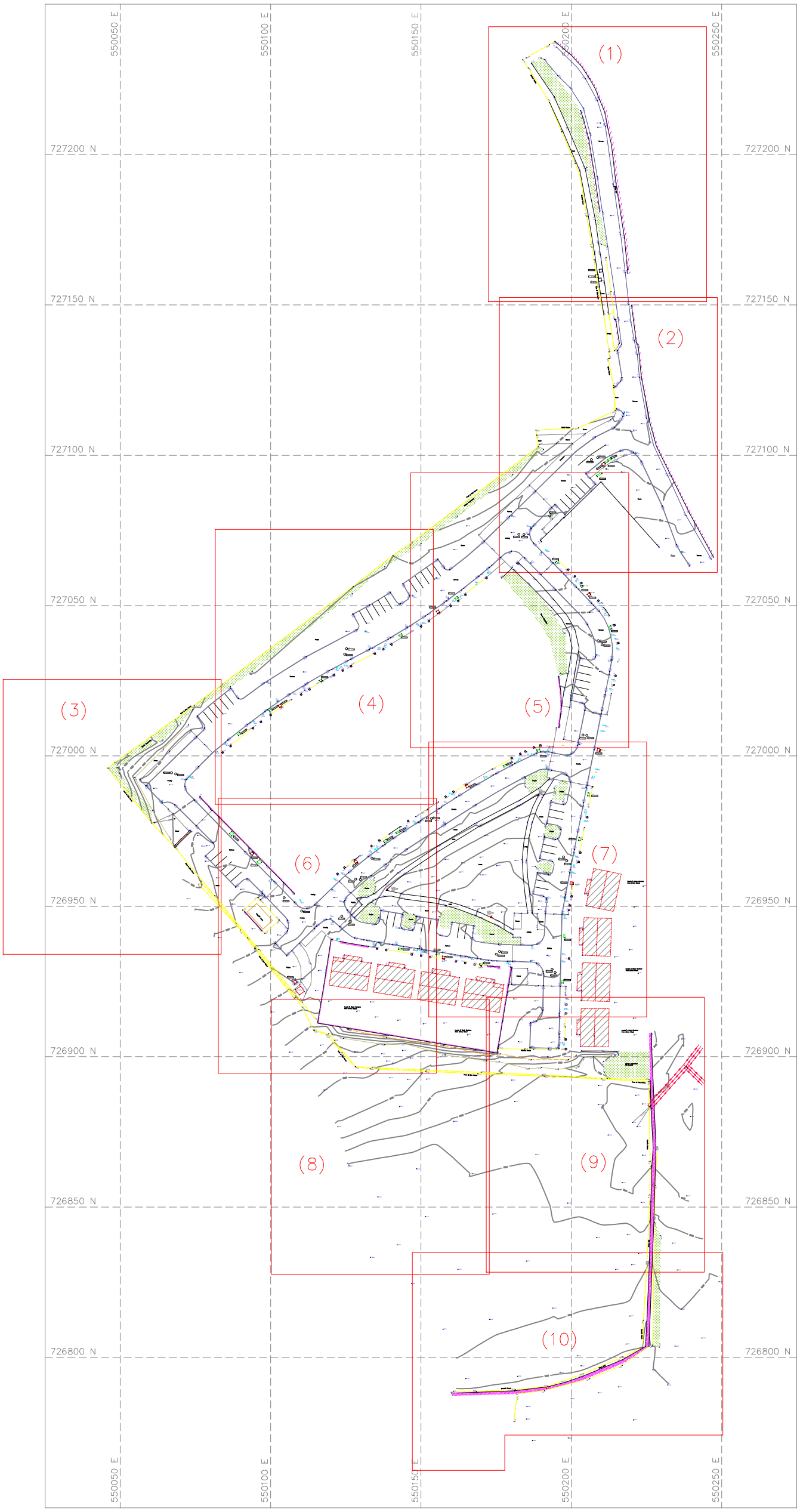
WASTEWATER SYSTEM

The total wastewater loading from the site will be 7.13m^3/day, with a peak flow of 0.458 l/s.

WATERMAINS

The total volume of water required by the proposed development will be circa 6.48m^3/day, with a peak flow of 0.469 l/s.

APPENDIX A – TOPGRAPHICAL SURVEY



LEGEND :

Survey Point		Manhole (General)		Survey Point Level	100.00
Contour	340	Storm Water		Roof / Wall Level	200.00
Fencing		Foul Water			
Gate		Access Junction	AJ	Digitised TÉ data:	
Building / Structure		Sluice Valve	SV	Folio Setout:	
Wall		Fire hydrant	FH		
Road Edge		Water Meter	WM	Setout Coordinate	S/O Pt: E:100.00 N:100.00
Kerbed Road		Telecom Pole	TP		
Path / Track		ESB Pole	EP	Window	
Banking / Drain		Lamp Post	LP	Door	
Detail		Sign Post	Sign	Structural H Beam	
Overhead Detail		Traffic Light	TL		
Overhead ESB	ESB	Bollard	Bol		
Overhead Telecom	TEL	Radon Sump	Radon		
		Earth Rod	Er		
Vegetation		Gas Valve	Gas		
Tree Trunk					
Tree Spread					

KGSS

Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	Key Plan	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	Level Datum:	Scale:	Surveyed By:	Survey Finish Date:	Drafted By:	Issue Date:
ITM IRENET95 / EPSG: 2157	OSGM15	1:1500 A3	UR & RT	15/07/2025	UR	21/07/2025

Survey Notes:

- There were large areas of dense vegetation/other materials on this site that would need to be cleared before surveying accurately
- Any boundaries shown may not define the legal boundary between properties.
- It is strongly recommended that a CCTV/GPR survey is undertaken in order to locate any underground services that are not visible/accessible from the surface.
- Please report any anomalies to the KGSS office for rectification.

Modifications	Date	Rev.

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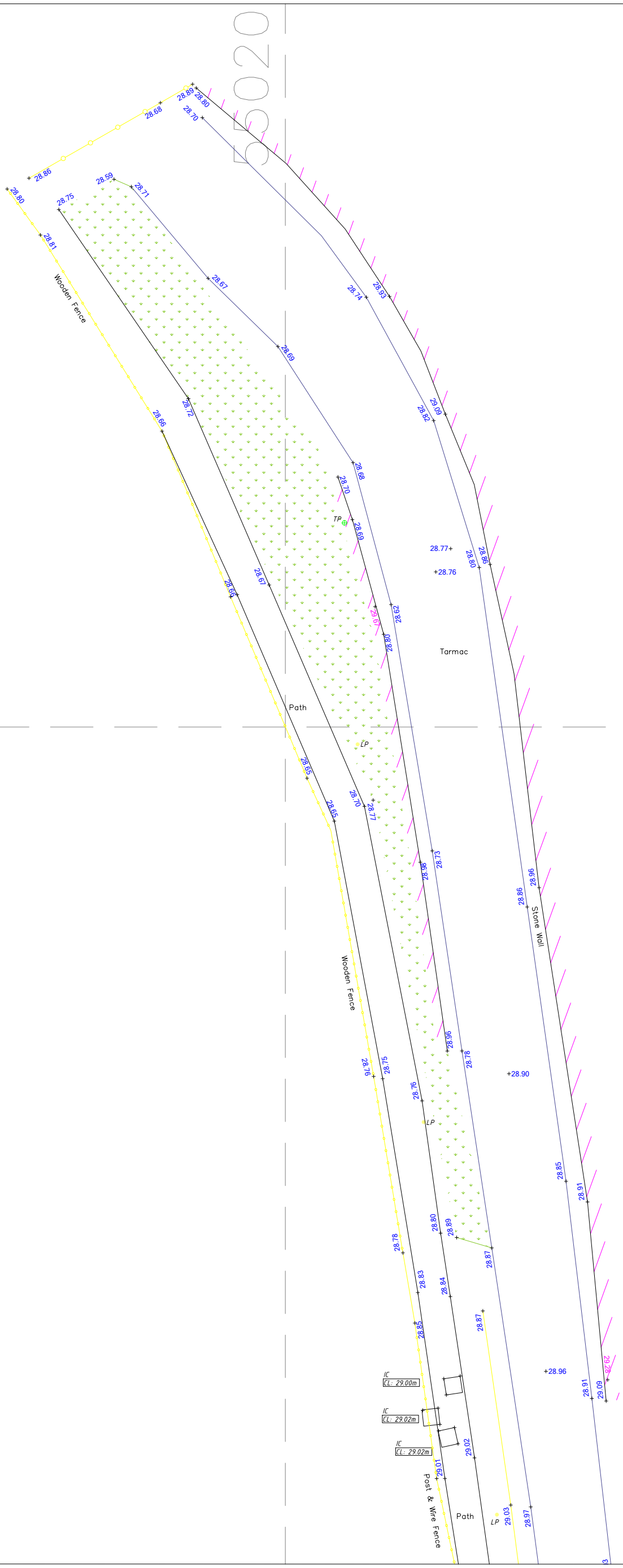

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Gate	Access Junction	Digitised TÉ data:			
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Kerbed Road	Telecom Pole				
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Overhead Detail	Traffic Light				
Overhead ESB	Bollard				
Overhead Telecom	Radon Sump				
	Earth Rod				
Vegetation	Gas Valve				
Tree Trunk					
Tree Spread					

KGSS

Geo Spatial Solutions: Topographic Services | Engineering Surveying | Legal Mapping | Monitoring Solutions

Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(1)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	Level Datum:	Scale:	Surveyed By:	Survey Finish Date:	Drafted By:	Issue Date:
ITM IRENET95 / EPSG: 2157	OSGM15	1:250 A3	UR & RT	15/07/2025	UR	21/07/2025

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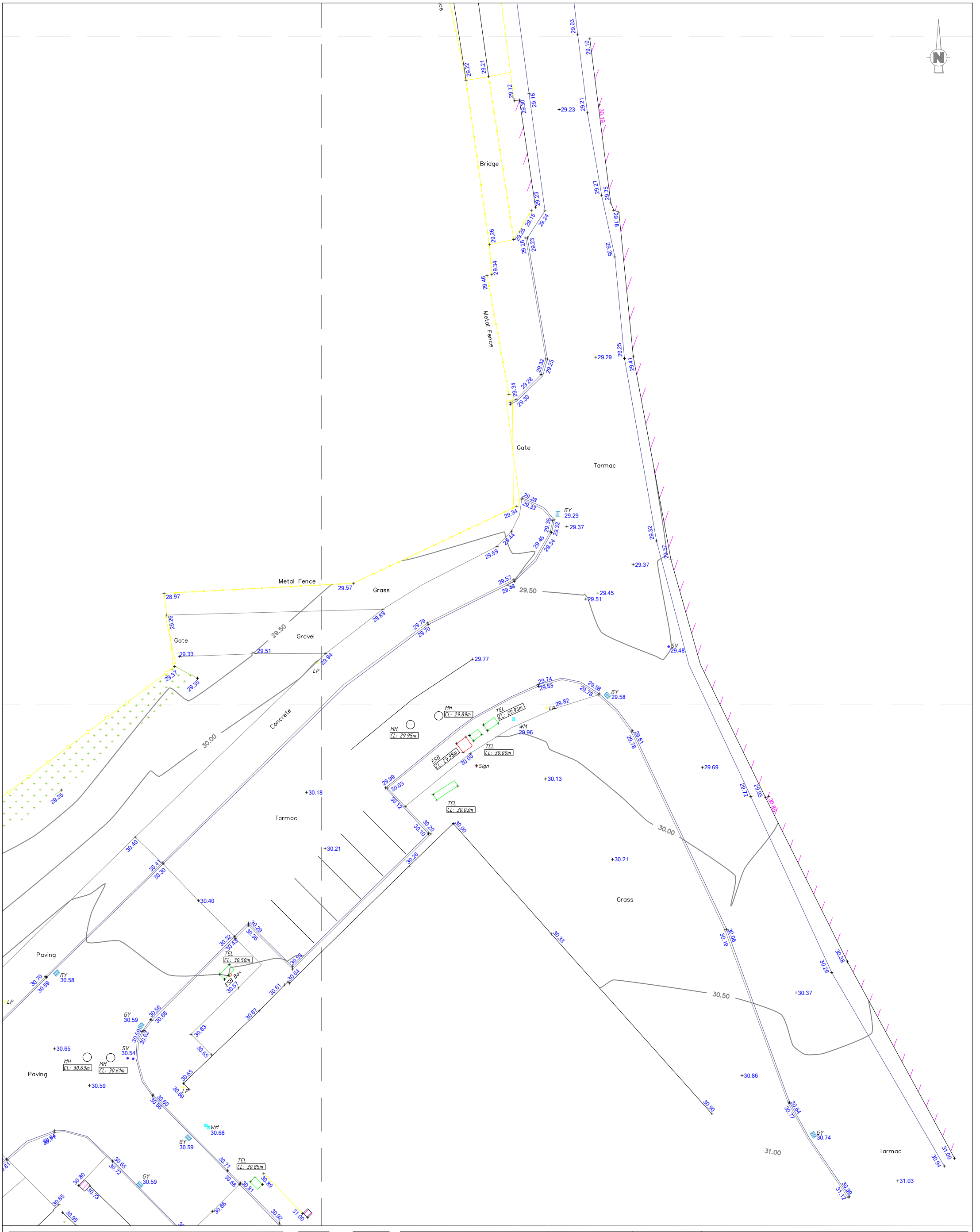

LEGEND :

Survey Point	Manhole (General)	Survey Point Level	100.00
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	Earth Rod		
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Tree Trunk			
Tree Spread			

KGSS

Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(2)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	**Level Datum:**	**Scale:**	**Surveyed By:**	**Survey Finish Date:**	**Drafted By:**	**Issue Date:**
ITM IRENET95 / EPSG: 2157	OSGM15	1:250 A3	UR & RT	15/07/2025	UR	21/07/2025

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Modifications	Date	Rev.

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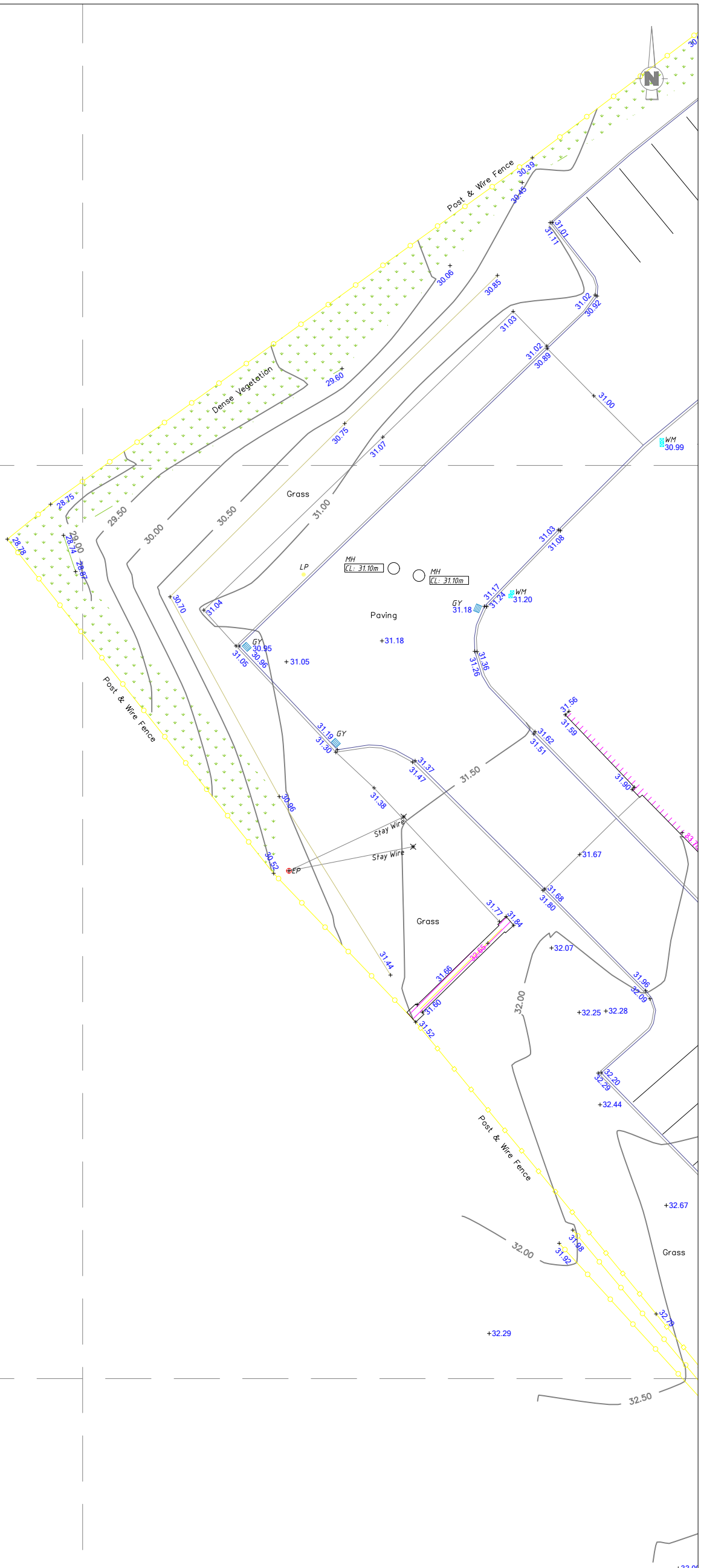
727000 N

726950 N



LEGEND :

Survey Point		Manhole (General)		Survey Point Level	100.00
Contour	34.0	Storm Water		Roof / Wall Level	200.00
Fencing		Foul Water			
Gate		Access Junction	AJ	Digitised TÉ data:	
Building / Structure		Sluice Valve	SV	Folio Setout:	
Wall		Fire hydrant	FH		
Road Edge		Water Meter	WM	Setout Coordinate	S/O Pt: E:100.00 N:100.00
Kerbed Road		Telecom Pole	TP		
Path / Track		ESB Pole	EP		
Banking / Drain		Lamp Post	LP	Window	
Detail		Sign Post	Sign	Door	
Overhead Detail		Traffic Light	TL	Structural H Beam	
Overhead ESB	ESB	Bollard	Bol		
Overhead Telecom	TEL	Radon Sump	Radon		
		Earth Rod	Er		
Vegetation		Gas Valve	Gas		
Tree Trunk					
Tree Spread					

KGSS

Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(3)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	Level Datum:	Scale:	Surveyed By:	Survey Finish Date:	Drafted By:	Issue Date:
ITM IRENET95 / EPSG: 2157	OSGM15	1:250 A3	UR & RT	15/07/2025	UR	21/07/2025

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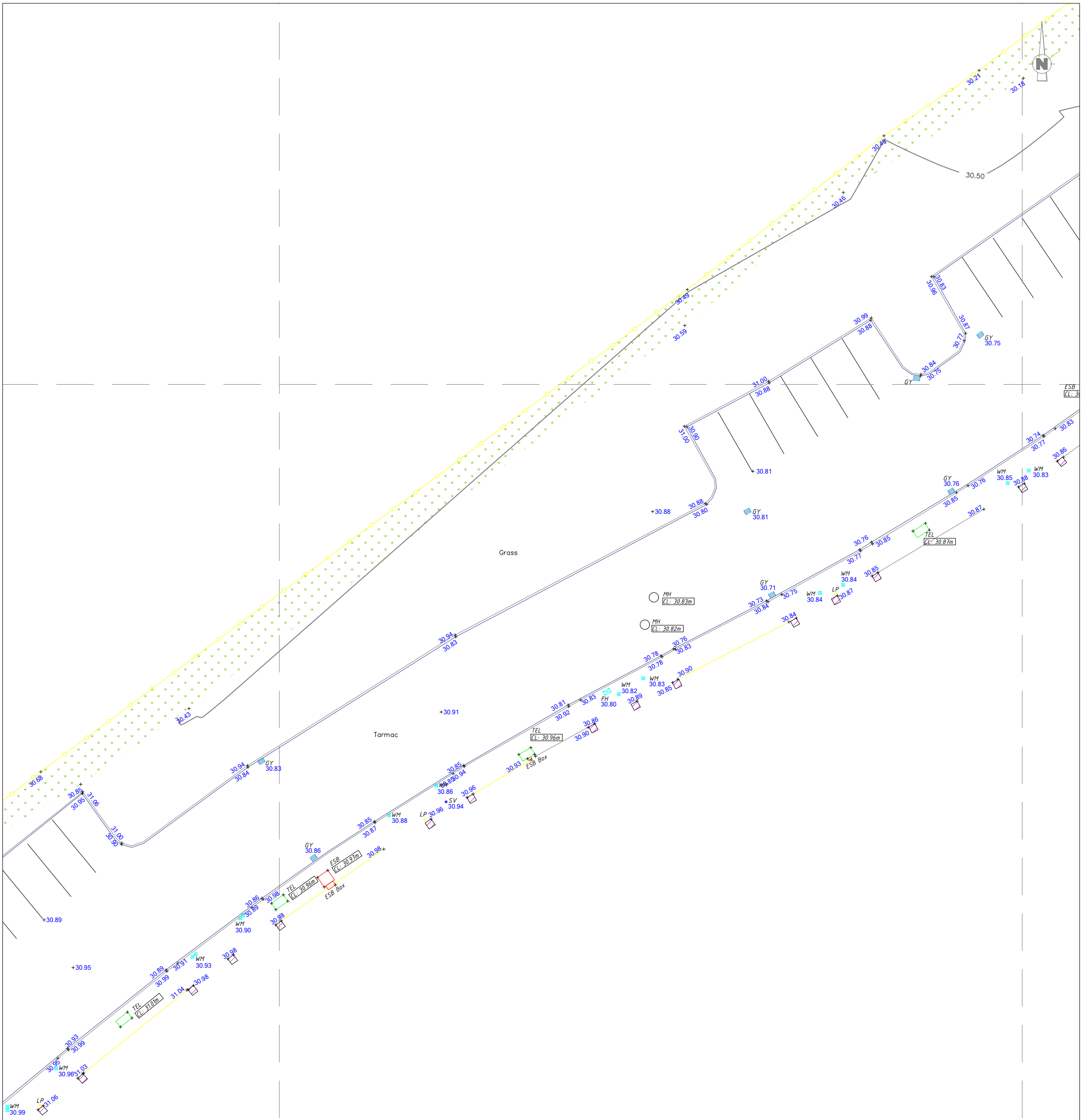

LEGEND :

Survey Point	Manhole (General)		Survey Point Level	100.00
Contour	Storm Water		Roof / Wall Level	200.00
Fencing	Foul Water			
Gate	Access Junction	AJ	Digitised TÉ data:	
Building / Structure	Sluice Valve	SV	Folio Setout:	
Wall	Fire hydrant	FH		
Road Edge	Water Meter	WM	Setout Coordinate	E:100.00 N:100.00
Kerbed Road	Telecom Pole	TP		
Path / Track	ESB Pole	EP	Window	
Banking / Drain	Lamp Post	LP	Door	
Detail	Sign Post	Sign	Structural H Beam	
Overhead Detail	Traffic Light	TL		
Overhead ESB	Bollard	Bol		
Overhead Telecom	Radon Sump	Radon		
	Earth Rod	Er		
Vegetation	Gas Valve	Gas		
Tree Trunk				
Tree Spread				

KGSS

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Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(4)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	Level Datum:	Scale:	Surveyed By:	Survey Finish Date:	Drafted By:	Issue Date:
ITM IRENET95 / EPSG: 2157	OSGM15	1:250 A3	UR & RT	15/07/2025	UR	21/07/2025

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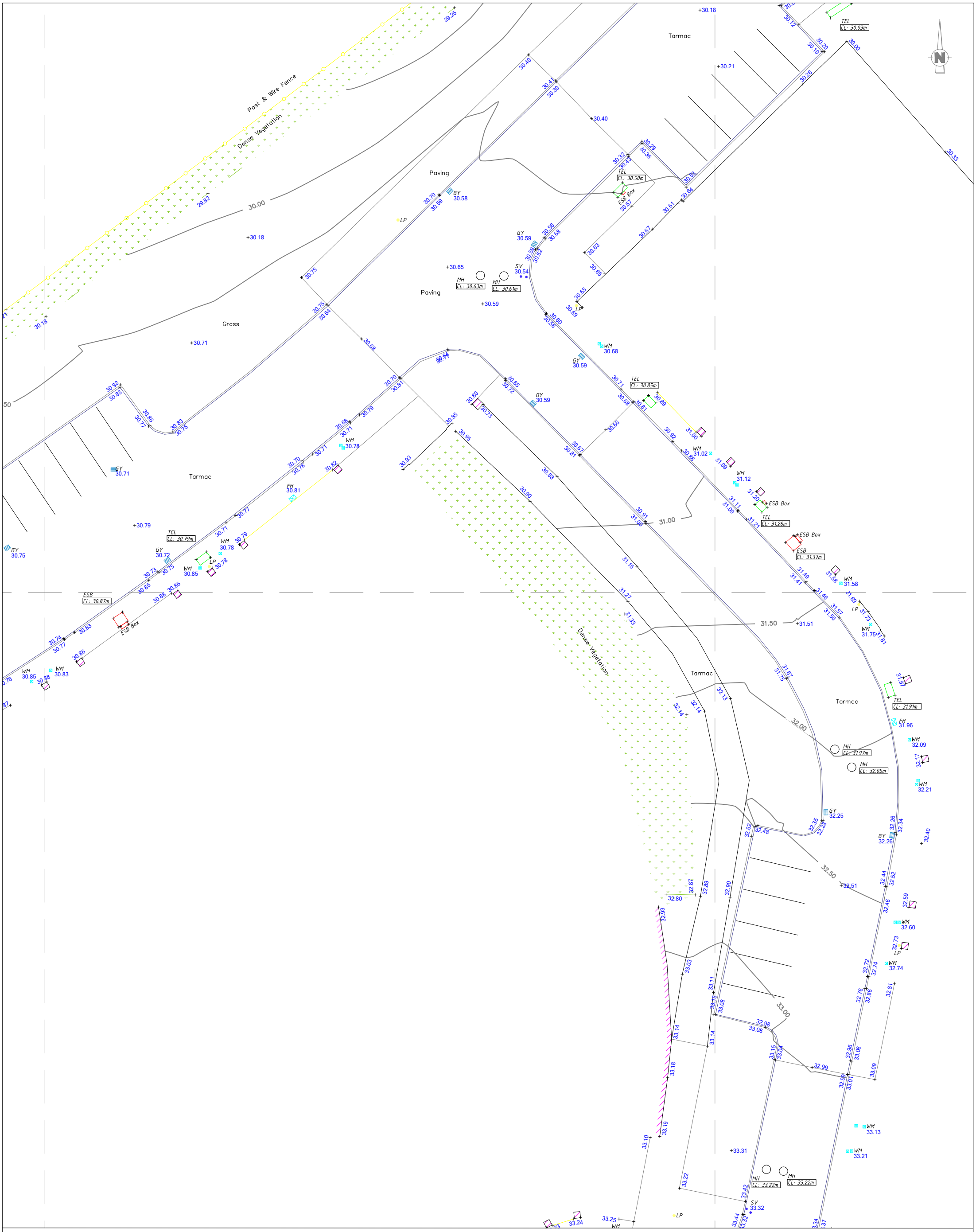

LEGEND :

Survey Point		Manhole (General)		Survey Point Level	100.00
Contour		Storm Water		Roof / Wall Level	200.00
Fencing		Foul Water		Digitised TÉ data:	
Gate		Access Junction	AJ	Folio Setout:	
Building / Structure		Sluice Valve	SV	Setout Coordinate	S/O Pt: E:100.00 N:100.00
Wall		Fire hydrant	FH		
Road Edge		Water Meter	WM	Window	
Kerbed Road		Telecom Pole	TP	Door	
Path / Track		ESB Pole	EP	Structural H Beam	
Banking / Drain		Lamp Post	LP		
Detail		Sign Post	SIgn		
Overhead Detail		Traffic Light	TL		
Overhead ESB	ESB	Bollard	Bol		
Overhead Telecom	TEL	Radon Sump	Radon		
		Earth Rod	Er		
Vegetation		Gas Valve	Gas		
Tree Trunk					
Tree Spread					

KGSS

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Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(5)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	**Level Datum:**	**Scale:**	**Surveyed By:**	**Survey Finish Date:**	**Drafted By:**	**Issue Date:**
ITM IRENET95 / EPSG: 2157	OSGM15	1:250 A3	UR & RT	15/07/2025	UR	21/07/2025

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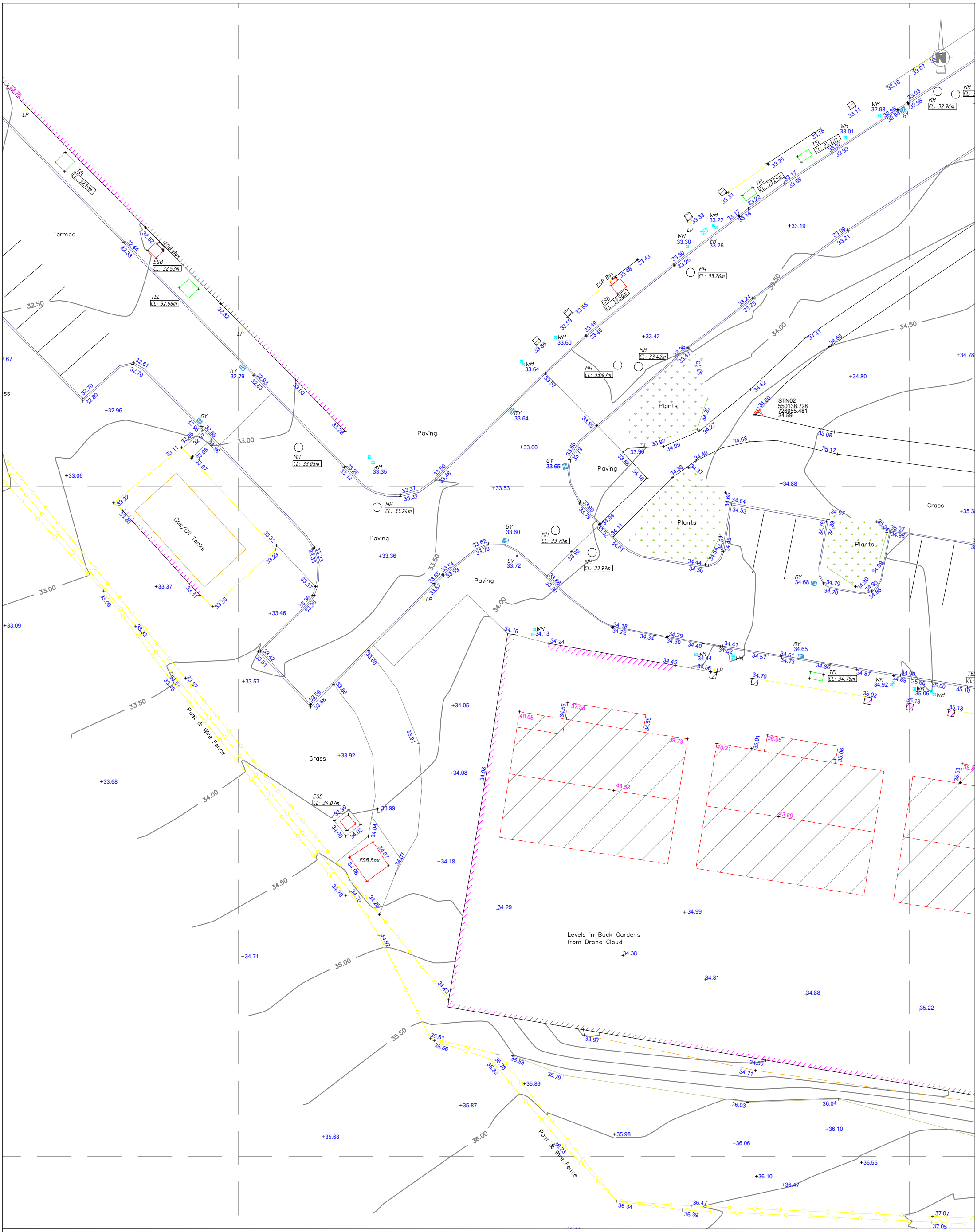

LEGEND :

Survey Point	Manhole (General)	Survey Point Level	100.00
Contour	Storm Water	Roof / Wall Level	200.00
Fencing	Foul Water		
Gate	Access Junction	Digitised TÉ data:	
Building / Structure	Sluice Valve	Folio Setout:	
Wall	Fire hydrant		
Road Edge	Water Meter	Setout Coordinate	S/O Pt: E:100.00 N:100.00
Kerbed Road	Telecom Pole		
Path / Track	ESB Pole	Window	
Banking / Drain	Lamp Post	Door	
Detail	Sign Post	Structural H Beam	
Overhead Detail	Traffic Light		
Overhead ESB	Bollard		
Overhead Telecom	Radon Sump		
	Earth Rod		
Vegetation	Gas Valve		
Tree Trunk			
Tree Spread			

KGSS

Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(6)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	**Level Datum:**	**Scale:**	**Surveyed By:**	**Survey Finish Date:**	**Drafted By:**	**Issue Date:**
ITM IRENET95 / EPSG: 2157	OSGM15	1:250 A3	UR & RT	15/07/2025	UR	21/07/2025

Modifications	Date	Rev.

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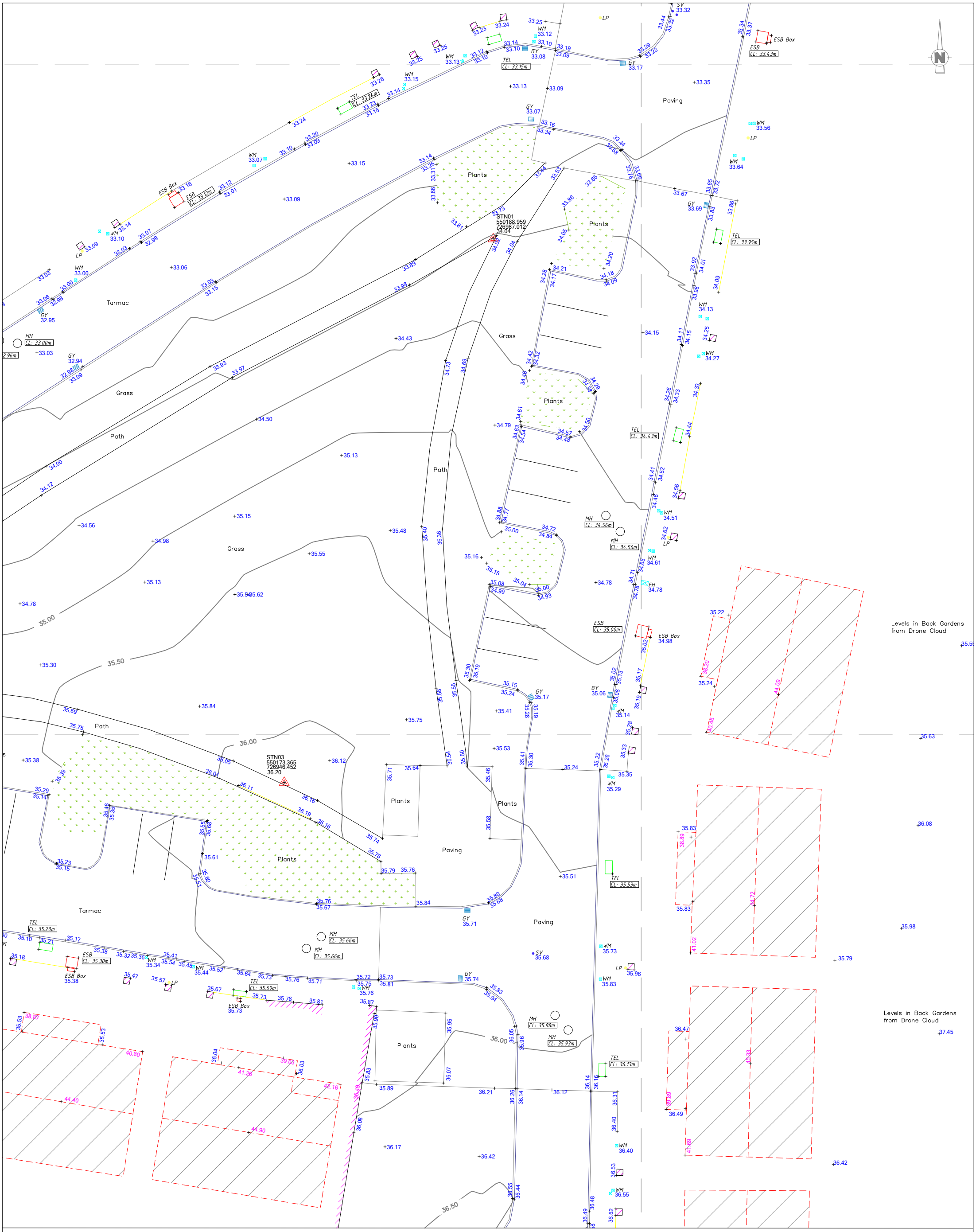

LEGEND :

Survey Point	Manhole (General)	Survey Point Level	100.00
Contour	Storm Water	Roof / Wall Level	200.00
Fencing	Foul Water		
Gate	Access Junction	Digitised TÉ data:	
Building / Structure	Sluice Valve	Folio Setout:	
Wall	Fire hydrant		
Road Edge	Water Meter	Setout Coordinate	E:100.00 N:100.00
Kerbed Road	Telecom Pole		
Path / Track	ESB Pole	Window	
Banking / Drain	Lamp Post	Door	
Detail	Sign Post	Structural H Beam	
Overhead Detail	Traffic Light		
Overhead ESB	Bollard		
Overhead Telecom	Radon Sump		
	Earth Rod		
Vegetation	Gas Valve		
Tree Trunk			
Tree Spread			

KGSS

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Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(7)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	Level Datum:	Scale:	Surveyed By:	Survey Finish Date:	Drafted By:	Issue Date:
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Levels in Back Gardens from Drone Cloud

Levels in Back Gardens from Drone Cloud

Post & Wire Fence

Post & Wire Fence

LEGEND :

Survey Point		Manhole (General)		Survey Point Level	100.00
Contour		Storm Water		Roof / Wall Level	200.00
Fencing		Foul Water			
Gate		Access Junction	AJ	Digitised TÉ data:	
Building / Structure		Sluice Valve	SV	Folio Setout:	
Wall		Fire hydrant	FH		
Road Edge		Water Meter	WM	Setout Coordinate	
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Banking / Drain		Lamp Post	LP	Window	
Detail		Sign Post	SIgn	Door	
Overhead Detail		Traffic Light	TL	Structural H Beam	
Overhead ESB		Bollard	Bol		
Overhead Telecom		Radon Sump	Radon		
		Earth Rod	Er		
Vegetation		Gas Valve	Gas		
Tree Trunk					
Tree Spread					

KGSS

Client: SDS	Survey Type: Topographic	Drawing No: (8)	Project No. KG25305	Project Location: Pairc Na hAbhainn	
Horizontal Datum: ITM IRENET95 / EPSG: 2157	Level Datum: OSGM15	Scale: 1:250 A3	Surveyed By: UR & RT	Survey Finish Date: 15/07/2025	Drafted By: UR / Issue Date: 21/07/2025

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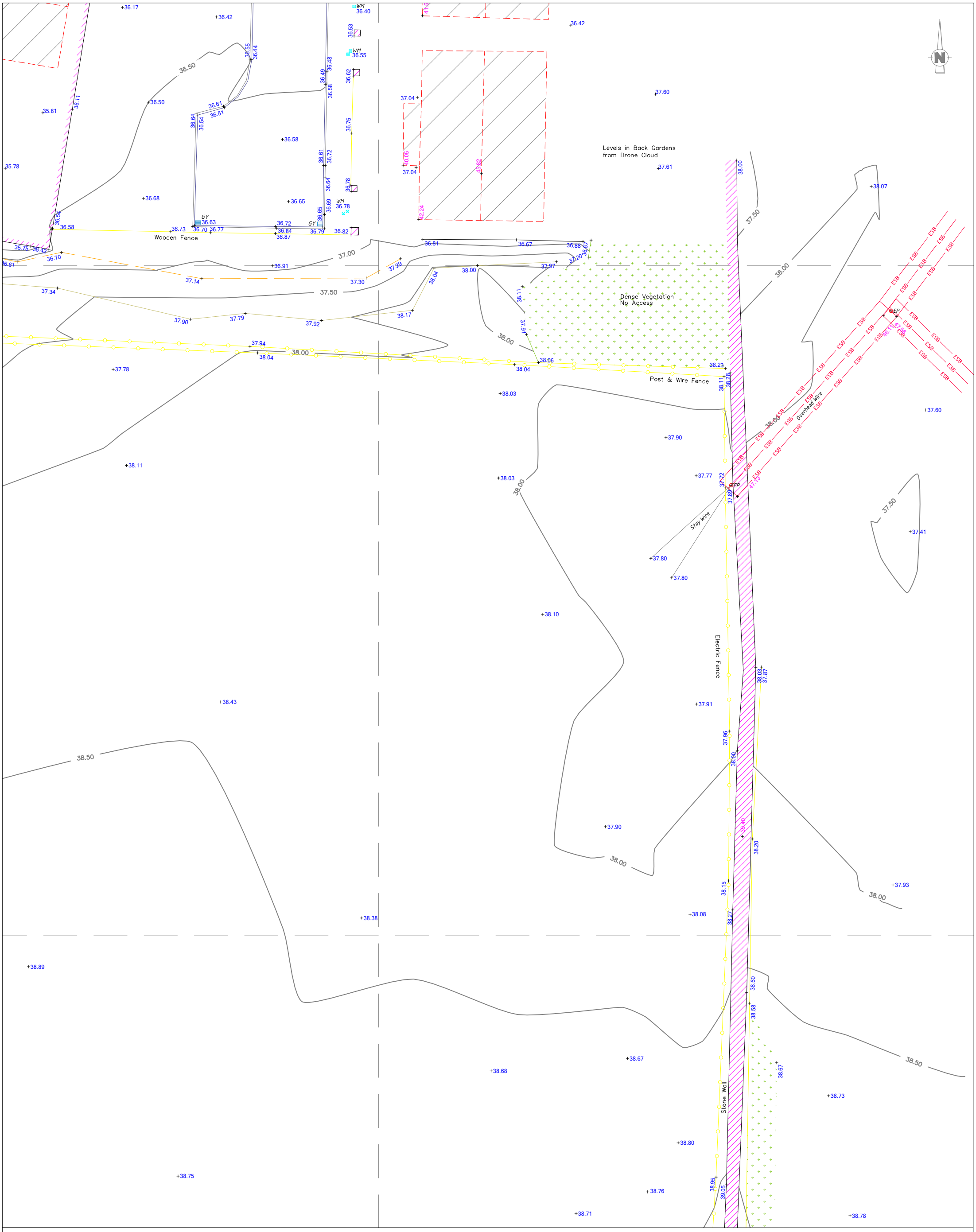

LEGEND :

Survey Point		Manhole (General)		Survey Point Level	100.00
Contour		Storm Water		Roof / Wall Level	200.00
Fencing		Foul Water		Digitised TÉ data:	
Gate		Access Junction		Folio Setout:	
Building / Structure		Sluice Valve		Setout Coordinate	
Wall		Fire hydrant		Window	
Road Edge		Water Meter		Door	
Kerbed Road		Telecom Pole		Structural H Beam	
Path / Track		ESB Pole			
Banking / Drain		Lamp Post			
Detail		Sign Post			
Overhead Detail		Traffic Light			
Overhead ESB		Bollard			
Overhead Telecom		Radon Sump			
		Earth Rod			
Vegetation		Gas Valve			
Tree Trunk					
Tree Spread					

KGSS

Client:	Survey Type:	Drawing No:	Project No.	Project Location:		
SDS	Topographic	(9)	KG25305	Pairc Na hAbhainn		
Horizontal Datum:	Level Datum:	Scale:	Surveyed By:	Survey Finish Date:	Drafted By:	Issue Date:
ITM IRENET95 / EPSG: 2157	OSGM15	1:250 A3	UR & RT	15/07/2025	UR	21/07/2025

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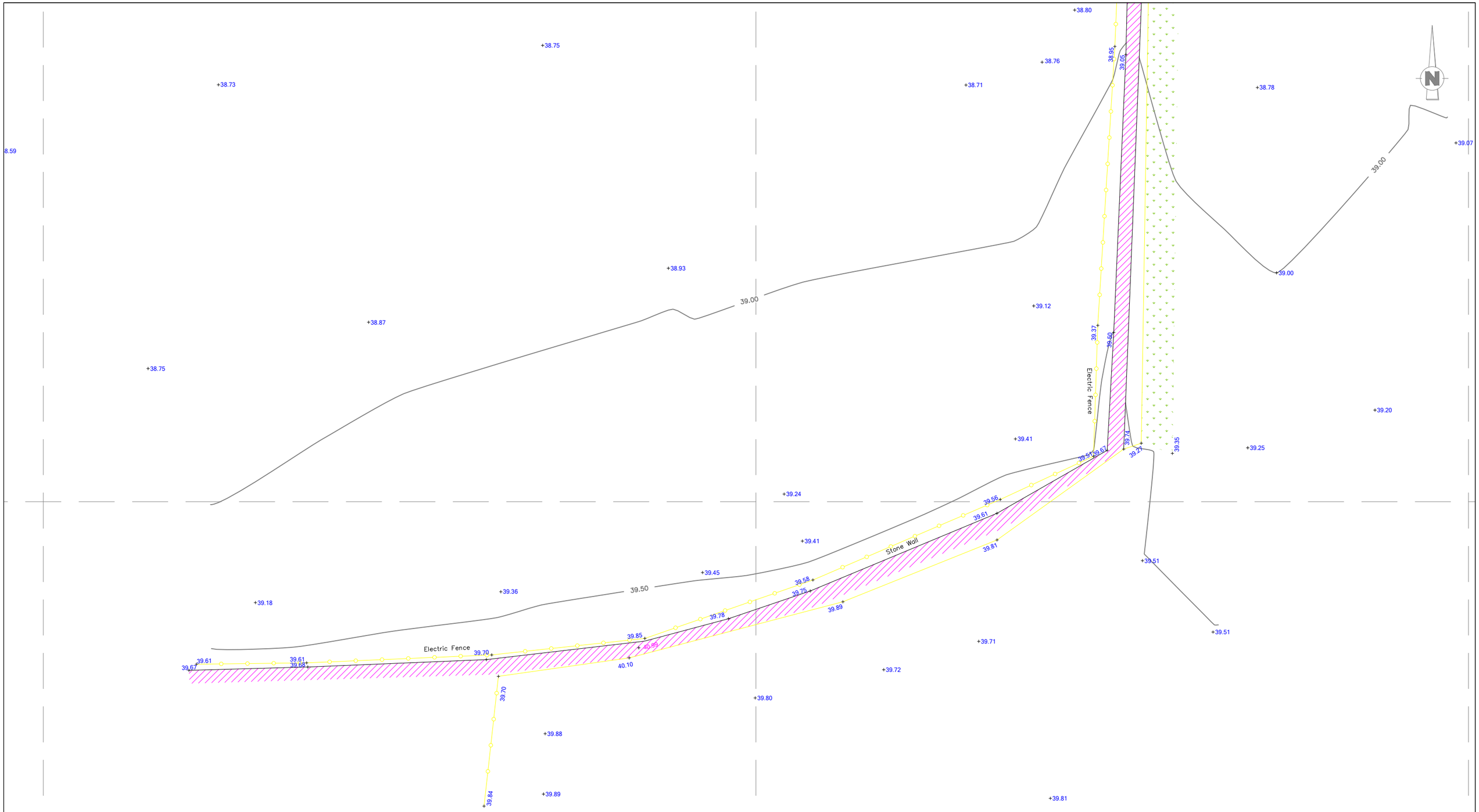

LEGEND :

Survey Point		Manhole (General)		Survey Point Level	100.00
Contour		Storm Water		Roof / Wall Level	200.00
Fencing		Foul Water			
Gate		Access Junction		Digitised TE data:	
Building / Structure		Sluice Valve		Folio Setout:	
Wall		Fire hydrant			
Road Edge		Water Meter		Setout Coordinate	S/O Pt: E:100.00 N:100.00
Kerbed Road		Telecom Pole			
Path / Track		ESB Pole		Window	
Banking / Drain		Lamp Post		Door	
Detail		Sign Post		Structural H Beam	
Overhead Detail		Traffic Light			
Overhead ESB	ESB	Bollard			
Overhead Telecom	TEL	Radon Sump			
		Earth Rod			
Vegetation		Gas Valve			
Tree Trunk					
Tree Spread					

KGSS

Client: SDS	Survey Type: Topographic	Drawing No: (10)		Project No. KG25305	Project Location: Pairc Na hAbhainn	
Horizontal Datum: ITM IRENET95 / EPSG: 2157	Level Datum: OSGM15	Scale: 1:250 A3		Surveyed By: UR & RT	Survey Finish Date: 15/07/2025	Drafted By: UR	Issue Date: 21/07/2025

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APPENDIX B – SITE INVESTIGATION REPORT

CAUSEWAY GEOTECH

25-0994

PAIRC NA HABHAINN, ATHENRY GROUND INVESTIGATION REPORT

Client:
GALWAY COUNTY COUNCIL

Client's Representative:
SDS

Date:
OCTOBER 2025

Status:
FINAL

CAUSEWAY GEOTECH LTD
8 Drumahiskey Road, Ballymoney
Co. Antrim, Northern Ireland, BT53 7QL

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

LIST OF TABLES

APPENDICES

DOCUMENT CONTROL SHEET

REPORT NO:		**25-0994**			
PROJECT TITLE:		**PAIRC NA HABHAINN, ATHENRY**			
CLIENT:		**GALWAY COUNTY COUNCIL**			
CLIENT'S REPRESENTATIVE:		**SDS**			
REVISION:	**A00**	**STATUS**	**INTERIM**	**ISSUE DATE**	**30/09/2025**
REVISION:	**A01**	**STATUS**	**FINAL**	**ISSUE DATE**	**06/10/2025**
PREPARED BY:		**REVIEWED BY:**		**APPROVED BY:**	
Buhlebenkosi Angie Ndebele BSc Geology		Gabriella Horan BSc PGeo (EurGeol)		Celine Rooney BSc MSc PGeo (EurGeol)	

This report presents a factual account of the ground investigation in accordance with the Specification and Related Documents for Ground Investigation in Ireland 2nd Edition, published by Engineers Ireland (2016), along with a preliminary geotechnical assessment.

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.
SB	Sonic 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	Uncorrected in situ hand shear vane test. Peak (HVP) and remoulded (HVR) results presented in kPa. Vane calibration factor has been applied, but no correction made for soil type.
c_{fv} / c_{rv}	Borehole shear vane test. Undisturbed (c_{fv}) and remoulded (c_{rv}) shear strengths presented in kPa.
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.

1 AUTHORITY

On the instructions of SDS, (the "Client's Representative"), acting on the behalf of Galway County Council (the "Client"), a ground investigation was undertaken at the site 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 and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the 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 and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 PURPOSE, RATIONALE & SCOPE OF THE INVESTIGATION

The purpose of this investigation is to assess the ground conditions and to allow an evaluation of the geotechnical and environmental issues with the current site and proposed development.

The rationale has been determined by the Client's Representative, with the extent of the investigation including boreholes, trial pits, soil sampling, environmental sampling, in-situ and laboratory testing, and the preparation of a report on the findings including recommendations for construction.

3 DESCRIPTION OF SITE

The site is located at Irish Transverse Mercator 550179, 726850 south of Athenry, Co.Galway. The site location is presented in Appendix A and a summary of the surrounding land uses is provided in Table 1.

Table 1: Summary of surrounding land uses

Location	Description
North	Residential premises, R348, Athenry.
East	Maryfield Nursing Home, R347, Athenry New Cemetery, R348
South	Agricultural lands, residential premises.
West	Agricultural lands, R348 and Clarinbridge River.

4 SITE OPERATIONS

4.1 SUMMARY OF SITE WORKS

Site operations, which were conducted between 12/08/2025 and 13/08/2025, comprised:

- Five boreholes by dynamic (windowless) sampling
- Five machine-dug trial pits
- in-situ testing, including:
    - Standard Penetration Tests
    - Two infiltration tests
    - Five plate load tests
- GPS survey of all completed locations

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, and as shown on the exploratory hole location plan in Appendix A.

4.2 BOREHOLES

4.2.1 DYNAMIC SAMPLED BOREHOLES

Five boreholes (BH01-BH05) 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 2.40m and 3.40m where they were terminated on encountering virtual refusal on obstructions.

Disturbed (bulk and small tub) samples were taken within the encountered strata. Environmental samples were taken at standard intervals, as directed by the Client's Representative. Undisturbed (U/UT100) samples were taken as appropriate within cohesive 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.

4.3 STANDARD PENETRATION TESTS

Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 (BSI, 2011) at standard depth intervals using the split spoon sampler ($SPT_{(s)}$). 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 I.

4.4 TRIAL PITS

Five trial pits (TH01-TH05) were excavated using an 14t tracked excavator fitted with a 600mm wide bucket, to depths of 3.00m.

Environmental samples were taken at standard depth intervals in each trial pit. Disturbed (small jar and bulk bag) samples were taken at standard depth intervals and at change of strata.

Any water strikes encountered during excavation were recorded and the stability of the trial pit walls was noted on completion.

Appendix C presents the trial pit logs with photographs of the pits and arisings provided in Appendix D.

4.5 INFILTRATION TESTS

Two infiltration/soakaway tests (INF01-INF02) were carried out in accordance with DG 365 Soakaway Design (BRE, 2016). The absence of the outflow from the pits precluded calculation of infiltration coefficients.

Appendix E presents the results and analysis of the infiltration tests.

4.6 PLATE LOAD TESTS

Plate load tests were carried out at five locations (PLT01-PLT05).

The plate load tests were conducted as incremental loading tests in accordance with Clause 4.1 of BS1377: Part 9: 1990 (BSI, 1990). A 600mm diameter bearing plate was used with five equal loadings to a maximum pressure of approximately 500kPa, followed by unloading. The testing was conducted using a wireless plate load testing system, PLATEMAN, which utilises Bluetooth technology with a remotely-operated rugged PDA system.

Plate movements were measured using three strain gauges fitted to a remotely fixed tripod frame. Each loading increment was maintained until the plate movement had essentially stopped.

The test results provided in Appendix F are as follows:

- plots of the plate settlements, average of the three gauges, against pressure.
- plots of average settlement against time during the loading increments/decrement.

The Modulus of Subgrade Reaction, *k*, is estimated by applying a “best fit” to the settlement-pressure plots, and is reported in MPa/m. The numerical value represents the pressure, in kPa, on the bearing plate that induces 1.25mm of settlement.

An approximate CBR value was estimated using the guidance provided in the Interim Advice Note 73/06 (Highways England, 2009) (now withdrawn). The document provides methods to convert the measured k value to the equivalent for a 762mm diameter plate and the consequent relationship with CBR. This method of estimating an equivalent CBR value is relatively conservative

4.7 SURVEYING

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

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

5 LABORATORY WORK

Laboratory testing was carried out between 10/09/2025 and 03/10/2025.

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.
- **direct shear:** shear box tests
- **soil chemistry:** sulphate content water extract

Laboratory testing of soils samples was carried out in accordance with BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (BSI, 2016), and Part 2 (BSI, 2022).

The test results are presented in Appendix G.

5.2 ENVIRONMENTAL LABORATORY TESTING OF SOIL

Environmental testing, as specified by the Client's Representative, was conducted on selected environmental soil by Normec DETS in Consett, Durham.

Rialta and Env3 suite of analysis was carried out on samples for landfill disposal criteria.

Analysis was undertaken on a range of determinants, including:

- Metals
- Speciated total petroleum hydrocarbons (TPH)
- Speciated polycyclic aromatic hydrocarbons (PAH)
- BTEX compounds
- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)
- Phenols

- Organic matter
- Total Organic Carbon (TOC)
- Cyanides
- Asbestos screen
- Sulphate and sulphide
- Sulphur
- Phosphate
- Calcium
- pH
- Waste acceptance criteria (WAC)

Results of environmental laboratory testing are be presented in Appendix H.

6 GROUND CONDITIONS

6.1 GENERAL GEOLOGY OF THE AREA

Published geological mapping from the online Geological Survey Ireland spatial resources database indicate the superficial deposits underlying the site comprise till derived from limestone. These deposits are shown to be underlain by pale grey skeletal limestone of the Burren 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 between 200-300mm thickness in TH01-TH05 and INF01-INF02.
- **Made Ground (fill):** reworked sandy gravelly clay fill encountered in BH01-BH05 and with low cobble content in BH01, extending to a depth of 1.00m.
- **Fluvioglacial deposits:** typically sands interspersed with layers of gravelly clay with variable cobble and boulder content encountered in INF01 and TH01-TH05.
- **Glacial Till:** sandy gravelly clay, frequently with variable cobble and boulder content, typically soft in upper horizons, becoming firm to stiff with increasing depth.

Further details of these ground types, including their specific depths and descriptions, can be found on the individual exploratory hole logs accompanying this report.

6.3 GROUNDWATER

Groundwater was not noted during drilling or trial pitting at any of the exploratory hole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any groundwater strikes and the possibility of encountering groundwater during

excavation works should not be ruled out.

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

7 DISCUSSION

7.1 PROPOSED CONSTRUCTION

It is proposed to construct new housing development.

No further details were available to Causeway Geotech at the time of preparing this report.

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 firm/stiff glacial till 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 at BH01 and BH03-BH05.

The ground conditions at BH02 will render the implementation of any shallow (spread) foundations problematic. The most practicable solution for installing safe working foundations across the site will be by a “deep” foundation method, such as piling to transfer loadings to depth.

Should piling be adopted as the preferred foundation type, it is highly recommended that further ground investigation works involving rotary drilling be carried out to prove the depth to bedrock across the site.

7.2.2 FOUNDATIONS

Foundations should transfer loading to below any Made Ground or soft subsoil. The recommended foundation construction and Presumed Bearing Resistance (PBR) (aka Allowable Bearing Pressure) for shallow spread foundations at defined exploratory hole locations are presented in Table 2.

Table 2: Foundation Construction Recommendations

Exploratory Hole Reference	Depth below EGL to bearing stratum (m BEGL)	PBR Assessment Input Parameters *	Estimated PBR (kPa)**	Bearing Stratum description	Foundation type	Groundwater*** (m BEGL)
BH01	1.20	$c_u \approx$ 170kPa (from SPT N @1.20mBEGL)	290	Stiff sandy gravelly CLAY	Strip or Pad	No Groundwater recorded
BH02	3.00	N/A	N/A	Suitable Bearing Strata not encountered prior to EH termination.	Piling or Ground Improvement	No Groundwater recorded
BH03	1.20	$c_u \approx$ 70kPa (from SPT N @1.20mBEGL)	120	Firm sandy gravelly CLAY	Strip or Pad	No Groundwater recorded
BH04	1.20	$c_u \approx$ 60kPa (from SPT N @1.20mBEGL)	100	Firm sandy gravelly CLAY	Strip or Pad	No Groundwater recorded
BH05	1.20	$c_u \approx$ 64kPa (from HV in TH05)	109	Firm sandy gravelly CLAY	Strip or Pad	No Groundwater recorded

Based on the findings of the ground investigation, spread foundations (strip/pad and trench fill) are considered suitable at BH01 and BH03-BH05 with estimated presumed bearing pressures between 100kPa and 290kPa at depths of 1.20m stiff glacial till.

Standard shallow spread foundations are considered unsuitable at BH02, it is recommended that alternative foundations solutions are implemented.

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. Where foundations are stepped, they should be stepped gradually with no step exceeding 0.5m in accordance with NHBC Standards (NHBC, 2025).

Following review of the available Atterberg Limit testing conducted on the cohesive samples, the strata within the zone of loading of proposed foundations, is considered to be of low to moderate plasticity, with Modified Plasticity Index values ranging 6% to 12%. This material is therefore categorised as having a low volume change potential. Where existing, recently removed, or proposed trees or shrubs are inside the zone of tree influence, foundations should be deepened where necessary in accordance with NHBC Standards, Chapter 4.2.

Given the predominance of the granular strata above the proposed foundation formation level and the

findings of the trial pit excavations (all of which were found to be unstable) excavations for foundations are unlikely to be stable. To maintain stability for foundation excavations and to preventing disturbance of the bearing strata, active dewatering and temporary trench support or battering the side slopes at 1 vertical to 2 horizontal is likely to be required. Where it is not feasible to implement these temporary measures then alternative foundations solutions should be considered.

The practicable alternative foundation solutions are:

1. The adoption of ground improvement using 'vibro' techniques, providing a foundation construction method flexible to the variable ground conditions across the site. The most appropriate technique is likely to be vibro-stone columns installed using the bottom feed process: these would penetrate through the Made Ground and loose soils to terminate in stiff / medium dense soils.

Detailed design proposals should be obtained from specialist ground improvement contractors: these should include the means to verify that the adopted treatment has achieved the specified ground bearing capacity (e.g. zone load tests). Subject to detailed design, ground improvement would allow the use of spread foundations at shallow depths and the application of ground bearing floor slab.

2. Piling to transfer loadings to depth:

Piling to transfer loadings to depth is suggested to be the most practicable and applicable option given the variation in depth to a consistent bearing stratum across the site.

Driven piles are the typical preferred pile type – of precast concrete or steel/ductile iron. The piles should be driven to a predetermined set – each pile will, therefore, be effectively proof tested by the installation method.

If the surrounding land use precludes the use of hard drive piles, due to environmental restrictions with respect to noise and vibration, low vibration driven piles, continuous flight auger (CFA) or continuous helical displacement (CHD) piles may be required.

Piles will acquire capacity from shaft friction through the cohesive and granular deposits, (depth to which has not yet been established within this reported phase of Ground Investigation and further investigation is recommended to confirm the presence and properties of the bedrock).

Where the ground in the vicinity of proposed piles is to be loaded (e.g. site levels are to be raised/working platform is to be installed, etc.), piles should be designed to resist additional loading that will arise due to negative skin friction along the pile length passing through compressible soils.

The detailed design of piles should be undertaken in conjunction with specialist piling contractors. Their proposals should include an appropriate piling methodology to ensure minimum required pile lengths can be achieved and the means to verify that the required load capacity has been achieved: for example, dynamic pile tests and/or static load tests.

Where pile foundation solution is adopted, floor slabs should be supported by ground beams spanning between piles caps supported by piles.

7.2.3 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.

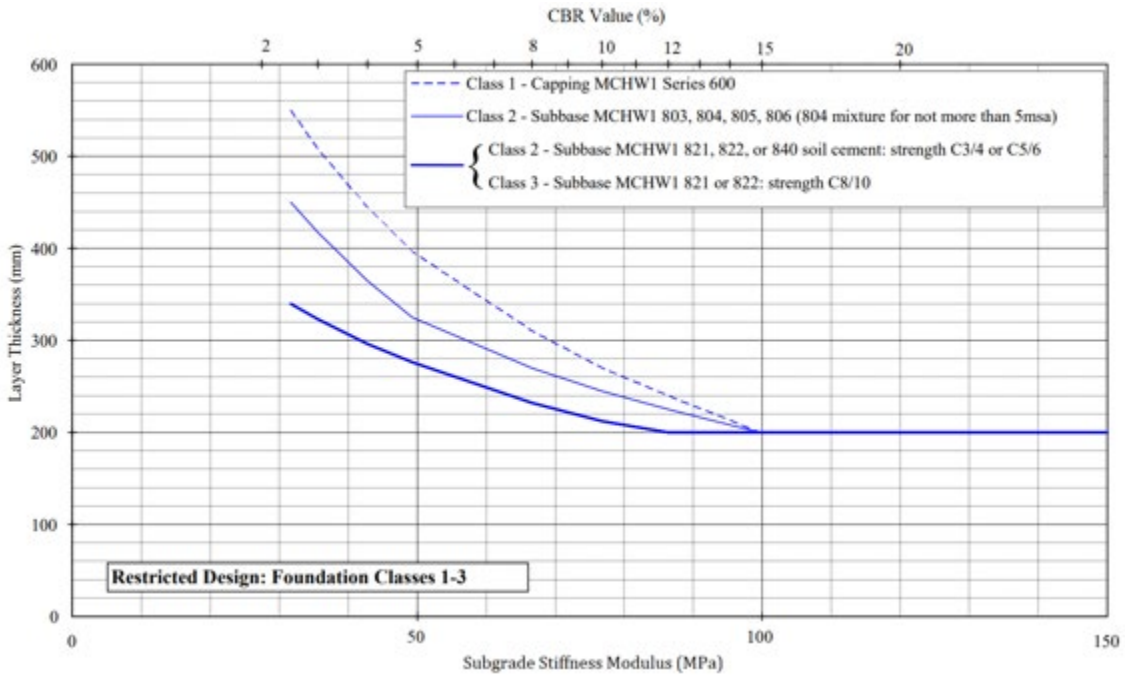
Backfilling of trenches may be completed by using compacted Cl 804 granular fill and reinstated as appropriate.

7.2.4 ACCESS ROADS, CAR PARKS AND HARD STANDING

Based on a summary of the CBR tests undertaken at the site, it is envisaged that the upper glacial till layers at the site would be suitable for the placement of road make up layers. Most areas across the site have CBR values in excess of 5% at ground level.

Table 2.1 of volume 7 section 2 of the Design Manual for Roads and Bridges (Figure 1), gives guidance on the average thickness of the pavement layers in relation to the CBR results. As can be seen, a CBR in excess of 5% requires a 400mm thick capping layer.

Figure 1: Table 2.1 (DMRB Vol.7 Sec2) 2009



The above plot should be used to determine the thicknesses of any capping or sub-base layers that may

need to be placed in these areas.

It is recommended that further testing be undertaken during the course of construction works at intervals as set out in the Earthworks Specification, and should any areas indicate lower than expected value, the above plot should be used to determine the thicknesses of any capping or sub-base layers that may need to be placed in these areas.

The use of geosynthetics in the construction of paved areas, will be beneficial, particularly in areas of Made Ground. These could include a geosynthetic (e.g., a geogrid) at subgrade level with further benefit gained by incorporating further layer(s) within the capping/sub-base layer. Road design should be undertaken by a specialist earthworks contractor/designer.

7.3 INFILTRATION DRAINAGE

Infiltration tests were carried out in INF01 and INF02. The low-permeability fine-grained soils are therefore considered to be poor infiltration media, and would be deemed unsuitable for the implementation of infiltration drainage systems.

Reference should be made to Sustainable Drainage Systems (SuDS) design guidance, considering meteorological conditions, a hydrogeological assessment, and other site-specific factors. The designer should evaluate potential maximum groundwater levels when designing any proposed infiltration systems. A minimum distance of 1m between the base of the infiltration system and the maximum likely groundwater level should be maintained.

8 REFERENCES

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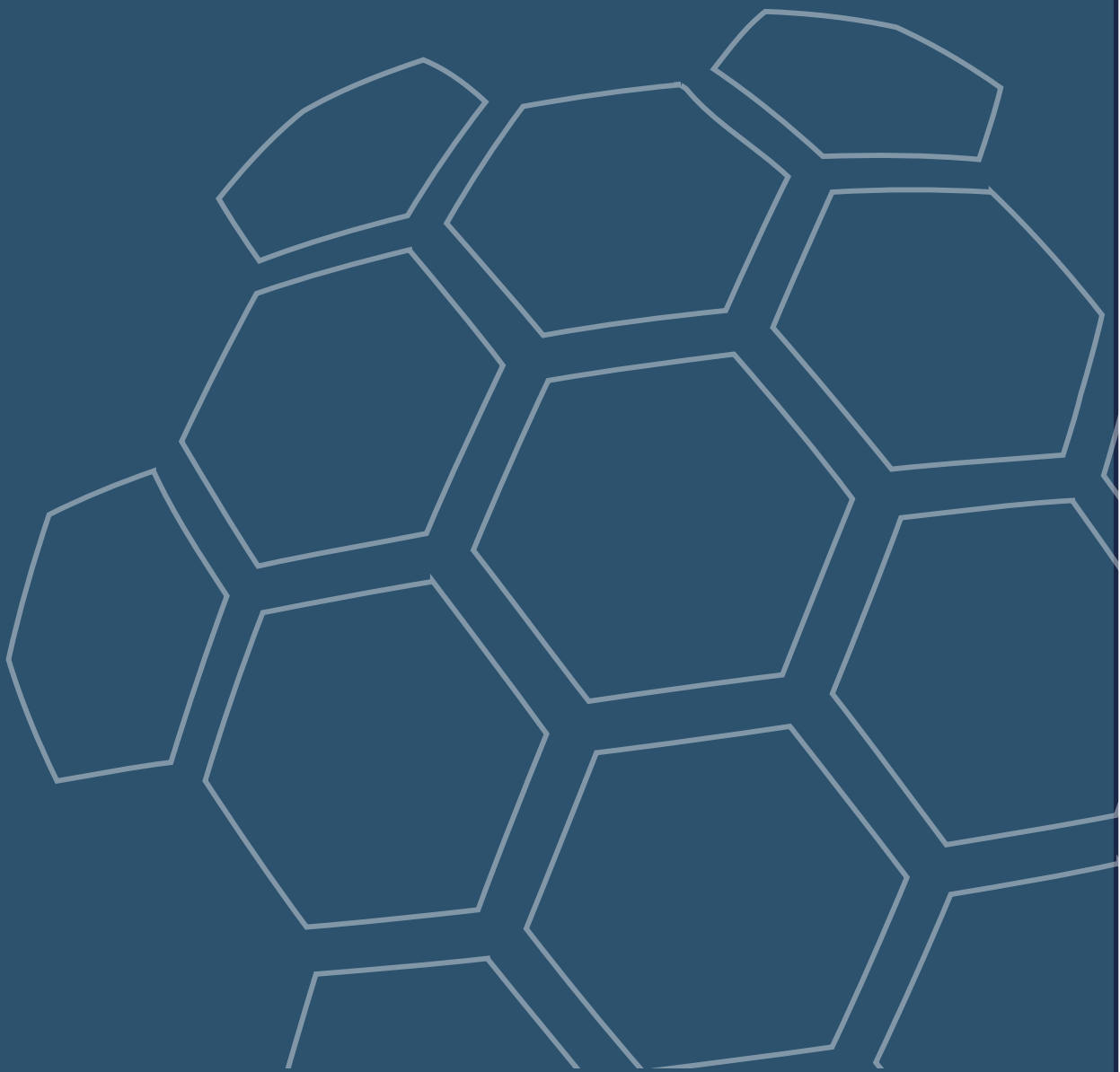
APPENDIX A – SITE AND EXPLORATORY HOLE LOCATION PLANS



Legend Key

Project No.	25-0994
Client	Galway County Council
Client's Rep	SDS

Site Location Plan

Pairc na hAbhainn, Athenry

CAUSEWAY GEOTECH

Last Revision	18/09/2025
Scale	1:15000

Legend Key

- Locations By Type - DS
- Locations By Type - IPLT
- Locations By Type - TP

Project No.	25-0994
Client	Galway County Council
Client's Rep	SDS

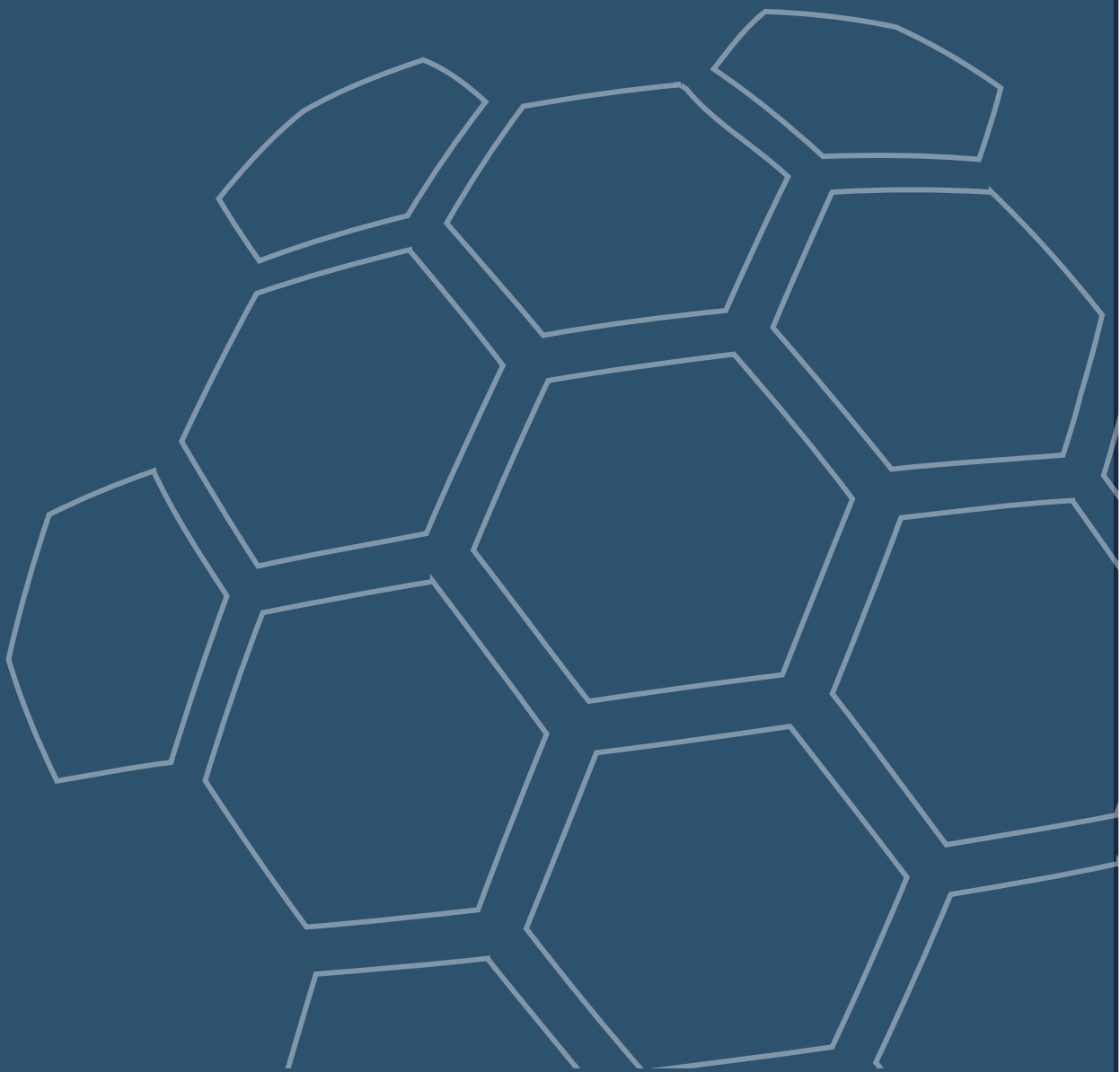
Exploratory Hole Location Plan

Pairc na hAbhainn, Athenry

CAUSEWAY GEOTECH

Last Revision	18/09/2025
Scale	1:750

APPENDIX B – BOREHOLE LOGS



CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
25-0994	Pairc na hAbhainn, Athenry	BH01
	Client: Galway County Council	
	Client's Rep: SDS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Dynamic Sampling	Dando Terrier	0.00	3.40	550216.97 E 726885.16 N

Final Depth:	3.40 m	Start Date:	12/08/2025	Driller:	SM	Sheet 1 of 1 Scale: 1:50
Elevation:	37.98 mOD	End Date:	12/08/2025	Logger:	GH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 0.50	B4							MADE GROUND: Dark brown sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subrounded.		
0.50	ES8				37.48	0.50				
0.50 - 1.20	B5							Soft greyish brown very sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular medium to coarse.		
1.00	ES9									
1.20 - 1.65	D1				36.78	1.20				
1.20 - 2.00	B6							Stiff greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.		
1.20 - 1.65	SPT (S)	N=26 (6,7/7,7,6,6) Hammer SN = 1502	0.00	0.00						
2.00 - 2.45	D2									
2.00 - 3.00	B7									
2.00 - 2.45	SPT (S)	N=27 (3,3/4,6,6,11) Hammer SN = 1502	0.00	0.00						
3.00 - 3.40	D3									
3.00 - 3.42	SPT (S)	50 (10,10/50 for 265mm) Hammer SN = 1502	0.00	0.00						
					34.58	3.40		End of Borehole at 3.40m		

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

Remarks

Inspection pit hand dug to 1.20m.
No groundwater encountered.

Termination Reason

Terminated at refusal on possible bedrock.

Last Updated

30/09/2025

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
25-0994	Pairc na hAbhainn, Athenry	BH02
	Client: Galway County Council	
	Client's Rep: SDS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Dynamic Sampling	Dando Terrier	0.00	3.40	550217.96 E 726836.81 N

Final Depth:	3.40 m	Start Date:	12/08/2025	Driller:	SM	Sheet 1 of 1 Scale: 1:50
Elevation:	38.57 mOD	End Date:	12/08/2025	Logger:	GH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.00	B4							MADE GROUND: Dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
0.50	ES7									
1.00	ES8				37.57	1.00		Soft light greyish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
1.00 - 2.00	B5									
1.20 - 1.65	D1									
1.20 - 1.65	SPT (S)	N=5 (1,1/1,1,1,2) Hammer SN = 1502	0.00	0.00						
2.00 - 2.45	D2				36.57	2.00		Very soft light greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
2.00 - 3.00	B6									
2.00 - 2.45	SPT (S)	N=2 (1,1/0,0,0,2) Hammer SN = 1502	0.00	0.00						
3.00 - 3.40	D3									
3.00 - 3.40	SPT (S)	50 (12,9/50 for 255mm) Hammer SN = 1502	0.00	0.00						
					35.17	3.40		End of Borehole at 3.40m		

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

Inspection pit hand dug to 1.20m.
No groundwater encountered.

Termination Reason

Terminated at refusal on possible bedrock.

Last Updated

30/09/2025

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
25-0994	Pairc na hAbhainn, Athenry	BH03
	Client: Galway County Council	
	Client's Rep: SDS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Dynamic Sampling	Dando Terrier	0.00	3.07	550184.82 E 726828.66 N

Final Depth:	3.07 m	Start Date:	12/08/2025	Driller:	SM	Sheet 1 of 1 Scale: 1:50
Elevation:	38.77 mOD	End Date:	12/08/2025	Logger:	GH	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 1.00	B4							MADE GROUND: Dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
0.50	ES8									
1.00	ES9				37.77	1.00		Soft to firm light greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.		
1.00 - 2.00	B5									
1.20 - 1.65	D1									
1.20 - 1.65	SPT (S)	N=11 (2,1/1,3,3,4) Hammer SN = 1502	0.00	0.00						
2.00 - 2.45	D2				36.77	2.00		Firm light greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
2.00 - 2.50	B6									
2.00 - 2.45	SPT (S)	N=14 (4,2/3,5,2,4) Hammer SN = 1502	0.00	0.00						
2.50 - 3.00	B7				36.27	2.50		Firm light greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
3.00 - 3.07	D3									
3.00 - 3.08	SPT (S)	50 (25 for 70mm/50 for 5mm) Hammer SN = 1502	0.00	0.00	35.70	3.07		End of Borehole at 3.07m		

Water Strikes

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

Casing Details

To (m)	Diameter

Remarks

Inspection pit hand dug to 1.20m.
No groundwater encountered.

Termination Reason

Terminated at refusal on possible bedrock.

Last Updated

30/09/2025

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
25-0994	Pairc na hAbhainn, Athenry	BH04
	Client: Galway County Council	
	Client's Rep: SDS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Dynamic Sampling	Dando Terrier	0.00	3.35	550171.84 E 726855.11 N

Final Depth:	3.35 m	Start Date:	13/08/2025	Driller:	SM
Elevation:	38.61 mOD	End Date:	13/08/2025	Logger:	BA

Sheet 1 of 1
Scale: 1:50
FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 0.50	B4							MADE GROUND: Dark brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
0.50	ES7				38.11	0.50				
0.50 - 1.20	B5							Firm light brown sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subrounded		
1.00	ES8									
1.20 - 1.65	D1				37.41	1.20				
1.20 - 2.00	B6							Firm light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
1.20 - 1.65	SPT (S)	N=9 (3,2/2,2,2,3) Hammer SN = 1502	0.00	0.00						
2.00 - 2.45	U2	Ublow=55 100% Recovery	0.00	0.00						
3.00 - 3.35	D3									
3.00 - 3.35	SPT (S)	50 (9,13/50 for 200mm) Hammer SN = 1502	0.00	0.00						
					35.26	3.35		End of Borehole at 3.35m		

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

Remarks

Inspection pit hand dug to 1.20m.
No groundwater encountered.

Termination Reason

Terminated at refusal on possible bedrock.

Last Updated

30/09/2025

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Borehole ID
25-0994	Pairc na hAbhainn, Athenry	BH05
	Client: Galway County Council	
	Client's Rep: SDS	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Dynamic Sampling	Dando Terrier	0.00	2.40	550156.11 E 726878.81 N

Final Depth: 2.40 m	Start Date: 13/08/2025	Driller: SM	Sheet 1 of 1	
Elevation: 37.98 mOD	End Date: 13/08/2025	Logger: BA	Scale: 1:50	
			FINAL	

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00 - 0.50	B3							MADE GROUND: Dark brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
0.50	ES6				37.48	0.50				
0.50 - 1.20	B4							Light brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
1.00	ES7									
1.20 - 1.65	U1	Ublow=53 100% Recovery	0.00	0.00	36.78	1.20		Stiff light brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
1.65 - 2.00	B5									
2.00 - 2.40	D2									
2.00 - 2.42	SPT (S)	50 (7,9/50 for 265mm) Hammer SN = 1502	0.00	0.00						
					35.58	2.40		End of Borehole at 2.40m		

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

Remarks

Inspection pit hand dug to 1.20m.
No groundwater encountered.

Termination Reason

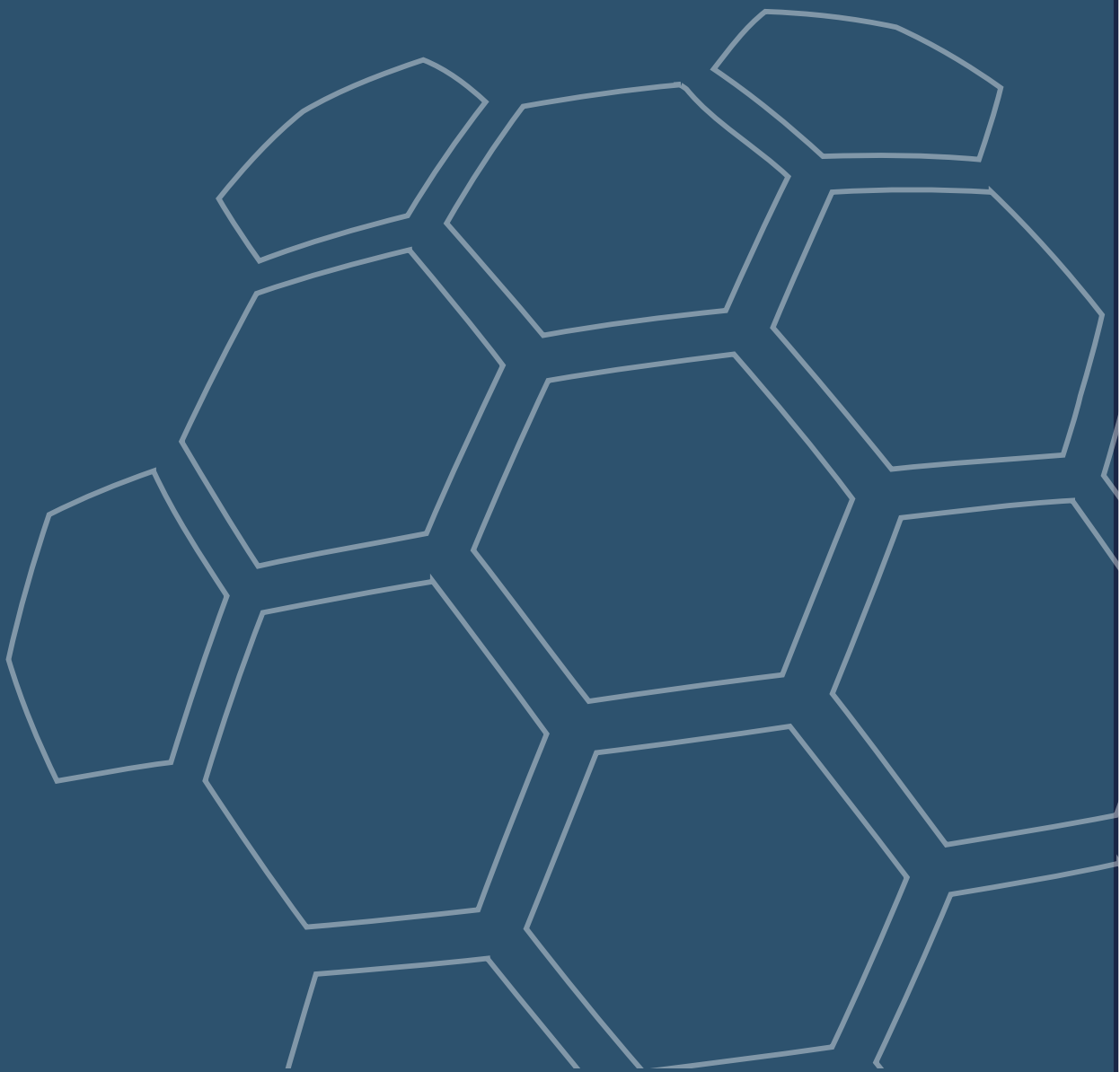
Terminated at refusal on possible bedrock.

Last Updated

30/09/2025

AGS

APPENDIX C – TRIAL PIT LOGS



CAUSEWAY GEOTECH

Project No. 25-0994	**Project Name:** Pairc na hAbhainn, Athenry		**Trial Pit ID** TH01
Coordinates 550207.78 E 726859.05 N	**Client:** Galway County Council		
Method: Trial Pitting	**Client's Representative:** SDS		Sheet 1 of 1 Scale: 1:25
Plant: 14t Tracked Excavator	**Elevation** 37.99 mOD	**Date:** 12/08/2025	**Logger:** EGA	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						TOPSOIL:	
			37.74	0.25		Brown slightly gravelly clayey fine to coarse SAND. Gravel is subrounded fine to coarse.	
0.50	D3						
0.50	ES1		37.39	0.60		Light brownish grey slightly clayey gravelly fine to coarse SAND with medium cobble and boulder content. Gravel is subrounded. Cobbles and boulders are subangular to subrounded.	
0.60 - 1.60	B6						
1.00	ES2						
1.50	D4		36.49	1.50		Firm light brownish grey sandy gravelly CLAY with medium cobble and boulder content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles are subangular to subrounded.	
1.60 - 2.60	B7						
2.50	D5						
2.60 - 3.00	B8						
			34.99	3.00		End of trial pit at 3.00m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 3.00
Width: 0.80
Length: 3.30

Remarks:
No groundwater encountered.
Hand shear vane not suitable due to ground conditions.

Stability: Unstable below 1.2m

Termination Reason: Terminated at scheduled depth.

Last Updated: 30/09/2025

AGS

CAUSEWAY GEOTECH

Project No. 25-0994	**Project Name:** Pairc na hAbhainn, Athenry		**Trial Pit ID** TH02
Coordinates 550201.70 E 726815.93 N	**Client:** Galway County Council		
Method: Trial Pitting	**Client's Representative:** SDS		Sheet 1 of 1 Scale: 1:25
Plant: 14t Tracked Excavator	**Elevation** 38.88 mOD	**Date:** 12/08/2025	**Logger:** EGA	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						TOPSOIL:	
			38.58	0.30			
0.50	D3					Light greyish brown clayey gravelly fine to coarse SAND with medium cobble content. Gravel is subrounded fine to coarse. Cobbles are subangular to subrounded.	
0.50	ES1						
0.50 - 1.50	B6						
1.00	ES2						
			37.68	1.20			
						Soft to firm light brownish grey sandy gravelly CLAY with medium cobble and boulder content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles and boulders are subrounded.	
1.50	D4						
1.50 - 2.50	B7						
2.50	D5						
2.50 - 3.00	B8						
			35.88	3.00		End of trial pit at 3.00m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 3.00
Width: 0.90
Length: 3.10

Remarks:
No groundwater encountered.
Hand shear vane not suitable due to ground conditions.

Stability: Unstable below 0.5m

Termination Reason: Terminated at scheduled depth.

Last Updated: 30/09/2025

AGS

CAUSEWAY GEOTECH

Project No. 25-0994	**Project Name:** Pairc na hAbhainn, Athenry		**Trial Pit ID** TH03
Coordinates 550182.59 E 726845.60 N	**Client:** Galway County Council		
Method: Trial Pitting	**Client's Representative:** SDS		Sheet 1 of 1 Scale: 1:25
Plant: 14t Tracked Excavator	**Elevation** 38.83 mOD	**Date:** 13/08/2025	**Logger:** EGA	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			38.58	0.25		TOPSOIL:	
						Brown slightly gravelly clayey fine to coarse SAND. Gravel is subangular fine to coarse.	
0.50 0.50 0.50 - 1.50	D3 ES1 B6		38.33	0.50		Light brownish grey clayey gravelly fine to coarse SAND with medium cobble and boulder content. Gravel is subrounded fine to coarse. Cobbles and boulders are subrounded	
1.00	ES2						
1.50 1.50 - 2.50	D4 B7		37.33	1.50		Soft to firm light brownish grey sandy gravelly CLAY with medium cobble and boulder content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles and boulders are subrounded.	
2.50 2.50 - 3.00	D5 B8						
			35.83	3.00		End of trial pit at 3.00m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 3.00
Width: 0.80
Length: 3.20

Remarks:
No groundwater encountered.
Hand shear vane not suitable due to ground conditions.

Stability:
Unstable below 0.5m

Termination Reason
Terminated at scheduled depth.

Last Updated
30/09/2025

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Trial Pit ID
25-0994	Pairc na hAbhainn, Athenry	TH04
Coordinates	**Client:**	
550174.33 E 726867.34 N	Galway County Council	
Method:	**Client's Representative:**	Sheet 1 of 1
Trial Pitting	SDS	Scale: 1:25
Plant:	**Elevation** / **Date:** / **Logger:**	FINAL
14t Tracked Excavator	38.41 mOD / 13/08/2025 / EGA	

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						TOPSOIL:	
			38.16	0.25		Brown slightly gravelly clayey fine to coarse SAND. Gravel is subangular fine to coarse.	
			38.01	0.40		Light brownish grey clayey gravelly fine to coarse SAND with medium cobble and boulder content. Gravel is subrounded fine to coarse. Cobbles and boulders are subrounded.	
0.50	D3						
0.50	ES1						
0.70 - 1.70	B6						
1.00	ES2						
1.50	D4						
1.70 - 2.70	B7		36.71	1.70		Firm light brownish grey sandy gravelly CLAY with medium cobble and boulder content. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse. Cobbles and boulders are subrounded to subangular.	
2.50	D5						
2.70 - 3.00	8						
			35.41	3.00		End of trial pit at 3.00m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 3.00
Width: 0.80
Length: 3.20

Remarks:
No groundwater encountered.
Hand shear vane not possible due to ground conditions.

Stability:
Unstable below 0.9m

Termination Reason
Terminated at scheduled depth.

Last Updated
30/09/2025

AGS

CAUSEWAY GEOTECH

Project No.	Project Name:	Trial Pit ID
25-0994	Pairc na hAbhainn, Athenry	TH05
Coordinates	**Client:**	
550154.22 E 726892.90 N	Galway County Council	
Method: Trial Pitting	**Client's Representative:** SDS	Sheet 1 of 1 Scale: 1:25
Plant: 14t Tracked Excavator	**Elevation** 37.23 mOD / **Date:** 12/08/2025 / **Logger:** EGA	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						TOPSOIL:	
			37.03	0.20		Firm brown slightly gravelly very sandy CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.	
0.40		HVP=64, HVR=29					
0.40		HVP=76, HVR=29					
0.40		HVP=76, HVR=32	36.73	0.50			
0.50	D3					Light brownish grey slightly clayey very gravelly fine to coarse SAND with medium cobble and boulder content. Gravel is subrounded fine to coarse. Cobbles and boulders are subangular to subrounded.	
0.50	ES1						
0.50 - 1.50	B6						
1.00	ES2						
1.50	D4						
1.50 - 2.50	B7						
2.50	D5		34.73	2.50			
2.50 - 3.00	B8					Light brownish grey clayey gravelly fine to coarse SAND with medium cobble and boulder content. Gravel is subrounded fine to coarse. Cobbles and boulders are subangular to subrounded.	
			34.23	3.00		End of trial pit at 3.00m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 3.00
Width: 1.10
Length: 3.50

Remarks:
No groundwater encountered. HSV #1445 19mm at 0.4m

Stability:	Termination Reason	Last Updated
Unstable below 1m	Terminated at scheduled depth.	30/09/2025

AGS

APPENDIX D – TRIAL PIT PHOTOGRAPHS

TH01


CAUSEWAY
GEOTECH
Project Name
Pairc na hAbhainn
Project Number
25-0994
Date
12-08-2025
EH Number
TH01

TH01

TH01

TH01


CAUSEWAY
GEOTECH
Project Name
Pairc na hAbhainn
Project Number
25-0994
Date
12-08-2025
EH Number
TH01
(m)
0.1
0.2
0.3
0.4
0.5

TH01

TH01

TH02

TH02

TH02

TH02


CAUSEWAY
GEOTECH
Project Name
Pairc na hAbhainn
Project Number
25-0994
Date
12-08-2025
EH Number
TH02
(m)
0.1
0.2
0.3
0.4
0.5

TH02

TH02

TH03

TH03

TH03

TH03

TH03

CAUSEWAY GEOTECH

TH03

TH04

TH04

TH04

TH04

TH04

CAUSEWAY GEOTECH

TH04

TH05

TH05

TH05

TH05


CAUSEWAY
GEOTECH
Project Name
Pairc na hAbhainn
Project Number
25-0994
Date
12-08-2025
EH Number
TH05
(m) 0.1 0.2 0.3 0.4 0.5

TH05

TH05

INF01

INF01

INF01

INF01

INF01

CAUSEWAY GEOTECH

INF01

INF02


CAUSEWAY
GEOTECH
Project Name
Pairc na hAbhainn
Project Number
25-0994
Date
13-08-2025
Hf Number
INF-02
(m)
0.1
0.2
0.3
0.4
0.5

INF02

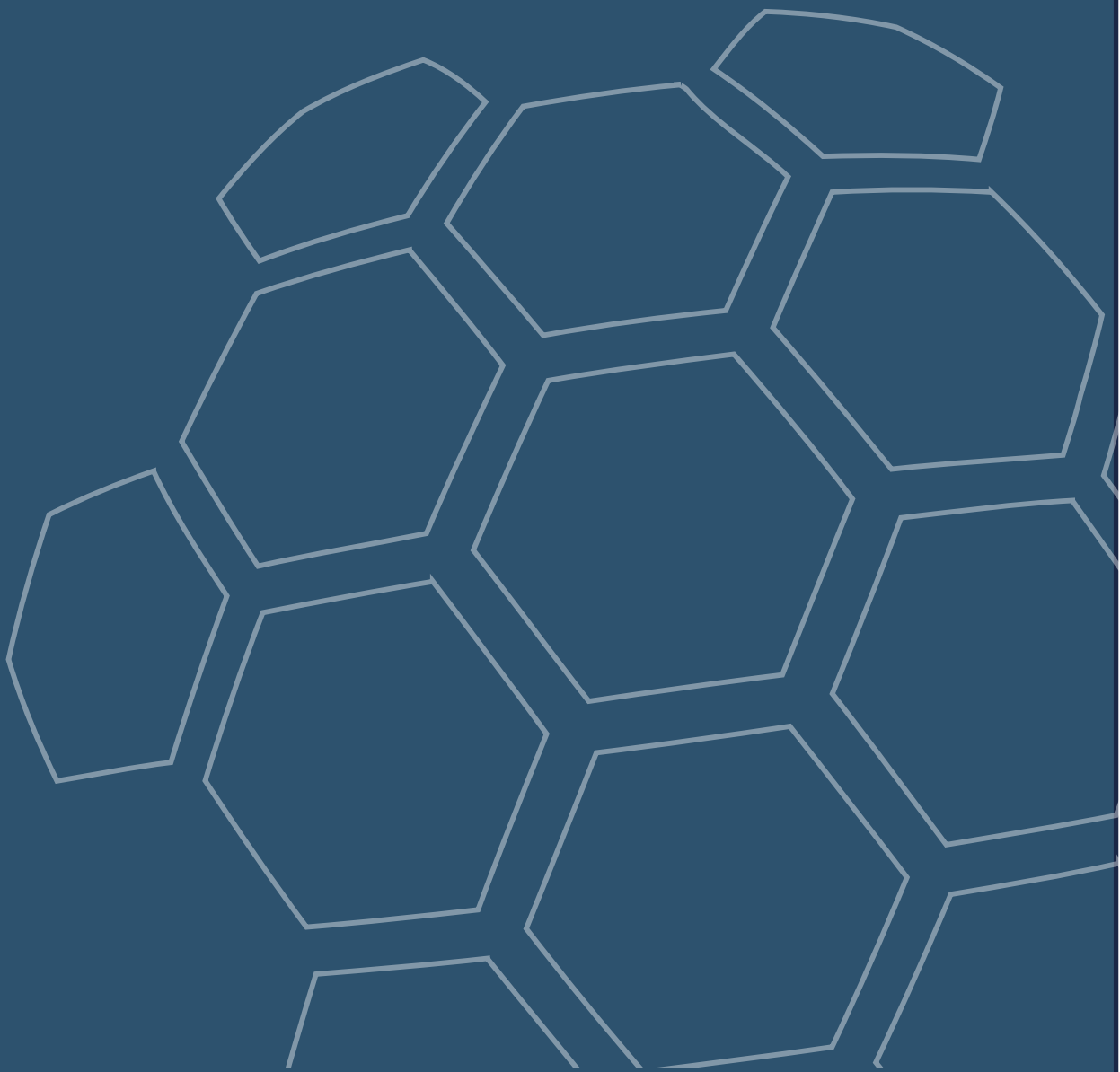
INF02


CAUSEWAY
GEOTECH
Project Name
Pairc na hAbhainn
Project Number
25-0994
Date

INF02

INF02

APPENDIX E – INFILTRATION TEST RESULTS



CAUSEWAY GEOTECH

Project No. 25-0994	**Project Name:** Pairc na hAbhainn, Athenry		**Trial Pit ID** INF01
Coordinates 550204.85 E 726801.21 N	**Client:** Galway County Council		
Method: Trial Pitting	**Client's Representative:** SDS		Sheet 1 of 1 Scale: 1:25
Plant: 14t Tracked Excavator	**Elevation** 39.12 mOD	**Date:** 13/08/2025	**Logger:** EGA	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			38.82	0.30		TOPSOIL:	
0.50 - 1.20	B1					Soft to firm light brownish grey sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles and boulders are subrounded	
			37.92	1.20		End of trial pit at 1.20m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 1.20
Width: 0.70
Length: 1.50

Remarks:
No groundwater encountered.

Stability:
Moderately stable

Termination Reason
Terminated at scheduled depth.

Last Updated
24/09/2025

AGS

Soakaway Infiltration Test

Project No.: 25-0994
Site: Pairc na hAbhainn, Athenry
Test Location: INF01
Test Date: 13 August 2025

Analysis using method as described in BRE DG 365 (2016) and CIRIA Report C753-The SUDS Manual (2015)

	width (m)	length (m)
test pit top dimensions	0.70	1.50
test pit base dimensions	0.70	1.00
test pit depth (m)	1.20	

depth to groundwater before adding water (m) = DRY

Time (mins)	Depth to water surface (m)	Head of water in pit (m)
0	0.40	0.80
1	0.41	0.79
2	0.41	0.79
4	0.41	0.79
6	0.41	0.79
8	0.41	0.79
10	0.41	0.79
12	0.41	0.79
14	0.41	0.79
16	0.41	0.79
18	0.41	0.79
20	0.42	0.78
30	0.42	0.78
40	0.43	0.77
50	0.43	0.77
60	0.43	0.77
75	0.43	0.77
90	0.43	0.77

RESULTS (FROM GRAPH BELOW)

Test start

75% head of water at 0.60 m
depth to water surface (target) 0.60 m
time to reach target depth not reached

Test end

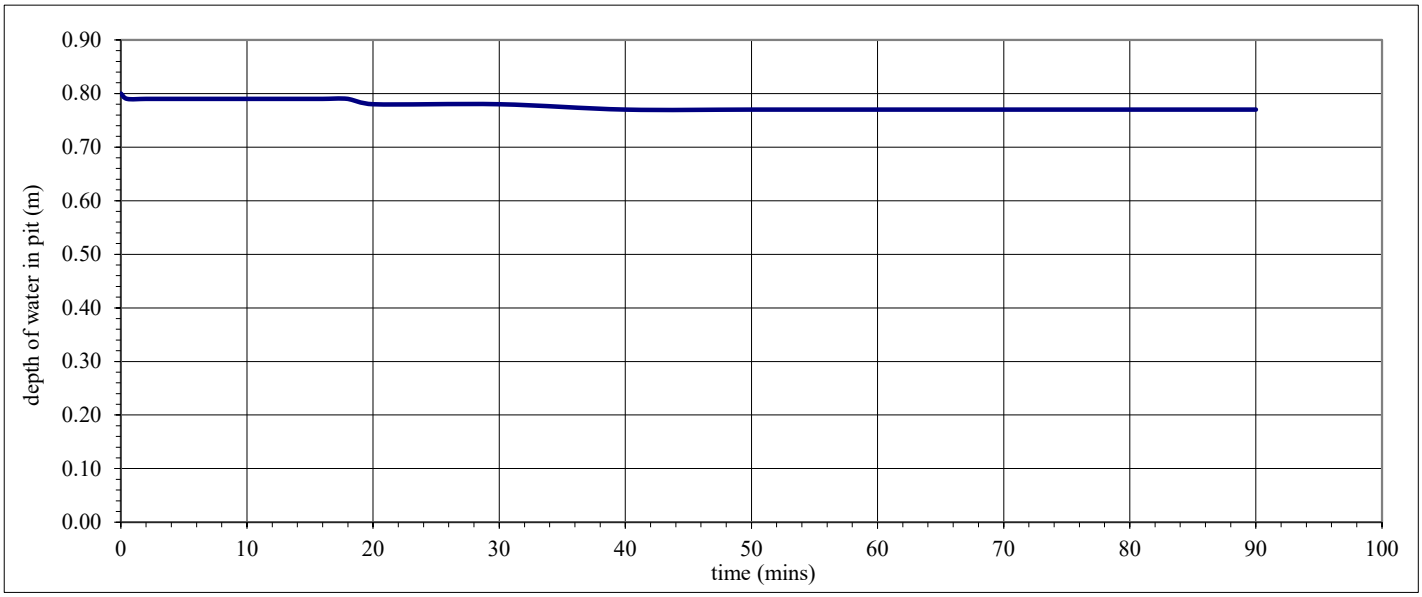
25% head of water at 0.20 m
depth to water surface (target) 1.00 m
time to reach target depth not reached

soil infiltration rate $f = \frac{V_{p75-25}}{a_{s50} \; x \; t_{p75-25}}$

Infiltration rate (f) is very low

TARGET DEPTHS AND CALCULATED VALUES

Time (mins)	Depth to water surface (m)	Head of water in pit (m)	Time elapsed, t_{p75-25} (mins)	Volume of water lost, V_{p75-25} (m^3)	Area of walls and base at 50% drop, a_{s50} (m^2)	Soil infiltration rate, f (m/min)	Soil infiltration rate, f (m/h)
			N/A				



CAUSEWAY GEOTECH

Project No. 25-0994	**Project Name:** Pairc na hAbhainn, Athenry		**Trial Pit ID** INF02
Coordinates 550195.55 E 726871.11 N	**Client:** Galway County Council		
Method: Trial Pitting	**Client's Representative:** SDS		Sheet 1 of 1 Scale: 1:25
Plant: 14t Tracked Excavator	**Elevation** 38.22 mOD	**Date:** 13/08/2025	**Logger:** EGA	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			37.97	0.25		TOPSOIL:	
0.50 - 1.20	B1					Light brownish grey clayey gravelly fine to coarse SAND with medium cobble content and low boulder content Gravel is subangular fine to coarse. Cobbles are subangular to subrounded	
			37.02	1.20		End of trial pit at 1.20m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes	
Struck at (m)	Remarks

Depth: 1.20
Width: 0.75
Length: 1.40

Remarks:
No groundwater encountered.

Stability:
Moderately stable

Termination Reason
Terminated at scheduled depth.

Last Updated
24/09/2025

AGS

Soakaway Infiltration Test

Project No.: 25-0994
Site: Pairc na hAbhainn, Athenry
Test Location: INF02
Test Date: 13 August 2025

Analysis using method as described in BRE DG 365 (2016) and CIRIA Report C753-The SUDS Manual (2015)

	width (m)	length (m)
test pit top dimensions	0.75	1.40
test pit base dimensions	0.75	0.70
test pit depth (m)	1.20	

depth to groundwater before adding water (m) = DRY

Time (mins)	Depth to water surface (m)	Head of water in pit (m)
0	0.40	0.80
1	0.40	0.80
2	0.41	0.79
4	0.41	0.79
6	0.41	0.79
8	0.41	0.79
10	0.41	0.79
12	0.41	0.79
14	0.41	0.79
16	0.41	0.79
18	0.41	0.79
20	0.41	0.79
30	0.41	0.79
40	0.41	0.79
50	0.41	0.79
60	0.41	0.79
75	0.41	0.79
90	0.41	0.79

RESULTS (FROM GRAPH BELOW)

Test start

75% head of water at 0.60 m
depth to water surface (target) 0.60 m
time to reach target depth not reached

Test end

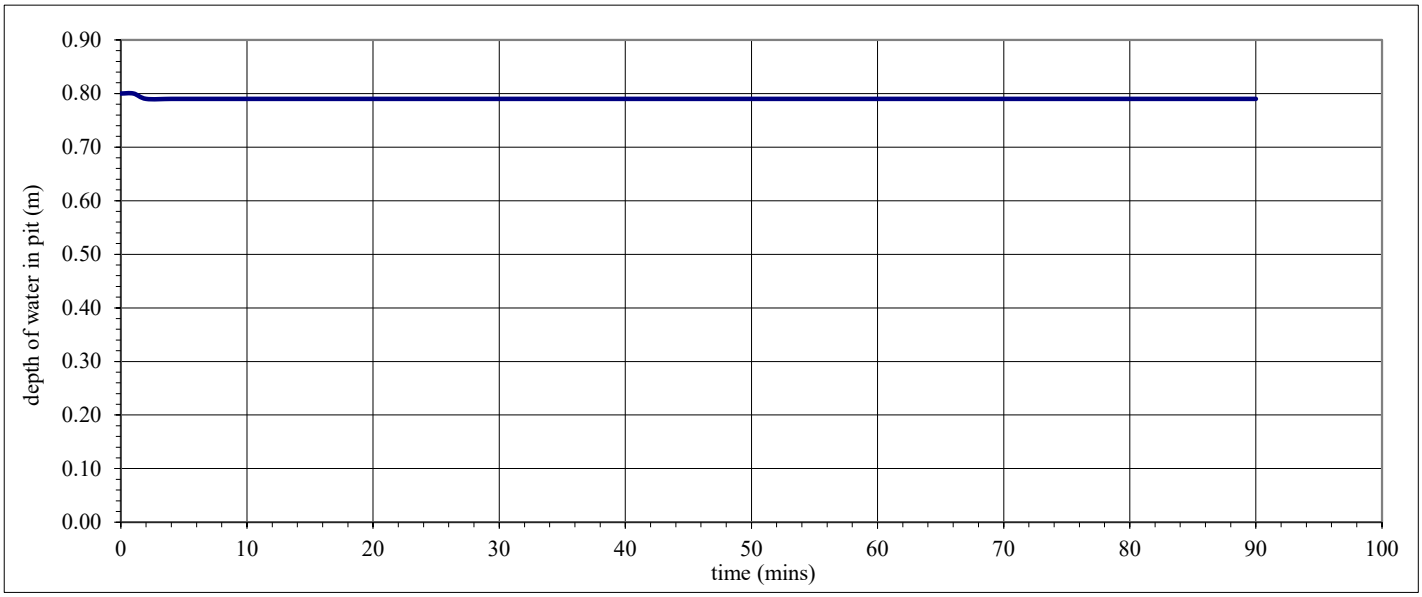
25% head of water at 0.20 m
depth to water surface (target) 1.00 m
time to reach target depth not reached

soil infiltration rate $f = \frac{V_{p75-25}}{a_{s50} \; x \; t_{p75-25}}$

Infiltration rate (f) is very low

TARGET DEPTHS AND CALCULATED VALUES

Time (mins)	Depth to water surface (m)	Head of water in pit (m)	Time elapsed, t_{p75-25} (mins)	Volume of water lost, V_{p75-25} (m^3)	Area of walls and base at 50% drop, a_{s50} (m^2)	Soil infiltration rate, f (m/min)	Soil infiltration rate, f (m/h)
			N/A				



APPENDIX F – PLATE LOAD TESTS

PLATE BEARING TEST REPORT 323513

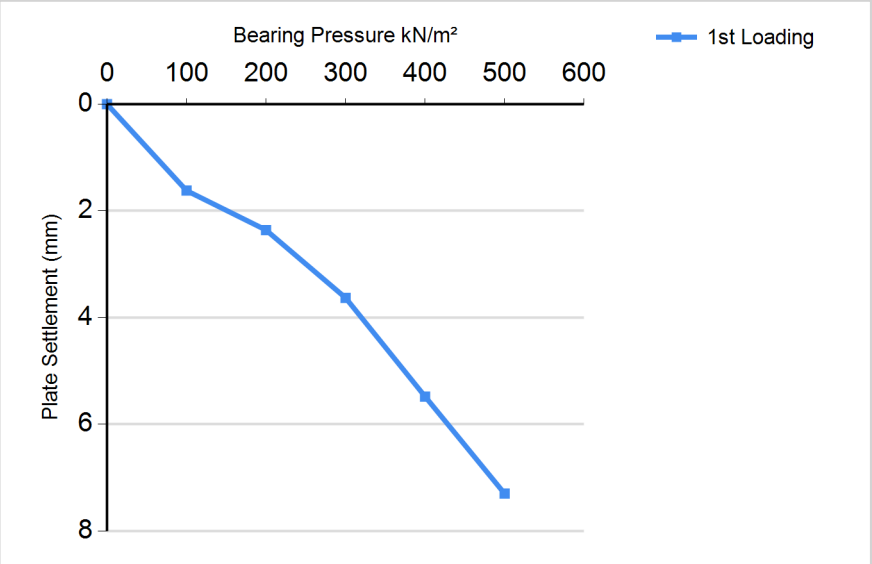
BHP MTI F1309 V 1.0 04/07/2022

Client: Causeway Geotech
Unit 3 Balbriggan Business Park
Balbriggan
FAO: Gabriella Horan

BHP Ref No: 25/08/2660
Order No: PO244229
Date Tested: 12/08/2025
Test Specification: Client Spec
Item: Formation

Project: Pairc na hAbhainn
Location Reference: PLT 01
Type of Reaction Load: Track Machine
Plate Diameter: 600
BS 1377:Part 9:1990, CL4.1 (Plate Loading Test)

Bearing Pressure (kN/m²)	Plate Settlement (mm)
0	0.00
100	1.62
200	2.36
300	3.63
400	5.48
500	7.30



Maximum Applied Pressure (kN/m²)	500
Maximum Deformation (mm)	7.3
Estimated CBR % @ 1.25mm deformation	9
K = (KN/m²/m) @ 1.25mm deformation	50204
K = (MN/m²/m) @ 1.25mm deformation	50

Remarks:
CBR calculated in accordance with Part 2 DMRB Vule 7 : Part 2 HD 25/94
Time recorded at each interval was 3 minutes.

Where the deformation does not exceed 1.25mm during the test, the CBR and K values have been estimated and are not included under our scope of accreditation. Information identifying the 'Client', 'FTAO', 'Project', 'Client Ref.', 'Order No.' & information regarding the supply of a 'Sampling Certificate', has been supplied by the customer.

Approved By:	**Signature:**
James Purcell - Field Service Manager	

For and On Behalf of BHP Laboratories Issue Date: 13/08/2025

Tested by BHP Laboratories, New Road, Thomondgate, Limerick Phone:(061) 455399 Email: jamespurcell@bhp.ie

PLATE BEARING TEST REPORT 323513

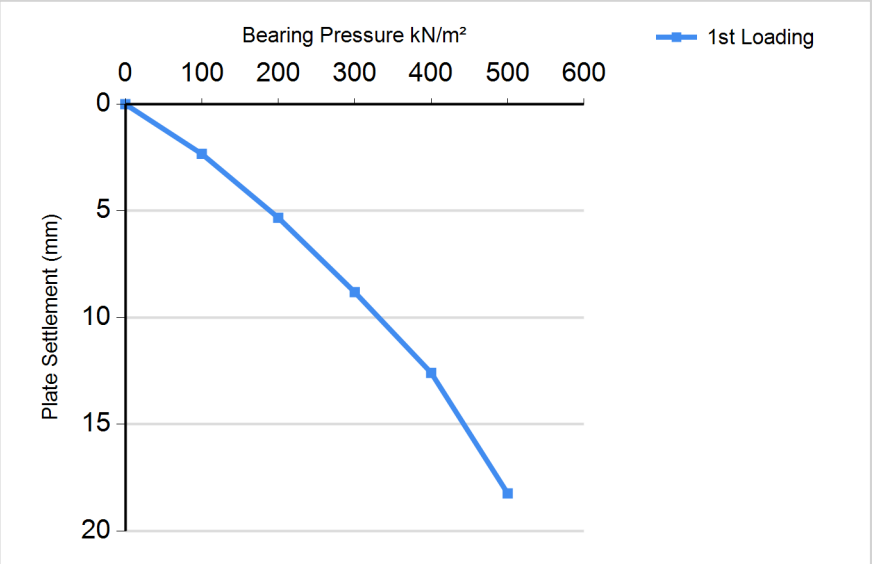
BHP MTI F1309 V 1.0 04/07/2022

Client: Causeway Geotech
Unit 3 Balbriggan Business Park
Balbriggan
FAO: Gabriella Horan

BHP Ref No: 25/08/2661
Order No: PO244229
Date Tested: 12/08/2025
Test Specification: Client Spec
Item: Formation

Project: Pairc na hAbhainn
Location Reference: PLT 02
Type of Reaction Load: Track Machine
Plate Diameter: 600
BS 1377:Part 9:1990, CL4.1 (Plate Loading Test)

Bearing Pressure (kN/m²)	Plate Settlement (mm)
0	0.00
100	2.33
200	5.32
300	8.81
400	12.59
500	18.24



Maximum Applied Pressure (kN/m²)	500
Maximum Deformation (mm)	18.24
Estimated CBR % @ 1.25mm deformation	5
K = (KN/m²/m) @ 1.25mm deformation	35208
K = (MN/m²/m) @ 1.25mm deformation	35

Remarks:
CBR calculated in accordance with Part 2 DMRB Vule 7 : Part 2 HD 25/94
Time recorded at each interval was 3 minutes.

Where the deformation does not exceed 1.25mm during the test, the CBR and K values have been estimated and are not included under our scope of accreditation. Information identifying the 'Client', 'FTAO', 'Project', 'Client Ref.', 'Order No.' & information regarding the supply of a 'Sampling Certificate', has been supplied by the customer.

Approved By:	**Signature:**
James Purcell - Field Service Manager	

For and On Behalf of BHP Laboratories Issue Date: 13/08/2025

Tested by BHP Laboratories, New Road, Thomondgate, Limerick Phone:(061) 455399 Email: jamespurcell@bhp.ie

PLATE BEARING TEST REPORT 323513

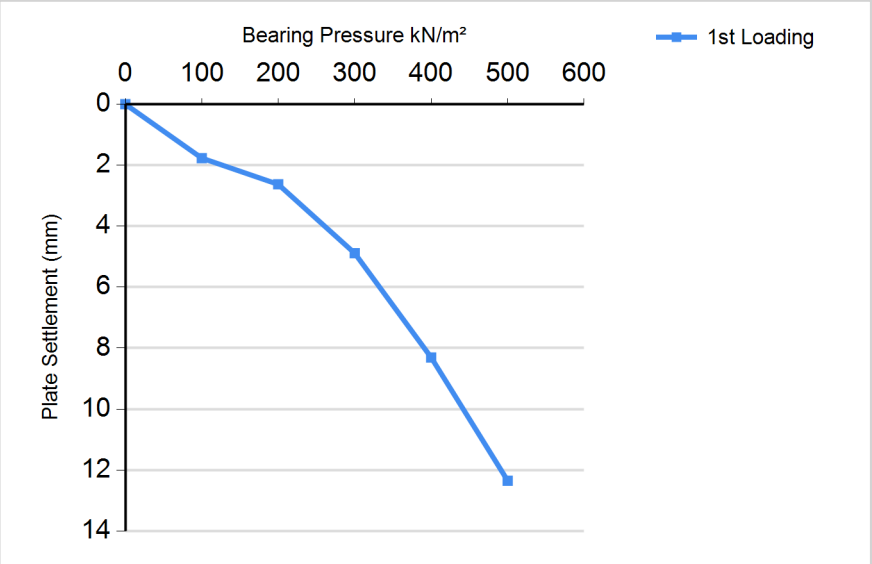
BHP MTI F1309 V 1.0 04/07/2022

Client: Causeway Geotech
Unit 3 Balbriggan Business Park
Balbriggan
FAO: Gabriella Horan

BHP Ref No: 25/08/2662
Order No: PO244229
Date Tested: 12/08/2025
Test Specification: Client Spec
Item: Formation

Project: Pairc na hAbhainn
Location Reference: PLT 03
Type of Reaction Load: Track Machine
Plate Diameter: 600
BS 1377:Part 9:1990, CL4.1 (Plate Loading Test)

Bearing Pressure (kN/m²)	Plate Settlement (mm)
0	0.00
100	1.77
200	2.63
300	4.89
400	8.31
500	12.35



Maximum Applied Pressure (kN/m²)	500
Maximum Deformation (mm)	12.35
Estimated CBR % @ 1.25mm deformation	7
K = (KN/m²/m) @ 1.25mm deformation	46292
K = (MN/m²/m) @ 1.25mm deformation	46

Remarks:
CBR calculated in accordance with Part 2 DMRB Vule 7 : Part 2 HD 25/94
Time recorded at each interval was 3 minutes.

Where the deformation does not exceed 1.25mm during the test, the CBR and K values have been estimated and are not included under our scope of accreditation. Information identifying the 'Client', 'FTAO', 'Project', 'Client Ref.', 'Order No.' & information regarding the supply of a 'Sampling Certificate', has been supplied by the customer.

Approved By:	Signature:
James Purcell - Field Service Manager	

For and On Behalf of BHP Laboratories Issue Date: 13/08/2025

Tested by BHP Laboratories, New Road, Thomondgate, Limerick Phone:(061) 455399 Email: jamespurcell@bhp.ie

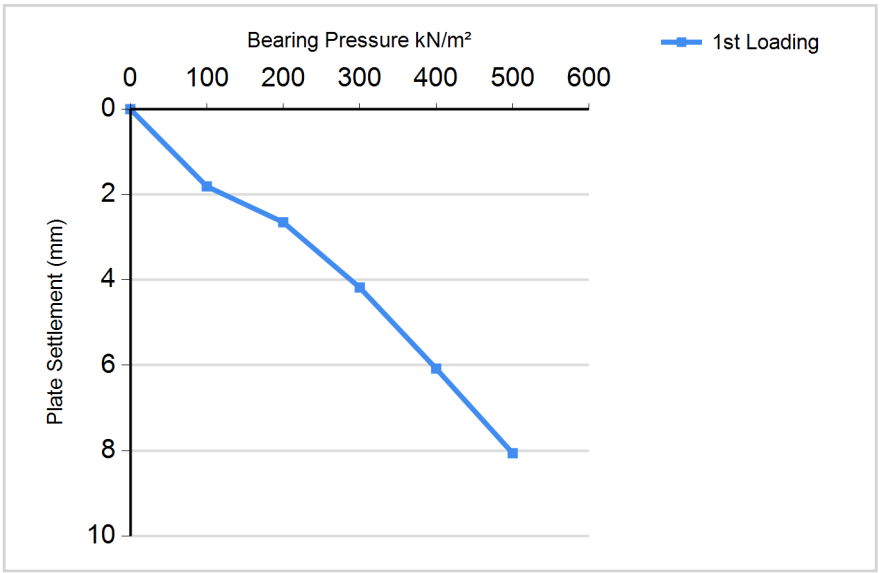
PLATE BEARING TEST REPORT 323513

BHP MTI F1309 V 1.0 04/07/2022

Client:	Causeway Geotech Unit 3 Balbriggan Business Park Balbriggan	**BHP Ref No:**	25/08/2663
		Order No:	PO244229
		Date Tested:	12/08/2025
		Test Specification:	Client Spec
FAO:	Gabriella Horan	**Item:**	Formation

Project: Pairc na hAbhainn
Location Reference: PLT 04
Type of Reaction Load: Track Machine
Plate Diameter: 600
BS 1377:Part 9:1990, CL4.1 (Plate Loading Test)

Bearing Pressure (kN/m²)	Plate Settlement (mm)
0	0.00
100	1.81
200	2.65
300	4.18
400	6.08
500	8.06



Maximum Applied Pressure (kN/m²)	500
Maximum Deformation (mm)	8.06
Estimated CBR % @ 1.25mm deformation	7
K = (KN/m²/m) @ 1.25mm deformation	44988
K = (MN/m²/m) @ 1.25mm deformation	44

Remarks:
CBR calculated in accordance with Part 2 DMRB Vule 7 : Part 2 HD 25/94
Time recorded at each interval was 3 minutes.

Where the deformation does not exceed 1.25mm during the test, the CBR and K values have been estimated and are not included under our scope of accreditation. Information identifying the 'Client', 'FTAO', 'Project', 'Client Ref.', 'Order No.' & information regarding the supply of a 'Sampling Certificate', has been supplied by the customer.

Approved By:	**Signature:**
James Purcell - Field Service Manager	

For and On Behalf of BHP Laboratories Issue Date: 13/08/2025

Tested by BHP Laboratories, New Road, Thomondgate, Limerick Phone:(061) 455399 Email: jamespurcell@bhp.ie

PLATE BEARING TEST REPORT 323513

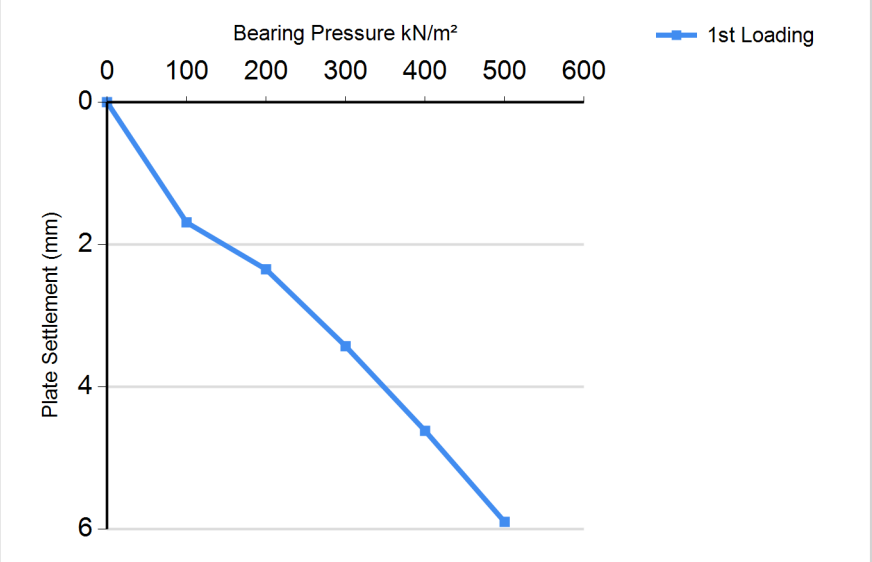
BHP MTI F1309 V 1.0 04/07/2022

Client: Causeway Geotech
Unit 3 Balbriggan Business Park
Balbriggan
FAO: Gabriella Horan

BHP Ref No: 25/08/2664
Order No: PO244229
Date Tested: 12/08/2025
Test Specification: Client Spec
Item: Formation

Project: Pairc na hAbhainn
Location Reference: PLT 05
Type of Reaction Load: Track Machine
Plate Diameter: 600
BS 1377:Part 9:1990, CL4.1 (Plate Loading Test)

Bearing Pressure (kN/m²)	Plate Settlement (mm)
0	0.00
100	1.69
200	2.35
300	3.43
400	4.62
500	5.90



Maximum Applied Pressure (kN/m²)	500
Maximum Deformation (mm)	5.9
Estimated CBR % @ 1.25mm deformation	8
K = (KN/m²/m) @ 1.25mm deformation	48248
K = (MN/m²/m) @ 1.25mm deformation	48

Remarks:
CBR calculated in accordance with Part 2 DMRB Vule 7 : Part 2 HD 25/94
Time recorded at each interval was 3 minutes.

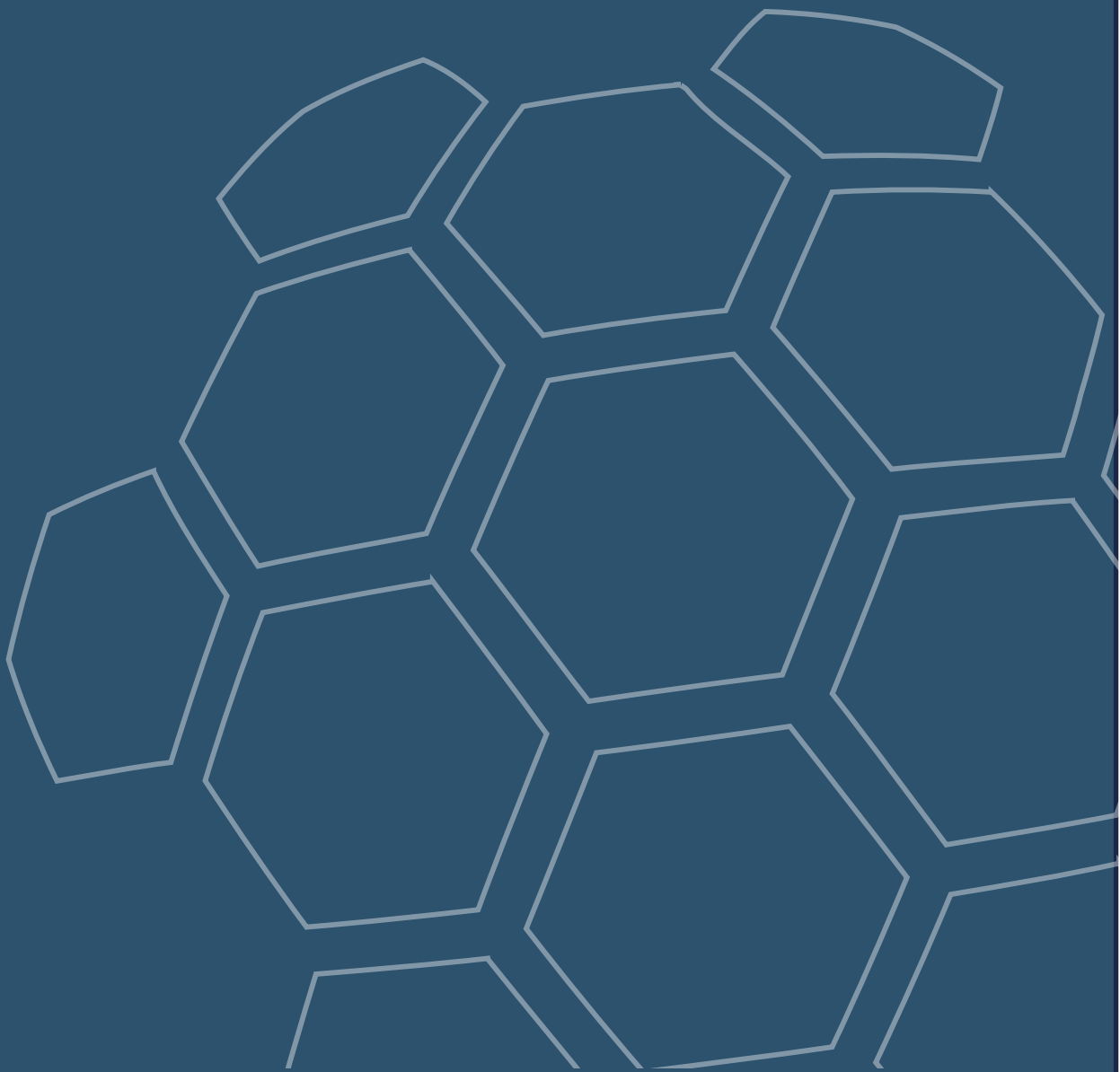
Where the deformation does not exceed 1.25mm during the test, the CBR and K values have been estimated and are not included under our scope of accreditation. Information identifying the 'Client', 'FTAO', 'Project', 'Client Ref.', 'Order No.' & information regarding the supply of a 'Sampling Certificate', has been supplied by the customer.

Approved By:	**Signature:**
James Purcell - Field Service Manager	

For and On Behalf of BHP Laboratories Issue Date: 13/08/2025

Tested by BHP Laboratories, New Road, Thomondgate, Limerick Phone:(061) 455399 Email: jamespurcell@bhp.ie

APPENDIX G – GEOTECHNICAL LABORATORY TEST RESULTS



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SOIL AND ROCK SAMPLE ANALYSIS
LABORATORY TEST REPORT

19 September 2025

PROJECT NAME	Pairc na hAbhainn, Athenry
PROJECT NUMBER	25-0994
CLIENT	Galway County Council
ENGINEER	N/A

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 10/09/2025 and 19/09/2025.

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

CAUSEWAY GEOTECH

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www.causewaygeotech.com

PROJECT NAME: Pairc na hAbhainn, Athenry

REPORT REFERENCE: Schedule 2

The table below details the tests carried out, the specifications used, and the number of tests included in this report. Tests marked with* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests.

The results contained in this report relate to the sample(s) as received. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. This report shall not be reproduced other than in full, without the prior written approval of the laboratory.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Water Content of Soil	*BS 1377-2: 2022: Cl 4 in accordance with ISO 17892-1:2014 + A1:2022*	5
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	*BS 1377-2: 2022: Cl 5.3 in accordance with ISO 17892-12:2018 + A2:2022*	5
SOIL	Particle size distribution - wet sieving	*BS 1377-2: 2022: Cl 10 in accordance with ISO 17892-4:2016, Cl 5.2*	5
SOIL	Particle size distribution - sedimentation hydrometer method	*BS 1377-2: 2022: Cl 10 in accordance with ISO 17892-4:2016, Cl 5.3*	5
SOIL	Direct Shear Test using 60mm Small Shearbox (up to 3 days)	*BS EN ISO 17892-10:2018*	2
	Extra over days (more than initial 3 days)		6

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 Normec DETS Limited *(UKAS 2139)*	Sulphate Content water extract	*Documented In-House Method No DETSC 2004 based on BS 1377: Part 3:1990*	5

CAUSEWAY GEOTECH

Summary of Classification Test Results

Project No.	Project Name
25-0994	Pairc na hAbhainn, Athenry

Hole No.	Sample				Specimen Description	Density bulk / dry Mg/m3		w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
	Ref	Top	Base	Type										
BH01	4	0.00	0.50	B	Brown sandy slightly gravelly clayey SILT.			23.5	74	41 -1pt	29	12		MI
BH02	5	1.00	2.00	B	Brown sandy slightly gravelly clayey SILT.			9.6	56	21 -1pt	15	6		ML/CL
BH03	6	2.00	2.50	B	Brown sandy slightly gravelly silty CLAY.			8.6	63	20 -1pt	13	7		CL
BH04	6	1.20	2.00	B	Brownish grey sandy slightly gravelly silty CLAY.			8.6	64	22 -1pt	13	9		CL
BH05	5	1.65	2.00	B	Brownish grey sandy slightly gravelly silty CLAY.			8.4	54	20 -1pt	12	8		CL

All tests performed in accordance with BS1377-2:2022 unless specified otherwise

LAB 26R - Version 2

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

17/09/2025

Approved By

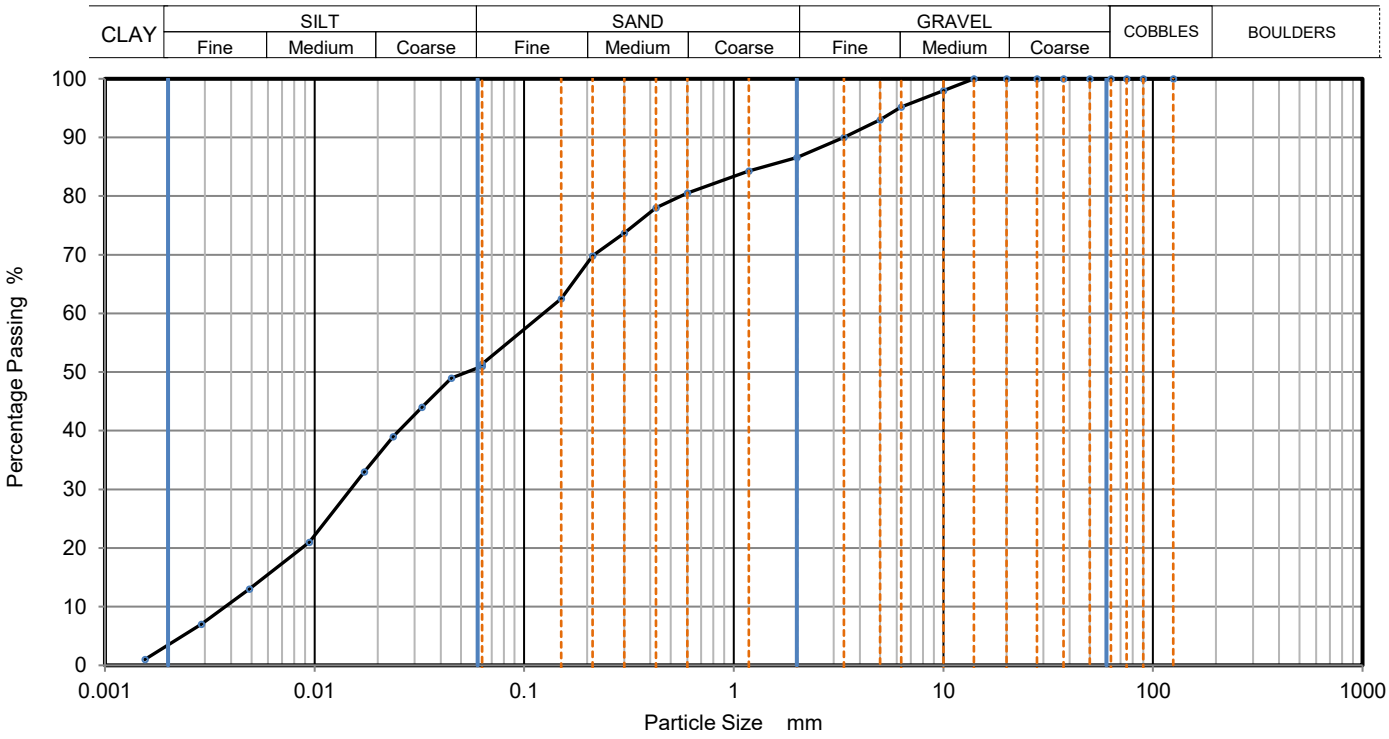
Stephen Watson

UKAS TESTING

10122

PARTICLE SIZE DISTRIBUTION

Job Ref					25-0994
Borehole/Pit No.					BH01
Site Name	Pairc na hAbhainn, Athenry				
Sample No.					4
Specimen Description	Brown sandy slightly gravelly clayey SILT.			Sample Depth (m) Top	0.00
				Base	0.50
Specimen Reference	6	Specimen Depth	0 m	Sample Type	B
Test Method	BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016			KeyLAB ID	Caus202509090



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	51
90	100	0.04500	49
75	100	0.03257	44
63	100	0.02372	39
50	100	0.01725	33
37.5	100	0.00944	21
28	100	0.00489	13
20	100	0.00288	7
14	100	0.00155	1
10	98		
6.3	95		
5	93		
3.35	90		
2	87		
1.18	84		
0.6	81	Particle density	(assumed)
0.425	78	2.65	Mg/m3
0.3	74		
0.212	70		
0.15	63		
0.063	51		

Dry Mass of sample, g: 360

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	13.4
Sand	35.2
Silt	47.7
Clay	3.7

Grading Analysis		
D100	mm	
D60	mm	0.123
D30	mm	0.0147
D10	mm	0.00385
Uniformity Coefficient		32
Curvature Coefficient		0.45

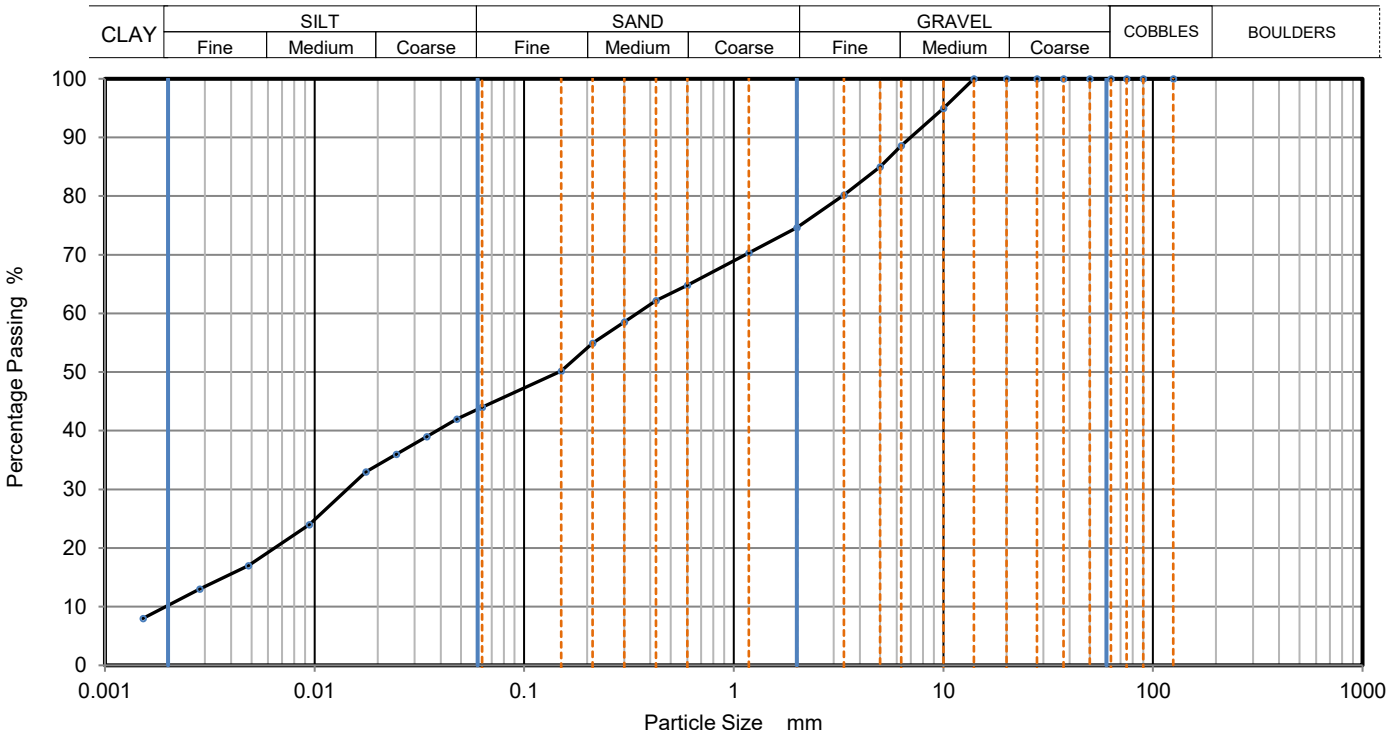
Remarks

Preparation and testing to BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016

Approved
Stephen Watson

PARTICLE SIZE DISTRIBUTION

Job Ref					25-0994
Borehole/Pit No.					BH02
Site Name	Pairc na hAbhainn, Athenry				
Sample No.					5
Specimen Description	Brown sandy slightly gravelly clayey SILT.			Sample Depth (m) Top	1.00
				Base	2.00
Specimen Reference	6	Specimen Depth	1 m	Sample Type	B
Test Method	BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016			KeyLAB ID	Caus202509091



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	44
90	100	0.04779	42
75	100	0.03426	39
63	100	0.02456	36
50	100	0.01760	33
37.5	100	0.00944	24
28	100	0.00483	17
20	100	0.00284	13
14	100	0.00152	8
10	95		
6.3	89		
5	85		
3.35	80		
2	75		
1.18	70		
0.6	65	Particle density	(assumed)
0.425	62	2.65	Mg/m3
0.3	59		
0.212	55		
0.15	50		
0.063	44		

Dry Mass of sample, g: 419

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	25.4
Sand	30.5
Silt	34.2
Clay	9.9

Grading Analysis		
D100	mm	
D60	mm	0.346
D30	mm	0.0144
D10	mm	0.00202
Uniformity Coefficient		170
Curvature Coefficient		0.3

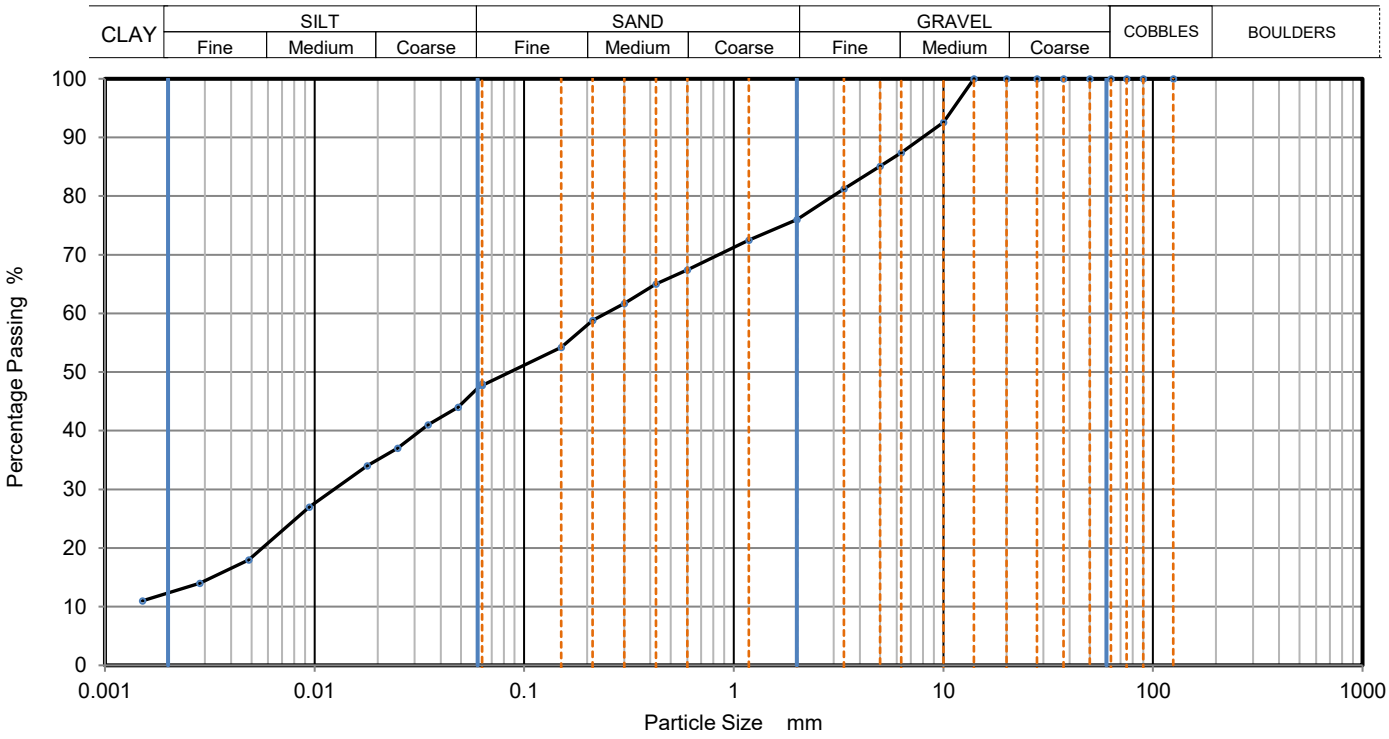
Remarks

Preparation and testing to BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016

Approved
Stephen Watson

PARTICLE SIZE DISTRIBUTION

Job Ref					25-0994
Borehole/Pit No.					BH03
Site Name	Pairc na hAbhainn, Athenry				
Sample No.					6
Specimen Description	Brown sandy slightly gravelly silty CLAY.			Sample Depth (m) Top	2.00
				Base	2.50
Specimen Reference	6	Specimen Depth	2 m	Sample Type	B
Test Method	BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016			KeyLAB ID	Caus202509092



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	48
90	100	0.04846	44
75	100	0.03473	41
63	100	0.02489	37
50	100	0.01783	34
37.5	100	0.00944	27
28	100	0.00486	18
20	100	0.00284	14
14	100	0.00151	11
10	93		
6.3	87		
5	85		
3.35	81		
2	76		
1.18	73		
0.6	67	Particle density	(assumed)
0.425	65	2.65	Mg/m3
0.3	62		
0.212	59		
0.15	54		
0.063	48		

Dry Mass of sample, g: 455

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	24.0
Sand	28.3
Silt	35.5
Clay	12.2

Grading Analysis		
D100	mm	
D60	mm	0.245
D30	mm	0.0129
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

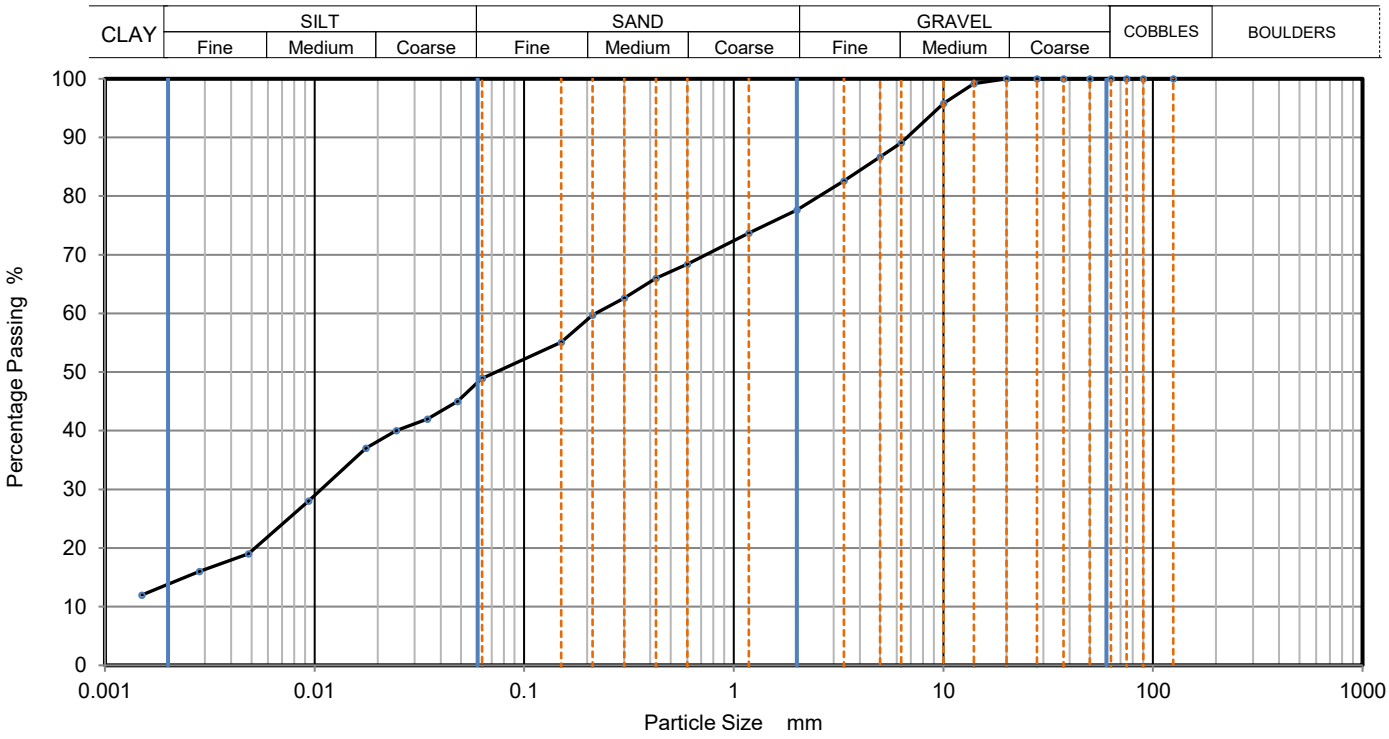
Remarks

Preparation and testing to BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016

Approved
Stephen Watson

PARTICLE SIZE DISTRIBUTION

Job Ref					25-0994
Borehole/Pit No.					BH04
Site Name	Pairc na hAbhainn, Athenry				
Sample No.					6
Specimen Description	Brownish grey sandy slightly gravelly silty CLAY.			Sample Depth (m) Top	1.20
				Base	2.00
Specimen Reference	6	Specimen Depth	1.2 m	Sample Type	B
Test Method	BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016			KeyLAB ID	Caus202509093



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	49
90	100	0.04812	45
75	100	0.03450	42
63	100	0.02456	40
50	100	0.01760	37
37.5	100	0.00938	28
28	100	0.00483	19
20	100	0.00282	16
14	99	0.00150	12
10	96		
6.3	89		
5	87		
3.35	83		
2	78		
1.18	74		
0.6	68	Particle density	(assumed)
0.425	66	2.65	Mg/m3
0.3	63		
0.212	60		
0.15	55		
0.063	49		

Dry Mass of sample, g: 362

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	22.4
Sand	28.7
Silt	35.1
Clay	13.8

Grading Analysis		
D100	mm	
D60	mm	0.22
D30	mm	0.0109
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

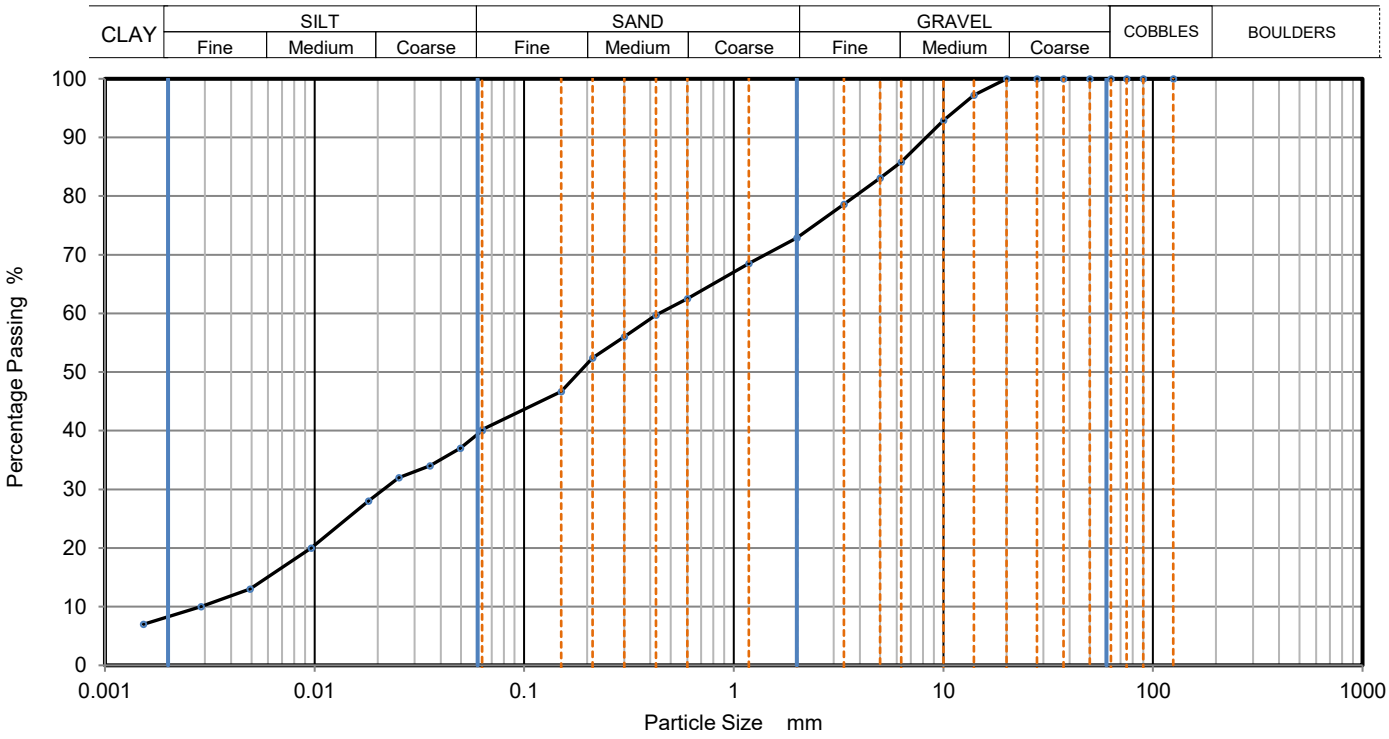
Remarks

Preparation and testing to BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016

Approved
Stephen Watson

PARTICLE SIZE DISTRIBUTION

Job Ref					25-0994
Borehole/Pit No.					BH05
Site Name	Pairc na hAbhainn, Athenry			Sample No.	5
Specimen Description	Brownish grey sandy slightly gravelly silty CLAY.			Sample Depth (m) Top	1.65
				Base	2.00
Specimen Reference	6	Specimen Depth	1.65 m	Sample Type	B
Test Method	BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016			KeyLAB ID	Caus202509096



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	40
90	100	0.04965	37
75	100	0.03555	34
63	100	0.02529	32
50	100	0.01810	28
37.5	100	0.00963	20
28	100	0.00492	13
20	100	0.00287	10
14	97	0.00153	7
10	93		
6.3	86		
5	83		
3.35	79		
2	73		
1.18	69		
0.6	63	Particle density	(assumed)
0.425	60	2.65	Mg/m3
0.3	56		
0.212	52		
0.15	47		
0.063	40		

Dry Mass of sample, g: 431

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	27.1
Sand	32.7
Silt	32.1
Clay	8.1

Grading Analysis		
D100	mm	
D60	mm	0.442
D30	mm	0.0211
D10	mm	0.00284
Uniformity Coefficient		160
Curvature Coefficient		0.35

Remarks

Preparation and testing to BS 1377-2 :2022 Cl 10 in accordance with ISO 17892-4:2016

Approved
Stephen Watson

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry		
Location Number	BH04	Sample Reference		2	
Depth (m)	2.00	Sample Submerged?		Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)		2.65	Assumed
Description	Brownish grey sandy slightly gravelly silty CLAY.				
Sample Preparation	Sample is recompacted using material passing 2mm test sieve				

Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	10.0	10.0	10.0
Bulk Density (Mg/m^3)	2.18	2.18	2.18
Dry Density (Mg/m^3)	1.97	1.97	1.97
Voids Ratio	0.345	0.343	0.345
Consolidation			
Normal Pressure (kPa)	50	100	200
Vertical Displacement (mm)	0.633	0.785	1.118
Shearing			
Rate of Strain (mm/min)	0.070	0.070	0.070
Peak Shear Stress (kPa)	60.8	104.1	154.0
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	1.797	1.437	2.757
Final Conditions			
Water Content (%)	10.0	10.0	9.7
Dry Density (Mg/m^3)	2.07	2.12	2.20
Voids Ratio	0.297	0.291	0.270

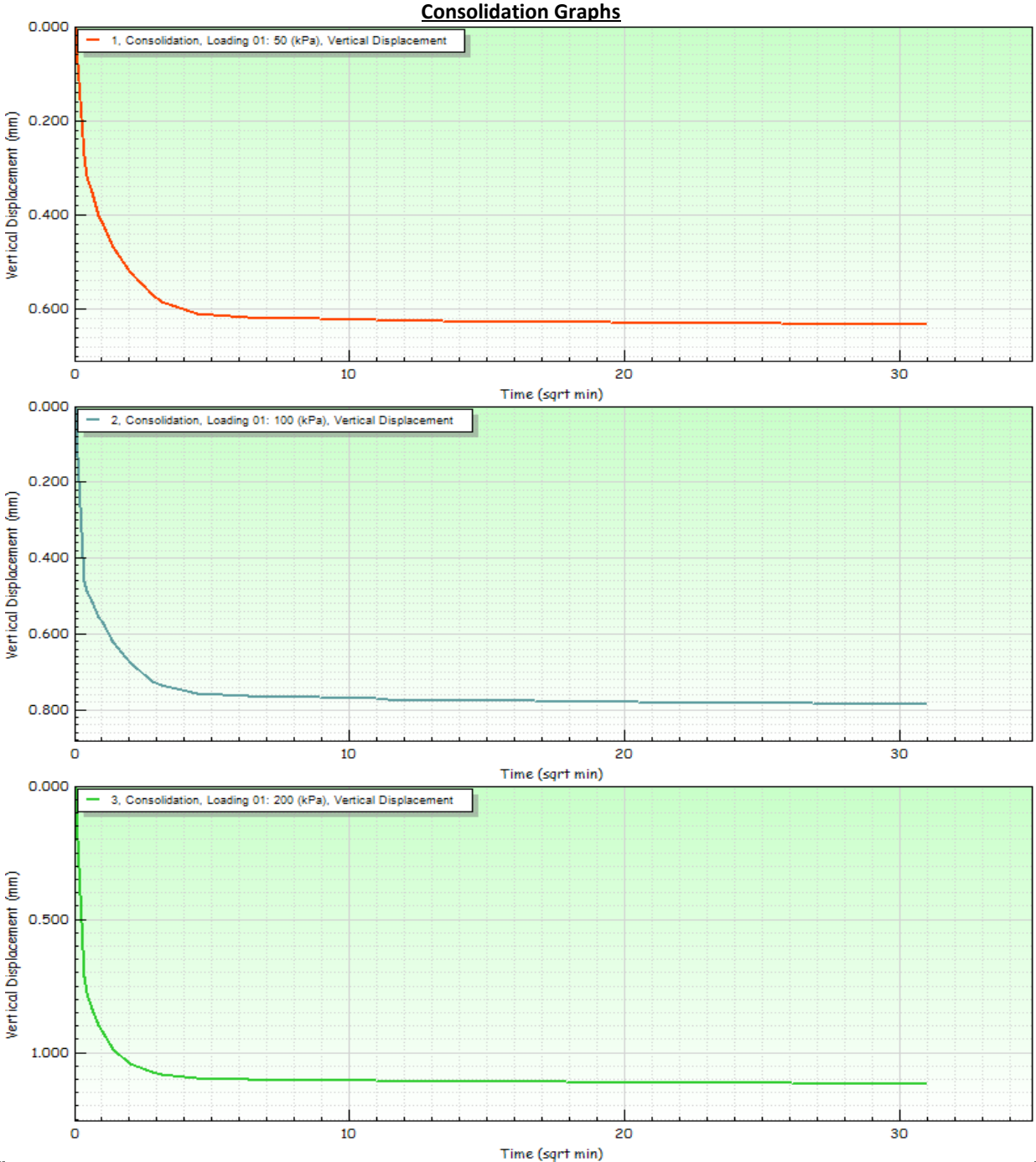
UKAS TESTING
10122

CAUSEWAY GEOTECH

Tested	Approved
Aaron Nutt	Joseph Nicholl

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry	
Location Number	BH04	Sample Reference	2	
Depth (m)	2.00	Sample Submerged?	Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs

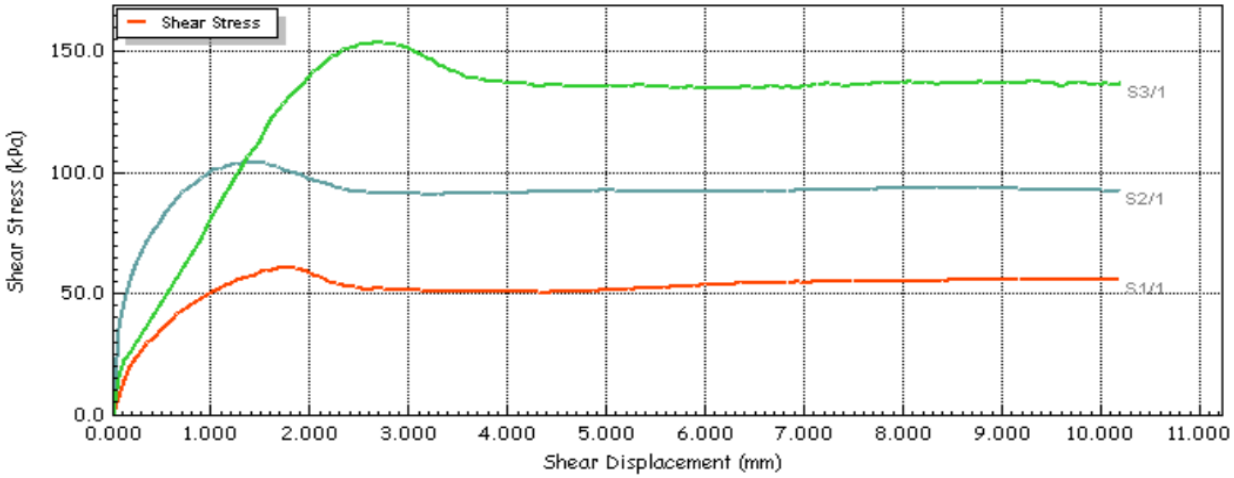


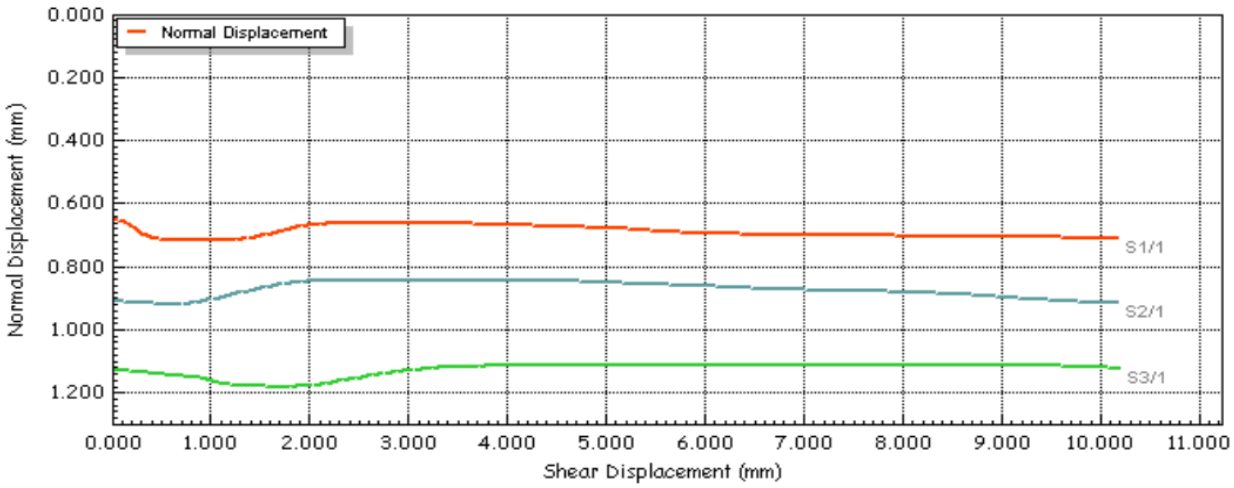
	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry	
Location Number	BH04	Sample Reference	2	
Depth (m)	2.00	Sample Submerged?	Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)	2.65	Assumed

Shear Stage



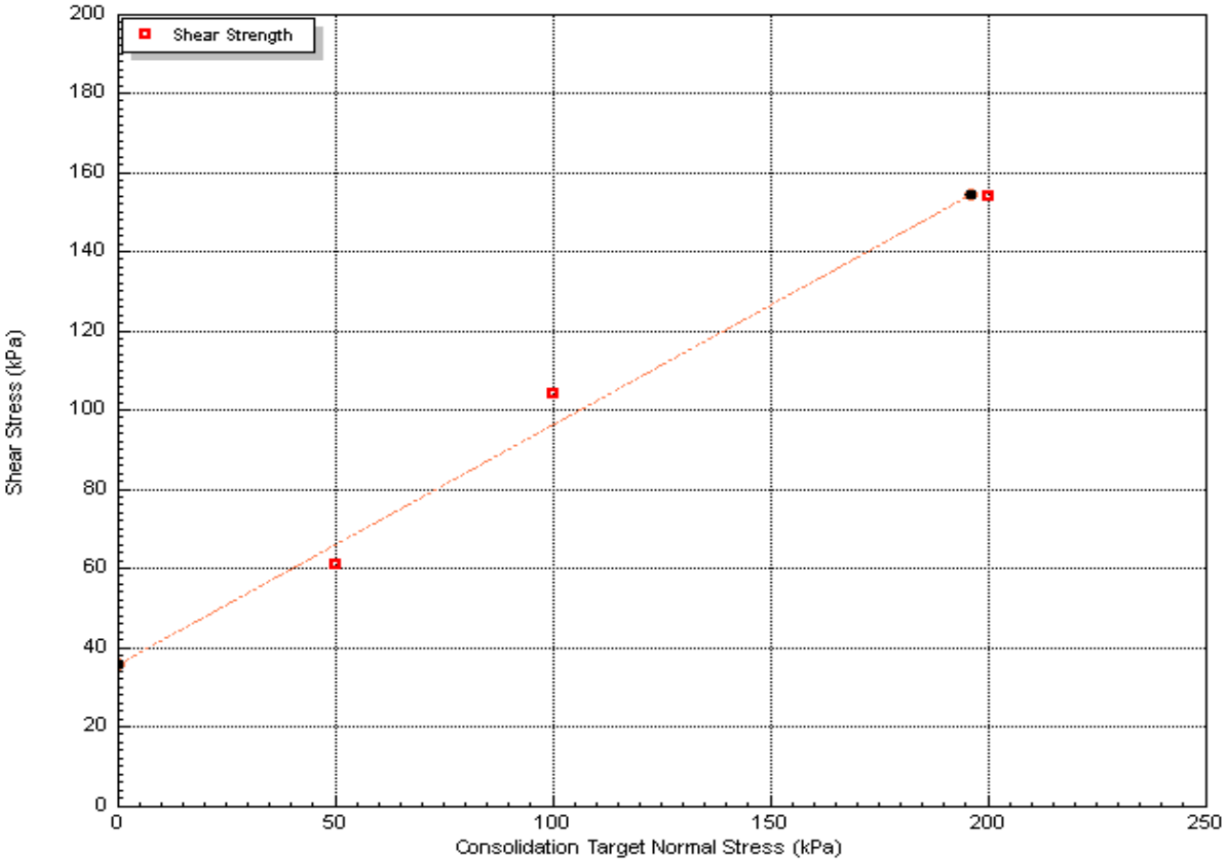


	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry	
Location Number	BH04	Sample Reference	2	
Depth (m)	2.00	Sample Submerged?	Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)	2.65	Assumed

Stage	1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)	36		
Angle of Shearing Resistance (°)	31.0		



	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018					
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry		
Location Number	BH05	Sample Reference		1	
Depth (m)	1.20	Sample Submerged?		Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)		2.65	Assumed
Description	Brownish grey sandy slightly gravelly silty CLAY.				
Sample Preparation	Sample is recompacted using material passing 2mm test sieve				

Stage	1	2	3
Initial Conditions			
Height (mm)	20.0	20.0	20.0
Diameter (mm)	60.0	60.0	60.0
Water Content (%)	9.6	9.6	9.6
Bulk Density (Mg/m^3)	2.21	2.21	2.22
Dry Density (Mg/m^3)	2.02	2.02	2.02
Voids Ratio	0.312	0.313	0.309
Consolidation			
Normal Pressure (kPa)	50	100	200
Vertical Displacement (mm)	0.716	0.792	0.867
Shearing			
Rate of Strain (mm/min)	0.085	0.085	0.085
Peak Shear Stress (kPa)	65.3	103.8	162.3
Hoz Displacement (mm)	10.2	10.2	10.2
Hoz Displacement at Peak Shear Stress (mm)	1.857	1.857	2.157
Final Conditions			
Water Content (%)	9.7	9.7	9.3
Dry Density (Mg/m^3)	2.14	2.15	2.20
Voids Ratio	0.272	0.261	0.255

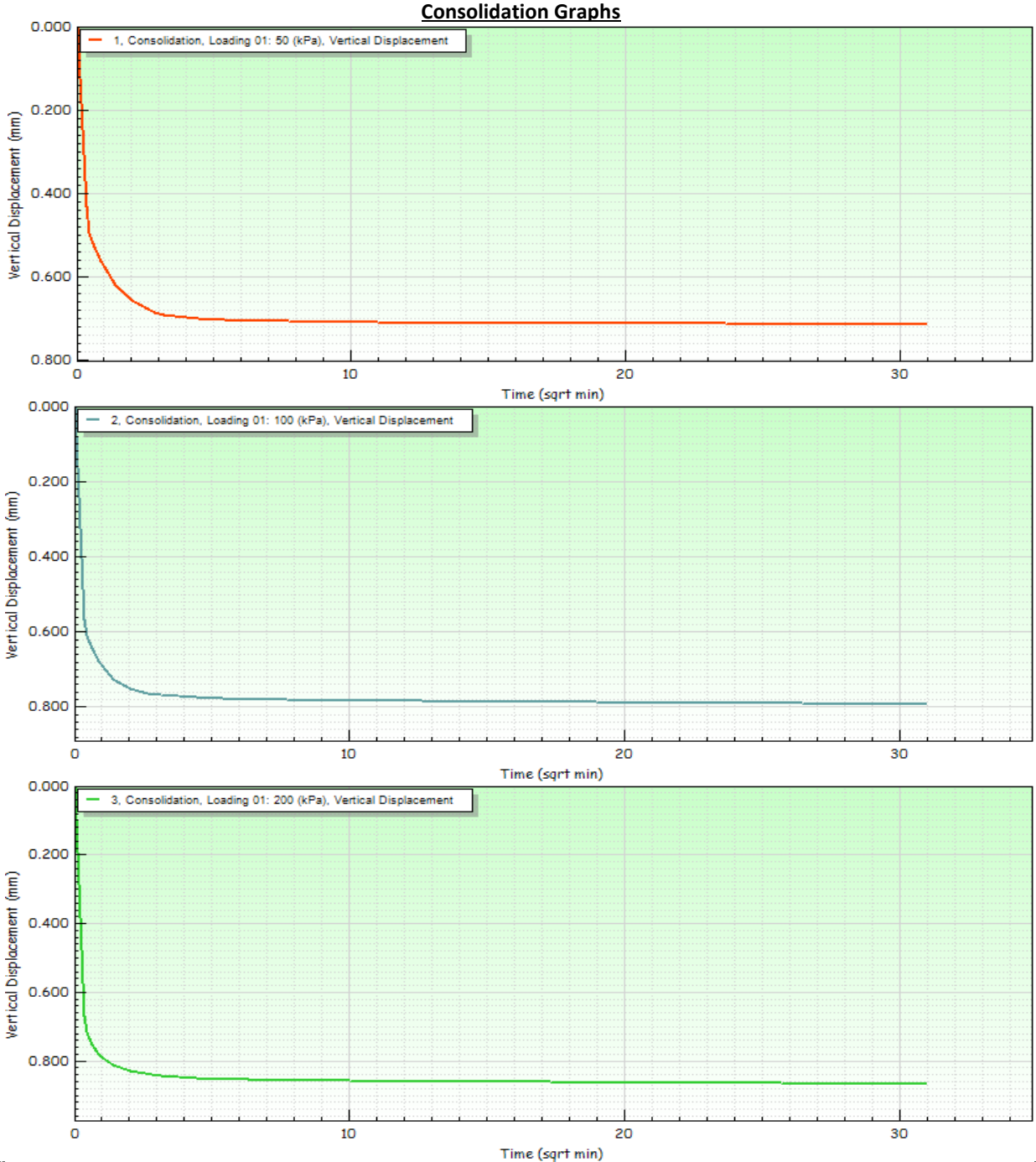
UKAS TESTING
10122

CAUSEWAY GEOTECH

Tested	Approved
Aaron Nutt	Joseph Nicholl

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry	
Location Number	BH05	Sample Reference	1	
Depth (m)	1.20	Sample Submerged?	Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)	2.65	Assumed

Consolidation Graphs

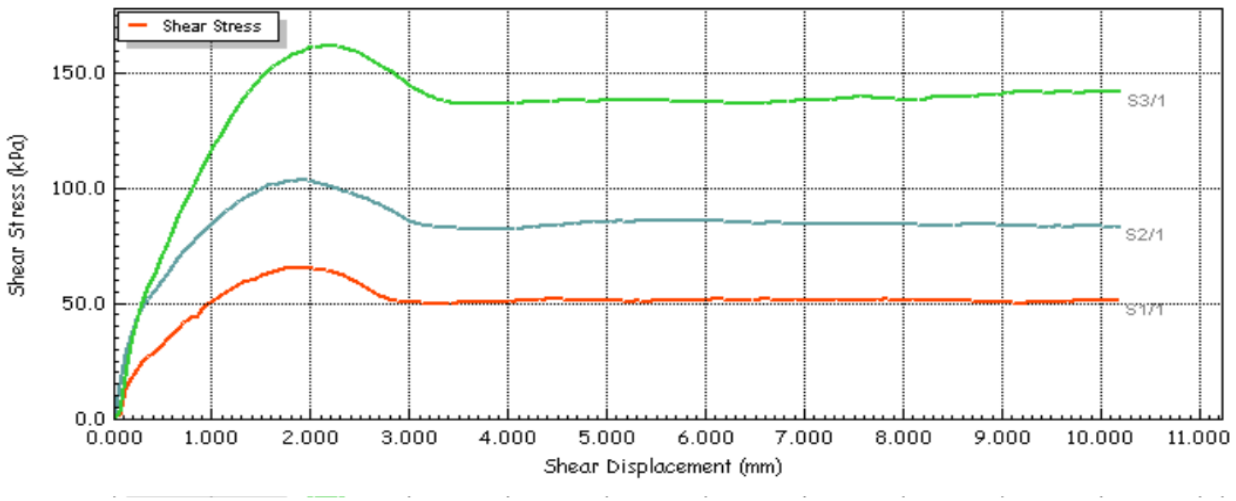


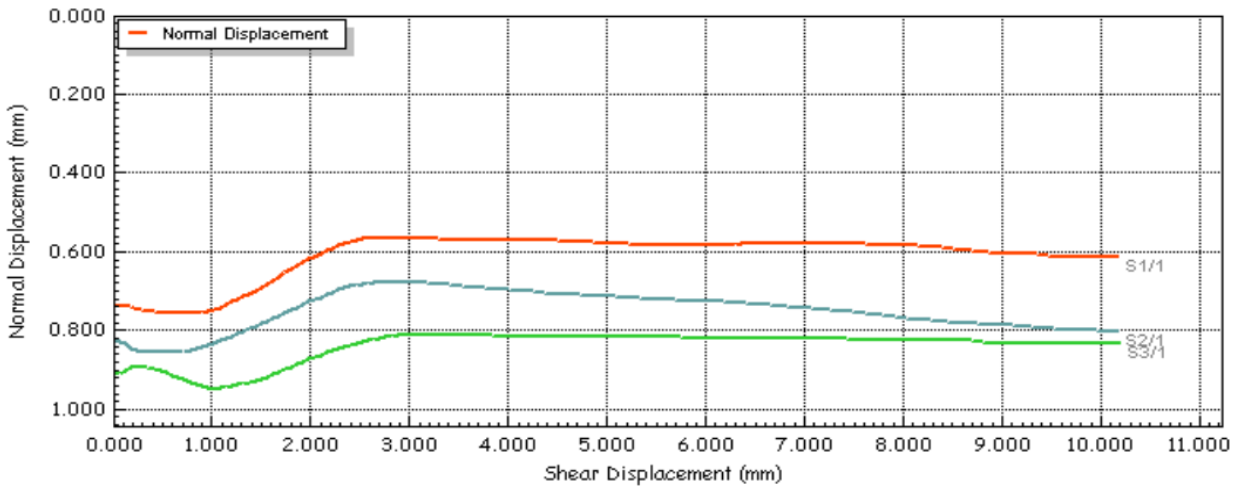
	Tested	Approved
10122	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry	
Location Number	BH05	Sample Reference	1	
Depth (m)	1.20	Sample Submerged?	Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)	2.65	Assumed

Shear Stage



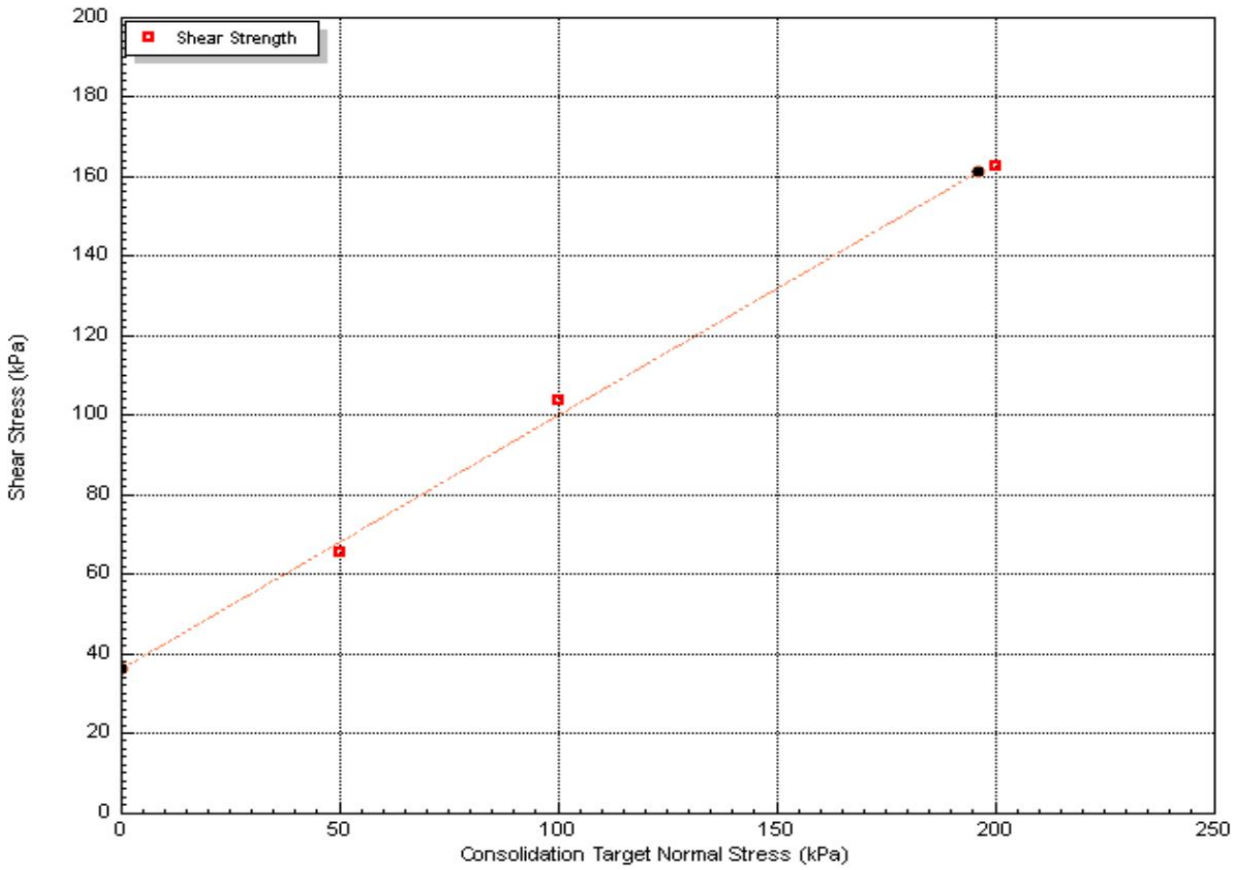


	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Direct Shear Test BS EN ISO 17892-10:2018				
Project Number	25-0994	Project	Pairc na hAbhainn, Athenry	
Location Number	BH05	Sample Reference	1	
Depth (m)	1.20	Sample Submerged?	Yes	~~No~~
Sample Type	U	Particle Density (Mg/m^3)	2.65	Assumed

Stage	1	2	3
Envelope Failure Results			
Apparent Cohesion (kPa)	36		
Angle of Shearing Resistance (°)	32.5		



	Tested	Approved
UKAS TESTING 10122 / CAUSEWAY GEOTECH	Aaron Nutt	Joseph Nicholl

Lab Sheet Reference : LAB25R - Version 4

Certificate of Analysis

Certificate Number	25-21404	*Issued:*	19-Sep-25

Client Causeway Geotech
8 Drumahiskey Road
Ballymoney
County Antrim
BT53 7QL

Our Reference	25-21404
Client Reference ~	25-0994
Order No ~	(not supplied)
Contract Title ~	Pairc na hAbhainn, Athenry
Description	5 Soil samples.
Date Received	15-Sep-25
Date Started	15-Sep-25
Date Completed	19-Sep-25
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Reyhan Irfan
Operations Manager

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Summary of Chemical Analysis
Soil Samples

Our Ref 25-21404
Client Ref ~ 25-0994
Contract Title ~ Pairc na hAbhainn, Athenry

			Lab No	2568764	2568765	2568766	2568767	2568768
			Sample ID ~	BH01	BH02	BH03	BH04	BH05
			Depth ~	0.50-1.20	1.00-2.00	2.00-2.50	1.20-2.00	1.65-2.00
			Other ID ~	5	5	6	6	5
			Sample Type ~	B	B	B	B	B
			Sampling Date ~	12/09/2025	12/09/2025	12/09/2025	12/09/2025	12/09/2025
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Inorganics								
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	14	12	12	15	15

Information in Support of the Analytical Results

Our Ref 25-21404
Client Ref ~ 25-0994
Contract ~ Pairc na hAbhainn, Athenry

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2568764	BH01 0.50-1.20 SOIL	12/09/25	PT 500ml		
2568765	BH02 1.00-2.00 SOIL	12/09/25	PT 500ml		
2568766	BH03 2.00-2.50 SOIL	12/09/25	PT 500ml		
2568767	BH04 1.20-2.00 SOIL	12/09/25	PT 500ml		
2568768	BH05 1.65-2.00 SOIL	12/09/25	PT 500ml		

Key: P-Plastic T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:
~ Sample details are provided by the client and can affect the validity of the results
***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report Ver 25.09.01

Certificate of Analysis

Certificate Number	25-21404	*Issued:*	19-Sep-25

Client Causeway Geotech
8 Drumahiskey Road
Ballymoney
County Antrim
BT53 7QL

Our Reference	25-21404
Client Reference ~	25-0994
Order No ~	(not supplied)
Contract Title ~	Pairc na hAbhainn, Athenry
Description	5 Soil samples.
Date Received	15-Sep-25
Date Started	15-Sep-25
Date Completed	19-Sep-25
Test Procedures	Identified by prefix DETSn (details on request).

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Approved By

Reyhan Irfan
Operations Manager

2139

Summary of Chemical Analysis
Soil Samples

Our Ref 25-21404
Client Ref ~ 25-0994
Contract Title ~ Pairc na hAbhainn, Athenry

			Lab No	2568764	2568765	2568766	2568767	2568768
			Sample ID ~	BH01	BH02	BH03	BH04	BH05
			Depth ~	0.50-1.20	1.00-2.00	2.00-2.50	1.20-2.00	1.65-2.00
			Other ID ~	5	5	6	6	5
			Sample Type ~	B	B	B	B	B
			Sampling Date ~	12/09/2025	12/09/2025	12/09/2025	12/09/2025	12/09/2025
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Inorganics								
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	14	12	12	15	15

Information in Support of the Analytical Results

Our Ref 25-21404
Client Ref ~ 25-0994
Contract ~ Pairc na hAbhainn, Athenry

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2568764	BH01 0.50-1.20 SOIL	12/09/25	PT 500ml		
2568765	BH02 1.00-2.00 SOIL	12/09/25	PT 500ml		
2568766	BH03 2.00-2.50 SOIL	12/09/25	PT 500ml		
2568767	BH04 1.20-2.00 SOIL	12/09/25	PT 500ml		
2568768	BH05 1.65-2.00 SOIL	12/09/25	PT 500ml		

Key: P-Plastic T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

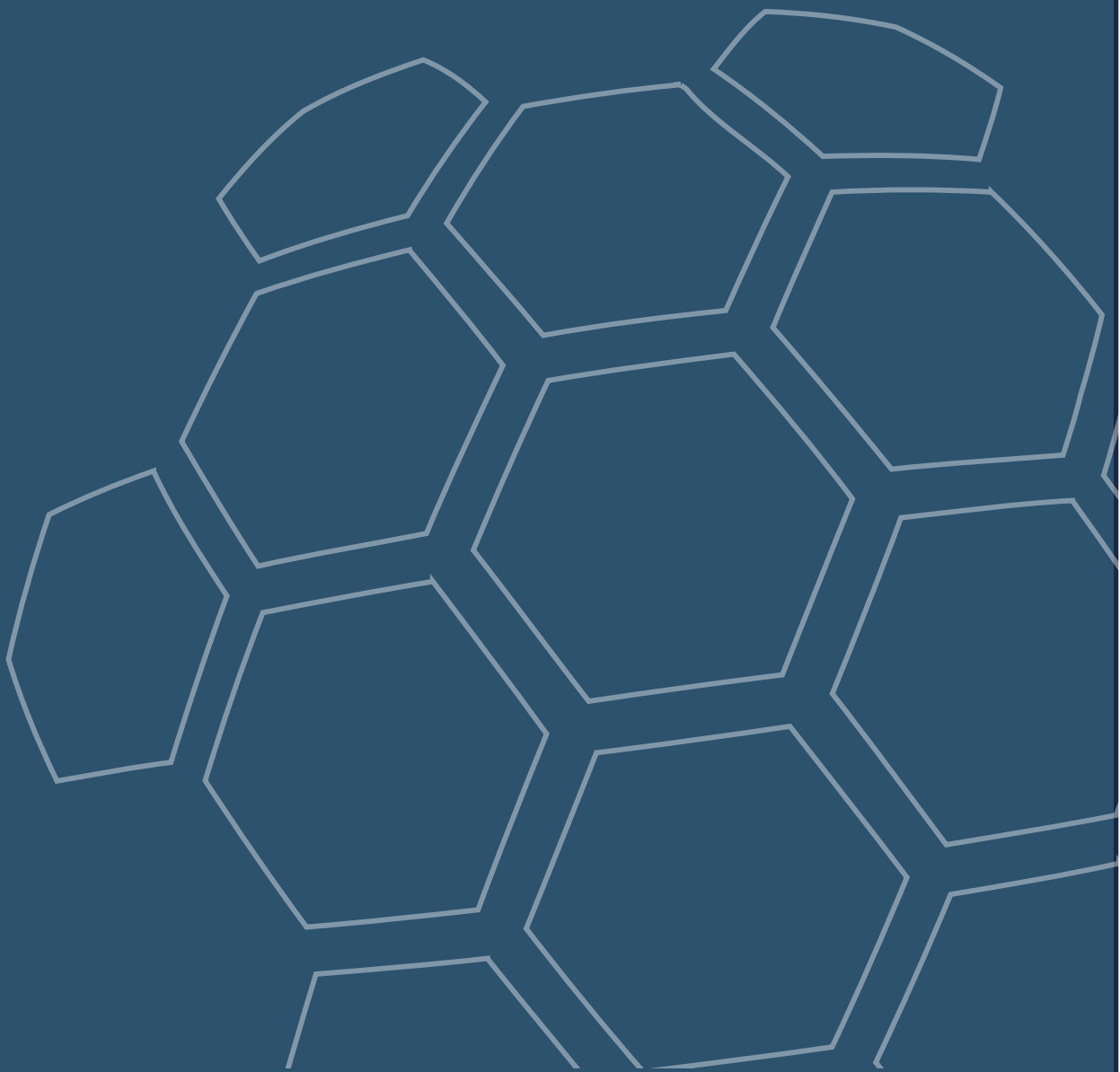
Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:
~ Sample details are provided by the client and can affect the validity of the results
***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report Ver 25.09.01

APPENDIX H – ENVIRONMENTAL LABORATORY TEST RESULTS



Certificate of Analysis

Certificate Number	25-22555	*Issued:*	03-Oct-25

Client Causeway Geotech
Unit 1 Fingal House
Stephenstown Industrial Estate
Balbriggan
Co. Dublin
K32 VR66

Our Reference 25-22555

Client Reference ~ 25-0994

Order No ~ (not supplied)

Contract Title ~ Pairc ba hAbhainn, Athenry

Description 3 Soil samples, 2 Leachate prepared by DETS samples.

Date Received 30-Sep-25

Date Started 30-Sep-25

Date Completed 03-Oct-25

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Reyhan Irfan
Operations Manager

2139

Sample Deviations present. See Deviation Table Section for details.

Summary of Chemical Analysis
Soil Samples

Our Ref 25-22555
Client Ref ~ 25-0994
Contract Title ~ Pairc ba hAbhainn, Athenry

			Lab No	2575844	2575845	2575846
			Sample ID ~	BH01	BH02	TH03
			Depth ~	0.50	1.00	0.50
			Other ID ~			
			Sample Type ~	ES	ES	ES
			Sampling Date ~	12/08/2025	12/08/2025	13/08/2025
			Sampling Time ~	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Preparation						
Moisture Content	DETSC 1004	0.1	%	17	12	
Metals						
Antimony	DETSC 2301*	1	mg/kg	< 1.0	< 1.0	
Arsenic	DETSC 2301#	0.2	mg/kg	7.9	4.0	3.5
Barium	DETSC 2301#	1.5	mg/kg	35	19	
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.3	0.4	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	1.3	1.3	0.6
Chromium	DETSC 2301#	0.15	mg/kg	17	9.0	6.3
Chromium III	DETSC 2301*	0.15	mg/kg	17	9.0	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	17	8.1	6.0
Lead	DETSC 2301#	0.3	mg/kg	18	5.4	4.0
Mercury	DETSC 2325#	0.05	mg/kg	0.10	< 0.05	< 0.05
Molybdenum	DETSC 2301#	0.4	mg/kg	9.4	1.1	
Nickel	DETSC 2301#	1	mg/kg	23	15	9.9
Selenium	DETSC 2301#	0.5	mg/kg	1.5	0.5	0.5
Zinc	DETSC 2301#	1	mg/kg	56	25	17
Inorganics						
pH	DETSC 2008#		pH	7.6	8.4	8.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.2	< 0.1	< 0.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg			< 0.1
Thiocyanate	DETSC 2130#	0.6	mg/kg			< 0.6
Total Organic Carbon	DETSC 2084#	0.5	%	1.3	0.8	
Organic matter	DETSC 2002#	0.1	%			0.6
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l			33
Sulphide	DETSC 2024*	10	mg/kg	< 10	44	24
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.05	0.03	0.02
Petroleum Hydrocarbons						
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C35-C40: EH_CU_1D_AL	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44: EH_CU_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aliphatic C5-C40: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aliphatic C5-C44: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref 25-22555
Client Ref ~ 25-0994
Contract Title ~ Pairc ba hAbhainn, Athenry

			Lab No	2575844	2575845	2575846
			Sample ID ~	BH01	BH02	TH03
			Depth ~	0.50	1.00	0.50
			Other ID ~			
			Sample Type ~	ES	ES	ES
			Sampling Date ~	12/08/2025	12/08/2025	13/08/2025
			Sampling Time ~	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C35-C40: EH_CU_1D_AR	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C10-C44: EH_CU_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C40: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C44: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
TPH Ali/Aro C5-C40: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
TPH Ali/Aro C5-C44: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Ali/Aro C10-C44: EH_CU_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
EPH (C24-C40): EH_1D_Total	DETSC 3311	10	mg/kg	< 10	< 10	
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	
PAHs						
Naphthalene	DETSC 3303#	0.03	mg/kg			< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg			< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg			< 0.03
Fluorene	DETSC 3303	0.03	mg/kg			< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg			< 0.03
Anthracene	DETSC 3303	0.03	mg/kg			< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg			< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg			< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg			< 0.03
Chrysene	DETSC 3303	0.03	mg/kg			< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg			< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg			< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg			< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg			< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg			< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg			< 0.03
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	

Summary of Chemical Analysis
Soil Samples

Our Ref 25-22555
Client Ref ~ 25-0994
Contract Title ~ Pairc ba hAbhainn, Athenry

			Lab No	2575844	2575845	2575846
			Sample ID ~	BH01	BH02	TH03
			Depth ~	0.50	1.00	0.50
			Other ID ~			
			Sample Type ~	ES	ES	ES
			Sampling Date ~	12/08/2025	12/08/2025	13/08/2025
			Sampling Time ~	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	
Coronene	DETSC 3301*	0.1	mg/kg	< 0.10	< 0.10	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg			< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	
PCBs						
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	1.0	1.9

Summary of Chemical Analysis
Leachate Samples

Our Ref 25-22555
Client Ref ~ 25-0994
Contract Title ~ Pairc ba hAbhainn, Athenry

Lab No	2575847	2575848
Sample ID ~	BH01	BH02
Depth ~	0.50	1.00
Other ID ~		
Sample Type ~	ES	ES
Sampling Date ~	12/08/2025	12/08/2025
Sampling Time ~	n/s	n/s

Test	Method	LOD	Units		
Inorganics					
Un-Ionised Ammonia	*	0.02	mg/l	< 0.02	< 0.02
Ammoniacal Nitrogen as NH4	DETSC 2207	0.0193	mg/l	< 0.02	0.15

Summary of Asbestos Analysis
Soil Samples

Our Ref 25-22555
Client Ref ~ 25-0994
Contract Title ~ Pairc ba hAbhainn, Athenry

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2575844	BH01 0.50	SOIL	NAD	none	Keith Wilson
2575845	BH02 1.00	SOIL	NAD	none	Keith Wilson
2575846	TH03 0.50	SOIL	NAD	none	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING
v20.25.02.03

Our Ref 25-22555
Client Ref 25-0994
Contract Title Pairc ba hAbhainn, Athenry
Sample Id BH01 0.50

Sample Numbers 2575844 2575847
Date Analysed 03/10/2025

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.3	3	5	6
DETSC 2003# Loss On Ignition	%	3.7	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311* Mineral Oil (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	7.6	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	0.65	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	4.6	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	0.072	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	2	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	5.7	0.06	2	50	100
DETSC 2306 Mercury as Hg	0.025	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	2.6	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.6	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.73	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	4.6	0.05	4	50	200
DETSC 2055 Chloride as Cl	1300	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	530	5.3	10	150	500
DETSC 2055 Sulphate as SO4	2700	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	96000	960	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	9700	97	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	8.4
DETSC 2009 Conductivity uS/cm	137.0
* Temperature*	20.0

Mass of Sample Kg	0.108
Mass of dry Sample Kg	0.090

Stage 1

Volume of Leachant L2	0.882
Volume of Eluate VE1	0.8

Disclaimer: *The WAC limit values are provided for guidance only. Normec DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

V.2.07

WASTE ACCEPTANCE CRITERIA TESTING
v20.25.02.03

Our Ref 25-22555
Client Ref 25-0994
Contract Title Pairc ba hAbhainn, Athenry
Sample Id BH02 1.00
Sample Numbers 2575845 2575848
Date Analysed 03/10/2025

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	0.8	3	5	6
DETSC 2003# Loss On Ignition	%	1.1	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311* Mineral Oil (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	8.4	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	7.0	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate) Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	0.51	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	4.6	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	0.049	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.6	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.4	0.02	2	50	100
DETSC 2306 Mercury as Hg	0.01	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	2.1	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.18	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.29	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	1.9	0.02	4	50	200
DETSC 2055 Chloride as Cl	890	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	250	2.5	10	150	500
DETSC 2055 Sulphate as SO4	2900	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	77000	770	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	6100	61	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.7
DETSC 2009 Conductivity uS/cm	109.0
* Temperature*	20.0

Mass of Sample Kg	0.102
Mass of dry Sample Kg	0.090

Stage 1

Volume of Leachant L2	0.888
Volume of Eluate VE1	0.8

Disclaimer: *The WAC limit values are provided for guidance only. Normec DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

V.2.07

Information in Support of the Analytical Results

Our Ref 25-22555
Client Ref ~ 25-0994
Contract ~ Pairc ba hAbhainn, Athenry

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2575844	BH01 0.50 SOIL	12/08/25	GJ 250ml, GJ 60ml, PT 1L x2	Aliphatics/Aromatics (14 days), BTEX / C5-C10 (14 days), Sulphur (free) (7 days), Mercury (28 days), Total Sulphate ICP (30 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), PCB (30 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days), EPH/TPH Cleanup (14 days)	
2575845	BH02 1.00 SOIL	12/08/25	GJ 250ml, GJ 60ml, PT 1L x2	Aliphatics/Aromatics (14 days), BTEX / C5-C10 (14 days), Sulphur (free) (7 days), Mercury (28 days), Total Sulphate ICP (30 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Auto) (28 days), PAH FID (14 days), PCB (30 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days), EPH/TPH Cleanup (14 days)	
2575846	TH03 0.50 SOIL	13/08/25	GJ 250ml, GJ 60ml, PT 1L x2	Anions 2:1 (30 days), Aliphatics/Aromatics (14 days), BTEX / C5-C10 (14 days), Mercury (28 days), Total Sulphate ICP (30 days), Kone Cr6 (30 days), Naphthalene (14 days), Organic Matter (Manual) (28 days), PAH MS (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
2575847	BH01 0.50 LEACHATE	12/08/25	GJ 250ml, GJ 60ml, PT 1L x2	Conductivity (non reportable) (28 days), Conductivity uS/cm (25oC) (28 days), Anions (28 days), Kone (4 days), pH/Cond (1 days), Un-Ionised Ammonia (10 days), Ammoniacal Nitrogen as NH4 (10 days), Phenol Index (30 days), Cyanide/Mono pHoh (14 days), Total Dissolved s (28 days), TOC AN (28 days)	
2575848	BH02 1.00 LEACHATE	12/08/25	GJ 250ml, GJ 60ml, PT 1L x2	Conductivity (non reportable) (28 days), Conductivity uS/cm (25oC) (28 days), Anions (28 days), Kone (4 days), pH/Cond (1 days), Un-Ionised Ammonia (10 days), Ammoniacal Nitrogen as NH4 (10 days), Phenol Index (30 days), Cyanide/Mono pHoh (14 days), Total Dissolved s (28 days), TOC AN (28 days)	

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

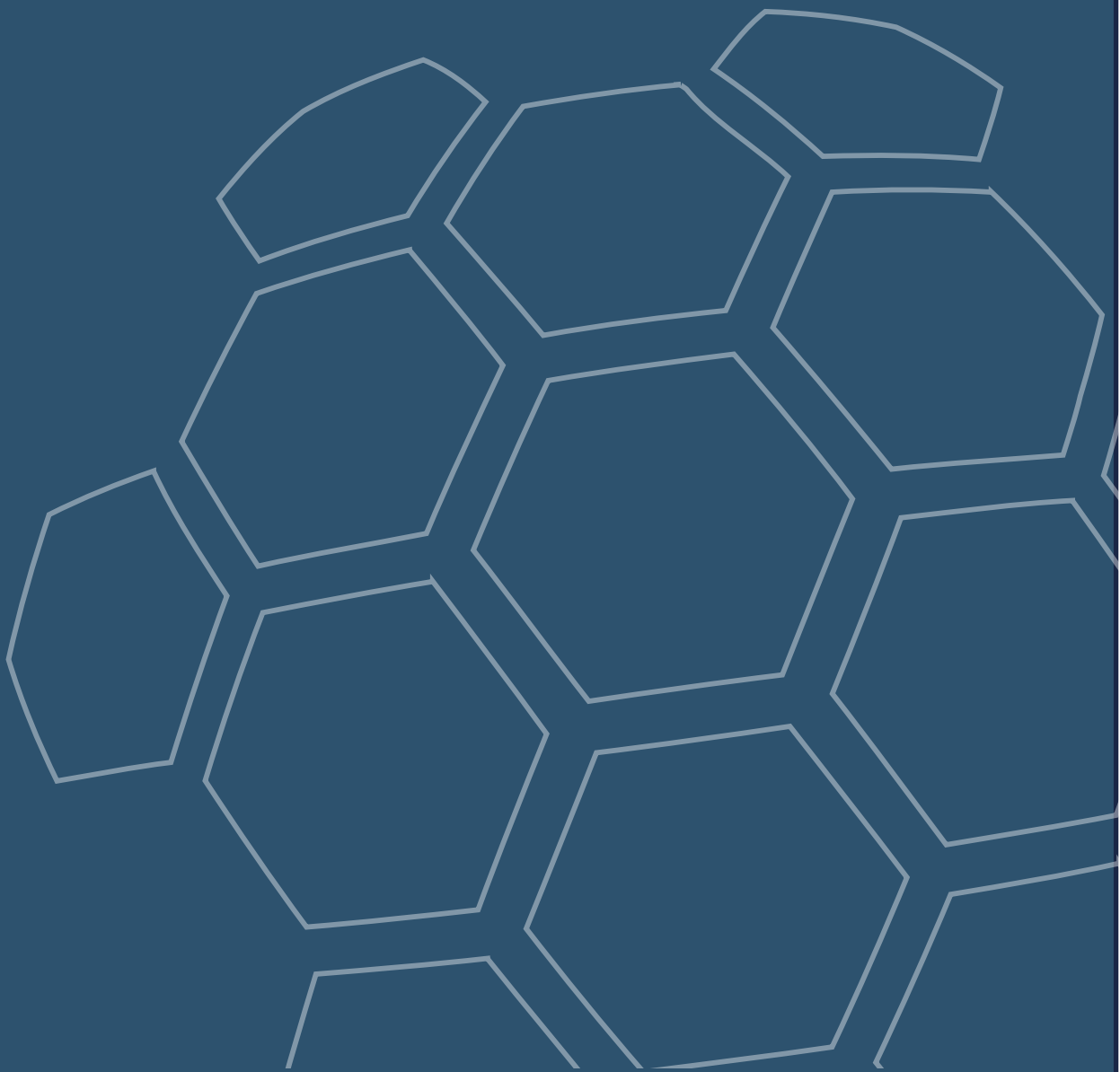
Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C35-C40	EH_CU_1D_AL
Aliphatic C10-C44	EH_CU_1D_AL
Aliphatic C5-C40	EH_CU+HS_1D_AL
Aliphatic C5-C44	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C35-C40	EH_CU_1D_AR
Aromatic C10-C44	EH_CU_1D_AR
Aromatic C5-C40	EH_CU+HS_1D_AR
Aromatic C5-C44	EH_CU+HS_1D_AR
TPH Ali/Aro C5-C40	EH_CU+HS_1D_Total
TPH Ali/Aro C5-C44	EH_CU+HS_1D_Total
Ali/Aro C10-C44	EH_CU_1D_Total
EPH (C24-C40)	EH_1D_Total
Mineral Oil (C10-C40) + Clean Up	EH_CU_1D_Total

Key:

~ Sample details are provided by the client and can affect the validity of the results
***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report Ver 25.09.29

APPENDIX I – SPT HAMMER ENERGY MEASUREMENT REPORT



SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Causeway Geotech LTD
8 Drumahiskey Road
Ballymoney
Co Antrim
BT53 7QL

SPT Hammer Ref: 1502
Test Date: 07/03/2025
Report Date:
File Name: 1502.spt
Test Operator: CD

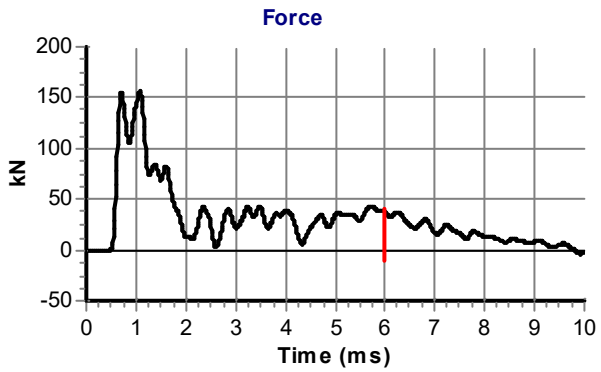
Instrumented Rod Data

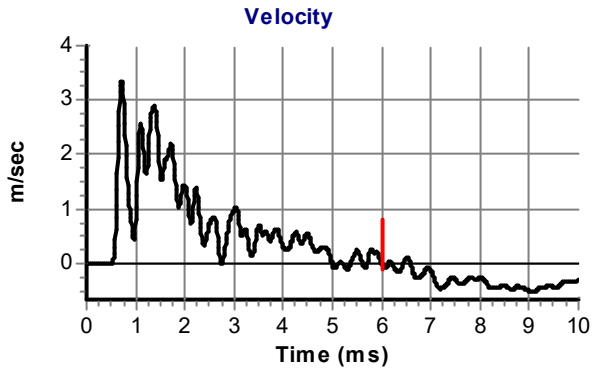
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.4
Rod Length l_r (m):	1.0
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	78855
Accelerometer No.2:	78856

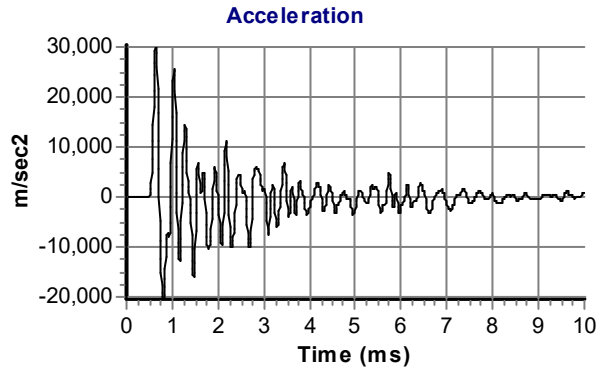
SPT Hammer Information

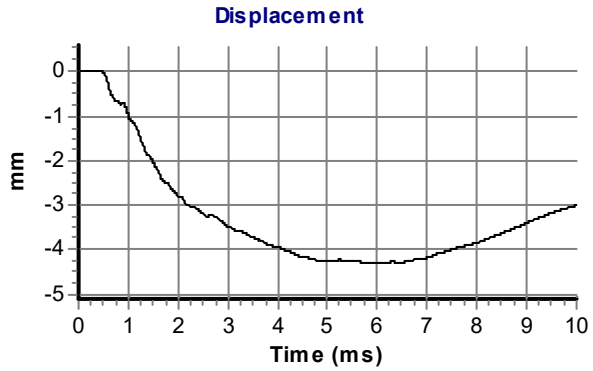
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

Comments / Location









Calculations

Area of Rod A (mm2):	957
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	322

Energy Ratio E_r (%): 68

Signed: Colin Dunlop
Title: Plant Manager

CAUSEWAY GEOTECH

Causeway Geotech Limited has made its commitment to health and safety of people, the environment and the quality of its services an integral part of our strategy.

Whether it be ensuring people's safety or meeting the challenges of operating in an ecologically diverse environment, we aim to act in a sustainable and responsible manner at all times.

CERTIFICATIONS /ACCREDITATIONS

Constructionline Gold Member

SCS INTEGRATED CERTIFICATION ISO 9001, 14001 & 45001 — UKAS MANAGEMENT SYSTEMS 9235

MEMBERSHIPS

AGS

BRITISH DRILLING ASSOCIATION

BGA · THE BRITISH · GEOTECHNICAL ASSOCIATION

INTERNATIONAL JACK-UP BARGE OPERATORS ASSOCIATION

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www.causewaygeotech.com

APPENDIX C – MICRODRAINAGE OUTPUTS

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 988 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	35.514	0.279	0.0	1.1	1.1	39.8	O K
30 min Summer	35.623	0.388	0.0	1.1	1.1	55.2	O K
60 min Summer	35.735	0.500	0.0	1.1	1.1	71.2	O K
120 min Summer	35.850	0.615	0.0	1.1	1.1	87.6	O K
180 min Summer	35.915	0.680	0.0	1.2	1.2	96.9	O K
240 min Summer	35.959	0.724	0.0	1.2	1.2	103.2	O K
360 min Summer	36.013	0.778	0.0	1.2	1.2	110.9	O K
480 min Summer	36.042	0.807	0.0	1.2	1.2	115.0	O K
600 min Summer	36.056	0.821	0.0	1.2	1.2	117.0	O K
720 min Summer	36.061	0.826	0.0	1.2	1.2	117.7	O K
960 min Summer	36.059	0.824	0.0	1.2	1.2	117.5	O K
1440 min Summer	36.049	0.814	0.0	1.2	1.2	116.0	O K
2160 min Summer	36.031	0.796	0.0	1.2	1.2	113.5	O K
2880 min Summer	36.008	0.773	0.0	1.2	1.2	110.1	O K
4320 min Summer	35.951	0.716	0.0	1.2	1.2	102.0	O K
5760 min Summer	35.889	0.654	0.0	1.1	1.1	93.2	O K
7200 min Summer	35.828	0.593	0.0	1.1	1.1	84.5	O K
8640 min Summer	35.767	0.532	0.0	1.1	1.1	75.8	O K
10080 min Summer	35.706	0.471	0.0	1.1	1.1	67.1	O K
15 min Winter	35.550	0.315	0.0	1.1	1.1	44.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	88.940	0.0	41.4	26
30 min Summer	61.847	0.0	57.7	41
60 min Summer	40.471	0.0	75.4	70
120 min Summer	25.661	0.0	95.8	128
180 min Summer	19.490	0.0	109.2	188
240 min Summer	15.998	0.0	119.4	246
360 min Summer	12.079	0.0	135.3	364
480 min Summer	9.881	0.0	147.5	484
600 min Summer	8.451	0.0	157.8	602
720 min Summer	7.435	0.0	166.5	720
960 min Summer	6.072	0.0	181.4	832
1440 min Summer	4.562	0.0	187.4	1090
2160 min Summer	3.427	0.0	230.4	1500
2880 min Summer	2.794	0.0	250.5	1928
4320 min Summer	2.093	0.0	281.4	2768
5760 min Summer	1.704	0.0	305.3	3576
7200 min Summer	1.452	0.0	325.1	4400
8640 min Summer	1.274	0.0	342.5	5192
10080 min Summer	1.140	0.0	357.7	6048
15 min Winter	88.940	0.0	46.4	26

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	35.671	0.436	0.0	1.1	1.1	62.2	O K
60 min Winter	35.799	0.564	0.0	1.1	1.1	80.3	O K
120 min Winter	35.931	0.696	0.0	1.2	1.2	99.2	O K
180 min Winter	36.008	0.773	0.0	1.2	1.2	110.2	O K
240 min Winter	36.061	0.826	0.0	1.2	1.2	117.7	O K
360 min Winter	36.128	0.893	0.0	1.3	1.3	127.3	O K
480 min Winter	36.168	0.933	0.0	1.3	1.3	132.9	O K
600 min Winter	36.191	0.956	0.0	1.3	1.3	136.2	O K
720 min Winter	36.204	0.969	0.0	1.3	1.3	138.0	O K
960 min Winter	36.210	0.975	0.0	1.3	1.3	138.9	O K
1440 min Winter	36.194	0.959	0.0	1.3	1.3	136.7	O K
2160 min Winter	36.160	0.925	0.0	1.3	1.3	131.8	O K
2880 min Winter	36.120	0.885	0.0	1.3	1.3	126.1	O K
4320 min Winter	36.024	0.789	0.0	1.2	1.2	112.4	O K
5760 min Winter	35.924	0.689	0.0	1.2	1.2	98.1	O K
7200 min Winter	35.826	0.591	0.0	1.1	1.1	84.2	O K
8640 min Winter	35.728	0.493	0.0	1.1	1.1	70.2	O K
10080 min Winter	35.604	0.369	0.0	1.1	1.1	52.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	61.847	0.0	64.6	40
60 min Winter	40.471	0.0	84.6	70
120 min Winter	25.661	0.0	107.3	126
180 min Winter	19.490	0.0	122.2	184
240 min Winter	15.998	0.0	133.8	242
360 min Winter	12.079	0.0	151.6	358
480 min Winter	9.881	0.0	165.3	472
600 min Winter	8.451	0.0	176.7	584
720 min Winter	7.435	0.0	186.6	696
960 min Winter	6.072	0.0	194.4	908
1440 min Winter	4.562	0.0	192.9	1144
2160 min Winter	3.427	0.0	257.9	1608
2880 min Winter	2.794	0.0	280.4	2080
4320 min Winter	2.093	0.0	315.2	2984
5760 min Winter	1.704	0.0	342.1	3864
7200 min Winter	1.452	0.0	364.2	4696
8640 min Winter	1.274	0.0	383.7	5616
10080 min Winter	1.140	0.0	400.5	6448

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	15.800	Shortest Storm (mins)	15
Ratio R	0.271	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.249

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.083	4	8	0.083	8	12	0.083

Model Details

Storage is Online Cover Level (m) 37.600

Cellular Storage Structure

Invert Level (m) 35.235 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	150.0	0.0	1.001	0.0	0.0
1.000	150.0	0.0	2.390	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0053-1300-1000-1300
Design Head (m)	1.000
Design Flow (l/s)	1.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	53
Invert Level (m)	35.145
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	1.3
Flush-Flo™	0.236	1.1
Kick-Flo®	0.477	0.9
Mean Flow over Head Range	-	1.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	1.4	3.000	2.1	7.000	3.2
0.200	1.1	1.400	1.5	3.500	2.3	7.500	3.3
0.300	1.1	1.600	1.6	4.000	2.4	8.000	3.4
0.400	1.1	1.800	1.7	4.500	2.6	8.500	3.5
0.500	1.0	2.000	1.8	5.000	2.7	9.000	3.6
0.600	1.0	2.200	1.9	5.500	2.8	9.500	3.6
0.800	1.2	2.400	1.9	6.000	2.9		
1.000	1.3	2.600	2.0	6.500	3.1		

APPENDIX D – MET ÉIREANN RAINFALL RETURN PERIOD DATA

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 150228, Northing: 226839,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.6,	3.7,	4.2,	5.0,	5.6,	6.0,	7.4,	8.9,	9.9,	11.3,	12.5,	13.5,	15.0,	16.1,	17.1,	N/A ,
10 mins	3.7,	5.1,	5.9,	7.0,	7.8,	8.3,	10.2,	12.4,	13.8,	15.7,	17.5,	18.8,	20.9,	22.5,	23.8,	N/A ,
15 mins	4.3,	6.0,	6.9,	8.2,	9.1,	9.8,	12.0,	14.6,	16.2,	18.5,	20.6,	22.1,	24.5,	26.4,	28.0,	N/A ,
30 mins	5.8,	7.9,	9.0,	10.6,	11.6,	12.4,	15.1,	18.0,	19.9,	22.6,	24.9,	26.7,	29.4,	31.5,	33.2,	N/A ,
1 hours	7.7,	10.3,	11.6,	13.5,	14.8,	15.8,	18.9,	22.3,	24.5,	27.5,	30.1,	32.1,	35.2,	37.5,	39.4,	N/A ,
2 hours	10.3,	13.5,	15.1,	17.4,	18.9,	20.0,	23.7,	27.6,	30.1,	33.5,	36.5,	38.7,	42.1,	44.7,	46.8,	N/A ,
3 hours	12.2,	15.8,	17.5,	20.1,	21.8,	23.0,	27.0,	31.3,	34.0,	37.6,	40.8,	43.2,	46.8,	49.6,	51.8,	N/A ,
4 hours	13.8,	17.6,	19.5,	22.3,	24.1,	25.4,	29.6,	34.1,	37.0,	40.9,	44.2,	46.7,	50.5,	53.3,	55.6,	N/A ,
6 hours	16.3,	20.6,	22.7,	25.8,	27.7,	29.2,	33.8,	38.7,	41.7,	45.9,	49.4,	52.1,	56.1,	59.1,	61.5,	N/A ,
9 hours	19.3,	24.1,	26.5,	29.8,	31.9,	33.6,	38.5,	43.8,	47.1,	51.5,	55.3,	58.1,	62.3,	65.5,	68.0,	N/A ,
12 hours	21.8,	27.0,	29.5,	33.0,	35.3,	37.0,	42.3,	47.8,	51.3,	55.9,	59.8,	62.8,	67.1,	70.4,	73.0,	N/A ,
18 hours	25.8,	31.5,	34.3,	38.2,	40.7,	42.6,	48.3,	54.2,	57.9,	62.8,	66.9,	70.0,	74.6,	78.0,	80.8,	N/A ,
24 hours	29.1,	35.3,	38.2,	42.4,	45.0,	47.0,	53.0,	59.2,	63.0,	68.1,	72.4,	75.6,	80.4,	83.9,	86.8,	96.2,
2 days	37.6,	44.9,	48.3,	53.1,	56.1,	58.4,	65.2,	72.2,	76.5,	82.1,	86.9,	90.4,	95.6,	99.4,	102.5,	112.7,
3 days	44.9,	53.0,	56.9,	62.2,	65.6,	68.1,	75.6,	83.2,	87.9,	94.1,	99.2,	103.0,	108.6,	112.7,	116.0,	126.9,
4 days	51.5,	60.4,	64.7,	70.5,	74.1,	76.8,	84.9,	93.2,	98.2,	104.8,	110.3,	114.4,	120.3,	124.7,	128.2,	139.8,
6 days	63.6,	73.9,	78.8,	85.4,	89.6,	92.6,	101.8,	111.1,	116.8,	124.1,	130.3,	134.8,	141.4,	146.2,	150.1,	162.8,
8 days	74.7,	86.3,	91.7,	99.1,	103.7,	107.1,	117.2,	127.4,	133.6,	141.7,	148.4,	153.3,	160.4,	165.7,	169.9,	183.7,
10 days	85.2,	97.9,	103.9,	111.9,	116.9,	120.6,	131.6,	142.7,	149.3,	158.0,	165.2,	170.5,	178.2,	183.8,	188.3,	203.0,
12 days	95.3,	109.1,	115.5,	124.2,	129.6,	133.5,	145.4,	157.2,	164.3,	173.6,	181.2,	186.8,	195.0,	201.0,	205.8,	221.3,
16 days	114.7,	130.4,	137.7,	147.5,	153.6,	158.1,	171.4,	184.6,	192.5,	202.9,	211.4,	217.6,	226.6,	233.2,	238.5,	255.6,
20 days	133.3,	150.8,	158.9,	169.7,	176.5,	181.4,	196.0,	210.5,	219.2,	230.5,	239.8,	246.5,	256.4,	263.6,	269.3,	287.8,
25 days	155.9,	175.4,	184.4,	196.5,	203.9,	209.4,	225.6,	241.6,	251.1,	263.5,	273.6,	281.0,	291.8,	299.6,	305.9,	326.0,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

APPENDIX E – UISCE EIREANN PRE-CONNECTION ENQUIRY

Pre-connection enquiry form

Business developments, mixed use developments, housing developments

This form is to be filled out by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure. If completing this form by hand, please use BLOCK CAPITALS and black ink.
Please note that this is a digital PDF form and can be filled in electronically

Please refer to the **Guide to completing the pre-connection enquiry form** on page 14 of this document when completing the form.

*** Denotes mandatory/ required field. Please note, if mandatory fields are not completed the application will be returned.**

Section A | Applicant details

1 *Applicant details:

Registered company name (if applicable):

Trading name (if applicable):

Company registration number (if applicable):

Parent company registered company name (if applicable):

Parent company registration number (if applicable):

If you are not a registered company/business, please provide the applicant's name:

GALWAY COUNTY COUNCIL

*Contact name: JAMES FARRELL

*Postal address: HOUSING DEPARTMENT,

ARAS AN CHONTAE, PROSPECT HILL

GALWAY

*Eircode: H91H6KX

Please provide either a landline or a mobile number

Landline:

*Mobile: 353 87 3959025

*Email: jfarrell@galway.coco.ie

2 Agent details (if applicable):

The fields marked with * in this section are mandatory if using an agent

*Contact name: CONNOR DALY

Company name (if applicable): SDS

*Postal address: UNIT 9, N5 BUSINESS PARK,
CASTLEBAR,
CO. MAYO

*Eircode: F23E283

Please provide either a landline or a mobile number

Landline: 0949034914

*Mobile 0876459256

*Email: cdaly@structuraldesign.ie

3 *Please indicate whether it is the applicant or agent who should receive future correspondence in relation to the enquiry:

Applicant [●] Agent [ ]

Section B | Site details

4 *Site address 1 (include Site name/Building name/Building number):

PAIRC NA hABHAINN

***Address 2**

***Address 3**

***City/Town** ATHENRY

***County** GALWAY **Eircode**

5 *Irish Grid co-ordinates (proposed connection point):

Eastings (X) 150237 Northings (Y) 226860

Note: Values for Eastings must be between 015,900 and 340,000. Northings, between 029,000 and 362,000
Eg. co-ordinates of GPO, O'Connell St., Dublin: E(X) 315,878 N(Y) 234,619

6 *Local Authority where proposed development is located:

GALWAY COUNTY COUNCIL

7 *Has full planning permission been granted? Yes [ ] No [✔]

If 'Yes', please provide the current or previous planning reference number:

8 ***Is this development affiliated with a government body/agency?** Yes ☐ No ☑

If 'Yes', please specify the body/agency:

Eg. IDA, HSE, LDA, etc.

Section C | Development details

9 ***Please outline the domestic and/or industry/business use proposed:**

Domestic:

Property type	Number of units	Property type	Number of units
House	16	Apartments	
Duplex		Number of Apartment Blocks	

Industry/business:

Property type	Number of units	Property type	Number of units
Agricultural		Brewery / Distillery	
Restaurant / Café / Pub		Car Wash / Valeting	
Creche		Data Centre	
Fire Hydrant		Fire Station	
Food Processing		Hotel Accommodation	
Industrial / Manufacturing		Laundry / Laundrette	
Office		Primary Care Centre	
Residential / Nursing Care Home		Retail	
School		Sports Facility	
Student Accommodation		Warehouse	

Other (please specify type)		No. of Units	

9.1 Please provide additional details if your proposed business use are in the Food Processing, Industrial unit/ Manufacturing, Sports Facility or Other Categories.

9.2 Please provide the maximum expected occupancy in number of people, according to the proposed development you selected, e.g. Number of office workers, number of nursing home residents, maximum pub occupancy, number of hotel beds, number of retail workers:

10 ***Approximate start date of proposed development:**

1	0	/	1	0	/	2	0	2	5

11 ***Is the development multi-phased?** Yes ☐ No ☑

If 'Yes', application must include a master-plan identifying the development phases and the current phase number.

If 'Yes', please provide details of variations in water demand volumes and wastewater discharge loads due to phasing requirements.

12 ***Please indicate the type of connection required by ticking the appropriate box below:**

Both Water and Wastewater ● Please complete both Sections D and E

Water only ☐ Please go to Section D

Wastewater only ☐ Please go to Section E

Reason for only applying for one service (if applicable):

Section D | Water connection and demand details

13 ***Is there an existing connection to public water mains at the site?** Yes ☐ No ☑

13.1 If yes, is this enquiry for an additional connection to one already installed? Yes ☐ No ☐

13.2 If yes, is this enquiry to increase the size of an existing connection? Yes ☐ No ☐

14 **Approximate date water connection is required:** 1 0 / 1 0 / 2 0 2 5

15 ***What diameter of water connection is required to service the development?** 1 0 0 mm

16 ***Is more than one connection required to the public infrastructure to service this development?** Yes ☐ No ☑

If 'Yes', how many? ☐☐

17 **Please indicate the business water demand (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak hour water demand		**l/s**
Post-development average hour water demand		**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

18 **Please indicate the industrial water demand (industry-specific water requirements):**

Post-development peak hour water demand		**l/s**
Post-development average hour water demand		**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

19 **What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?**

3 6 . 8 4 m

20 **What is the highest finished floor level of the proposed development above Malin Head Ordnance Datum?**

3 8 . 5 1 m

21 **Is on-site water storage being provided?** Yes ☑ No ☐

Please include calculations on the attached sheet provided.

22 **Are there fire flow requirements?** Yes ☐ No ☑

Additional fire flow requirements over and above those identified in Q17-18		l/s

Please include calculations on the attached sheet provided, and include confirmation of requirements from the Fire Authority.

23 **Do you propose to supplement your potable water supply from other sources?** Yes ☐ No ☑

If 'Yes', please indicate how you propose to supplement your potable water supply from other sources (see **Guide to completing the application form** on page 15 of this document for further details):

Section E | Wastewater connection and discharge details

24 ***Is there an existing connection to a public sewer at the site?** Yes ☐ No ☑

24.1 If yes, is this enquiry for an additional connection to the one already installed? Yes ☐ No ☐

24.2 If yes, is this enquiry to increase the size of an existing connection? Yes ☐ No ☐

25 ***Approximate date that wastewater connection is required:** 10 / 10 / 2025

26 ***What diameter of wastewater connection is required to service the development?** 225 mm

27 ***Is more than one connection required to the public infrastructure to service this development?** Yes ☐ No ☑

If 'Yes', how many? ☐☐

28 **Please indicate the commercial wastewater hydraulic load (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak discharge		l/s
Post-development average discharge		l/s

Please include calculations on the attached sheet provided.

29 **Please indicate the industrial wastewater hydraulic load (industry-specific discharge requirements):**

Post-development peak discharge		l/s
Post-development average discharge		l/s

Please include calculations on the attached sheet provided.

30 Wastewater organic load:

Characteristic	Max concentration (mg/l)	Average concentration (mg/l)	Maximum daily load (kg/day)
Biochemical oxygen demand (BOD)			
Chemical oxygen demand (COD)			
Suspended solids (SS)			
Total nitrogen (N)			
Total phosphorus (P)			
Other			

Temperature range	
pH range	

31 *Storm water run-off will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer. In the case of such brownfield sites, please indicate if the development intends discharging surface water to the combined wastewater collection system:

Yes ☐ No ☑

If 'Yes', please give reason for discharge and comment on adequacy of SUDS/attenuation measures proposed.

Please submit detailed calculations on discharge volumes, peak flows and attenuation volumes with this application

32 *Do you propose to pump the wastewater? Yes ☐ No ☑

If 'Yes', please include justification for your pumped solution with this application.

33 What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?

36.84 m

34 What is the lowest finished floor level on site above Malin Head Ordnance Datum? 38.05 m

35 What is the proposed invert level of the pipe exiting the property to the public road?

34.38 m

Section F | Supporting documentation

Please provide the following additional information (all mandatory):

> Site location map: A site location map to a scale of 1:1000, which clearly identifies the land or structure to which the enquiry relates. The map shall include the following details: ☑

i. The scale shall be clearly indicated on the map.

ii. The boundaries shall be delineated in red.

iii. The site co-ordinates shall be marked on the site location map.

> Details of planning and development exemptions (if applicable). ☑

> Calculations (calculation sheets provided below). ☑

> Site layout map to a scale of 1:500 showing layout of proposed development, water network and wastewater network layouts, additional water/wastewater infrastructure if proposed, connection points to Irish Water infrastructure. ☑

> Conceptual design of the connection asset from the proposed development to the existing Irish Water infrastructure, including service conflicts, gradients, pipe sizes and invert levels. ☑

> Any other information that might help Irish Water assess this pre-connection enquiry. ☑

Section G | Declaration

I/We hereby make this application to Irish Water for a water and/or wastewater connection as detailed on this form.

I/We understand that any alterations made to this application must be declared to Irish Water.

The details that I/we have given with this application are accurate.

I/We have enclosed all the necessary supporting documentation.

Any personal data you provide will be stored and processed by Irish Water and may be transferred to third parties for the purposes of the water and/or wastewater connection process. I hereby give consent to Irish Water to store and process my personal data and to transfer my personal data to third parties, if required, for the purposes of the connection process.

If you wish to revoke consent at any time or wish to see Irish Water's full Data Protection Notice, please see **https://www.water.ie/privacy-notice/**

Signature: Mark Walsh Date: 10 / 09 / 2025

Your full name (in BLOCK CAPITALS):

M	A	R	K		W	A	L	S	H																					

Irish Water will carry out a formal assessment based on the information provided on this form.
Any future connection offer made by Irish Water will be based on the information that has been provided here.

Please submit the completed form to **newconnections@water.ie** or alternatively, post to:

Irish Water
PO Box 860
South City Delivery Office
Cork City

Please note that if you are sending us your application form and any associated documentation by email, the maximum file size that we can receive in any one email is 35MB.

Please note, if mandatory fields are not completed the application will be returned.

Irish Water is subject to the provisions of the Freedom of Information Act 2014 ("FOIA") and the codes of practice issued under FOIA as may be amended, updated or replaced from time to time. The FOIA enables members of the public to obtain access to records held by public bodies subject to certain exemptions such as where the requested records may not be released, for example to protect another individual's privacy rights or to protect commercially sensitive information. Please clearly label any document or part thereof which contains commercially sensitive information. Irish Water accepts no responsibility for any loss or damage arising as a result of its processing of freedom of information requests.

Calculations

Water demand

Reference: 'Code of Practice for Water Infrastructure, Connections and Developer Services, Design & Construction Requirements for Self-Lay Developments, July 2020 (Revision 2)',

Section 3.7.2 Water Demand Calculations

Per-capita Consumption = 150l/person/day

Average occupancy ratio of 2.7 persons/dwelling.

16 No. dwellings

Average Daily Domestic Demand (ADDD) = 16 * 2.7 * 150 = 6,480 l/day

Average Hour Water Demand (AHWD) = 6,480 * (1day/24hrs) * (1hr/3600s) = 0.075 l/s

Average Day/Peak Week Demand = 1.25 * ADDD or 1.25 * AHWD

Peak Demand = 5.0 * AD/PWD

Peak Hour Water Demand = 5 * 1.25 * AHWD = 5 * 1.25 * 0.075 l/s = 0.469 l/s

On-site storage

Each dwelling will have an attic storage tank capable of providing storage for 24 hours of maximum consumption. As per IW-CDS-5020-03 (Revision 2-2020), the following minimum cold water storage volumes, for new developments using low flush and dual flush WC's, will be provided:

Dwelling house or Apt. (up to 3 Bed without power shower) = 227 litres

Dwelling house or Apt. (4 Bedrooms or single power shower) = 340 litres

Dwelling house or Apt. (having 2 full bathrooms) = 682 litres

Additional water storage per shower en-suite in the above = 90 litres.

Fire flow requirements

Reference: 'Code of Practice for Wastewater Infrastructure, Connections and Developer Services, Design & Construction Requirements for Self-Lay Developments, December 2020 (Revision 2)',

Appendix B Gravity Sewer Design Requirements

Section 2.2 Wastewater Flows - New Networks

Dry Weather Flow = PG + I + E

P=Population = 16 Units * 2.7 persons/unit = 43.2 Persons (Ref Section 2.2)

G=Water Consumption/Capita = 150 l/person/day (Ref Section 2.2)

I = Infiltration = 10% of G = 15 l/person/day

E=0

Dry Weather Flow = 43.2 persons * 150 l/person/day + 43.2 * 15 l/person/day = 7,128 l/day

Design Flow = PfDom * PG + I

PfDom = 6 (Population < 750) See Table (Ref Section 2.2.5)

Design Flow = 6 * 43.2 * 150 + 43.2 * 15 = 39,528 l/day

Average Discharge = 7,128 l/day * (1day/24hrs) * (1hr/3600s) = 0.083 l/s

Peak Discharge = 39,528 l/day * (1day/24hrs) * (1hr/3600s) = 0.458 l/s

Guide to completing the pre-connection enquiry form

This form should be completed by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure.

The Irish Water Codes of Practice are available at **www.water.ie** for reference.

Section A | Applicant Details

Question 1: This question requires the applicant or company enquiring about the feasibility of a connection to identify themselves, their postal address, and to provide their contact details.

Question 2: If the applicant has employed a consulting engineer or an agent to manage the enquiry on their behalf, the agent's address and contact details should be recorded here.

Question 3: Please indicate whether it is the applicant or the agent who should receive future correspondence in relation to the enquiry.

Section B | Site details

Question 4: This is the address of the site requiring the water/wastewater service connection and for which this enquiry is being made.

Question 5: Please provide the Irish Grid co-ordinates of the proposed site. Irish grid positions on maps are expressed in two dimensions as Eastings (E or X) and Northings (N or Y) relative to an origin. You will find these coordinates on your Ordnance Survey map which is required to be submitted with an application.

Question 6: Please identify the Local Authority that is or will be dealing with your planning application, for example Cork City Council.

Question 7: Please indicate if planning permission has been granted for this application, and if so, please provide the planning permission reference number.

Question 8: Please indicate if this development is affiliated with a government body/agency, and if so, specify

Section C | Development details

Question 9: Please specify the number of different property/premises types by filling in the tables provided.

Question 9.1: Please provide additional details if your proposed business use are in the Food Processing, Industrial unit/ Manufacturing, Sports Facility or Other Categories.

Question 9.2: Please indicate the maximum expected occupancy in numbers of people according to the proposed development you selected.

Question 10: Please indicate the approximate commencement date of works on the development.

Question 11: Please indicate if a phased building approach is to be adopted when developing the site. If so, please provide details of the phase master-plan and the proposed variation in water demand/wastewater discharge as a result of the phasing of the development.

Question 12: Please indicate the type of connection required by ticking the appropriate box and proceed to complete the appropriate section or sections.

Section D | Water connection and demand details

Question 13: Please indicate if a water connection already exists for this site.

Question 13.1: Please indicate if this enquiry concerns an additional connection to one already installed on the site.

Question 13.2: Please indicate if you are proposing to upgrade the water connection to facilitate an increase in water demand. Irish Water will determine what impact this will have on our infrastructure.

Question 14: Please indicate the approximate date that the proposed connection to the water infrastructure will be required.

Question 15: Please indicate what diameter of water connection is required to service this development.

Question 16: Please indicate if more than one connection is required to service this development. Please note that the connection size provided may be used to determine the connection charge.

Question 17: If this connection enquiry concerns a business premises, please provide calculations for the water demand and include your calculations on the calculation sheet provided. Business premises include shops, offices, hotels, schools, etc. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.

Question 18: If this connection enquiry is for an industrial premises, please calculate the water demand and include your calculations on the calculation sheet provided. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak demand for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.

Question 19: Please specify the ground level at the location where connection to the public water mains will be made. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 20: Please specify the highest finished floor level on site. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 21: If storage is required, water storage capacity of 24-hour water demand must usually be provided at the proposed site. In some cases, 24-hour storage capacity may not be required, for example 24-hour storage for a domestic house would be provided in an attic storage tank. Please calculate the 24-hour water storage requirements and include your calculations on the attached sheet provided. Please also confirm that on-site storage is being provided by ticking the appropriate box.

Question 22: The water supply system shall be designed and constructed to reliably convey the water flows that are required of the development including fire flow requirements by the Fire Authority. The Fire Authority will provide the requirement for fire flow rates that the water supply system will have to carry. Please note that while flows in excess of your required demand may be achieved in the Irish Water network and could be utilised in the event of a fire, Irish Water cannot guarantee a flow rate to meet your fire flow requirement. To guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development. Please include your calculations on the attached sheet provided, and further provide confirmation of the Fire Authority requirements.

Question 23: Please identify proposed additional water supply sources, that is, do you intend to connect to the public water mains or the public mains and supplement from other sources? If supplementing public water supply with a supply from another source, please provide details as to how the potable water supply is to be protected from cross contamination at the premises.

Section E | Wastewater connection and discharge details

Question 24: Please indicate if a wastewater connection to a public sewer already exists for this site.

Question 24.1: Please indicate if this enquiry relates to an additional wastewater connection to one already installed.

Question 24.2: Please indicate if you are proposing to upgrade the wastewater connection to facilitate an increased discharge. Irish Water will determine what impact this will have on our infrastructure.

Question 25: Please specify the approximate date that the proposed connection to the wastewater infrastructure will be required.

Question 26: Please indicate what diameter of wastewater connection is required to service this development.

Question 27: Please indicate if more than one connection is required to service this development. Please indicate number required.

Question 28: If this enquiry relates to a business premises, please provide calculations for the wastewater discharge and include your calculations on the attached sheet provided. Business premises include shops, offices, hotels, schools, etc. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.

Question 29: If this enquiry relates to an industrial premises, please provide calculations for the wastewater discharge and include your calculations on the calculation sheet provided. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak discharge for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.

Question 30: Please specify the maximum and average concentrations and the maximum daily load of each of the wastewater characteristics listed in the wastewater organic load table (if not domestic effluent), and also specify if any other significant concentrations are expected in the effluent. Please complete the table and provide additional supporting documentation if relevant. Note that the concentration shall be in mg/l and the load shall be in kg/day. Note that for business premises (shops, offices, schools, hotels, etc.) for which only domestic effluent will be discharged (excluding discharge from canteens/ restaurants which would require a Trade Effluent Discharge licence), there is no need to complete this question.

Question 31: In exceptional circumstances, such as brownfield sites, where the only practical outlet for storm/ surface water is to a combined sewer, Irish Water will consider permitting a restricted attenuated flow to the combined sewer. Storm/surface water will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer and the applicant must demonstrate how the storm/surface water flow from the proposed site is minimised using sustainable urban drainage system (SUDS). This type of connection will only be considered on a case by case basis. Please advise if the proposed development intends discharging surface water to the combined wastewater collection system.

Question 32: Please specify if the development needs to pump its wastewater discharge to gain access to Irish Water infrastructure.

Question 33: Please specify the ground level at the location where connection to the public sewer will be made. This is required to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 34: Please specify the lowest floor level of the proposed development. This is required in order to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 35: Please specify the proposed invert level of the pipe exiting the property to the public road.

Section F | Supporting documentation

Please provide additional information as listed.

Section G | Declaration

Please review the declaration, sign, and return the completed application form to Irish Water by email or by post using the contact details provided in Section G.

Notes

Notes