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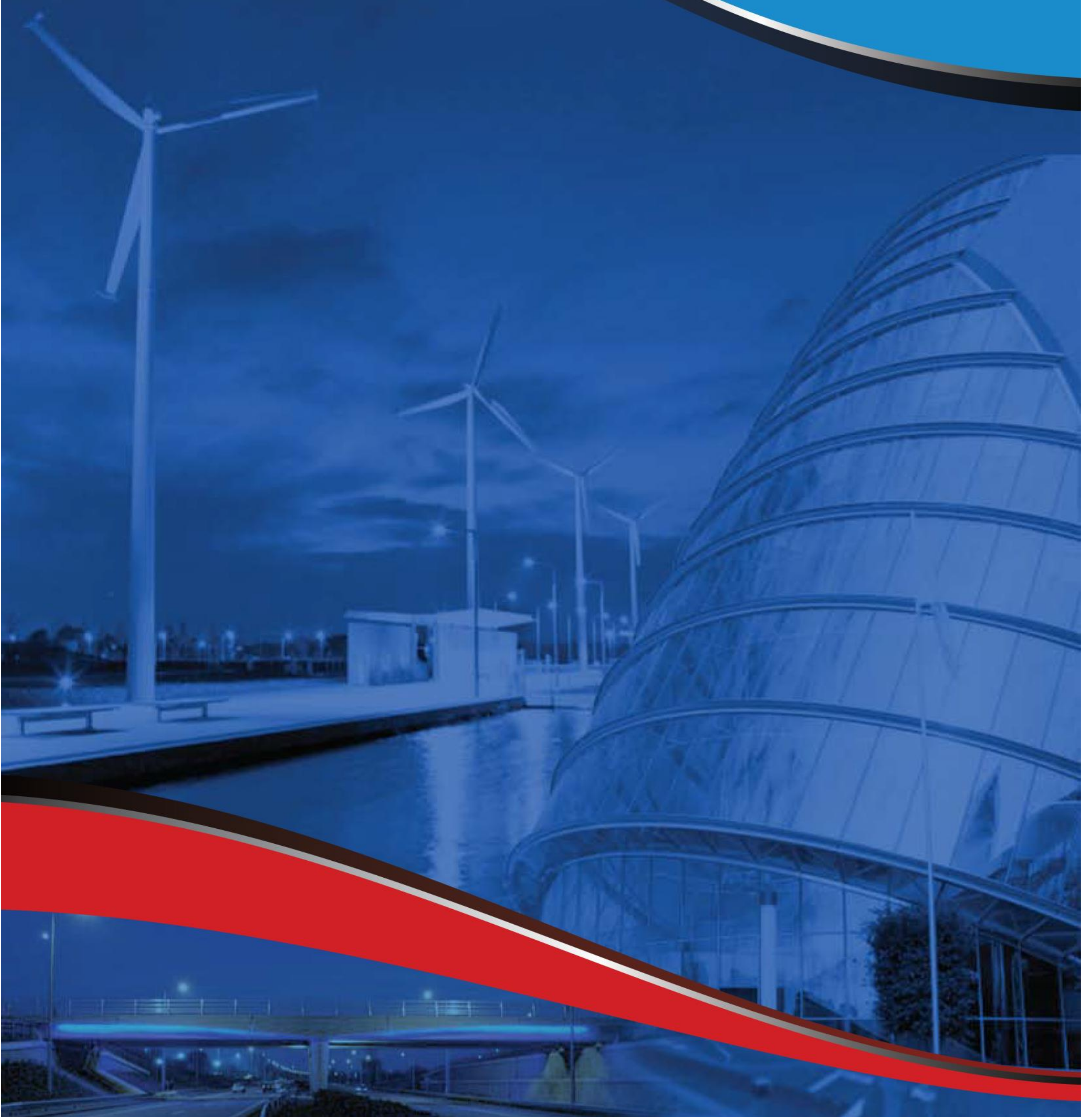
ENGINEERING SERVICES REPORT

ST. VINCENT'S HOSPITAL FAIRVIEW REDEVELOPMENT

For St. Vincent's Hospital Fairview
R517
24 March 2023



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St. Vincent’s Hospital Fairview Redevelopment, Richmond Road and Convent Avenue, Fairview, Dublin 3

PROJECT NO. R517

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ENGINEERING SERVICES REPORT

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APPENDICES

1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by *St. Vincent's Hospital Fairview* to carry out the design of the Civil Engineering services (surface water and wastewater drainage, watermain) associated with the site at St. Vincent's Hospital, Richmond Road and Convent Avenue, Fairview, Dublin 3.

1.2 Administrative Jurisdiction

The proposed development is located in the jurisdiction of Dublin City Council (DCC), and therefore the engineering services design was carried out with reference to the following:

- Dublin City Council Development Plan (2022 – 2028);
- Greater Dublin Strategic Drainage Study (GDSDS);
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government and the Office of Public Works).
- Circular PL2/2014 (13th August 2014)

1.3 Site Location

The subject site is located at and surrounding St. Vincent's Hospital, Richmond Road and Convent Avenue, Fairview, Dublin 3. The site contains protected structures under RPS Ref.: 2032 (St. Vincent's Hospital), 8788 (Richmond House) and 8789 (Brooklawn). The application site includes an area of the public road/footpaths (extending for approximately 0.8km) to facilitate service connections via Griffith Court, Phillipsburgh Avenue and Griffith Avenue, part of the An Post service yard and part of the open space within Grace Park Wood to facilitate pedestrian/cycle connections, and part of Richmond Road to facilitate service connections and associated upgrades.

The site is bound by the Grace Park Wood residential development to the northwest; Griffith Court, the 'Fairview Community Unit' nursing home, Fairview Day Centre, Gheel Autism Services and a graveyard to the north; the An Post Fairview Delivery Service Unit on Lomond Avenue and residential properties on Inverness Road to the east; existing residential and commercial properties on Richmond Road and Convent Avenue to the south and Charthouse Business Centre, Dublin Port Stadium / Stella Maris FC, and Ierne Sports and Social Club to the west of the site.

- Overall Application Site Area: 9.46 hectares
- Land in applicant's ownership: 8.71 hectares
- Residential Site Area: 6.04 ha
- Hospital Site Area: 2.67 ha

Figure 1-1: Site Location

1.4 Existing Site Overview

The subject site is approximately 9.46 hectares, and the site is a mix of greenfield and existing hardstanding, see Figure 1 2.

Figure 1-2: Existing site overview

The site falls from north to south with levels along the northern boundary approximately 11 mAOD falling to 4.5 mAOD in the south, see Figure 1-.

Figure 1-3: Site contour map (source: https://contourmapcreator.urgr8.ch/)

There is a sharp drop in elevation at the centre of the site as can be seen from Figure 1-3 where the elevation drops from 11 mAOD to 5 mAOD.

Figure 1-4: Section A-A

1.5 Proposed Development Description

In summary, the proposed development can be described as follows:

A ten-year planning permission is sought for the proposed development comprising the following:

- Provision of a new part two and part three storey hospital building, providing mental health services, accommodating 73 no. beds, associated facilities, a single storey facilities management building, plant rooms and service areas, associated car and cycle parking, access roads, and open space, all on a proposed hospital site of c. 2.67 ha.

- Refurbishment and repurposing of existing buildings on site including Brooklawn (RPS Ref.: 8789), Richmond House, including chapel and outbuildings (RPS Ref.: 8788), the Laundry building and Rose Cottage for ancillary uses associated with the new hospital. The existing gate lodge building will remain in residential use and used by visiting members of staff to the new hospital.

- Change of use, refurbishment, alterations and extensions, to the existing hospital building (part protected structure under RPS Ref.: 2032), to provide residential amenity areas, a gym, a café, co-working space, a library, a childcare facility, and a community hall (referred to as Block K).

- The proposal includes the demolition of existing structures on site with a GFA of 5,872 sq.m, including the (1) westernmost range of the hospital building, which includes St. Teresa's and the Freeman Wing, (2) extensions to the south and north of the main hospital building, including the conservatory extension, toilet block extension, an external corridor, toilet core, lift core, and stair core (which are all part of / within the curtilage of RPS Ref.: 2032), (3) hospital buildings and outbuildings located to the north of the existing main hospital building, (4) St. Joseph's Adolescent School located in the southeast of the site, (5) Crannog Day Hospital located in the southwest of the site, and (6) extensions to the Old Laundry Building and Rose Cottage.

- Provision of 9 no. residential buildings (Blocks A, B, C, D-E, F, G, H, J, and L) providing a total of 811 no. residential units, including 494 no. standard designed apartments (in Blocks A, B, C, G, H, J, and L) and 317 no. Build to Rent apartments (in Blocks D-E and F). Residential amenities and facilities are proposed in Block C, D-E, J and K. A retail unit is proposed in Block A and a café in Block F. Block J is proposed as an extension of the existing hospital buildings (protected structure RPS Ref.: 2032- referred to as Block K).

- The building heights of the proposed residential blocks range from part 2 to part 13 storeys. A proposed basement / lower ground level, containing car and cycle parking and plant areas, is located below and accessed via Blocks C, D-E and F.

- Access to the new hospital and associated grounds is provided from Richmond Road and Convent Avenue, with separate internal access points. A separate vehicular access to the residential development is provided from Richmond Road. The development includes a proposed pedestrian / cycle connection to Griffith Court, requiring alterations to the service yard of the Fairview Community Unit, pedestrian / cycle connections to the Fairview Community Unit campus to the north (providing an onward connection to Griffith Court), a pedestrian / cycle connection to Grace Park Wood, and makes provision internally within the site for a potential future connection to Lomond Avenue / Inverness Road.

- The proposal includes public open space, including allotments, children's play areas, a central park, a linear park and an entrance plaza, with a set down area at Richmond Road, and communal open space at surface level. The proposal includes communal roof terraces on Block C and Blocks D-E and private balconies / terraces for the apartments.

- The proposal also includes provision of internal access roads, car and cycle parking, pedestrian and cycle infrastructure, associated set down areas, alterations to existing landscape features, landscaping, boundary treatments, lighting, telecommunications infrastructure at roof level of Block B, green roofs, lift overruns and plant at roof level, site services, including a watermain connection / upgrade via Griffith Court, Philipsburgh Avenue and Griffith Avenue, site clearance, and all associated site works.

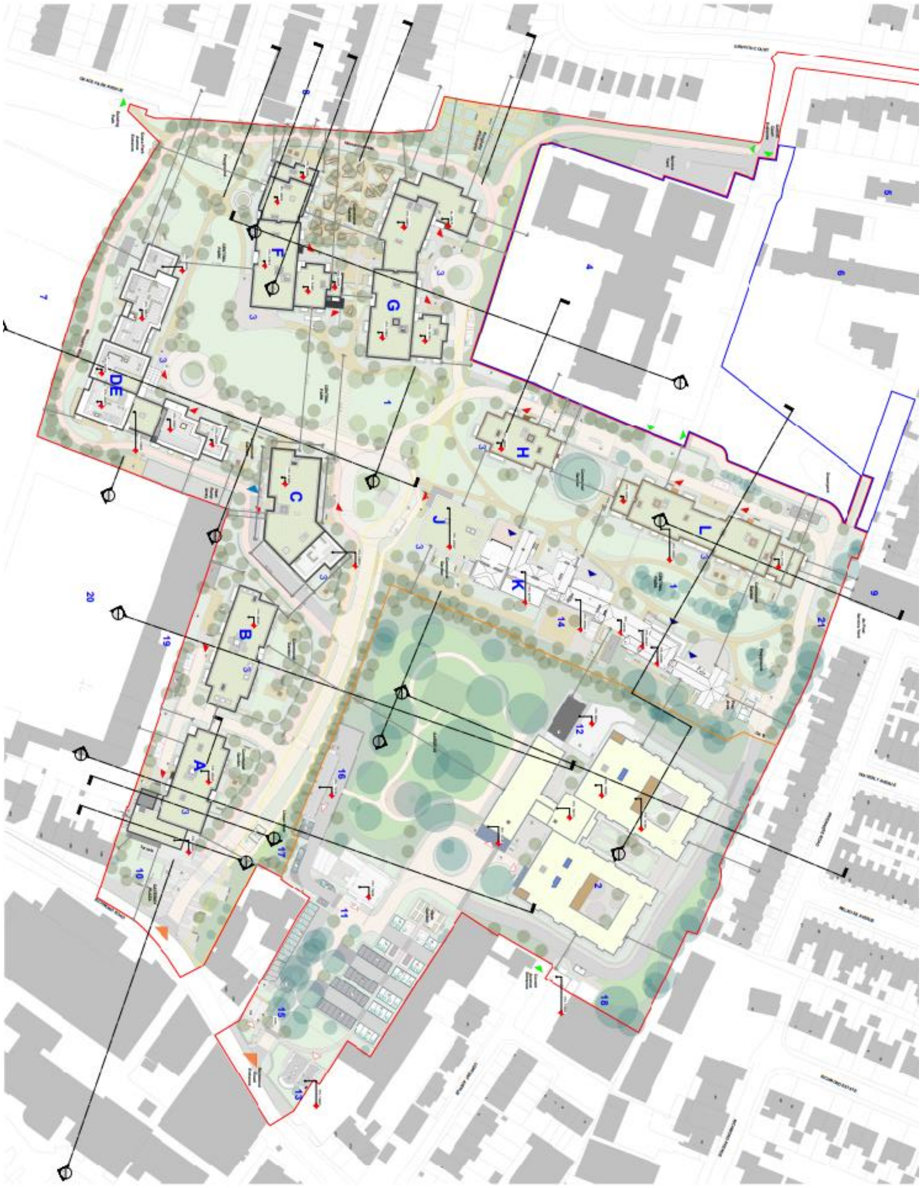

Figure 1.5 – Proposed Site Layout

Duration of Permission

A ten-year permission for the proposed development will be sought. This is considered appropriate given the scale and nature of the proposed development, notwithstanding that based on the best-case scenario the project is expected to be completed within c. 5 to 6 years from receipt of a final grant of permission (allowing for tender and construction phases). Furthermore, following legislation in 2021[1], Section 42(8) of the Planning and Development (Housing) and

Residential Tenancies Act 2016, as amended, provides that a planning authority shall not extend planning permission where an EIAR or Natura Impact Statement would be required for the project to be extended, and accordingly it is considered appropriate to request a duration beyond the typical five-year permission for this application.

Estimated Duration of Construction

As set out in the EIAR and CEMP, based on the associated durations of the respective construction stages, which are dependent on a number of factors, at a high level a preliminary estimate would suggest the construction works, including infrastructural works, will take approximately 48 months from commencement of development. In addition, a c. 6-month period would be required for the tender process from receipt of the final grant. Thus, based on the best-case scenario the development could be completed within c. 5 years from a final grant of permission. However, as noted elsewhere a ten-year permission is sought for this project, which is considered appropriate given the residential, hospital and protected structure aspects of the project and the need to allow sufficient time to address any unforeseen delays during the construction process.

2 SCOPE OF SERVICES REPORT

This Engineering Services Report was prepared by reviewing the available data from the Local Authority sources and national bodies *i.e.,* Dublin City Council, Irish Water, The OPW, and the wider Design Team. The following services are addressed within this report, with respect to the proposed development:

- Surface Water Drainage;
- Wastewater Drainage;
- Potable Water Supply;

An assessment of potential flood risks associated with, and as a result of, the proposed development is provided under separate cover, as part of this application. Refer to document **R517-OCSC-XX-XX-RP-C-0003** for details of the Site-Specific Flood Risk Assessment.

This report should be read in conjunction with the set of OCSC Civil Engineering design drawings that also accompany this submission:

The proposed design, for the aforementioned services, has been carried out in accordance with the following technical guidelines and information:

- Dublin City Council Development Plan (2022 – 2028);
- Dublin City Council SuDS Design & Evaluation Guide (2021);
- Dublin City Council Green Blue Roof Guide (2021);
- Greater Dublin Strategic Drainage Study (GDSDS);
- Greater Dublin Regional Code of Practice for Drainage Works (GDRCOP);
- Irish Water Code of Practice for Wastewater, IW-CDS-5030-03;
- Irish Water Code of Practice for Water Supply, IW-CDS-5020-03;
- The Building Regulations – Technical Guidance Document Part H;
- BE EN 752 – Drainage Outside Buildings;
- BS 7533-13 – Guide for Design of Permeable Pavements;
- The Office of Public Works, the Planning System and Flood Risk Management;
- Dublin City Council's and Irish Water's Drainage and Watermain Records.

Members of the wider design team cover all other elements of the application pertaining to traffic, sustainability, landscaping, planning, ecological, and architectural detail.

3 SURFACE WATER DRAINAGE

3.1 Design Guidelines Overview

Any planning permission sought on the subject lands is required to adhere to the Local Authority requirements *i.e.,* the Dublin City Council Development Plan, and as such, the Greater Dublin Strategic Drainage Study (Dublin City Council, 2005) and Dublin City Council SuDS Design and Evaluation Guide (2021).

New development must ensure that a comprehensive Sustainable Drainage System (SuDS) is incorporated into the development. SuDS requires that post-development run-off rates be maintained at equivalent, or lower, levels than pre-development levels. Thus, the development must be able to retain, within its boundaries, surface water volumes from extreme rainfall events up to a 1 in 100-year rainfall event, more commonly expressed as a 1.0% AEP (Annual Exceedance Probability), *while also allowing for an additional climate change factor of* ***20%*** *increase in rainfall intensity* in accordance with the current DCC Development Plan (2022 – 2026).

Any new development must also have the physical capacity to retain surface water volumes as directed under the Greater Dublin Strategic Drainage Strategy (GDSDS) and, if necessary, release these attenuated surface water volumes to an outfall at a controlled flow rate, not greater than the greenfield runoff equivalent.

A further component of the SuDS protocol is to increase the overall water quality of surface water runoff before it enters a natural watercourse or a public sewer, which ultimately discharges to a water body. This is to ensure the highest possible standard of surface water quality.

All SuDS are designed in accordance with best practice, DCC's SuDS Design and Evaluation Guide, and the CIRIA C753 (The SuDS Manual) guidance material, with development discharge rates restricted to greenfield runoff equivalent, which is significantly less than the existing scenario.

3.2 Existing Site Drainage

3.2.1 Existing Surface Water Drainage Infrastructure

The existing units and hardstanding areas currently discharge surface water to the local combined infrastructure, with no apparent treatment or attenuation facilities in place.

Public records indicate an existing 525 mm concrete stormwater sewer within the site boundary. This sewer flows in the southerly direction towards Richmond Road before discharging to the 1350 mm sewer on Richmond Road. This sewer discharges to the Tolka River immediately downstream of the site.

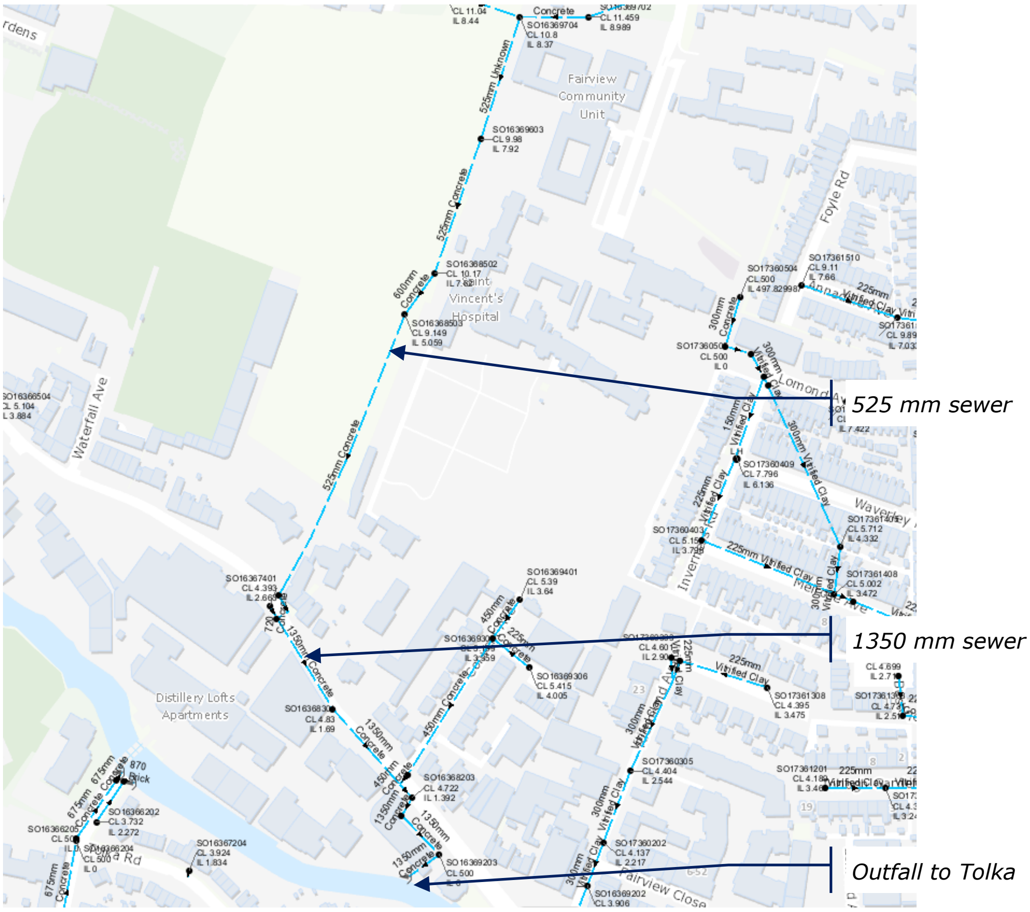

Figure 3-1: Existing surface water records

As part of a new development that was constructed at St Joseph's lands (planning ref. 2991/15) the 525mm diameter surface water sewer that runs through St. Vincent's lands and is shown in figure 3-1 above was replaced with

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OCSC O'CONNOR | SUTTON | CRONIN Multidisciplinary Consulting Engineers a 900mm diameter surface water sewer and connects to the existing drainage system on Richmond Rd.

Refer to section 4.5 Historic flooding of the Site Specific Flood Risk Assessment (doc ref. R517-OCSC-XX-XX-RP-C-0003) for more information on the new 900mm surface water sewer.

3.2.2 Existing Site Catchment Area

As detailed in *Section 1.4*, the existing 9.46 hectares is a mix of greenfield and existing hardstanding. The site falls from north to south with levels along the northern boundary of approximately 11 mAOD falling to 4.5 mAOD in the south.

3.2.3 Existing Site Rainfall Runoff

All surface water runoff on the existing site is currently allowed to infiltrate naturally from the greenfield areas or collected by the existing combined and surface water gravity sewers on site.

There are no apparent treatment or attenuation facilities on site, with all rainfall runoff from hardstanding areas discharging directly to the public drainage network, which outfalls to the Tolka River.

The soil value can be calculated from *Figure 1.4.18 (institute of Hydrology, 1978)* which shows the various soil types. The soil classifications are also available from the *Wallingford Procedure, Volume 3, Maps, "Winter rain acceptance potential"*. The equation was first published in FSSR 16, 1985. Refer to *Figure 3.2* for the "Soil" value in MicroDrainage that consider the SPR value and it can be obtained at *Greater Dublin Strategic Drainage Study – Regional Drainage Policies Volume 2 – New Development at section 6.7.2*.

SOIL	SPR value (% runoff)
1	0.1
2	0.3
3	0.37
4	0.47
5	0.53

Figure 3.2 – SPR Values for Soil (Excerpt from GDSDS: Table 6.7)

From the aforementioned mapping and Ground investigation report (refer to **Appendix G**), a **Soil Type 3** was used in design calculations along with the local Standard Annual Average Rainfall (SAAR) equivalent of **720mm**, as received from Met Éireann, which was used to determine the rainfall-runoff rate. Refer to the **Appendix B** for the Return Period Rainfall Depths for Sliding Durations from Met Éireann.

Results from three soakaway tests indicated infiltration at all three of the test locations SA01, SA02 and SA03 with infiltration rates of 9.981×10^{-5} m/s, 4.83×10^{-5} m/s and 3.71×10^{-5} m/s. Refer to **Appendix G** for the locations of the soakaways)

Using the ICPSuDS Input, {Flood Studies Report (FSR)} Method, the rainfall-runoff discharging from the total brownfield site area that is to be developed (i.e. 8.79 ha), in its existing condition, has been estimated at **$QBAR_{RURAL}$ = 3.0 l/s/ha**. Refer to *Figure 3.3* for an excerpt of the results from the MicroDrainage Runoff Calculator, which also provides the calculated QBAR runoff rate along with the discharge rate for varying Annual Recurrence Intervals (ARI). Refer to **Appendix B** for the QBAR runoff calculations.

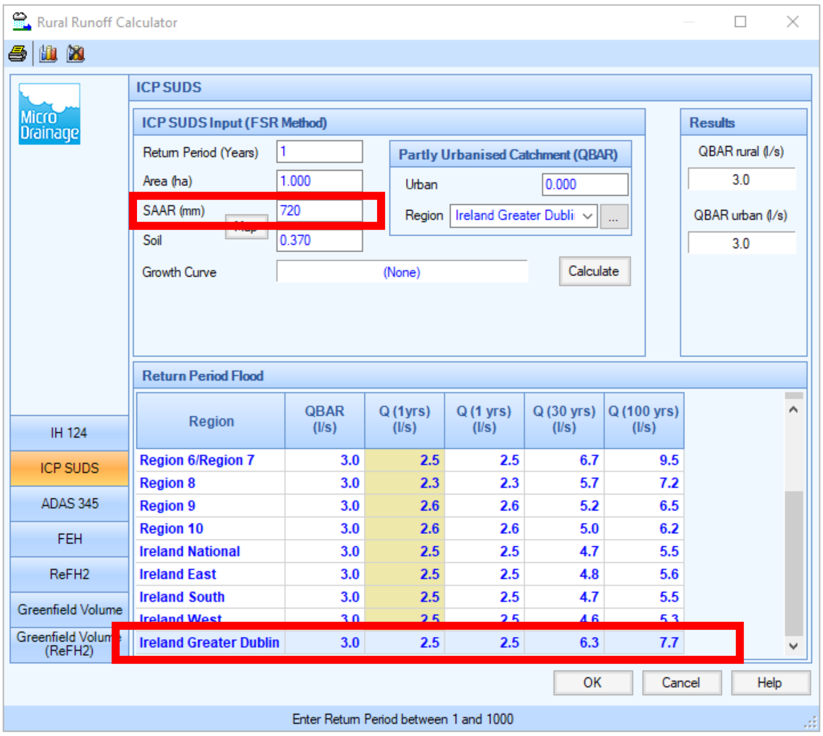


Figure 3.3 - Existing Site Runoff Calculator Results (MicroDrainage Excerpt)

3.3 Proposed Surface Water Drainage Design Strategy

3.3.1 Proposed Surface Water Strategy Overview

It is proposed to separate the surface water and wastewater drainage networks, which will serve the proposed development, and provide independent connections to the local public surface water and wastewater sewer networks respectively.

Refer to *Section 4* for details of the proposed wastewater drainage design.

Refer to drawings **R517-OCSC-XX-XX-DR-C-0500, R517-OCSC-XX-XX-DR-C-0501 & R517-OCSC-XX-XX-DR-C-0502** for details of the proposed drainage layout, which is to serve the proposed development.

The proposed development is to be served by a sustainable drainage system that is to be integrated with the developments landscaping features and is typically to comprise green roofs, blue podiums, intensive landscaping, pervious paving and filter drains, rain gardens, infiltration basins, trapped road gullies, flow control devices, attenuation storages.

The overall development is divided into a number of surface water sub-catchments as a result of the natural topography, site layout, and other site constraints. All surface water runoff is to be attenuated and treated within the new development site boundary, before ultimately discharging to the existing public surface water network on Richmond Road.

Sustainable Drainage Systems are to be provided, wherever practicable, and these are discussed in more detail in Section 3.3.2, with discharge rates from the site being restricted to the greenfield equivalent runoff rate for design rainfall events up to, and including, the 1% AEP, in accordance with the DCC County Development Plan and the GDSDS.

3.3.2 Climate Change Allowance

The proposed surface water network has been designed to allow for an additional 20% increase in rainfall intensity, to allow for Climate Change projections, in accordance with the Dublin City Council Development Plan and the GDSDS.

All discussions within this report, with regards to surface water network design calculation and results, include for the allowance of an increase of <u>20%</u> in rainfall intensity, as required.

3.3.3 Surface Water Management Strategy

The proposed surface water network is to be split into 2nr. main catchments, which are described further, in *Section 3.4.3*, replicating the natural site catchments.

1) Catchment 1 – Proposed Hospital area

2) Catchment 2 – Residential area

Figure 3.4 - Proposed Surface Water Drainage Strategy

Due to its size and layout, Catchment 2 will be divided into a number of sub-catchments, in order to best integrate Sustainable Drainage Systems. Each sub-catchment area will look to provide interception and treatment to the rainfall-runoff, either at source or through site design. Refer to Section 3.5.3 and Figure 3.1 for an overview of the proposed catchment areas.

Infiltration systems will be provided where applicable as the soakaway testing carried out on-site resulted in good infiltration rates across the site.

Each catchment is to discharge treated and attenuated flows (to Qbar equivalent) to the existing public surface water infrastructure.

Interim attenuation benefits are to be provided at roof level, through the provision of green roofs (extension of green roofs shown on the proposed drainage layout and architectural drawings), and throughout the external drainage network: within the landscape features, the podium build-up and pervious paving base course. However, in order to reduce development flow rates to the Greenfield Equivalent Runoff Rate (QBAR), further attenuation is to be provided; before discharging from the site.

The typical traditional and Sustainable Drainage Systems (SuDS) provided, all of which have been designed in accordance with CIRIA C753, the SuDS Manual, and the design guidance material listed in *Section 2* of this report, are listed and detailed in order of general sequence within the drainage network, as follows:

3.3.3.1 Green Roofs

It is proposed to provide green roofs on the buildings within the development. This increases the time of entry for rainwater falling on the roof area of the development while providing source treatment prior to entering the surface water network. At least 70% Green Roof coverage will be provided which is in line with the DCC Development Plan. Refer to drawing R517-OCSC-XX-XX-DR-C-0500 & R517-OCSC-XX-XX-DR-C-0501 & R517-OCSC-XX-XX-DR-C-0502.

As described in section 3.2.3. results from three soakaway tests indicated good infiltration rates throughout the site and therefore instead of implementing green-blue roofs underground attenuation system at ground level has been implemented to allow for infiltration and recharging water into the ground.

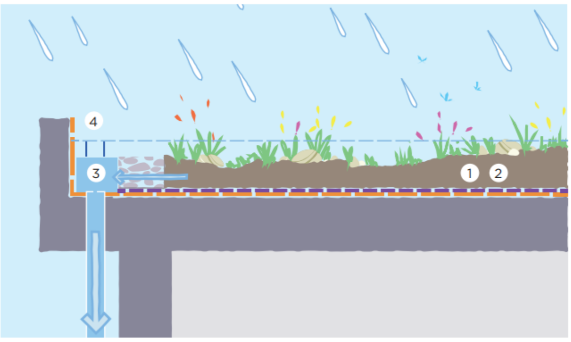


Figure 3.5 - Illustration of Green Roof (DCC SuDS Guide)

The removal of pollutants and reduction of surface water runoff will be provided as a first level of treatment before discharging to the SuDS components downstream.

3.3.3.2 Blue Podium

As a part of the development is a basement structure, there will be significant landscaping and paving above the podium slab. These surfaces shall either be pervious in nature or drain laterally to landscaping features, where the rainfall runoff will be directed to a storage layer above the podium slab that is to comprise either open-graded crushed rock or a proprietary cellular product, in order to attenuate development rainfall discharge rates to the public infrastructure.

Flow controls shall be provided in order to restrict the flow rate from the podium structure.

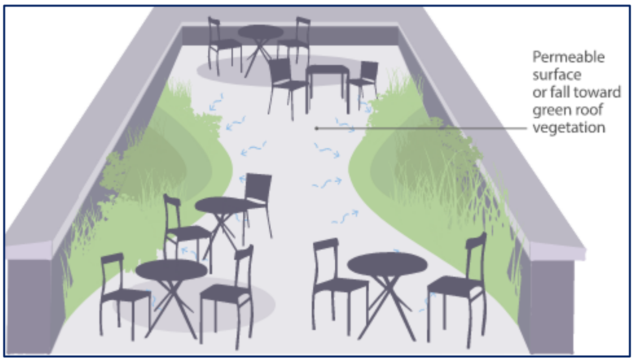


Figure 3.2 - Illustration of Podium Blue Roof (DCC SuDS Guide)

3.3.3.3 Pervious Paving

Pervious pavements provide a pavement finish suitable for both pedestrian and vehicular traffic, while also allowing rainwater to infiltrate the surface layer and into the underlying pervious structural layers. Here, the rainwater is temporarily stored beneath the overlying finished surface before either infiltration to the ground or/and discharge to the main surface water drainage network.

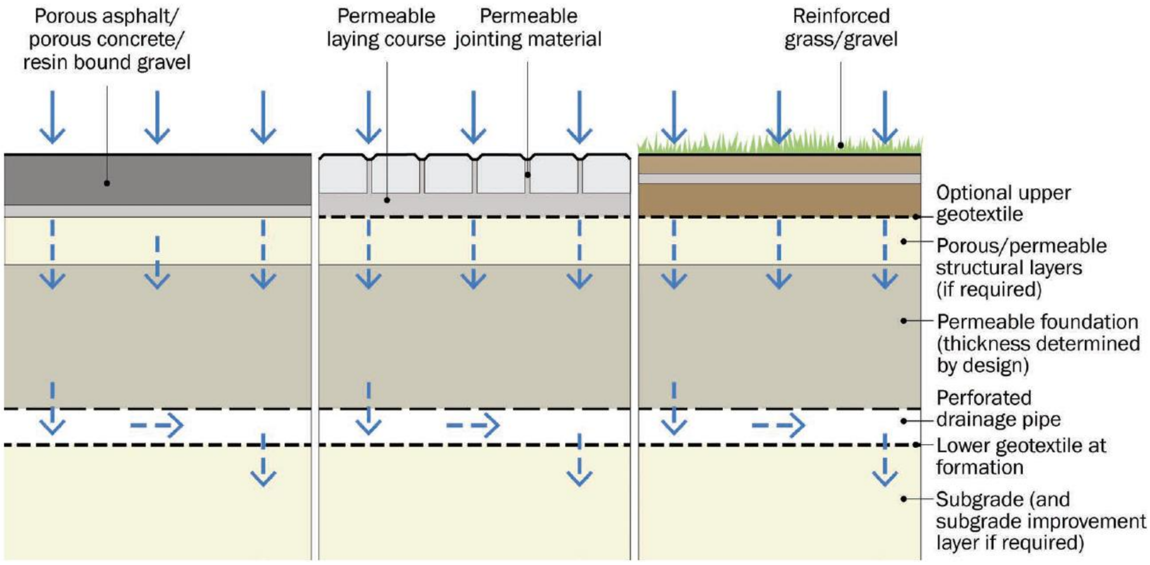


Figure 3.5 - Detail of Type B Pervious Paving (CIRIA C753)

Pervious paving systems are an efficient means of treating the rainwater at source by providing initial interception of the rainwater, reducing the volume and frequency of the runoff and improving the surface water quality by providing at-source treatment of the rainfall-runoff leaving the site. This is achieved by helping remove and retain pollutants prior to discharge to the drainage system and/or groundwater system.

A **Type B** pervious paving, with a 300mm (typical) depth of open graded crushed rock as base course, is to be provided in all car parking spaces, within the proposed development. An overflow pipe, from the base course, will be provided to the drainage network, which will allow for interception of initial rainfall, and groundwater discharge, with an attenuated outflow to the main network in extreme rainfall events.

3.3.3.4 Filter Drains

Filter drains (perforated pipe with cl505 surround) are to be provided along roads where possible to intercept and treat polluted water.

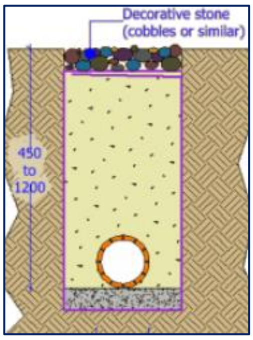


Figure 3.6 - Filter Drain under pavement (left)

Filter drains allow for the interception of rainfall, while also acting as storage and conveying the excess rainfall runoff to the network outfall. Further benefits allow for the filtration of surface water and infiltration to groundwater.

3.3.3.5 Trapped Road Gullies

All road gullies serving the proposed development are to be trapped, to help prevent sediment and gross pollutants from entering the surface water network, thus improving the water quality discharging from the site.

The grated covers are to have a minimum load classification of D400, for frequent vehicular traffic.

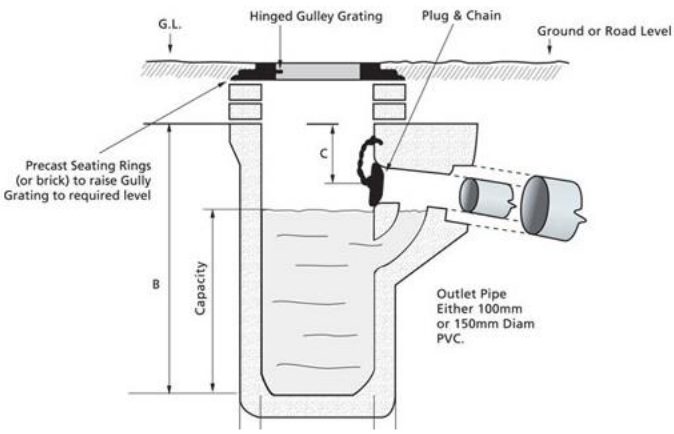


Figure 3.7 - Trapped Road Gully (Typical Detail)

3.3.3.6 Underground Pipe Network

A traditional gravity pipe and manhole network will be provided, to convey the collected rainfall runoff as far as the development's outfall. Manholes, compliant with the GDSDS and GDRCOP, are provided for maintenance access at branched connections, changes in pipe size and gradient, and at intervals no greater than 90m distance.

3.3.3.7 Silt Traps

A manhole upstream of the attenuation system is to contain a 600mm sump, below the invert level of the outlet pipe, in order to trap sediment and other gross pollutants, and prevent them from entering the downstream watercourse; thus improving the water quality discharging from the site.

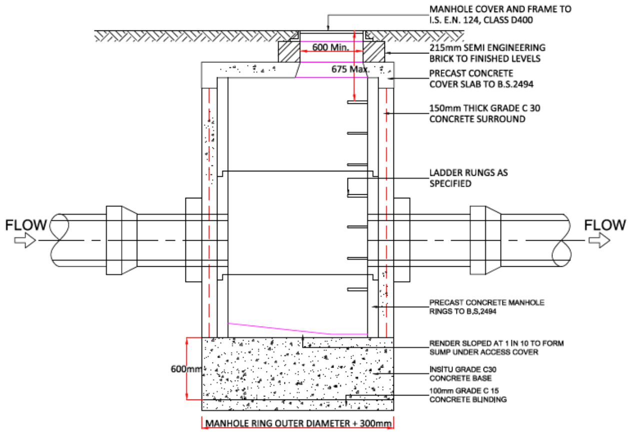


Figure 3.8 - Typical Detail of Silt Trap Manhole

3.3.3.8 Geocellular Storage Systems

Unlined proprietary geocellular storage units are to be provided for the attenuation of rainfall runoff for the catchment area.

These systems are to provide a sufficient temporary storage volume for rainfall events up to, and including, the design of 1% AEP rainfall event (including climate change). Typical geocellular storage systems comprise plastic cellular units of high porosity (typically >95%), structurally arranged in rows and layers, with a perforated distribution pipe through the centre.

These systems also allow for interception of initial rainfall to be provided at the base of the system, by elevating the outlet relative to the system's base.

Access chambers for inspection and maintenance are also to be provided.

Refer to **Appendix F** for a copy of the Cellular Attenuation System details.

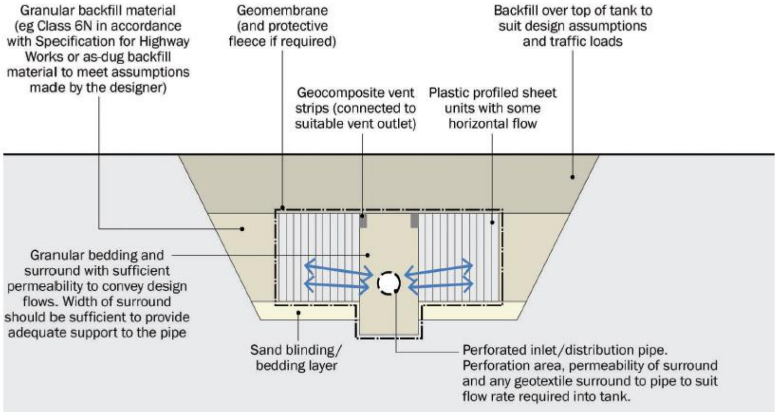


Figure 3.9 - Typical Section of Geocellular System (CIRIA C753)

3.3.3.9 Flow Control Device

Flow Control devices are to be provided at outlet locations at both roof and podium levels, as described previously in *Sections 3.3.3.1* and *3.3.3.2*. These flow control devices shall be as per specialist design.

In areas off the podium, e.g., along the site perimeter and the covered street, a more conventional vortex hydro-brake type flow control is to be provided.

Figure 3.10 - Vortex Hydro-Brake Flow Control Unit (Hydro International)

The flow controls shall all be placed strategically across the development's sub-catchments so that the total development discharge rate is restricted to the greenfield equivalent runoff rate of 3.0 l/s/ha, as described in Section 3.4.2.

3.3.3.10 Oil Separator

Oil separators are designed to separate gross amounts of oil and large (>250µm) suspended solids from the surface water, mainly through the sedimentation process.

A Class 1 bypass fuel separator is to be provided immediately upstream of the final manhole discharging from the site, as an additional and final mitigation measure, prior to surface water discharge from each unit catchment to the public surface water network.

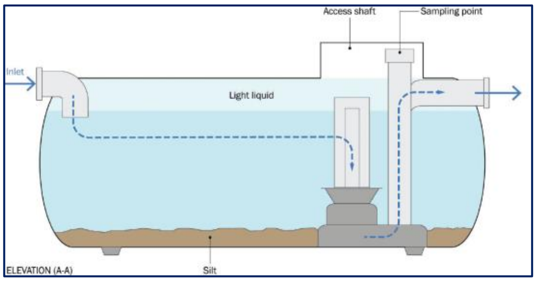


Figure 3.11 - Typical Section Detail of Fuel Separator (CIRIA C753)

3.4 Proposed Sustainable Drainage Network Detailed Design

3.4.1 Software Design Criteria

The proposed surface water network has been designed in accordance with the regulations and guidelines outlined in *Section 2*, using the MicroDrainage Network Design package, by Innovyze Inc., which simulates the performance of the integrated drainage network for varying rainfall return periods and storm durations.

The MicroDrainage Network Design software applies the Flood Studies Report (FSR) methodology for the analysis of the rainfall profiles. However, the input design parameters that were used, as part of this design, were based on the available Flood Studies Update (FSU) data, *i.e.,* the return period rainfall depths for sliding durations, which determine the $\mathbf{M_{5\text{-}60}}$ and **R** values, and the standard annual average rainfall (SAAR); as sourced from Met Éireann.

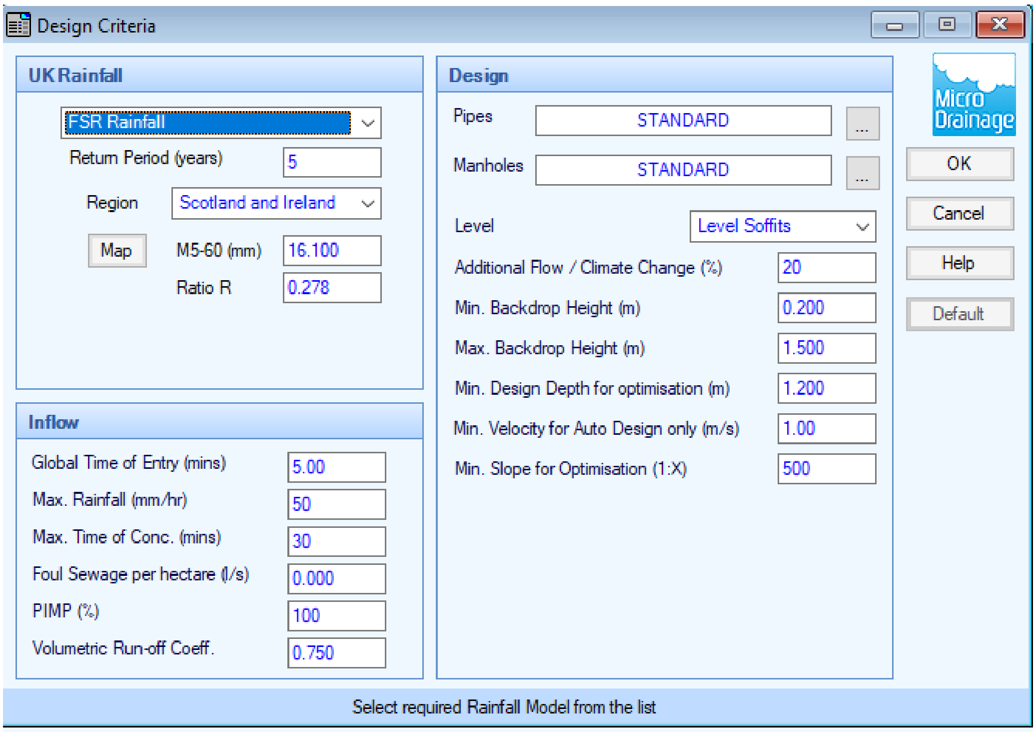


Figure 3.12 - Surface Water Network Design Criteria (MicroDrainage Excerpt)

3.4.2 Proposed Development Rainfall Runoff

It is proposed to reduce and restrict the rainfall-runoff, discharging from the proposed development to the greenfield equivalent, $QBAR_{RURAL}$, runoff rate, as per the FSR ICP SuDS method, which is based on the IH124 method for catchments smaller than 25km^2 in area.

This is to be achieved with the provision of a flow restrictor (Hydro-Brake Optimum by Hydro-International, or similar approved) prior to discharging to the existing surface water network on Richmond Road, with the appropriate measures of attenuation provided. Sub-catchment flow-control devices and associated attenuation are also to be strategically provided, in order to maximise SuDS benefits and avail of the open space for preliminary attenuation.

Refer to **Figure 3.3**, in *Section 3.2.3*, for an excerpt from the results MicroDrainage Runoff Calculator for the development catchment area (c.8.9-hectares total development area, which indicates the greenfield equivalent,

$QBAR_{RURAL}$, value of 3.0 l/s/ha**,** along with the calculated runoff for varying Average Recurrence Intervals (ARI).

This maximum flow rate (i.e., greenfield equivalent) was incorporated into the integrated drainage network design for each contributing catchment, on a pro-rata basis for each of the development's outfalls to the public sewer.

For the purpose of the surface water network design simulation, we have considered all external (roads, pavement, and roofs) areas as being 100% impermeable and taken a *winter* global runoff coefficient, C_v, of 0.90. The proposed car parking areas comprise pervious paving above a drainage layer base course.

3.4.3 Proposed Development Surface Water Catchment Areas

Due to the topography of the site and the proposed layout, the proposed surface water network is to be split into 2nr. main catchment areas. With catchment 1 being the new hospital area and catchment 2 being the residential area.

Each catchment is to be split into further sub-catchments, in order to maximise the treatment and storage benefits of the SuDS structures described in *Section 3.3.3*

The total **net** contributing area for each catchment is as follows:

- Catchment 1 (Hospital) 1.39ha
- Catchment 2 (Residential): 3.18ha

Each catchment is to discharge treated and attenuated flows (to Qbar equivalent of 3.0 l/s/ha) to the existing public surface water drainage infrastructure.

All other areas within the development boundary are to be allowed drain naturally, as per existing.

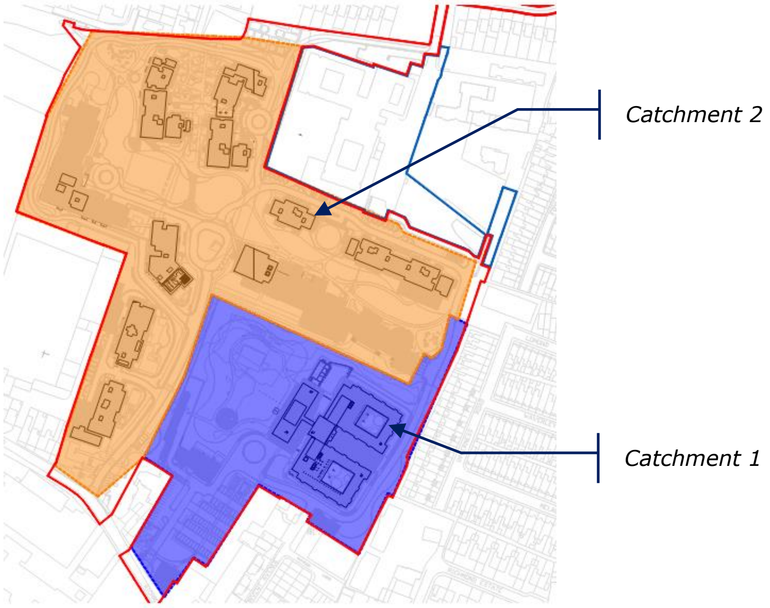


Figure 3.13 - Surface Water Network Catchment Overview

Refer to catchment drawing **R517-OCSC-XX-XX-DR-C-0505** for information.

3.4.4 Proposed Surface Water Pipe Network Design

The overall surface water drainage system, serving the proposed development, is to consist of a gravity sewer network that will convey runoff from the roofs and paved areas to the outfall manhole. The new gravity networks will discharge a controlled attenuated flow rate to the existing public network to the new surface water sewer on Richmond Road, as outlined in Section 3.3.2.

The proposed piped network has been designed in accordance with BS EN 752 and all new infrastructure is to be compliant with the requirements of the GDSDS and the GDRCOP for Drainage Works, with minimum full-bore velocities of 1.0 m/s achieved throughout.

All main surface water carrier pipes have been sized to ensure no surcharging of the proposed drainage network for rainfall events up to, and including, the 1 in 5-year ARI event.

Refer to drawing **R517-OCSC-XX-XX-DR-C-0500**, **R517-OCSC-XX-XX-DR-C-0501 & R517-OCSC-XX-XX-DR-C-0502** for masterplan details of the proposed drainage infrastructure layout.

3.5 Proposed Surface Water Attenuation Storage

An integrated attenuation strategy has been applied across the entire masterplan development, in order to best manage the rainfall runoff from hardstanding areas and reduce the runoff rates to less than the greenfield runoff equivalent rate.

This will be provided initially through integration with the landscape proposals around the development, with the further provision of pervious paving for car parking areas.

The development is to combine a number of sustainable drainage features along with elements of a traditional drainage system. The development's main attenuation will be provided on podium level within a 300mm layer of open-graded crushed rock and underground attenuation in the form of a proprietary, modular system (such as the geocellular Y-ESS Pluval Cube, or similar approved).

Pervious paving is to be provided within all car parking spaces within the development. This will provide at-source treatment of runoff from the roads while also providing interim storage within the base course. A minimum of 300mm stone with a minimum porosity of 30% is to be provided below the pervious paving. Runoff temporarily stored within the base course will be allowed to infiltrate naturally into groundwater, an overflow from this is to be provided for events where infiltration is not achieved.

3.6 Surface Water Outfall Locations

Each catchment will have its own independent outfall to the public surface water network located on Richmond Road, based on the natural topography of the site, the new development layout, and resultant design finish levels.

Refer to *Section 3.2.1* for further details of existing public drainage infrastructure.

The discharge rates at both outfall locations are to be restricted to a maximum flow rate of **3.0 l/s/ha**, which is equal to the greenfield runoff equivalent as discussed in *Section 3.2.3*.

The above is to ensure that there is no increase in flow rates and volumes, from the development site, being discharged to the receiving infrastructure and waterbodies; thus causing no adverse impact on adjoining and other downstream properties.

3.7 Water Quality

The quality of the surface water discharging from the site is to be improved through the following provisions, each of which is discussed in greater detail in *Section 3.3.3.*:

- Pervious Paving in all car parking areas;
- Green roofs;
- Intensive landscaping, where practical;
- Interception storage;
- Trapped road gullies on the road carriageway, to trap silt and gross pollutants;
- Silt trap to be provided on manhole immediately upstream of attenuation system, as a further preventative measure to trap silt and other gross pollutants;
- Class 1 bypass fuel separator to be provided prior to discharging from the site.

3.8 Maintenance

The proposed surface water drainage network has been carefully designed, to minimise the risk of blockage throughout the network, mainly through the following provisions that limit and restrict the size of pollutants entering the network:

- Pervious paving;
- Trapped road gullies;
- Silt trap manhole;
- Flow control greater than 50mm diameter.

All devices, including rainwater harvesting units, road gullies, silt traps, flow control devices and attenuation systems, should be inspected regularly and maintained, as appropriate and in accordance with the manufacturer's recommendations and guidelines. Items such as the flow controls and fuel separators have been located so as to provide easy vehicular access for inspection and maintenance.

3.9 Taking in Charge

It is proposed that all new surface water infrastructure associated with the proposed distribution park development **is not** to be offered to be taken in charge by Dublin City Council.

3.10 Surface Water Impact Assessment

The design criteria for the drainage system are established in GDSDS-RDP Volume 2, Section 6.3.4 and explained further in GDSDS-RDP Volume 2, Appendix E. There are four design criteria, each of which has been considered for the subject site:

- River Water Quality Protection;
- River Regime Protection;
- Level of Service (flooding) for the site and;
- River Flood Protection.

3.11 Criterion 1 – River Water Quality Protection

It is proposed that the overall drainage system, serving this development, will contain a range of surface water treatment methods, as outlined previously in *Section 3.3.3,* which will improve the quality of surface water being discharged from the proposed development.

Gross pollutants, sediments, hydrocarbons, and other impurities, will be removed at the source with the following provisions:

a) Green Roofs
b) Pervious Paving along fire tender routes and shared surfaces;
c) Intensive landscaping, where practicable, including blue podium;
d) Filter drains
e) Silt-traps prior to the attenuation storage area.
f) Class 1 fuel separator prior to discharge from the development.

3.12 Criterion 2 – River Regime Protection

Surface water discharge from the overall development will be restricted to an equivalent rural runoff rate of **3.0 l/s/ha**, which is equal to the greenfield runoff equivalent and significantly less than the existing scenario that discharges unattenuated flows to the public network. Refer to *Section 3.4.2* for further details of the proposed development rainfall runoff calculations.

This will be achieved with the provision of a flow control device (Roof and podium outlets, and Hydro-Brake Optimum, by Hydro-International, or similar approved) upstream of the outfall manholes. Refer to *Section 3.3.3.* for further details.

3.13 Criterion 3 – Level of Service (Flooding) Site

There are four sub-criteria for the required level of service, for a new development; as set out in the *GDSDS Volume 2, Section 6.3.4 (Table 6.3).*

- No flooding on site except where planned (30-year high-intensity rainfall event);
- No internal property flooding (100-year high-intensity rainfall event);
- No internal property flooding (100-year river event and critical duration for site) and;
- No flood routing off-site except where specifically planned. (100-year high-intensity rainfall event).

3.13.1 Sub-Criterion 3.1

The surface water drainage systems, serving the proposed development, have been designed to accommodate the 30-year return period rainfall event (including an allowance of a 20% increase in rainfall intensity for climate change) without flooding.

The performance of the proposed drainage system has been analysed for design rainfall events up to, and including, the 1% AEP event (incl. 20% climate change allowance) using the *MicroDrainage Network Design Software*, by Innovyze Inc. Refer to **Appendix C** for details of design criteria, calculations and results.

3.13.2 Sub-Criterion 3.2

The surface water drainage systems, serving the proposed development, have been designed to accommodate the 100-year return period rainfall event (including an allowance of a 20% increase in rainfall intensity for climate change) without flooding of property.

The performance of the proposed drainage system in 100-year return period storm events (incl. 20% climate change allowance) has been analysed – Refer to **Appendix C** for calculations. The analyses show that no flooding will occur in 100-year return period storm events.

3.13.3 Sub-Criterion 3.3

Details of the flood risk assessment associated with the proposed development are outlined under separate cover, which is submitted as part of this application. The assessment indicates that there is no apparent risk of internal property flooding for a design 100-year return period pluvial rainfall event (including a 20% climate change allowance).

3.13.4 Sub-Criterion 3.4

The surface water drainage systems, serving the proposed development, have been designed to accommodate the 100-year return period rainfall event (including an allowance of 20% increase in rainfall intensity for climate change) without flooding of property, so no flood routing off-site will be experienced for such a rainfall event.

The performance of the proposed drainage system in 100-year return period storm events (incl. 20% climate change allowance) has been analysed – Refer to **Appendix C** for calculations. The analyses show that no flooding will occur in 100-year return period storm events.

Details of the flood risk assessment associated with the proposed development are outlined in the Site-Specific Flood Risk Assessment (Document Nr. **R517-OCSC-XX-XX-RP-C-0003**), which has been submitted under separate cover, as part of this application. This assessment, along with the network design simulation results, from the

MicroDrainage Network Analysis, indicates that no internal property flooding will occur in a 100-year return period fluvial flood event (including 20% climate change allowance).

3.14 Criterion 4 – River Flood Protection

As outlined in *Section 3.12* (Criterion 2), the surface water runoff from the development's catchment will be limited to a maximum of **3.0 l/s/ha**, which is equal to the greenfield runoff equivalent.

Refer to *Section 3.2.3* and *Section 3.4.2* of this report for further details on the limiting discharge rates. The *GDSDS Volume 2, Appendix E* states that this practice ensures *"that sufficient stormwater runoff retention is achieved to protect the river during extreme events".*

Attenuation storage is to be provided for the 100-year return period rainfall event (including an increased 20% rainfall intensity; to allow for climate change). Discharge from the site is to be achieved through the use of a vortex flow control device (e.g. Hydro-Brake Optimum, by Hydro-International, or similar approved), which will reduce the risk of blockage present with other flow devices. Refer to **Appendix C** for details of hydraulic modelling calculations of attenuation and flow control facilities, as carried out using MicroDrainage software by Innovyze Inc.

3.15 Consultation

Meetings have been held with the Dublin City Drainage Department (mid-October 2022) to discuss the proposed strategy and agree on the provision of SUDS elements. Also, all comments that have risen from the Large-scale residential development Pre-application submission and consultations have been addressed. The Drainage Division was generally satisfied with the submission received.

4 WASTEWATER DRAINAGE

4.1 Overview

All proposed wastewater sewer design has been carried out in accordance with Irish Water's Code of Practice for Wastewater Infrastructure. The existing site is currently a mix of greenfield and existing buildings, with existing combined sewer discharging to the public wastewater infrastructure.

It is proposed to provide a connection from each structure to the existing public wastewater network inside the site boundary.

4.2 Existing Wastewater Drainage

Irish Water records a 300 mm sewer within the site boundary with a 900 mm concrete sewer on Richmond Road. This 900 mm sewer flows in an easterly direction and is treated at Ringsend.

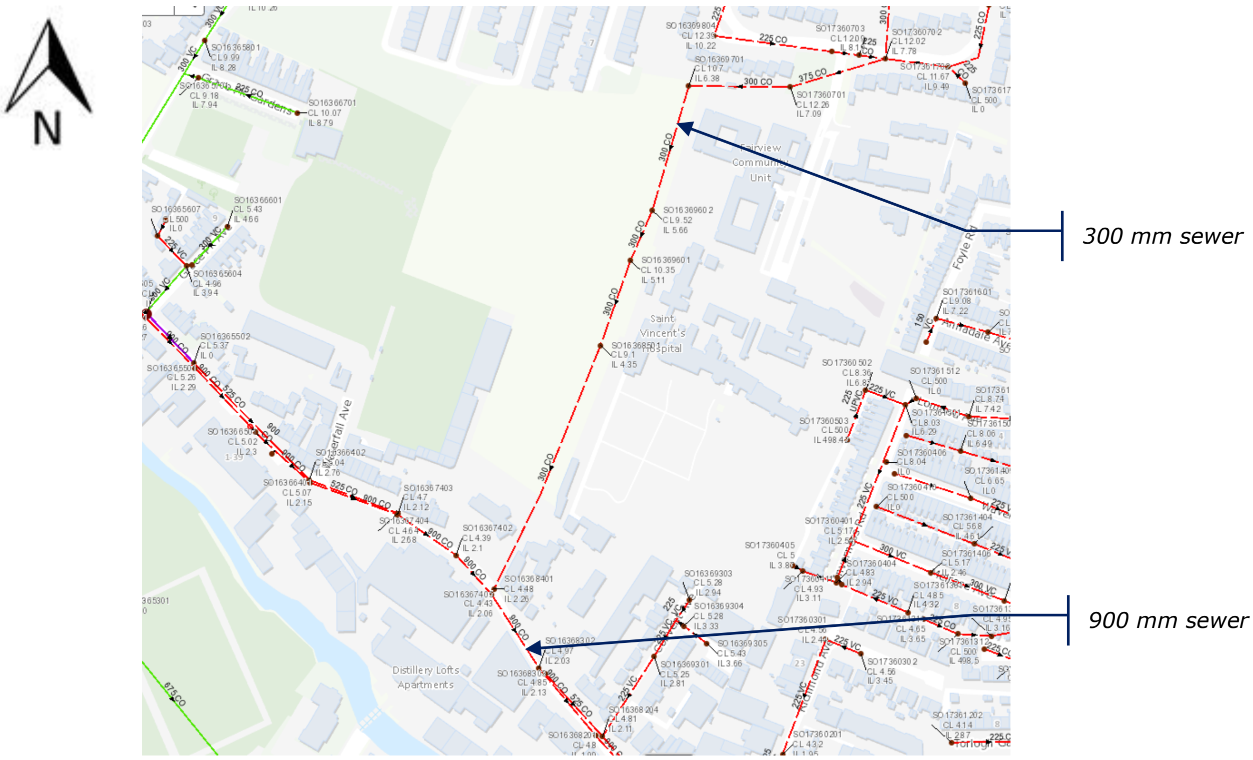


Figure 4.1 - Irish Water Public Records (Excerpt)

Refer to **Appendix A** for details of Irish Water's existing wastewater infrastructure records.

4.3 Consultation

A Pre-Connection Enquiry (PCE) Form (***IW Ref Nr. CDS22004338***) has been submitted to Irish Water with a Confirmation of Feasibility received on the 31st January 2023 stating that the connection is Feasible Subject to upgrades.

As noted in the Confirmation of Feasibility: '*The connection of the Hospital can proceed prior to any works as it will replace the existing Hospital and hence does not increase the overall load on the downstream network.*

In order to accommodate the proposed connection (excluding the Hospital) at the Premises, Storm Sewer Separation works are required to reduce the load on the downstream combined network.

Storm separation of the full site including roofs of any buildings must be undertaken as part of the works.

This Development is being permitted on the bases that a minimum of 1.238ha of hardstanding on the site discharging to the Irish Water combined network must be fully separated. The removal of surface flows from this land will enable the proposed development to connect. The information included in R517-OCSC-ZZ-XX-0006-S0-P04 will need to be independently verified by Irish Water prior to the connection. Irish Water must be contacted in advance of any onsite works impacting the existing storm arrangements to coordinate onsite verification.

As noted in the received Confirmation of feasibility the study undertaken has shown that enough stormwater will be removed from the combined sewer running through the site as part of the new surface scheme that is proposed under this planning application to allow for the connection to the Irish Water wastewater network. Drawing R517-OCSC-ZZ-XX-0006-S0-P04 has been included in **Appendix E**

Refer to **Appendix E** for the Irish Water Confirmation of Feasibility and Statement of Design Acceptance.

4.4 Proposed Wastewater Drainage Strategy

It is proposed to separate the wastewater and surface water drainage networks, which will serve the proposed development, and provide independent connections to the public wastewater and surface water infrastructure respectively.

Refer to *Section 3* for details of the proposed surface water drainage design strategy.

The overall development is to be separated into 2nr. individual gravity wastewater catchments and is to be drained by a gravity wastewater network, based on the natural topography of the development site. It is proposed to provide two individual connections to the existing 900mm public wastewater sewer on Richmond Road (one for the hospital and one for the residential part of the development). All proposed wastewater sewer design is to be carried out in accordance with Irish Water's Code of Practice for Wastewater Infrastructure and submitted as part of the PCE application process.

Refer to detailed design drawing **R517-OCSC-XX-XX-DR-C-0500 & R517-OCSC-XX-XX-DR-C-0501** for masterplan drainage layout.

4.5 Taking In Charge

All new wastewater drainage infrastructure, installed to serve the proposed development **is not** to be offered to Irish Water for to be taken-in-charge.

5 POTABLE WATER SUPPLY

5.1 Overview

All proposed potable water design has been carried out in accordance with Irish Water’s Code of Practice for Water Infrastructure, IW-CDS-5020-03.

A new 200mm HDPE watermain connection is to be provided from the existing public watermain with upgrades to the public watermain as noted in the Irish Water Confirmation of Feasibility

5.2 Existing Watermain Infrastructure

Irish Water records show an existing 3 and 5-inch cast iron main within the site and a 6-inch main on Richmond Road.

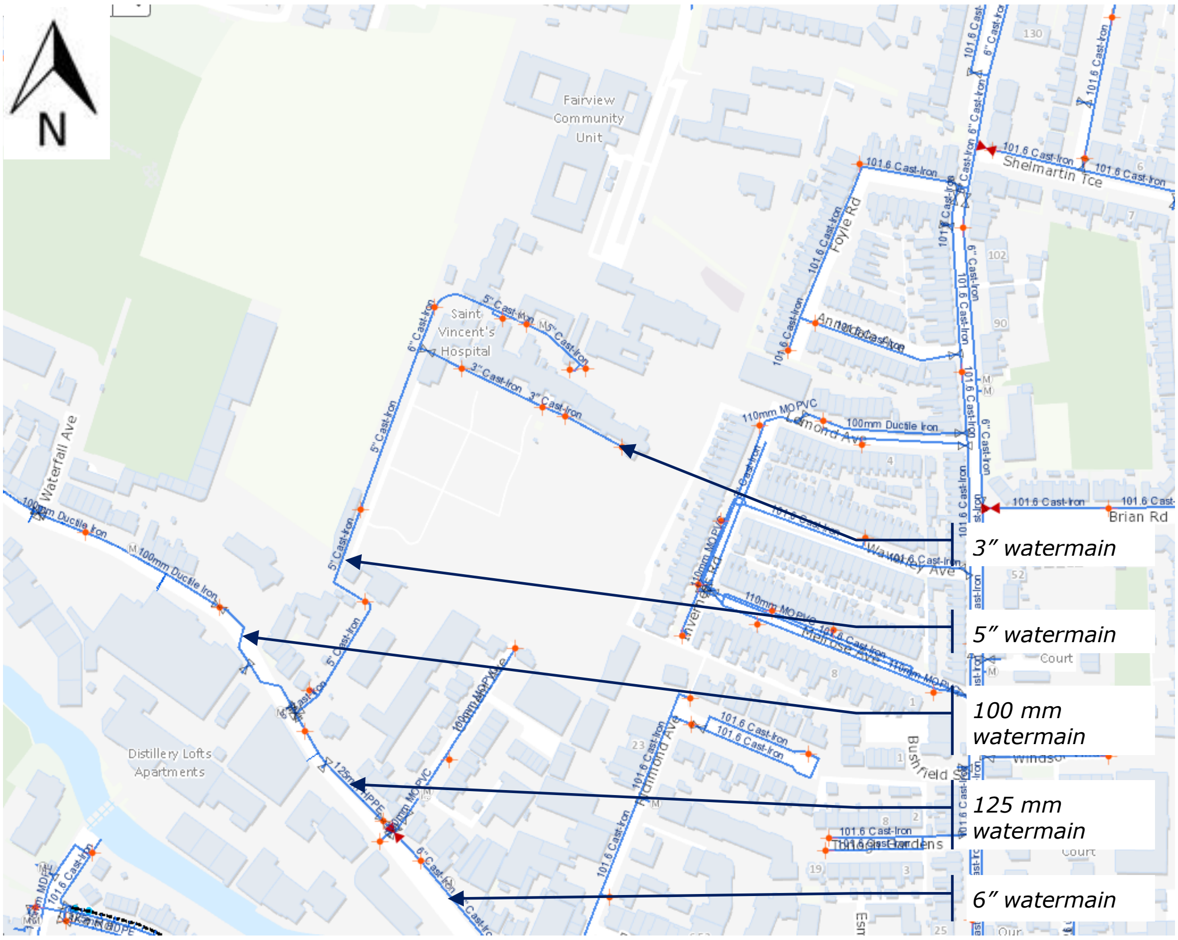


Figure 5-1: Existing watermain infrastructure

Refer to **Appendix A** for details of existing watermain infrastructure records.

5.3 Consultation

A Pre-Connection Enquiry (PCE) Form (***IW Ref Nr. CDS22004338***) has been submitted to Irish Water with a Confirmation of Feasibility received on the 31st January 2023 stating that the connection is Feasible Subject to upgrades.

As noted in the Confirmation of Feasibility: '*In order to accommodate the proposed connection at the Premises upgrade works are required to increase the capacity of the Irish Water network.*

The upgrade works must include:

- *IN 1: Replace 100mm uPVC with 200mm ID pipe for 310m from the Inlet meter of DMA MA01251.*
- *IN 2: New 200mm ID pipe to be laid for 300m to connect the site to newly laid 200mm ID pipe in IN 1. (Could replace 100mm uPVC main instead of new additional pipe in Griffith Court Road.)*
- *IN 3: New 250mm ID main for 50m from 300mm CI to IN 1 (Inlet meter).*

Figure 5-2: Indicative watermain upgrades required

Refer to **Appendix E** for the Irish Water Confirmation of Feasibility and Statement of Design Acceptance.

5.4 Connection to the Existing Network

It is proposed to serve the proposed development by providing a new 200mm high-density polyethylene (HDPE) connection to the upgraded public network sd noted in the Irish Water Confirmation of Feasibility. All works outside the site boundary are in public space and will be undertaken by Irish Water.

The proposed connection is to be carried out in accordance with *Irish Water's Code of Practice for Water Infrastructure*, following a New Connection agreement with Irish Water, with a bulk water meter to be provided at the development's entrance.

Refer to drawing **R517-OCSC-XX-XX-DR-C-0550 and R517-OCSC-XX-XX-DR-C-0551** for the proposed watermain layout.

5.5 Water Saving Devices

Water saving devices are to be considered for use within the proposed development units, in order to conserve the use of water, as part of the internal fit-out.

5.6 Water Meters

Water metering arrangements are to be upgraded at the connection location so that they are to Irish Water's satisfaction. A bulk water meter is to be provided at the connection to the public watermain, at the development entrance, along with individual meters provided at the connection to each commercial and domestic unit. All metering is to be provided in accordance with Irish Water's requirements.

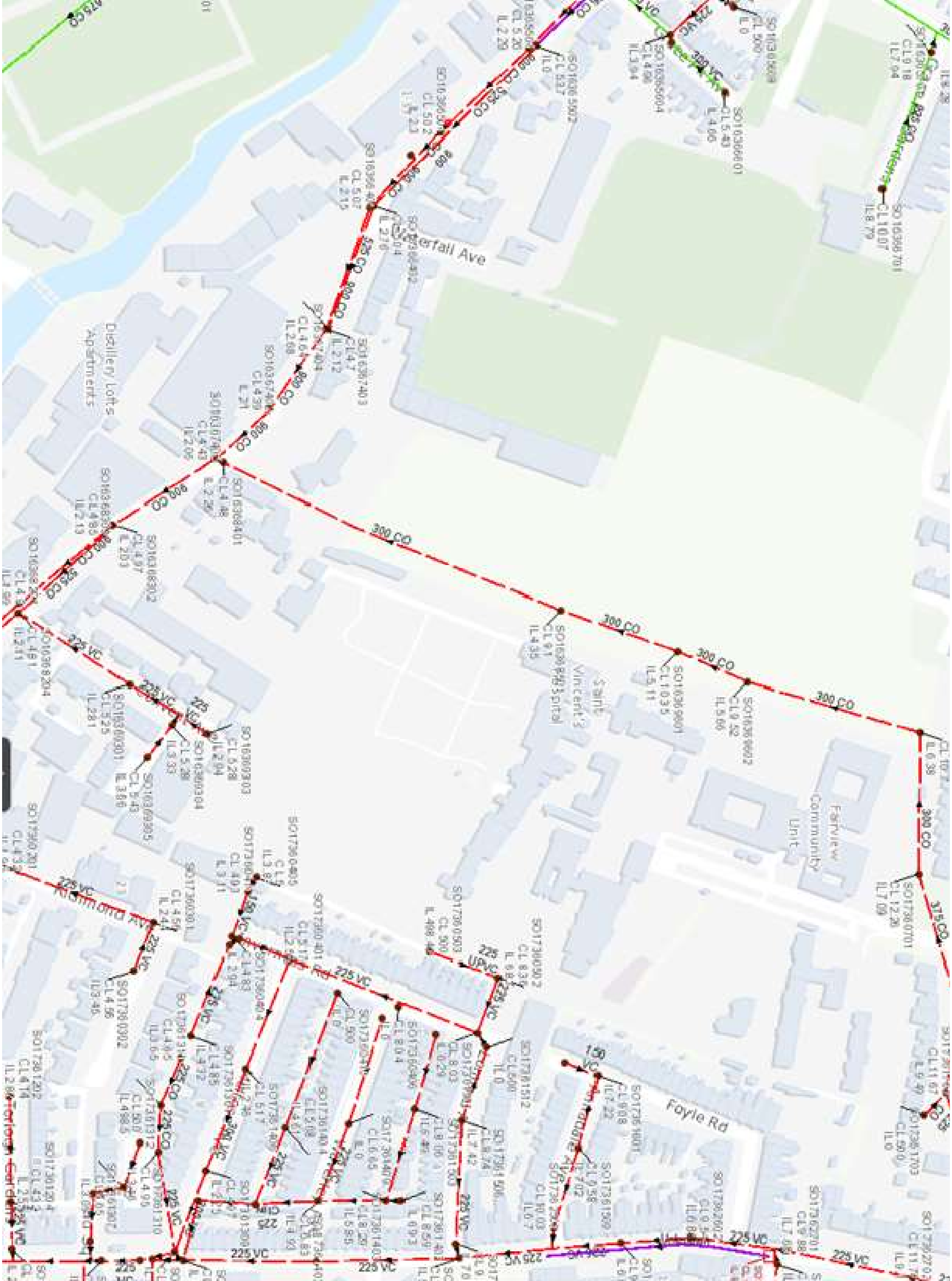
5.7 Taking In Charge

All new watermain infrastructure inside the site boundary, installed to serve the proposed development **is not** to be offered to Irish Water for to be taken-in-charge.

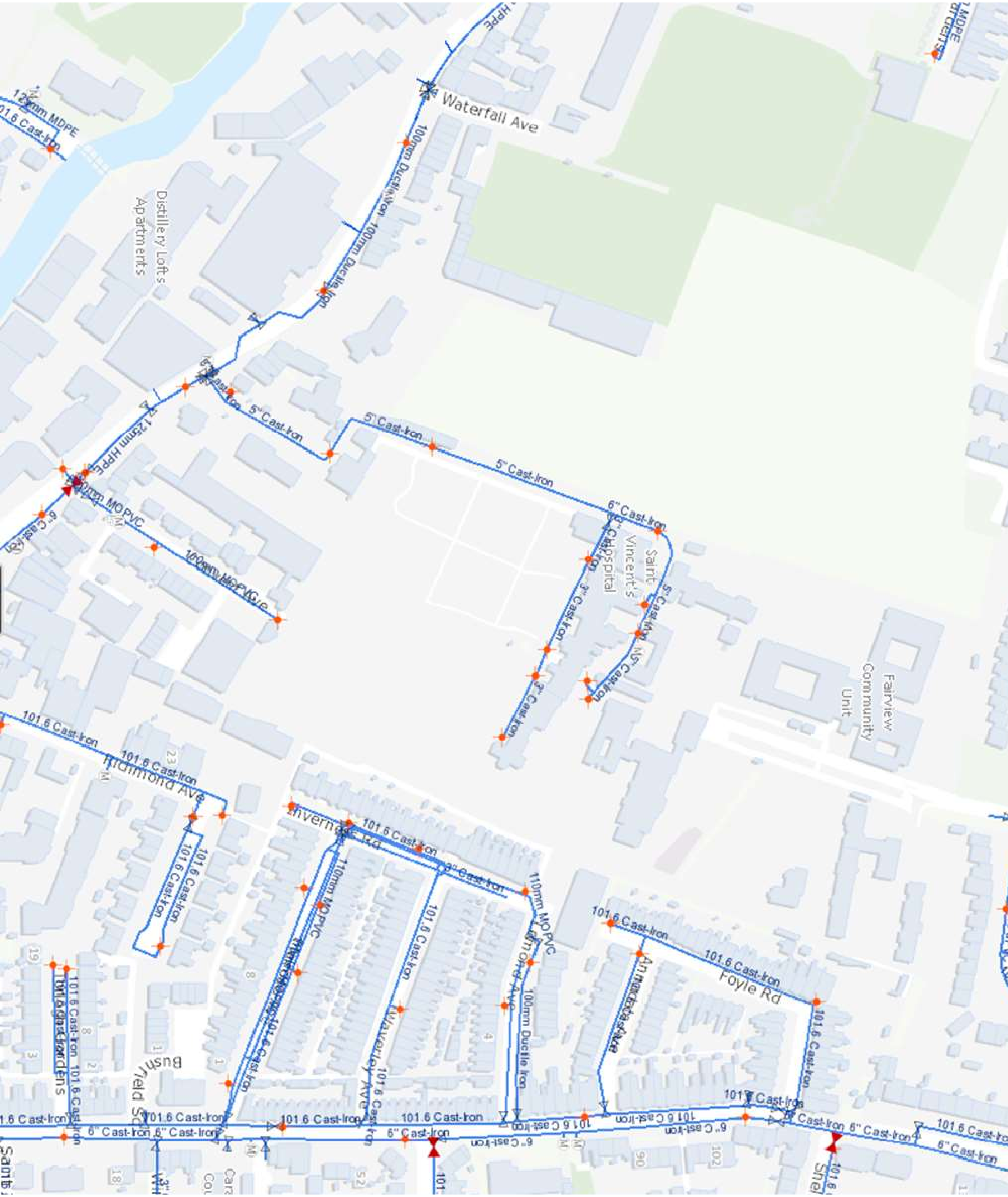
APPENDIX A. DUBLIN CITY COUNCIL & IRISH WATER PUBLIC RECORDS

Appendix A

Dublin City Council & Irish Water Public Records



Waterfall Ave
Distillery Lofts Apartments
Saint Vincent's Hospital
Fairview Community Unit
Foyle Rd
300 CO
225 VC
375 CO
225 UPVC
150 VC


Waterfall Ave
Distillery Lofts Apartments
125mm MDPE
101.6 Cast-Iron
100mm Ductile Iron
125mm HPPE
5" Cast-Iron
6" Cast-Iron
100mm MOPVC
3" Cast-Iron
Saint Vincent's Hospital
Fairview Community Unit
Richmond Ave
101.6 Cast-Iron
110mm MOPVC
Foyle Rd
Waverley Ave
Bushfield Sq

APPENDIX B. Q_{BAR} RUNOFF CALCULATIONS & MET EIRAN

Appendix B

Q_{BAR} Runoff Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.370
Area (ha)	1.000	Urban	0.000
SAAR (mm)	720	Region Number	Ireland Greater Dublin

Results	**l/s**
QBAR Rural	3.0
QBAR Urban	3.0
Q1 year	2.5
Q1 year	2.5
Q30 years	6.3
Q100 years	7.7

Met Eireann

Return Period Rainfall Depths for sliding Durations

Irish Grid: Easting: 316967, Northing: 236469,

	Interval		Years													
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.6,	4.1,	5.0,	5.6,	6.0,	7.5,	9.1,	10.2,	11.8,	13.1,	14.2,	15.9,	17.1,	18.2,	N/A ,
10 mins	3.5,	5.0,	5.8,	6.9,	7.7,	8.4,	10.4,	12.7,	14.2,	16.4,	18.3,	19.8,	22.1,	23.9,	25.4,	N/A ,
15 mins	4.1,	5.9,	6.8,	8.2,	9.1,	9.8,	12.2,	15.0,	16.8,	19.3,	21.5,	23.3,	26.0,	28.1,	29.8,	N/A ,
30 mins	5.5,	7.6,	8.8,	10.5,	11.7,	12.6,	15.5,	18.8,	21.0,	24.0,	26.7,	28.8,	32.0,	34.5,	36.5,	N/A ,
1 hours	7.2,	10.0,	11.4,	13.5,	15.0,	16.1,	19.7,	23.7,	26.3,	29.9,	33.1,	35.6,	39.4,	42.3,	44.7,	N/A ,
2 hours	9.6,	13.0,	14.8,	17.4,	19.2,	20.6,	24.9,	29.7,	32.9,	37.3,	41.1,	44.0,	48.5,	52.0,	54.8,	N/A ,
3 hours	11.3,	15.2,	17.2,	20.2,	22.2,	23.7,	28.6,	34.0,	37.5,	42.4,	46.6,	49.8,	54.8,	58.6,	61.7,	N/A ,
4 hours	12.7,	16.9,	19.2,	22.4,	24.6,	26.3,	31.6,	37.4,	41.2,	46.4,	50.9,	54.4,	59.7,	63.8,	67.1,	N/A ,
6 hours	14.9,	19.8,	22.3,	26.0,	28.5,	30.3,	36.3,	42.8,	47.0,	52.8,	57.8,	61.6,	67.4,	71.9,	75.5,	N/A ,
9 hours	17.5,	23.1,	26.0,	30.2,	32.9,	35.0,	41.7,	48.9,	53.6,	60.0,	65.5,	69.8,	76.2,	81.0,	85.0,	N/A ,
12 hours	19.7,	25.8,	29.0,	33.5,	36.5,	38.8,	46.0,	53.8,	58.8,	65.7,	71.7,	76.2,	83.0,	88.2,	92.5,	N/A ,
18 hours	23.2,	30.2,	33.7,	38.8,	42.2,	44.8,	52.8,	61.5,	67.1,	74.7,	81.3,	86.2,	93.8,	99.5,	104.1,	N/A ,
24 hours	26.0,	33.7,	37.5,	43.1,	46.8,	49.6,	58.3,	67.7,	73.7,	81.8,	88.9,	94.2,	102.2,	108.3,	113.3,	130.2,
2 days	31.8,	40.4,	44.7,	50.9,	54.8,	57.9,	67.3,	77.3,	83.6,	92.2,	99.6,	105.1,	113.4,	119.7,	124.8,	142.0,
3 days	36.4,	45.8,	50.5,	57.1,	61.4,	64.6,	74.6,	85.2,	91.9,	100.9,	108.5,	114.3,	122.9,	129.4,	134.7,	152.4,
4 days	40.5,	50.5,	55.5,	62.5,	67.1,	70.5,	81.0,	92.1,	99.1,	108.4,	116.4,	122.4,	131.3,	138.0,	143.4,	161.6,
6 days	47.6,	58.8,	64.3,	72.0,	76.9,	80.6,	92.1,	104.1,	111.5,	121.6,	130.0,	136.4,	145.8,	152.9,	158.6,	177.8,
8 days	53.8,	66.0,	71.9,	80.2,	85.5,	89.5,	101.7,	114.5,	122.4,	133.0,	141.9,	148.6,	158.5,	165.9,	171.9,	191.9,
10 days	59.5,	72.5,	78.9,	87.7,	93.3,	97.5,	110.5,	123.9,	132.2,	143.3,	152.6,	159.6,	169.9,	177.7,	183.9,	204.6,
12 days	64.8,	78.6,	85.3,	94.6,	100.6,	105.0,	118.5,	132.6,	141.2,	152.8,	162.5,	169.8,	180.5,	188.5,	194.9,	216.3,
16 days	74.6,	89.8,	97.1,	107.3,	113.8,	118.6,	133.3,	148.4,	157.7,	170.1,	180.5,	188.2,	199.6,	208.1,	214.9,	237.5,
20 days	83.6,	100.1,	108.0,	118.9,	125.9,	131.0,	146.7,	162.8,	172.7,	185.8,	196.8,	204.9,	216.9,	225.9,	233.0,	256.7,
25 days	94.2,	112.0,	120.6,	132.4,	139.8,	145.4,	162.2,	179.4,	189.9,	203.8,	215.5,	224.1,	236.8,	246.2,	253.8,	278.7,

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 C. SURFACE WATER DESIGN & ATTENUATION CALCULATIONS

- Design Criteria;
- Area Summary;
- Network Design & Results Table;
- Simulation Criteria;
- Hydrobrake / Controls & Storage Design;
- Summary of Results.

Appendix C

Surface Water Design and Attenuation Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes GDSDS Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	16.100	Add Flow / Climate Change (%)	20
Ratio R	0.278	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	20.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	38.454	0.410	93.8	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.47	10.725	0.000	0.0	0.0	0.0	1.35	53.7	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	23.468	0.240	97.8	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	26.914	0.200	134.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	13.602	0.100	136.0	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	5.774	0.100	57.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	11.096	0.100	111.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	14.123	0.083	169.6	0.009	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.007	2.306	0.014	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	1.459	0.009	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.009	9.029	0.053	169.6	0.097	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.010	13.601	0.080	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	50.00	5.77	10.315	0.014	0.0	0.0	0.4	1.32	52.6	2.3
S1.002	50.00	6.17	10.075	0.014	0.0	0.0	0.4	1.13	44.7	2.3
S1.003	50.00	6.37	9.875	0.020	0.0	0.0	0.6	1.12	44.5	3.3
S1.004	50.00	6.43	9.775	0.020	0.0	0.0	0.6	1.72	68.6	3.3
S1.005	50.00	6.58	9.675	0.020	0.0	0.0	0.6	1.24	49.3	3.3
S1.006	50.00	6.81	9.575	0.029	0.0	0.0	0.8	1.00	39.8	4.7
S1.007	50.00	6.85	9.492	0.029	0.0	0.0	0.8	1.00	39.8	4.7
S1.008	50.00	6.87	9.478	0.029	0.0	0.0	0.8	1.00	39.8	4.7
S1.009	50.00	7.02	9.470	0.126	0.0	0.0	3.4	1.00	39.8	20.5
S1.010	50.00	7.25	9.416	0.126	0.0	0.0	3.4	1.00	39.8	20.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S2.000	6.014	0.035	169.6	0.027	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	2.051	0.012	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.002	7.520	0.044	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.011	38.332	0.271	141.4	0.115	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	4.009	0.024	167.0	0.058	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	7.737	0.046	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.002	25.157	0.148	169.6	0.029	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	3.605	0.021	169.6	0.069	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S2.000	50.00	5.10	9.075	0.027	0.0	0.0	0.7	1.00	39.8	4.4
S2.001	50.00	5.13	9.040	0.027	0.0	0.0	0.7	1.00	39.8	4.4
S2.002	50.00	5.26	9.027	0.027	0.0	0.0	0.7	1.00	39.8	4.4
S1.011	50.00	7.83	8.983	0.268	0.0	0.0	7.3	1.10	43.6	43.5
S3.000	50.00	5.07	7.750	0.058	0.0	0.0	1.6	1.01	40.1	9.5
S3.001	50.00	5.20	7.726	0.058	0.0	0.0	1.6	1.00	39.8	9.5
S3.002	50.00	5.61	7.680	0.088	0.0	0.0	2.4	1.00	39.8	14.3
S4.000	50.00	5.06	7.325	0.069	0.0	0.0	1.9	1.00	39.8	11.2

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S4.001	3.389	0.020	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.003	40.642	0.240	169.6	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	
S5.000	4.641	0.027	169.6	0.075	5.00	0.0	0.600	o	225	Pipe/Conduit	
S5.001	2.967	0.017	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.004	11.866	0.024	486.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.005	24.077	0.050	486.2	0.041	0.00	0.0	0.600	o	375	Pipe/Conduit	
S6.000	2.129	0.013	169.6	0.032	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S4.001	50.00	5.12	7.304	0.069	0.0	0.0	1.9	1.00	39.8	11.2
S3.003	50.00	6.29	7.284	0.211	0.0	0.0	5.7	1.00	39.8	34.3
S5.000	50.00	5.08	7.425	0.075	0.0	0.0	2.0	1.00	39.8	12.3
S5.001	50.00	5.13	7.398	0.075	0.0	0.0	2.0	1.00	39.8	12.3
S3.004	50.00	6.57	6.969	0.286	0.0	0.0	7.8	0.71	49.9	46.5
S3.005	50.00	7.06	6.870	0.328	0.0	0.0	8.9	0.81	90.0	53.3
S6.000	50.00	5.04	7.875	0.032	0.0	0.0	0.9	1.00	39.8	5.2

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S6.001	3.405	0.020	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.006	31.320	0.064	486.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.000	2.454	0.014	169.6	0.040	5.00	0.0	0.600	o	225	Pipe/Conduit	
S7.001	3.536	0.021	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.007	17.617	0.036	486.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.012	17.703	0.036	486.2	0.052	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S6.001	50.00	5.09	7.862	0.032	0.0	0.0	0.9	1.00	39.8	5.2
S3.006	50.00	7.70	6.820	0.360	0.0	0.0	9.7	0.81	90.0	58.5
S7.000	50.00	5.04	8.175	0.040	0.0	0.0	1.1	1.00	39.8	6.5
S7.001	50.00	5.10	8.161	0.040	0.0	0.0	1.1	1.00	39.8	6.5
S3.007	49.96	8.06	6.756	0.400	0.0	0.0	10.8	0.81	90.0	65.0
S1.012	49.10	8.39	6.645	0.720	0.0	0.0	19.1	0.92	145.6	114.8

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S8.000	2.514	0.015	169.6	0.058	5.00	0.0	0.600	o	225	Pipe/Conduit	
S8.001	1.004	0.006	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.002	21.963	0.130	169.6	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.003	5.416	0.032	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S9.000	2.543	0.015	169.6	0.051	5.00	0.0	0.600	o	225	Pipe/Conduit	
S9.001	1.593	0.009	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.004	12.995	0.077	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.000	2.515	0.015	167.7	0.086	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S8.000	50.00	5.04	8.875	0.058	0.0	0.0	1.6	1.00	39.8	9.4
S8.001	50.00	5.06	8.860	0.058	0.0	0.0	1.6	1.00	39.8	9.4
S8.002	50.00	5.42	8.854	0.077	0.0	0.0	2.1	1.00	39.8	12.6
S8.003	50.00	5.51	8.725	0.077	0.0	0.0	2.1	1.00	39.8	12.6
S9.000	50.00	5.04	8.775	0.051	0.0	0.0	1.4	1.00	39.8	8.4
S9.001	50.00	5.07	8.760	0.051	0.0	0.0	1.4	1.00	39.8	8.4
S8.004	50.00	5.73	8.693	0.129	0.0	0.0	3.5	1.00	39.8	21.0
S10.000	50.00	5.04	8.800	0.086	0.0	0.0	2.3	1.01	40.0	13.9

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S10.001	2.213	0.013	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.005	4.926	0.029	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.006	23.970	0.594	40.3	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.007	12.363	0.073	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S11.000	2.167	0.013	166.7	0.090	5.00	0.0	0.600	o	225	Pipe/Conduit	
S11.001	0.845	0.005	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.008	13.631	0.028	485.6	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S10.001	50.00	5.08	8.785	0.086	0.0	0.0	2.3	1.00	39.8	13.9
S8.005	50.00	5.81	8.616	0.215	0.0	0.0	5.8	1.00	39.8	34.9
S8.006	50.00	6.01	8.587	0.225	0.0	0.0	6.1	2.07	82.1	36.5
S8.007	50.00	6.21	7.993	0.225	0.0	0.0	6.1	1.00	39.8	36.5
S11.000	50.00	5.04	8.100	0.090	0.0	0.0	2.4	1.01	40.2	14.6
S11.001	50.00	5.05	8.087	0.090	0.0	0.0	2.4	1.00	39.8	14.6
S8.008	50.00	6.49	7.770	0.315	0.0	0.0	8.5	0.82	90.1	51.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S12.000	2.342	0.014	169.6	0.075	5.00	0.0	0.600	o	225	Pipe/Conduit	
S12.001	1.501	0.009	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.009	13.100	0.027	485.6	0.013	0.00	0.0	0.600	o	375	Pipe/Conduit	
S8.010	36.439	0.075	485.6	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.013	13.156	0.027	485.6	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.014	12.825	0.026	485.6	0.016	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.015	14.655	0.030	485.6	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S13.000	8.105	0.016	491.3	1.115	5.00	0.0	0.600	o	525	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S12.000	50.00	5.04	8.175	0.075	0.0	0.0	2.0	1.00	39.8	12.2
S12.001	50.00	5.06	8.161	0.075	0.0	0.0	2.0	1.00	39.8	12.2
S8.009	50.00	6.76	7.742	0.402	0.0	0.0	10.9	0.82	90.1	65.4
S8.010	50.00	7.50	7.715	0.402	0.0	0.0	10.9	0.82	90.1	65.4
S1.013	48.54	8.60	6.533	1.122	0.0	0.0	29.5	1.01	218.6	177.0
S1.014	48.00	8.81	6.506	1.138	0.0	0.0	29.6	1.01	218.6	177.6
S1.015	47.41	9.06	6.480	1.138	0.0	0.0	29.6	1.01	218.6	177.6
S13.000	50.00	5.13	8.775	1.115	0.0	0.0	30.2	1.00	217.3	181.2

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S13.001	9.854	0.020	491.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S13.002	25.786	0.052	491.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.016	26.667	0.053	500.0	0.022	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.017	16.759	0.034	500.0	0.049	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.018	34.490	0.069	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S14.000	6.170	0.144	42.8	0.033	5.00	0.0	0.600	o	225	Pipe/Conduit	
S14.001	22.921	1.311	17.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.002	6.783	0.130	52.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S13.001	50.00	5.30	8.759	1.115	0.0	0.0	30.2	1.00	217.3	181.2
S13.002	50.00	5.73	8.738	1.115	0.0	0.0	30.2	1.00	217.3	181.2
S1.016	46.52	9.44	6.299	2.275	0.0	0.0	57.3	1.17	417.0	343.9
S1.017	45.97	9.68	6.246	2.324	0.0	0.0	57.9	1.17	417.0	347.2
S1.018	44.91	10.17	6.213	2.324	0.0	0.0	57.9	1.17	417.0	347.2
S14.000	50.00	5.05	8.575	0.033	0.0	0.0	0.9	2.00	79.7	5.4
S14.001	50.00	5.17	8.431	0.033	0.0	0.0	0.9	3.14	125.0	5.4
S14.002	50.00	5.24	7.120	0.033	0.0	0.0	0.9	1.81	72.2	5.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.019	12.258	0.025	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S15.000	13.497	0.080	169.6	0.019	5.00	0.0	0.600	o	225	Pipe/Conduit	
S15.001	23.170	0.137	169.6	0.007	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.002	30.254	0.334	90.6	0.007	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.003	35.074	0.900	39.0	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.004	30.286	1.200	25.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.005	9.822	0.058	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.006	38.966	1.842	21.2	0.009	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.007	14.031	0.083	169.6	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.008	21.819	0.129	169.6	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.019	44.54	10.35	6.144	2.357	0.0	0.0	57.9	1.17	417.0	347.2
S15.000	50.00	5.22	10.225	0.019	0.0	0.0	0.5	1.00	39.8	3.1
S15.001	50.00	5.61	10.145	0.026	0.0	0.0	0.7	1.00	39.8	4.2
S15.002	50.00	5.98	10.009	0.033	0.0	0.0	0.9	1.37	54.6	5.4
S15.003	50.00	6.26	9.675	0.049	0.0	0.0	1.3	2.10	83.6	7.9
S15.004	50.00	6.45	8.775	0.049	0.0	0.0	1.3	2.62	104.0	7.9
S15.005	50.00	6.61	7.575	0.049	0.0	0.0	1.3	1.00	39.8	7.9
S15.006	50.00	6.84	7.517	0.058	0.0	0.0	1.6	2.86	113.6	9.4
S15.007	50.00	7.07	5.675	0.071	0.0	0.0	1.9	1.00	39.8	11.5
S15.008	50.00	7.44	5.592	0.074	0.0	0.0	2.0	1.00	39.8	12.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S15.009	24.459	0.144	169.6	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.010	6.068	0.036	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.011	16.037	0.095	169.6	0.037	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.012	11.087	0.065	169.6	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.013	21.863	0.129	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.014	21.863	0.129	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.015	3.552	0.021	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.016	8.110	0.048	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.020	25.539	0.051	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.021	20.106	0.071	283.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S15.009	50.00	7.84	5.464	0.090	0.0	0.0	2.4	1.00	39.8	14.6
S15.010	50.00	7.94	5.319	0.090	0.0	0.0	2.4	1.00	39.8	14.6
S15.011	49.56	8.21	5.284	0.127	0.0	0.0	3.4	1.00	39.8	20.5
S15.012	49.07	8.40	5.189	0.146	0.0	0.0	3.9	1.00	39.8	23.3
S15.013	48.14	8.76	5.124	0.146	0.0	0.0	3.9	1.00	39.8	23.3
S15.014	47.25	9.12	4.995	0.146	0.0	0.0	3.9	1.00	39.8	23.3
S15.015	47.11	9.18	4.866	0.146	0.0	0.0	3.9	1.00	39.8	23.3
S15.016	46.79	9.32	4.845	0.146	0.0	0.0	3.9	1.00	39.8	23.3
S1.020	43.81	10.71	4.347	2.503	0.0	0.0	59.4	1.17	417.0	356.4
S1.021	43.38	10.93	4.296	2.503	0.0	0.0	59.4	1.55	555.1	356.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S16.000	25.314	0.149	169.9	0.139	5.00	0.0	0.600	o	225	Pipe/Conduit	
S17.000	22.496	0.133	169.1	0.136	5.00	0.0	0.600	o	225	Pipe/Conduit	
S16.001	34.485	0.071	486.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S16.002	11.000	0.023	486.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S16.003	2.504	0.005	486.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S16.004	15.241	0.031	486.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S18.000	29.713	0.800	37.1	0.048	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S16.000	50.00	5.42	3.327	0.139	0.0	0.0	3.8	1.00	39.8	22.6
S17.000	50.00	5.37	3.325	0.136	0.0	0.0	3.7	1.00	39.9	22.2
S16.001	50.00	6.24	3.103	0.275	0.0	0.0	7.5	0.71	49.9	44.7
S16.002	50.00	6.50	3.032	0.275	0.0	0.0	7.5	0.71	49.9	44.7
S16.003	50.00	6.55	3.009	0.275	0.0	0.0	7.5	0.71	49.9	44.7
S16.004	50.00	6.91	3.004	0.275	0.0	0.0	7.5	0.71	49.9	44.7
S18.000	50.00	5.23	7.575	0.048	0.0	0.0	1.3	2.15	85.6	7.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S18.001	19.140	0.700	27.3	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S18.002	25.683	1.200	21.4	0.032	0.00	0.0	0.600	o	225	Pipe/Conduit	
S18.003	6.199	0.200	31.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.022	46.659	0.093	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.023	18.064	0.036	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S19.000	8.763	0.052	169.6	0.035	5.00	0.0	0.600	o	225	Pipe/Conduit	
S19.001	3.747	0.022	170.3	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.002	6.550	0.039	167.9	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.003	11.024	0.065	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S18.001	50.00	5.36	6.775	0.067	0.0	0.0	1.8	2.51	99.9	10.9
S18.002	50.00	5.51	6.075	0.099	0.0	0.0	2.7	2.84	113.0	16.1
S18.003	50.00	5.55	4.875	0.099	0.0	0.0	2.7	2.36	93.8	16.1
S1.022	42.14	11.60	2.598	2.878	0.0	0.0	65.7	1.17	417.0	394.1
S1.023	41.69	11.85	2.505	2.878	0.0	0.0	65.7	1.17	417.0	394.1
S19.000	50.00	5.15	3.518	0.035	0.0	0.0	1.0	1.00	39.8	5.7
S19.001	50.00	5.21	3.466	0.048	0.0	0.0	1.3	1.00	39.7	7.8
S19.002	50.00	5.32	3.444	0.061	0.0	0.0	1.7	1.01	40.0	9.9
S19.003	50.00	5.50	3.405	0.061	0.0	0.0	1.7	1.00	39.8	9.9

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S19.004	6.411	0.038	169.6	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.005	7.568	0.045	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.006	6.808	0.040	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.007	25.564	0.151	169.6	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.008	21.061	0.124	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.009	4.207	0.025	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.024	12.634	0.025	500.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S20.000	11.067	0.065	170.3	0.062	5.00	0.0	0.600	o	225	Pipe/Conduit	
S20.001	13.875	0.082	169.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S19.004	50.00	5.61	3.340	0.081	0.0	0.0	2.2	1.00	39.8	13.2
S19.005	50.00	5.73	3.303	0.081	0.0	0.0	2.2	1.00	39.8	13.2
S19.006	50.00	5.85	3.258	0.081	0.0	0.0	2.2	1.00	39.8	13.2
S19.007	50.00	6.27	3.218	0.122	0.0	0.0	3.3	1.00	39.8	19.8
S19.008	50.00	6.62	3.067	0.122	0.0	0.0	3.3	1.00	39.8	19.8
S19.009	50.00	6.69	2.943	0.122	0.0	0.0	3.3	1.00	39.8	19.8
S1.024	41.38	12.03	2.468	2.999	0.0	0.0	67.2	1.17	417.0	403.3
S20.000	50.00	5.18	3.040	0.062	0.0	0.0	1.7	1.00	39.7	10.1
S20.001	50.00	5.42	3.800	0.062	0.0	0.0	1.7	1.00	39.8	10.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.025	21.480	0.043	500.0	0.025	0.00	0.0	0.600	o	675	Pipe/Conduit	
S21.000	24.463	0.729	33.6	0.025	5.00	0.0	0.600	o	225	Pipe/Conduit	
S21.001	16.808	0.099	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.002	28.687	1.001	28.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S22.000	44.827	0.264	169.6	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit	
S21.003	24.725	0.146	169.6	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.025	40.86	12.34	2.443	3.087	0.0	0.0	68.3	1.17	417.0	409.9
S21.000	50.00	5.18	7.904	0.025	0.0	0.0	0.7	2.27	90.1	4.1
S21.001	50.00	5.46	7.175	0.025	0.0	0.0	0.7	1.00	39.8	4.1
S21.002	50.00	5.65	7.076	0.025	0.0	0.0	0.7	2.45	97.5	4.1
S22.000	50.00	5.75	3.688	0.015	0.0	0.0	0.4	1.00	39.8	2.5
S21.003	50.00	6.16	3.424	0.080	0.0	0.0	2.2	1.00	39.8	13.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S23.000	23.110	0.136	169.6	0.038	5.00	0.0	0.600	o	225	Pipe/Conduit	
S21.004	29.096	0.172	169.6	0.042	0.00	0.0	0.600	o	225	Pipe/Conduit	
S24.000	39.526	0.080	494.8	0.391	5.00	0.0	0.600	o	375	Pipe/Conduit	
S21.005	20.855	0.042	494.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S25.000	20.331	0.120	169.6	0.039	5.00	0.0	0.600	o	225	Pipe/Conduit	
S21.006	14.643	0.030	494.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S23.000	50.00	5.38	3.475	0.038	0.0	0.0	1.0	1.00	39.8	6.3
S21.004	50.00	6.64	3.278	0.161	0.0	0.0	4.4	1.00	39.8	26.1
S24.000	50.00	5.82	3.175	0.391	0.0	0.0	10.6	0.81	89.2	63.6
S21.005	50.00	7.03	2.881	0.552	0.0	0.0	14.9	0.91	144.3	89.7
S25.000	50.00	5.34	3.475	0.039	0.0	0.0	1.1	1.00	39.8	6.3
S21.006	50.00	7.29	2.839	0.591	0.0	0.0	16.0	0.91	144.3	96.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S21.007	10.761	0.022	494.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S21.008	8.771	0.018	494.8	0.033	0.00	0.0	0.600	o	450	Pipe/Conduit	
S21.009	25.558	0.052	494.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S21.010	44.532	0.090	494.8	0.074	0.00	0.0	0.600	o	450	Pipe/Conduit	
S26.000	26.943	0.159	169.6	0.052	5.00	0.0	0.600	o	225	Pipe/Conduit	
S26.001	7.354	0.043	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S26.002	25.204	0.149	169.6	0.124	0.00	0.0	0.600	o	225	Pipe/Conduit	
S26.003	13.309	0.078	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S26.004	26.747	0.158	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S21.007	50.00	7.49	2.809	0.591	0.0	0.0	16.0	0.91	144.3	96.0
S21.008	50.00	7.65	2.788	0.624	0.0	0.0	16.9	0.91	144.3	101.4
S21.009	49.80	8.12	2.770	0.624	0.0	0.0	16.9	0.91	144.3	101.4
S21.010	47.69	8.94	2.718	0.698	0.0	0.0	18.0	0.91	144.3	108.2
S26.000	50.00	5.45	3.475	0.052	0.0	0.0	1.4	1.00	39.8	8.4
S26.001	50.00	5.57	3.316	0.052	0.0	0.0	1.4	1.00	39.8	8.4
S26.002	50.00	5.99	3.273	0.176	0.0	0.0	4.8	1.00	39.8	28.6
S26.003	50.00	6.21	3.124	0.176	0.0	0.0	4.8	1.00	39.8	28.6
S26.004	50.00	6.66	3.046	0.176	0.0	0.0	4.8	1.00	39.8	28.6

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S21.011	19.776	0.040	494.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S27.000	7.514	0.044	169.6	0.060	5.00	0.0	0.600	o	225	Pipe/Conduit	
S27.001	1.614	0.010	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S27.002	13.027	0.077	169.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.012	26.689	0.054	494.8	0.029	0.00	0.0	0.600	o	450	Pipe/Conduit	
S28.000	37.780	0.223	169.6	0.061	5.00	0.0	0.600	o	225	Pipe/Conduit	
S28.001	20.178	0.119	169.6	0.093	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S21.011	46.82	9.30	2.628	0.874	0.0	0.0	22.2	0.91	144.3	133.0
S27.000	50.00	5.13	3.975	0.060	0.0	0.0	1.6	1.00	39.8	9.7
S27.001	50.00	5.15	3.931	0.060	0.0	0.0	1.6	1.00	39.8	9.7
S27.002	50.00	5.37	3.921	0.060	0.0	0.0	1.6	1.00	39.8	9.7
S21.012	45.71	9.79	2.588	0.962	0.0	0.0	23.8	0.91	144.3	143.0
S28.000	50.00	5.63	4.775	0.061	0.0	0.0	1.7	1.00	39.8	10.0
S28.001	50.00	5.96	4.552	0.155	0.0	0.0	4.2	1.00	39.8	25.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S21.013	11.765	0.024	494.8	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S29.000	53.782	0.317	169.6	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	
S29.001	21.237	0.125	169.6	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
S29.002	7.362	0.043	169.6	0.046	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.014	20.659	0.042	494.8	0.031	0.00	0.0	0.600	o	525	Pipe/Conduit	
S30.000	35.301	0.208	169.6	0.046	5.00	0.0	0.600	o	225	Pipe/Conduit	
S21.015	5.158	0.010	494.8	0.074	0.00	0.0	0.600	o	525	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S21.013	45.29	9.99	2.459	1.117	0.0	0.0	27.4	1.00	216.5	164.4
S29.000	50.00	5.90	4.475	0.050	0.0	0.0	1.3	1.00	39.8	8.1
S29.001	50.00	6.25	4.158	0.075	0.0	0.0	2.0	1.00	39.8	12.3
S29.002	50.00	6.37	4.033	0.122	0.0	0.0	3.3	1.00	39.8	19.8
S21.014	44.57	10.33	2.436	1.270	0.0	0.0	30.7	1.00	216.5	183.9
S30.000	50.00	5.59	4.075	0.046	0.0	0.0	1.3	1.00	39.8	7.5
S21.015	44.39	10.42	2.394	1.390	0.0	0.0	33.4	1.00	216.5	200.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S21.016	17.607	0.036	494.8	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S21.017	24.354	0.049	494.8	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S21.018	15.039	0.030	494.8	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S21.019	8.545	0.017	494.8	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S21.016	43.80	10.71	2.383	1.390	0.0	0.0	33.4	1.00	216.5	200.5
S21.017	43.02	11.12	2.348	1.390	0.0	0.0	33.4	1.00	216.5	200.5
S21.018	42.55	11.37	2.299	1.390	0.0	0.0	33.4	1.00	216.5	200.5
S21.019	42.29	11.51	2.268	1.390	0.0	0.0	33.4	1.00	216.5	200.5

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	User	-	100	0.014	0.014	0.014
1.002	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.006	0.006	0.006
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	User	-	100	0.009	0.009	0.009
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
1.009	User	-	100	0.097	0.097	0.097
1.010	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.006	0.006	0.006
	User	-	100	0.015	0.015	0.021
	User	-	100	0.006	0.006	0.027
2.001	-	-	100	0.000	0.000	0.000
2.002	-	-	100	0.000	0.000	0.000
1.011	User	-	100	0.109	0.109	0.109
	User	-	100	0.006	0.006	0.115
3.000	User	-	100	0.058	0.058	0.058
3.001	-	-	100	0.000	0.000	0.000
3.002	User	-	100	0.029	0.029	0.029
4.000	User	-	100	0.069	0.069	0.069
4.001	-	-	100	0.000	0.000	0.000
3.003	User	-	100	0.054	0.054	0.054
5.000	User	-	100	0.075	0.075	0.075
5.001	-	-	100	0.000	0.000	0.000
3.004	-	-	100	0.000	0.000	0.000
3.005	User	-	100	0.035	0.035	0.035

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	100	0.006	0.006	0.041
6.000	User	-	100	0.032	0.032	0.032
6.001	-	-	100	0.000	0.000	0.000
3.006	-	-	100	0.000	0.000	0.000
7.000	User	-	100	0.040	0.040	0.040
7.001	-	-	100	0.000	0.000	0.000
3.007	-	-	100	0.000	0.000	0.000
1.012	User	-	100	0.025	0.025	0.025
	User	-	100	0.027	0.027	0.052
8.000	User	-	100	0.058	0.058	0.058
8.001	-	-	100	0.000	0.000	0.000
8.002	User	-	100	0.020	0.020	0.020
8.003	-	-	100	0.000	0.000	0.000
9.000	User	-	100	0.051	0.051	0.051
9.001	-	-	100	0.000	0.000	0.000
8.004	-	-	100	0.000	0.000	0.000
10.000	User	-	100	0.086	0.086	0.086
10.001	-	-	100	0.000	0.000	0.000
8.005	-	-	100	0.000	0.000	0.000
8.006	User	-	100	0.010	0.010	0.010
8.007	-	-	100	0.000	0.000	0.000
11.000	User	-	100	0.090	0.090	0.090
11.001	-	-	100	0.000	0.000	0.000
8.008	-	-	100	0.000	0.000	0.000
12.000	User	-	100	0.075	0.075	0.075
12.001	-	-	100	0.000	0.000	0.000
8.009	User	-	100	0.013	0.013	0.013
8.010	-	-	100	0.000	0.000	0.000

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.013	-	-	100	0.000	0.000	0.000
1.014	User	-	100	0.016	0.016	0.016
1.015	-	-	100	0.000	0.000	0.000
13.000	User	-	100	0.258	0.258	0.258
	User	-	100	0.170	0.170	0.428
	User	-	100	0.123	0.123	0.551
	User	-	100	0.564	0.564	1.115
13.001	-	-	100	0.000	0.000	0.000
13.002	-	-	100	0.000	0.000	0.000
1.016	User	-	100	0.022	0.022	0.022
1.017	User	-	100	0.049	0.049	0.049
1.018	-	-	100	0.000	0.000	0.000
14.000	User	-	100	0.011	0.011	0.011
	User	-	100	0.022	0.022	0.033
14.001	-	-	100	0.000	0.000	0.000
14.002	-	-	100	0.000	0.000	0.000
1.019	-	-	100	0.000	0.000	0.000
15.000	User	-	100	0.019	0.019	0.019
15.001	User	-	100	0.007	0.007	0.007
15.002	User	-	100	0.007	0.007	0.007
15.003	User	-	100	0.016	0.016	0.016
15.004	-	-	100	0.000	0.000	0.000
15.005	-	-	100	0.000	0.000	0.000
15.006	User	-	100	0.009	0.009	0.009
15.007	User	-	100	0.013	0.013	0.013
15.008	User	-	100	0.003	0.003	0.003
15.009	User	-	100	0.016	0.016	0.016
15.010	-	-	100	0.000	0.000	0.000

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
15.011	User	-	100	0.037	0.037	0.037
15.012	User	-	100	0.019	0.019	0.019
15.013	-	-	100	0.000	0.000	0.000
15.014	-	-	100	0.000	0.000	0.000
15.015	-	-	100	0.000	0.000	0.000
15.016	-	-	100	0.000	0.000	0.000
1.020	-	-	100	0.000	0.000	0.000
1.021	-	-	100	0.000	0.000	0.000
16.000	User	-	100	0.139	0.139	0.139
17.000	User	-	100	0.031	0.031	0.031
	User	-	100	0.105	0.105	0.136
16.001	-	-	100	0.000	0.000	0.000
16.002	-	-	100	0.000	0.000	0.000
16.003	-	-	100	0.000	0.000	0.000
16.004	-	-	100	0.000	0.000	0.000
18.000	User	-	100	0.048	0.048	0.048
18.001	User	-	100	0.019	0.019	0.019
18.002	User	-	100	0.032	0.032	0.032
18.003	-	-	100	0.000	0.000	0.000
1.022	-	-	100	0.000	0.000	0.000
1.023	-	-	100	0.000	0.000	0.000
19.000	User	-	100	0.019	0.019	0.019
	User	-	100	0.016	0.016	0.035
19.001	-	-	100	0.013	0.013	0.013
19.002	-	-	100	0.013	0.013	0.013
19.003	-	-	100	0.000	0.000	0.000
19.004	User	-	100	0.020	0.020	0.020
19.005	-	-	100	0.000	0.000	0.000

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
19.006	-	-	100	0.000	0.000	0.000
19.007	User	-	100	0.025	0.025	0.025
	User	-	100	0.015	0.015	0.040
19.008	-	-	100	0.000	0.000	0.000
19.009	-	-	100	0.000	0.000	0.000
1.024	-	-	100	0.000	0.000	0.000
20.000	User	-	100	0.030	0.030	0.030
	User	-	100	0.033	0.033	0.062
20.001	-	-	100	0.000	0.000	0.000
1.025	User	-	100	0.025	0.025	0.025
21.000	User	-	100	0.025	0.025	0.025
21.001	-	-	100	0.000	0.000	0.000
21.002	-	-	100	0.000	0.000	0.000
22.000	User	-	100	0.015	0.015	0.015
21.003	User	-	100	0.040	0.040	0.040
23.000	User	-	100	0.038	0.038	0.038
21.004	User	-	100	0.042	0.042	0.042
24.000	User	-	100	0.192	0.192	0.192
	User	-	100	0.199	0.199	0.391
21.005	-	-	100	0.000	0.000	0.000
25.000	User	-	100	0.039	0.039	0.039
21.006	-	-	100	0.000	0.000	0.000
21.007	-	-	100	0.000	0.000	0.000
21.008	User	-	100	0.033	0.033	0.033
21.009	-	-	100	0.000	0.000	0.000
21.010	User	-	100	0.074	0.074	0.074
26.000	User	-	100	0.052	0.052	0.052
26.001	-	-	100	0.000	0.000	0.000

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
26.002	User	-	100	0.124	0.124	0.124
26.003	-	-	100	0.000	0.000	0.000
26.004	-	-	100	0.000	0.000	0.000
21.011	-	-	100	0.000	0.000	0.000
27.000	User	-	100	0.047	0.047	0.047
	User	-	100	0.013	0.013	0.060
27.001	-	-	100	0.000	0.000	0.000
27.002	-	-	100	0.000	0.000	0.000
21.012	User	-	100	0.029	0.029	0.029
28.000	User	-	100	0.007	0.007	0.007
	User	-	100	0.016	0.016	0.023
	User	-	100	0.022	0.022	0.045
	User	-	100	0.016	0.016	0.061
28.001	User	-	100	0.016	0.016	0.016
	User	-	100	0.022	0.022	0.038
	User	-	100	0.016	0.016	0.054
	User	-	100	0.012	0.012	0.066
	User	-	100	0.012	0.012	0.079
	User	-	100	0.014	0.014	0.093
21.013	-	-	100	0.000	0.000	0.000
29.000	User	-	100	0.050	0.050	0.050
29.001	User	-	100	0.026	0.026	0.026
29.002	User	-	100	0.038	0.038	0.038
	User	-	100	0.008	0.008	0.046
21.014	User	-	100	0.031	0.031	0.031
30.000	User	-	100	0.029	0.029	0.029
	User	-	100	0.012	0.012	0.041
	User	-	100	0.005	0.005	0.046

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
21.015	User	-	100	0.030	0.030	0.030
	User	-	100	0.044	0.044	0.074
21.016	-	-	100	0.000	0.000	0.000
21.017	-	-	100	0.000	0.000	0.000
21.018	-	-	100	0.000	0.000	0.000
21.019	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				4.477	4.477	4.477

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.025	S	4.400	2.400	2.400	0	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S21.019	S	4.730	2.251	2.251	0	0

Online Controls for Storm

Orifice Manhole: S70, DS/PN: S2.001, Volume (m^3): 1.8

Diameter (m) 0.021 Discharge Coefficient 0.600 Invert Level (m) 9.040

Orifice Manhole: S20, DS/PN: S3.001, Volume (m^3): 1.4

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 7.726

Orifice Manhole: S120, DS/PN: S4.001, Volume (m^3): 1.7

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 7.304

Orifice Manhole: S21, DS/PN: S5.001, Volume (m^3): 1.8

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 7.398

Orifice Manhole: S30, DS/PN: S6.001, Volume (m^3): 1.7

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 7.862

Orifice Manhole: S33, DS/PN: S7.001, Volume (m^3): 1.7

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 8.161

Orifice Manhole: S37, DS/PN: S8.001, Volume (m³): 1.7

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 8.860

Orifice Manhole: S39, DS/PN: S9.001, Volume (m³): 1.7

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 8.760

Orifice Manhole: S41, DS/PN: S12.001, Volume (m³): 1.7

Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 8.161

Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.014, Volume (m³): 9.6

Unit Reference	MD-SHE-0057-2000-2000-2000	Sump Available	Yes
Design Head (m)	2.000	Diameter (mm)	57
Design Flow (l/s)	2.0	Invert Level (m)	6.506
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	75
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	2.0	Kick-Flo®	0.506	1.1
Flush-Flo™	0.247	1.3	Mean Flow over Head Range	-	1.5

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

Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.014, Volume (m^3): 9.6

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.2	0.600	1.2	1.600	1.8	2.600	2.3	5.000	3.0	7.500	3.7
0.200	1.3	0.800	1.3	1.800	1.9	3.000	2.4	5.500	3.2	8.000	3.8
0.300	1.3	1.000	1.5	2.000	2.0	3.500	2.6	6.000	3.3	8.500	3.9
0.400	1.3	1.200	1.6	2.200	2.1	4.000	2.7	6.500	3.4	9.000	4.0
0.500	1.1	1.400	1.7	2.400	2.2	4.500	2.9	7.000	3.6	9.500	4.1

Hydro-Brake® Optimum Manhole: S2, DS/PN: S13.001, Volume (m^3): 4.5

Unit Reference	MD-SHE-0104-4000-0300-4000	Sump Available	Yes
Design Head (m)	0.300	Diameter (mm)	104
Design Flow (l/s)	4.0	Invert Level (m)	8.759
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.300	4.0	Kick-Flo®	0.247	3.7
Flush-Flo™	0.149	4.0	Mean Flow over Head Range	-	3.1

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.5	0.300	4.0	0.500	5.1	0.800	6.3	1.200	7.6	1.600	8.7
0.200	3.9	0.400	4.6	0.600	5.5	1.000	7.0	1.400	8.2	1.800	9.2

Hydro-Brake® Optimum Manhole: S2, DS/PN: S13.001, Volume (m^3): 4.5

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.000	9.7	2.600	11.0	4.000	13.5	5.500	15.9	7.000	17.9	8.500	19.8
2.200	10.2	3.000	11.8	4.500	14.3	6.000	16.6	7.500	18.6	9.000	20.3
2.400	10.6	3.500	12.6	5.000	15.1	6.500	17.3	8.000	19.2	9.500	20.9

Orifice Manhole: S37, DS/PN: S14.001, Volume (m^3): 1.8

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 8.431

Orifice Manhole: S41, DS/PN: S15.001, Volume (m^3): 2.2

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 10.145

Orifice Manhole: S42, DS/PN: S15.002, Volume (m^3): 2.9

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 10.009

Orifice Manhole: S43, DS/PN: S15.003, Volume (m^3): 2.8

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 9.675

Orifice Manhole: S44, DS/PN: S15.004, Volume (m^3): 3.0

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 8.775

Orifice Manhole: S45, DS/PN: S15.005, Volume (m^3): 2.8

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 7.575

Orifice Manhole: S46, DS/PN: S15.006, Volume (m^3): 2.6

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 7.517

Orifice Manhole: S47, DS/PN: S15.007, Volume (m^3): 3.1

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 5.675

Orifice Manhole: S48, DS/PN: S15.008, Volume (m^3): 2.2

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 5.592

Orifice Manhole: S49, DS/PN: S15.009, Volume (m^3): 2.7

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 5.464

Orifice Manhole: S51, DS/PN: S15.011, Volume (m^3): 2.2

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 5.284

Orifice Manhole: S52, DS/PN: S15.012, Volume (m^3): 3.3

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 5.189

Orifice Manhole: S53, DS/PN: S15.013, Volume (m^3): 3.4

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 5.124

Orifice Manhole: S54, DS/PN: S15.014, Volume (m^3): 4.0

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 4.995

Orifice Manhole: S55, DS/PN: S15.015, Volume (m^3): 4.7

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 4.866

Hydro-Brake® Optimum Manhole: S24, DS/PN: S16.004, Volume (m^3): 3.1

Unit Reference	MD-SHE-0061-2000-1500-2000	Sump Available	Yes
Design Head (m)	1.500	Diameter (mm)	61
Design Flow (l/s)	2.0	Invert Level (m)	3.004
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	75
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	**Head (m)**	**Flow (l/s)**	**Control Points**	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.500	2.0	Kick-Flo®	0.545	1.3
Flush-Flo™	0.269	1.6	Mean Flow over Head Range	-	1.5

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

Hydro-Brake® Optimum Manhole: S24, DS/PN: S16.004, Volume (m^3): 3.1

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.3	0.600	1.3	1.600	2.1	2.600	2.6	5.000	3.5	7.500	4.2
0.200	1.5	0.800	1.5	1.800	2.2	3.000	2.7	5.500	3.6	8.000	4.3
0.300	1.6	1.000	1.7	2.000	2.3	3.500	3.0	6.000	3.8	8.500	4.5
0.400	1.5	1.200	1.8	2.200	2.4	4.000	3.1	6.500	3.9	9.000	4.6
0.500	1.4	1.400	1.9	2.400	2.5	4.500	3.3	7.000	4.1	9.500	4.7

Orifice Manhole: S49, DS/PN: S18.001, Volume (m^3): 2.7

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 6.775

Orifice Manhole: S50, DS/PN: S18.002, Volume (m^3): 2.3

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 6.075

Orifice Manhole: S51, DS/PN: S18.003, Volume (m^3): 2.6

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 4.875

Orifice Manhole: S55, DS/PN: S19.001, Volume (m^3): 1.8

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 3.466

Orifice Manhole: S56, DS/PN: S19.002, Volume (m^3): 1.6

Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 3.444

Orifice Manhole: S57, DS/PN: S19.003, Volume (m^3): 1.8

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 3.405

Orifice Manhole: S58, DS/PN: S19.004, Volume (m^3): 2.7

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 3.340

Orifice Manhole: S59, DS/PN: S19.005, Volume (m^3): 2.8

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 3.303

Orifice Manhole: S60, DS/PN: S19.006, Volume (m^3): 3.2

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 3.258

Orifice Manhole: S61, DS/PN: S19.007, Volume (m^3): 3.3

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 3.218

Orifice Manhole: S62, DS/PN: S19.008, Volume (m^3): 3.3

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 3.067

Orifice Manhole: S63, DS/PN: S19.009, Volume (m^3): 2.6

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 2.943

Orifice Manhole: S99, DS/PN: S20.001, Volume (m^3): 1.1

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 3.800

Hydro-Brake® Optimum Manhole: S13, DS/PN: S1.025, Volume (m^3): 7.9

Unit Reference	MD-SHE-0142-9500-1000-9500	Sump Available	Yes
Design Head (m)	1.000	Diameter (mm)	142
Design Flow (l/s)	9.5	Invert Level (m)	2.443
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	9.5	Kick-Flo®	0.675	7.9
Flush-Flo™	0.305	9.5	Mean Flow over Head Range	-	8.2

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.1	0.600	8.7	1.600	11.9	2.600	14.9	5.000	20.4	7.500	24.8
0.200	9.2	0.800	8.6	1.800	12.5	3.000	16.0	5.500	21.4	8.000	25.6
0.300	9.5	1.000	9.5	2.000	13.2	3.500	17.2	6.000	22.3	8.500	26.3
0.400	9.4	1.200	10.4	2.200	13.8	4.000	18.3	6.500	23.1	9.000	27.1
0.500	9.2	1.400	11.1	2.400	14.4	4.500	19.4	7.000	24.0	9.500	27.8

Orifice Manhole: S132, DS/PN: S27.001, Volume (m^3): 1.9

Diameter (m) 0.021 Discharge Coefficient 0.600 Invert Level (m) 3.931

Hydro-Brake® Optimum Manhole: S53, DS/PN: S21.016, Volume (m^3): 8.1

Unit Reference	MD-SHE-0093-4200-1300-4200	Sump Available	Yes
Design Head (m)	1.300	Diameter (mm)	93
Design Flow (l/s)	4.2	Invert Level (m)	2.383
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	4.2	Kick-Flo®	0.803	3.4
Flush-Flo™	0.392	4.2	Mean Flow over Head Range	-	3.7

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.9	0.600	4.0	1.600	4.6	2.600	5.8	5.000	7.9	7.500	9.6
0.200	3.9	0.800	3.4	1.800	4.9	3.000	6.2	5.500	8.2	8.000	9.9
0.300	4.1	1.000	3.7	2.000	5.1	3.500	6.7	6.000	8.6	8.500	10.1
0.400	4.2	1.200	4.0	2.200	5.4	4.000	7.1	6.500	8.9	9.000	10.4
0.500	4.2	1.400	4.3	2.400	5.6	4.500	7.5	7.000	9.2	9.500	10.7

Storage Structures for Storm

Filter Drain Manhole: S4, DS/PN: S1.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	10.725	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	38.0		

Filter Drain Manhole: S5, DS/PN: S1.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	10.315	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	23.0		

Filter Drain Manhole: S6, DS/PN: S1.002

Infiltration Coefficient Base (m/hr)	0.00000	Trench Length (m)	27.0
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Diameter (m)	0.225
Safety Factor	1.0	Pipe Depth above Invert (m)	0.100
Porosity	0.30	Number of Pipes	1
Invert Level (m)	10.075	Slope (1:X)	100.0
Trench Width (m)	0.7	Cap Volume Depth (m)	0.000

Filter Drain Manhole: S6, DS/PN: S1.002

Cap Infiltration Depth (m) 0.000

Filter Drain Manhole: S7, DS/PN: S1.003

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	9.875	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	13.6		

Filter Drain Manhole: S9, DS/PN: S1.005

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	9.675	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	11.0		

Filter Drain Manhole: S10, DS/PN: S1.006

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.7
Infiltration Coefficient Side (m/hr)	0.13356	Trench Length (m)	14.0
Safety Factor	1.0	Pipe Diameter (m)	0.225
Porosity	0.30	Pipe Depth above Invert (m)	0.100
Invert Level (m)	9.575	Number of Pipes	1

Filter Drain Manhole: S10, DS/PN: S1.006

Slope (1:X)	100.0	Cap Infiltration Depth (m)	0.000
Cap Volume Depth (m)	0.000		

Filter Drain Manhole: S11, DS/PN: S1.007

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	9.492	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	2.3		

Cellular Storage Manhole: S69, DS/PN: S2.000

Invert Level (m)	9.075	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30
Infiltration Coefficient Side (m/hr)	0.02300		

Depth (m)	**Area (m²)**	**Inf. Area (m²)**	**Depth (m)**	**Area (m²)**	**Inf. Area (m²)**	**Depth (m)**	**Area (m²)**	**Inf. Area (m²)**
0.000	59.0	0.0	1.000	59.0	27.0	1.001	0.0	27.0

Cellular Storage Manhole: S20, DS/PN: S3.001

Invert Level (m)	7.726	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30
Infiltration Coefficient Side (m/hr)	0.13356		

Cellular Storage Manhole: S20, DS/PN: S3.001

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	90.0	0.0	0.800	90.0	32.0	0.801	0.0	32.0

Cellular Storage Manhole: S120, DS/PN: S4.001

Invert Level (m) 7.304 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.13356

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	80.0	0.0	0.800	80.0	39.0	0.801	0.0	39.0

Cellular Storage Manhole: S21, DS/PN: S5.001

Invert Level (m) 7.398 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.13356

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	85.0	0.0	0.800	85.0	37.0	0.801	0.0	37.0

Cellular Storage Manhole: S30, DS/PN: S6.001

Invert Level (m) 7.862 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.13356

Cellular Storage Manhole: S30, DS/PN: S6.001

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	70.0	0.0	0.800	70.0	29.0	0.801	0.0	29.0

Cellular Storage Manhole: S33, DS/PN: S7.001

Invert Level (m) 8.161 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.13356

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	43.0	0.0	0.800	43.0	20.0	0.801	0.0	20.0

Cellular Storage Manhole: S37, DS/PN: S8.001

Invert Level (m) 8.860 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.13356

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	63.0	0.0	0.800	63.0	28.0	0.801	0.0	28.0

Cellular Storage Manhole: S39, DS/PN: S9.001

Invert Level (m) 8.760 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.13356

Cellular Storage Manhole: S39, DS/PN: S9.001

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	84.0	0.0	0.800	84.0	29.0	0.801	0.0	29.0

Cellular Storage Manhole: S39, DS/PN: S10.001

Invert Level (m)	8.360	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30
Infiltration Coefficient Side (m/hr)	0.13356		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.0	0.0	0.800	30.0	17.6	0.801	0.0	17.6

Cellular Storage Manhole: S132, DS/PN: S11.001

Invert Level (m)	7.662	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30
Infiltration Coefficient Side (m/hr)	0.13356		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	38.0	0.0	0.800	38.0	26.0	0.801	0.0	26.0

Cellular Storage Manhole: S41, DS/PN: S12.001

Invert Level (m)	8.161	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30
Infiltration Coefficient Side (m/hr)	0.13356		

Cellular Storage Manhole: S41, DS/PN: S12.001

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	140.0	0.0	0.800	140.0	61.0	0.801	0.0	61.0

Cellular Storage Manhole: S9, DS/PN: S1.014

Invert Level (m) 6.506 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.35932

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	290.0	0.0	2.000	290.0	136.0	2.001	0.0	136.0

Cellular Storage Manhole: S1, DS/PN: S13.000

Invert Level (m) 8.775 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	5260.0	0.0	0.450	5260.0	0.0	0.451	0.0	0.0

Filter Drain Manhole: S36, DS/PN: S14.000

Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.35932 Invert Level (m) 8.575
Safety Factor 1.0 Trench Width (m) 0.7

Filter Drain Manhole: S36, DS/PN: S14.000

Trench Length (m)	6.0	Slope (1:X)	170.0
Pipe Diameter (m)	0.225	Cap Volume Depth (m)	0.000
Pipe Depth above Invert (m)	0.100	Cap Infiltration Depth (m)	0.000
Number of Pipes	1		

Filter Drain Manhole: S37, DS/PN: S14.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	8.431	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	23.0		

Filter Drain Manhole: S40, DS/PN: S15.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	10.225	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	13.5		

Filter Drain Manhole: S41, DS/PN: S15.001

Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	1.0
Infiltration Coefficient Side (m/hr)	0.13356	Porosity	0.30

Filter Drain Manhole: S41, DS/PN: S15.001

Invert Level (m)	10.145	Number of Pipes	1
Trench Width (m)	0.7	Slope (1:X)	100.0
Trench Length (m)	23.0	Cap Volume Depth (m)	0.000
Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Pipe Depth above Invert (m)	0.100		

Filter Drain Manhole: S42, DS/PN: S15.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	10.009	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	30.0		

Filter Drain Manhole: S43, DS/PN: S15.003

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	9.675	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	35.0		

Filter Drain Manhole: S44, DS/PN: S15.004

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	8.775	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	30.0		

Filter Drain Manhole: S45, DS/PN: S15.005

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	7.575	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	10.0		

Filter Drain Manhole: S46, DS/PN: S15.006

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	7.517	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	39.0		

Filter Drain Manhole: S47, DS/PN: S15.007

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	5.675	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	14.0		

Filter Drain Manhole: S48, DS/PN: S15.008

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	5.592	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	22.0		

Filter Drain Manhole: S49, DS/PN: S15.009

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	5.464	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	24.0		

Filter Drain Manhole: S51, DS/PN: S15.011

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	5.284	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	16.0		

Filter Drain Manhole: S52, DS/PN: S15.012

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	5.189	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	11.0		

Filter Drain Manhole: S53, DS/PN: S15.013

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	5.124	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	22.0		

Filter Drain Manhole: S54, DS/PN: S15.014

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.13356	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	4.995	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	25.0		

Cellular Storage Manhole: S23, DS/PN: S16.003

Invert Level (m)	3.009	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.13356		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	121.0	0.0	1.500	121.0	95.0	1.501	0.0	95.0

Filter Drain Manhole: S48, DS/PN: S18.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	7.575	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	30.0		

Filter Drain Manhole: S49, DS/PN: S18.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	6.775	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	19.0		

Filter Drain Manhole: S50, DS/PN: S18.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	6.075	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	25.0		

Filter Drain Manhole: S54, DS/PN: S19.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	3.518	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000
Trench Length (m)	8.7		

Filter Drain Manhole: S55, DS/PN: S19.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	3.466	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000
Trench Length (m)	3.7		

Filter Drain Manhole: S57, DS/PN: S19.003

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	3.406	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000
Trench Length (m)	11.0		

Filter Drain Manhole: S59, DS/PN: S19.005

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	3.303	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000
Trench Length (m)	14.0		

Filter Drain Manhole: S60, DS/PN: S19.006

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	3.258	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	6.8		

Filter Drain Manhole: S61, DS/PN: S19.007

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	3.218	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	25.5		

Filter Drain Manhole: S62, DS/PN: S19.008

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.35932	Pipe Depth above Invert (m)	0.100
Safety Factor	1.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	170.0
Invert Level (m)	3.067	Cap Volume Depth (m)	0.000
Trench Width (m)	0.7	Cap Infiltration Depth (m)	0.000
Trench Length (m)	21.0		

Infiltration Basin Manhole: S98, DS/PN: S20.000

Invert Level (m) 3.040 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.35932

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	166.0	1.000	166.0	1.001	0.0

Cellular Storage Manhole: S131, DS/PN: S27.000

Invert Level (m) 3.975 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.02300

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	113.0	0.0	1.000	113.0	37.0	1.001	0.0	37.0

Cellular Storage Manhole: S53, DS/PN: S21.016

Invert Level (m) 2.383 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.35932

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	617.0	0.0	1.300	617.0	130.0	1.301	0.0	130.0

5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	43	Number of Storage Structures	50	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	16.100	Cv (Summer)	0.750
Region	Scotland and Ireland	Ratio R	0.278	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	5, 30, 100
Climate Change (%)	20, 20, 20

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status

5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m^3)	Pipe Flow (l/s)	Status
S1.000	S4	15 minute 5 year Summer I+20%	11.650	0.000	0.0	OK
S1.001	S5	15 minute 5 year Winter I+20%	11.240	1.319	2.4	OK
S1.002	S6	15 minute 5 year Winter I+20%	11.000	1.316	2.3	OK
S1.003	S7	15 minute 5 year Winter I+20%	10.800	1.884	3.3	OK
S1.004	S8	15 minute 5 year Winter I+20%	10.700	1.884	3.3	OK
S1.005	S9	15 minute 5 year Winter I+20%	10.600	1.881	3.3	OK
S1.006	S10	15 minute 5 year Winter I+20%	10.500	2.672	4.6	OK
S1.007	S11	15 minute 5 year Winter I+20%	10.500	2.660	4.8	OK
S1.008	S12	15 minute 5 year Winter I+20%	10.500	2.660	5.0	OK
S1.009	S4	15 minute 5 year Winter I+20%	10.500	11.697	19.4	OK
S1.010	S5	15 minute 5 year Winter I+20%	10.500	11.697	19.5	OK
S2.000	S69	180 minute 5 year Winter I+20%	10.500	5.753	0.4	OK
S2.001	S70	180 minute 5 year Winter I+20%	10.500	5.654	0.4	SURCHARGED
S2.002	S71	15 minute 5 year Winter I+20%	10.500	0.832	0.6	OK
S1.011	S6	15 minute 5 year Winter I+20%	10.500	23.205	37.8	OK
S3.000	S19	240 minute 5 year Winter I+20%	8.754	15.903	2.6	SURCHARGED
S3.001	S20	240 minute 5 year Winter I+20%	8.850	9.743	0.6	SURCHARGED
S3.002	S7	15 minute 5 year Winter I+20%	8.750	3.928	5.2	OK
S4.000	S119	240 minute 5 year Winter I+20%	8.750	18.731	3.1	SURCHARGED
S4.001	S120	240 minute 5 year Winter I+20%	8.750	8.557	0.5	SURCHARGED
S3.003	S20	15 minute 5 year Winter I+20%	8.850	10.202	14.1	OK
S5.000	S20	180 minute 5 year Winter I+20%	8.850	18.515	4.1	SURCHARGED
S5.001	S21	180 minute 5 year Winter I+20%	8.850	9.437	0.7	SURCHARGED
S3.004	S8	1440 minute 5 year Winter I+20%	9.000	106.127	2.6	OK
S3.005	S9	1440 minute 5 year Winter I+20%	9.150	126.852	3.1	OK
S6.000	S29	180 minute 5 year Winter I+20%	9.300	7.880	1.7	OK

5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S6.001	S30	180 minute 5 year Winter I+20%	9.300	5.286	0.5	OK
S3.006	S29	1440 minute 5 year Winter I+20%	9.300	138.576	3.3	OK
S7.000	S32	120 minute 5 year Winter I+20%	9.600	8.535	2.7	SURCHARGED
S7.001	S33	120 minute 5 year Winter I+20%	9.600	5.662	0.6	SURCHARGED
S3.007	S10	1440 minute 5 year Winter I+20%	9.600	154.412	3.5	SURCHARGED
S1.012	S7	1440 minute 5 year Winter I+20%	10.500	313.512	7.7	SURCHARGED
S8.000	S36	240 minute 5 year Winter I+20%	10.300	15.660	2.5	SURCHARGED
S8.001	S37	240 minute 5 year Winter I+20%	10.300	7.963	0.5	SURCHARGED
S8.002	S31	15 minute 5 year Winter I+20%	10.300	3.144	3.6	OK
S8.003	S32	15 minute 5 year Winter I+20%	10.200	3.121	3.5	OK
S9.000	S38	180 minute 5 year Winter I+20%	10.200	12.656	2.8	SURCHARGED
S9.001	S39	180 minute 5 year Winter I+20%	10.200	7.640	0.6	SURCHARGED
S8.004	S38	30 minute 5 year Winter I+20%	9.800	4.385	3.7	OK
S10.000	S38	15 minute 5 year Winter I+20%	9.800	7.989	16.9	OK
S10.001	S39	30 minute 5 year Winter I+20%	9.800	5.892	12.2	OK
S8.005	S38	30 minute 5 year Winter I+20%	9.800	10.232	15.7	OK
S8.006	S33	30 minute 5 year Winter I+20%	9.800	11.476	17.1	OK
S8.007	S34	30 minute 5 year Winter I+20%	9.100	11.449	17.1	OK
S11.000	S131	15 minute 5 year Winter I+20%	9.100	8.392	17.8	OK
S11.001	S132	30 minute 5 year Winter I+20%	9.100	5.151	11.1	OK
S8.008	S40	30 minute 5 year Winter I+20%	9.100	16.554	27.4	OK
S12.000	S40	240 minute 5 year Winter I+20%	9.600	20.387	3.4	SURCHARGED
S12.001	S41	240 minute 5 year Winter I+20%	9.600	9.417	0.5	SURCHARGED
S8.009	S35	30 minute 5 year Winter I+20%	9.600	19.266	29.3	OK
S8.010	S36	30 minute 5 year Winter I+20%	9.490	19.162	29.1	OK
S1.013	S8	1440 minute 5 year Winter I+20%	10.500	422.368	11.0	SURCHARGED

5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m^3)	Pipe Flow (l/s)	Status
S1.014	S9	1440 minute 5 year Winter I+20%	10.500	142.580	1.3	SURCHARGED
S1.015	S10	7200 minute 5 year Winter I+20%	10.500	334.522	1.3	OK
S13.000	S1	2160 minute 5 year Winter I+20%	10.500	602.458	5.8	OK
S13.001	S2	2160 minute 5 year Winter I+20%	10.500	601.981	3.9	OK
S13.002	S3	2160 minute 5 year Winter I+20%	10.500	602.024	3.9	OK
S1.016	S4	30 minute 5 year Winter I+20%	10.500	11.753	5.2	OK
S1.017	S5	15 minute 5 year Winter I+20%	10.395	14.971	11.9	OK
S1.018	S6	30 minute 5 year Winter I+20%	9.960	17.333	11.7	OK
S14.000	S36	30 minute 5 year Winter I+20%	10.000	4.006	4.4	OK
S14.001	S37	30 minute 5 year Winter I+20%	9.856	1.907	0.7	SURCHARGED
S14.002	S38	30 minute 5 year Winter I+20%	8.545	1.898	0.7	OK
S1.019	S7	30 minute 5 year Winter I+20%	8.415	18.902	12.4	OK
S15.000	S40	60 minute 5 year Winter I+20%	11.650	2.876	1.5	OK
S15.001	S41	60 minute 5 year Winter I+20%	11.700	3.130	0.6	SURCHARGED
S15.002	S42	120 minute 5 year Winter I+20%	11.800	4.879	0.6	OK
S15.003	S43	120 minute 5 year Winter I+20%	11.100	6.560	0.7	SURCHARGED
S15.004	S44	180 minute 5 year Winter I+20%	10.200	6.724	0.6	OK
S15.005	S45	240 minute 5 year Winter I+20%	9.000	6.174	0.5	OK
S15.006	S46	120 minute 5 year Winter I+20%	9.500	5.713	0.5	OK
S15.007	S47	240 minute 5 year Winter I+20%	7.100	7.998	0.5	SURCHARGED
S15.008	S48	240 minute 5 year Winter I+20%	7.100	6.226	0.4	SURCHARGED
S15.009	S49	240 minute 5 year Winter I+20%	7.100	6.705	0.5	SURCHARGED
S15.010	S50	120 minute 5 year Winter I+20%	7.100	3.072	0.5	SURCHARGED
S15.011	S51	120 minute 5 year Winter I+20%	7.100	6.187	0.5	SURCHARGED
S15.012	S52	120 minute 5 year Winter I+20%	7.550	6.961	0.8	SURCHARGED
S15.013	S53	240 minute 5 year Winter I+20%	7.800	11.179	0.6	OK

5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S15.014	S54	240 minute 5 year Winter I+20%	7.823	10.249	0.5	OK
S15.015	S55	360 minute 5 year Winter I+20%	8.300	12.155	0.5	OK
S15.016	S56	360 minute 5 year Winter I+20%	8.300	12.151	0.5	OK
S1.020	S8	30 minute 5 year Winter I+20%	8.200	19.379	12.4	OK
S1.021	S9	30 minute 5 year Winter I+20%	7.000	19.179	12.5	OK
S16.000	S20	15 minute 5 year Winter I+20%	4.755	12.941	26.7	OK
S17.000	S21	15 minute 5 year Winter I+20%	4.755	12.718	26.4	OK
S16.001	S21	480 minute 5 year Winter I+20%	4.750	95.085	8.1	SURCHARGED
S16.002	S22	480 minute 5 year Winter I+20%	5.391	95.094	7.7	SURCHARGED
S16.003	S23	480 minute 5 year Winter I+20%	5.700	67.386	4.0	SURCHARGED
S16.004	S24	480 minute 5 year Winter I+20%	5.700	67.467	1.6	SURCHARGED
S18.000	S48	15 minute 5 year Winter I+20%	9.000	4.416	9.4	OK
S18.001	S49	60 minute 5 year Winter I+20%	8.200	4.578	1.2	SURCHARGED
S18.002	S50	60 minute 5 year Winter I+20%	7.500	4.303	0.9	SURCHARGED
S18.003	S51	120 minute 5 year Winter I+20%	6.300	5.915	0.8	SURCHARGED
S1.022	S10	240 minute 5 year Winter I+20%	6.100	183.678	10.5	OK
S1.023	S11	240 minute 5 year Winter I+20%	4.825	182.708	9.0	OK
S19.000	S54	60 minute 5 year Winter I+20%	4.750	2.187	0.8	SURCHARGED
S19.001	S55	60 minute 5 year Winter I+20%	4.750	1.795	0.5	SURCHARGED
S19.002	S56	60 minute 5 year Winter I+20%	4.750	3.725	1.3	SURCHARGED
S19.003	S57	120 minute 5 year Winter I+20%	4.840	1.161	0.3	SURCHARGED
S19.004	S58	30 minute 5 year Winter I+20%	5.390	1.641	0.9	SURCHARGED
S19.005	S59	120 minute 5 year Winter I+20%	5.600	2.815	0.3	OK
S19.006	S60	120 minute 5 year Winter I+20%	5.900	1.362	0.4	OK
S19.007	S61	60 minute 5 year Winter I+20%	5.900	3.427	0.8	SURCHARGED
S19.008	S62	120 minute 5 year Winter I+20%	5.100	4.224	0.4	OK

5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S19.009	S63	120 minute 5 year Winter I+20%	4.500	4.161	0.4	OK
S1.024	S12	240 minute 5 year Winter I+20%	4.533	188.153	9.2	OK
S20.000	S98	360 minute 5 year Winter I+20%	4.400	0.184	0.1	OK
S20.001	S99	360 minute 5 year Winter I+20%	4.400	0.000	0.0	OK
S1.025	S13	240 minute 5 year Winter I+20%	4.400	194.158	9.5	OK
S21.000	S37	15 minute 5 year Winter I+20%	9.329	2.329	5.0	OK
S21.001	S38	15 minute 5 year Winter I+20%	8.600	2.329	4.9	OK
S21.002	S39	15 minute 5 year Winter I+20%	9.400	2.329	5.0	OK
S22.000	S40	15 minute 5 year Winter I+20%	4.750	1.411	2.9	OK
S21.003	S40	15 minute 5 year Winter I+20%	7.500	7.453	14.4	OK
S23.000	S142	15 minute 5 year Winter I+20%	4.900	3.586	7.5	OK
S21.004	S41	15 minute 5 year Winter I+20%	6.000	14.977	28.2	OK
S24.000	S117	15 minute 5 year Winter I+20%	4.900	36.440	75.2	OK
S21.005	S42	15 minute 5 year Winter I+20%	5.120	51.425	91.4	OK
S25.000	S119	15 minute 5 year Winter I+20%	4.900	3.628	7.6	OK
S21.006	S43	15 minute 5 year Winter I+20%	5.070	55.054	96.7	SURCHARGED
S21.007	S44	15 minute 5 year Winter I+20%	5.300	55.054	95.6	SURCHARGED
S21.008	S45	15 minute 5 year Winter I+20%	5.400	58.141	96.1	OK
S21.009	S46	15 minute 5 year Winter I+20%	5.500	58.141	94.0	OK
S21.010	S47	15 minute 5 year Winter I+20%	5.400	65.057	92.2	OK
S26.000	S49	15 minute 5 year Winter I+20%	4.900	4.833	10.1	OK
S26.001	S50	15 minute 5 year Winter I+20%	4.900	4.833	10.1	OK
S26.002	S51	15 minute 5 year Winter I+20%	4.900	16.377	30.2	OK
S26.003	S52	15 minute 5 year Winter I+20%	4.875	16.377	30.2	OK
S26.004	S53	15 minute 5 year Winter I+20%	4.875	16.377	29.8	OK
S21.011	S48	15 minute 5 year Winter I+20%	5.300	81.433	106.9	OK

5 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S27.000	S131	480 minute 5 year Winter I+20%	5.400	17.240	0.5	SURCHARGED
S27.001	S132	480 minute 5 year Winter I+20%	5.400	17.097	0.4	SURCHARGED
S27.002	S133	2160 minute 5 year Winter I+20%	5.400	31.779	0.4	OK
S21.012	S49	30 minute 5 year Winter I+20%	5.750	115.121	104.9	OK
S28.000	S56	15 minute 5 year Winter I+20%	6.200	5.726	12.0	OK
S28.001	S57	15 minute 5 year Winter I+20%	6.200	14.400	27.4	OK
S21.013	S50	30 minute 5 year Winter I+20%	6.200	134.005	117.1	OK
S29.000	S63	15 minute 5 year Winter I+20%	5.900	4.633	9.6	OK
S29.001	S64	15 minute 5 year Winter I+20%	6.100	7.028	13.6	OK
S29.002	S65	15 minute 5 year Winter I+20%	6.500	11.327	21.0	OK
S21.014	S51	720 minute 5 year Winter I+20%	6.500	500.152	27.2	OK
S30.000	S63	15 minute 5 year Winter I+20%	5.500	4.322	9.2	OK
S21.015	S52	720 minute 5 year Winter I+20%	6.000	547.502	29.6	OK
S21.016	S53	720 minute 5 year Winter I+20%	6.500	274.418	4.2	OK
S21.017	S54	720 minute 5 year Winter I+20%	6.500	274.255	4.2	OK
S21.018	S55	720 minute 5 year Winter I+20%	5.500	274.036	4.2	OK
S21.019	S56	720 minute 5 year Winter I+20%	4.900	273.879	4.2	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * $10m^3$/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	43	Number of Storage Structures	50	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	16.100	Cv (Summer)	0.750
Region	Scotland and Ireland	Ratio R	0.278	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	5, 30, 100
Climate Change (%)	20, 20, 20

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m^3)	Pipe Flow (l/s)	Status

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S4	15 minute 30 year Summer I+20%	11.650	0.000	0.0	OK
S1.001	S5	15 minute 30 year Winter I+20%	11.240	1.940	4.4	OK
S1.002	S6	15 minute 30 year Winter I+20%	11.000	1.936	4.3	OK
S1.003	S7	15 minute 30 year Winter I+20%	10.800	2.771	6.1	OK
S1.004	S8	15 minute 30 year Winter I+20%	10.700	2.771	6.1	OK
S1.005	S9	15 minute 30 year Winter I+20%	10.600	2.766	6.0	OK
S1.006	S10	15 minute 30 year Winter I+20%	10.500	3.924	9.6	OK
S1.007	S11	15 minute 30 year Winter I+20%	10.500	3.906	11.4	OK
S1.008	S12	15 minute 30 year Winter I+20%	10.500	3.906	11.8	OK
S1.009	S4	15 minute 30 year Winter I+20%	10.500	17.194	32.5	OK
S1.010	S5	15 minute 30 year Winter I+20%	10.500	17.194	32.5	OK
S2.000	S69	240 minute 30 year Winter I+20%	10.500	8.497	0.5	SURCHARGED
S2.001	S70	240 minute 30 year Winter I+20%	10.500	8.338	0.4	SURCHARGED
S2.002	S71	15 minute 30 year Winter I+20%	10.500	0.869	3.2	SURCHARGED
S1.011	S6	15 minute 30 year Winter I+20%	10.500	33.767	60.8	SURCHARGED
S3.000	S19	240 minute 30 year Winter I+20%	8.754	22.825	3.8	SURCHARGED
S3.001	S20	240 minute 30 year Winter I+20%	8.850	12.729	0.7	SURCHARGED
S3.002	S7	15 minute 30 year Winter I+20%	8.750	5.506	9.4	OK
S4.000	S119	240 minute 30 year Winter I+20%	8.750	26.875	4.4	SURCHARGED
S4.001	S120	240 minute 30 year Winter I+20%	8.750	11.143	0.7	SURCHARGED
S3.003	S20	960 minute 30 year Winter I+20%	8.850	91.641	3.2	OK
S5.000	S20	180 minute 30 year Winter I+20%	8.850	26.704	5.9	SURCHARGED
S5.001	S21	180 minute 30 year Winter I+20%	8.850	11.991	0.8	SURCHARGED
S3.004	S8	960 minute 30 year Winter I+20%	9.000	115.870	3.8	SURCHARGED
S3.005	S9	960 minute 30 year Winter I+20%	9.150	140.952	4.8	SURCHARGED
S6.000	S29	180 minute 30 year Winter I+20%	9.300	11.398	2.5	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m^3)	Pipe Flow (l/s)	Status
S6.001	S30	180 minute 30 year Winter I+20%	9.300	7.198	0.6	SURCHARGED
S3.006	S29	960 minute 30 year Winter I+20%	9.300	154.548	4.9	SURCHARGED
S7.000	S32	120 minute 30 year Winter I+20%	9.600	12.389	4.0	SURCHARGED
S7.001	S33	120 minute 30 year Winter I+20%	9.600	7.369	0.8	SURCHARGED
S3.007	S10	960 minute 30 year Winter I+20%	9.600	172.643	5.1	SURCHARGED
S1.012	S7	960 minute 30 year Winter I+20%	10.500	364.518	12.9	SURCHARGED
S8.000	S36	180 minute 30 year Winter I+20%	10.300	20.289	4.4	SURCHARGED
S8.001	S37	180 minute 30 year Winter I+20%	10.300	8.510	0.7	SURCHARGED
S8.002	S31	15 minute 30 year Winter I+20%	10.300	3.533	6.4	OK
S8.003	S32	30 minute 30 year Summer I+20%	10.200	4.410	5.7	OK
S9.000	S38	180 minute 30 year Winter I+20%	10.200	18.261	4.0	SURCHARGED
S9.001	S39	180 minute 30 year Winter I+20%	10.200	9.873	0.7	SURCHARGED
S8.004	S38	15 minute 30 year Winter I+20%	9.800	4.973	6.5	OK
S10.000	S38	15 minute 30 year Winter I+20%	9.800	11.746	24.9	OK
S10.001	S39	15 minute 30 year Winter I+20%	9.800	6.951	21.8	OK
S8.005	S38	15 minute 30 year Winter I+20%	9.800	11.878	26.2	OK
S8.006	S33	15 minute 30 year Winter I+20%	9.800	13.226	28.0	OK
S8.007	S34	15 minute 30 year Winter I+20%	9.100	13.199	28.4	OK
S11.000	S131	15 minute 30 year Winter I+20%	9.100	12.339	26.1	OK
S11.001	S132	30 minute 30 year Summer I+20%	9.100	8.793	20.7	OK
S8.008	S40	30 minute 30 year Summer I+20%	9.100	25.519	47.9	OK
S12.000	S40	240 minute 30 year Winter I+20%	9.600	29.277	4.9	SURCHARGED
S12.001	S41	240 minute 30 year Winter I+20%	9.600	12.060	0.7	SURCHARGED
S8.009	S35	30 minute 30 year Summer I+20%	9.600	28.949	49.8	OK
S8.010	S36	30 minute 30 year Summer I+20%	9.490	28.813	49.6	OK
S1.013	S8	960 minute 30 year Winter I+20%	10.500	507.669	19.0	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.014	S9	960 minute 30 year Winter I+20%	10.500	131.226	1.4	SURCHARGED
S1.015	S10	960 minute 30 year Winter I+20%	10.500	131.151	1.4	OK
S13.000	S1	2160 minute 30 year Winter I+20%	10.500	778.343	6.3	OK
S13.001	S2	2160 minute 30 year Winter I+20%	10.500	778.629	4.1	OK
S13.002	S3	2160 minute 30 year Winter I+20%	10.500	778.590	4.1	OK
S1.016	S4	15 minute 30 year Winter I+20%	10.500	14.092	7.5	OK
S1.017	S5	15 minute 30 year Winter I+20%	10.395	20.450	21.2	OK
S1.018	S6	15 minute 30 year Winter I+20%	9.960	20.157	20.1	OK
S14.000	S36	30 minute 30 year Winter I+20%	10.000	5.809	6.3	SURCHARGED
S14.001	S37	30 minute 30 year Winter I+20%	9.856	2.268	0.9	SURCHARGED
S14.002	S38	30 minute 30 year Winter I+20%	8.545	2.254	0.9	OK
S1.019	S7	15 minute 30 year Winter I+20%	8.415	21.825	20.3	OK
S15.000	S40	60 minute 30 year Winter I+20%	11.650	3.965	1.9	SURCHARGED
S15.001	S41	60 minute 30 year Winter I+20%	11.700	3.704	0.7	SURCHARGED
S15.002	S42	120 minute 30 year Winter I+20%	11.800	6.242	0.7	SURCHARGED
S15.003	S43	120 minute 30 year Winter I+20%	11.100	8.294	0.8	SURCHARGED
S15.004	S44	180 minute 30 year Winter I+20%	10.200	8.189	0.6	OK
S15.005	S45	240 minute 30 year Winter I+20%	9.000	6.825	0.6	SURCHARGED
S15.006	S46	30 minute 30 year Winter I+20%	9.500	1.654	0.6	OK
S15.007	S47	180 minute 30 year Winter I+20%	7.100	8.391	0.7	SURCHARGED
S15.008	S48	240 minute 30 year Winter I+20%	7.100	6.319	0.4	SURCHARGED
S15.009	S49	180 minute 30 year Winter I+20%	7.100	5.061	0.5	SURCHARGED
S15.010	S50	120 minute 30 year Winter I+20%	7.100	1.911	0.6	SURCHARGED
S15.011	S51	120 minute 30 year Winter I+20%	7.100	6.851	0.6	SURCHARGED
S15.012	S52	120 minute 30 year Winter I+20%	7.550	8.204	1.1	SURCHARGED
S15.013	S53	240 minute 30 year Winter I+20%	7.800	12.360	0.6	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S15.014	S54	360 minute 30 year Winter I+20%	7.823	13.689	0.5	OK
S15.015	S55	360 minute 30 year Winter I+20%	8.300	13.686	0.5	OK
S15.016	S56	360 minute 30 year Winter I+20%	8.300	13.684	0.5	OK
S1.020	S8	15 minute 30 year Winter I+20%	8.200	22.422	20.1	OK
S1.021	S9	15 minute 30 year Winter I+20%	7.000	22.218	20.1	OK
S16.000	S20	15 minute 30 year Winter I+20%	4.755	19.027	36.6	SURCHARGED
S17.000	S21	15 minute 30 year Winter I+20%	4.755	18.698	36.1	SURCHARGED
S16.001	S21	480 minute 30 year Winter I+20%	4.750	134.402	10.8	SURCHARGED
S16.002	S22	480 minute 30 year Winter I+20%	5.391	134.024	10.6	SURCHARGED
S16.003	S23	480 minute 30 year Winter I+20%	5.700	76.270	4.2	SURCHARGED
S16.004	S24	600 minute 30 year Winter I+20%	5.700	90.306	1.6	SURCHARGED
S18.000	S48	60 minute 30 year Winter I+20%	9.000	11.163	7.9	OK
S18.001	S49	60 minute 30 year Winter I+20%	8.200	5.738	1.4	SURCHARGED
S18.002	S50	60 minute 30 year Winter I+20%	7.500	5.061	1.0	SURCHARGED
S18.003	S51	120 minute 30 year Winter I+20%	6.300	7.116	0.9	SURCHARGED
S1.022	S10	360 minute 30 year Winter I+20%	6.100	308.936	11.3	OK
S1.023	S11	360 minute 30 year Winter I+20%	4.825	307.818	9.3	OK
S19.000	S54	60 minute 30 year Winter I+20%	4.750	2.726	0.9	SURCHARGED
S19.001	S55	60 minute 30 year Winter I+20%	4.750	2.157	0.6	SURCHARGED
S19.002	S56	60 minute 30 year Winter I+20%	4.750	5.033	1.7	SURCHARGED
S19.003	S57	120 minute 30 year Winter I+20%	4.840	0.579	0.3	SURCHARGED
S19.004	S58	30 minute 30 year Winter I+20%	5.390	2.458	1.3	SURCHARGED
S19.005	S59	120 minute 30 year Winter I+20%	5.600	2.954	0.4	SURCHARGED
S19.006	S60	120 minute 30 year Winter I+20%	5.900	0.954	0.4	SURCHARGED
S19.007	S61	30 minute 30 year Winter I+20%	5.900	2.407	1.0	SURCHARGED
S19.008	S62	120 minute 30 year Winter I+20%	5.100	4.578	0.5	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m^3)	Pipe Flow (l/s)	Status
S19.009	S63	240 minute 30 year Winter I+20%	4.500	6.495	0.5	OK
S1.024	S12	360 minute 30 year Winter I+20%	4.533	315.049	9.2	OK
S20.000	S98	240 minute 30 year Winter I+20%	4.400	0.333	0.2	SURCHARGED
S20.001	S99	240 minute 30 year Winter I+20%	4.400	0.000	0.0	OK
S1.025	S13	360 minute 30 year Winter I+20%	4.400	325.378	9.5	OK
S21.000	S37	15 minute 30 year Winter I+20%	9.329	3.424	7.3	OK
S21.001	S38	15 minute 30 year Winter I+20%	8.600	3.424	7.2	OK
S21.002	S39	15 minute 30 year Winter I+20%	9.400	3.424	7.3	OK
S22.000	S40	15 minute 30 year Winter I+20%	4.750	2.075	4.3	OK
S21.003	S40	15 minute 30 year Winter I+20%	7.500	10.958	20.9	OK
S23.000	S142	15 minute 30 year Winter I+20%	4.900	5.274	10.9	OK
S21.004	S41	15 minute 30 year Winter I+20%	6.000	22.022	36.9	SURCHARGED
S24.000	S117	15 minute 30 year Winter I+20%	4.900	53.589	110.1	SURCHARGED
S21.005	S42	15 minute 30 year Winter I+20%	5.120	75.612	131.7	SURCHARGED
S25.000	S119	15 minute 30 year Winter I+20%	4.900	5.335	11.2	OK
S21.006	S43	15 minute 30 year Winter I+20%	5.070	80.947	140.4	SURCHARGED
S21.007	S44	15 minute 30 year Winter I+20%	5.300	80.947	137.9	SURCHARGED
S21.008	S45	15 minute 30 year Winter I+20%	5.400	85.485	140.7	SURCHARGED
S21.009	S46	15 minute 30 year Winter I+20%	5.500	85.473	134.6	SURCHARGED
S21.010	S47	15 minute 30 year Winter I+20%	5.400	95.643	134.8	SURCHARGED
S26.000	S49	15 minute 30 year Winter I+20%	4.900	7.107	13.6	OK
S26.001	S50	15 minute 30 year Winter I+20%	4.900	7.107	16.4	SURCHARGED
S26.002	S51	15 minute 30 year Winter I+20%	4.900	24.081	44.3	SURCHARGED
S26.003	S52	15 minute 30 year Winter I+20%	4.875	24.081	42.1	SURCHARGED
S26.004	S53	15 minute 30 year Winter I+20%	4.875	24.082	41.0	SURCHARGED
S21.011	S48	15 minute 30 year Winter I+20%	5.300	119.582	167.2	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m^3)	Pipe Flow (l/s)	Status
S27.000	S131	480 minute 30 year Winter I+20%	5.400	21.410	0.5	SURCHARGED
S27.001	S132	480 minute 30 year Winter I+20%	5.400	21.075	0.5	SURCHARGED
S27.002	S133	480 minute 30 year Winter I+20%	5.400	21.062	0.5	OK
S21.012	S49	720 minute 30 year Winter I+20%	5.750	528.416	27.5	SURCHARGED
S28.000	S56	15 minute 30 year Winter I+20%	6.200	8.420	17.6	OK
S28.001	S57	15 minute 30 year Winter I+20%	6.200	21.173	43.3	SURCHARGED
S21.013	S50	720 minute 30 year Winter I+20%	6.200	613.825	31.8	SURCHARGED
S29.000	S63	15 minute 30 year Winter I+20%	5.900	6.812	14.0	OK
S29.001	S64	15 minute 30 year Winter I+20%	6.100	10.332	20.4	OK
S29.002	S65	15 minute 30 year Winter I+20%	6.500	16.653	32.5	SURCHARGED
S21.014	S51	720 minute 30 year Winter I+20%	6.500	697.967	36.4	SURCHARGED
S30.000	S63	15 minute 30 year Winter I+20%	5.500	6.354	13.5	OK
S21.015	S52	720 minute 30 year Winter I+20%	6.000	763.537	39.8	SURCHARGED
S21.016	S53	720 minute 30 year Winter I+20%	6.500	308.565	4.2	SURCHARGED
S21.017	S54	2160 minute 30 year Summer I+20%	6.500	504.794	4.2	OK
S21.018	S55	2160 minute 30 year Summer I+20%	5.500	504.776	4.2	OK
S21.019	S56	2160 minute 30 year Summer I+20%	4.900	504.685	4.2	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	43	Number of Storage Structures	50	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	16.100	Cv (Summer)	0.750
Region	Scotland and Ireland	Ratio R	0.278	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	5, 30, 100
Climate Change (%)	20, 20, 20

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S4	15 minute 100 year Summer I+20%	11.650	0.000	0.0	OK
S1.001	S5	15 minute 100 year Winter I+20%	11.240	2.514	5.7	OK
S1.002	S6	15 minute 100 year Winter I+20%	11.000	2.508	5.6	OK
S1.003	S7	15 minute 100 year Winter I+20%	10.800	3.590	7.9	OK
S1.004	S8	15 minute 100 year Winter I+20%	10.700	3.590	7.8	OK
S1.005	S9	15 minute 100 year Winter I+20%	10.600	3.571	9.5	OK
S1.006	S10	15 minute 100 year Winter I+20%	10.500	5.036	15.9	SURCHARGED
S1.007	S11	15 minute 100 year Winter I+20%	10.500	5.006	18.9	SURCHARGED
S1.008	S12	15 minute 100 year Winter I+20%	10.500	5.006	20.1	SURCHARGED
S1.009	S4	15 minute 100 year Winter I+20%	10.500	22.223	36.8	SURCHARGED
S1.010	S5	15 minute 100 year Winter I+20%	10.500	22.223	38.1	SURCHARGED
S2.000	S69	240 minute 100 year Winter I+20%	10.500	9.929	0.5	SURCHARGED
S2.001	S70	240 minute 100 year Winter I+20%	10.500	9.643	0.5	SURCHARGED
S2.002	S71	15 minute 100 year Winter I+20%	10.500	0.621	3.2	SURCHARGED
S1.011	S6	15 minute 100 year Winter I+20%	10.500	43.202	69.2	SURCHARGED
S3.000	S19	180 minute 100 year Winter I+20%	8.754	26.406	5.8	SURCHARGED
S3.001	S20	180 minute 100 year Winter I+20%	8.850	11.983	0.8	SURCHARGED
S3.002	S7	15 minute 100 year Winter I+20%	8.750	6.883	12.2	OK
S4.000	S119	180 minute 100 year Winter I+20%	8.750	31.063	6.8	SURCHARGED
S4.001	S120	180 minute 100 year Winter I+20%	8.750	10.011	0.8	SURCHARGED
S3.003	S20	960 minute 100 year Winter I+20%	8.850	107.818	4.0	SURCHARGED
S5.000	S20	180 minute 100 year Winter I+20%	8.850	34.109	7.5	SURCHARGED
S5.001	S21	180 minute 100 year Winter I+20%	8.850	12.885	1.0	SURCHARGED
S3.004	S8	960 minute 100 year Winter I+20%	9.000	134.068	4.3	SURCHARGED
S3.005	S9	960 minute 100 year Winter I+20%	9.150	165.339	5.5	SURCHARGED
S6.000	S29	180 minute 100 year Winter I+20%	9.300	14.593	3.2	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S6.001	S30	180 minute 100 year Winter I+20%	9.300	8.669	0.7	SURCHARGED
S3.006	S29	960 minute 100 year Winter I+20%	9.300	181.812	5.8	SURCHARGED
S7.000	S32	120 minute 100 year Winter I+20%	9.600	15.915	5.1	SURCHARGED
S7.001	S33	120 minute 100 year Winter I+20%	9.600	8.713	0.9	SURCHARGED
S3.007	S10	960 minute 100 year Winter I+20%	9.600	203.598	6.4	SURCHARGED
S1.012	S7	960 minute 100 year Winter I+20%	10.500	442.309	16.0	SURCHARGED
S8.000	S36	180 minute 100 year Winter I+20%	10.300	25.947	5.7	SURCHARGED
S8.001	S37	180 minute 100 year Winter I+20%	10.300	10.113	0.8	SURCHARGED
S8.002	S31	15 minute 100 year Summer I+20%	10.300	4.255	8.3	OK
S8.003	S32	15 minute 100 year Winter I+20%	10.200	4.866	8.1	OK
S9.000	S38	180 minute 100 year Winter I+20%	10.200	23.364	5.2	SURCHARGED
S9.001	S39	180 minute 100 year Winter I+20%	10.200	11.617	0.8	SURCHARGED
S8.004	S38	15 minute 100 year Winter I+20%	9.800	6.460	7.9	OK
S10.000	S38	15 minute 100 year Winter I+20%	9.800	15.220	31.7	SURCHARGED
S10.001	S39	15 minute 100 year Winter I+20%	9.800	10.388	28.5	OK
S8.005	S38	15 minute 100 year Winter I+20%	9.800	16.796	33.5	SURCHARGED
S8.006	S33	15 minute 100 year Winter I+20%	9.800	18.542	35.4	OK
S8.007	S34	30 minute 100 year Summer I+20%	9.100	23.199	34.7	SURCHARGED
S11.000	S131	15 minute 100 year Winter I+20%	9.100	15.988	33.4	SURCHARGED
S11.001	S132	15 minute 100 year Winter I+20%	9.100	9.910	29.4	OK
S8.008	S40	30 minute 100 year Summer I+20%	9.100	36.456	61.4	SURCHARGED
S12.000	S40	240 minute 100 year Winter I+20%	9.600	37.336	6.3	SURCHARGED
S12.001	S41	240 minute 100 year Winter I+20%	9.600	14.105	0.8	SURCHARGED
S8.009	S35	30 minute 100 year Summer I+20%	9.600	40.748	64.8	OK
S8.010	S36	30 minute 100 year Summer I+20%	9.490	40.574	64.5	OK
S1.013	S8	960 minute 100 year Winter I+20%	10.500	626.750	23.8	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m^3)	Pipe Flow (l/s)	Status
S1.014	S9	960 minute 100 year Winter I+20%	10.500	140.360	1.6	SURCHARGED
S1.015	S10	960 minute 100 year Winter I+20%	10.500	140.266	1.6	OK
S13.000	S1	2160 minute 100 year Winter I+20%	10.500	895.336	8.4	OK
S13.001	S2	2160 minute 100 year Winter I+20%	10.500	896.132	4.7	OK
S13.002	S3	2160 minute 100 year Winter I+20%	10.500	895.970	4.7	OK
S1.016	S4	15 minute 100 year Winter I+20%	10.500	16.225	9.9	OK
S1.017	S5	15 minute 100 year Winter I+20%	10.395	24.527	27.6	OK
S1.018	S6	15 minute 100 year Winter I+20%	9.960	24.205	26.3	OK
S14.000	S36	30 minute 100 year Winter I+20%	10.000	7.375	7.7	SURCHARGED
S14.001	S37	30 minute 100 year Winter I+20%	9.856	2.545	1.0	SURCHARGED
S14.002	S38	30 minute 100 year Winter I+20%	8.545	2.530	1.0	OK
S1.019	S7	15 minute 100 year Winter I+20%	8.415	26.112	26.4	OK
S15.000	S40	60 minute 100 year Winter I+20%	11.650	4.858	2.3	SURCHARGED
S15.001	S41	60 minute 100 year Winter I+20%	11.700	4.095	0.8	SURCHARGED
S15.002	S42	120 minute 100 year Winter I+20%	11.800	7.158	0.7	SURCHARGED
S15.003	S43	120 minute 100 year Winter I+20%	11.100	9.397	0.9	SURCHARGED
S15.004	S44	240 minute 100 year Winter I+20%	10.200	10.387	0.6	OK
S15.005	S45	240 minute 100 year Winter I+20%	9.000	7.549	0.6	SURCHARGED
S15.006	S46	60 minute 100 year Winter I+20%	9.500	3.511	0.7	SURCHARGED
S15.007	S47	180 minute 100 year Winter I+20%	7.100	9.210	0.7	SURCHARGED
S15.008	S48	240 minute 100 year Winter I+20%	7.100	6.123	0.4	SURCHARGED
S15.009	S49	180 minute 100 year Winter I+20%	7.100	3.920	0.5	SURCHARGED
S15.010	S50	60 minute 100 year Winter I+20%	7.100	-1.573	0.5	SURCHARGED
S15.011	S51	60 minute 100 year Winter I+20%	7.100	3.922	0.7	SURCHARGED
S15.012	S52	120 minute 100 year Winter I+20%	7.550	9.221	1.2	SURCHARGED
S15.013	S53	240 minute 100 year Winter I+20%	7.800	12.998	0.7	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S15.014	S54	960 minute 100 year Summer I+20%	7.823	24.253	0.5	OK
S15.015	S55	960 minute 100 year Summer I+20%	8.300	24.255	0.5	OK
S15.016	S56	960 minute 100 year Summer I+20%	8.300	24.249	0.5	OK
S1.020	S8	15 minute 100 year Winter I+20%	8.200	26.730	26.4	OK
S1.021	S9	15 minute 100 year Winter I+20%	7.000	26.503	26.1	OK
S16.000	S20	15 minute 100 year Winter I+20%	4.755	24.639	46.3	SURCHARGED
S17.000	S21	15 minute 100 year Winter I+20%	4.755	24.210	45.8	SURCHARGED
S16.001	S21	480 minute 100 year Winter I+20%	4.750	169.373	14.0	SURCHARGED
S16.002	S22	480 minute 100 year Winter I+20%	5.391	167.938	13.9	SURCHARGED
S16.003	S23	480 minute 100 year Winter I+20%	5.700	79.278	4.1	SURCHARGED
S16.004	S24	480 minute 100 year Winter I+20%	5.700	78.922	1.6	SURCHARGED
S18.000	S48	60 minute 100 year Winter I+20%	9.000	13.303	9.1	SURCHARGED
S18.001	S49	60 minute 100 year Winter I+20%	8.200	6.495	1.5	FLOOD RISK
S18.002	S50	60 minute 100 year Winter I+20%	7.500	5.601	1.2	SURCHARGED
S18.003	S51	120 minute 100 year Winter I+20%	6.300	8.005	1.0	SURCHARGED
S1.022	S10	600 minute 100 year Winter I+20%	6.100	535.676	11.5	SURCHARGED
S1.023	S11	600 minute 100 year Winter I+20%	4.825	534.633	9.9	SURCHARGED
S19.000	S54	60 minute 100 year Winter I+20%	4.750	3.117	1.1	FLOOD RISK
S19.001	S55	60 minute 100 year Winter I+20%	4.750	2.392	0.7	FLOOD RISK
S19.002	S56	60 minute 100 year Winter I+20%	4.750	6.159	2.0	FLOOD RISK
S19.003	S57	120 minute 100 year Winter I+20%	4.840	-0.094	0.3	SURCHARGED
S19.004	S58	30 minute 100 year Winter I+20%	5.390	3.107	1.6	SURCHARGED
S19.005	S59	120 minute 100 year Winter I+20%	5.600	3.079	0.3	SURCHARGED
S19.006	S60	120 minute 100 year Winter I+20%	5.900	0.604	0.5	SURCHARGED
S19.007	S61	30 minute 100 year Winter I+20%	5.900	2.730	1.2	SURCHARGED
S19.008	S62	480 minute 100 year Winter I+20%	5.100	3.331	0.5	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S19.009	S63	480 minute 100 year Winter I+20%	4.500	3.330	0.4	SURCHARGED
S1.024	S12	600 minute 100 year Winter I+20%	4.533	537.925	9.4	SURCHARGED
S20.000	S98	240 minute 100 year Winter I+20%	4.400	0.398	0.2	SURCHARGED
S20.001	S99	240 minute 100 year Winter I+20%	4.400	0.000	0.0	OK
S1.025	S13	600 minute 100 year Winter I+20%	4.400	553.588	9.7	SURCHARGED
S21.000	S37	15 minute 100 year Winter I+20%	9.329	4.437	9.5	OK
S21.001	S38	15 minute 100 year Winter I+20%	8.600	4.437	9.4	OK
S21.002	S39	15 minute 100 year Winter I+20%	9.400	4.437	9.5	OK
S22.000	S40	15 minute 100 year Winter I+20%	4.750	2.688	5.3	SURCHARGED
S21.003	S40	15 minute 100 year Winter I+20%	7.500	14.194	21.9	SURCHARGED
S23.000	S142	15 minute 100 year Winter I+20%	4.900	6.830	12.4	SURCHARGED
S21.004	S41	15 minute 100 year Winter I+20%	6.000	28.530	40.1	SURCHARGED
S24.000	S117	15 minute 100 year Winter I+20%	4.900	69.431	137.1	SURCHARGED
S21.005	S42	15 minute 100 year Winter I+20%	5.120	97.964	159.4	SURCHARGED
S25.000	S119	15 minute 100 year Winter I+20%	4.900	6.916	14.6	SURCHARGED
S21.006	S43	15 minute 100 year Winter I+20%	5.070	104.878	160.7	SURCHARGED
S21.007	S44	15 minute 100 year Winter I+20%	5.300	104.878	156.2	SURCHARGED
S21.008	S45	15 minute 100 year Winter I+20%	5.400	110.759	159.0	SURCHARGED
S21.009	S46	15 minute 100 year Winter I+20%	5.500	110.758	153.0	SURCHARGED
S21.010	S47	15 minute 100 year Winter I+20%	5.400	123.864	159.7	SURCHARGED
S26.000	S49	15 minute 100 year Winter I+20%	4.900	9.206	15.9	SURCHARGED
S26.001	S50	15 minute 100 year Winter I+20%	4.900	9.206	16.0	SURCHARGED
S26.002	S51	15 minute 100 year Winter I+20%	4.900	31.200	53.4	SURCHARGED
S26.003	S52	15 minute 100 year Winter I+20%	4.875	31.203	51.0	SURCHARGED
S26.004	S53	15 minute 100 year Winter I+20%	4.875	31.203	47.7	SURCHARGED
S21.011	S48	15 minute 100 year Winter I+20%	5.300	154.377	199.5	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S27.000	S131	480 minute 100 year Winter I+20%	5.400	24.909	0.6	SURCHARGED
S27.001	S132	480 minute 100 year Winter I+20%	5.400	24.407	0.6	SURCHARGED
S27.002	S133	480 minute 100 year Winter I+20%	5.400	24.395	0.6	OK
S21.012	S49	15 minute 100 year Winter I+20%	5.750	159.684	201.4	SURCHARGED
S28.000	S56	15 minute 100 year Winter I+20%	6.200	10.908	22.0	SURCHARGED
S28.001	S57	15 minute 100 year Winter I+20%	6.200	27.433	55.3	SURCHARGED
S21.013	S50	720 minute 100 year Winter I+20%	6.200	765.470	38.9	SURCHARGED
S29.000	S63	15 minute 100 year Winter I+20%	5.900	8.827	18.2	OK
S29.001	S64	15 minute 100 year Winter I+20%	6.100	13.390	26.9	OK
S29.002	S65	15 minute 100 year Winter I+20%	6.500	21.579	42.3	SURCHARGED
S21.014	S51	720 minute 100 year Winter I+20%	6.500	870.215	44.8	SURCHARGED
S30.000	S63	15 minute 100 year Winter I+20%	5.500	8.233	17.6	OK
S21.015	S52	720 minute 100 year Winter I+20%	6.000	951.309	49.4	SURCHARGED
S21.016	S53	720 minute 100 year Winter I+20%	6.500	309.200	4.2	SURCHARGED
S21.017	S54	4320 minute 100 year Winter I+20%	6.500	837.801	4.2	OK
S21.018	S55	4320 minute 100 year Winter I+20%	5.500	837.783	4.2	OK
S21.019	S56	4320 minute 100 year Winter I+20%	4.900	837.695	4.2	OK

APPENDIX D. WASTEWATER DESIGN CALCULATIONS

- As per Irish Water Code of Practice for Wastewater Infrastructure, IW-CDS-5030-03
- Network Design Tables

Appendix D

Wastewater Design Calculations

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes GDSDS Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	20.000
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.000
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	62.456	0.312	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.001	16.539	0.083	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	7.612	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F1.001	7.300	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.002	53.149	0.266	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.003	20.177	0.101	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F2.000	9.076	0.061	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F2.001	13.575	0.091	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F2.002	30.412	0.203	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F2.003	8.018	0.053	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.004	32.626	0.163	200.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F3.000	32.153	0.536	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.002	7.217	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F1.003	6.951	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F2.000	9.358	0.000	0.0	0	0.0	0	0.00	0.94	37.2	0.0
F2.001	9.297	0.000	0.0	0	0.0	0	0.00	0.94	37.2	0.0
F2.002	9.207	0.000	0.0	0	0.0	0	0.00	0.94	37.2	0.0
F2.003	9.004	0.000	0.0	0	0.0	0	0.00	0.94	37.2	0.0
F1.004	6.775	0.000	0.0	0	0.0	0	0.00	0.98	69.2	0.0
F3.000	9.211	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F3.001	32.833	0.657	50.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F3.002	41.630	0.208	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F3.003	41.630	0.208	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.005	18.107	0.060	300.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F4.000	30.000	0.150	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.006	23.857	0.080	300.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.007	22.305	0.074	300.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.008	39.854	0.141	282.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F3.001	8.675	0.000	0.0	0	0.0	0	0.00	1.63	64.6	0.0
F3.002	8.018	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F3.003	7.810	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F1.005	6.612	0.000	0.0	0	0.0	0	0.00	0.80	56.4	0.0
F4.000	9.358	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F1.006	6.552	0.000	0.0	0	0.0	0	0.00	0.80	56.4	0.0
F1.007	6.472	0.000	0.0	0	0.0	0	0.00	0.80	56.4	0.0
F1.008	6.398	0.000	0.0	0	0.0	0	0.00	0.82	58.2	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F5.000	52.122	0.261	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.009	58.835	1.471	40.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F6.000	23.147	0.103	225.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.000	20.324	0.102	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F6.001	30.497	0.152	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F6.002	28.290	0.141	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F5.000	6.582	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F1.009	6.246	0.000	0.0	0	0.0	0	0.00	2.20	155.2	0.0
F6.000	3.710	0.000	0.0	0	0.0	0	0.00	0.76	30.4	0.0
F7.000	3.701	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.001	3.599	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.002	3.447	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.010	45.490	0.152	300.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.011	29.945	0.100	300.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.012	17.850	0.060	300.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F8.000	23.921	0.120	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.001	14.768	0.074	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.002	25.675	0.128	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.003	25.158	0.126	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.004	35.329	0.177	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.005	14.987	0.075	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.010	3.230	0.000	0.0	0	0.0	0	0.00	0.80	56.4	0.0
F1.011	3.079	0.000	0.0	0	0.0	0	0.00	0.80	56.4	0.0
F1.012	2.979	0.000	0.0	0	0.0	0	0.00	0.80	56.4	0.0
F8.000	3.905	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.001	3.785	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.002	3.712	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.003	3.583	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.004	3.457	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.005	3.281	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F8.006	37.284	0.186	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.007	8.420	0.042	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.008	10.272	0.051	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.009	19.580	0.098	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F9.000	12.896	0.064	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F9.001	14.578	0.073	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F9.002	23.009	0.115	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.000	23.979	0.510	47.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.001	19.769	0.300	65.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F8.006	3.206	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.007	3.019	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.008	2.977	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.009	2.926	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F9.000	3.675	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F9.001	3.611	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F9.002	3.538	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F10.000	4.885	0.000	0.0	0	0.0	0	0.00	1.68	66.7	0.0
F10.001	4.375	0.000	0.0	0	0.0	0	0.00	1.42	56.3	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F9.003	11.913	0.060	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F9.004	29.815	0.149	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F9.005	4.355	0.022	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F9.003	3.423	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F9.004	3.363	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F9.005	3.214	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.012	F	4.400	2.919	3.000	0	0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F8.009	F	5.300	2.828	2.948	0	0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F9.005	F	5.300	3.192	2.948	0	0

APPENDIX E. IRISH WATER CONFIRMATION OF FEASIBILITY

Appendix E

Irish Water Confirmation Of Feasibility

UISCE ÉIREANN : IRISH WATER

CONFIRMATION OF FEASIBILITY

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City Delivery Office,
Cork City.

www.water.ie

Marko Komso

9 Prussia Street
Stoneybatter
Dublin 7
D07KT57

31 January 2023

Our Ref: CDS22004338 Pre-Connection Enquiry
St. Vincent's, Fairview, Dublin 3, Co. Dublin

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 851 unit(s) at St. Vincent's, Fairview, Dublin 3, Co. Dublin, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection** - Feasible Subject to upgrades

  In order to accommodate the proposed connection at the Premises upgrade works are required to increase the capacity of the Irish Water network.

  The upgrade works must include:

  IN 1: Replace 100mm uPVC with 200mm ID pipe for 310m from Inlet meter of DMA MA01251.

  IN 2: New 200mm ID pipe to be laid for 300m to connect the site to newly laid 200mm ID pipe in IN 1. (Could replace 100mm uPVC main instead of new additional pipe in Griffith Court Road.)

  IN 3: New 250mm ID main for 50m from 300mm CI to IN 1 (Inlet meter).

- **Wastewater Connection**

  - Feasible Subject to upgrades

The connection of the Hospital can proceed prior to any works as it will replace the existing Hospital and hence does not increase the overall load on the downstream network.

In order to accommodate the proposed connection (excluding the Hospital) at the Premises, Storm Sewer Separation works are required to reduce the load on the downstream combined network.

Storm separation of the full site including roofs of any buildings must be undertaken as part of the works.

This Development is being permitted on the bases that a minimum of 1.238ha of hardstanding on the site discharging to the Irish Water combined network must be fully separated. The removal of surface flows from this land will enable the proposed development to connect. The information included in R517-OCSC-ZZ-XX-0006-S0-P04 will need to be independently verified by Irish Water prior to the connection. Irish Water must be contacted in advance of any onsite works impacting the existing storm arrangements to coordinate onsite verification.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

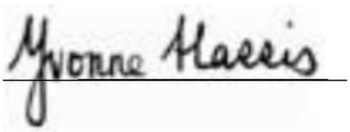
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit **www.water.ie/connections**, **email** **newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Yvonne Harris
Head of Customer Operations

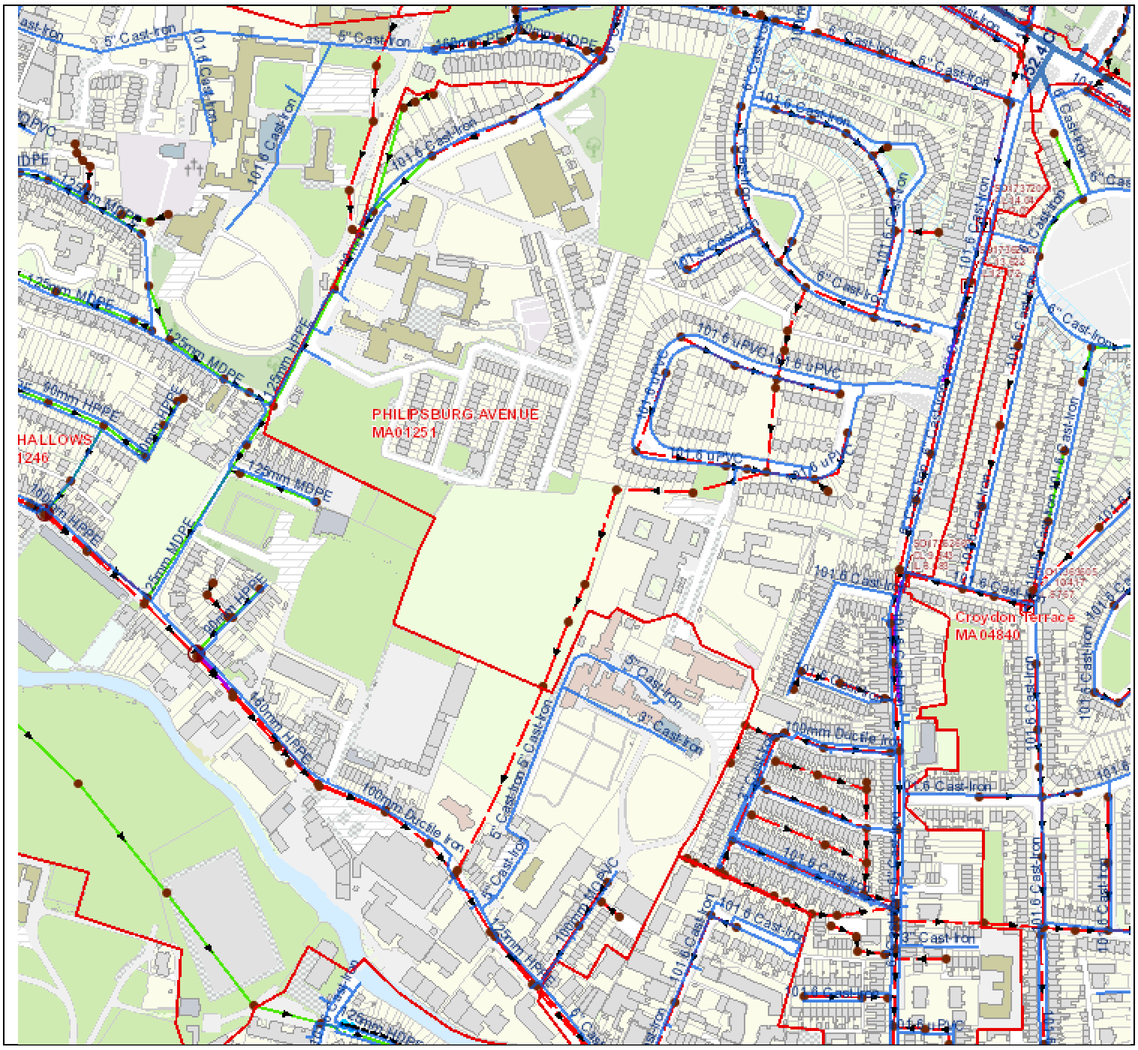
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with ***the Irish Water Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Irish Water's Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email datarequests@water.ie



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Note: The information provided on the included maps as to the position of Irish Water's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water’s underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

Marko Komso
O'Connor Sutton Cronin
9 Prussia Street
Stoneybatter
Dublin 7
D07KT57

3 March 2023

Re: Design Submission for St. Vincent's, Fairview, Dublin 3, Co. Dublin (the "Development")
(the "Design Submission") / Connection Reference No: CDS22004338

Dear Marko Komso,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative:
Name: Antonio Garzón
Email: antonio.garzon@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

Document Title & Revision

- R517-OCSC-XX-XX-DR-C-0500-S4-P04
- R517-OCSC-XX-XX-DR-C-0501-S4-P04
- R517-OCSC-XX-XX-DR-C-0502-S4-P04
- R517-OCSC-XX-XX-DR-C-0503-S4-P01
- R517-OCSC-XX-XX-DR-C-0515-S4-P01
- R517-OCSC-XX-XX-DR-C-0516-S4-P01
- R517-OCSC-XX-XX-DR-C-0550-S4-P04
- R517-OCSC-XX-XX-DR-C-0551-S4-P04
- R517-OCSC-XX-XX-DR-C-0552-S4-P04

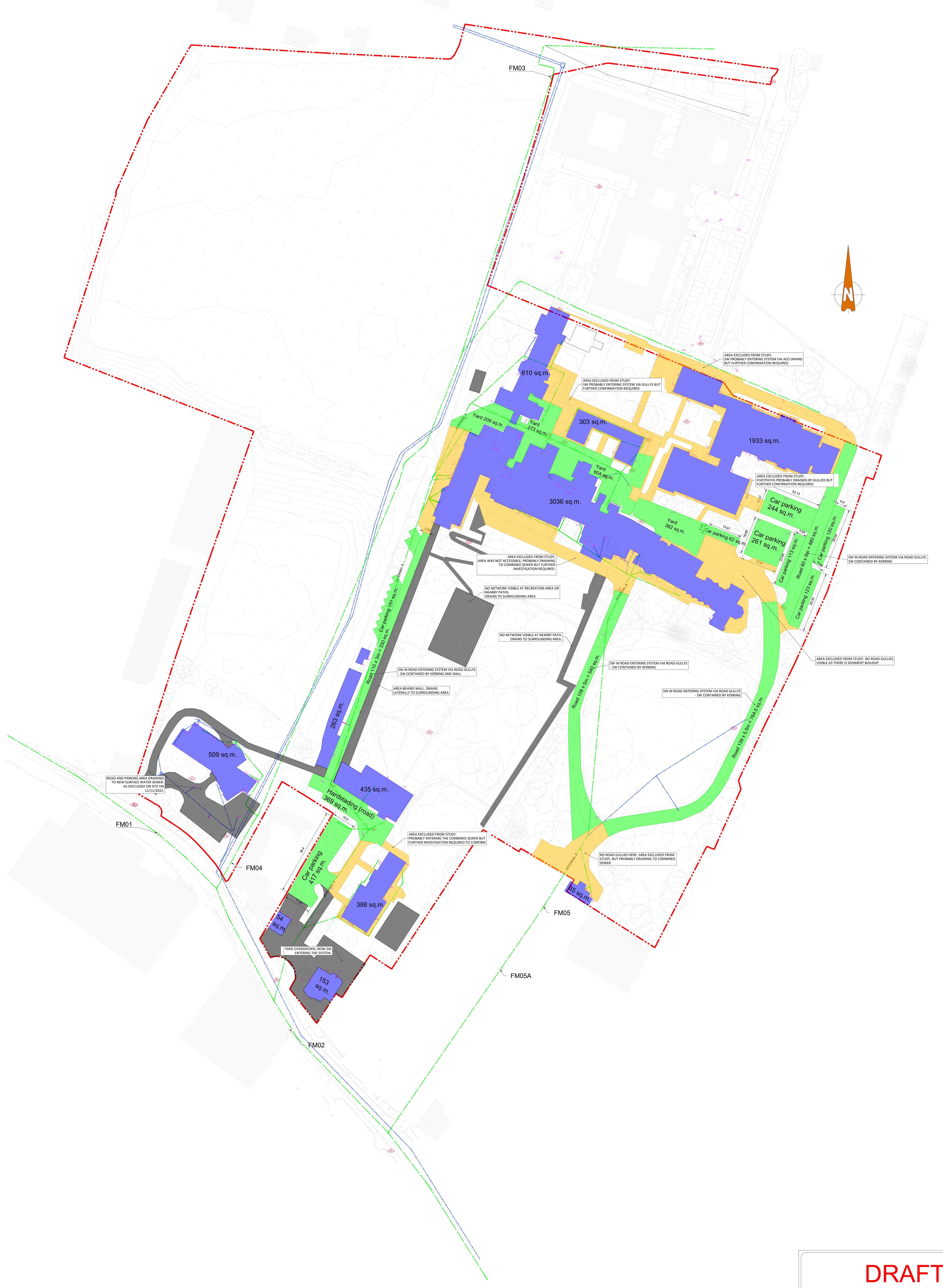
Additional Comments

The design submission will be subject to further technical review at connection application stage.

Irish Water cannot guarantee that its Network in any location will have the capacity to deliver a particular flow rate and associated residual pressure to meet the requirements of the relevant Fire Authority, see Section 1.17 of Water Code of Practice.

For further information, visit ***www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.



LEGEND:

- PROPOSED SITE BOUNDARY
- EXISTING ROOF AREA DRAINING TO COMBINED SEWER
- EXISTING HARDSTANDING DRAINING TO COMBINED SEWER
- EXISTING HARDSTANDING EXCLUDED FROM STUDY. PROBABLY DRAINING TO COMBINED BUT FURTHER INVESTIGATION REQUIRED
- EXISTING HARDSTANDING NOT DRAINING TO COMBINED SEWER
- EXISTING SURFACE WATER
- EXISTING WASTEWATER
- EXISTING COMBINED

NOTES:

TOTAL HARDSTANDING AREA TAKEN IN ACCOUNT= 1.238 HA

ROOF AREA = 0.7531 HA
ROAD/YARD AREA = 0.4852 HA

DRAFT

THIS DRAWING HAS BEEN ISSUED FOR INFORMATION PURPOSES ONLY AND MUST NOT BE USED FOR CONSTRUCTION UNDER ANY CIRCUMSTANCES

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Rev No.	Date	Revision Note	Drn by	Chkd by
P01	18.11.21	SUITABLE FOR INFORMATION	DR	DR
P02	29.11.21	EXISTING INFRASTRUCTURE ADDED	DR	DR
P03	12.08.22	REVISED RED LINE BOUNDARY AND AREAS	MKo	MK
P04	14.11.22	REVISED AREAS	MKo	MK

ENVIRONMENT ISO 14001:2015 NSAI Certified
QUALITY ISO 9001:2015 NSAI Certified
HEALTH & SAFETY ISO 45001:2018 NSAI Certified
bsi BIM Design & Construction Capital/Delivery ISO 19650-1 and -2 VERIFIED

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w: www.ocsc.ie

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary Consulting Engineers

Dublin | London | Belfast | Galway | Cork | Birmingham

Client: ROYALTON GROUP
Project: ST VINCENT'S FAIRVIEW

Title: EXISTING HARDSTANDING

Code	Originator	Zone	Level	Type	Role	Number	Status	Revision
R517	OCSC	XX	XX	SK	C	0006	S0	P04

Date: 18.11.21 Scale:1000 @ A1 Drn by:DR Chkd by:DR Aprvd by:AH

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Consulting Engineers

APPENDIX F. CELLULAR ATTENUATION SYSTEM

- Y-E.S.S. Pluvial Cube with Access and Inspection Chamber

Appendix F

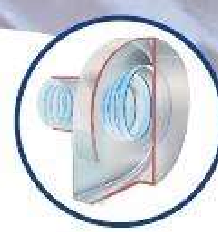
Cellular Attenuation System

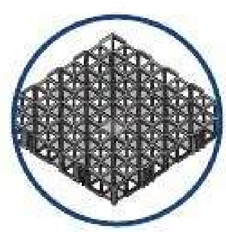
Modular Geo-Void Systems

Total Water Management

ESS EcoCell

Ecological Tank Systems





ENVIRONMENTAL SUSTAINABLE SOLUTIONS LTD

Environmental Sustainable Solutions

Welcome to Environmental Sustainable Solutions; specialist suppliers and designers of geocomposites and water re-use systems. Environmental Sustainable Solutions can help you achieve innovative results for all your requirements:-

G Stormwater Management
G Gas Barrier Protection
G Stormwater Attenuation
G Contaminated Land Development
G Stormwater Drainage
G Ground Stabilisation
G Rainwater Recycling Management
G Structural Waterproofing
G Gas Venting Systems
G Damp-proofing projects

Over the last 12 years Environmental Sustainable Solutions, and associated companies, have designed and installed thousands of water recycling, drainage and attenuation tank systems for schools, car parks, retail parks, offices and sports arenas throughout Ireland, UK, Europe and the Middle East.

Our wide range of environmental protection products, surface water drainage modules and modular water storage tank systems provides maximum design flexibility for engineers and architects working on even the most demanding of storm water storage and recycling projects.

Stormwater Management And Design

Stormwater is the phrase used to describe the excess rainwater that flows from rooftops, roads, car parks and other buildings. This water can contain many pollutants picked up from roofs and highways. In extreme weather conditions sudden heavy downpours of rain can cause major environmental disasters. Using our Rainmanager products; stormwater can not only safely be removed, but it can be stored and recycled for commercial and domestic use.

How it works - ESS Attenuation Tank

Stormwater enters the attenuation tank via the inlet manhole, which incorporates a silt collection sump and a galvanised leaf collection basket. Water passes through the tank and exits through the outlet manhole, which contains an AquaBrake flow control device.
This flow control device regulates the release rate of water from the tank, and in so doing, enables the tank to fill. As a result of water entering the tank at a greater rate than it can exit, the void space then fills with water. While the tank fills, air is vented from the tank.
The Inlet/Outlet pipe will act as a flushing channel. This perforated pipe is wrapped completely in High Flow Filtering Geotextile, which prevents silt entering the block area. As the tank continues to empty at a pre-determined rate, air re-enters the tank via the same air vent system. The roof of the completed tank must be lower than the lowest gully trap on site.

Benefits

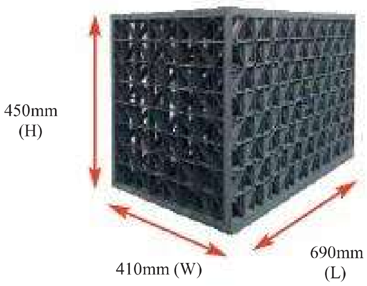
G 100% sealed tank
G Full installation service provided
G 12 years experience as market leader
G Quick installation – reduce site access delays
G Increased land usage – tanks are sub surface
G Economical – generally more cost efficient than any other equivalent sealed tank
G Cost effective – reduced costs for excavation and disposal of material
G Modular – easy to create any shape
G Strong – designed to support shear loading
G Lightweight – no cranes required
G Determinate volume – one cubic metre of matrix tank modules contain 950 litres of water, whereas stone fill will only provide 300 litres of storage per cubic metre.

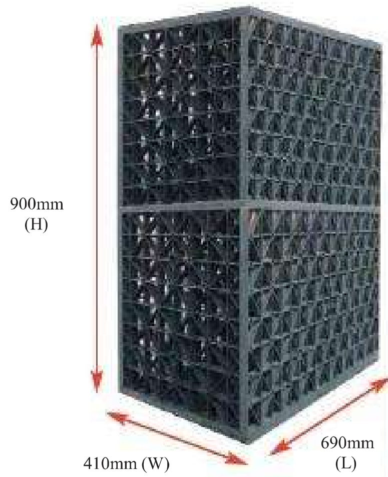
Soakaway

The soakaway is normally best built as a long narrow structure.
The inlet pipe comes in at roof level and faces downwards so that the water can percolate into the tank.
The blocks are wrapped in Geotextile, to protect them and also to keep clay from filling up the void.
An air vent pipe is installed on the highest point with a cowl on top or vented back to an inlet manhole.
There is no outlet from a soakaway, therefore no flow control unit is required.

Stormwater Storage Tank

SUITABLE FOR USE UNDER:
- Roadways
- Car parks
- Green areas





Single
8 Modules/m^3
Flowrate - 2300 l/min

Double
4 Modules/m^3
Flowrate - 4600 l/min

Triple
2.6 Modules/m^3
Flowrate - 6900 l/min

Notes:
Blocks must be positioned in the correct orientation.
See opposite above

SPECIFICATION (SINGLE)

Weight (maximum)	9.17kg
Crush Strength (up to)	400kN/m^2
Lateral Strength	80kN/m^2
Minimum Cover (green areas)	500mm
(trafficked areas)	650mm
Maximum Cover	3m
Material	Polypropylene
Void Ratio (Internal)	>95%

Design Requirements:

Tank storage capacity (m^3)
Depth restrictions
Location (Road, Car Park, Green Area)
Design constraints on site

A set of loading calculations specific to the site requirement will be done by ESS and submitted on all tanks

DESIGN CRITERIA

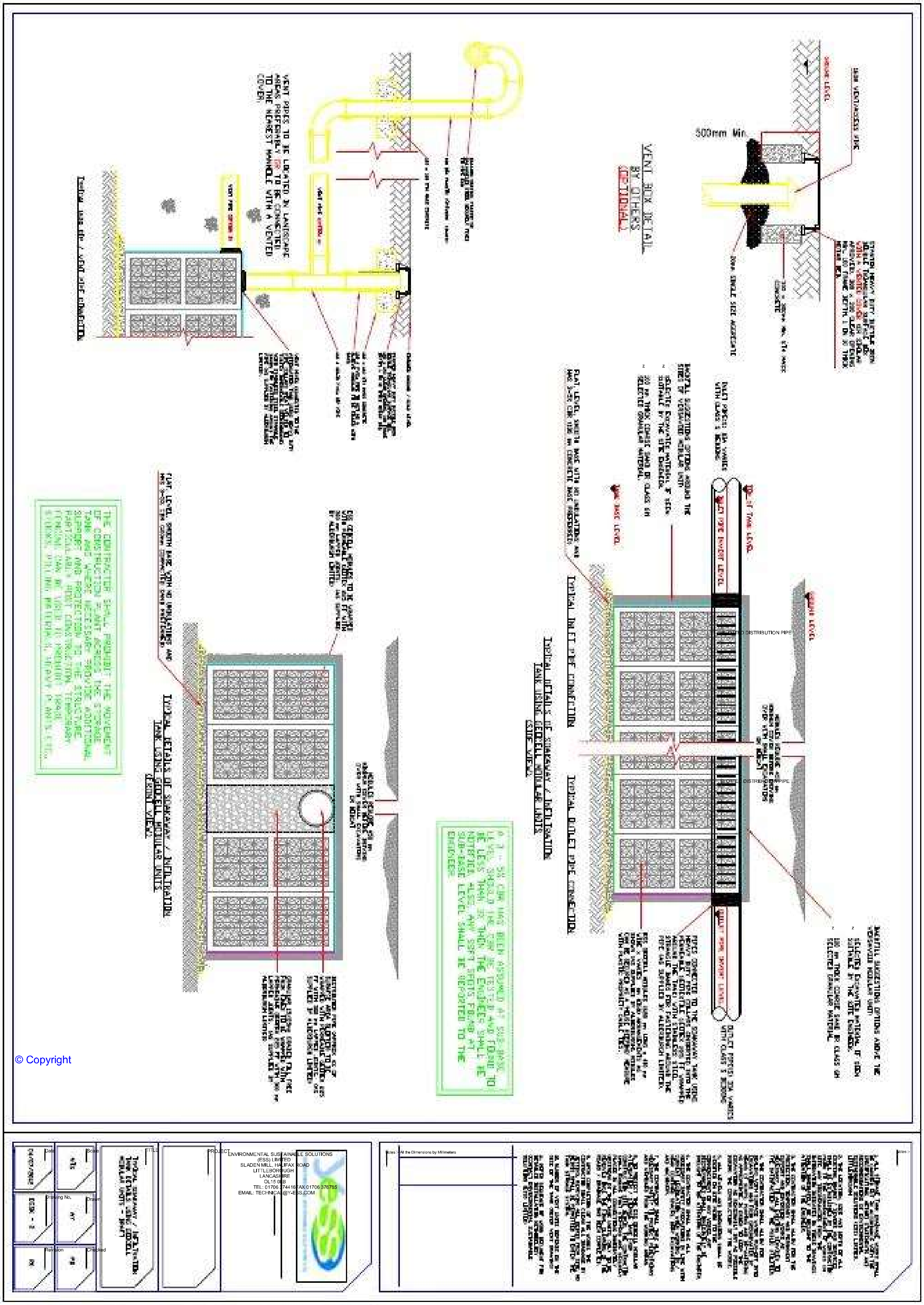
The attenuation tank is constructed using matrix module blocks. These blocks can take passing loads of up to 40 tonnes/m^2. The void ratio of each block is 95%. The blocks are made from polypropylene.

The tank is sealed with a layer of Tuflex membrane, which is fully welded together to form a 100% seal. All pipe penetrations are fully sealed to the membrane. The Tuflex membrane is protected by a layer of heavy duty protection geotextile, to prevent damage from construction or backfilling. A number of air extraction vents/flushing points are placed in the roof of the tank.

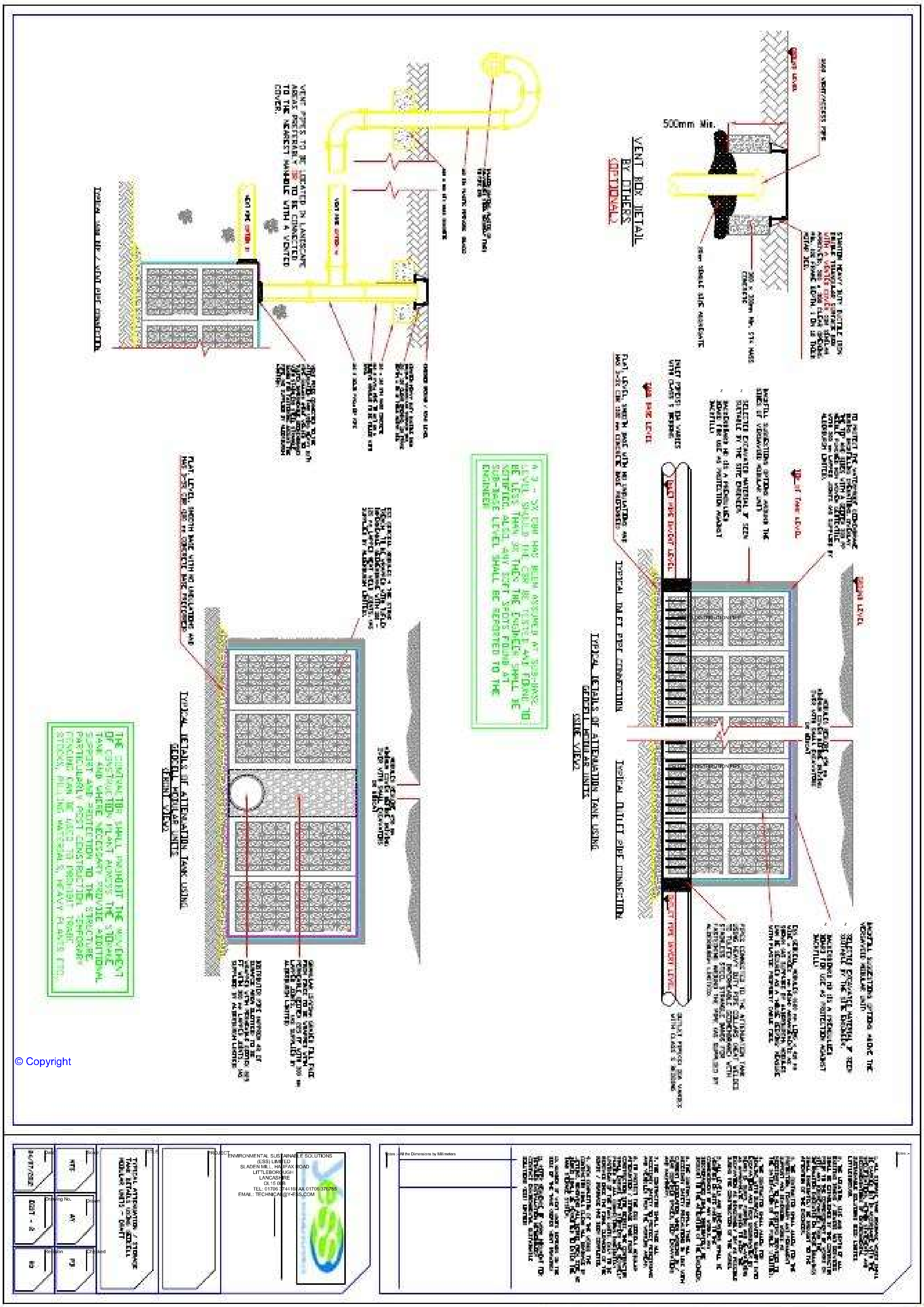
Note:
It is vital that the underground tanks are fully sealed, otherwise ground water and silt particles may enter the void ~~space and use up capacity. Preferably, the base of the tank should be 500mm~~ above the ground water level. Otherwise ground water relief measures should be implemented.

Infiltration System

Typical arrangement using ESS Ecological Tank System for water quality



Typical on site collection and recycling arrangement using ESS Ecological Tank System



Infiltration Swales & Underground Channels

Please refer to separate data sheets for the following products

Modular VersaVoid System

Benefits

G **Quick**
Reduce site access delays

G **Lightweight**
No cranes required

G **Strong**
Designed for maximum anticipated loads

G **Maintenance Free Tank**
All debris and sediment is pre-filtered

G **Determinate Volume**
One cubic metre of Tank modules contain 950 litres of water

G **Cost Effective**
Reduces excavation and disposal by up to 5 x compared with conventional soak wells

G **High Infiltration**
98% void surface area

G **Totally Modular**
For greatest flexibility designed to cope. Units start at 300mm deep for shallow inverts to 3050mm+ deep in 250mm increments.

G **Designed by Engineers for Engineers** – to specify with confidence.

G **Designing out Problems**
with such systems (access, maintenance, loading etc.)

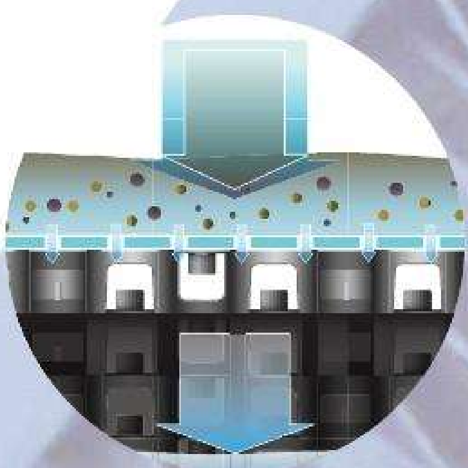
G **Designing in Answers**
to design requirements.

G **Total 3D Access**
For total maintenance with total confidence.

G **Structurally Designed**
with built in safety factor to carry all loads with complete confidence.
16 clear vertical access chambers per m2.

G **Total Void Creation**
With the greatest strength from any modular systems.

Oil Filtration



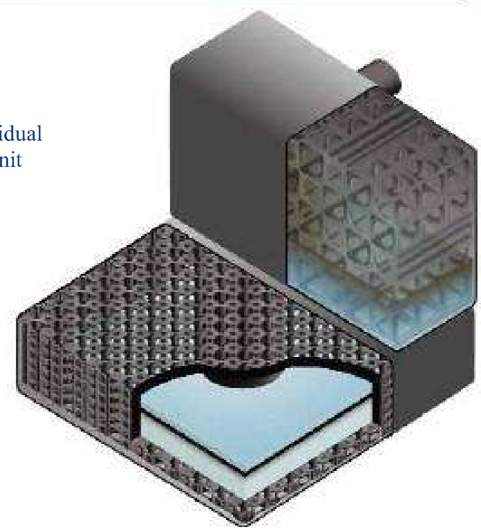
Benefits

G Source control designed to handle catastrophic spillages

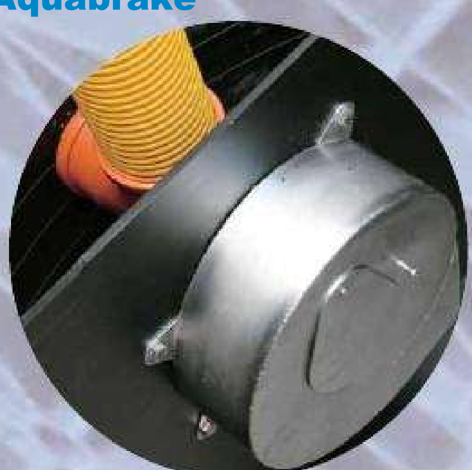
G Capture, filter and break down residual hydrocarbons - all in one compact unit

G Self-maintaining ecosystems decompose hydrocarbon compounds and clean filters

G Load bearing, modular components provide up to 200t/m² loading capacity



Aquabrake



Benefits

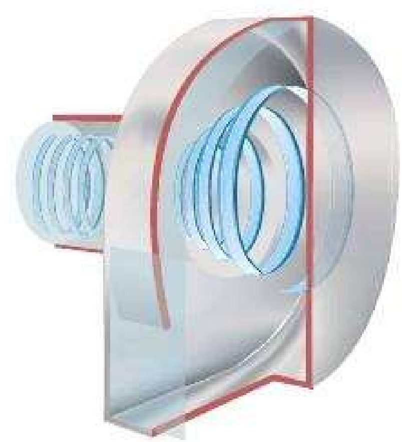
G Cost Savings
Can reduce upstream storage requirements by up to 30%.

G Durability
Corrosion resistant stainless steel.

G No energy requirements
Self-activating solution with no moving parts.

G Clog Resistant
AquaBrake design prevents blockages likely to occur in traditional orifices.

G Flexible Design
Several options for attachment available.

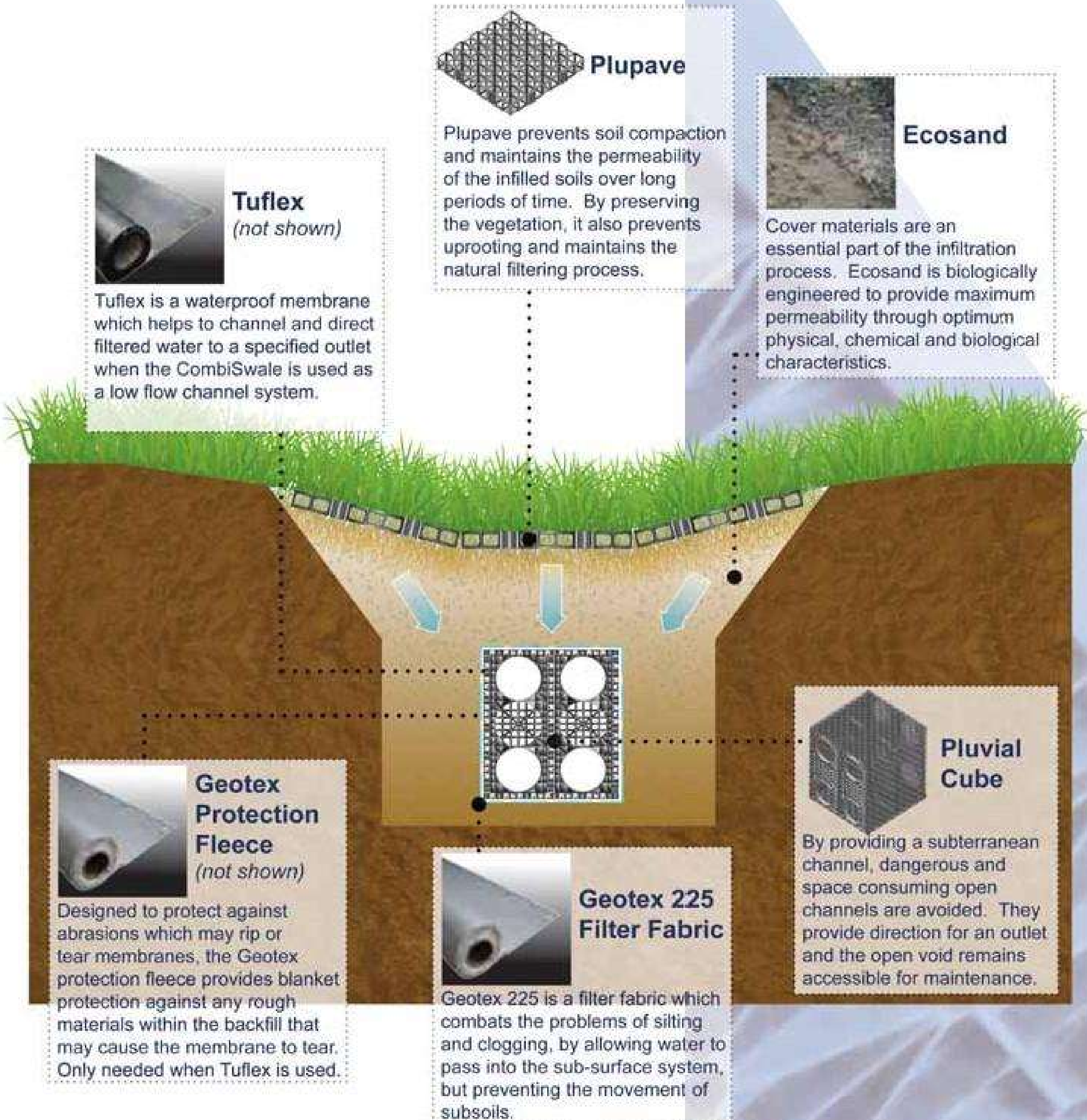


Water Sensitive Urban Channels

Surface and Sub-Surface Water Treatment

By combining surface and sub-surface channeling and treatment solutions, ESS has created the ideal in bioswale water management.

The CombiSwale system includes the addition of permeable sub-surface waterways that further restore water quality and recharge the natural environment. The sub-surface ESS channel system provides a unique way of working with nature to solve the enormous problems currently associated with open concrete channels and swales.



All products are manufactured to the highest quality, being subject to rigid quality control. However, the company cannot control conditions of application and use of its products, thus any warranty, written or implied, is given in good faith for materials only. ESS Ltd will not accept any responsibility for damage or injury arising from storage handling, misapplication or misuse of its products All transactions are subject to our standard condition of sale, copies of which are available on request.

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Multidisciplinary Consulting Engineers

APPENDIX G. GROUND INVESTIGATION REPORT & GROUND WATER MONITORING DATA

Appendix G

Ground Investigation Report

Ground Water Monitoring Data

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

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Hazelhatch Road,
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Web: www.gii.ie

Ground Investigations Ireland

St Vincent's Fairview

OCSC

Ground Investigation Report

April 2022

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DOCUMENT CONTROL SHEET

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Engineer	OCSC
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Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Interim	M Sutton	A McDonnell	A McDonnell	Dublin	20 December 2021
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APPENDICES

1.0 Preamble

On the instructions of OCSC Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between September and November 2021 at the site of the proposed hospital and residential development in St. Vincent's hospital, Fairview.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development and hospital with associated services, access roads and car parking at the proposed site. The eastern part of the site is currently occupied by the existing Fairview hospital and gardens with a greenfield area on the western area of the site. The site is situated in north Dublin city to the north of Richmond Road off Convent Avenue. The proposed construction is envisaged to consist of conventional foundations or piles and pavement make up with some local excavations for services and plant. A basement is proposed as part of the proposed residential scheme which will require excavation of approximately 4m BGL and is understood to be in the northwest part of the site.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 8 No. Trial Pits to a maximum depth of 3.7m BGL
- Carry out 3 Slit trenches to investigate the presence of existing services.
- Carry out 2 Foundation Pits to investigate existing foundations.
- Carry out 3 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 22 No. Cable Percussion boreholes to a maximum depth of 10.2m BGL
- Carry out 15 No. Rotary Core follow on Boreholes to a maximum depth of 26m BGL
- Carry out 3 No. Plate Bearing Tests to determine CBR Value.
- Installation of 19 No. Groundwater monitoring wells
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.1. Slit Trenching

The slit trenches were excavated a JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The soil was slowly stripped using a spotter on the trench to alert the driver if any services were seen, to avoid damage to any underlying services. The slit trenches were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the slit trench records which are provided in Appendix 3 of this Report.

3.2. Foundation Pits

The foundation inspection pits were excavated at the locations shown in the exploratory hole location plan in Appendix 1. The exposed foundations were logged and sketched prior to backfilling and reinstatement. The logs and sketches are provided in Appendix 3 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 4 of this Report.

3.4. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.

The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata.

Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 5 of this Report.

3.5. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring.

The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the "overshoot" recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 5 of this Report.

3.6. Surveying

The exploratory hole locations have been recorded using a KQ GEO Technologies KQ-M8 System which records the coordinates and elevation of the locations to ITM or Irish National Grid as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.7. Groundwater/Gas Monitoring Installations

Groundwater and or Gas Monitoring Installation were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm uPVC/HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.8. Insitu Plate Bearing Test

The plate bearing tests were carried out using a 450mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the displacement was monitored in accordance with BS1377 Part 9 using independently mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 3 of this Report.

3.9. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Chemical testing as required by the specification, including pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer, California Bearing Ratio (CBR), tests were carried out in Pro Soils Geotechnical Laboratory in the UK.

Rock strength testing including Point Load (Is_{50}) and Unconfined Compressive Strength (UCS) testing was carried out in Pro Soils Geotechnical Laboratory
The results of the laboratory testing are included in Appendix 7 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and generally comprised;

- Topsoil/Surfacing
- Made Ground
- Cohesive Deposits
- Granular Deposits
- Bedrock

TOPSOIL: Topsoil was encountered in the majority of exploratory holes and was present to a maximum depth of 0.3m BGL. Tarmac surfacing was present in BH05 and BH05A typically to a depth of 0.10m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil/Surfacing in the majority of the trial pits (TP01 to TP08) and boreholes (BH01 to BH04) in the south eastern area of the site and was present to depths of between 0.6m and 1.80m BGL. Made ground deposits were also encountered in some of the boreholes in other areas of the site including BH06, BH08, BH09, BH10, BH12 and BH17 to depths of up to 3m BGL. These deposits were described generally as *brown sandy slightly gravelly CLAY with occasional cobbles and contained occasional fragments of concrete, red brick, glass, ash, ceramic and plastic.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and were described typically as *brown sandy gravelly CLAY with occasional cobbles and boulders* overlying a *stiff dark brown / grey sandy gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was firm and stiff to very stiff below 1.5m to 2m BGL in the majority of the exploratory holes. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: The granular deposits were encountered within the cohesive deposits at some of the borehole locations and were typically described as G*rey brown clayey sandy sub rounded to sub*

angular fine to coarse GRAVEL with occasional cobbles and rare boulders. The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs.
Based on the SPT N values the deposits are typically medium dense or dense. It should be noted that some of the trial pits where granular deposits or groundwater were encountered, experienced instability. This was described either as side wall spalling or as side wall collapse in the remarks section at the base of the trial pit logs. Groundwater strikes were noted in some the boreholes where noted on the logs.

BEDROCK: The rotary core boreholes recovered Medium strong to very strong grey/dark grey fine to medium grained laminated LIMESTONE interbedded with weak black fine grained laminated Mudstone. This is typical of the Calp Formation, which is noted on the geological mapping to the east of the proposed site. Rare visible calcite and pyrite veins were noted during logging which are typically present within the Calp Limestone.
The depth to rock across the site varies from 15.5m BGL in BH13 to a maximum of 22.5m BGL in BH21. To the northern park of the site which has a higher ground level the rock was encountered between 19.0m in BH05A and 22.50m in BH21. On the southern part of the site the rock was encountered between 15.50 in BH13 and 16.50m in BH12. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in the majority of the boreholes to allow the equilibrium groundwater level to be determined. The groundwater monitoring is included in Appendix 8 of this Report.

4.3. Laboratory Testing

4.3.1. Geotechnical Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low to intermediate plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 18% and 47% generally with fines contents of 34 to 49%.
The Particle Size Distribution test taken on a sample from granular deposits show the material has a percentage of sands of 15%, silt/clay of 9% with a gravel content of 37% and Cobble content of 39%.

The CBR testing on remoulded samples gave results ranging between 0.4% and 4.1% for the cohesive deposits and made ground.

4.3.2. Chemical Laboratory Testing

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

4.3.3. Rock Laboratory Testing

The rock testing carried out on samples recovered from the boreholes reported Unconfined Compressive Strength (UCS) values ranging between 16.3 and 49.7 MPa while the point load testing gave Is50 values ranging between 1.94 MPa to 8.66 MPa. The Is_{50} results correlate to the UCS values using a factor of approximately 20, giving values of 38.8 MPa and 173.2 MPa. These results correlate to the strength descriptions ranging between of Extremely Weak to Strong and confirming the variability of this stratum and the descriptions on the logs.

The results from the completed laboratory testing is included in Appendix 7 of this report.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

5.2.1. Foundations for Hospital (South eastern area of site)

An allowable bearing capacity of 300 kN/m^2 is recommended for conventional strip or pad foundations on the stiff cohesive deposits at a depth of 2.0m BGL for the proposed construction in the area of BH01-BH04 and TP01-TP08.

A ground bearing floor slab is recommended to be based on the firm to stiff cohesive deposits with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill. Where the depth of Made Ground/Soft deposits exceeds 0.9m then suspended floor slabs should be considered.

5.2.2. Foundations for Residential Buildings (Western area of site)

An allowable bearing capacity of 125 kN/m^2 is achievable for conventional strip or pad foundations on the firm to stiff / stiff cohesive deposits generally at depths of between 1.0m and 2.70m. An allowable bearing capacity of 250 is achievable on the very stiff cohesive deposits at depths of between 2.3m and 4.0m. Due to the high loading anticipated, piled foundations may be more economically advantageous for the proposed building. The type, size and depth of the pile foundations should be confirmed by a specialist piling contractor based on the loading from the proposed building.

Table 1 below shows the depths where an allowable bearing capacity of 125 kN/m^2 and 250kN/m^2 is achievable for conventional strip or pad foundations at each of the borehole locations in the areas where the residential development is proposed. Where the founding strata is deeper than standard depth that conventional foundations would be constructed, lean mix trench fill is recommended to achieve the recommended allowable bearing capacity.

The possibility for variation in the depth of the made ground in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

Table 1 - Allowable Bearing Capacities

	Allowable Bearing Capacities (ABC) kN/m2						
Dynamic Probe	125 kN/m2 ABC	250 kN/m2 ABC	Comment	Dynamic Probe	125 kN/m2 ABC	250 kN/m2 ABC	Comment
No.	Depth m BGL	Depth m BGL		No.	Depth m BGL	Depth m BGL	
BH01	Boreholes BH01 to BH04 within Hospital Area See section 5.2.1 for foundation recommendations			BH12	3.0	3.0	
BH02				BH13	1.9	4.0	
BH03				BH14	1.0	3.0	
BH04				BH15	2.0	4.0	
BH05A	2.0	2.0		BH16	2.7	4.0	
BH06	2.5	5.5		BH17	4.0	7.0	
BH07				BH18	2.3	3.0	
BH08	2.8	2.8		BH19	1.0	3.0	
BH09	2.0	4.7		BH20	2.0	2.7	
BH10	3.0	3.0		BH21	2.8	2.8	
BH11	2.9	2.9		BH22	2.7	2.7	

A ground bearing floor slab is recommended to be based on the firm to stiff cohesive deposits with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill. Where the depth of Made Ground/Soft deposits exceeds 0.9m then suspended floor slabs should be considered.

The pH and sulphate testing completed on samples recovered from the exploratory holes indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack. The samples tested were below the limits of DS1 in the BRE Special Digest 1:2005.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendices of this Report. The low CBR test results indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.4. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Excavations in the Made Ground or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

The groundwater and stability noted on the trial pit logs and borehole logs should be consulted when determining the most appropriate construction methods for excavations.

The water level recorded in the boreholes was above the presumed basement level however generally Cohesive deposits were encountered at the proposed location of the basement so is it expected that water inflow will be limited. It should be noted that granular deposits where encountered in areas on the site and generally, where significant excavations are required in water bearing granular deposits a cut-off wall may be more cost effective than extensive dewatering. An assessment by a specialist dewatering contractor is recommended to determine the most cost effective approach to the proposed excavation.

Excavations in the upper cohesive and weathered rock deposits are expected to be excavatable with conventional excavation equipment.

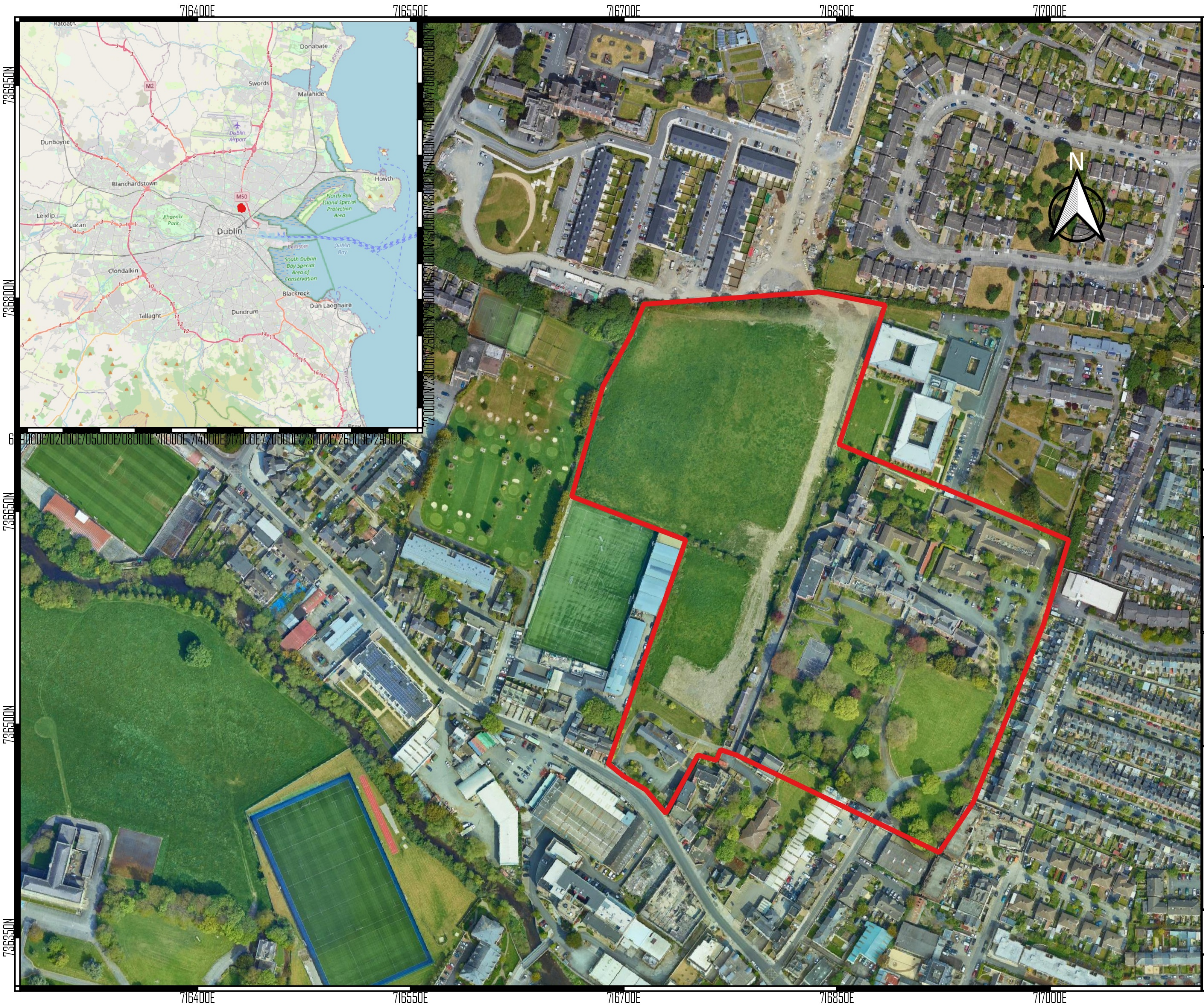
Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

5.5. Soakaway Design

Infiltration rates of f=9.981 x 10^{-5} m/s, 4.83 x 10^{-5} m/s and f=3.71 x 10^{-5} m/s respectively were calculated for the soakaway locations SA01, SA02 and SA03. It should be noted that groundwater was encountered in the soakaway pits and excavation was stopped at this depth to undertake soakaway test. Depth that ground water was encountered in the pit should be considered when determining the design of soakaway areas.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan



Site Location

Indicative Site Boundary

Client:

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary Consulting Engineers

Project Code:
10927-08-21

Project Title:
St Vincents Fairview

Drawing Title:
Figure 1 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 30 60 90 120 150 m

Drawn By:	Date:
Tmcl	16/11/2021

Legend

- Indicative Site Boundary
- CBR Tests
- Trial Pits
- Soakaways
- Boreholes
- Slit Trenches
- Foundation Pits

Client:

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary Consulting Engineers

Project Code:
10927-08-21

Project Title:
St. Vincents Fairview

Drawing Title:
SI Locations

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
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Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 20 40 60 80 m

Drawn By:	Date:
Tmcl	18.11.2021

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Trial Pit Number: TP01
Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.60 x 0.40 x 3.10	Ground Level (mOD): 5.34	Client:	Job Number: 10927-08-21
	Location: 736477.3 E 716878.2 N	Dates: 14/09/2021	Engineer: OCSC	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				5.14	(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
0.50	B			4.44	(0.70) 0.90	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles ceramic and red brick fragments.		
1.50	B			2.24	(2.20) 3.10	Greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with some angular to subrounded cobbles and occasional boulders.		
						Complete at 3.10m		

Plan

Remarks

No groundwater encountered during excavation.
Slight spalling of trial pit walls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP01

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Trial Pit Number: TP02
Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.30 x 0.40 x 3.10	Ground Level (mOD): 5.03	Client	Job Number: 10927-08-21
	Location: 736444.2 E 716909 N	Dates: 14/09/2021	Engineer: OCSC	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				4.73	0.30			
					(0.30)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles ceramic and red brick fragments.		
				4.43	0.60			
1.00	B				(1.40)	Greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with some angular to subrounded cobbles and occasional boulders.		
				3.03	2.00			
2.50	B				(1.00)	Brownish grey very sandy slightly clayey subangular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles.		
				2.03	3.00			
					(0.10)	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
				1.93	3.10			
						Complete at 3.10m		

Plan

Remarks

No groundwater encountered during excavation.
Slight spalling of trial pit walls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP02

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Trial Pit Number: TP03
Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.90 x 0.50 x 3.50	Ground Level (mOD): 7.16	Client:	Job Number: 10927-08-21
	Location: 736544.5 E 716891 N	Dates: 14/09/2021	Engineer: OCSC	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				6.96	(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
0.50	B			5.41	(1.55) 1.75	MADE GROUND: Brown slightly gravelly silty Clay with ooc. subangular to subrounded cobbles glass metal rubbish and ceramic fragments.		
2.00	B			4.06	(1.35) 3.10	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
				3.66	(0.40) 3.50	Greyish brown sandy clayey subangular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles.		
						Complete at 3.50m		

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP03

Ground Investigations Ireland Ltd
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Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.30 x 0.50 x 3.10	**Ground Level (mOD)** 5.22	**Site** St. Vincent's Fairview **Client**	**Trial Pit Number** TP04 **Job Number** 10927-08-21
	Location 736508.4 E 716870 N	**Dates** 14/09/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
0.50	B			4.92	0.30 (0.90)	Light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
2.50	B		Water strike(1) at 3.00m.	4.02	1.20 (1.90)	Greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with occasional angular to subrounded cobbles. Gravel becoming wet from 2.00m BGL.		∇1
				2.12	3.10	Complete at 3.10m		

Plan

Remarks

Groundwater encountered at 3.00m BGL.
Slight spalling of trial pit walls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP04

Ground Investigations Ireland Ltd www.gii.ie			Site St. Vincent's Fairview	Trial Pit Number **TP05**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.30 x 0.50 x 3.70	**Ground Level (mOD)** 5.65	**Client**	**Job Number** 10927-08-21
	Location 736527.1 E 716910.8 N	**Dates** 14/09/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				5.45	(0.20) 0.20	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				5.25	(0.20) 0.40	MADE GROUND: Grey sandy subangular to subrounded fine to coarse Gravel.		
0.80	B			4.45	(0.80) 1.20	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional cobbles concrete and red brick fragments.		
2.00	B		Water strike(1) at 3.50m.	1.95	(2.50) 3.70	Greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with occasional angular to subrounded cobbles. Gravel becoming wet from 2.70m BGL.		∇1
						Complete at 3.70m		

Plan

Remarks

Groundwater encountered at 3.50m BGL.
Slight spalling of trial pit walls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP05

Ground Investigations Ireland Ltd www.gii.ie		Site St. Vincent's Fairview	Trial Pit Number **TP06**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.40 x 0.50 x 3.40	**Ground Level (mOD)** 5.40	**Client**	**Job Number** 10927-08-21
	Location 736516.3 E 716938.4 N	**Dates** 14/09/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				5.20	0.20 (0.15)	MADE GROUND: Grey sandy subangular to subrounded fine to coarse Gravel.		
				5.05	0.35 (0.75)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional cobbles plastic and red brick fragments.		
			Water strike(1) at 3.10m.	4.30	1.10 (2.30)	Greyish brown sandy clayey subangular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles. Gravel becoming wet from 2.80m BGL.		∇1
				2.00	3.40	Complete at 3.40m		

Plan

Remarks

Groundwater encountered at 3.10m BGL.
Slight spalling of trial pit walls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP06

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Trial Pit Number: **TP07**
Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.30 x 0.50 x 3.20 Ground Level (mOD): 5.18	Client:	Job Number: 10927-08-21
	Location: 736489.3 E 716930.3 N Dates: 14/09/2021	Engineer: OCSC	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				4.88	0.30 (0.60)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional cobbles plastic and red brick fragments.		
1.20	B			4.28	0.90 (2.30)	Greyish brown sandy clayey subangular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles. Gravel becoming wet from 2.70m BGL.		
			Water strike(1) at 3.00m.					∇1
3.20	B			1.98	3.20	Complete at 3.20m		

Plan

Remarks

Groundwater encountered at 3.00m BGL.
Slight spalling of trial pit walls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP07

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Trial Pit Number: TP08
Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.50 x 0.50 x 3.20	Ground Level (mOD): 5.15	Client:	Job Number: 10927-08-21
	Location: 736471.8 E 716917.1 N	Dates: 14/09/2021	Engineer: OCSC	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				4.75	0.40 (0.70)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional cobbles ceramic and red brick fragments.		
				4.05	1.10 (2.10)	Greyish brown sandy clayey subangular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles. Gravel becoming wet from 2.60m BGL.		
			Water strike(1) at 3.00m.					∇1
				1.95	3.20	Complete at 3.20m		

Plan

Remarks

Groundwater encountered at 3.00m BGL.
Slight spalling of trial pit walls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.TP08

Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP01






Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP02






Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP03






Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP04






Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP05






Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP06

Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP07






Trial Pit Photographs – St. Vincents Fairview
OCSC – 10927-08-21

TP08



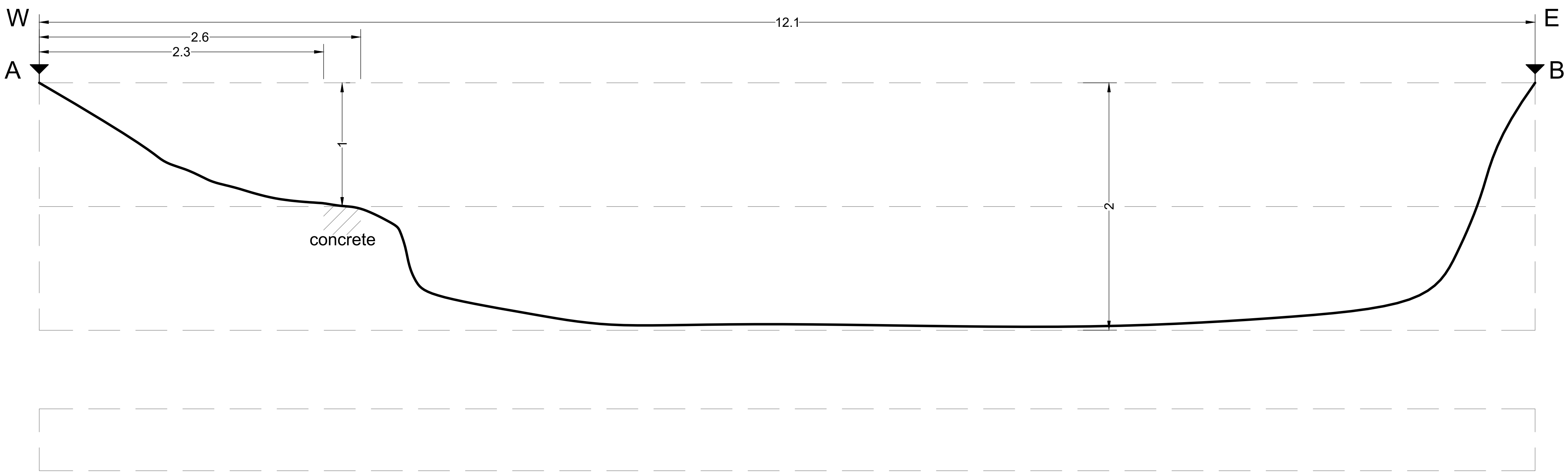



APPENDIX 3 – Slit Trench / Foundation Pit Records

ST01

E:716858.7
N:736776.7
Z:10.815

E:716869.9
N:736773.4
Z:10.778



From (m)	To (m)	Description
0.00	0.30	Brown Topsoil
0.30	1.60	MG: Dark Brown SS SG CLAY, R, Red Brick Fragments, Plastic & Concrete
1.60	2.00	Greyish Brown SS SG CLAY with occasional cobbles

Sample Depth	Sample Type
N	

Surface from/to		Surface Type
0.00	12.10	Grass

Service No	ø (m)	Colour - Material	Utility	Angle to trench	Easting	Northing	Elevation
S1		Grey - Concrete	Possible Culvert	90º	716860.824	736775.851	9.918

Groundwater	Y/N	Depth
	N	

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Email: info@gii.e Web: www.gii.e

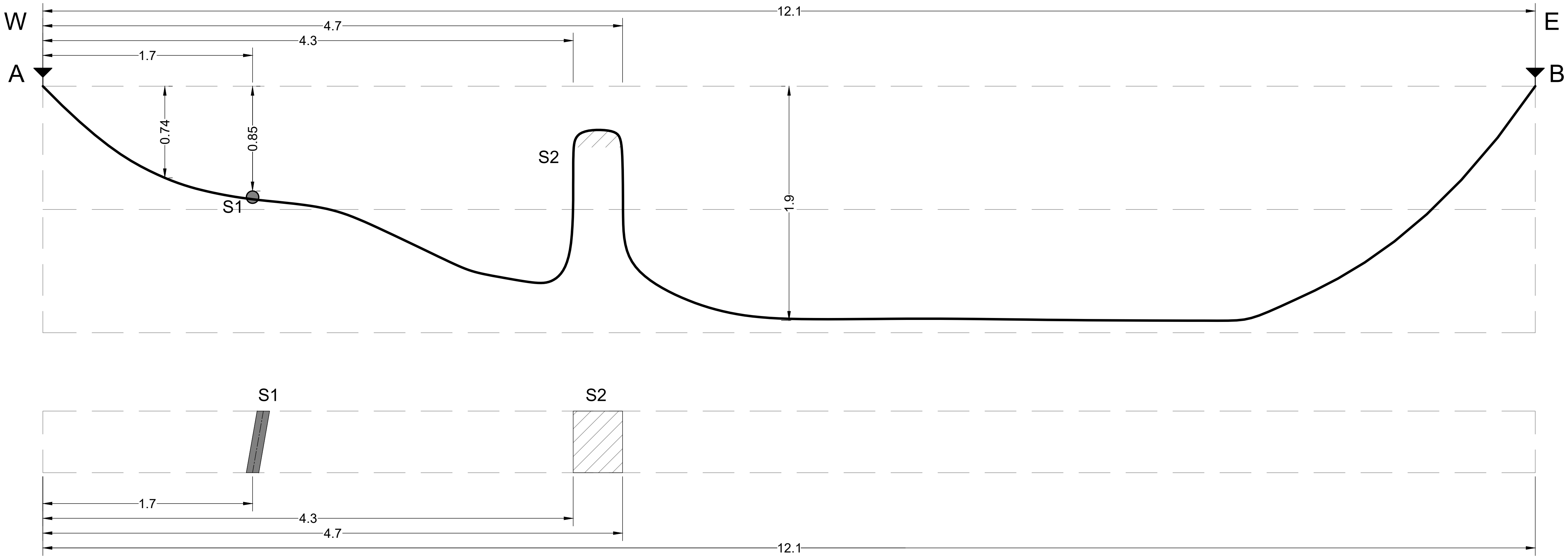
PROJECT:	St Vincent's Fairview
DRAWING No.:	10927-08-21-ST 01
DATE:	04/11/21
CLIENT:	OCSC
SCALE:	1:40 @ A3

Version:	Date:	Drawn By:	Checked By:
-	04/11/21	G.O.B.	-

ST02

E:716837.4
N:736701
Z:10.392

E:716846.2
N:736698.5
Z:10.57



From (m)	To (m)	Description
0.00	0.20	Topsoil
0.20	1.50	MG: Brown/Grey SS SG CLAY with Red Brick Fragments Plastic Rusbbish & Timber
1.50	1.90	F SS GR BR SS SG CLAY with Occasional Cobbles

Service No	ø (m)	Colour - Material	Utility	Angle to trench	Easting	Northing	Northing
S1	0.100	Black - PVC	Possible Water?	80º	716839	736700.492	9.648
S2	?	Grey - Concrete	Possible Culvert	90º	716842	736699.591	10.17

Groundwater	Y/N	Depth
	N	

Sample Depth	Sample Type
N	

Surface from/to		Surface Type
0.00	10.10	Grass

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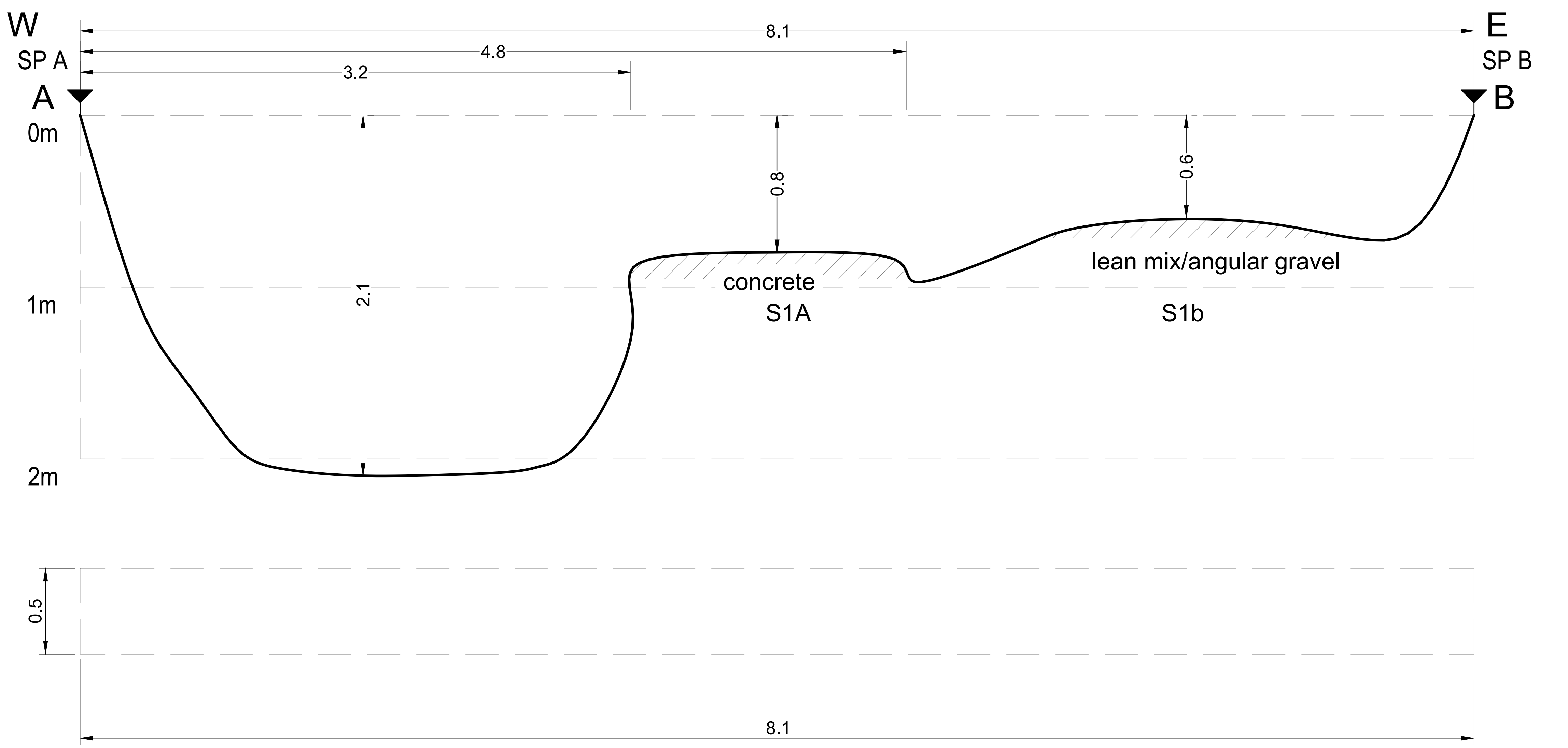
PROJECT:	St Vincent's Fairview
DRAWING No.:	10927-08-21-ST 02
DATE:	04/11/21
CLIENT:	OCSC
SCALE:	1:40 @ A3

Version:	Date:	Drawn By:	Checked By:
-	04/11/21	G.O.B.	-

E:716769.2
N:736524.9
Z:5.163

ST04

E:716777
N:736522.4
Z:5.485



From (m)	To (m)	Description
0.00	0.30	Dark Brown Topsoil
0.30	1.60	MG: Dark Brown SS SG CLAY with occassional cobbles rubbish plastic & red brick fragments
1.60	2.00	MG Brown SS SG CLAY with occassional cobbles red brick fragments mortar

Service No	ø (m)	Colour - Material	Utility	Angle to trench	Easting	Northing	Elevation
S1A	?	Grey - Lean Mix Concrete	Possible Culvert	90º	716772.327	736523.8	4.565
S1B	?	Grey - Concrete	?	90º	716773.696	736523.3	4.581

Groundwater	Y/N	Depth
	N	

Sample Depth	Sample Type
0.5	B

Surface from/to		Surface Type
0.00	8.10	Grass

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PROJECT:	St Vincent's Fairview
DRAWING No.:	10927-08-21-ST 04
DATE:	04/11/21
CLIENT:	OCSC
SCALE:	1:40 @ A3

Version:	Date:	Drawn By:	Checked By:
-	04/11/21	G.O.B.	-

Slit Trench Photographs – St. Vincents Fairview
OCSC – 10927-08-21

ST01 Looking East

ST01 S1

ST01 Slit trench centre

ST01 Eastern end of trench

ST01 Spoil

Slit Trench Photographs – St. Vincents Fairview
OCSC – 10927-08-21

ST02 Looking East

ST02 S1

ST02 S2 Western end of trench

ST02 S2

Slit Trench Photographs – St. Vincents Fairview
OCSC – 10927-08-21

ST02 Eastern end of trench

Slit Trench Photographs – St. Vincents Fairview
OCSC – 10927-08-21

ST04 Looking East

ST04 Western end of trench

Slit Trench Photographs – St. Vincents Fairview
OCSC – 10927-08-21

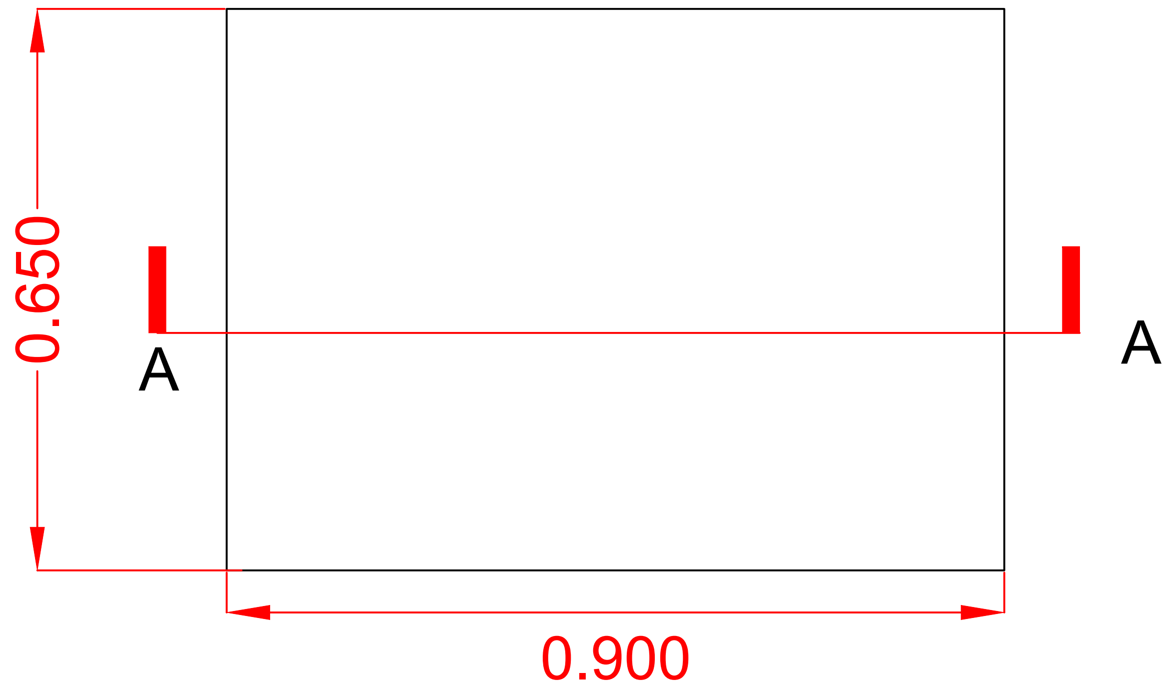
ST04 S1A

ST04 Eastern end of trench

ST04 Spoil

FP01 - St Vincents, Fairview

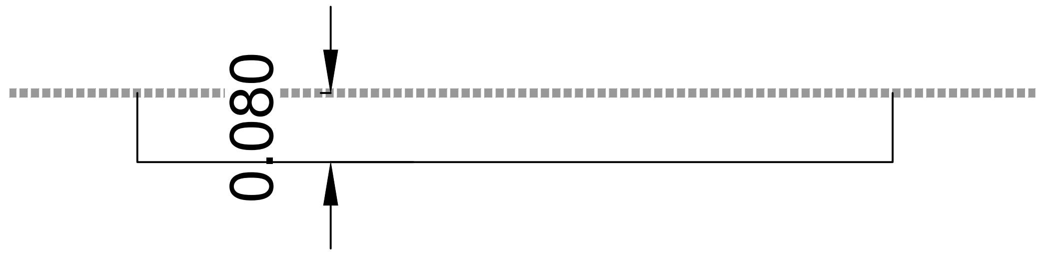
PLAN



TRIAL PIT LOG

0.00 - 0.08 Concrete

SECTION A-A



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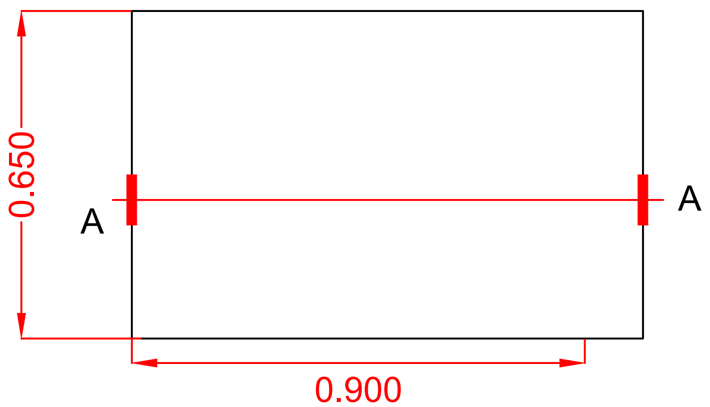
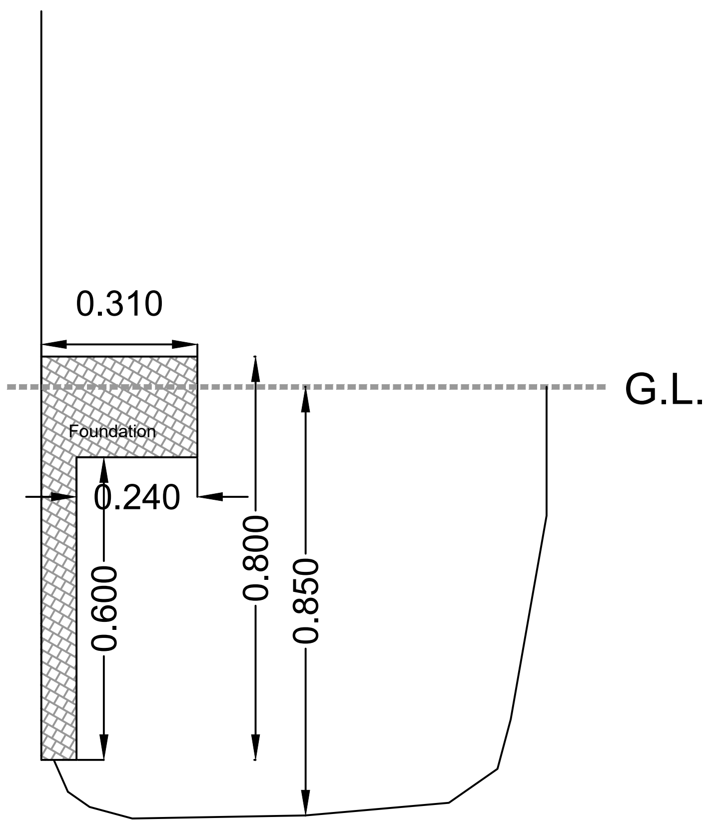
PROJECT:	St. Vincents Fairview
DRAWING No.:	10927-08-21 - FP01
DATE:	15/02/22
CLIENT:	OCSC
SCALE:	NTS @ A3

Version:	Date:	Drawn By:	Checked By:
0	23/03/2022	S.K.	-

FP02 - St Vincents Fairview



PLAN



TRIAL PIT LOG

0.00 - 0.05	MADE GROUND: Grey slightly sandy angular fine to coarse Gravel.
0.05 - 0.10	MADE GROUND: Brown fine to medium Sand.
0.10 - 0.85	MADE GROUND: Dark brown slightly gravelly slightly sandy CLAY with fragments of mortar and concrete.

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PROJECT:	St. Vincents Fairview
DRAWING No.:	10927-08-21 - FP02
DATE:	15/02/22
CLIENT:	OCSC
SCALE:	NTS @ A3

Version:	Date:	Drawn By:	Checked By:
-	23/03/2022	S.K.	-

FP01

FP02

APPENDIX 4 – Soakaway Records

www.gii.ie

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SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 4.00m x 0.60m x 3.20m (L x W x D)

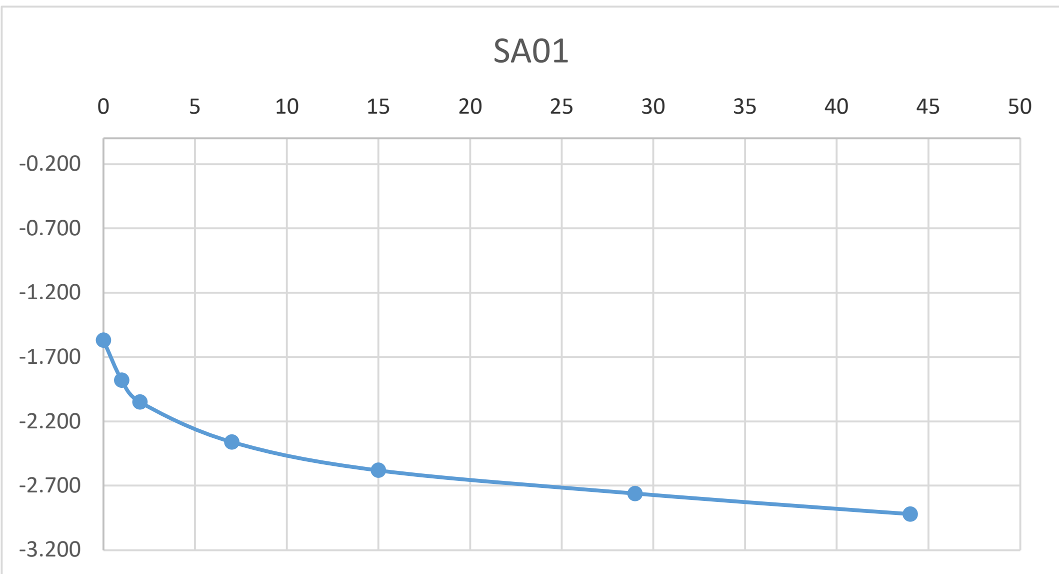
Date	Time	Water level (m bgl)
27/10/2021	0	-1.570
27/10/2021	1	-1.880
27/10/2021	2	-2.050
27/10/2021	7	-2.360
27/10/2021	15	-2.580
27/10/2021	29	-2.760
27/10/2021	44	-2.920

Start depth	Depth of Pit	Diff	75% full	25%full
1.57	3.200	1.630	1.9775	2.7925

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
4.000	0.600	0.815	1.96

Tp75-25 (from graph) (s)	1980	50% Eff Depth	ap50 (m2)
		0.815	9.898

f = 9.981E-05 m/s



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SA02

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 3.80m x 0.60m x 3.00m (L x W x D)

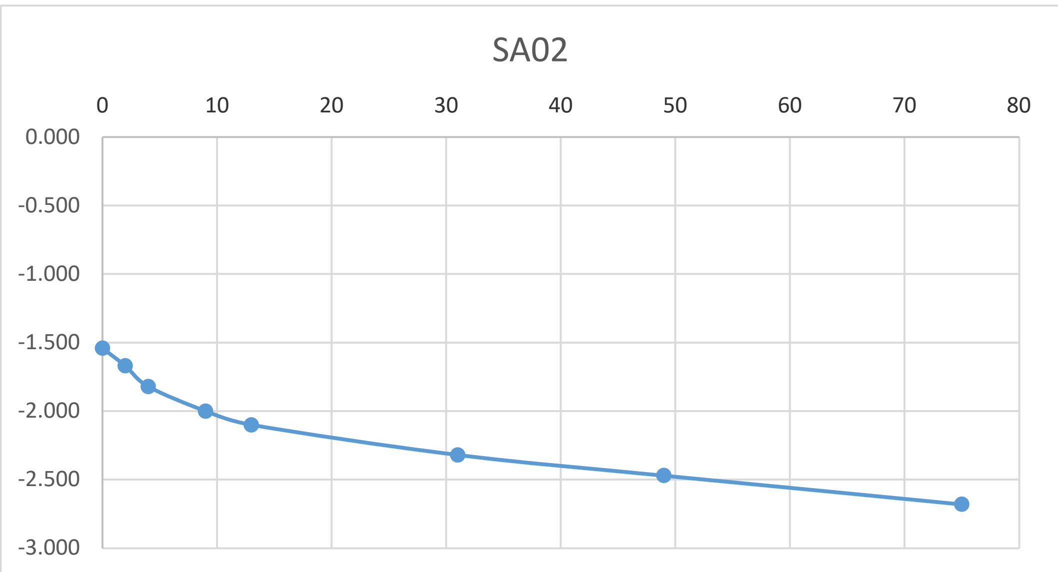
Date	Time	Water level (m bgl)
27/10/2021	0	-1.540
27/10/2021	2	-1.670
27/10/2021	4	-1.820
27/10/2021	9	-2.000
27/10/2021	13	-2.100
27/10/2021	31	-2.320
27/10/2021	49	-2.470
27/10/2021	75	-2.680

Start depth	**Depth of Pit**	**Diff**	**75% full**	**25%full**
1.54	**3.000**	**1.460**	**1.905**	**2.635**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
3.800	0.600	0.730	1.66

Tp75-25 (from graph) (s)	**3960**	50% Eff Depth	ap50 (m2)
		0.730	8.704

f = 4.829E-05 m/s



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SA03

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 3.00m x 0.60m x 2.10m (L x W x D)

Date	Time	Water level (m bgl)
27/10/2021	0	-0.850
27/10/2021	2	-1.100
27/10/2021	5	-1.240
27/10/2021	9	-1.320
27/10/2021	15	-1.410
27/10/2021	27	-1.500
27/10/2021	47	-1.580
27/10/2021		

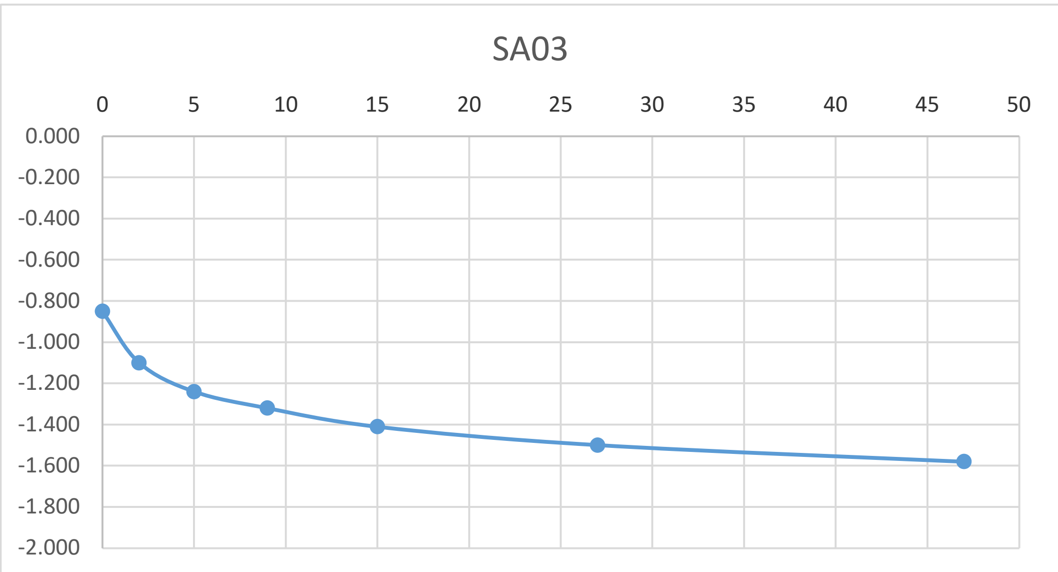
Start depth	Depth of Pit	Diff	75% full	25%full
0.85	**2.100**	**1.250**	**1.1625**	**1.7875**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
3.000	0.600	0.625	1.13

Tp75-25 (from graph) (s) **5460**

50% Eff Depth: 0.625 — ap50 (m2): 6.3

f = 3.271E-05 m/s



Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Trial Pit Number: SA01

Machine : JCB 3CX Method : Trial Pit	Dimensions: 4.00 x 0.60 x 3.20	Ground Level (mOD): 5.60	Client:	Job Number: 10927-08-21
	Location: 736510 E 716809.9 N	Dates: 27/10/2021-27/11/2021	Engineer: OCSC	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				5.35	(0.25) 0.25	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				4.80	(0.55) 0.80	Soft to firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
				4.00	(0.80) 1.60	Greyish brown slightly sandy clayey angular to subrounded fine to coarse GRAVEL with some angular to subrounded cobbles.		
			Water strike(1) at 3.20m.	2.40	(1.60) 3.20	Greyish brown slightly sandy clayey sangular to rounded fine to coarse GRAVEL with some sangular to rounded cobbles.		∇1
						Complete at 3.20m		

Plan

Remarks

Groundwater encountered at 3.20m BGL.
Trial pit stable.
Soakaway test SA01 undertaken in pit.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.SA01

Ground Investigations Ireland Ltd www.gii.ie	Site St. Vincent's Fairview		Trial Pit Number **SA02**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 3.80 x 0.60 x 3.00	**Ground Level (mOD)** 5.17	**Client**	**Job Number** 10927-08-21
	Location 736538.1 E 716847.6 N	**Dates** 27/10/2021- 27/11/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				4.97	0.20	Soft to firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(1.00)			
				3.97	1.20	Greyish brown slightly sandy clayey angular to subrounded fine to coarse GRAVEL with some angular to subrounded cobbles.		
					(1.30)			
				2.67	2.50	Greyish brown sandy clayey sangular to rounded fine to coarse GRAVEL with some sangular to rounded cobbles.		
					(0.50)			
			Water strike(1) at 3.00m.	2.17	3.00	Complete at 3.00m		∇1

Plan

Remarks

Groundwater encountered at 3.00m BGL.
Trial pit stable.
Soakaway test SA02 undertaken in pit.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.SA02

Ground Investigations Ireland Ltd www.gii.ie	Site St. Vincent's Fairview	Trial Pit Number SA03

Machine : JCB 3CX Method : Trial Pit	Dimensions 3.00 x 0.60 x 2.10	Ground Level (mOD) 4.42	Client	Job Number 10927-08-21
	Location 736507.9 E 716740.1 N	Dates 27/10/2021-27/11/2021	Engineer OCSC	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				4.22	(0.20) 0.20	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
				3.82	(0.40) 0.60	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with ceramic plastic and red brick fragments.		
				3.32	(0.50) 1.10	MADE GROUND: Brown slightly sandy slightly gravelly Clay with ceramic and red brick fragments.		
			Water strike(1) at 2.00m.	2.32	(1.00) 2.10	MADE GROUND: Brown slightly sandy gravelly Clay with ceramic and red brick fragments.		∇1
						Complete at 2.10m		

Plan

Remarks

Groundwater encountered at 2.00m BGL.
Trial pit stable.
Soakaway test SA03 undertaken in pit.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	10927-08-21.SA03

Soakaway Photographs – St. Vincents Fairview
OCSC – 10927-08-21

SA01






Soakaway Photographs – St. Vincents Fairview
OCSC – 10927-08-21

SA02






Soakaway Photographs – St. Vincents Fairview
OCSC – 10927-08-21

SA03






APPENDIX 5 - Borehole Records

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH01

Machine : Dando 2000 / Method : Cable Percussion	Casing Diameter: 200mm cased to 10.20m	Ground Level (mOD): 4.57	Client	Job Number: 10927-08-21
	Location: 716749.6 E 736508.2 N	Dates: 13/09/2021	Engineer: OCSC	Sheet: 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.40)	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.			
					4.17	0.40 (0.60)	MADE GROUND: Grey slightly sandy angular fine to coarse Gravel with some angular cobbles (crushed rock fill).			
1.00-1.45	SPT(C) N=17			4,4/5,4,4,4	3.57	1.00 (0.80)	MADE GROUND: Brown sandy slightly gravelly Clay with occasional subangular to subrounded cobbles and red brick fragments.			
1.50	B									
2.00-2.45	SPT(C) N=41			4,5/5,7,13,16	2.77	1.80 (0.50)	Stiff brown sandy slightly gravelly CLAY.			
2.40	B				2.27	2.30 (1.10)	Very stiff brown/grey sandy slightly gravelly CLAY.			
3.00-3.28	SPT(C) 50/125			13,17/20,30						
				Water strike(1) at 3.40m, rose to 3.37m in 20 mins.	1.17	3.40 (0.20)	Very stiff greyish brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		1	
					0.97	3.60 (6.60)	Very stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.			
3.70	B									
4.00-4.45	SPT(C) N=47			3,8/12,12,12,11						
4.40	B									
5.00-5.45	SPT(C) N=44			4,6/10,11,13,10						
5.40	B									
6.50-6.86 6.50	SPT(C) 50/210 B			8,11/14,16,20						
7.50	B									
8.00-8.31	SPT(C) 50/160			10,13/18,22,10						
8.50	B									
9.50-9.80 9.50	SPT(C) 50/150 B			Water strike(2) at 9,12/20,24,6 9.70m, rose to 9.60m in 20 mins.					2 2	

Remarks
Groundwater encountered at 3.40m and 9.70m BGL.
Borehole complete at 10.20m BGL.
Slotted standpipe with gravel filter zone installed from 10.20m to 2.00m BGL with plain pipe and bentonite seal from 2.00m BGL to GL. Finished with a raised cover.
Chiselling from 2.60m for 0.5 hours. Chiselling from 3.30m for 1 hour. Chiselling from 6.70m for 0.5 hours. Chiselling from 8.90m for 0.5 hours.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No. 10927-08-21.BH01

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH01
Machine : Dando 2000 Method : Cable Percussion	Casing Diameter: 200mm cased to 10.20m	Ground Level (mOD): 4.57	Client:	Job Number: 10927-08-21
	Location: 716749.6 E 736508.2 N	Dates: 13/09/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					-5.63	10.20	Complete at 10.20m			

Remarks	Scale (approx): 1:50	Logged By: C. Byrne
	Figure No.: 10927-08-21.BH01	

Ground Investigations Ireland Ltd www.gii.ie			Site St. Vincent's Fairview	Borehole Number **BH02**
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 1.60m	**Ground Level (mOD)** 5.77	**Client**	**Job Number** 10927-08-21
	Location 716947.6 E 736441.3 N	**Dates** 14/09/2021- 15/09/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					5.57	(0.20) 0.20	Brown slightly sandy slightly gravelly TOPOSIL with rootlets.		
					5.27	(0.30) 0.50	MADE GROUND: Light brown slightly sandy slightly gravelly Clay.		
0.50	B								
					4.77	(0.50) 1.00	Grey sandy gravelly CLAY with occasional subangular to subrounded cobbles and boulders.		
1.00-1.00	SPT(C) 25*/0 50/0			25/50					
					4.17	(0.60) 1.60	Dense greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles and boulders.		
1.60-1.60	SPT(C) 25*/0 50/0			25/50			Obstruction: Boulders.		
							Refusal at 1.60m		

Remarks
No groundwater encountered during drilling.
Borehole complete at 1.60m BGL.
Borehole refused at 1.60m due to obstruction.
Chiselling from 1.00m for 1 hour. Chiselling from 1.60m for 1 hour.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No. 10927-08-21.BH02

Ground Investigations Ireland Ltd
www.gii.ie

Machine: Dando 2000 **Method:** Cable Percussion	**Casing Diameter** 200mm cased to 7.50m	**Ground Level (mOD)** 5.12	**Site** St. Vincent's Fairview		**Borehole Number** BH02A
	Location 736444.2 E 716909 N	**Dates** 20/09/2021	**Client**	**Engineer** OCSC	**Job Number** 10927-08-21 **Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
					4.82	0.30 (0.30)	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.
					4.52	0.60 (0.30)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles ceramic and red brick fragments.
					3.12	2.00 (1.40)	Greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with some angular to subrounded cobbles and occasional boulders.
2.80	B				2.12	3.00 (1.00)	Brownish grey very sandy slightly clayey subangular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles.
3.00-3.45	SPT(C) N=47			4,9/12,12,11,12			
3.20	B						
3.50	B						
4.00-4.38	SPT(C) 50/225			8,11/12,16,18,4	0.82	4.30 (1.30)	Very stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.
4.50	B						
5.00-5.45	SPT(C) 50/295			7,10/13,14,12,11			
5.50	B				-0.98	6.10 (1.80)	Dense dark grey sandy angular to subrounded fine to coarse GRAVEL with occasional angular to subrounded cobbles.
6.00-6.45	SPT(C) N=46			9,11/9,10,13,14			
6.30	B						
7.00-7.26	SPT(C) 50/110			10,13/25,25	-2.38	7.50 (1.40)	Dense dark grey sandy angular to subrounded fine to coarse GRAVEL with occasional angular to subrounded cobbles and pockets of clay.
							Obstruction: Boulder.
							Refusal at 7.50m

Remarks
Borehole drilled through TP02.
Groundwater encountered at 3.30m and 4.30m BGL.
Borehole complete at 7.50m BGL.
Slotted standpipe with gravel filter zone installed from 7.40m to 2.00m BGL with plain pipe and bentonite seal from 2.00m BGL to GL. Finished with a raised cover.
Chiselling from 1.40m for 0.5 hours. Chiselling from 2.50m for 0.75 hours. Chiselling from 5.60m for 0.75 hours. Chiselling from 6.20m for 0.5 hours. Chiselling from 6.90m for 1 hour. Chiselling from 7.50m for 1 hour.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No. 10927-08-21.BH02A

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 5.30m	**Ground Level (mOD)** 5.74	**Site** St. Vincent's Fairview **Client**	**Borehole Number** BH03 **Job Number** 10927-08-21
	Location 716880.7 E 736547.3 N	**Dates** 15/09/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					5.64	0.10	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.			
					5.44	(0.20) 0.30	MADE GROUND: Brown gravelly fine Sand.			
						(0.70)	MADE GROUND: Light brown sandy slightly gravelly Clay with red brick fragments.			
1.00-1.45 1.00	SPT(C) N=49 B			9,13/18,9,11,11	4.74	1.00	Very stiff brown sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.			
2.00-2.45 2.00	SPT(C) N=49 B			8,8/10,13,12,14		(1.60)				
3.00-3.23 3.00	SPT(C) 50/75 B			14,17/20,30	3.14	2.60	Dense brown slightly gravelly fine to coarse SAND with occasional subangular to subrounded cobbles and boulders.			
						(1.60)			▼1 ▽1	
4.00-4.45 4.20	SPT(C) N=45 B			10,12/10,12,11,12 Water strike(1) at 4.20m, rose to 4.00m in 20 mins.	1.54	4.20	Very stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and boulders.			
5.00-5.30	SPT(C) 50/150			13,14/16,20,14		(1.10)				
					0.44	5.30	Obstruction: Boulders.			
							Complete at 5.30m			

Remarks
Groundwater encountered at 4.20m BGL.
Borehole complete at 5.30m BGL.
Slotted standpipe with gravel filter zone installed from 1.50m to 0.50m BGL with plain pipe and bentonite seal from 0.50m BGL to GL. Finished with a raised cover.
Chiselling from 2.70m for 1 hour. Chiselling from 3.50m for 0.75 hours. Chiselling from 4.10m for 1 hour.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No.
10927-08-21.BH03

Ground Investigations Ireland Ltd www.gii.ie			Site St. Vincent's Fairview	Borehole Number **BH04**
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 7.00m	**Ground Level (mOD)** 4.57	**Client**	**Job Number** 10927-08-21
	Location 716857.5 E 736497.9 N	**Dates** 16/09/2021- 17/09/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					4.27	(0.30) 0.30	TOPSOIL			
							Very stiff brown slightly sandy slightly gravelly CLAY with fine to coarse subrounded to subangular gravel and subangular cobbles.			
1.00-1.23 1.00	SPT(C) 50/75 B			15,17/20,30						
						(2.50)				
2.00-2.15 2.00	SPT(C) 50/0 B			10,25/50						
					1.77	2.80	Very stiff dark brown slightly sandy slightly gravelly CLAY with fine to coarse subrounded to subangular gravels.			
3.00-3.25 3.00	SPT(C) 50/95 B			8,20/30,20						
4.00-4.30 4.00	SPT(C) 50/150 B			7,10/17,23,10 Water strike(1) at 4.30m, fell to 4.50m in 20 mins.					1 1	
						(4.20)				
5.00-5.30 5.00	SPT(C) 50/150 B			8,10/13,19,18						
6.00	B									
6.50-6.80	SPT(C) 50/150			10,12/18,22,10						
					-2.43	7.00	Complete at 7.00m			

Remarks
Groundwater encountered at 4.30m BGL.
Borehole complete at 7.00m BGL.
Slotted standpipe with gravel filter zone installed from 7.00m to 2.00m BGL with plain pipe and bentonite seal from 2.00m BGL to GL. Finished with a raised cover.
Chiselling from 1.70m for 1 hour. Chiselling from 2.30m for 1 hour. Chiselling from 2.70m for 1 hour. Chiselling from 4.40m for 1 hour. Chiselling from 5.70m for 0.75 hours. Chiselling from 7.00m for 1 hour.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No.
10927-08-21.BH04

Ground Investigations Ireland Ltd www.gii.ie			**Site** St. Vincent's Fairview	**Borehole Number** **BH05**
Machine : Dando 150 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 0.90m	**Ground Level (mOD)** 9.40	**Client**	**Job Number** 10927-08-21
	Location 716981.1 E 736578.8 N	**Dates** 12/10/2021- 13/11/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					9.30	0.10	MADE GROUND: Tarmacadam		
						(0.40)	MADE GROUND: brown slightly sandy gravelly clay with occasional grass rootlets and fine to coarse round to subangular gravel.		
0.50	B				8.90	0.50			
							Complete at 0.90m		

Remarks
No grounwater encountered during drilling.
Borehole refusal at 0.90m BGL due to obstruction, possible concrete.
Borehole backfilled upon completion.
Chiselling from 0.90m to 0.90m for 0.01 hours.

Scale (approx) 1:50	**Logged By**
Figure No. 10927-08-21.BH06	

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Borehole Number: BH05A
Machine : Beretta T44 Flush : Water Core Dia : 63.5 mm Method : Rotary Core	Casing Diameter: 96mm cased to 21.50m Ground Level (mOD): Location: Dates: 01/11/2021	Client: Engineer: OCSC	Job Number: 10927-08-21 Sheet: 1/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00	10						(0.20) 0.20	TARMACADOM			
							(1.80)	Poor recovery. Recovery consists of MADE GROUND. Firm slightly gravelly sandy Clay with tarmac and occasioanal subangular cobble. Gravel is angular to subangular fine to medium.			
2.00 2.00-2.45	27				5,4/5,5,9,14 SPT N=33		2.00	Very stiff grey gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine to coarse.			
3.50 3.50-3.95	23				4,4/6,6,8,12 SPT N=32		(4.50)				
5.00 5.00-5.23	23				10,14/14,36 SPT 50/75						
6.50 6.50-6.58	87				18,7/50 SPT 25*/75 50/0		6.50	Very stiff grey slightly gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine to coarse.			
8.00 8.00-8.00	47				25/50 SPT 25*/0 50/0		(3.00)				
9.50 9.50-9.58					25/50 SPT 25*/75 50/0		9.50	Poor recovery. Recovery consist of dense grey subangular medium to coarse GRAVELS with cobbles. (Dense) [Driller's notes: grey sands and gravels].			

Remarks
No groundwater encountered during drilling
Rotary core drilling complete from GL to 21.50m BGL.
Slotted standpipe installed from 21.50m to 13.50m BGL with plain pipe from 13.50m BGL to GL finished with a flush cover. Gravel filter zone from 21.50m to 13.50m BGL with bentonite sealed from 13.50m BGL to GL. Finished with a flush cover.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH05A

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH05A

Machine : Beretta T44	Casing Diameter: 96mm cased to 21.50m	Ground Level (mOD)	Client	Job Number: 10927-08-21
Flush : Water				
Core Dia : 63.5 mm	Location	Dates: 01/11/2021	Engineer: OCSC	Sheet: 2/3
Method : Rotary Core				

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	7						(2.50)				
11.00 11.00-11.15	41				11,18/50 SPT 50/0						
							12.00	Very stiff slightly sandy slightly gravelly CLAY with occasional subangular cobbles. Gravel is subangular to subrounded fine to coarse.			
12.50 12.50-12.58	79				21,4/50 SPT 25*/75 50/0		(2.00)				
14.00 14.00-14.08	10				18,7/50 SPT 25*/75 50/0		14.00 (1.50)	Poor recovery. Recovery consists of subangular coarse GRAVEL. (Dense) [Driller's notes: brown slightly sandy slightly gravelly clay].			
15.50 15.50-15.58	50				22,3/50 SPT 25*/75 50/0		15.50	Very stiff grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded medium to coarse.			
17.00 17.00-17.00	50				25/50 SPT 25*/0 50/0		(3.50)				
18.50 18.50-18.65					18,18/50 SPT 50/0						
19.00	60	33	9	41			19.00	Medium strong to strong dark grey LIMESTONE interbedded with weak grey MUDSTONE. Partially to distinctly weathered. 1 set of fractures. F1 0-20 degrees extremely closely to medium spaced undulating rough with occasional clay smearing.			
20.00											

Remarks

Scale (approx)	Logged By
1:50	RM

Figure No.
10927-08-21.BH05A

Ground Investigations Ireland Ltd www.gii.ie		Site St. Vincent's Fairview	Borehole Number **BH05A**
Machine : Beretta T44 **Flush :** Water **Core Dia :** 63.5 mm **Method :** Rotary Core	**Casing Diameter** 96mm cased to 21.50m **Location**	**Ground Level (mOD)** **Dates** 01/11/2021	**Client** **Engineer** OCSC	**Job Number** 10927-08-21 **Sheet** 3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	92	80	47	25			(2.50)				
21.50							21.50	Complete at 21.50m			

Remarks	Scale (approx)	Logged By
	1:50	RM
	Figure No. 10927-08-21.BH05A	

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH06

Machine : Dando 150 + Beretta T44 Method : Cable Percussion with rotary core follow on	Casing Diameter: 200mm cased to 5.10m; 96mm cased to 12.50m	Ground Level (mOD): 8.75	Client:	Job Number: 10927-08-21
	Location: 716986.4 E 736630.9 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.50)	MADE GROUND: Brown sightly sandy slightly gravelly Clay with grass, red brick, ceramic, ash, plaster and few very small pieces of glass.			
0.50	B				8.25	0.50	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with occasional rootlets and ash. Gravel is subangular to subrounded fine to course.			
1.00-1.45 1.00	SPT(C) N=6 B			1,1/1,1,2,2						
						(2.00)				
2.00-2.45 2.00	SPT(C) N=8 B			1,2/2,2,2,2						
					6.25	2.50	Firm to stiff brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse.			
3.00-3.45 3.00	SPT(C) N=14 B			2,2/3,3,4,4						
						(3.00)				
4.00-4.45 4.00	SPT(C) N=14 B			3,3/3,4,4,3						
5.00 5.00-5.00	B SPT 25*/0 50/0			25/50						

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
5.50						3.25	5.50	Very stiff brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse.
	82							
6.50-6.65 6.50					11,13/50 SPT 50/0			
							(2.50)	
	39							
8.00-8.15 8.00					12,13/50 SPT 50/0	0.75	8.00	Very stiff brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse.
	58						(1.50)	
9.50-9.58 9.50					18,7/50 SPT 25*/75 50/0	-0.75	9.50	Poor recovery. Recovery consists of: Brown slightly gravelly SAND. Gravel is subangular fine to coarse. [Driller notes sandy gravelly Clay]

Remarks
No groundwater encountered during drilling.
Cable percussion drilling complete at 5.10m with Rotary follow on complete at 12.50m.
Slotted standpipe installed from 12.50m to 9.50m BGL with plain pipe from BGL to GL. Gravel filter zone 12.50 to 9.50m BGL with bentonite sealed from 9.50m BGL to GL. Finished with a flush cover.
Chiselling from 5.00m to 5.10m for 1 hour.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH06

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH06

Machine : Dando 150 + Beretta T44 Flush : water Core Dia: 63.5 mm Method : Cable Percussion with rotary core follow on	Casing Diameter: 200mm cased to 5.10m 96mm cased to 12.50m	Ground Level (mOD): 8.75	Client:	Job Number: 10927-08-21
	Location: 716986.4 E 736630.9 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	30						(1.50)				
11.00						-2.25	11.00	Poor recovery. Recovery consists of: grey slightly sandy slightly gravelly CLAY with occasional subangular cobbles. Gravel is subangular to subrounded fine to coarse.			
	27						(1.50)				
12.50						-3.75	12.50	Complete at 12.50m			

Remarks	Scale (approx): 1:50	Logged By: RM
	Figure No.: 10927-08-21.BH06	

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH07

Machine : Berretta T44 Flush : water Core Dia : mm Method : Rotary Cored	Casing Diameter: 96mm to 14.00m	Ground Level (mOD): 9.67	Client:	Job Number: 10927-08-21
	Location: 716906.4 E 736644.1 N	Dates: 01/10/2021-01/11/2021	Engineer: OCSC	Sheet: 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(1.20)	Hand pit dug to 1.20m.			
1.20	31					8.47	1.20	Firm to stiff light brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse suubangular to subrounded.			
2.00 2.00-2.45	27				3,4/4,6,7,11 SPT N=28		(2.30)				
3.50 3.50-3.95	72				4,4/7,11,12,12 SPT N=42	6.17	3.50	Very stiff grey slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is fine to coarse angular to subangular.			
5.00 5.00-5.30	43				8,13/19,31 SPT 50/150		(4.50)				
6.50 6.50-6.80	90				8,8/14,36 SPT 50/150						
8.00 8.00-8.08	13				10,15/50 SPT 25*/75 50/0	1.67	8.00	Poor recovery: Recovery consists of dense fine to coarse angular to subangular GRAVEL and occasional subangular cobbles. (Dense) [Driller notes gravelly clay with sand bands]			
9.50 9.50-9.65					12,17/50 SPT 50/0		(3.00)				

Remarks
No groundwater encountered during drilling.
Borehole complete at 14.00m BGL.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH07

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH07

Machine : Berretta T44 Flush : water Core Dia : mm Method : Rotary Cored	Casing Diameter: 96mm to 14.00m	Ground Level (mOD): 9.67	Client:	Job Number: 10927-08-21
	Location: 716906.4 E 736644.1 N	Dates: 01/10/2021-01/11/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	30										
11.00 11.00-11.08	38				15,10/50 SPT 25*/75 50/0	-1.33	11.00 (1.50)	Very stiff brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is subangular fine to coarse.			
12.50 12.50-12.65	10				9,17/50 SPT 50/0	-2.83	12.50 (1.50)	Poor recovery: Recovery consists of subangular to subrounded fine to coarse GRAVEL. [Driller notes sandy gravelly Clay]			
14.00						-4.33	14.00	Complete at 14.00m			

Remarks

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH07

Ground Investigations Ireland Ltd www.gii.ie			Site St. Vincent's Fairview	Borehole Number **BH08**
Machine : Dando 150 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 5.70m	**Ground Level (mOD)** 4.93	**Client**	**Job Number** 10927-08-21
	Location 716762.4 E 736520.4 N	**Dates** 01/11/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							MADE GROUND: brown slightly sandy slightly gravelly Clay with occasional rootlets and red brick.		
0.50	B								
1.00-1.45 1.00	SPT N=6 B			1,2/2,1,1,2					
						(2.80)			
2.00-2.45 2.00	SPT N=7 B			2,3/2,1,2,2					
					2.13	2.80	Very stiff dark brown slightly clayey slightly sandy CLAY with occasional subangular to subrounded cobbles. Gravel is subangular to subrounded fine to medium.		
3.00-3.45 3.00	SPT N=48 B			4,6/7,10,15,16					
						(1.20)			
4.00-4.45 4.00	SPT N=50 B			6,8/9,12,15,14	0.93	4.00	Very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium.		
						(1.70)			
5.00-5.38 5.00	SPT 50/225 B			8,11/15,19,16					
					-0.77	5.70	Complete at 5.70m		

Remarks
No groundwater encountered during cable pecussion drilling
Cable percussion drilling complete at 5.70m.
Chiselling from 5.70m to 5.70m for 1.0 hour.

Scale (approx)	Logged By
1:50	RM

Figure No.
10927-08-21.BH08

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH09
Machine : Dando 150 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 5.50m	**Ground Level (mOD)** 5.77	**Client**	**Job Number** 10927-08-21
	Location 716787.9 E 736578.6 N	**Dates** 01/11/2021	**Engineer** OCSC	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.80)	MADE GROUND. Brown slightly sandy slightly gravelly Clay with grass and subangular to subrounded fine to coarse gravel and occasional subangular cobbles.		
0.50	B								
					4.97	0.80	Firm to stiff light brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular to subrounded fine to coarse.		
1.00-1.45 1.00	SPT N=13 B			2,3/3,3,3,4					
						(1.20)			
2.00-2.45 2.00	SPT N=17 B			2,3/4,4,5,4	3.77	2.00	Stiff light brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular to subrounded fine to coarse.		
3.00-3.45 3.00	SPT N=16 B			3,3/4,4,4,4					
						(2.70)			
4.00-4.45 4.00	SPT N=21 B			3,4/5,5,5,6					▼1
				Water strike(1) at 4.50m, rose to 4.00m in 20 mins.					▽1
					1.07	4.70	Very stiff dark brown slightly sandy gravelly CLAY with subrounded cobbles. Gravel is angular to subrounded fine to coarse.		
5.00-5.38 5.00	SPT 50/225 B			6,9/12,17,21		(0.80)			
					0.27	5.50	Complete at 5.50m		

Remarks	Scale (approx)	Logged By
Groundwater encountered 4.5m BGL during drilling. Cable percussion drilling complete at 5.50m BGL. Chiselling from 5.50m to 5.50m for 1.0 hour.	1:50	RM
	Figure No. 10927-08-21.BH09	

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH10

Machine: Dando 150 + Beretta T44; Method: Cable Percussion with Rotary core follow on	Casing Diameter: 200mm cased to 5.10m, 96mm cased to 23.00m	Ground Level (mOD): 10.44	Client:	Job Number: 10927-08-21
	Location: 716811.8 E 736630.1 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
							MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional subangular cobbles and rootlets. Gravel is subangular to subrounded fine to coarse.
0.50	B						
1.00-1.45	SPT(C) N=5			1,1/1,2,1,1		(1.90)	
1.00	B						
					8.54	1.90	Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium.
2.00-2.45	SPT(C) N=12			2,2/2,3,3,4			
2.00	B					(1.10)	
					7.44	3.00	Very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium.
3.00-3.45	SPT(C) N=30			3,4/6,7,7,10			
3.00	B					(2.00)	
4.00-4.45	SPT(C) N=50			5,7/9,13,13,15			
4.00	B						
5.00-5.08				13,12/50 50/0 SPT(C) 25*/75			
5.00				B	5.44	5.00	Slightly sandy slightly clayey GRAVEL. Gravel is subrounded to subangular fine to coarse.
5.10					5.34	5.10	Stiff dark brown slightly sandy gravelly CLAY and subangular to subrounded cobbles. Gravel is subrounded to subangular medium to coarse.

TCR	SCR	RQD	FI	Depth (m)	Field Records
30				6.50-6.88, 6.50	5,8/9,17,24 SPT(C) 50/225
20				8.00-8.38, 8.00	13,14/14,16,20 SPT(C) 50/225
32				9.50-9.80, 9.50	10,15/18,32 SPT(C) 50/150

(5.90)

Remarks
No groundwater encountered during drilling.
Cable percussion drilling complete at 5.10m BGL with Rotary follow on complete at 23.00m BGL.
Slotted standpipe installed from 2.00m BGL to 1.50m BGL with plain pipe from 1.50m BGL to GL. Gravel filter zone from 2.00m BGL to 1.5m BGL with bentonite sealed from 1.50m BGL to GL. Finished with a raised cover.
Chiselling from 5.10m to 5.10m for 1 hour.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH10

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH10

Machine : Dando 150 + Beretta T44 Flush : water Core Dia: 63.5 mm Method : Cable Percussion with Rotary core follow on	Casing Diameter 200mm cased to 5.10m 96mm cased to 23.00m	Ground Level (mOD) 10.44	Client	Job Number 10927-08-21
	Location 716811.8 E 736630.1 N	Dates 12/10/2021-13/11/2021	Engineer OCSC	Sheet 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	63										
11.00-11.30 11.00					10,14/14,36 SPT(C) 50/150	-0.56	11.00	Poor recovery: Recovery consists of dense subangular to subrounded cobbles.			
	35						(1.65)				
12.50-12.58 12.50					18,7/50 SPT(C) 25*/75 50/0	-2.21	12.65	Very stiff brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium.			
	39						(1.45)				
14.00-14.15 14.00					14,17/50 SPT(C) 50/0	-3.66	14.10	Poor recovery: Recovery consists of grey coarse subangular gravel. Clay likely washed away. (Stiff) [Driller's notes: gravelly sandy clay]			
	17										
15.50-15.58 15.50					19,6/50 SPT(C) 25*/75 50/0		(2.90)				
	13										
17.00-17.08 17.00					18,7/50 SPT(C) 25*/75 50/0	-6.56	17.00	Poor recovery: Recovery consists of very stiff brown slightly sandy slightly gravelly CLAY with occasional cobbles. Sand and silt washed away.			
	10						(1.50)				
18.50-18.50 18.50					25/50 SPT(C) 25*/0 50/0	-8.06	18.50	Very stiff brown slightly sandy gravelly CLAY. Gravel is subrounded to subangular medium to coarse.			
	27						(2.30)				
20.00											

Remarks	Scale (approx) 1:50	Logged By RM
	Figure No. 10927-08-21.BH10	

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Borehole Number: BH10
Machine : Dando 150 + Beretta T44 Flush : water Core Dia : 63.5 mm Method : Cable Percussion with Rotary core follow on	Casing Diameter: 200mm cased to 5.10m, 96mm cased to 23.00m	Ground Level (mOD): 10.44	Client:	Job Number: 10927-08-21
	Location: 716811.8 E 736630.1 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	54	33	23	10							
						-10.36	20.80	Medium strong to strong thinly to medium bedded dark grey to black fine to medium grained LIMESTONE with occasional calcite veins inter-bedded with weak to medium strong thinly laminated dark grey fine grained MUDSTONE. Partially weathered. (20.8-23.00m) 2 sets of fractures. F1 10-15 degrees. Very closely to medium spaced rough occasionaly open with clay smearing. F2 70-90 degrees. Medium spaced undulating rough with occasional clay smearing.			
21.50	90	87	44	16			(2.20)				
23.00						-12.56	23.00	Complete at 23.00m			

Remarks	Scale (approx)	Logged By
	1:50	RM
	Figure No. 10927-08-21.BH10	

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH11
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter:** 200mm cased to 5.60m	**Ground Level (mOD):** 10.61	**Client:**	**Job Number:** 10927-08-21
	Location: 716831.1 E 736673.4 N	**Dates:** 01/11/2021	**Engineer:** OCSC	**Sheet:** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					10.41	(0.20) 0.20	TOPSOIL		
0.50	B						Firm brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is subrounded to subangular fine to course gravel.		
1.00-1.45 1.00	SPT N=13 B			2,3/3,3,3,4					
						(2.70)			
2.00-2.45 2.00	SPT N=10 B			2,2/2,2,3,3					
					7.71	2.90	Stiff greyish brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles. Gravel is subangular to subrounded fine to coarse.		
3.00-3.45 3.00	SPT N=30 B			3,5/6,7,7,10					
						(1.10)			
4.00-4.45 4.00	SPT N=48 B			5,8/11,12,12,13	6.61	4.00	Very stiff greyish brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles. Gravel is subangular to subrounded fine to coarse.		
						(1.60)			
5.00-5.38 5.00	SPT 50/225 B			7,10/13,17,20					
					5.01	5.60	Complete at 5.60m		

Remarks
Chiselling from 5.60m to 5.60m for 1.0 hour.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH11

Ground Investigations Ireland Ltd
www.gii.ie

Site St. Vincent's Fairview				**Borehole Number** BH12
Machine : Dando 2000 + Beretta T44 **Method :** Cable Percussion with Rotary follow on	**Casing Diameter** 200mm cased to 3.70m 90mm cased to 19.50m	**Ground Level (mOD)** 4.65	**Client**	**Job Number** 10927-08-21
	Location 716726.9 E 736508.6 N	**Dates** 14/09/2021-15/09/2021	**Engineer** OCSC	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					4.45	(0.20) 0.20	Dark brown TOPSOIL			
0.50	B					(0.80)	MADE GROUND: Brown sandy gravelly Clay with ash and plaster fragments and subangular to subrounded fine to coarse gravel			
1.00-1.45 1.00	SPT(C) N=7 B			1,1/2,2,2,1	3.65	1.00	MADE GROUND: Brown sandy clayey angular to subangular fine to coarse Gravel.			
2.00-2.45 2.00	SPT(C) N=13 B			2,3/3,4,3,3		(1.60)				
					2.05	2.60	Very stiff grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium.			
3.00-3.45 3.00	SPT(C) N=43 B			3,4/5,8,13,17		(1.10)				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
3.70	38					0.95	3.70	Poor recovery. Recovery consists of slightly sandy GRAVEL. Gravel is subangualr to subrounded fine to coarse.
							(1.50)	
5.00-5.08 5.00	30				19,6/50 SPT 25*/75 50/0	-0.55	5.20	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is angulalr to subrounded fine to coarse.
6.50-6.65 6.50	13				15,15/50 SPT 50/0			(6.50-8.00m) Driller's notes: Bands of sand and gravel.
							(4.30)	
8.00-8.30 8.00	71				7,7/16,34 SPT 50/150			
9.50-9.65 9.50					10,15/50 SPT 50/0	-4.85	9.50	Very stiff dark grey slightly sandy slightly gravelley CLAY with occasional cobbles and bands of gravel. Gravel is subangular to angular fine to coarse.

Remarks
No groundwater encountered during drilling.
Cable percussion drilling complete at 3.70m with rotary follow on complete at 19.50m BGL.
Slotted standpipe with gravel filter zone installed from 19.50m to 16.50m BGL with plain pipe and bentonite seal from 16.50m BGL to GL. Finished with a raised cover.
Chiselling from 3.70m for 1 hour.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No. 10927-08-21.BH12

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Borehole Number: BH12
Machine: Dando 2000 + Beretta T44 Flush : Core Dia: mm Method : Cable Percussion with Rotary follow on	Casing Diameter: 200mm cased to 3.70m, 90mm cased to 19.50m Ground Level (mOD): 4.65	Client:	Job Number: 10927-08-21
	Location: 716726.9 E 736508.6 N Dates: 14/09/2021-15/09/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	32						(1.50)				
11.00-11.08 11.00	83				25/50 SPT 25*/75 50/0	-6.35	11.00	Very stiff dark grey slightly sandy gravelly CLAY with occasional cobbles and bands of gravel. Gravel is subangular to subrounded fine to coarse.			
12.50-15.65 12.50	80				17,8/50 SPT 50/0						
14.00-14.00 14.00	100				25/50 SPT 25*/0 50/0		(5.50)				
15.50	90	31	20			-11.85	16.50	Medium strong to strong grey/black thinly to medium bedded fine to medium grained LIMESTONE interbedded with weak grey MUDSTONE with clay lenses and smearing. Partially weathered. (16.5-19.5m) 2 fracture sets: F1 5-20 degrees very closely to medium spaced, undulating, rough with occasional clay smearing. F2 70-87 degrees medium spaced undulating rough with clay smearing.			
17.00	97	93	44	13			(3.00)				
18.50	100	74	26	14							
19.50						-14.85	19.50	Complete at 19.50m			

Remarks	Scale (approx)	Logged By
	1:50	C. Byrne
	Figure No. 10927-08-21.BH12	

Ground Investigations Ireland Ltd www.gii.ie		Site St. Vincent's Fairview	Borehole Number **BH13**
Machine : Dando 2000 & Beretta T44 **Method :** Cable Percussion with Rotary core follow on	**Casing Diameter** 200mm cased to 8.20m 96mm cased to 8.00m	**Ground Level (mOD)** 4.16	**Client**	**Job Number** 10927-08-21
	Location 716746.9 E 736559.4 N	**Dates** 14/09/2021- 15/09/2021	**Engineer** OCSC	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.30)	Brown sandy TOPSOIL			
					3.86	0.30	Firm brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular to subrounded fine to medium			
0.50	B									
1.00-1.45 1.00	SPT(C) N=11 B			1,2/2,3,3,3		(1.60)				
					2.26	1.90	Stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse.			
2.00-2.45 2.00	SPT(C) N=20 B			2,3/4,5,5,6						
						(2.10)				
3.00-3.45 3.00	SPT(C) N=28 B			3,5/5,7,8,8						
4.00-4.45 4.00	SPT(C) N=48 B			5,7/9,11,13,15	0.16	4.00	Very stiff dark brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse.			
5.00-5.45 5.00	SPT(C) N=44 B			5,8/9,9,12,14						
6.00-6.38 6.00	SPT(C) 50/225 B			5,8/11,13,15,11		(4.20)				
7.00-7.38 7.00	SPT(C) 50/225 B			7,9/13,17,19,1						
8.00 8.00-8.15 8.00				9,19/50 B SPT(C) 50/0						

	TCR	SCR	RQD	FI					
					-4.04	8.20	Very stiff greyish brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
	65					(1.30)			
9.50-9.58 9.50				11/50 SPT 11*/75 50/0	-5.34	9.50	Very stiff dark grey slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles.		

Remarks
No groundwater encountered during cable percussion drilling.
Slotted standpipe with gravel filter zone installed from 18.50m to 15.50m BGL with plain pipe and bentonite seal from 15.50m BGL to GL. Finished with a raised cover.
Chiselling from 8.20m for 1 hour.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No. 10927-08-21.BH13

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH13
Machine : Dando 2000 & Beretta T44 Flush : water Core Dia : mm Method : Cable Percussion with Rotary core follow on	Casing Diameter: 200mm cased to 8.20m 96mm cased to 8.00m	Ground Level (mOD): 4.16	Client:	Job Number: 10927-08-21
	Location: 716746.9 E 736559.4 N	Dates: 14/09/2021-15/09/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	67										
11.00-11.23 11.00					12,17/50 SPT 50/75						
	77										
12.50-12.58 12.50					18/50 SPT 18*/75 50/0		(6.00)				
	83										
14.00-14.00 14.00					25/50 SPT 25*/0 50/0						
	100										
15.50-15.50 15.50					25/50 SPT 25*/0 50/0	-11.34	15.50	Medium-strong to strong thinly to thickly laminated grey fine to medium grained argillaceous LIMESTONE interbedded with weak to medium-strong thinly laminated dark grey fine-grained MUDSTONE with occasional calcite veins and pyrite. Partially weathered to unweathered. 2 sets of fractures. F1 5-15 degrees. Very close to medium spaced undulating rough occasionally open with clay smearing. F2 70-80 degrees. Medium spaced undulating rough open with clay staining.			
	97	72	50	12							
17.00							(3.00)				
	100	85	43	10							
18.50						-14.34	18.50	Complete at 18.50m			

Remarks	Scale (approx)	Logged By
	1:50	C. Byrne
	Figure No. 10927-08-21.BH13	

Ground Investigations Ireland Ltd
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Machine : Dando 2000 + Beretta T44 **Method :** Cable percussion with Rotary follow on.	**Casing Diameter** 200mm cased to 1.60m 96mm cased to 15.00m	**Ground Level (mOD)** 4.86	**Site** St. Vincent's Fairview	**Client**	**Borehole Number** **BH14**
	Location 716762.3 E 736588.4 N	**Dates** 14/09/2021-15/09/2021	**Engineer** OCSC	**Job Number** 10927-08-21	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.50)	Brown slightly sandy slightly gravelly clay. TOPSOIL with grass and rootlets and fine to coarse subangular to subrounded gravel			
					4.36	0.50	Firm to stiff light brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse.			
0.50	B									
1.00-1.45 1.00	SPT(C) N=15 B			2,3/3,4,4,4						
						(1.80)				
2.00-2.45 2.00	SPT(C) N=20 B			2,3/4,5,5,6						
					2.56	2.30	Stiff grey slightly gravelly sandy CLAY. Gravel is subangular fine to coarse.			
3.00-3.45 3.00	SPT(C) N=28 B			4,5/5,7,7,9						
						(1.70)				
					0.86	4.00	Very stiff grey slightly gravelly sandy CLAY. Gravel is subangular fine to coarse.			
4.00-4.45 4.00	SPT(C) N=50 B			5,7/10,13,14,13						
						(1.50)				
5.00-5.38 5.00	SPT(C) 50/225 B			6,9/13,16,19,2						

Depth (m)	TCR	SCR	RQD	FI	Level (mOD)	Depth (m) (Thickness)	Description
5.50					-0.64	5.50	Poor recovery. Recovery consists of soft dark brown slightly gravelly sandy CLAY. Gravel is fine to coarse subangular to subrounded.
	19					(1.00)	
6.50					-1.64	6.50	Stiff dark brown slightly sandy slightly gravelly CLAY.
	60					(1.50)	
8.00					-3.14	8.00	Stiff dark brown slightly sandy gravelly CLAY with a abnd of light brown firm to stiff clay at the bottom.
	57					(1.25)	
					-4.39	9.25	Stiff brown slightly sandy slightly gravelly CLAY.
9.50							

Remarks
No groundwater encountered during cable percussion drilling.
Cable percussion borehole complete at 5.50m BGL with Rotary follow on complete at 15.00m BGL.
Slotted standpipe with gravel filter zone installed from 15.00m to 12.00m BGL with plain pipe and bentonite seal from 12.00m BGL to GL. Finished with a raised cover.
Chiselling from 5.40m to 5.50m for 1 hour.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH14

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH14

Machine : Dando 2000 + Beretta T44	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :	200mm cased to 1.60m 96mm cased to 15.00m	4.86		10927-08-21
Core Dia: 63.5 mm	**Location**	**Dates**	**Engineer**	**Sheet**
Method : Cable percussion with Rotary follow on.	716762.3 E 736588.4 N	14/09/2021-15/09/2021	OCSC	2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	21						(1.75)				
11.00	33					-6.14	11.00	Grey slightly clayey sandy subrounded to subangular GRAVEL with occasional subangular cobbles			
							(3.00)				
12.50	40										
14.00	45					-9.14	14.00	Stiff dark grey slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse.			
							(1.00)				
15.00						-10.14	15.00	Complete at 15.00m			

Remarks	Scale (approx)	Logged By
	1:50	RM
	Figure No. 10927-08-21.BH14	

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Borehole Number: **BH15**
Machine : Dando 2000 + Beretta T44 **Method :** Cable Percussion with Rotary follow on	**Casing Diameter:** 200mm cased to 8.60m 96mm cased to 15.50m	**Ground Level (mOD):** 10.28	**Client:**
	Location: 716770.6 E 736637.2 N	**Dates:** 27/09/2021-13/10/2021	**Engineer:** OCSC
Job Number: 10927-08-21	**Sheet:** 1/2		

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					10.08	(0.20) 0.20	TOPSOIL.			
							Firm greyish-brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is sub-angular to sub-rounded medium to coarse.			
1.00-1.45 1.00	SPT(C) N=10 B			1,2/2,3,2,3						
						(2.40)				
2.00-2.45 2.00	SPT(C) N=14 B			2,3/3,3,4,4						
					7.68	2.60	Stiff grey slightly sandy slightly gravelly CLAY with rootlets. Gravel is subangular to subroounded fine to coarse.			
3.00-3.45 3.00	SPT(C) N=28 B			3,5/5,7,8,8						
						(1.40)				
4.00-4.45 4.00	SPT(C) N=35 B			4,6/6,8,10,11	6.28	4.00	Very stiff grey slightly sandy slightly gravelly CLAY with rootlets. Gravel is subangular to subroounded fine to coarse.			
5.00-5.45 5.00	SPT(C) N=50 B			5,8/10,13,15,12						
6.00-6.45 6.00	SPT(C) N=50 B			5,9/12,14,14,10						
						(4.60)				
7.00-7.45 7.00	SPT(C) N=50 B			7,10/14,17,19						
8.00-8.45 8.00	SPT(C) N=50 B			6,11/14,18,18						
	TCR / **SCR**	**RQD**	**FI**		1.68	8.60	Very stiff grey slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is angular to subangular and fine to coarse.			
8.70	50					(0.90)				
9.50-9.95 9.50				18/50 SPT N=50	0.78	9.50	Dense grey clayey sandy sub angular to sub rounded fine to coarse GRAVEL.			

Remarks
No Groundwater encountered during cable percussion drilling.
Cable percussion drilling complete at 8.6m BGL with rotary follow on complete at 15.50m BGL.
Slotted standpipe with gravel filter zone installed from 10.7m to 7.7m BGL with plain pipe and bentonite seal from 7.7m BGL to GL. Finished with a raised cover.
Chiselling from 8.40m to 8.60m for 1 hour.

Scale (approx)	Logged By
1:50	C. Byrne

Figure No. 10927-08-21.BH15

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH15

Machine : Dando 2000 + Beretta T44 Flush : water Core Dia: 63.5 mm Method : Cable Percussion with Rotary follow on	Casing Diameter: 200mm cased to 8.60m 96mm cased to 15.50m	Ground Level (mOD): 10.28	Client:	Job Number: 10927-08-21
	Location: 716770.6 E 736637.2 N	Dates: 27/09/2021-13/10/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	66						(1.10)				
						-0.32	10.60	Very stiff brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is sub angular to sub rounded fine to coarse.			
11.00-11.00 11.00					25/50 SPT 25*/0 50/0						
	37						(3.40)				
12.50-12.58 12.50					16/50 SPT 16*/75 50/0						
	100										
14.00-14.08 14.00					17/50 SPT 17*/75 50/0	-3.72	14.00 (0.50)	Very stiff light brown slightly sandy slightly gravelly CLAY with occassional sub angular to sub rounded cobbles. Gravel is subangular fine to coarse.			
	30					-4.22	14.50 (1.00)	Poor recovery. Recovery consists of subangular fine to coarse GRAVEL with occasional subangular cobbles. (Driller notes sand and gravel)			
15.50						-5.22	15.50	Complete at 15.50m			

Remarks	Scale (approx): 1:50	Logged By: C. Byrne
	Figure No.: 10927-08-21.BH15	

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH16
Machine : Dando 2000 + Beretta T44 Method : Cable Percussion with Rotary follow on	Casing Diameter: 200mm cased to 5.20m	Ground Level (mOD): 10.02	Client:	Job Number: 10927-08-21
	Location: 716737.3 E 736658.1 N	Dates: 01/11/2021	Engineer: OCSC	Sheet: 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					9.92	0.10	TOPSOIL			
0.50	B					(0.90)	Brown slightly sandy slightly gravelly CLAY. Gravel is Sub-angular to sub-rounded fine to coarse.			
1.00-1.45 1.00	SPT N=11 B			2,3/3,2,3,3	9.02	1.00	Firm light brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded fine to medium.			
2.00-2.45 2.00	SPT N=13 B			2,3/3,3,3,4		(1.70)				
3.00-3.45 3.00	SPT N=25 B			3,5/5,6,7,7	7.32	2.70	Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse.			
4.00-4.45 4.00	SPT N=41 B			5,7/9,10,11,11		(2.40)				
5.00-5.30 5.00	SPT 50/150 B			7,11/21,29	4.92	5.10	Dense grey slightly gravelly SAND with occasional subangular cobbles. Gravel is subangular and fine to coarse.			

Depth (m)	TCR	SCR	RQD	FI	Field Records	Depth (m) (Thickness)
5.50	70					
6.50-6.65 6.50					12,15/50 SPT 50/0	
	11					
8.00-8.38 8.00					10,10/12,17,21 SPT 50/225	(5.90)
	43					
9.50-9.58 9.50					19,6/50 SPT 25*/75 50/0	

Remarks
No groundwater encountered during drilling
Cable percussion drilling complete at 5.30m BGL with rotary follow on complete at 15.00m BGL.
Slotted standpipe installed from 15.00m BGL to 12.00m BGL with plain pipe from 12.00m BGL to GL. Finished with a raised cover.
Chiselling from 5.10m to 5.30m for 1 hour.

Scale (approx): 1:50
Logged By:
Figure No.: 10927-08-21.BH16

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH16

Machine : Dando 2000 + Beretta T44 **Flush** : water **Core Dia**: 63.5 mm **Method** : Cable Percussion with Rotary follow on	**Casing Diameter** 200mm cased to 5.20m	**Ground Level (mOD)** 10.02	**Client**	**Job Number** 10927-08-21
	Location 716737.3 E 736658.1 N	**Dates** 01/11/2021	**Engineer** OCSC	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	13										
11.00-11.38 11.00					8,11/14,19,17 SPT 50/225	-0.98	11.00	Very stiff light brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles. Sand into clay. Gravel is subangular fine to coarse.			
	27						(1.50)				
12.50-12.58 12.50					15,10/50 SPT 25*/75 50/0	-2.48	12.50	Very stiff light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse.			
	68						(1.50)				
14.00-14.00 14.00					25/50 SPT 25*/0 50/0	-3.98	14.00	Poor recovery: Recovery consists of very stiff light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse. (Driller notes sandy gravelly Clay)			
	10						(1.00)				
15.00						-4.98	15.00	Complete at 15.00m			

Remarks	**Scale (approx)** 1:50	**Logged By**
	Figure No. 10927-08-21.BH16	

Ground Investigations Ireland Ltd
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Site	Borehole Number
St. Vincent's Fairview	**BH17**

Machine : Dando 2000 + Beretta T44

Method : Cable Percussion with Rotary follow on

Casing Diameter	Ground Level (mOD)	Client	Job Number
200mm cased to 8.30m 96mm cased to 25.30m	10.14		10927-08-21

Location	Dates	Engineer	Sheet
716689.9 E 736669.7 N	01/11/2021	OCSC	1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
							MADE GROUND: Brown slightly sandy slightly gravelly Clay with ash and fragments of brick and ceramic. Gravel is sub-angualr to sub-rounded medium to coarse.
0.50	B						
1.00-1.45 1.00	SPT N=9 B			1,2/2,2,2,3			
						(3.00)	
2.00-2.45 2.00	SPT N=10 B			2,1/2,2,3,3			
					7.14	3.00	Firm to stiff light brown slightly sandy slightly gravelly CLAY with sub-angular to sub-rounded medium to coarse gravel.
3.00-3.45 3.00	SPT N=13 B			2,3/3,4,3,3			
4.00-4.45 4.00	SPT N=17 B			2,3/4,4,5,4			
						(3.50)	
5.00-5.45 5.00	SPT N=14 B			2,3/3,3,4,4			
6.00-6.45 6.00	SPT N=18 B			3,4/5,4,4,5			
					3.64	6.50	Stiff greyish-brown sandy gravelly CLAY with occasional cobbles. Gravel is sub-angular to sub-rounded medium to coarse.
7.00-7.45 7.00	SPT N=50 B			5,8/10,13,16,11			
	TCR / SCR	RQD	FI			(1.50)	
7.40	50						(7.40-8.30m) Redrill of collapsed material from cable percussion hole.
8.00-8.08 8.00 8.00				14,11/50 SPT 25*/75 50/0 B	2.14	8.00 (0.30)	Grey slightly sandy GRAVEL. Sub-angular to rounded fine to coarse gravel.
					1.84	8.30	Poor recovery: Recovery consist of grey slightly gravelly sandy CLAY. Gravel is subangular fine to coarse. (Very stiff).
	23					(1.20)	
9.50-9.80 9.50				9,9/12,38 SPT 50/150	0.64	9.50	Poor recovery: Recovery consists of brown slightly sandy slightly gravelly CLAY. Gravel is subangular and subrounded fine to coarse. [Driller's notes: sands, gravels and clay] (Very stiff).

Remarks
No groundwater encountered during cables percussion drilling
Cable percussion drilling complete at 8.30mBGL with rotary drilling complete at 25.30m BGL.
Slotted standpipe installed from 25.30m BGL to 22.30m BGL with plain pipe from 22.30m BGL to GL. Finished with a raised cover.
Chiselling from 8.10m to 8.30m for 1.0 hour.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH17

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: **BH17**
Machine : Dando 2000 + Beretta T44 **Flush :** water **Core Dia :** 63.5 mm **Method :** Cable Percussion with Rotary follow on	**Casing Diameter** 200mm cased to 8.30m 96mm cased to 25.30m	**Ground Level (mOD)** 10.14	**Client**	**Job Number** 10927-08-21
	Location 716689.9 E 736669.7 N	**Dates** 01/11/2021	**Engineer** OCSC	**Sheet** 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	17										
11.00-11.08 11.00					21,4/50 SPT 25*/75 50/0						
	17						(4.50)				
12.50-12.50 12.50					25/50 SPT 25*/0 50/0						
	13										
14.00-14.08 14.00					19,6/50 SPT 25*/75 50/0	-3.86	14.00	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded medium to coarse.			
	30						(1.50)				
15.50-15.50 15.50					25/50 SPT 25*/0 50/0	-5.36	15.50	Poor recovery: Recovery consists of clayey gravelly SAND. Gravel is subangular fine to coarse. [Driller's notes: Black sands and gravels] (Dense)			
	17						(2.40)				
17.00-17.00 17.00					25/50 SPT 25*/0 50/0						
	37					-7.76	17.90	Very stiff brownish-grey slightly sandy gravelly CLAY. Gravel is subangular fine to coarse.			
18.50-18.50 18.50					25/50 SPT 25*/0 50/0						
	60						(2.10)				
20.00											

Remarks

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH17

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH17
Machine: Dando 2000 + Beretta T44 Flush: water Core Dia: 63.5 mm Method: Cable Percussion with Rotary follow on	Casing Diameter: 200mm cased to 8.30m 96mm cased to 25.30m	Ground Level (mOD): 10.14	Client:	Job Number: 10927-08-21
	Location: 716689.9 E 736669.7 N	Dates: 01/11/2021	Engineer: OCSC	Sheet: 3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	50					-9.86	20.00 (2.00)	Very stiff grey slightly sandy slightly gravelly CLAY with subangular cobbles. Gravel is subangular to subrounded fine to coarse.			
21.50-21.50 21.50					25/50 SPT 25*/0 50/0						
22.00	65	37	45	9		-11.86	22.00	Medium-strong to strong dark grey medium grained LIMESTONE interbedded with weak to medium-strong MUDSTONE with some clay smearing. Partially weathered. (22.0-25.30) 2 sets of fractures. F1 0-30 degrees very thinnely to medium spaced undulating rough. F2 75-90 degrees medium spaced unduàlting rough, occasionaly stepped.			
23.00	83	57	29	19			(3.30)				
24.50	96	93	84	9							
25.30						-15.16	25.30	Complete at 25.30m			

Remarks

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH17

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH18
Machine : Dando 150 + Berretta T44. Method : Cable percussion with Rotary follow on.	Casing Diameter: 200mm cased to 5.50m; 96mm cased to 15.00m	Ground Level (mOD): 11.09	Client:	Job Number: 10927-08-21
	Location: 716713.8 E 736746.7 N	Dates: 01/10/2021-01/11/2021	Engineer: OCSC	Sheet: 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.30)	Slightly gravelly TOPSOIL with occasional rootlets			
					10.79	0.30	Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse			
0.50	B									
1.00-1.45 1.00	SPT(C) N=13 B			2,3/3,4,3,3						
						(2.00)				
2.00-2.45 2.00	SPT(C) N=31 B			3,6/7,7,6,11						
					8.79	2.30	Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse.			
						(0.70)				
					8.09	3.00	Very stiff dark brown slightly gravelly sandy CLAY with occasional subangular to subrounded cobbles. Gravel is subangular to subrounded fine to coarse.			
3.00-3.45 3.00	SPT(C) N=36 B			4,5/7,8,9,12						
						(2.00)				
4.00-4.45 4.00	SPT(C) N=49 B			5,8/9,12,13,15						

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
5.00 4.70 5.00-5.30 5.00	73				B 6,11/15,35 SPT(C) 50/150			(4.70-5.50m) Redrill of collaosed cable percussion hole.
						6.09	5.00	Very stiff light brown slightly sandy slightly gravelly slightly silty CLAY. Gravel is subrounded to subangular fine to coarse.
	67							
6.50-6.65 6.50					21,4/50 SPT 50/0			
	100							
8.00-8.08 8.00					6,19/50 SPT 25*/75 50/0			
	47							
9.50-9.50 9.50					25/50 SPT 25*/0 50/0			

Remarks
Cable percussion drilling complete at 5.5mBGL with rotary drilling complete at 15.00m BGL.
No groundwater encountered during drilling.
Slotted standpipe installed from 15.00m BGL to 12.00m BGL with plain pipe from 12.00m BGL to GL. Finished with a raised cover.
Chiselling from 5.40m to 5.50m for 1 hour.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH17

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: BH18
Machine : Dando 150 + Berretta T44. Flush : water Core Dia : 63.5 mm Method : Cable percussion with Rotary follow on.	Casing Diameter: 200mm cased to 5.50m 96mm cased to 15.00m	Ground Level (mOD): 11.09	Client:	Job Number: 10927-08-21
	Location: 716713.8 E 736746.7 N	Dates: 01/10/2021-01/11/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(10.00)				
	100										
11.00-11.00 11.00					25/50 SPT 25*/0 50/0						
	100										
12.50-12.58 12.50					21,4/50 SPT 25*/75 50/0						
	100										
14.00-14.00 14.00					25/50 SPT 25*/0 50/0						
	85										
15.00						-3.91	15.00	Complete at 15.00m			

Remarks
No groundwater encountered during drilling.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH17

Ground Investigations Ireland Ltd www.gii.ie			Site: St. Vincent's Fairview	Borehole Number: **BH19**
Machine : Dando 150 + Beretta T44 **Method :** Cable Percussion with Rotary follow on	**Casing Diameter** 200mm cased to 5.00m 96mm cased to 5.50m	**Ground Level (mOD)** 10.66	**Client**	**Job Number** 10927-08-21
	Location 716757.2 E 736718.3 N	**Dates** 12/10/2021-13/11/2021	**Engineer** OCSC	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					10.36	(0.30) 0.30	TOPSOIL			
0.50	B				10.16	(0.20) 0.50	Firm brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular fine to medium.			
1.00-1.45 1.00	SPT(C) N=14 B			2,3/3,3,4,4			Firm to stiff brown slightly sandy slightly gravelly CLAY.			
2.00-2.45 2.00	SPT(C) N=14 B			2,3/4,4,3,3		(2.50)				
3.00-3.45 3.00	SPT(C) N=40 B			5,7/8,8,11,13	7.66	3.00	Very stiff dark brown/grey slightly gravelly sandy CLAY. Gravel is subangular to subrounded medium to coarse.			
4.00-4.45 4.00	SPT(C) N=62 B			7,10/14,15,15,18		(2.00)				
5.00 5.00-5.00 5.00				25/50 B SPT(C) 25*/0 50/0	5.66	5.00	Very stiff brown slightly sandy gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse.			

Depth (m)	TCR	SCR	RQD	FI	Field Records	Depth (m) (Thickness)
5.00	100					
6.50-6.58 6.50	100				12,13/50 SPT 25*/75 50/0	
8.00-8.00 8.00	100				25/50 SPT 25*/0 50/0	(8.40)
9.50						

Remarks
No Groundwater encountered during cable percussion drilling
Cable percussion drilling complete at 5.00m BGL with Rotary follow on complete at 15.00m BGL.
Gravel filter zone from 15.00m BGL to 12.00m BGL with bentonite sealed from 12.00m BGL to GL. Finished with a flush cover.
Chiselling from 5.00m to 5.00m for 1.0 hour.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH19

Ground Investigations Ireland Ltd www.gii.ie		Site: St. Vincent's Fairview	Borehole Number: BH19
Machine: Dando 150 + Beretta T44 Flush: water Core Dia: 64 mm Method: Cable Percussion with Rotary follow on	Casing Diameter: 200mm cased to 5.00m, 96mm cased to 5.50m Ground Level (mOD): 10.66	Client:	Job Number: 10927-08-21
	Location: 716757.2 E 736718.3 N Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
	100							
11.00	87							
12.50	100							
						-2.74	13.40 (0.60)	Very stiff light brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse.
14.00	15					-3.34	14.00 (1.00)	Poor recovery: Recovery consists of brown gravelly SAND. Gravel is fine to coarse angular to subangular fine to coarse.
15.00						-4.34	15.00	Complete at 15.00m

Remarks	Scale (approx)	Logged By
	1:50	RM
	Figure No. 10927-08-21.BH19	

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH20
Machine: Dando 150 + Beretta T41; Method: Cable Percussion with Rotary follow on	Casing Diameter: 200mm cased to 5.50m, 96mm cased to 21.50m	Ground Level (mOD): 10.47
Location: 716829.8 E 736724.8 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC
Client:	Job Number: 10927-08-21	Sheet: 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
					10.27	(0.20) 0.20	TOPSOIL
0.50	B						Firm brown slightly sandy slightly gravelly CLAY with grass rootlets. Gravel is subangular to subrounded fine to course.
1.00-1.45 / 1.00	SPT(C) N=11 / B			1,2/2,3,3,3			
						(2.50)	
2.00-2.45 / 2.00	SPT(C) N=14 / B			2,3/4,3,3,4			
					7.77	2.70	Very stiff dark brown/grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse.
3.00-3.45 / 3.00	SPT(C) N=35 / B			3,5/7,9,9,10			
4.00-4.45 / 4.00	SPT(C) N=47 / B			6,8/9,12,13,13		(2.80)	
5.00-5.45 / 5.00	SPT(C) N=33 / B			8,11/14,19			

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
5.50						4.97	5.50	Very stiff brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles. Gravel is subangular to subrounded fine to coarse.
	97							
6.50-6.65 / 6.50					12,17/50 SPT 50/0			
	60							
8.00-8.15 / 8.00					9,18/50 SPT 50/0			
	17							
9.50-9.50 / 9.50					25/50 SPT 25*/0 50/0			

Remarks
Cable percussion drilling completed at 5.50m BGL with Rotary follow on complete at 21.50m BGL.
No groundwater encountered during drilling
Slotted standpipe installed from 21.50m to 18.5m BGL. Finished with a raised cover.
Chiselling from 5.40m to 5.50m for 1.0 hour.

Scale (approx): 1:50 | Logged By: RM | Figure No.: 10927-08-21.BH20

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH20

Machine : Dando 150 + Beretta T41 Flush : water Core Dia: 63.5 mm Method : Cable Percussion with Rotary follow on	Casing Diameter: 200mm cased to 5.50m, 96mm cased to 21.50m	Ground Level (mOD): 10.47	Client:	Job Number: 10927-08-21
	Location: 716829.8 E 736724.8 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
	100						(10.00)	
11.00-11.08 11.00					21,4/50 SPT 25*/75 50/0			
	97							
12.50-12.50 12.50					25/50 SPT 25*/0 50/0			
	92							
14.00-14.08 14.00					12,13/50 SPT 25*/75 50/0			
	33							
15.50-15.65 15.50					17,17/50 SPT 50/0	-5.03	15.50	Poor recovery: Recovery consists of subrounded to subangular medium to coarse GRAVELS. (Dense) [Driller notes: grey sand and gravel.
	25						(1.50)	
17.00-17.08 17.00					20,5/50 SPT 25*/75 50/0	-6.53	17.00	Very stiff dark grey slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is fine to coarse subangular and subrounded.
	56						(1.50)	
18.50-18.58 18.50					26/50 SPT 26*/75 50/0	-8.03	18.50 (0.35)	Very weak fine to medium grained grey LIMESTONE. Highly weathered, mostly non-intact.
						-8.38	18.85	Medium-strong to strong thinly to thickly laminated grey fine to medium grained argillaceous LIMESTONE with calcite veins interbedded with medium to strong thinly laminated dark grey medium to fine grained MUDSTONE. Partially weathered. 2 sets of fractures. F1 5-15 degrees closely to medium spaced undulating rough occasionally open with clay smearing. F2
	80	73	72	NI				
20.00								

Remarks
No groundwater encountered during drilling

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH20

Ground Investigations Ireland Ltd www.gii.ie	Site St. Vincent's Fairview	Borehole Number **BH20**

Machine : Dando 150 + Beretta T41 **Flush :** water **Core Dia :** 63.5 mm	**Casing Diameter** 200mm cased to 5.50m 96mm cased to 21.50m	**Ground Level (mOD)** 10.47	**Client**	**Job Number** 10927-08-21
Method : Cable Percussion with Rotary follow on	**Location** 716829.8 E 736724.8 N	**Dates** 12/10/2021- 13/11/2021	**Engineer** OCSC	**Sheet** 3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	100	86	65	5			(2.65)	70-80 degrees medium spaced undulating occasionally stepped rough with occasional clay smearing.			
21.50						-11.03	21.50	Complete at 21.50m			

Remarks
No groundwater encountered during drilling

Scale (approx)	Logged By
1:50	RM

Figure No.
10927-08-21.BH20

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: **BH21**

Machine : Dando 150 + Bertta T44 Method : Cable Percussion with Rotary follow on.	Casing Diameter: 200mm cased to 5.10m, 96mm cased to 26.00m	Ground Level (mOD): 11.18	Client:	Job Number: 10927-08-21
	Location: 716766.1 E 736771.7 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.30)	Brown sandy TOPSOIL			
					10.88	0.30	Firm brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is subangular to subrounded fine to course.			
0.50	B									
1.00-1.45 1.00	SPT N=10 B			1,2/2,2,3,3		(1.70)				
					9.18	2.00	Firm light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to course.			
2.00-2.45 2.00	SPT N=11 B			2,3/2,2,3,4		(0.80)				
					8.38	2.80	Very stiff dark greyish brown slightly sandy slightly gravelly CLAY with subangular fine to coarse gravels.			
3.00-3.45 3.00	SPT N=34 B			4,5/7,8,9,10						
4.00-4.45 4.00	SPT N=50 B			7,10/14,16,19,1		(2.30)				
5.00-5.38 5.00				13,12/50 SPT 50/225 B						

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
5.10						6.08	5.10	Very stiff grey slightly sandy gravelly CLAY with subangular cobbles. Gravel is subangular to subrounded fine to coarse.
	32							
6.50-6.88 6.50					6,6/8,14,17,11 SPT 50/225		(2.90)	
	53							
8.00-8.15 8.00					12,12/50 SPT 50/0	3.18	8.00	Very stiff brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles.
	100							
9.50-9.58 9.50					22,3/50 SPT 25*/75 50/0			

Remarks
No groundwater encountered during drilling.
Cable percussion drilling complete at 5.10m BGL with Rotary follow on complete at 26.00m BGL.
Slotted standpipe installed from 6.50m BGL to 13.50m BGL with plain pipe from 13.50m BGL to GL. Finished with a raised cover.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH21

Ground Investigations Ireland Ltd www.gii.ie	Site St. Vincent's Fairview	Borehole Number **BH21**

Machine : Dando 150 + Bertta T44 Flush : water Core Dia: 63.5 mm Method : Cable Percussion with Rotary follow on.	Casing Diameter 200mm cased to 5.10m 96mm cased to 26.00m	Ground Level (mOD) 11.18	Client	Job Number 10927-08-21
	Location 716766.1 E 736771.7 N	Dates 12/10/2021-13/11/2021	Engineer OCSC	Sheet 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	99						(4.50)				
11.00-11.00 11.00					25/50 SPT 25*/0 50/0						
	40										
12.50-12.88 12.50					5,10/12,25,13 SPT 50/225	-1.32	12.50	Poor recovery. Recovery consists of brown slightly sandy gravelly CLAY. Gravel is medium to coarse subangular.(Very stiff) [Driller's notes: yellow brown silty sandy gravels]			
	9						(1.50)				
14.00-14.38 14.00					8,14/14,21,15 SPT 50/225	-2.82	14.00	Poor recovery. Recovery consists of firm slightly sandy gravelly CLAY. (Dense) [Driller's notes: Grey sands and gravels]			
	10						(1.50)				
15.50-15.65 15.50					14,15/18,32 SPT 29*/0 50/150	-4.32	15.50	Poor recovery. Recovery consists of firm slightly sandy slightly gravelly CLAY with occasional subangular cobble. Gravel is subangular medium to coarse. (Very stiff) [Driller's notes: sandy gravelly CLAY]			
	20						(1.50)				
17.00-17.15 17.00					17,15/50 SPT 50/0	-5.82	17.00	Firm to stiff dark grey slightly sandy gravelly CLAY with some subangular cobbles. Gravel is subangular to subrounded fine to coarse.			
	30										
18.50-18.58 18.50					22,4/50 SPT 26*/75 50/0						
	49						(5.50)				
20.00											

Remarks	Scale (approx) 1:50	Logged By RM
	Figure No. 10927-08-21.BH21	

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH21

Machine: Dando 150 + Bertta T44 Flush: water Core Dia: 63.5 mm Method: Cable Percussion with Rotary follow on.	Casing Diameter: 200mm cased to 5.10m 96mm cased to 26.00m	Ground Level (mOD): 11.18	Client:	Job Number: 10927-08-21
	Location: 716766.1 E 736771.7 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.00-20.00	47	9			SPT 25*/0 25/50 50/0						
21.50-21.50 21.50	60	36	13		25/50 SPT 25*/0 50/0						
22.50				30		-11.32	22.50 (1.60)	Weak to medium strong grey LIMESTONE with calcite veins interbedded with weak MUDSTONE. Distinctly weathered. 2 sets of fractures. F1: 0-15 degrees very closely to closely spaced undulating rough with clay smearing. F2: 45-90 degrees medium spaced undulating rough with occasional clay smearing.			
23.00	93	29	13								
						-12.92	24.10 (1.90)	Strong grey LIMESTONE with pyrite and calcite veins interbedded with weak to medium strong MUDSTONE. Partially weathereed. 2 sets of fractures. F1 5-20 degrees extremely closely to closely spaced undulating rough occasionaly stepped with clay smearing. F2 70-90 degrees very closely to medium spaced undulating rough.			
24.50	100	67	28	31							
26.00						-14.82	26.00	Complete at 26.00m			

Remarks	Scale (approx): 1:50	Logged By: RM
	Figure No.: 10927-08-21.BH21	

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Dando 150 + Beretta T44 **Method :** Cable percussion with Rotary follow on	**Casing Diameter** 200mm cased to 5.50m 96mm cased to 15.50m	**Ground Level (mOD)** 10.52	**Site** St. Vincent's Fairview		**Borehole Number** BH22
	Location 716829.1 E 736765.6 N	**Dates** 12/10/2021-13/11/2021	**Client**		**Job Number** 10927-08-21
			Engineer OCSC		**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Water
					10.32	(0.20) 0.20	Brown sandy TOPSOIL.	
							Firm brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is angular to subangular fine to coarse.	
1.00-1.45	SPT N=12			2,2/3,3,3,3				
						(2.50)		
2.00-2.45	SPT N=13			2,3/3,4,3,3				
					7.82	2.70	Very stiff dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to angular fine to course.	
3.00-3.45	SPT N=33			4,5/5,7,10,11				
						(2.30)		
4.00-4.45	SPT N=54			6,9/10,13,15,16				1
				Water strike(1) at 4.80m, rose to 4.30m in 20 mins.				1
5.00-5.45	SPT N=36			8,11/17,19	5.52	5.00	Dense brown slightly clayey slightly sandy GRAVEL. Gravel is fine to coarse subangular to subrounded.	

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
5.50							(1.10)	
	47					4.42	6.10	Very stiff brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles. Gravel is subrounded to subangular fine to coarse.
6.50-6.58 6.50					8,17/50 SPT 25*/75 50/0			
	80						(3.00)	
8.00-8.08 8.00					19/50 SPT 19*/75 50/0			
	68					1.42	9.10	Very stiff dark brown slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is subrounded and subangular fine to coarse.
9.50-9.65 9.50					17,18/50 SPT 50/0			

Remarks
No groundwater encountered during drilling.
Cable percussion drilling complete at 5.50m BGL with Rotary follow on complete at 15.50m BGL.
Slotted standpipe installed from 15.00m BGL to 12.00m BGL with plain pipe from 12.00m BGL to GL. Finished with a raised cover.

Scale (approx)	Logged By
1:50	RM

Figure No. 10927-08-21.BH22

Ground Investigations Ireland Ltd www.gii.ie	Site: St. Vincent's Fairview	Borehole Number: BH22

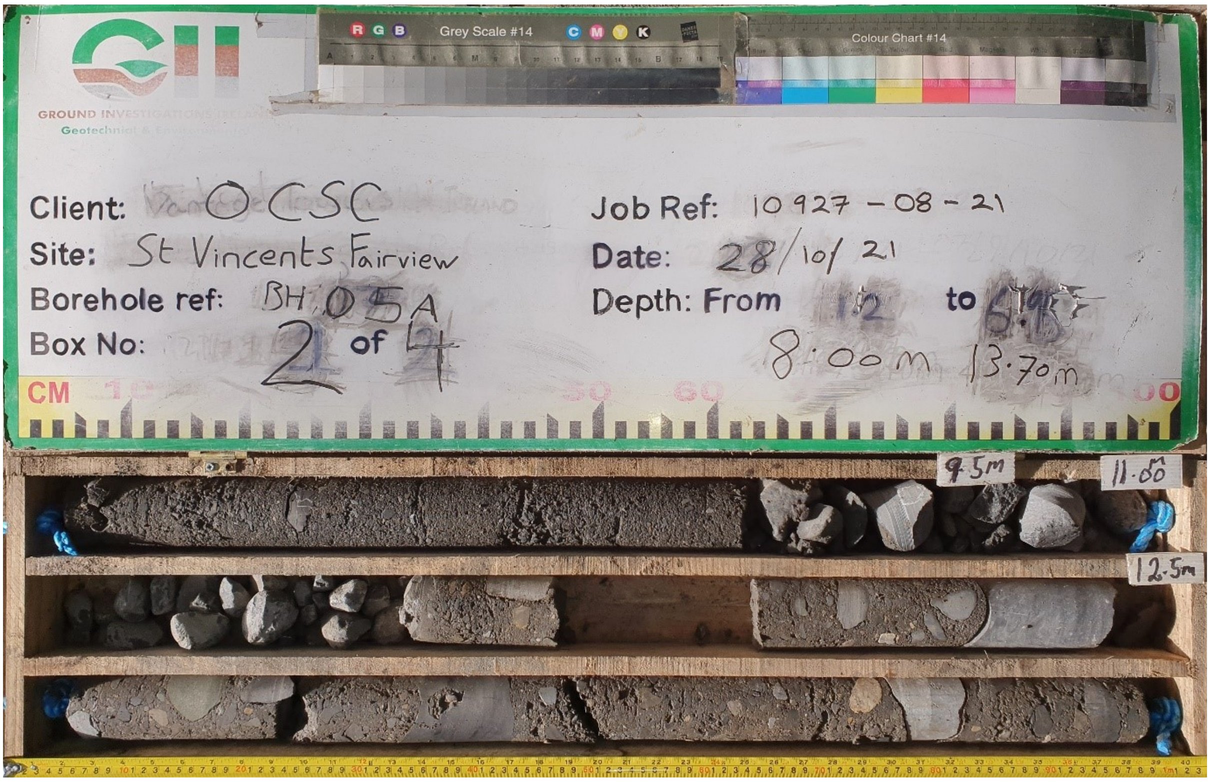
Machine : Dando 150 + Beretta T44 Flush : water Core Dia: 63.5 mm Method : Cable percussion with Rotary follow on	Casing Diameter: 200mm cased to 5.50m, 96mm cased to 15.50m	Ground Level (mOD): 10.52	Client	Job Number: 10927-08-21
	Location: 716829.1 E 736765.6 N	Dates: 12/10/2021-13/11/2021	Engineer: OCSC	Sheet: 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	83						(2.90)				
11.00-11.08 11.00					21,4/50 SPT 25*/75 50/0						
	43					-1.48	12.00 (0.50)	Very stiff light brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles. Gravel is subrounded and subangular fine to coarse.			
12.50-12.80 12.50					15,12/17,33 SPT 50/150	-1.98	12.50	Dense sandy subangular fine to coarse GRAVEL with subrounded to subangular cobbles.			
	30						(1.50)				
14.00-14.08 14.00					18/50 SPT 18*/75 50/0	-3.48	14.00	Poor recovery. Recovery consists of: Subangular to subrounded fine to coarse GRAVEL. (Dense) [Driller's notes: Sands and gravels]			
	17						(1.50)				
15.50						-4.98	15.50	Complete at 15.50m			

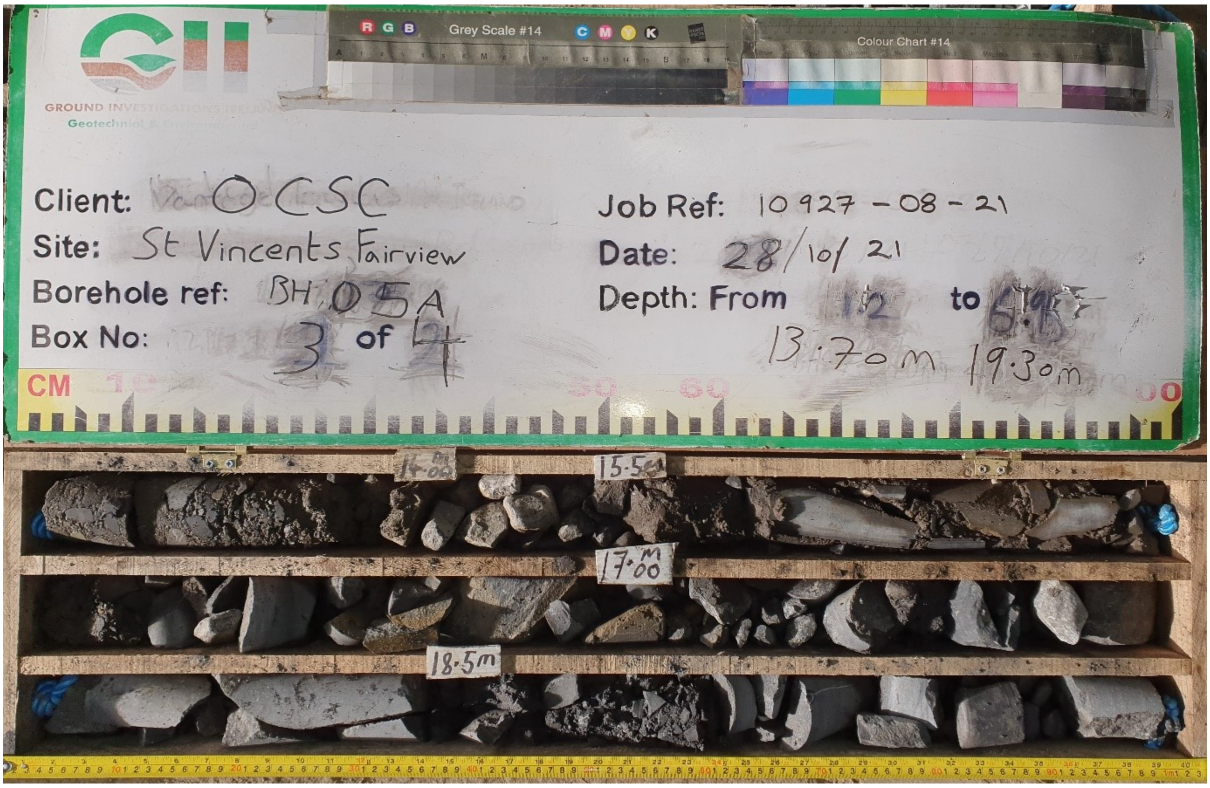
Remarks	Scale (approx): 1:50	Logged By: RM
	Figure No.: 10927-08-21.BH22	

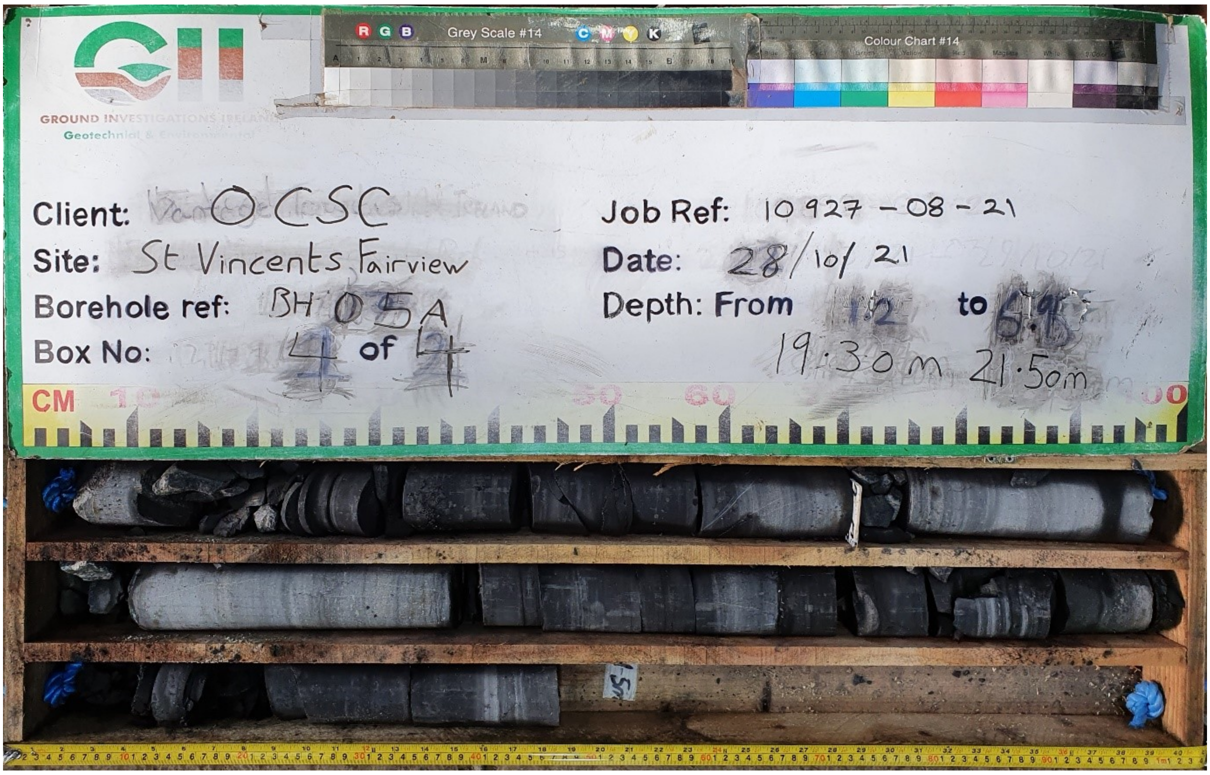
BH05A


Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH05A
Box No: 1 of 4
Job Ref: 10927-08-21
Date: 28/10/21
Depth: From 0m to 8.00m


Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH05A
Box No: 2 of 4
Job Ref: 10927-08-21
Date: 28/10/21
Depth: From 8.00m to 13.70m

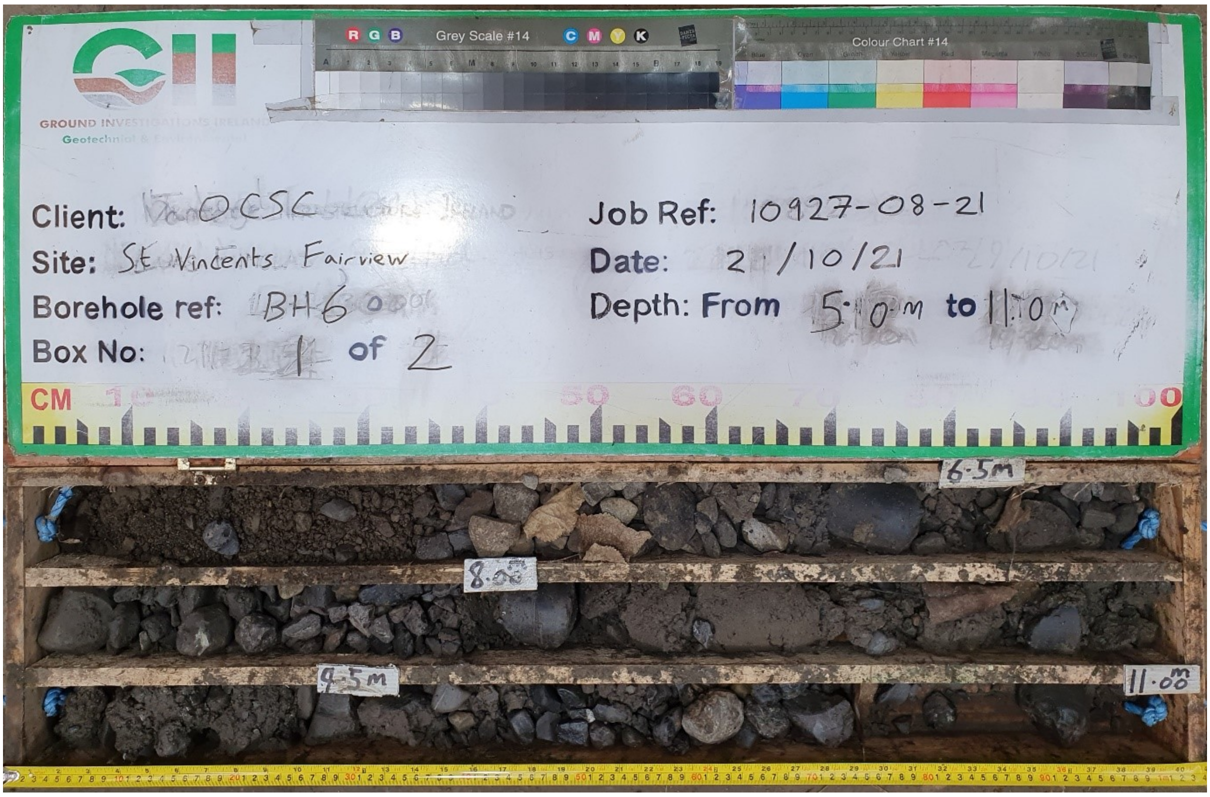
St Vincents Fairview – Rotary Core Photos -10927-08-21

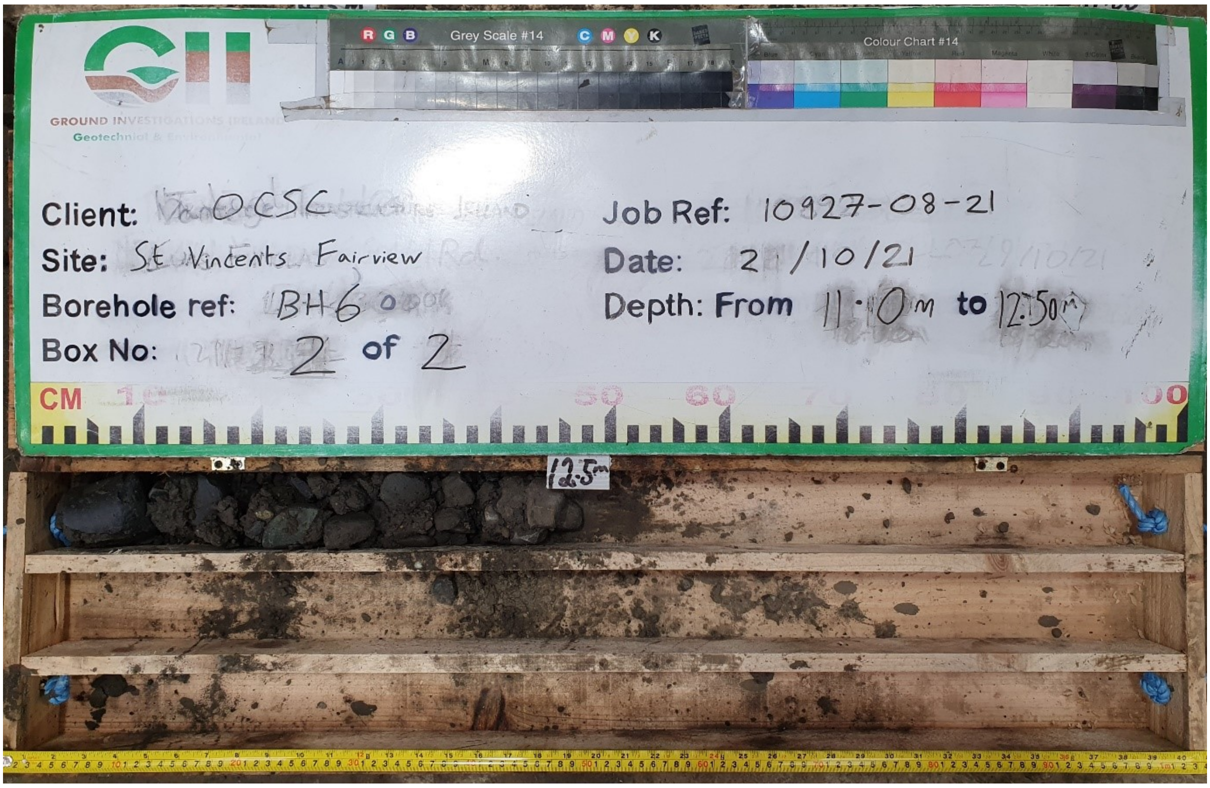




St Vincents Fairview – Rotary Core Photos -10927-08-21

BH06





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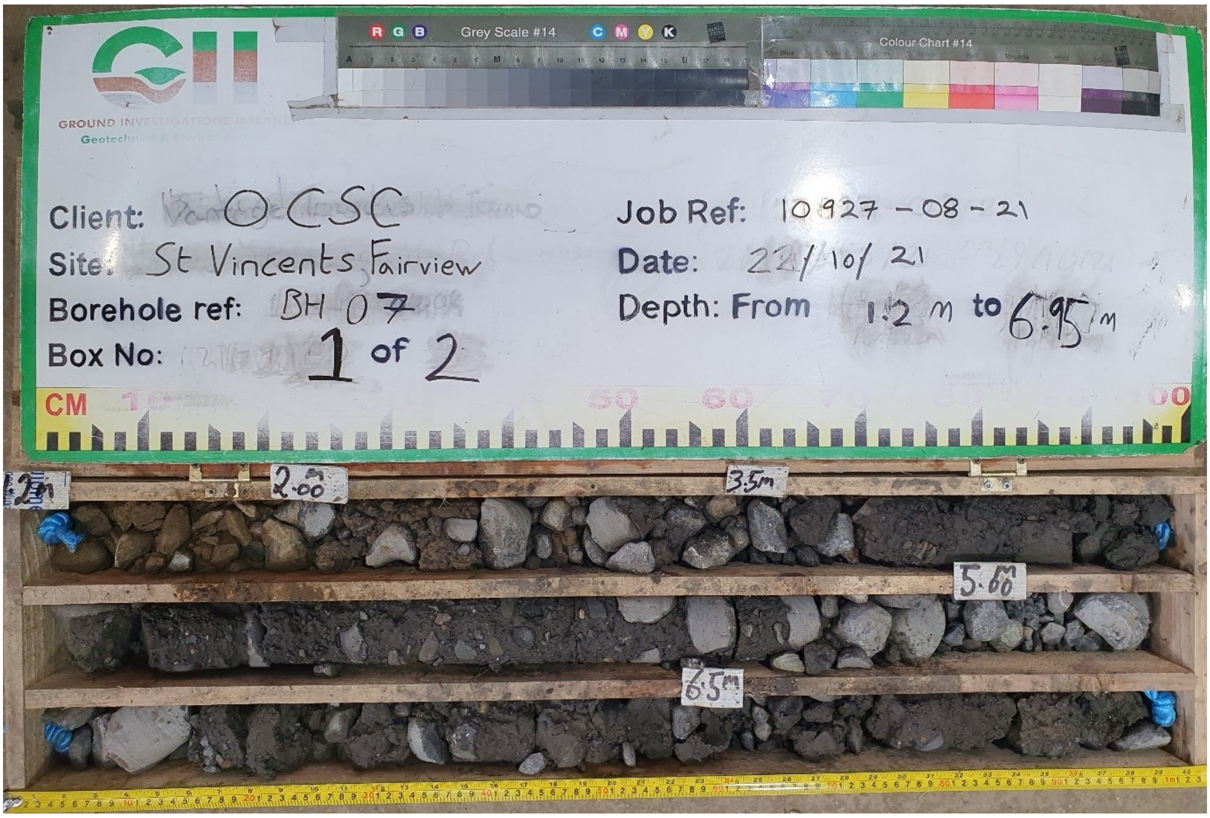
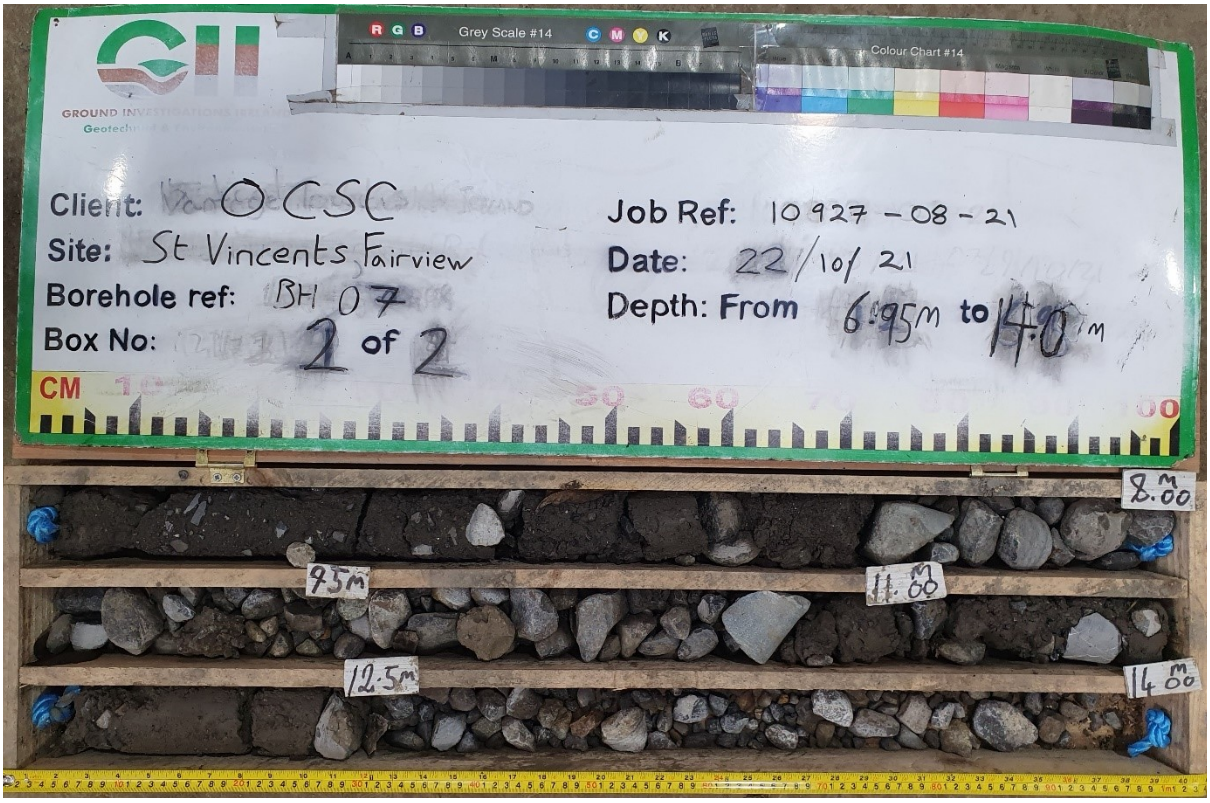

Grey Scale #14
Colour Chart #14
GROUND INVESTIGATIONS IRELAND
Client: OCSC
Job Ref: 10 927 - 08 - 21
Site: St Vincents Fairview
Date: 22/10/21
Borehole ref: BH 07
Depth: From 1.2 m to 6.95 m
Box No: 1 of 2
CM
1.2m
2.00m
3.5m
5.00m
6.5m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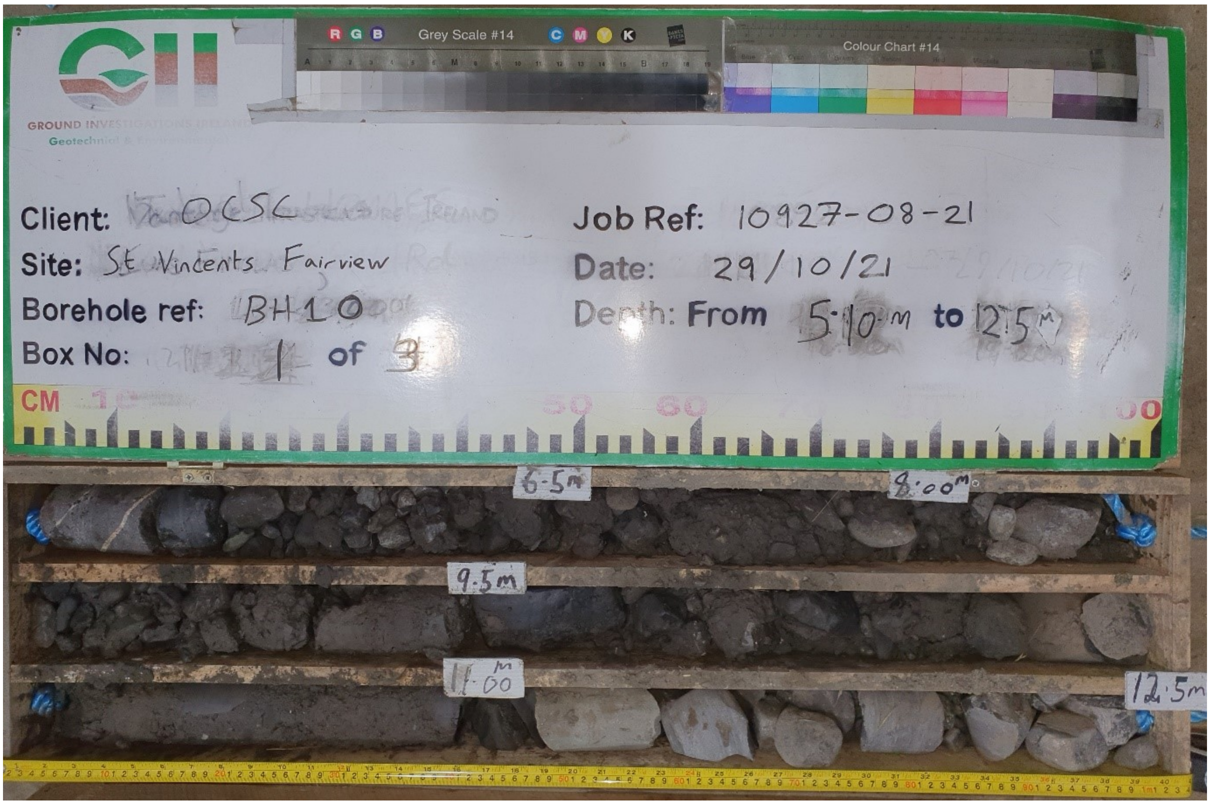
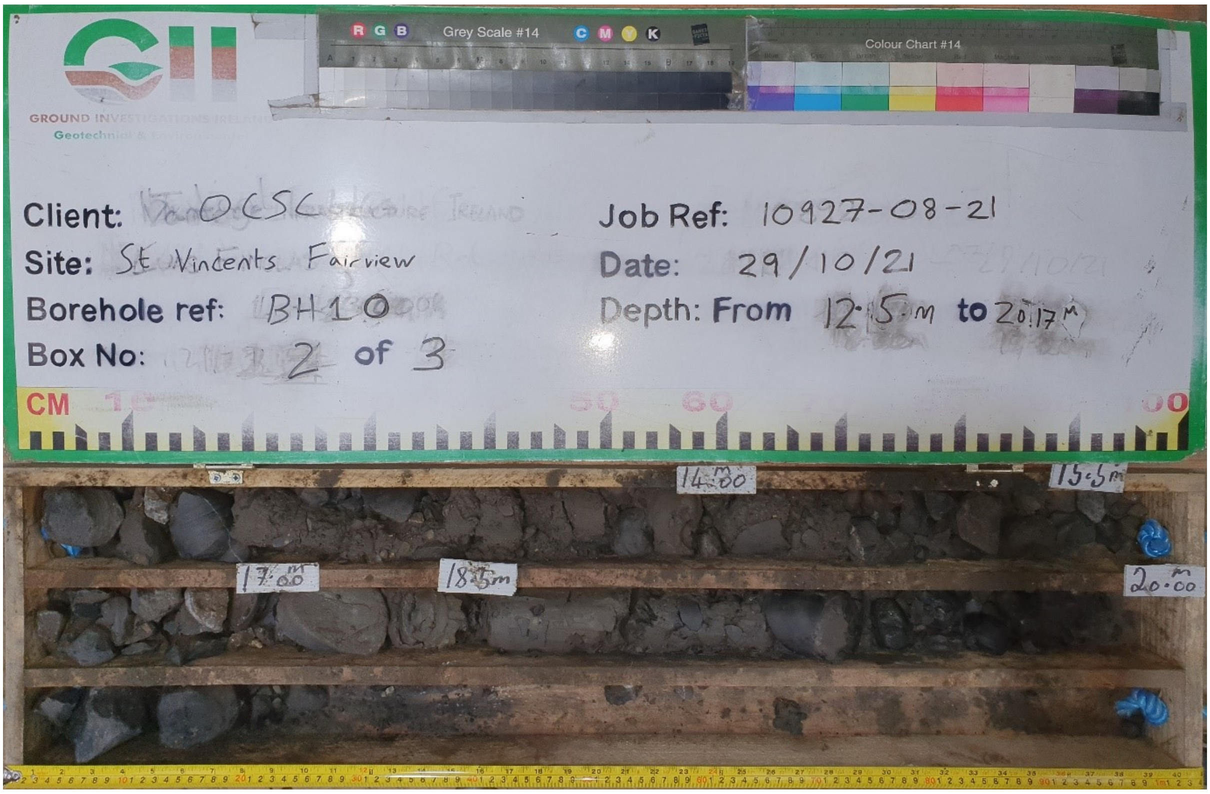
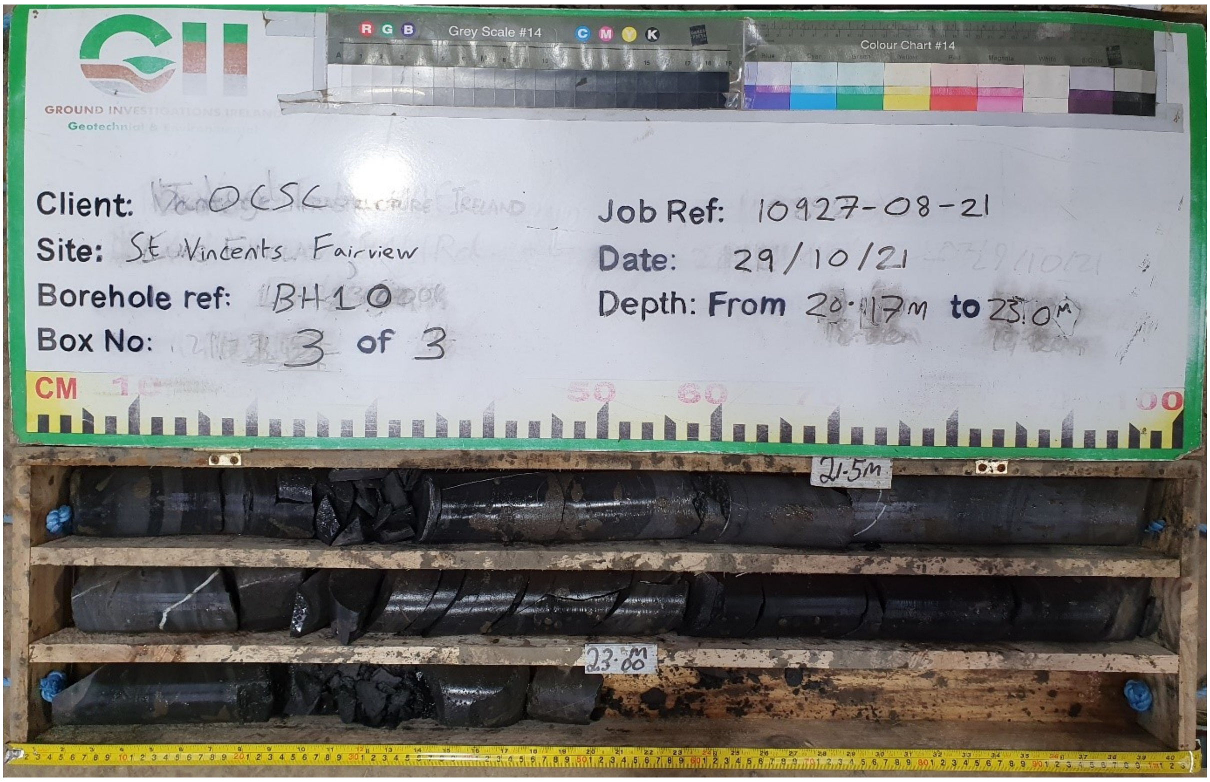
Colour Chart #14
GROUND INVESTIGATIONS IRELAND
Client: OCSC
Job Ref: 10 927 - 08 - 21
Site: St Vincents Fairview
Date: 22/10/21
Borehole ref: BH 07
Depth: From 6.95m to 14.0 m
Box No: 2 of 2
CM
8.00m
9.5m
11.00m
12.5m
14.00m

St Vincents Fairview – Rotary Core Photos -10927-08-21

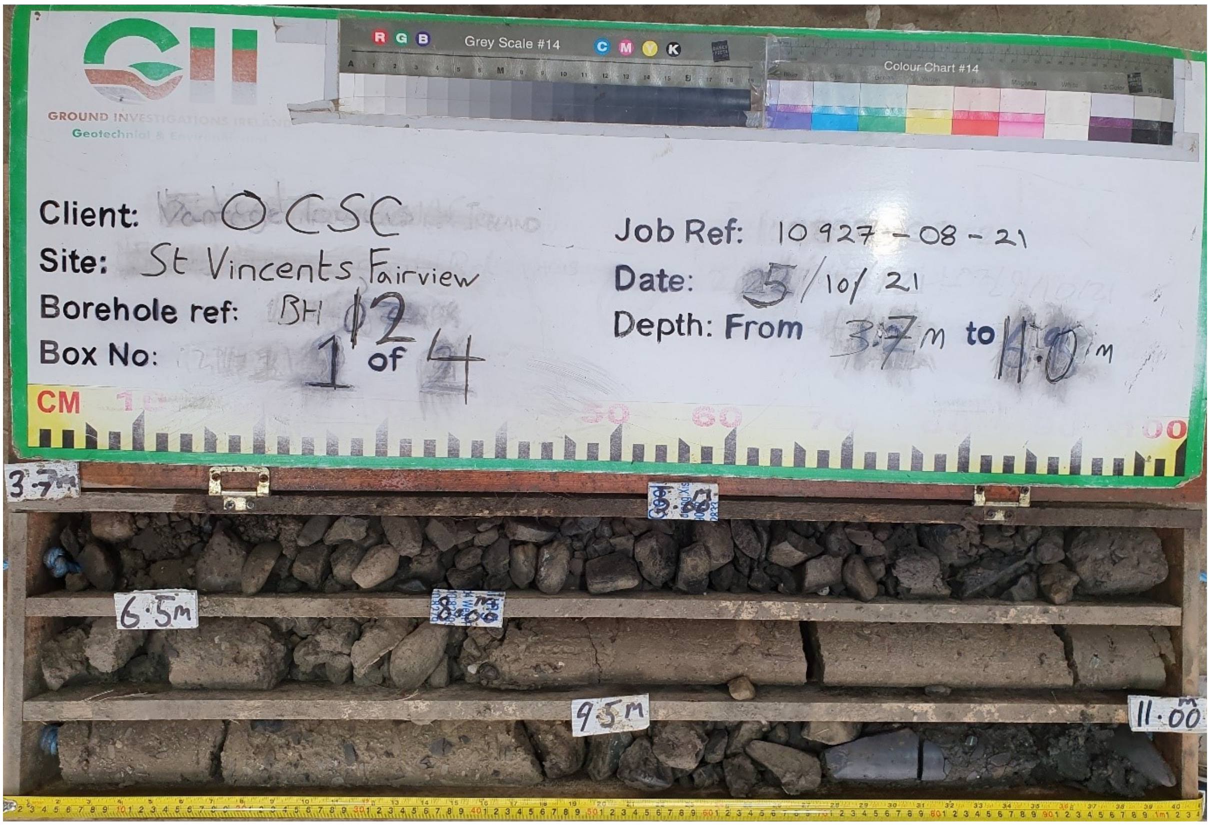
BH10





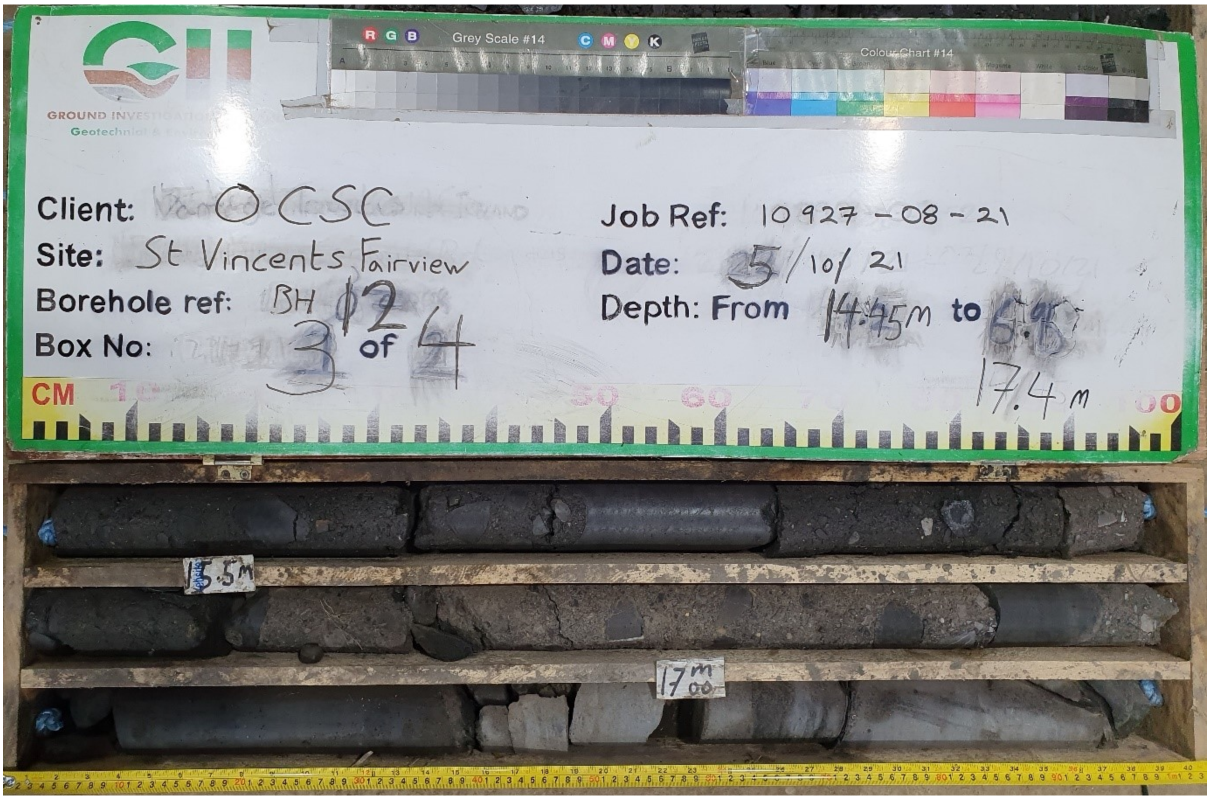

GROUND INVESTIGATIONS IRELAND
Grey Scale #14
Colour Chart #14
Client: OCSC
Job Ref: 10927-08-21
Site: St Vincents Fairview
Date: 29/10/21
Borehole ref: BH10
Depth: From 20.17m to 23.0m
Box No: 3 of 3
CM
21.5m
23.00m

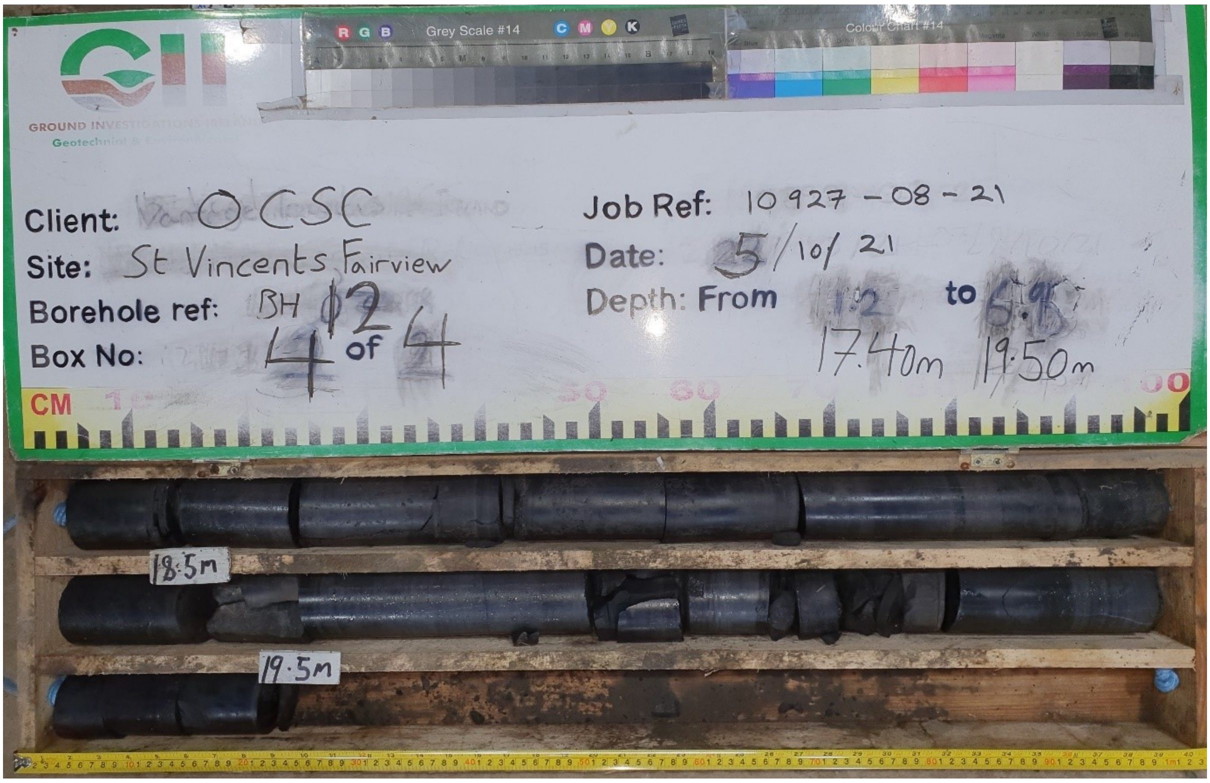
BH12


GROUND INVESTIGATIONS IRELAND
Grey Scale #14
Colour Chart #14
Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 12
Box No: 1 of 4
Job Ref: 10927-08-21
Date: 5/10/21
Depth: From 3.7m to 11.0m
3.7m
6.5m
9.5m
11.00


GROUND INVESTIGATIONS IRELAND
Grey Scale #14
Colour Chart #14
Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 12
Box No: 2 of 4
Job Ref: 10927-08-21
Date: 5/10/21
Depth: From 11.0m to
14.45m
11.00
12.5
14.00

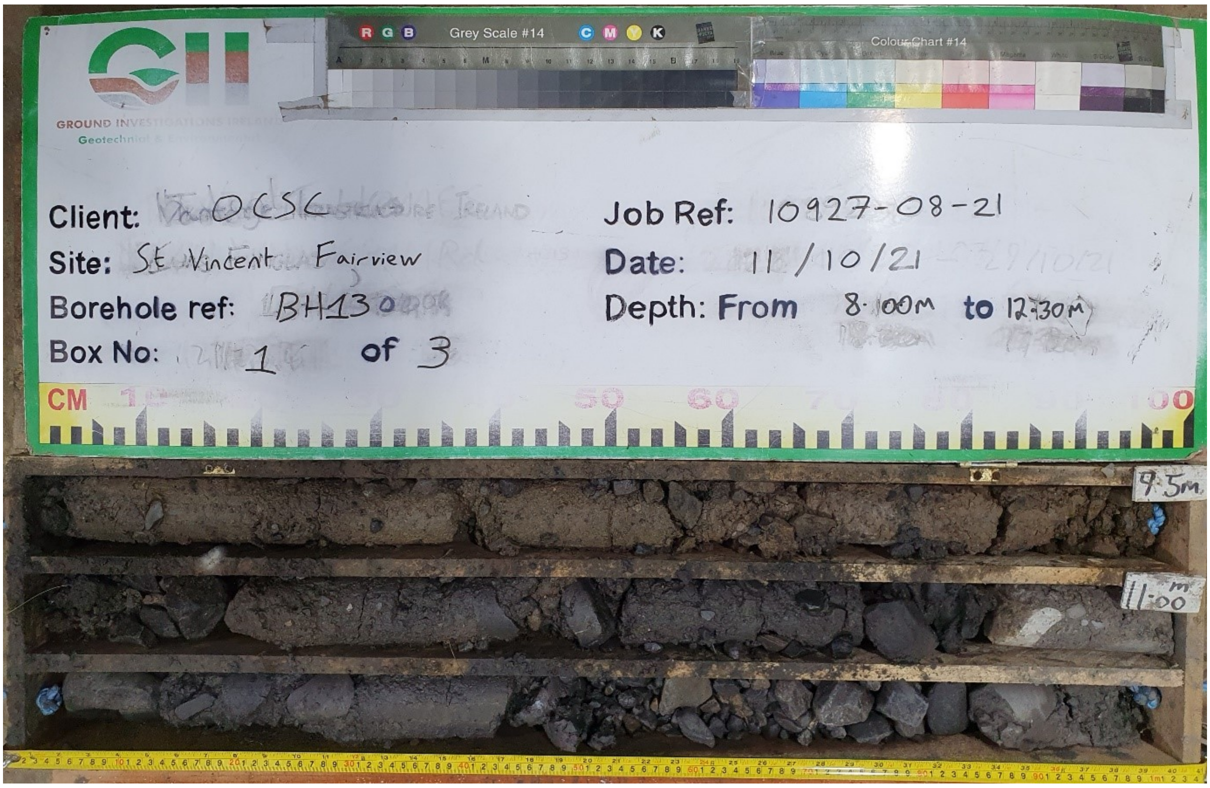
St Vincents Fairview – Rotary Core Photos -10927-08-21

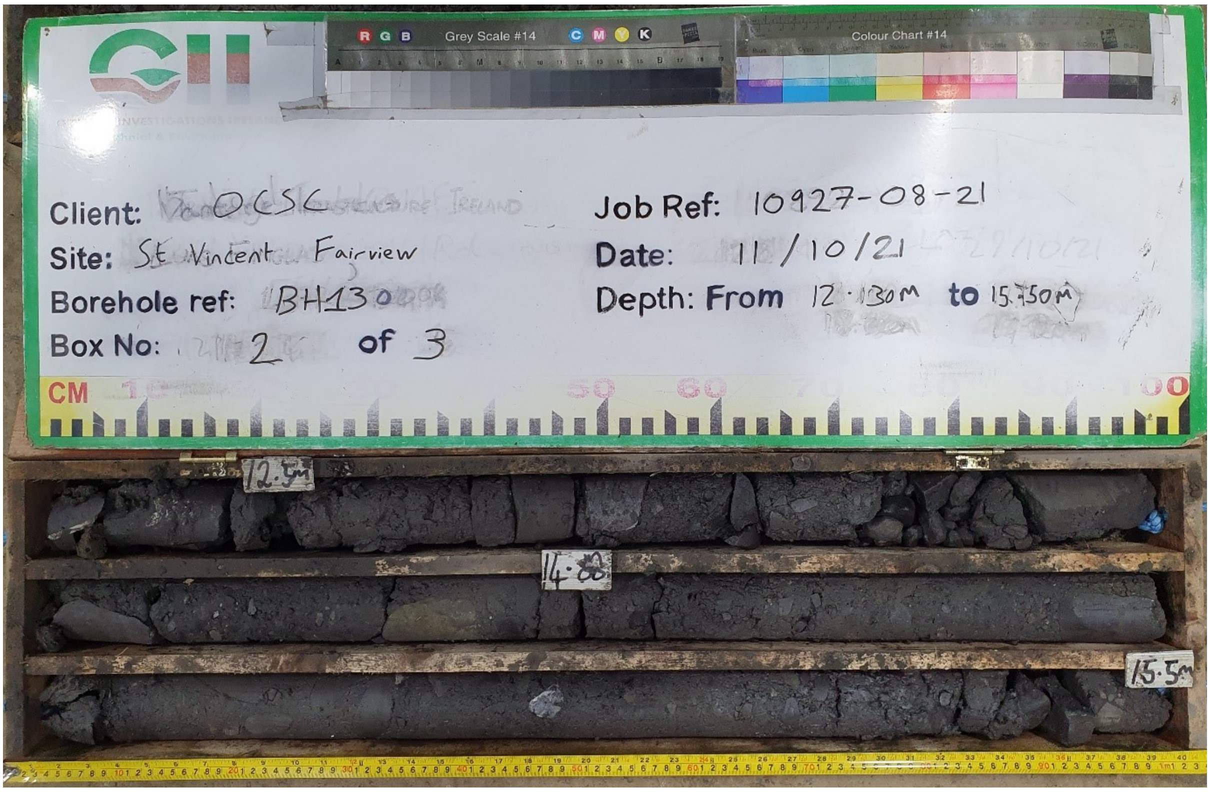




St Vincents Fairview – Rotary Core Photos -10927-08-21

BH13

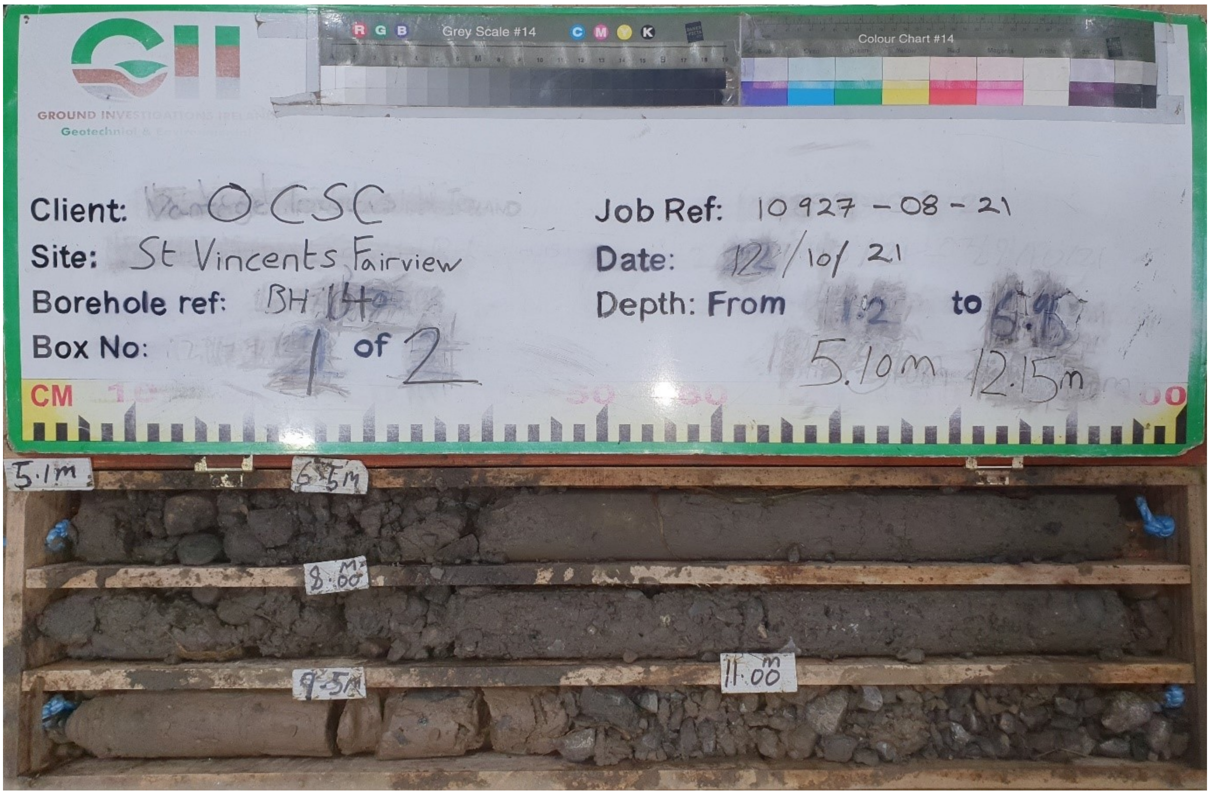


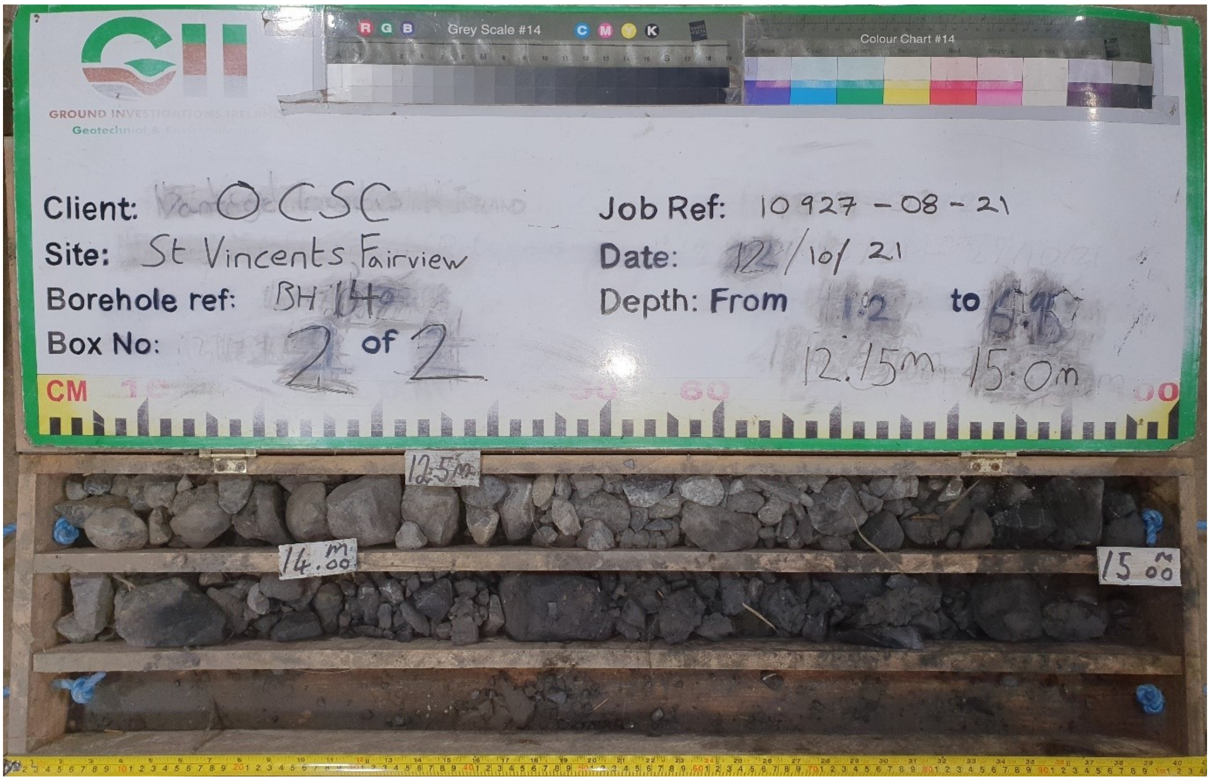


St Vincents Fairview – Rotary Core Photos -10927-08-21

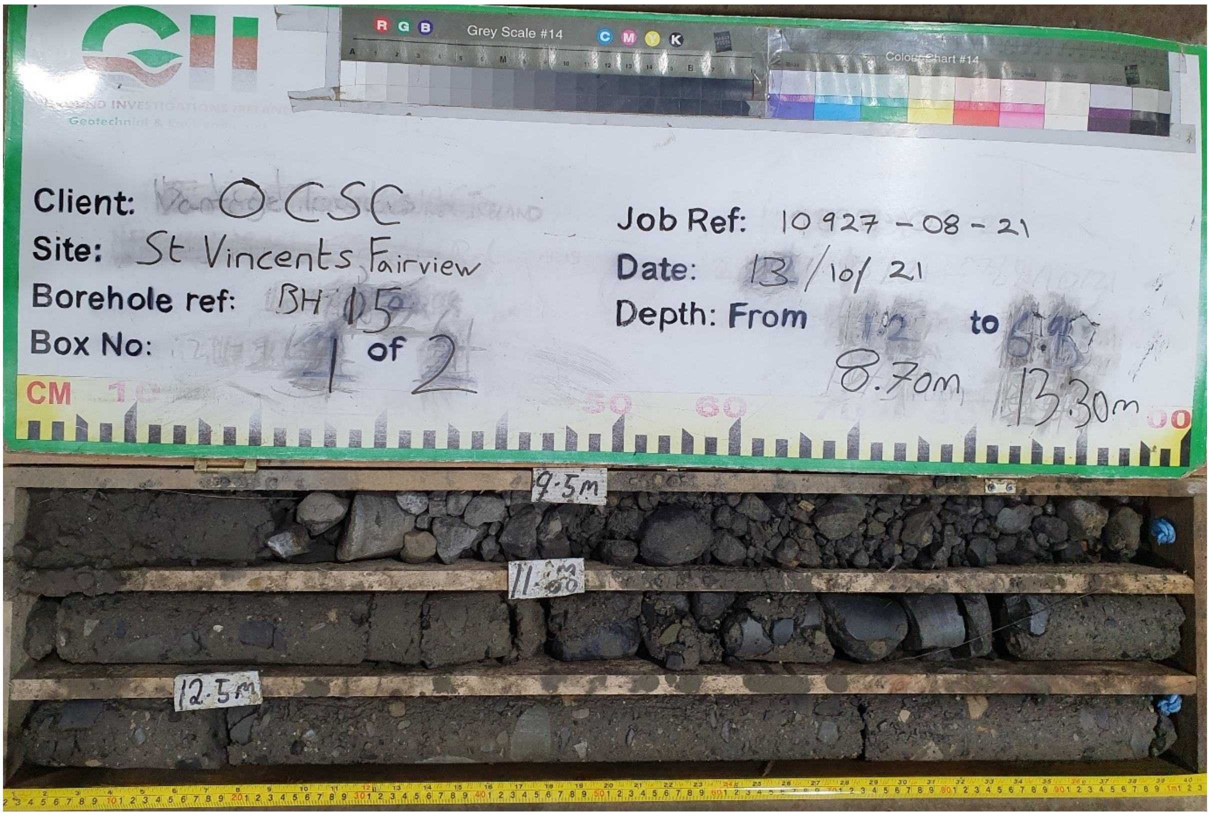
St Vincents Fairview – Rotary Core Photos -10927-08-21

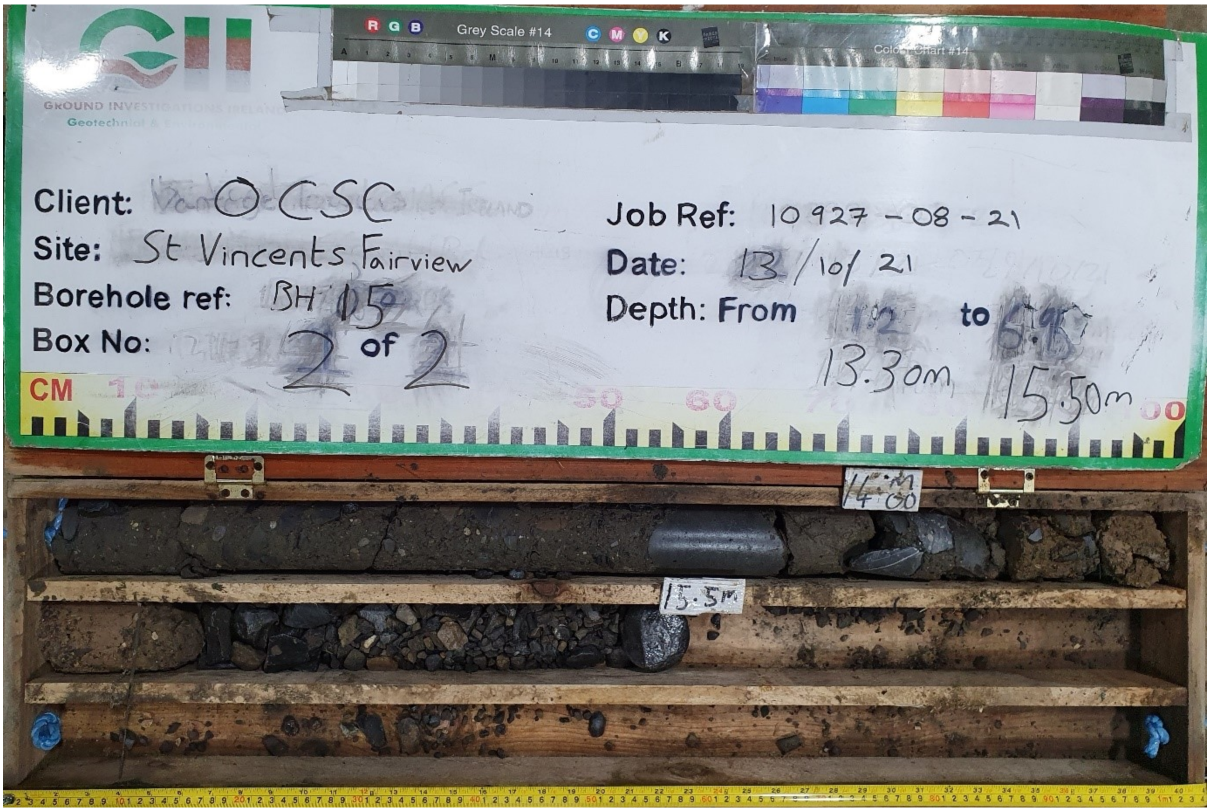
BH14





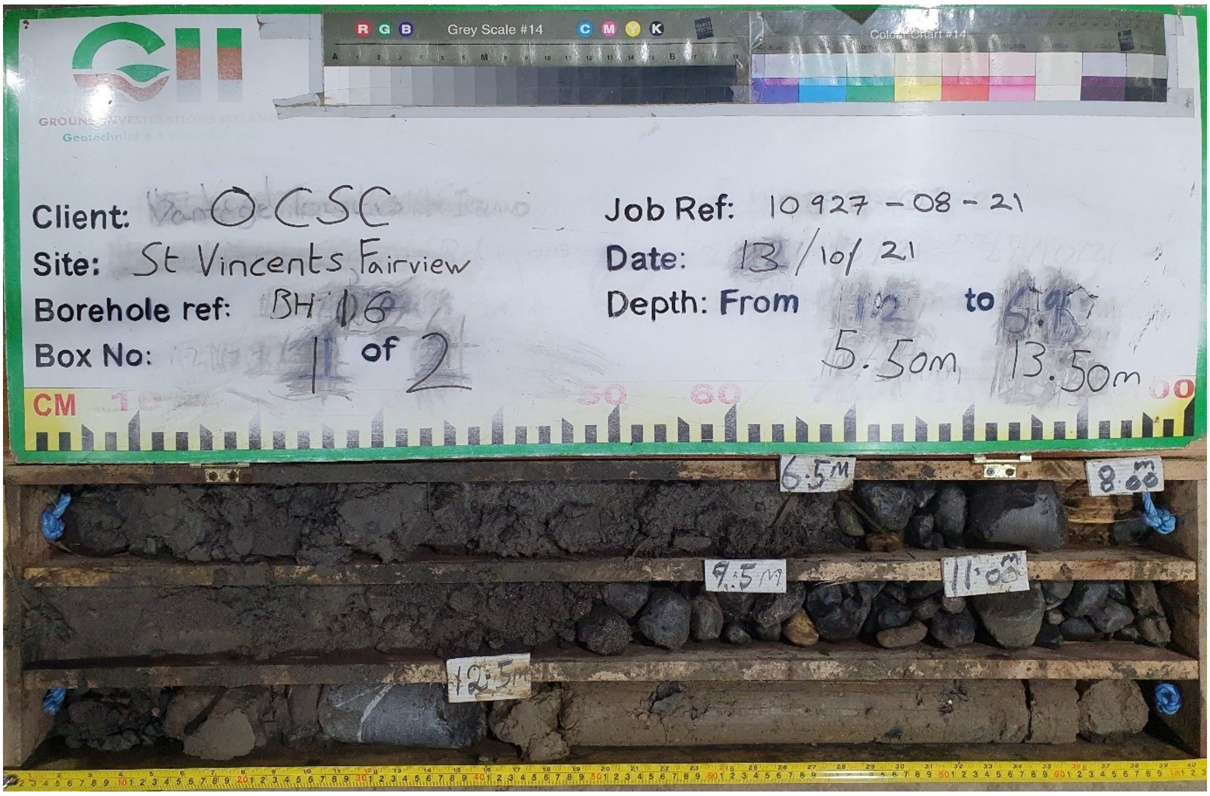
BH15


Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 15
Box No: 1 of 2
Job Ref: 10927-08-21
Date: 13/10/21
Depth: From 8.70m to 13.30m
9.5m
11.00m
12.5m

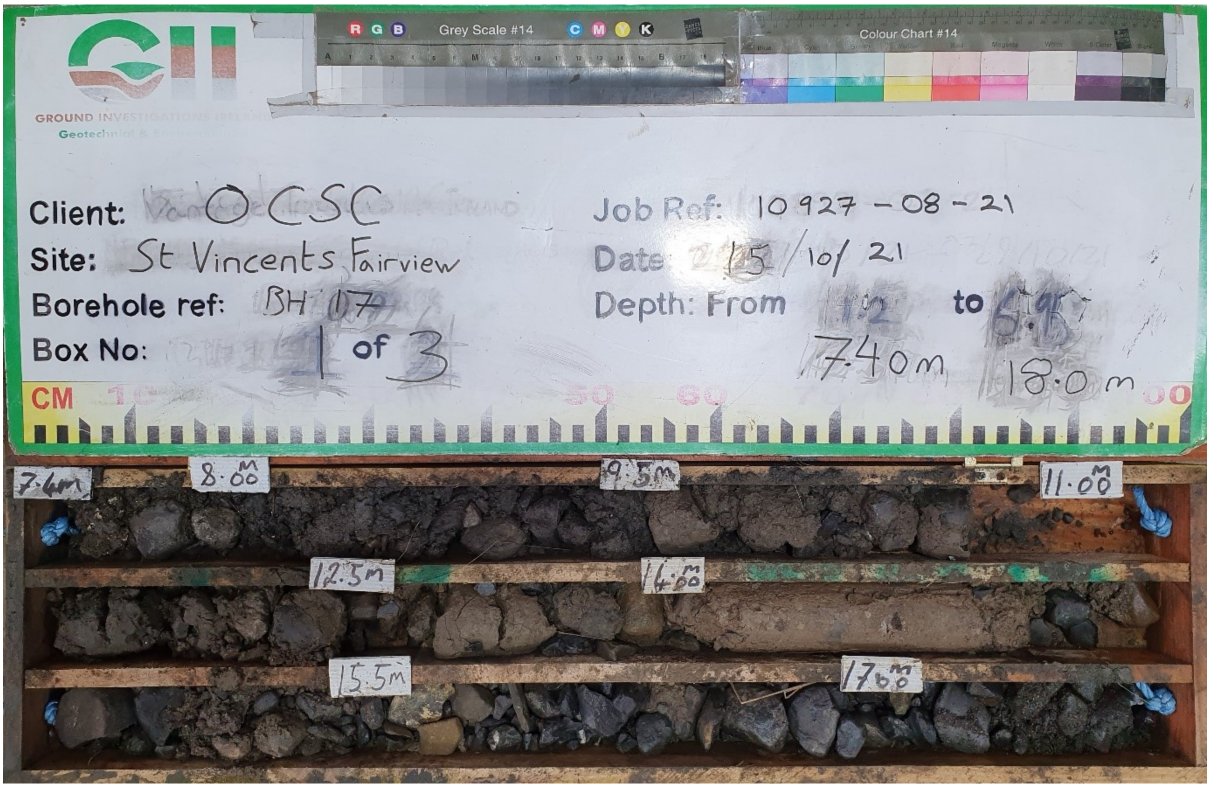

Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 15
Box No: 2 of 2
Job Ref: 10927-08-21
Date: 13/10/21
Depth: From 13.30m to 15.50m
14.00m
15.5m

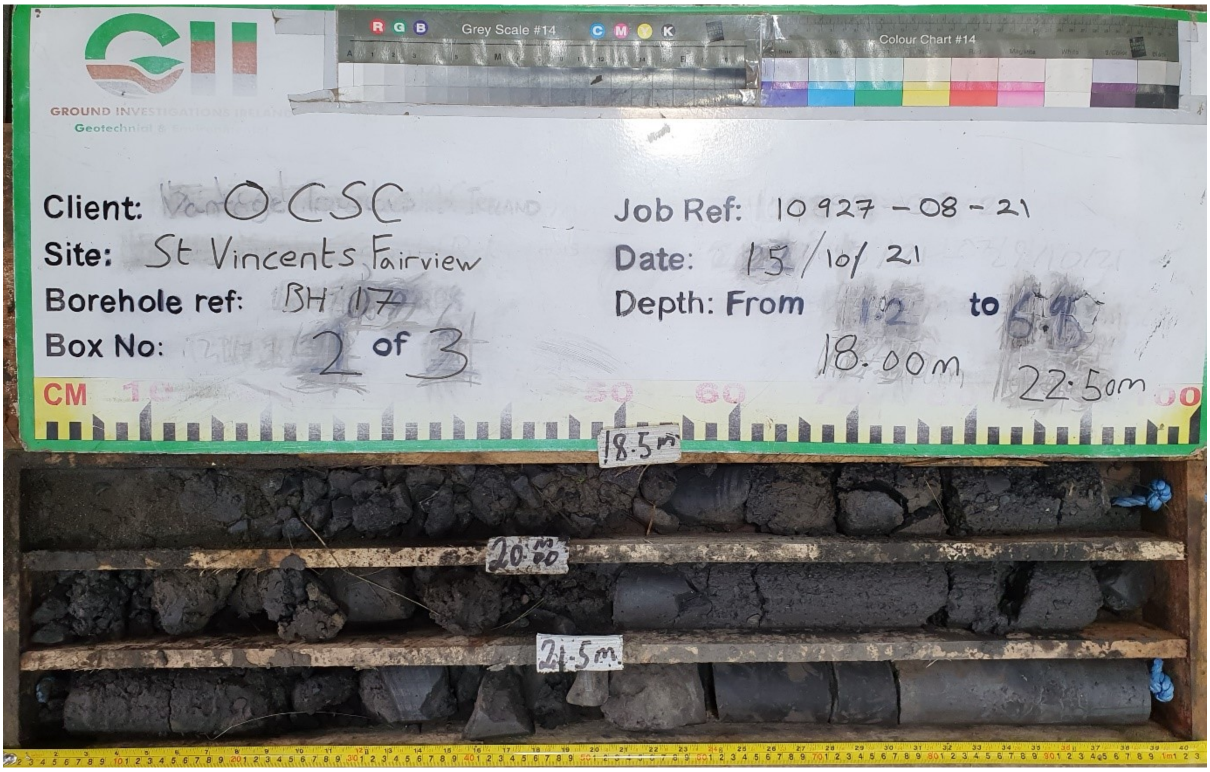
St Vincents Fairview – Rotary Core Photos -10927-08-21

BH16

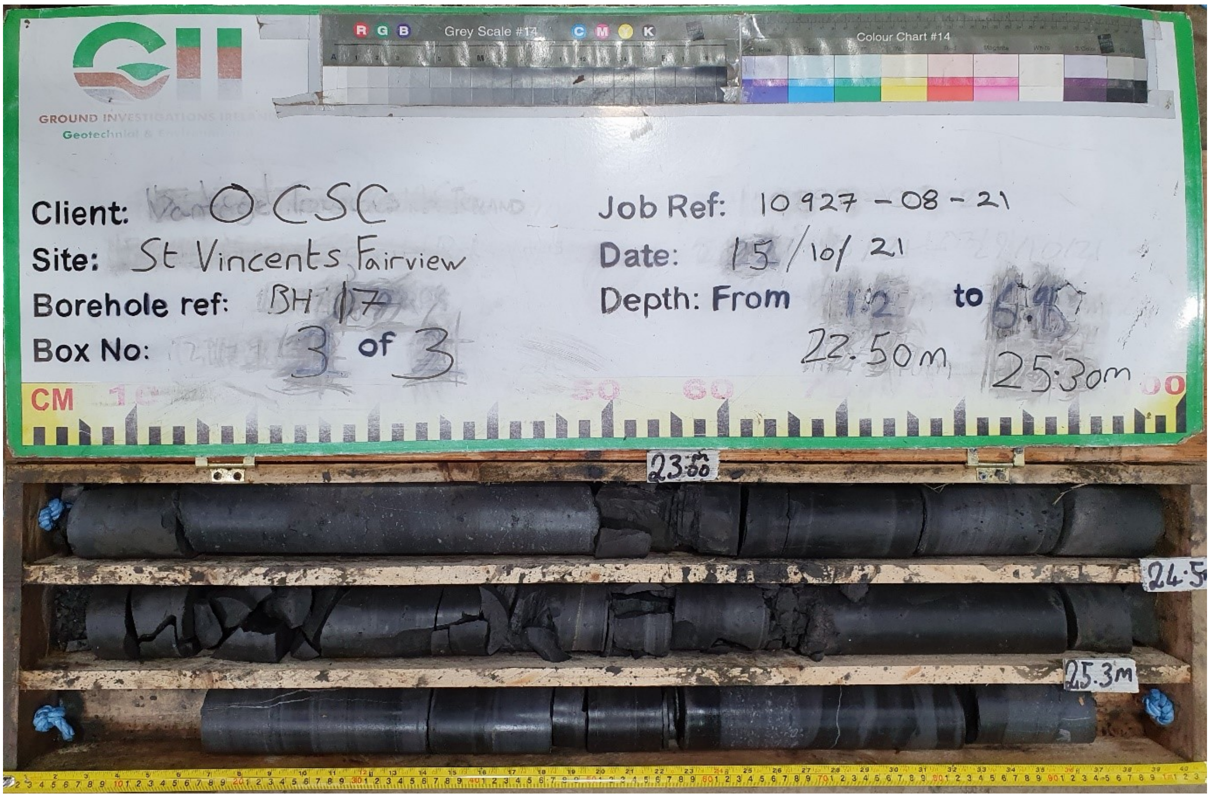


BH17



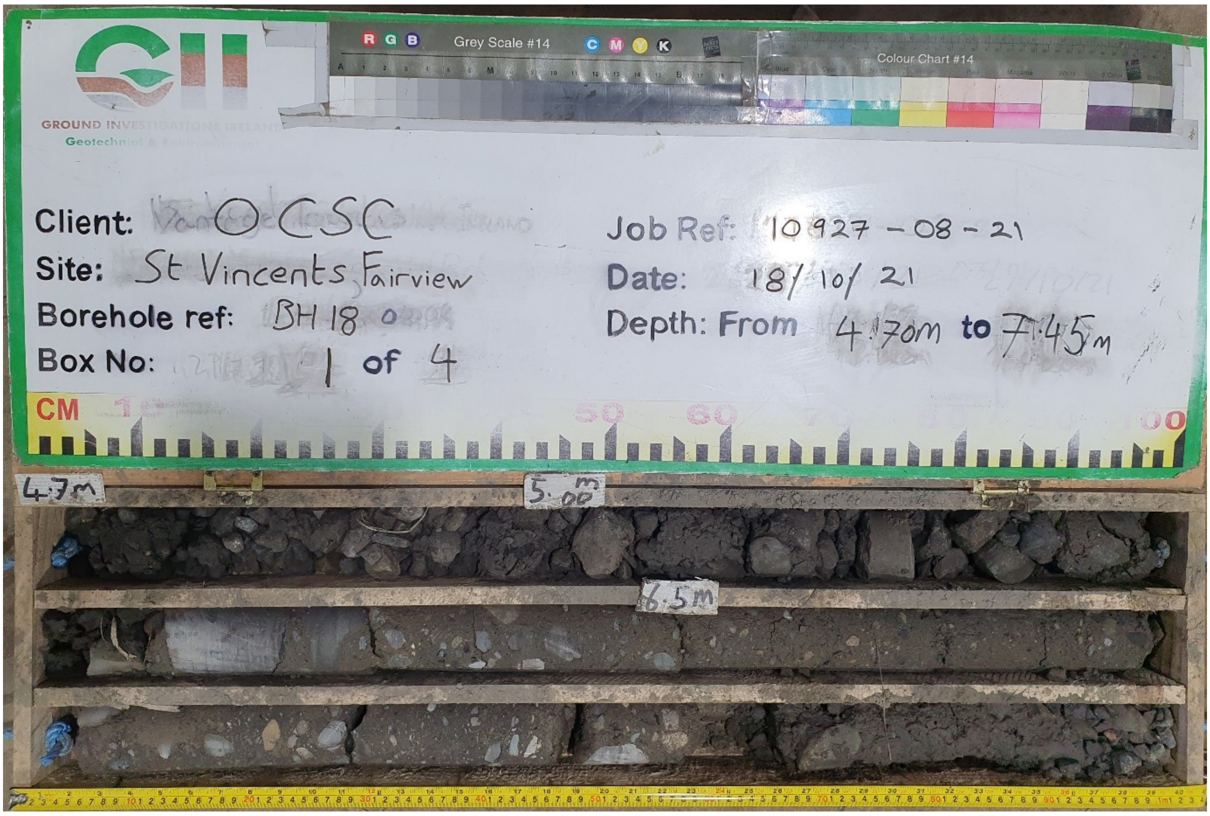


St Vincents Fairview – Rotary Core Photos -10927-08-21

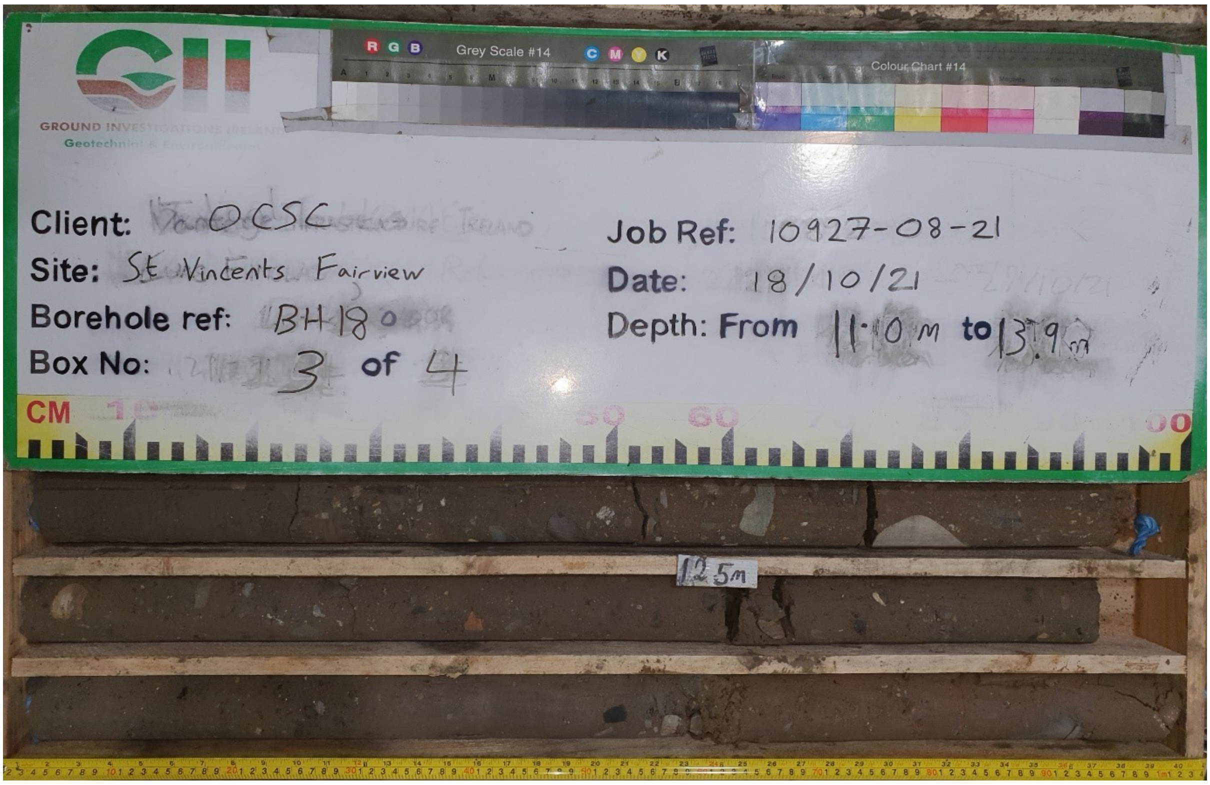


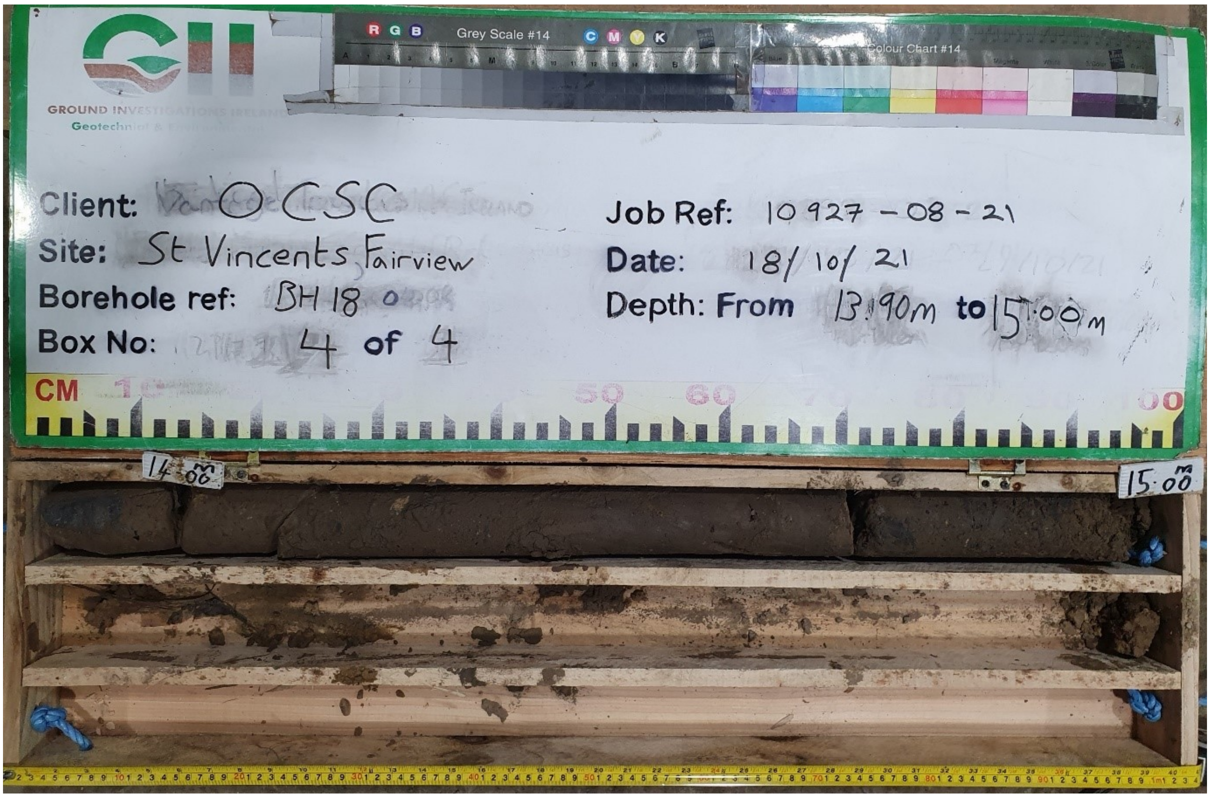
St Vincents Fairview – Rotary Core Photos -10927-08-21

BH18



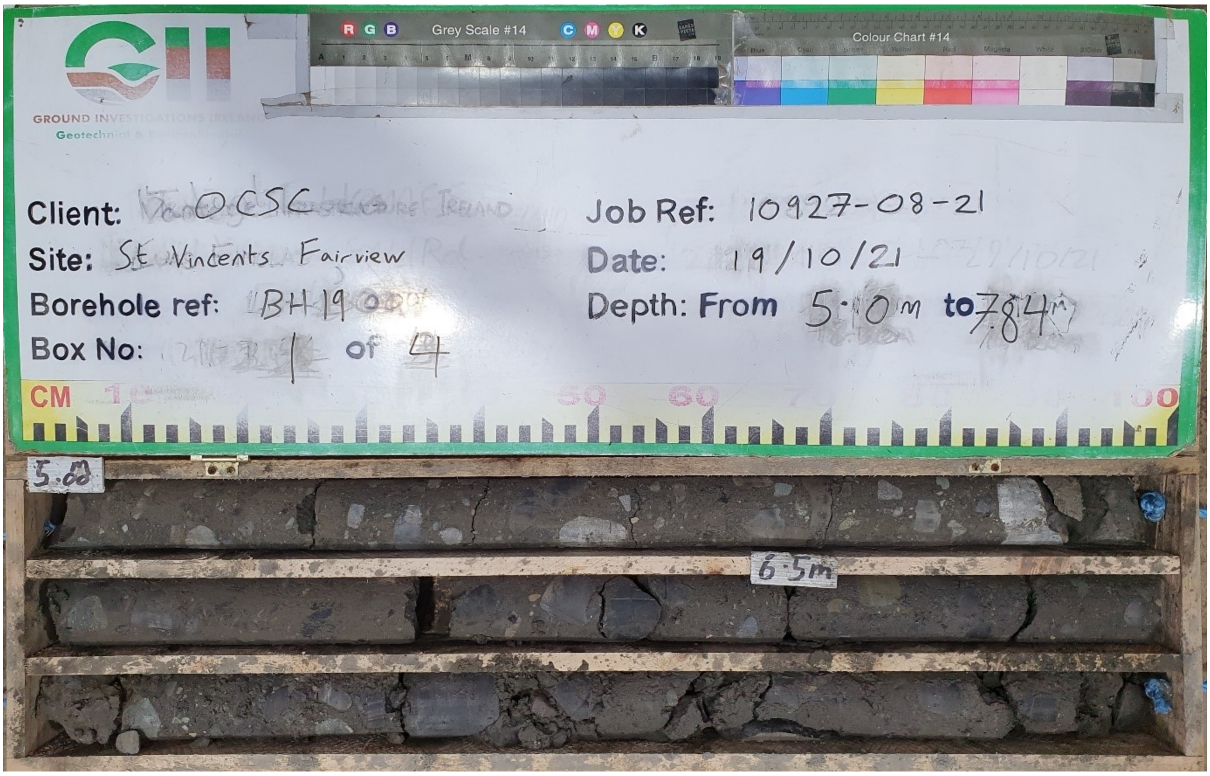
St Vincents Fairview – Rotary Core Photos -10927-08-21

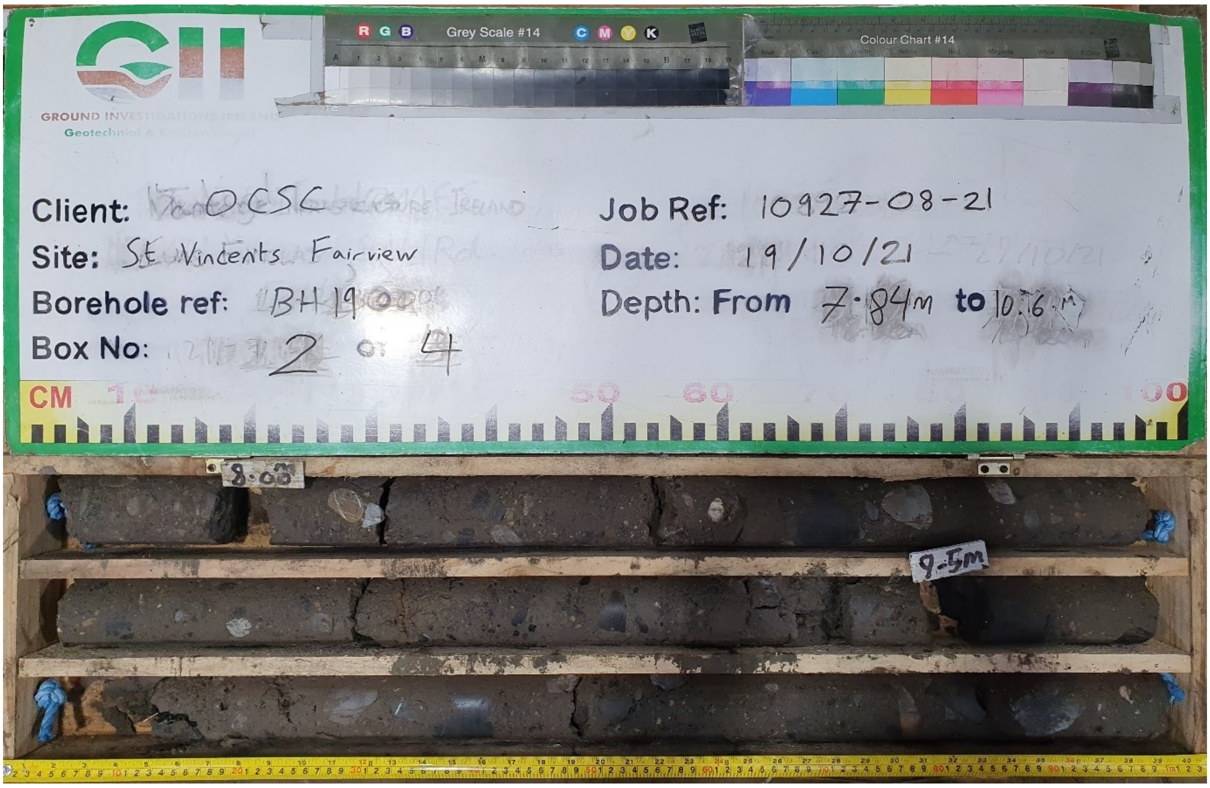




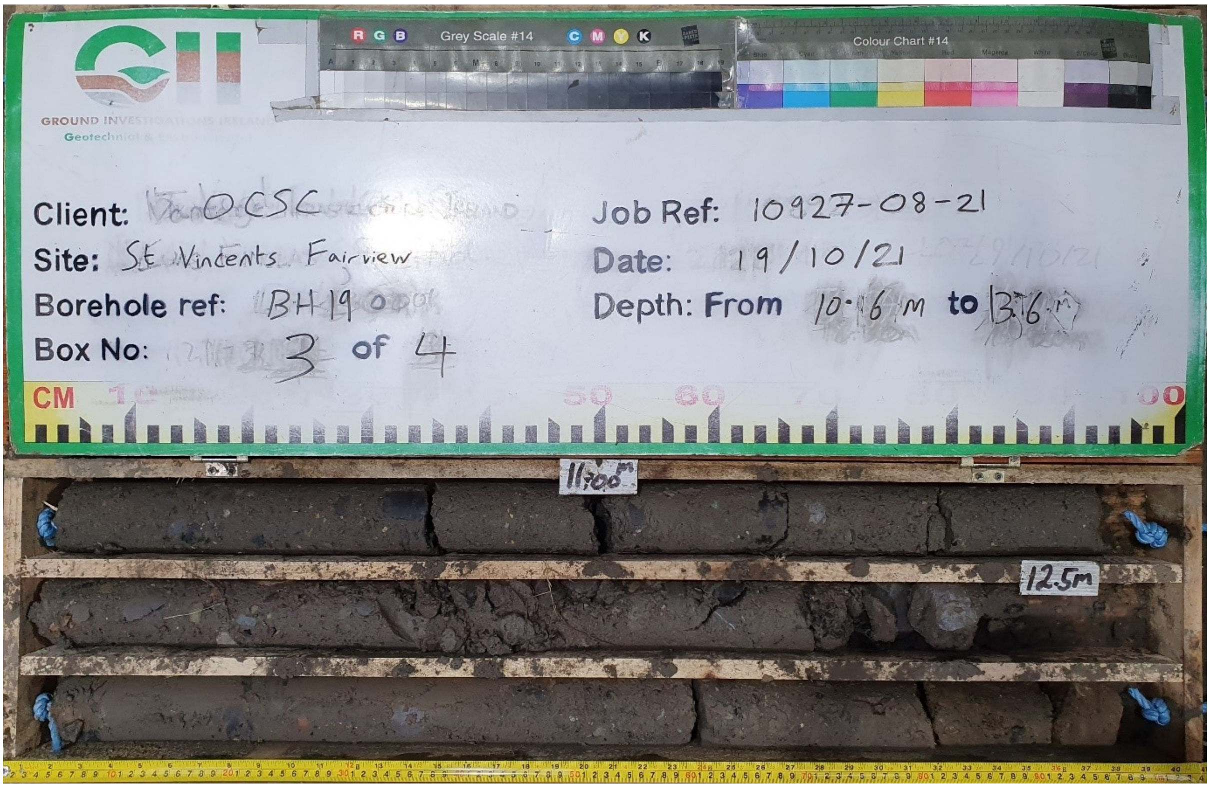
St Vincents Fairview – Rotary Core Photos -10927-08-21

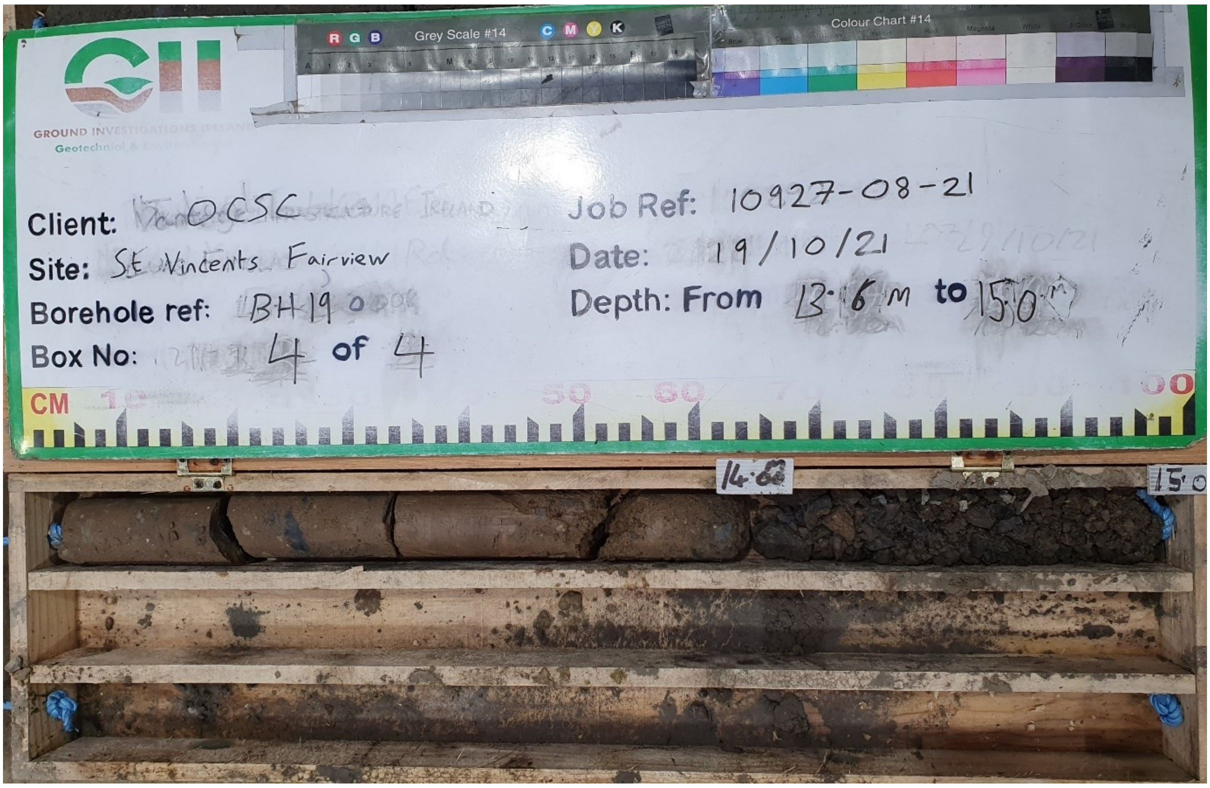
BH19





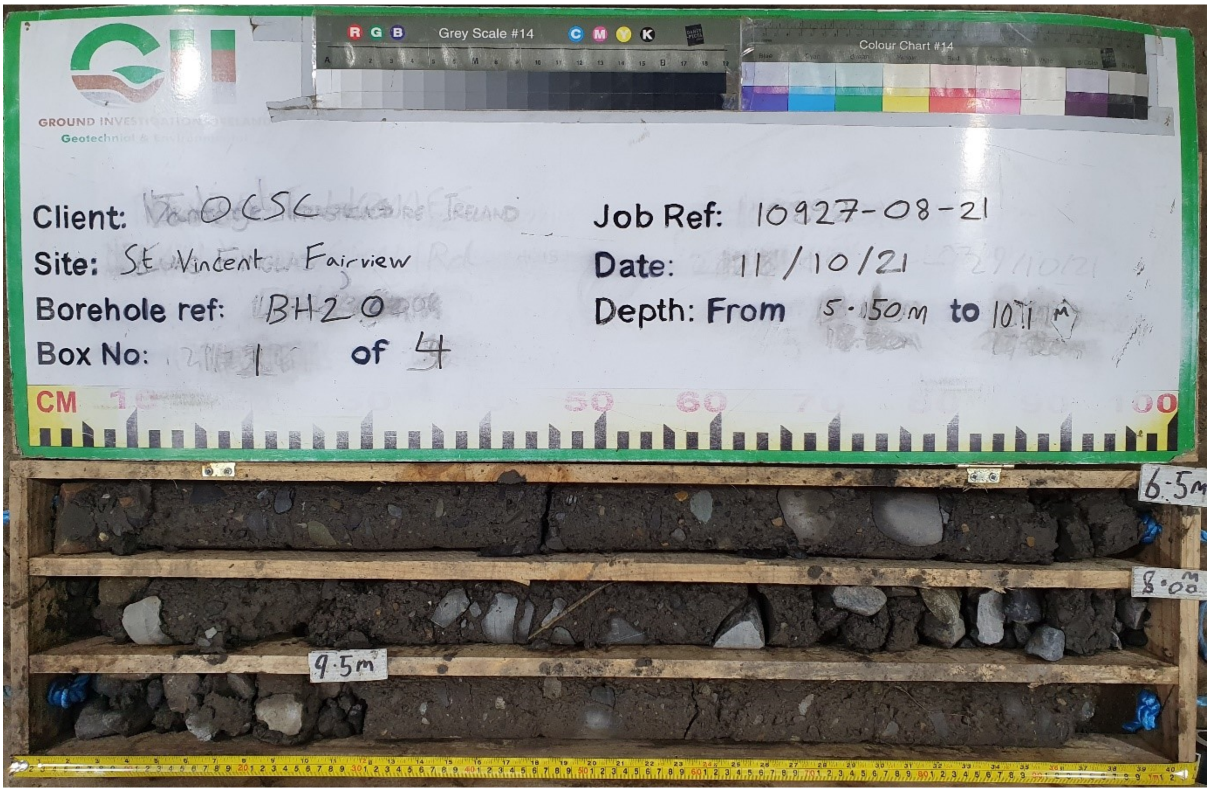
St Vincents Fairview – Rotary Core Photos -10927-08-21

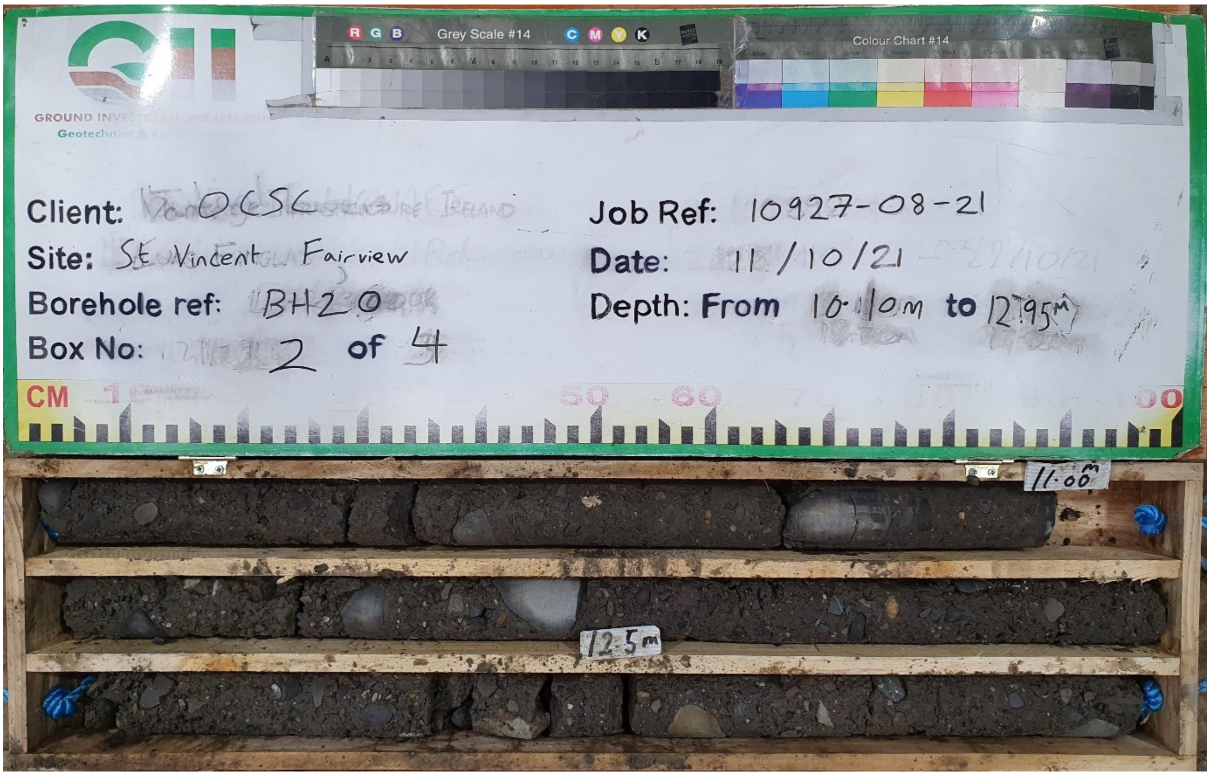




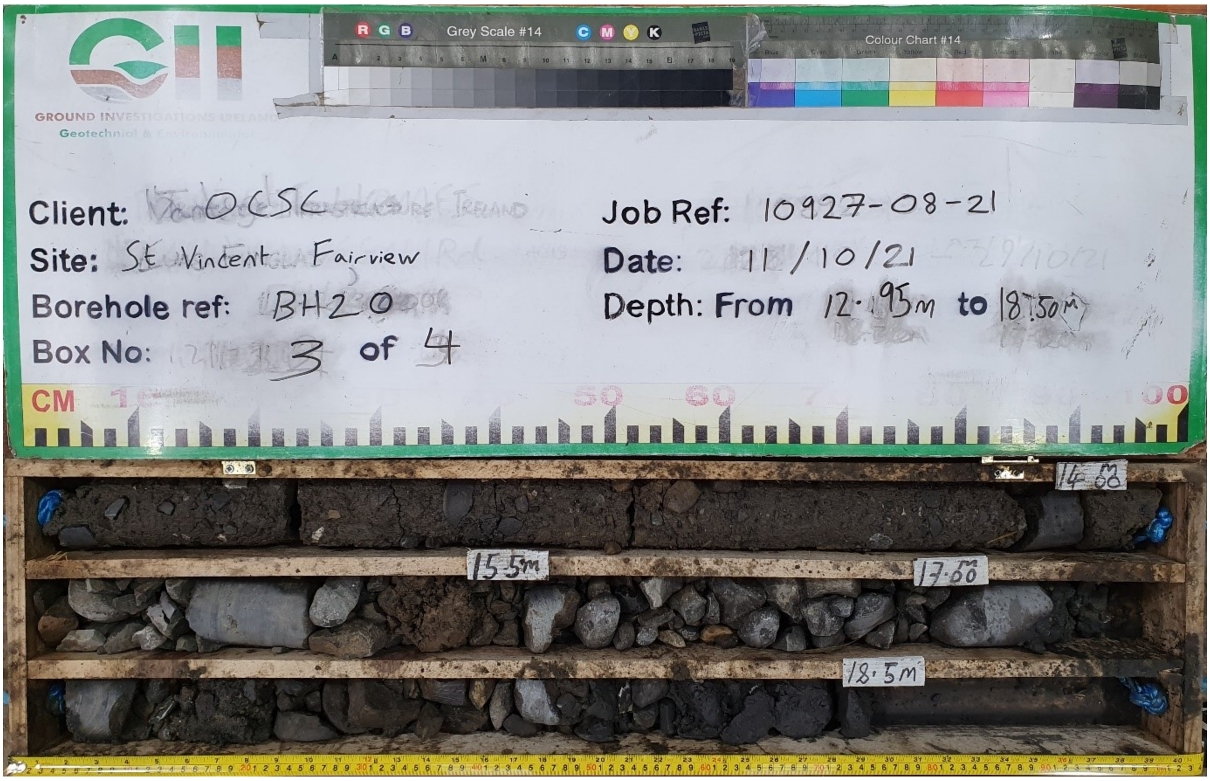
St Vincents Fairview – Rotary Core Photos -10927-08-21

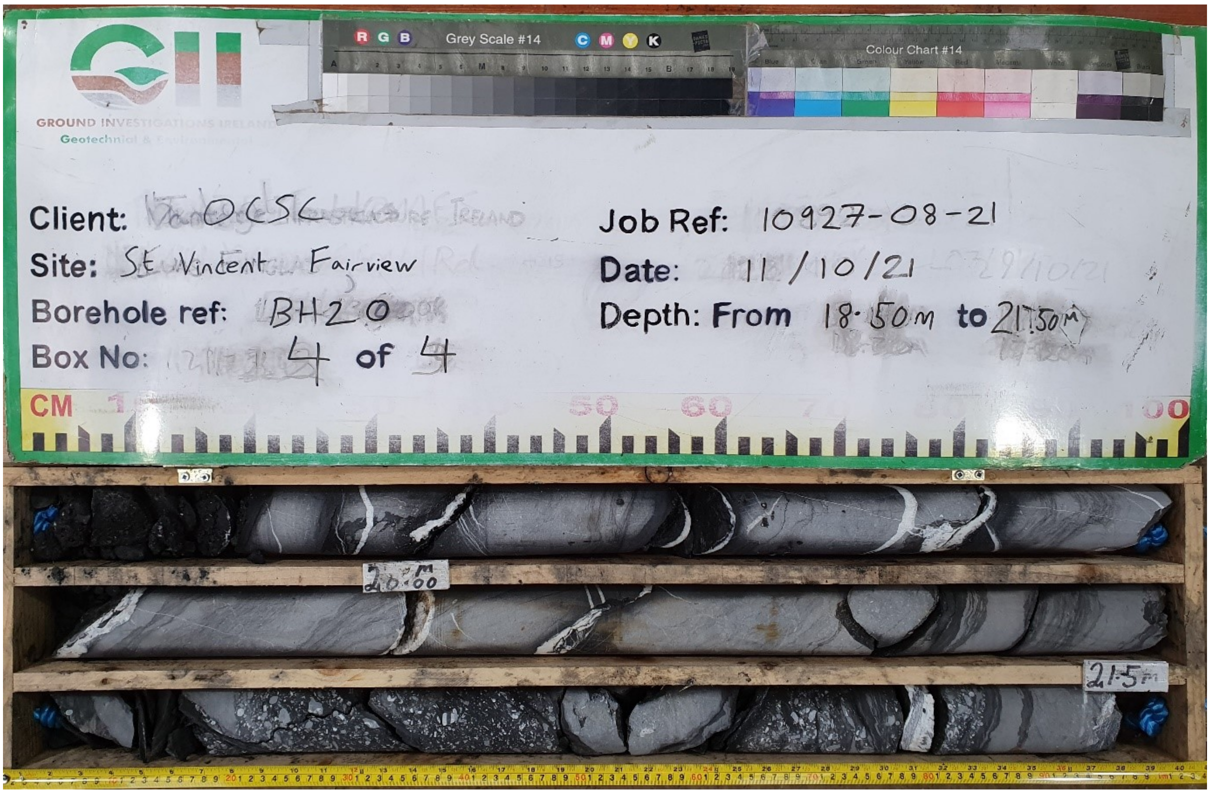
BH20



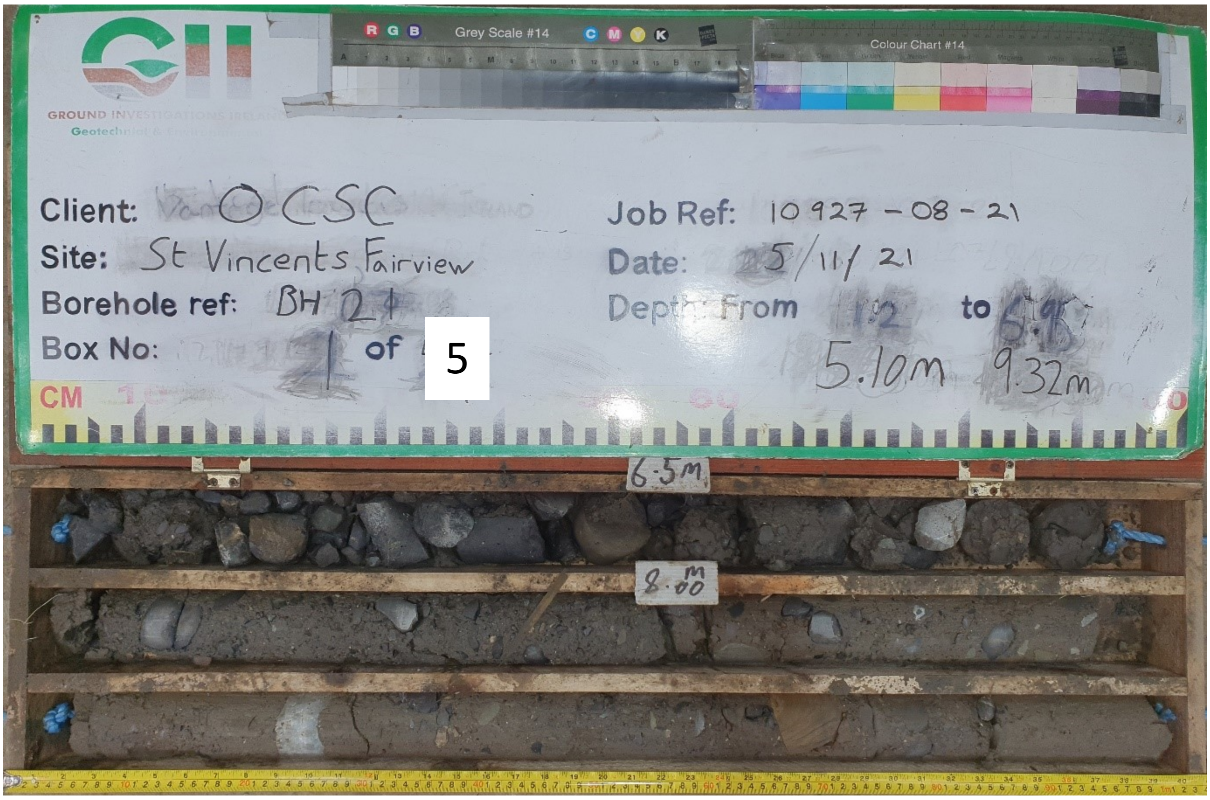


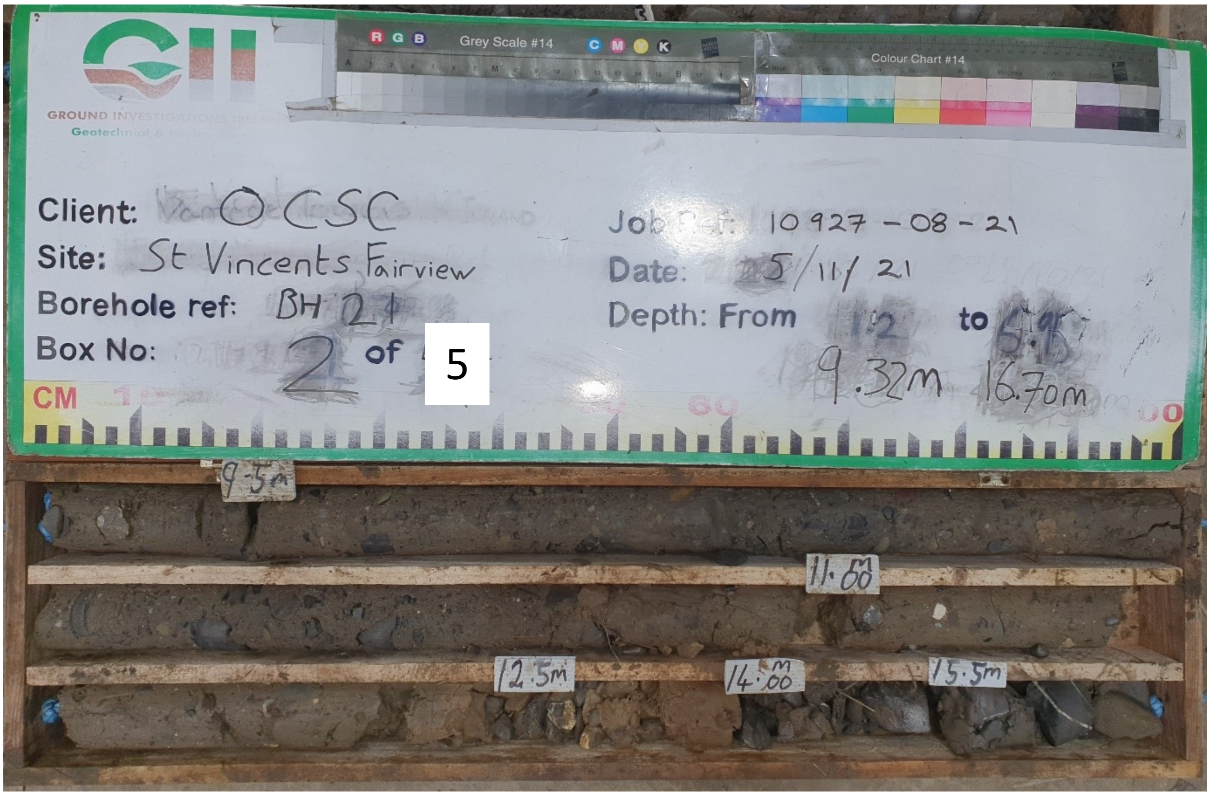
St Vincents Fairview – Rotary Core Photos -10927-08-21

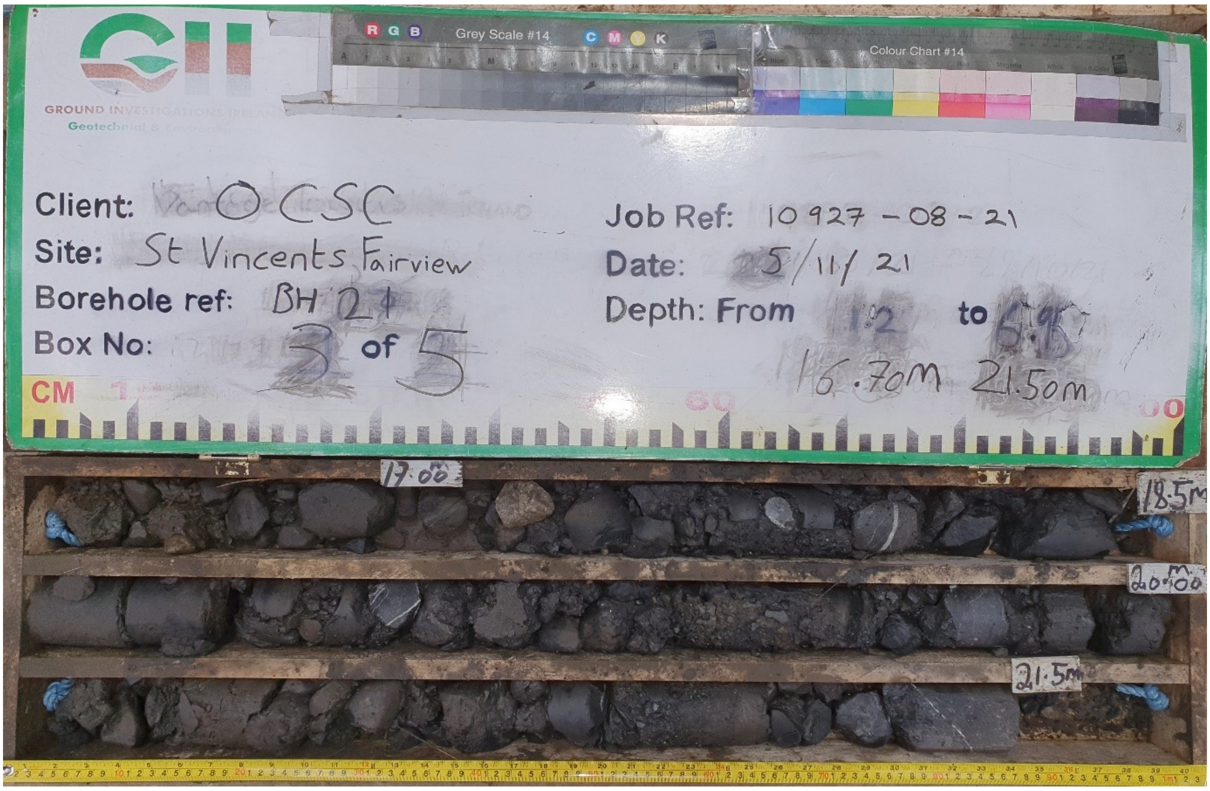




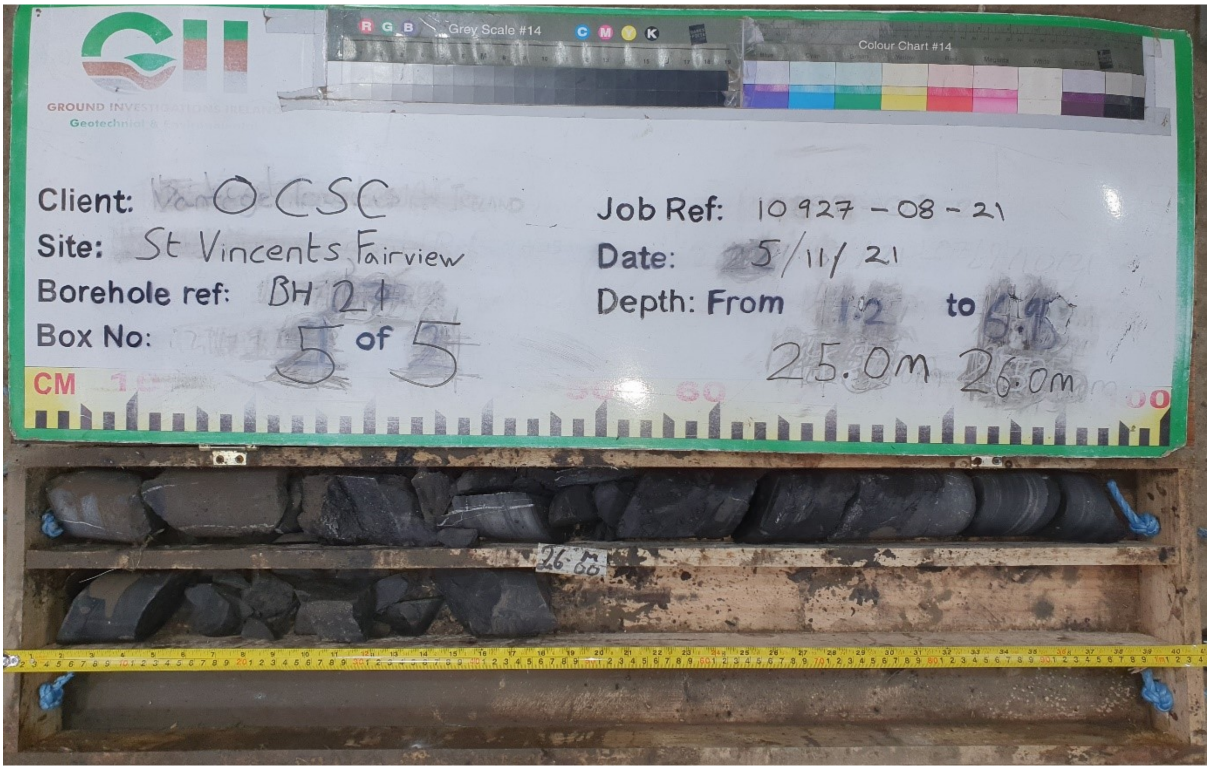
BH21


GROUND INVESTIGATIONS IRELAND
Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 21
Box No: 1 of 5
Job Ref: 10 927 - 08 - 21
Date: 5/11/21
Depth: From 5.10m to 9.32m
6.5m
8.00m

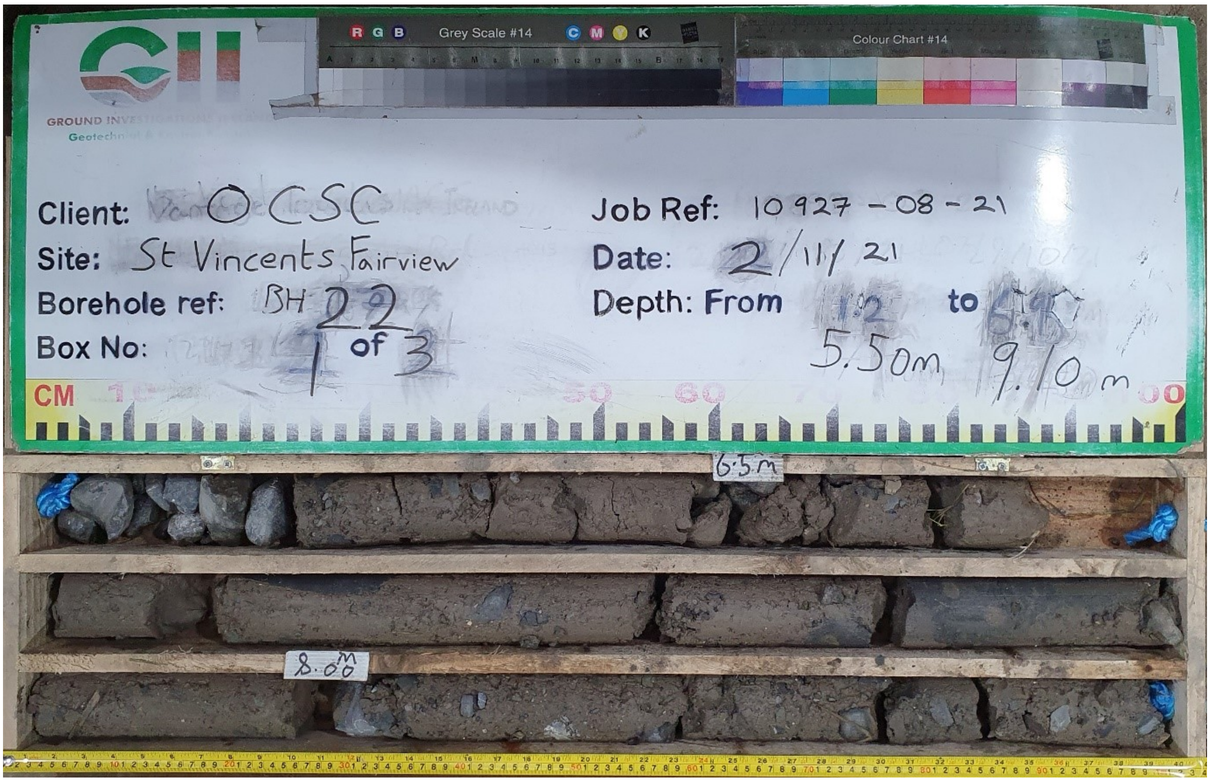

GROUND INVESTIGATIONS IRELAND
Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 21
Box No: 2 of 5
Job Ref: 10 927 - 08 - 21
Date: 5/11/21
Depth: From 9.32m to 16.70m
9.5m
11.00m
12.5m
14.00m
15.5m

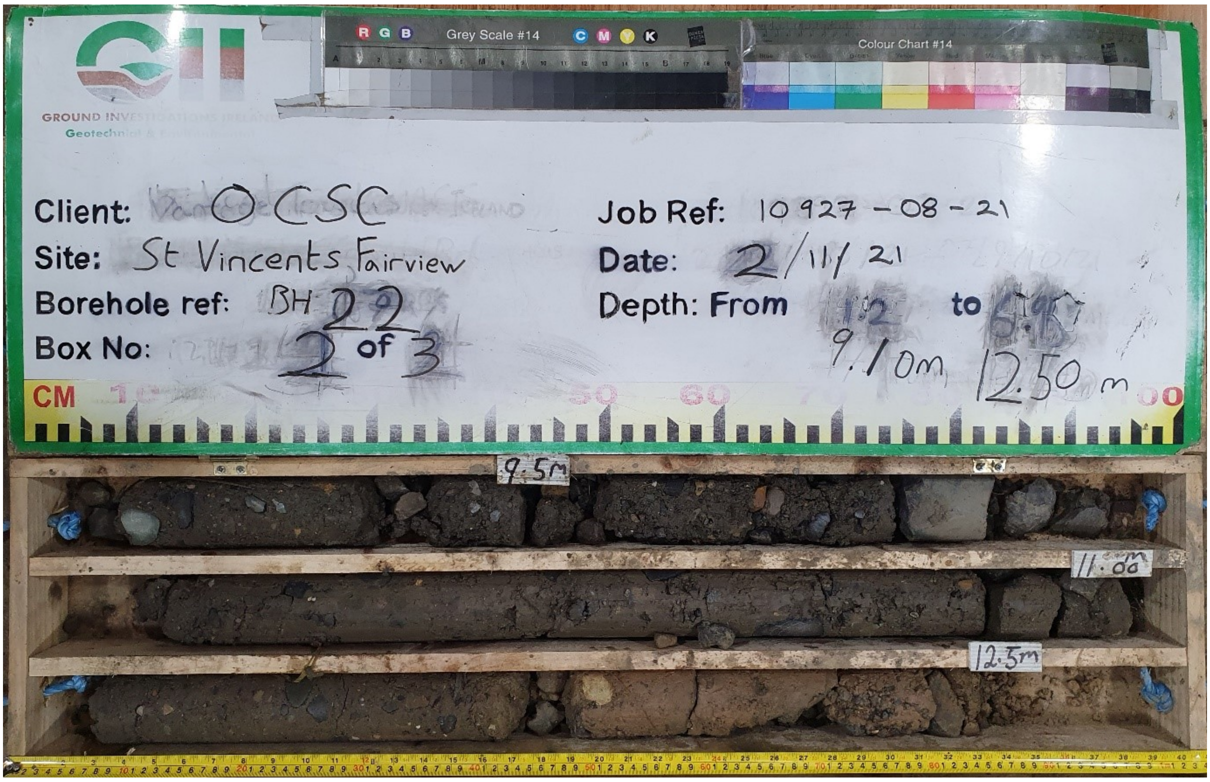

Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 21
Box No: 3 of 5
Job Ref: 10927-08-21
Date: 25/11/21
Depth: From 16.70m to 21.50m
17.00
18.5m
20.00
21.5m


Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 21
Box No: 4 of 5
Job Ref: 10927-08-21
Date: 25/11/21
Depth: From 21.50m to 25.0m
23.00m
26.5m

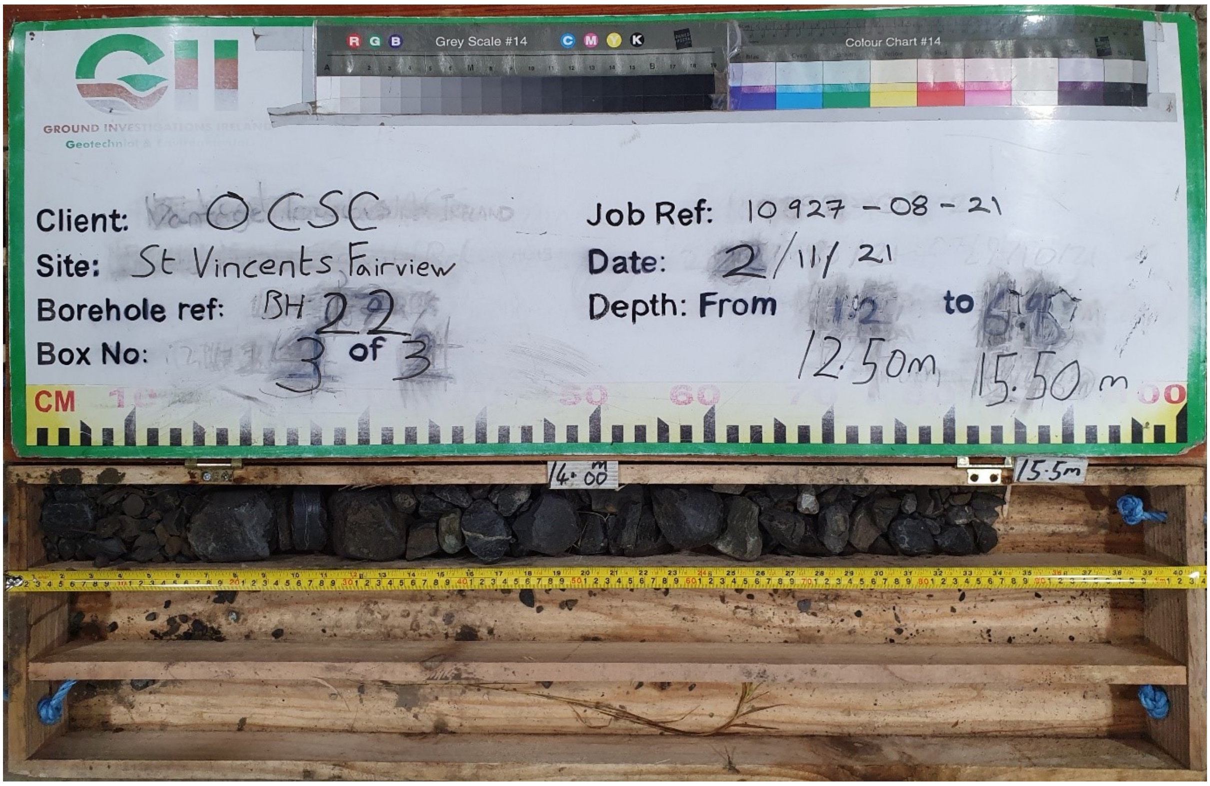

GROUND INVESTIGATIONS IRELAND
Client: OCSC
Site: St Vincents Fairview
Borehole ref: BH 21
Box No: 5 of 5
Job Ref: 10 927 – 08 – 21
Date: 5/11/21
Depth: From 25.0m to 26.0m
Grey Scale #14
Colour Chart #14
CM
26.60

BH22


Client: OCSC
Job Ref: 10927 – 08 – 21
Site: St Vincents Fairview
Date: 2/11/21
Borehole ref: BH 22
Depth: From 5.50m to 9.10m
Box No: 1 of 3
6.5m
8.00m


Client: OCSC
Job Ref: 10927 – 08 – 21
Site: St Vincents Fairview
Date: 2/11/21
Borehole ref: BH 22
Depth: From 9.10m to 12.50m
Box No: 2 of 3
9.5m
11.00m
12.5m

St Vincents Fairview – Rotary Core Photos -10927-08-21



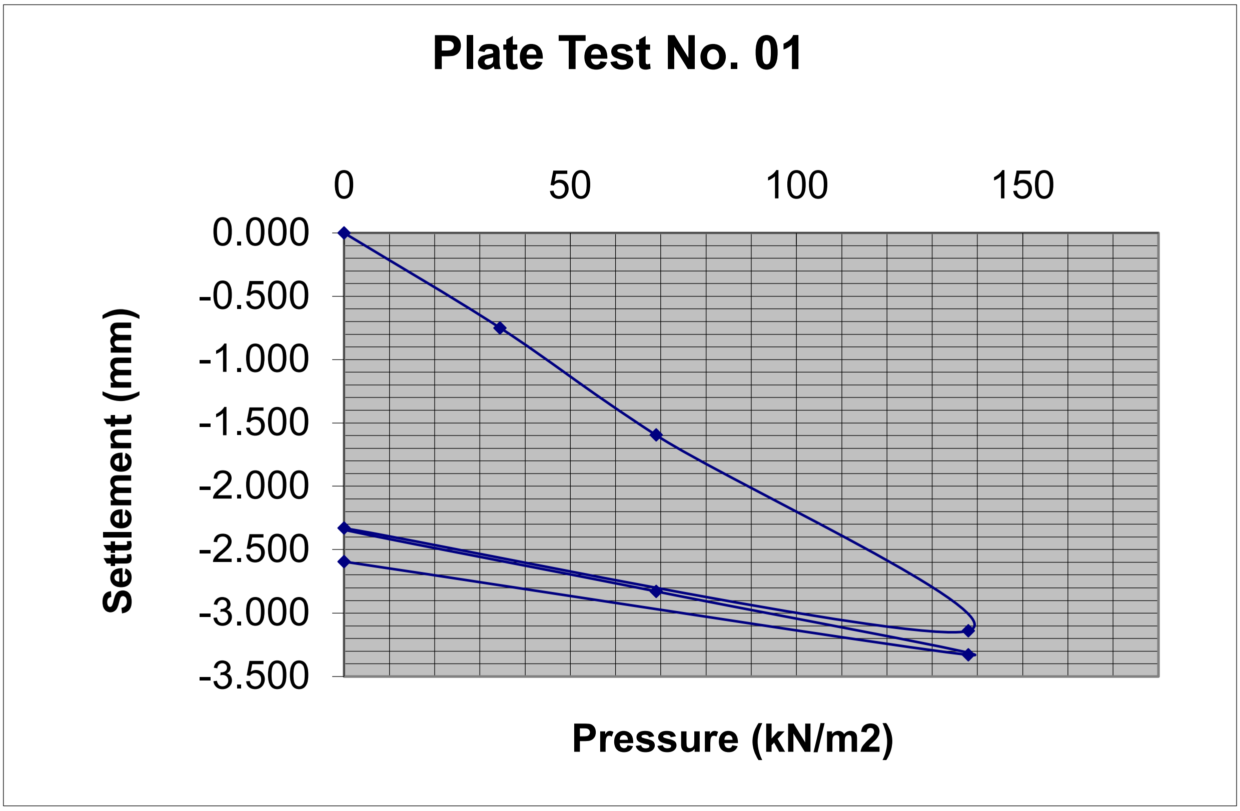
APPENDIX 6 – Plate Bearing Test Records

www.gii.ie

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.75
69	-1.595
138	-3.14
0	-2.33
69	-2.83
138	-3.33
0	-2.595

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	St. Vincents Fairview	**MATERIAL**	MADE GROUND: Brown slightly sandy slightly gravelly Clay.
CONTRACT NO.	10927-08-21		
DATE	14/09/2021		
CLIENT	OCSC	**DEPTH**	0.30m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-01	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **29.23 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **93.25 MN/m2/m**

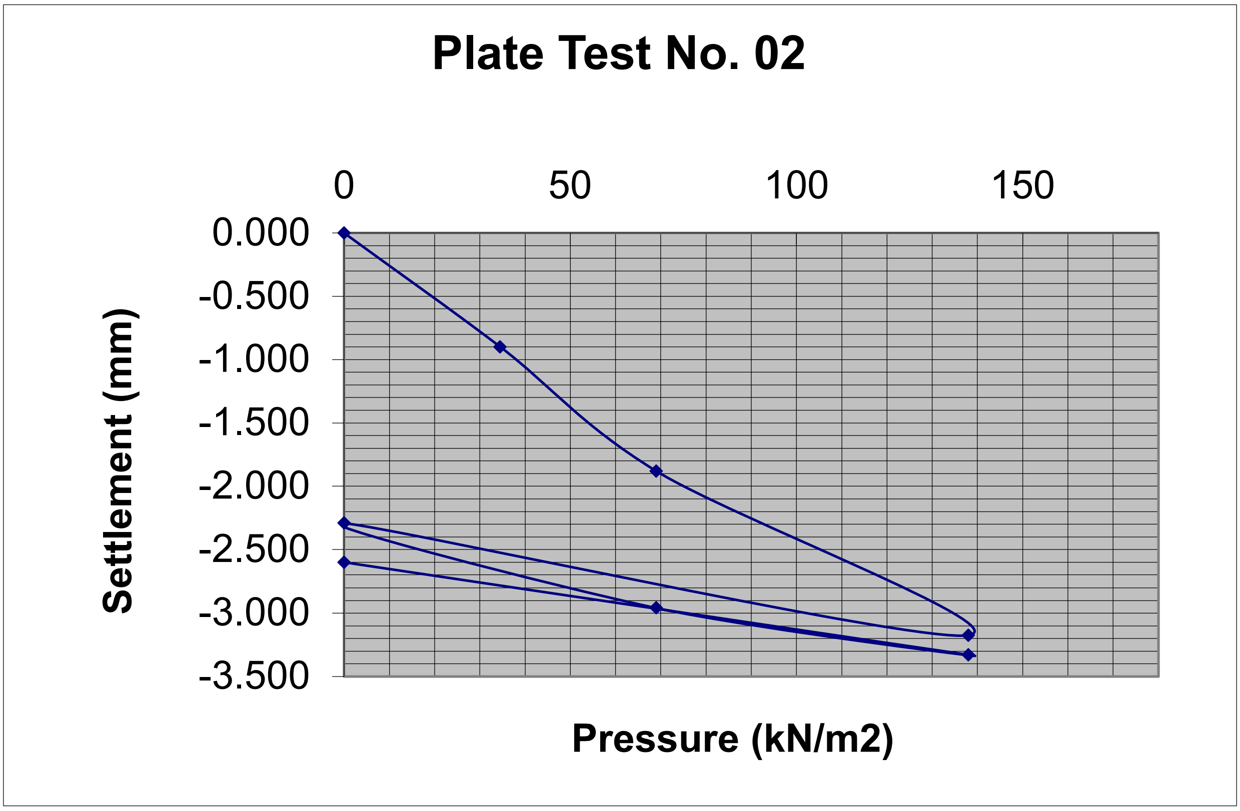
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **3.35 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **24.99 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.9
69	-1.88
138	-3.175
0	-2.29
69	-2.96
138	-3.33
0	-2.6

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	St. Vincents Fairview	**MATERIAL**	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay.
CONTRACT NO.	10927-08-21		
DATE	14/09/2021		
CLIENT	OCSC	**DEPTH**	0.30m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-02	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **24.80 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **69.59 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **2.52 %**

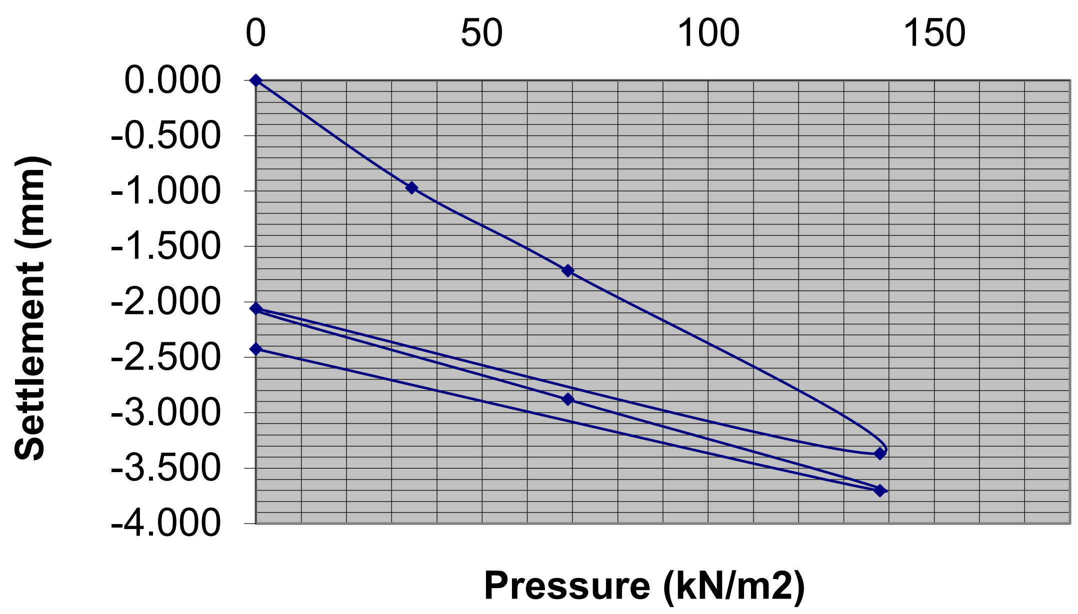
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **15.05 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.97
69	-1.72
138	-3.37
0	-2.06
69	-2.88
138	-3.705
0	-2.425

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	St. Vincents Fairview	**MATERIAL**	MADE GROUND: Brown slightly sandy slightly gravelly Clay.
CONTRACT NO.	10927-08-21		
DATE	14/09/2021		
CLIENT	OCSC	**DEPTH**	0.30m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-03	**SAMPLES**	

Plate Test No. 03



Modulus of subgrade reaction, K (Initial) = **27.11 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **56.86 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **2.94 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **10.60 %**

APPENDIX 7 – Laboratory Testing

www.gii.ie

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

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F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Mike Sutton
Date :	27th September, 2021
Your reference :	10927-08-21
Our reference :	Test Report 21/14659 Batch 1
Location :	St. Vincents
Date samples received :	18th September, 2021
Status :	Final Report
Issue :	1

Five samples were received for analysis on 18th September, 2021 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

HAProwse

Hayley Prowse
Project Manager

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 10 Lower Grosvenor Place, London, SW1W 0EN
Company Registration No: 11371415

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10927-08-21
Location: St. Vincents
Contact: Mike Sutton
EMT Job No: 21/14659

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	4	11											
Sample ID	TP01	TP07											
Depth	1.50	1.20											
COC No / misc													
Containers	T	T											
Sample Date	16/09/2021	16/09/2021											
Sample Type	Soil	Soil											
Batch Number	1	1									LOD/LOR	Units	Method No.
Date of Receipt	18/09/2021	18/09/2021											
Sulphate as SO4 (2:1 Ext) #	0.0094	0.0124									<0.0015	g/l	TM38/PM20
pH #	8.72	8.55									<0.01	pH units	TM73/PM11

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 10927-08-21
Location: St. Vincents
Contact: Mike Sutton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/14659						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

EMT Job No.: 21/14659

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/14659

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

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Ground Investigations Ireland
Catherinestown House
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Co. Dublin
Ireland

Attention :	Mike Sutton
Date :	8th December, 2021
Your reference :	10927-08-21
Our reference :	Test Report 21/18949 Batch 1
Location :	St Vincents
Date samples received :	30th November, 2021
Status :	Final Report
Issue :	1

Ten samples were received for analysis on 30th November, 2021 of which ten were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Client Name: Ground Investigations Ireland
Reference: 10927-08-21
Location: St Vincents
Contact: Mike Sutton
EMT Job No: 21/18949

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	BH03	BH03	BH01	BH12	BH13	BH16	BH16	BH19	BH22	BH22			
Depth	1.00	3.00	2.40	1.00	2.00	1.00	4.00	4.00	1.00	2.00			
COC No / misc													
Containers	T	T	T	T	T	T	T	T	T	T			
Sample Date	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	30/11/2021	30/11/2021	30/11/2021	30/11/2021	30/11/2021	30/11/2021	30/11/2021	30/11/2021	30/11/2021	30/11/2021			
Sulphate as SO4 (2:1 Ext) #	0.0104	0.0113	0.0126	0.0208	0.2011	0.0173	0.3145	0.2302	0.1231	0.0473	<0.0015	g/l	TM38/PM20
pH #	8.79	8.86	8.85	8.30	8.20	8.12	8.07	8.16	8.00	8.05	<0.01	pH units	TM73/PM11

Client Name: Ground Investigations Ireland
Reference: 10927-08-21
Location: St Vincents
Contact: Mike Sutton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/18949						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/18949

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

LABORATORY REPORT

4043

Contract Number: PSL21/9612

Report Date:	26 January 2022
Client's Reference:	10927-08-21
Client Name:	Ground Investigations Ireland Ltd Catherinestown House Hazelhatch Road Newcastle Co Dublin D22 YD52
For the attention of:	**Michael Sutton**
Contract Title:	St Vincent's Fairview
Date Received:	8/12/2021
Date Commenced:	8/12/2021
Date Completed:	26/1/2022
Notes:	**Opinions and Interpretations are outside the UKAS Accreditation**

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH01		B	2.40		Brown silty sandy GRAVEL with many cobbles.
BH03		B	1.00		Brown slightly sandy gravelly CLAY.
BH03		B	3.00		Brown clayey sandy GRAVEL of cobbles.
BH06		B	0.50		Brown slightly sandy gravelly CLAY.
BH10		B	0.50		Brown sandy gravelly CLAY.
BH12		B	1.00		Brown slightly sandy slightly gravelly CLAY.
BH13		B	2.00		Brown slightly sandy gravelly CLAY.
BH16		B	1.00		Brown slightly sandy slightly gravelly CLAY.
BH16		B	4.00		Brown mottled grey slightly sandy gravelly CLAY.
BH17		B	3.00		Brown slightly sandy slightly gravelly CLAY.
BH19		B	1.00		Brown slightly sandy gravelly CLAY.
BH19		B	4.00		Grey slightly sandy gravelly CLAY.
BH21		B	0.50		Brown slightly sandy slightly gravelly CLAY.
BH22		B	1.00		Brown slightly sandy slightly gravelly CLAY.
BH22		B	2.00		Brown slightly sandy gravelly CLAY.

SUMMARY OF SOIL CLASSIFICATION TESTS

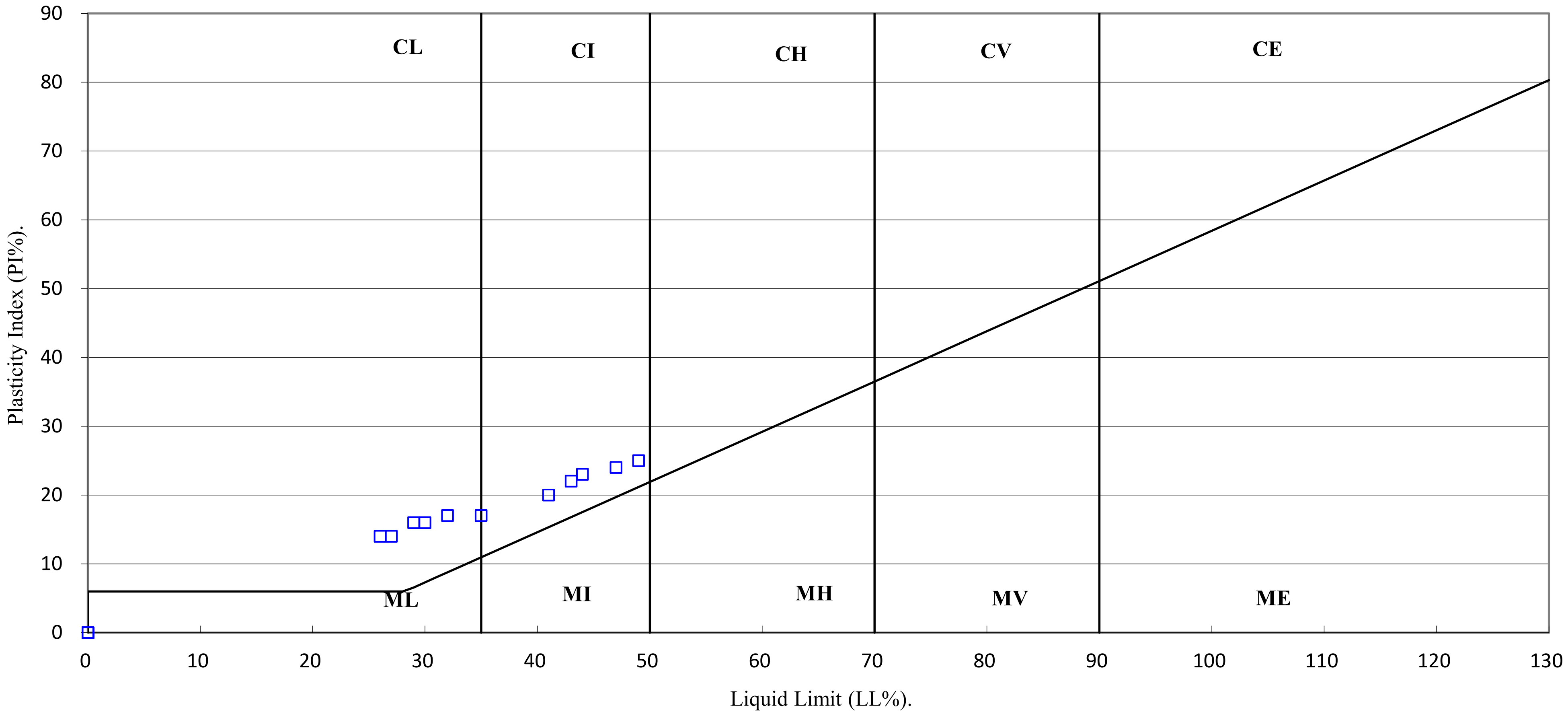
(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH01		B	2.40		7.3				NP			
BH03		B	1.00		13			29	13	16	52	Low Plasticity CL
BH06		B	0.50		22			49	24	25	49	Intermediate Plasticity CI
BH13		B	2.00		14			27	13	14	50	Low Plasticity CL
BH16		B	1.00		16			43	21	22	57	Intermediate Plasticity CI
BH16		B	4.00		9.5			30	14	16	44	Low Plasticity CL
BH17		B	3.00		16			32	15	17	53	Low Plasticity CL
BH19		B	1.00		20			35	18	17	47	Intermediate Plasticity CI
BH19		B	4.00		11			26	12	14	48	Low Plasticity CL
BH21		B	0.50		20			44	21	23	66	Intermediate Plasticity CI
BH22		B	1.00		17			47	23	24	54	Intermediate Plasticity CI
BH22		B	2.00		22			41	21	20	49	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic * : Liquid Limit and Plastic Limit Wet Sieved.

UKAS TESTING 4043	PSL Professional Soils Laboratory	St Vincent's Fairview	Contract No: PSL21/9612 Client Ref: 10927-08-21

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



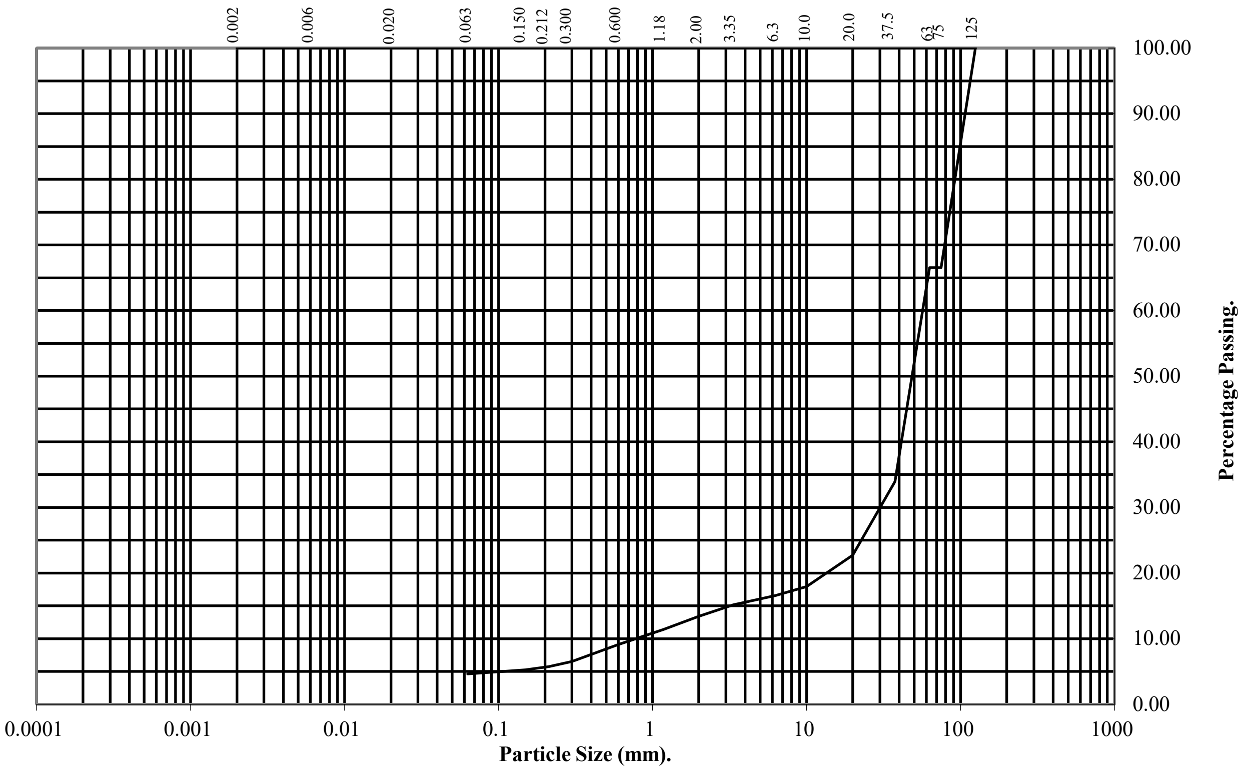
UKAS TESTING 4043	PSL Professional Soils Laboratory	St Vincent's Fairview	Contract No:
			PSL21/9612
			Client Ref:
			10927-08-21

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH01**	**Top Depth (m):**	**2.40**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	67
63	67
37.5	34
20	23
10	18
6.3	17
3.35	15
2	13
1.18	11
0.6	9
0.3	6
0.212	6
0.15	5
0.063	5

Soil Fraction	Total Percentage
Cobbles	33
Gravel	54
Sand	8
Silt/Clay	5

Remarks:
See Summary of Soil Descriptions

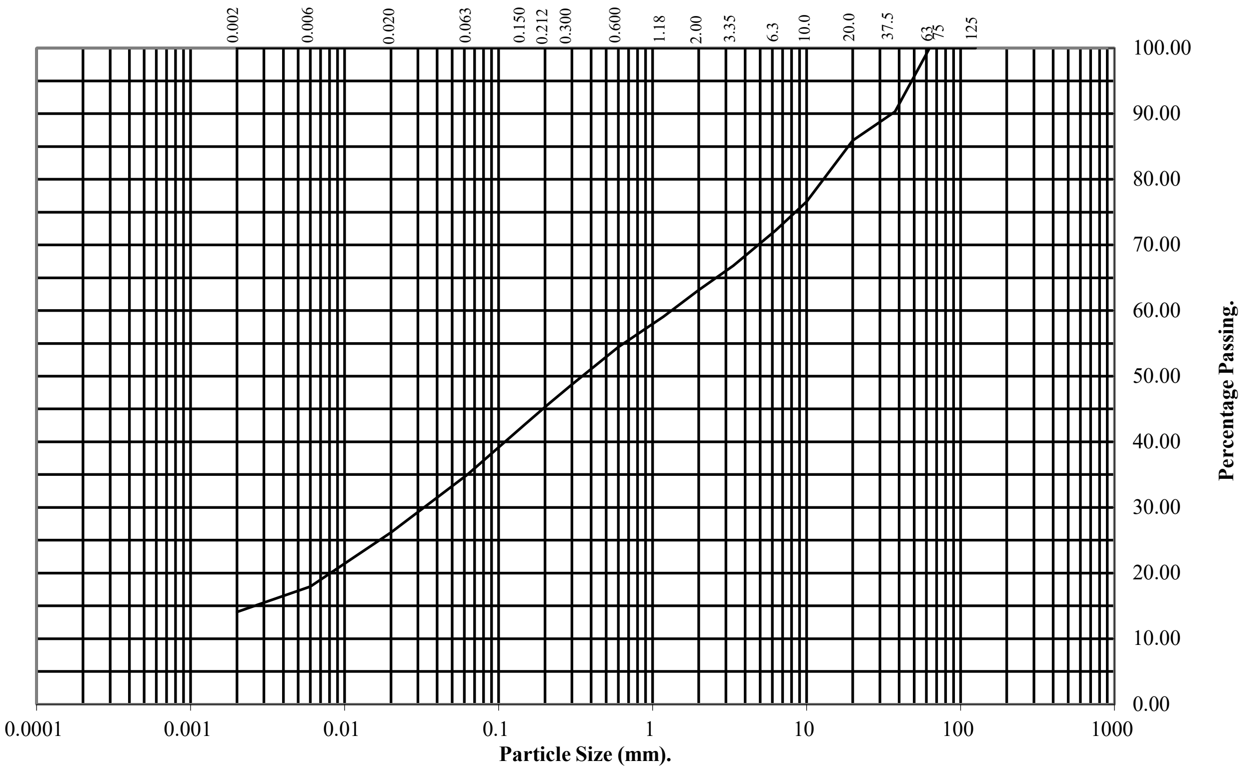
UKAS TESTING 4043	PSL Professional Soils Laboratory	**St Vincent's Fairview**	**Contract No: PSL21/9612**
			Client Ref: 10927-08-21

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH03**	**Top Depth (m):**	**1.00**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	90
20	86
10	77
6.3	72
3.35	67
2	63
1.18	59
0.6	54
0.3	49
0.212	46
0.15	43
0.063	35

Particle Diameter	Percentage Passing
0.02	26
0.006	18
0.002	14

Soil Fraction	Total Percentage
Cobbles	0
Gravel	37
Sand	28
Silt	21
Clay	14

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	Professional Soils Laboratory	**St Vincent's Fairview**	**Contract No:** **PSL21/9612** **Client Ref:** **10927-08-21**

PARTICLE SIZE DISTRIBUTION TEST

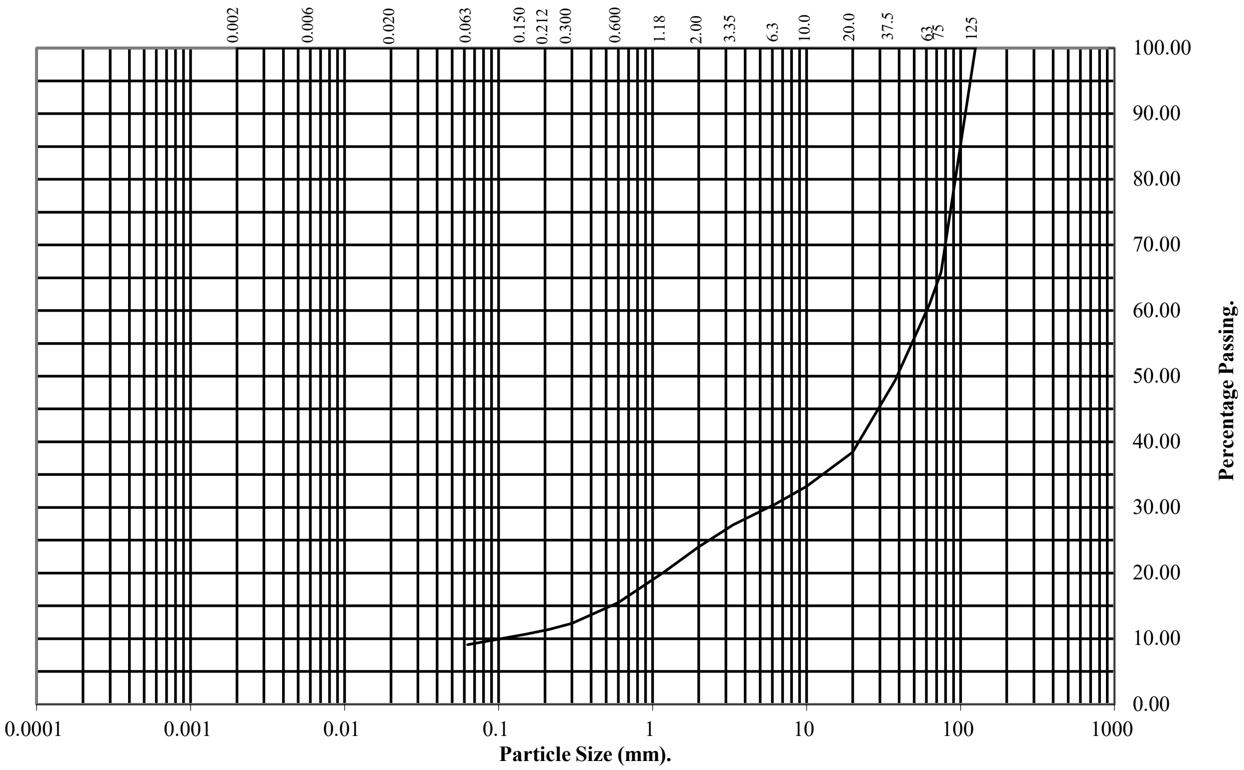
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH03** **Top Depth (m):** **3.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	66
63	61
37.5	49
20	38
10	33
6.3	31
3.35	27
2	24
1.18	20
0.6	16
0.3	12
0.212	11
0.15	11
0.063	9

Soil Fraction	Total Percentage
Cobbles	39
Gravel	37
Sand	15
Silt/Clay	9

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

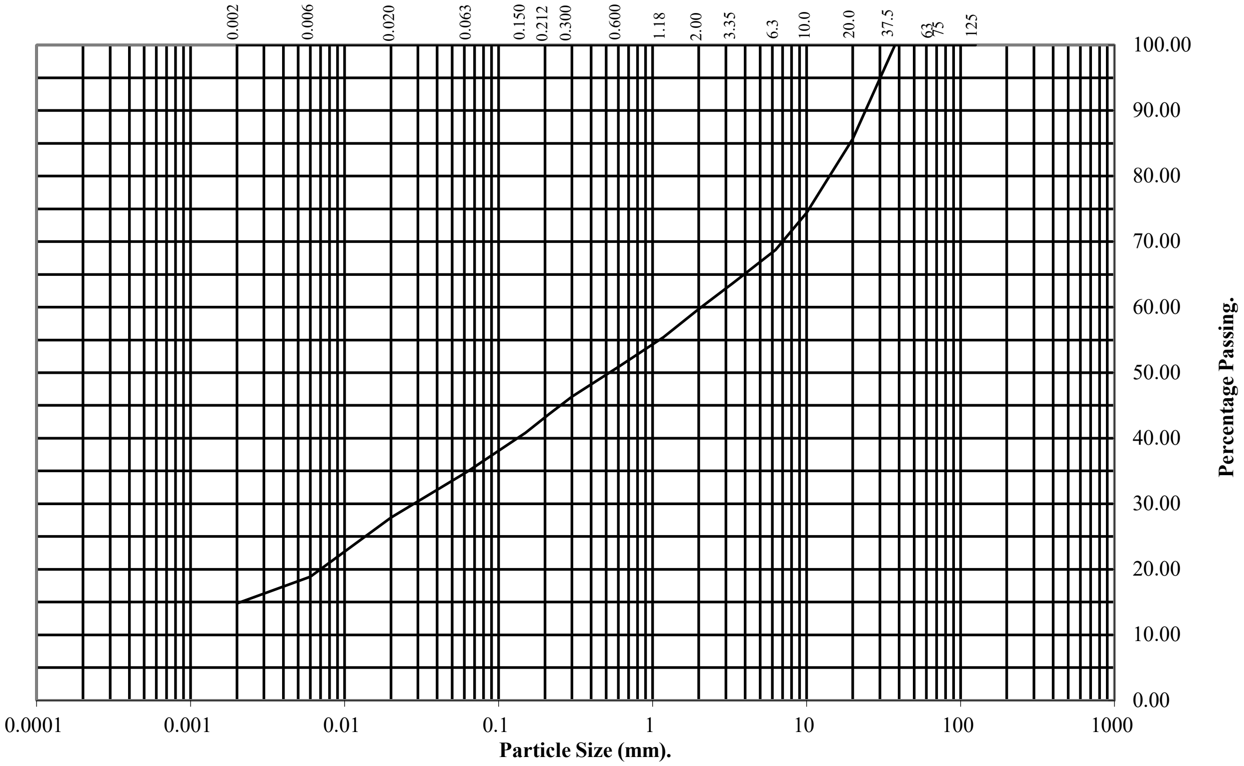
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH06 **Top Depth (m):** 0.50

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	86
10	74
6.3	69
3.35	64
2	60
1.18	55
0.6	51
0.3	46
0.212	44
0.15	41
0.063	35

Particle Diameter	Percentage Passing
0.02	28
0.006	19
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	40
Sand	25
Silt	20
Clay	15

Remarks:
See Summary of Soil Descriptions

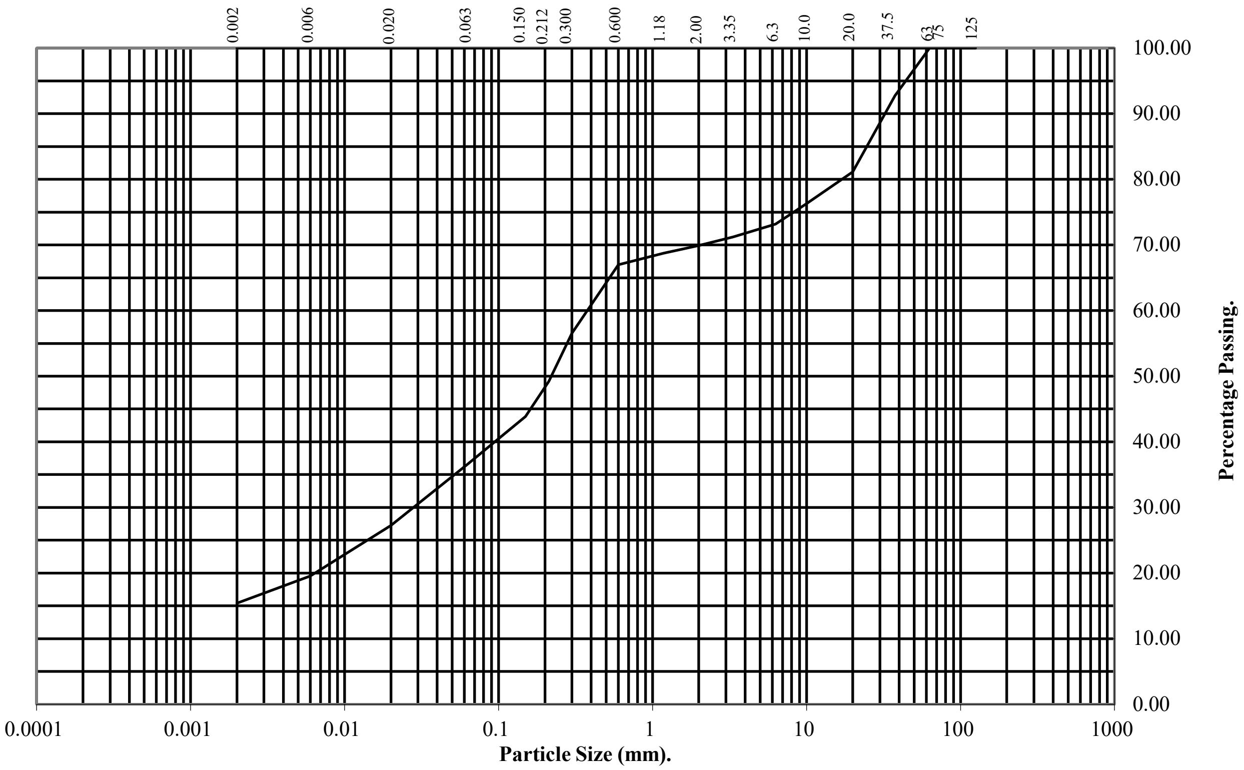
UKAS TESTING 4043 | PSL Professional Soils Laboratory | **St Vincent's Fairview** | **Contract No:** **PSL21/9612** **Client Ref:** **10927-08-21**

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH12**	**Top Depth (m):**	**1.00**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	81
10	76
6.3	73
3.35	71
2	70
1.18	69
0.6	67
0.3	57
0.212	49
0.15	44
0.063	37

Particle Diameter	Percentage Passing
0.02	27
0.006	20
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	30
Sand	33
Silt	22
Clay	15

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

St Vincent's Fairview

Contract No: **PSL21/9612**

Client Ref: **10927-08-21**

PARTICLE SIZE DISTRIBUTION TEST

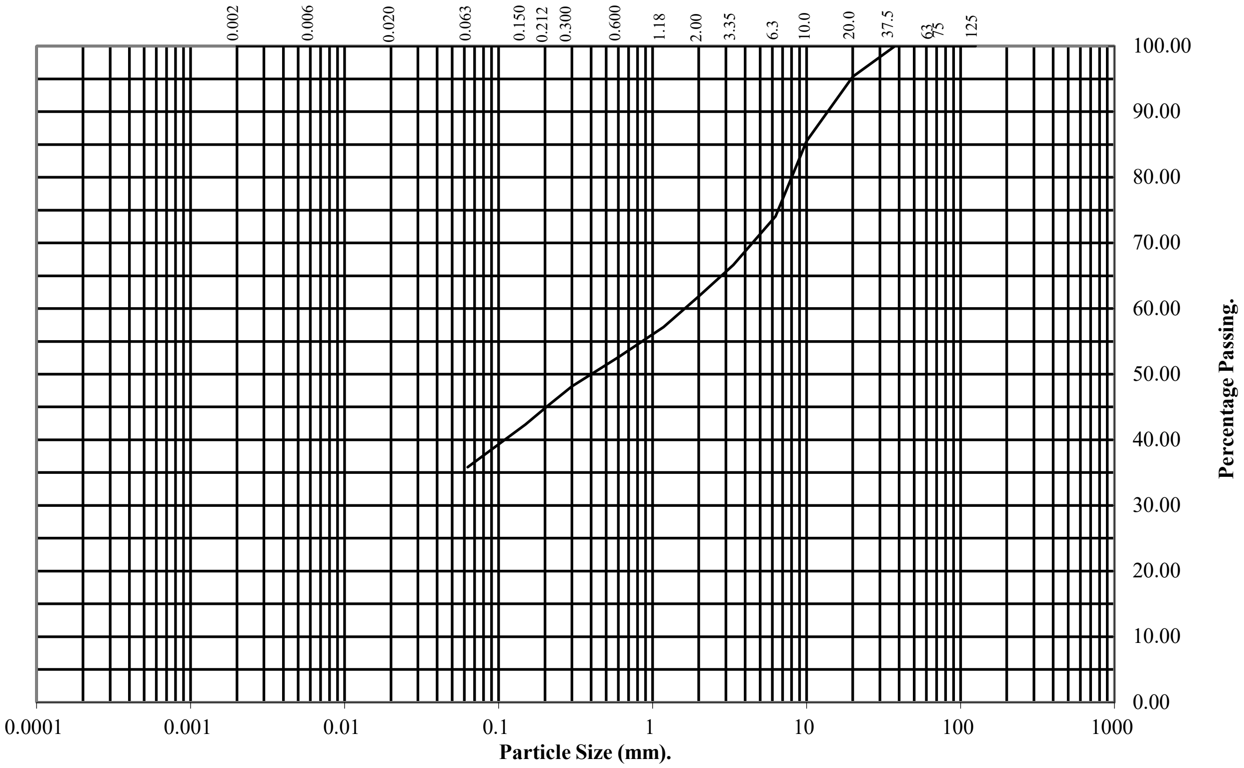
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH13** **Top Depth (m):** **2.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	95
10	86
6.3	74
3.35	67
2	62
1.18	57
0.6	53
0.3	48
0.212	45
0.15	42
0.063	36

Soil Fraction	Total Percentage
Cobbles	0
Gravel	38
Sand	26
Silt/Clay	36

Remarks:

See Summary of Soil Descriptions

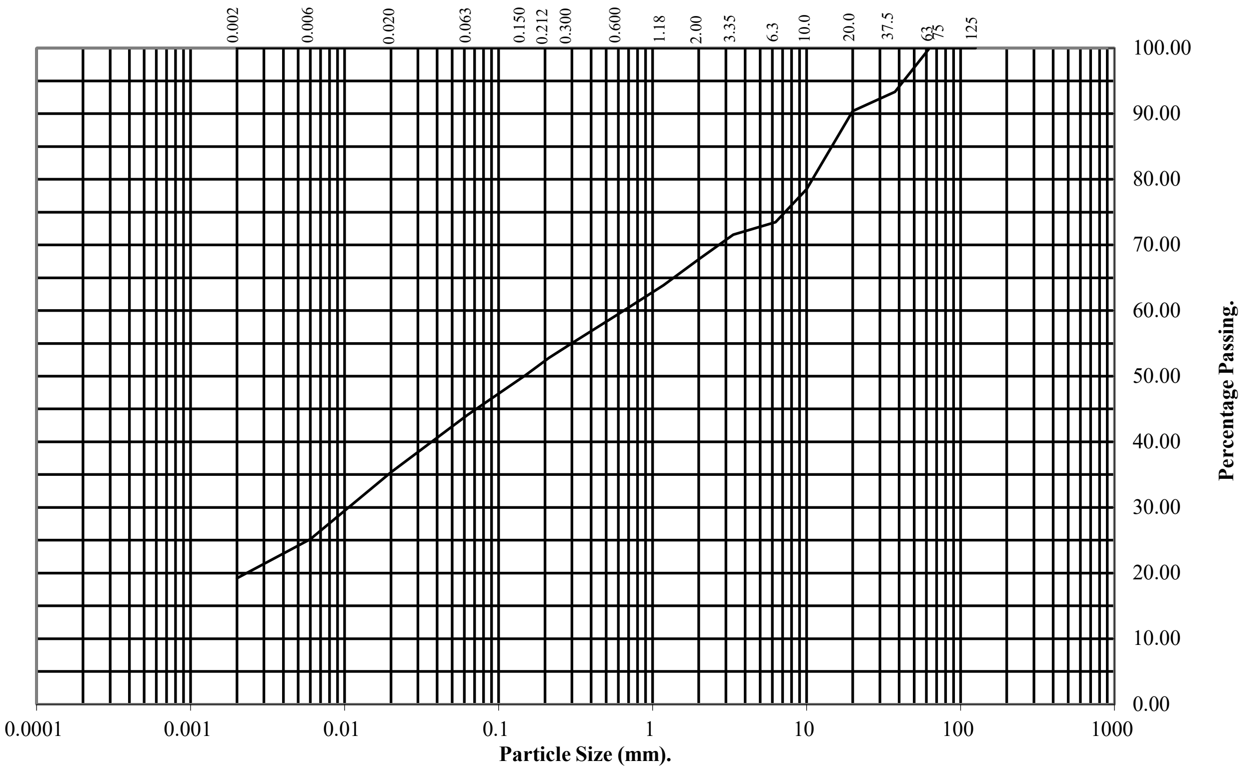
UKAS TESTING 4043	PSL Professional Soils Laboratory	**St Vincent's Fairview**	**Contract No:** **PSL21/9612** **Client Ref:** **10927-08-21**

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH16**	**Top Depth (m):**	**1.00**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	90
10	78
6.3	73
3.35	72
2	68
1.18	64
0.6	59
0.3	55
0.212	53
0.15	50
0.063	44

Particle Diameter	Percentage Passing
0.02	35
0.006	25
0.002	19

Soil Fraction	Total Percentage
Cobbles	0
Gravel	32
Sand	24
Silt	25
Clay	19

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043 — PSL Professional Soils Laboratory	**St Vincent's Fairview**	**Contract No:** **PSL21/9612** **Client Ref:** **10927-08-21**

PARTICLE SIZE DISTRIBUTION TEST

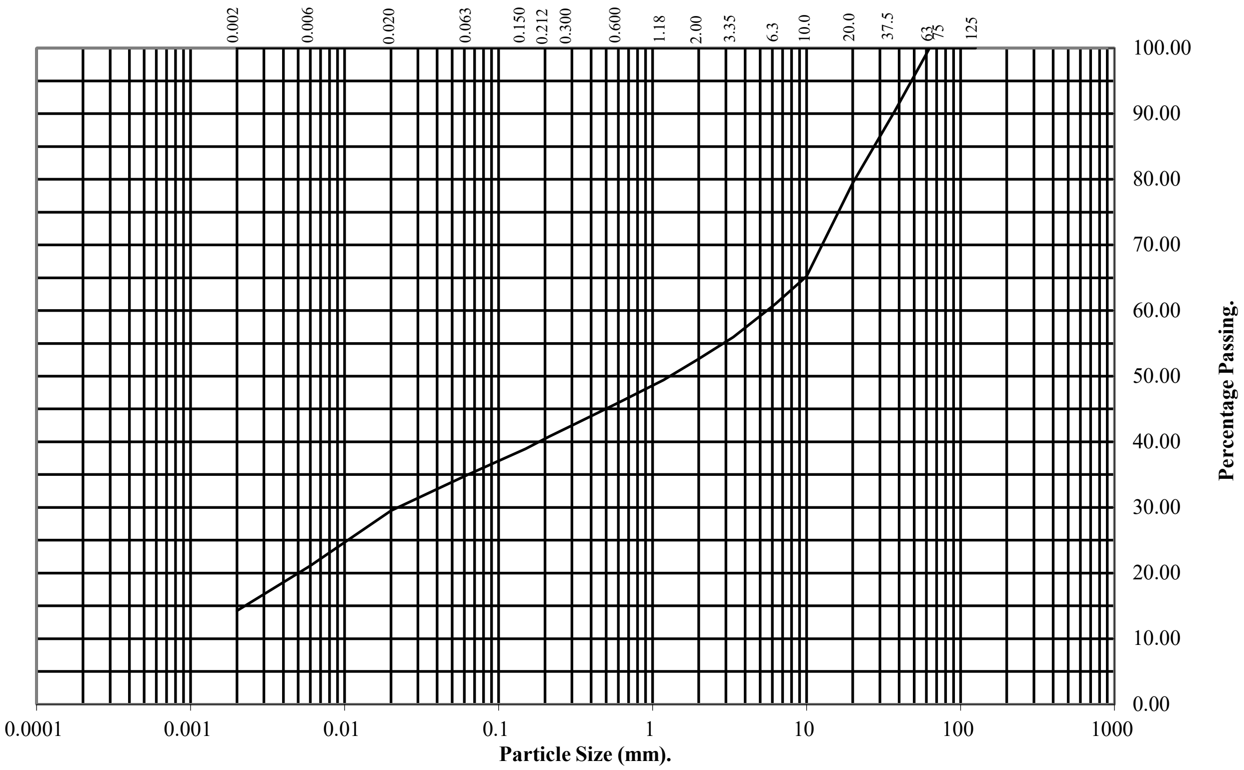
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH16 **Top Depth (m):** 4.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	90
20	79
10	65
6.3	61
3.35	56
2	53
1.18	49
0.6	46
0.3	42
0.212	41
0.15	39
0.063	35

Particle Diameter	Percentage Passing
0.02	30
0.006	21
0.002	14

Soil Fraction	Total Percentage
Cobbles	0
Gravel	47
Sand	18
Silt	21
Clay	14

Remarks:
See Summary of Soil Descriptions

4043

Professional Soils Laboratory

St Vincent's Fairview

Contract No:
PSL21/9612
Client Ref:
10927-08-21

PARTICLE SIZE DISTRIBUTION TEST

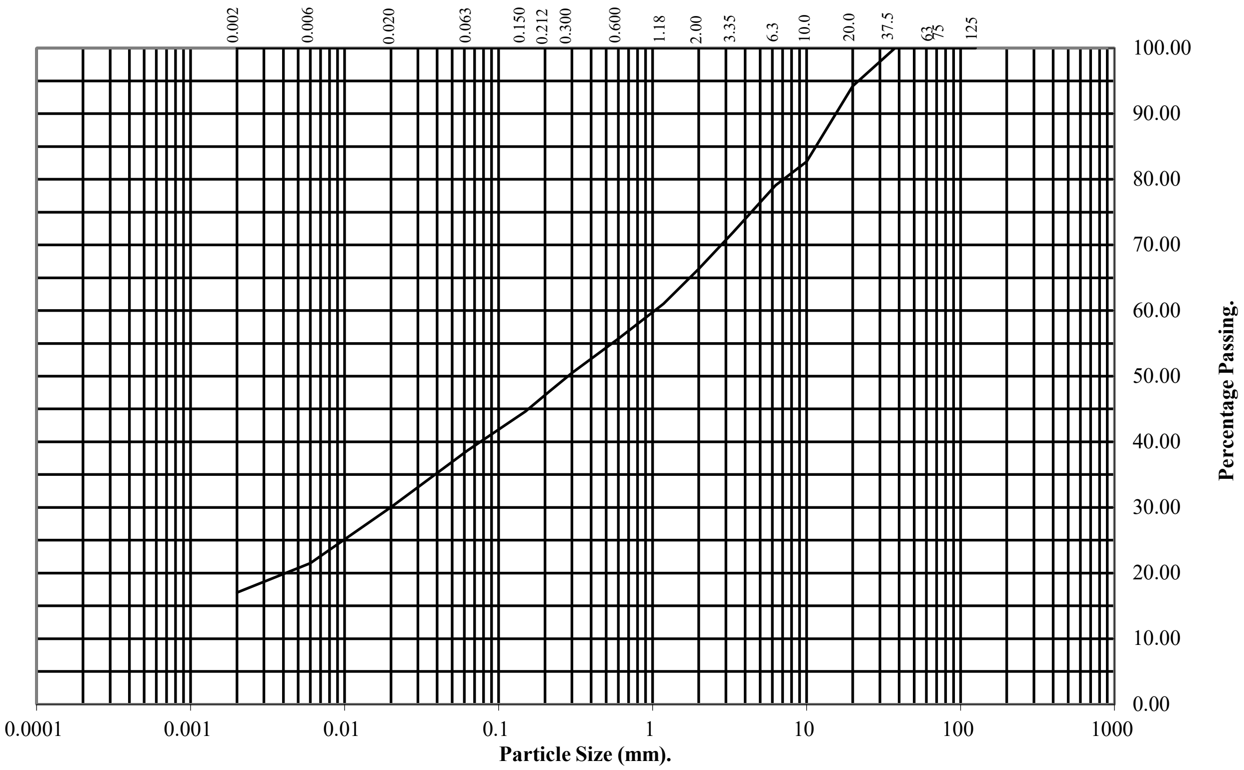
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH17 **Top Depth (m):** 3.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	94
10	83
6.3	79
3.35	72
2	66
1.18	61
0.6	56
0.3	50
0.212	48
0.15	45
0.063	39

Particle Diameter	Percentage Passing
0.02	30
0.006	21
0.002	17

Soil Fraction	Total Percentage
Cobbles	0
Gravel	34
Sand	27
Silt	22
Clay	17

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

St Vincent's Fairview

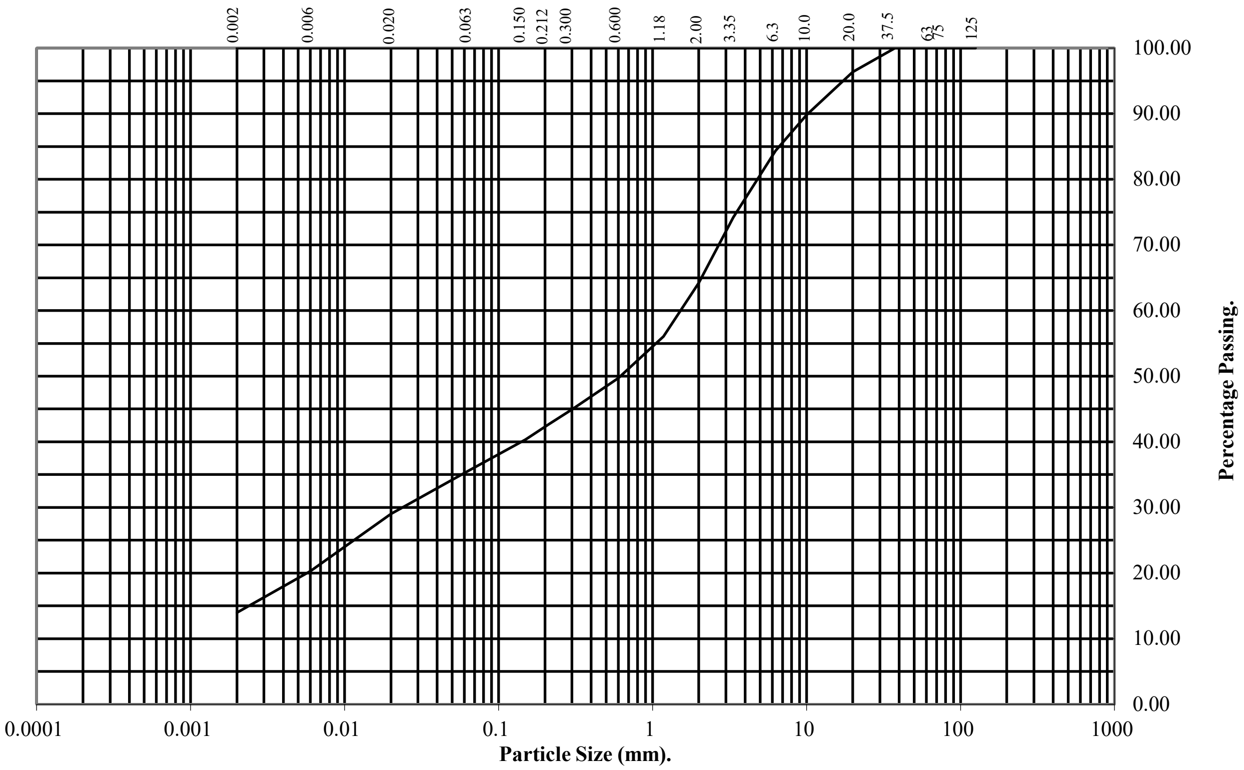
Contract No:
PSL21/9612
Client Ref:
10927-08-21

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**BH19**	**Top Depth (m):**	**1.00**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	90
6.3	84
3.35	74
2	64
1.18	56
0.6	50
0.3	45
0.212	43
0.15	40
0.063	35

Particle Diameter	Percentage Passing
0.02	29
0.006	20
0.002	14

Soil Fraction	Total Percentage
Cobbles	0
Gravel	36
Sand	29
Silt	21
Clay	14

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

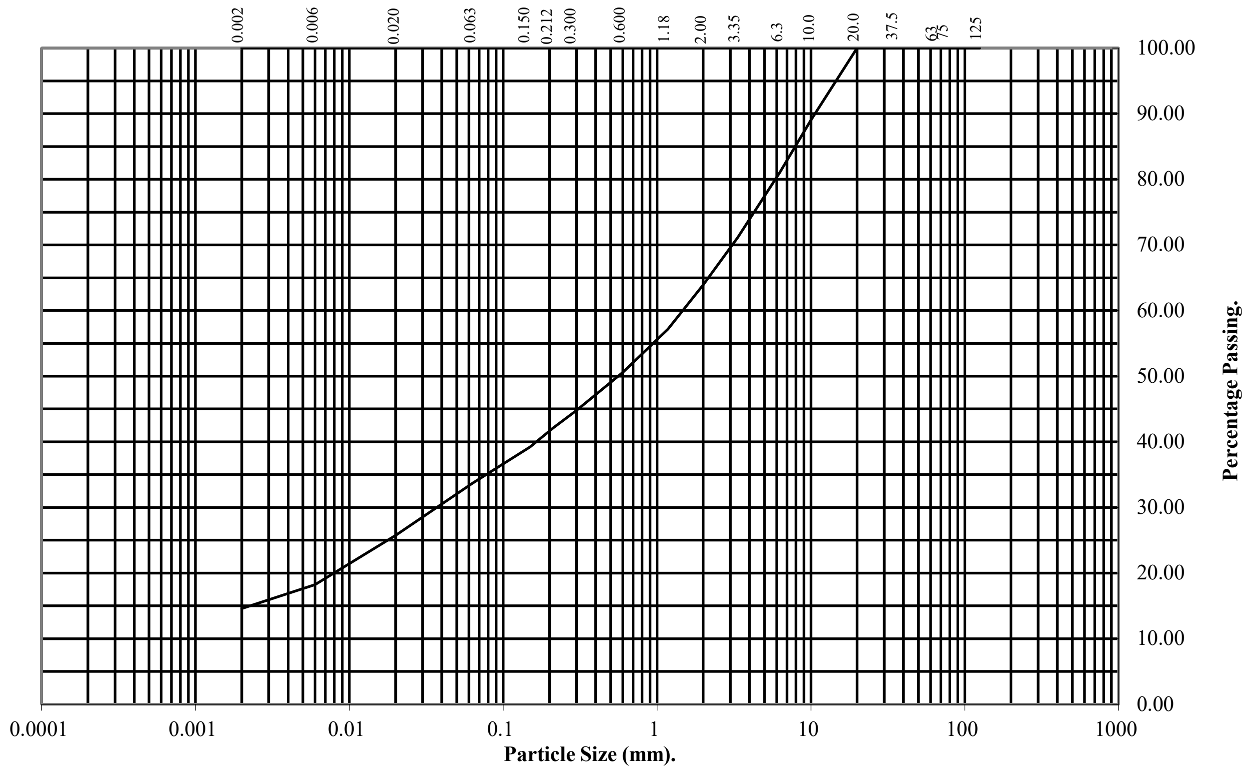
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH19 **Top Depth (m):** 4.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	89
6.3	81
3.35	71
2	64
1.18	57
0.6	51
0.3	45
0.212	42
0.15	39
0.063	34

Particle Diameter	Percentage Passing
0.02	26
0.006	18
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	36
Sand	30
Silt	19
Clay	15

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

St Vincent's Fairview

Contract No: **PSL21/9612**

Client Ref: **10927-08-21**

PARTICLE SIZE DISTRIBUTION TEST

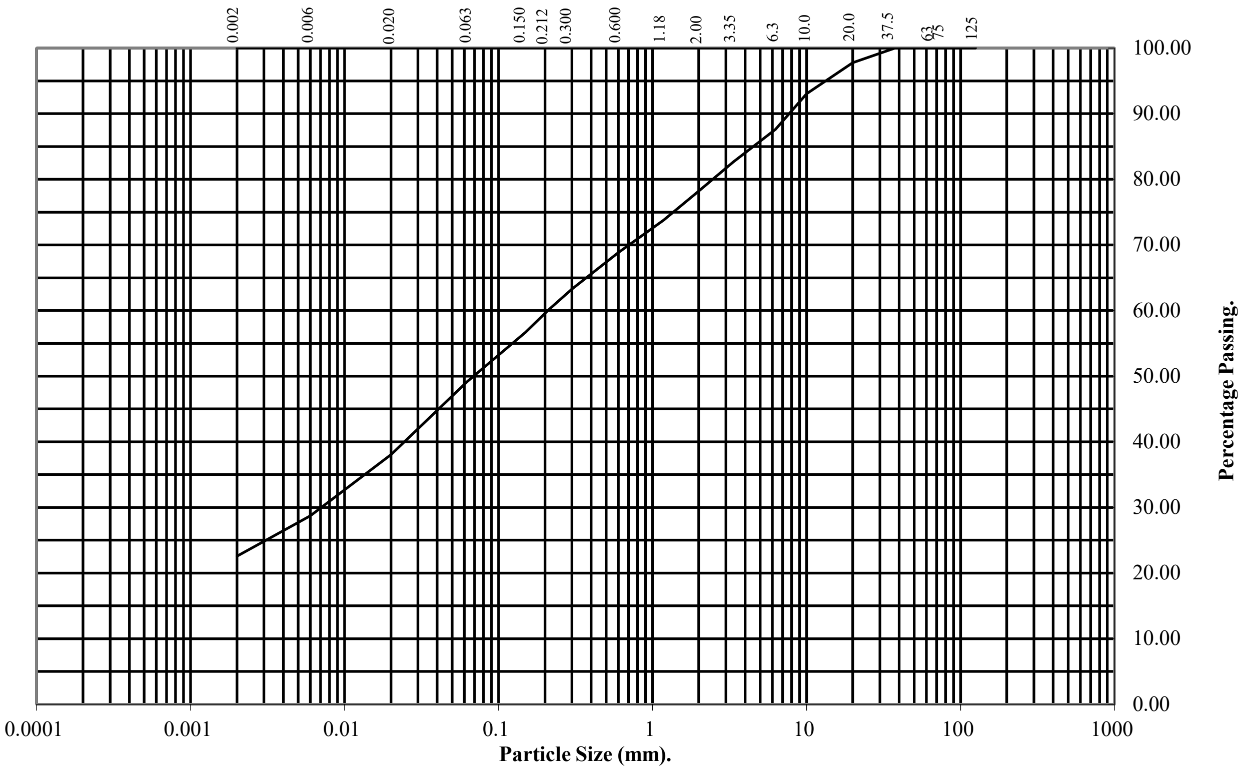
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH21 **Top Depth (m):** 0.50

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	93
6.3	88
3.35	83
2	78
1.18	74
0.6	69
0.3	63
0.212	60
0.15	57
0.063	49

Particle Diameter	Percentage Passing
0.02	38
0.006	29
0.002	23

Soil Fraction	Total Percentage
Cobbles	0
Gravel	22
Sand	29
Silt	26
Clay	23

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

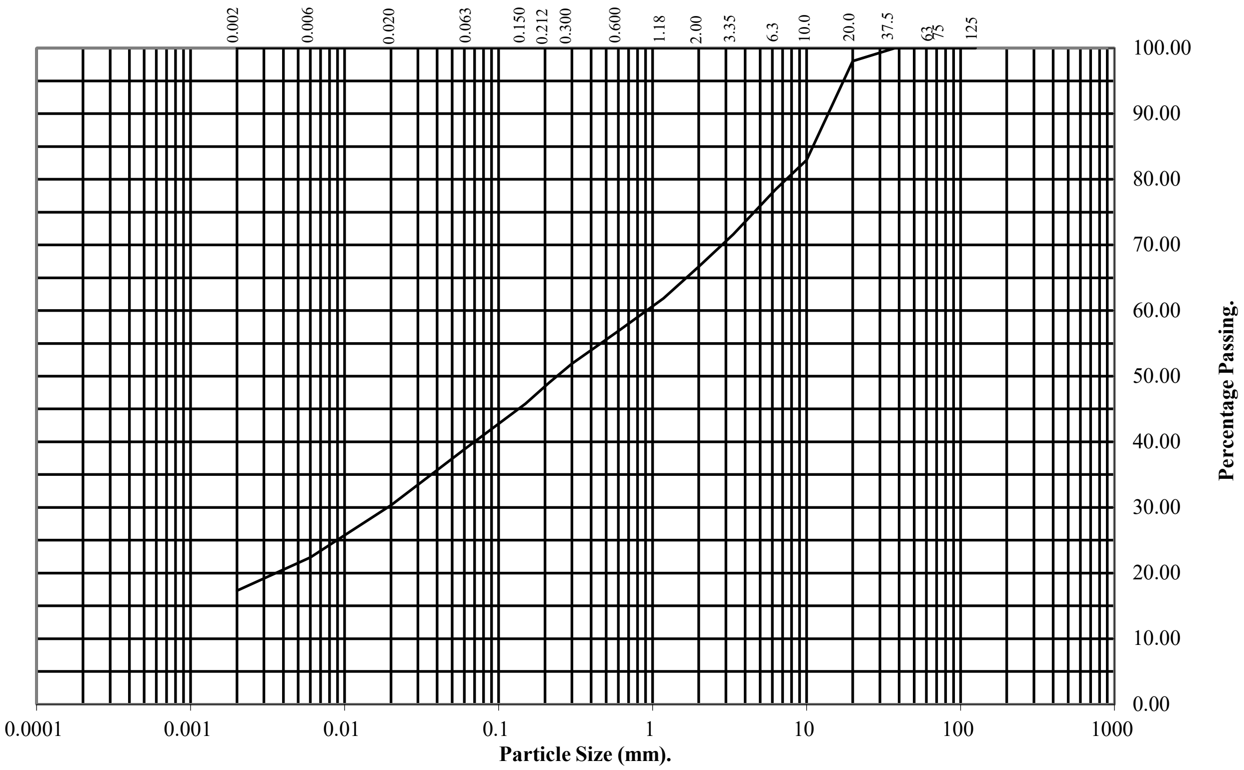
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **BH22** **Top Depth (m):** **1.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	83
6.3	78
3.35	72
2	67
1.18	62
0.6	57
0.3	52
0.212	49
0.15	46
0.063	39

Particle Diameter	Percentage Passing
0.02	30
0.006	22
0.002	17

Soil Fraction	Total Percentage
Cobbles	0
Gravel	33
Sand	28
Silt	22
Clay	17

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**St Vincent's Fairview**	**Contract No:** **PSL21/9612** **Client Ref:** **10927-08-21**

PARTICLE SIZE DISTRIBUTION TEST

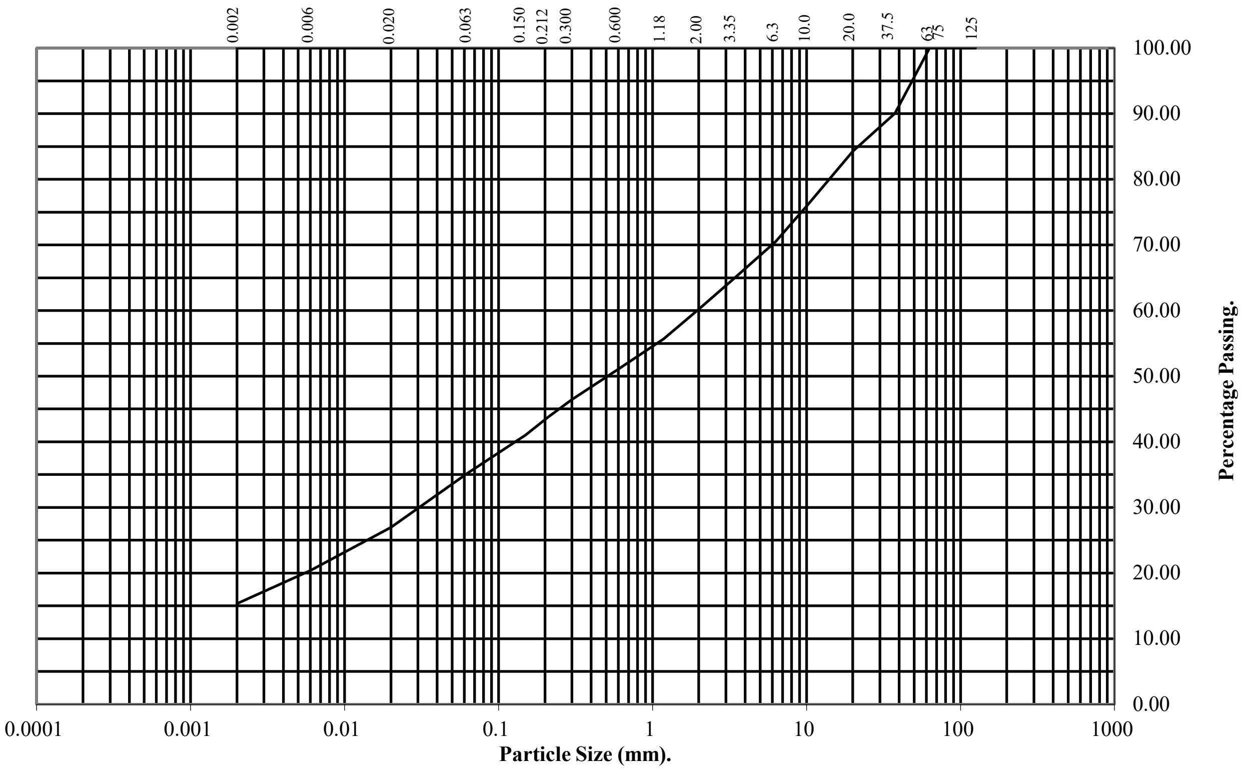
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH22 **Top Depth (m):** 2.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	90
20	84
10	76
6.3	71
3.35	65
2	60
1.18	56
0.6	51
0.3	46
0.212	44
0.15	41
0.063	35

Particle Diameter	Percentage Passing
0.02	27
0.006	20
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	40
Sand	25
Silt	20
Clay	15

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	Professional Soils Laboratory	St Vincent's Fairview	Contract No: PSL21/9612 Client Ref: 10927-08-21

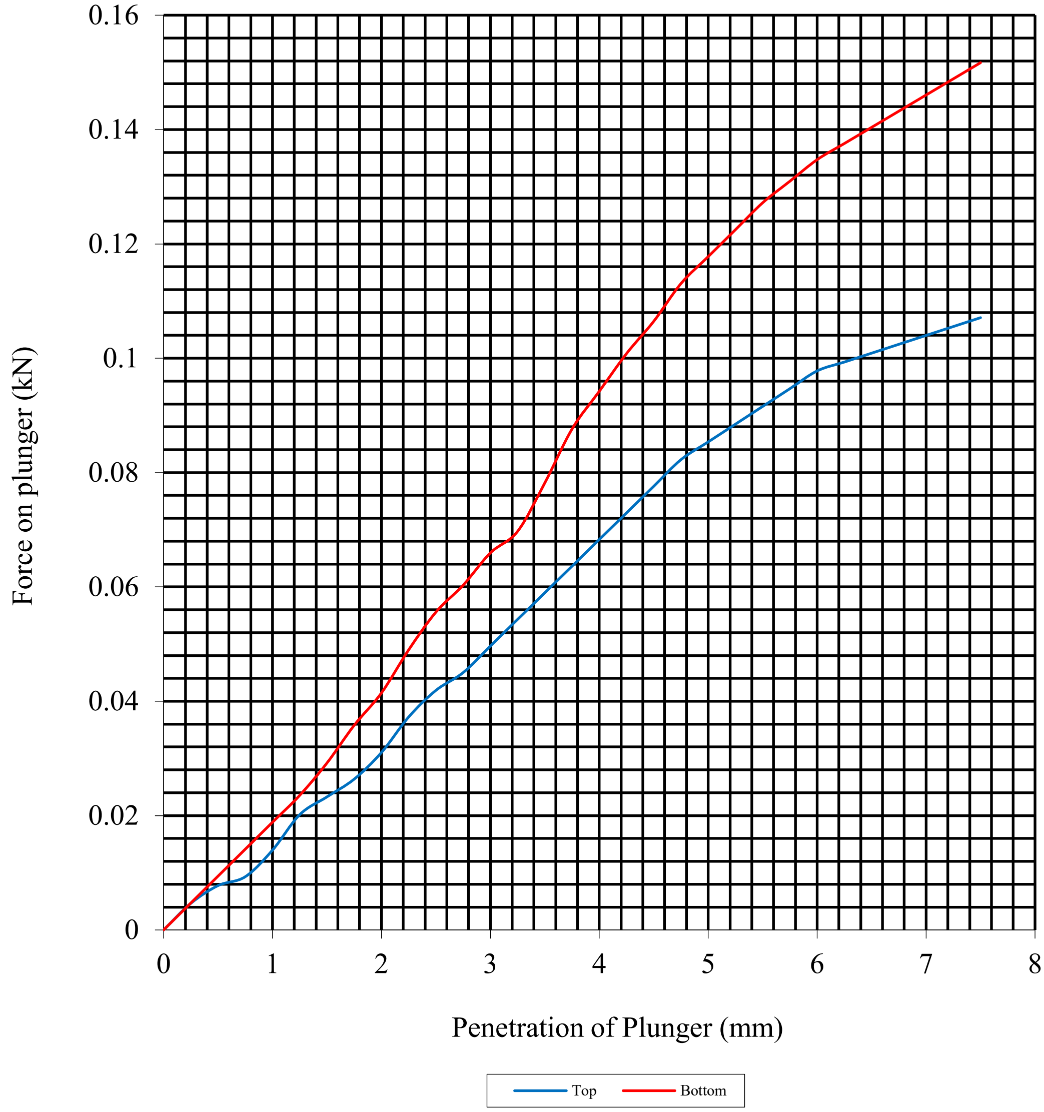
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH06 **Top Depth (m):** 0.50

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	22	Surcharge Kg:	4.20	Sample Top	22	Sample Top	0.4
Bulk Density Mg/m3:	1.98	Soaking Time hrs	0	Sample Bottom	22	Sample Bottom	0.6
Dry Density Mg/m3:	1.63	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			15				
Compaction Conditions		2.5kg					

UKAS TESTING 4043	PSL Professional Soils Laboratory	St Vincent's Fairview	Contract No: PSL21/9612 Client Ref: 10927-08-21

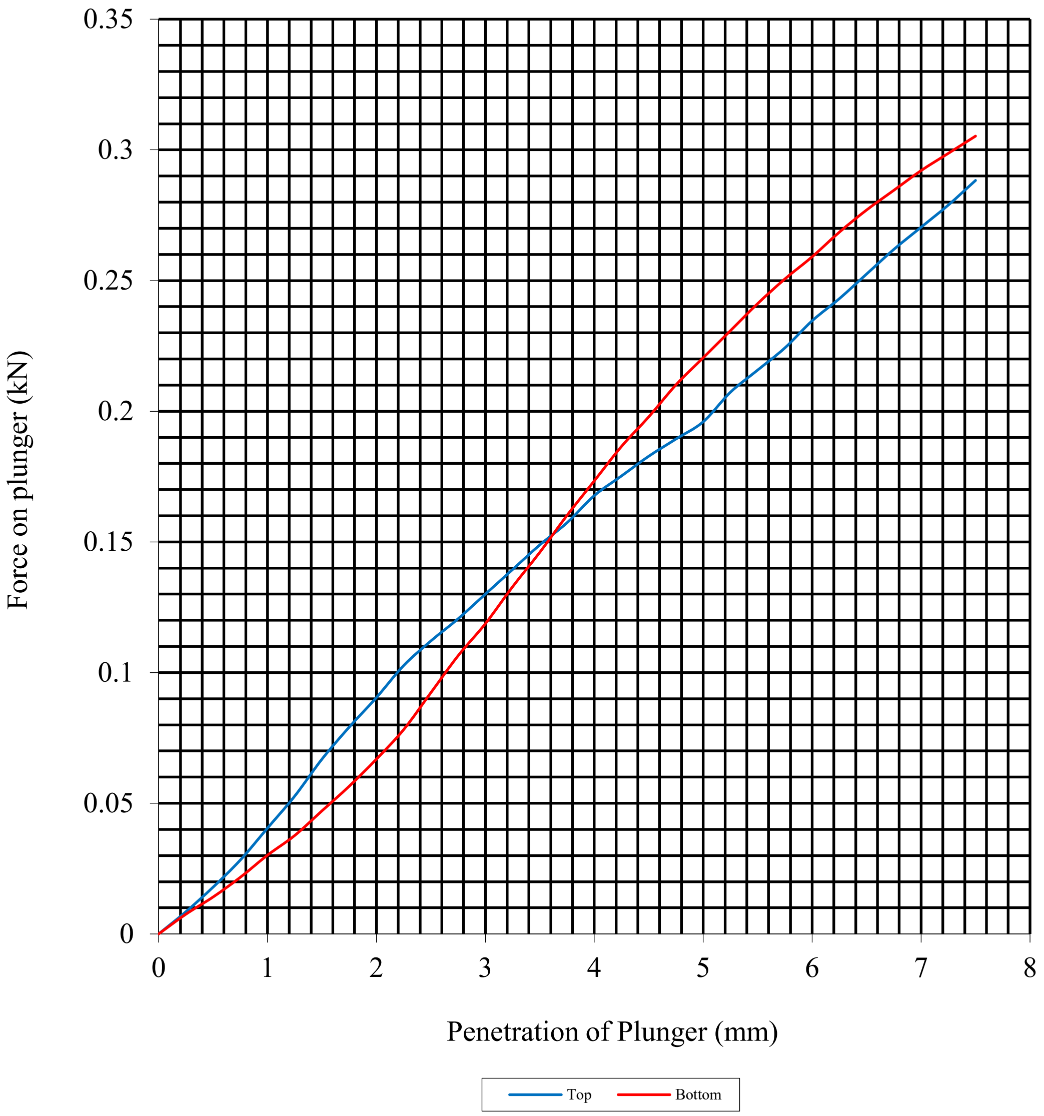
CALIFORNIA BEARING RATIO TEST

Non compliance with BS 1377 : Part 4 : 1990

Hole Number: BH10 **Top Depth (m):** 0.50

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	17	Surcharge Kg:	4.20	Sample Top	17	Sample Top	1.0
Bulk Density Mg/m3:	2.04	Soaking Time hrs	0	Sample Bottom	17	Sample Bottom	1.1
Dry Density Mg/m3:	1.74	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			30				
Compaction Conditions		2.5kg					

UKAS TESTING 4043 | PSL Professional Soils Laboratory | **St Vincent's Fairview** | **Contract No:** **PSL21/9612** **Client Ref:** **10927-08-21**

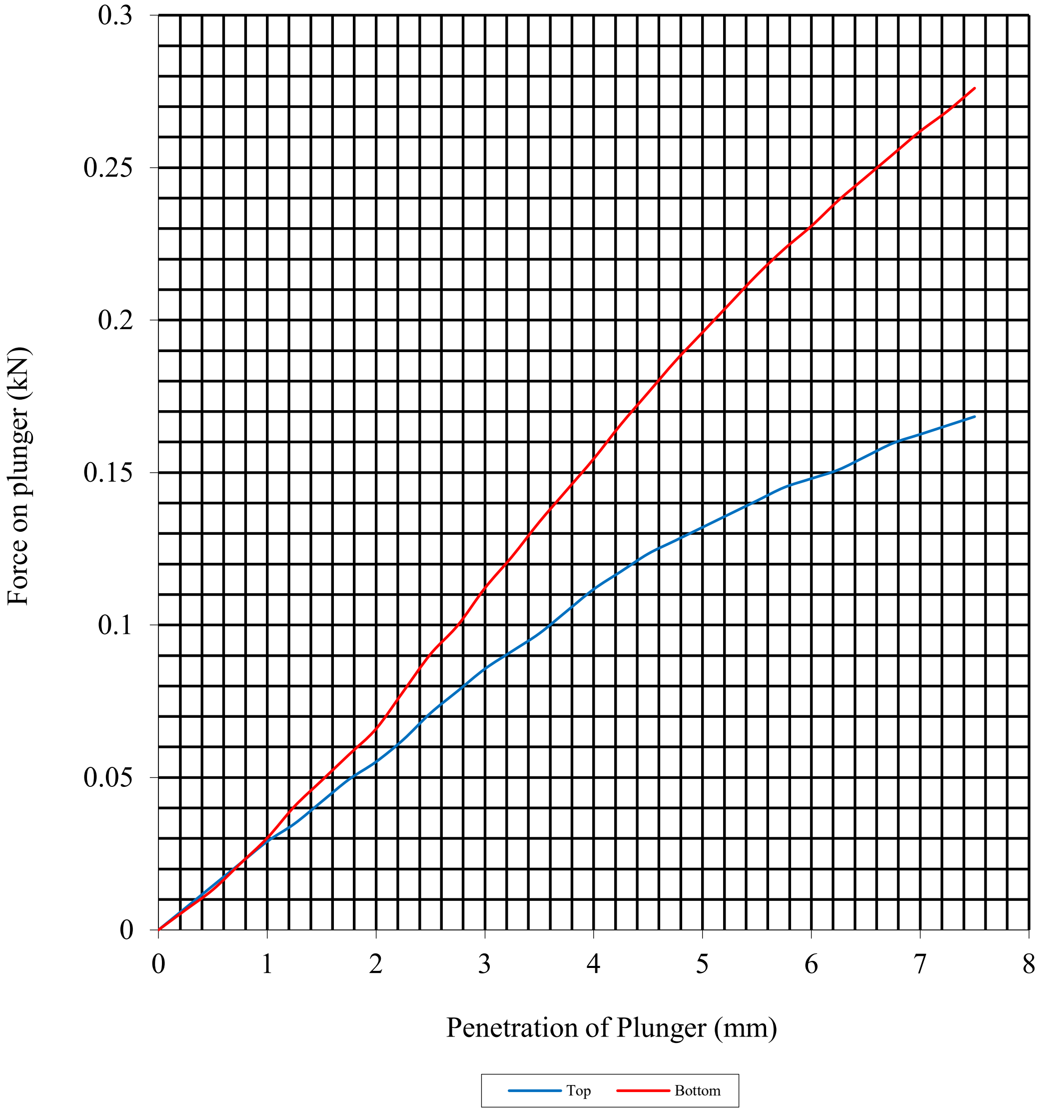
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH12 **Top Depth (m):** 1.00

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	19	Surcharge Kg:	4.20	Sample Top	19	Sample Top	0.7
Bulk Density Mg/m3:	1.97	Soaking Time hrs	0	Sample Bottom	19	Sample Bottom	1.0
Dry Density Mg/m3:	1.65	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			19				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

St Vincent's Fairview

Contract No: **PSL21/9612**

Client Ref: **10927-08-21**

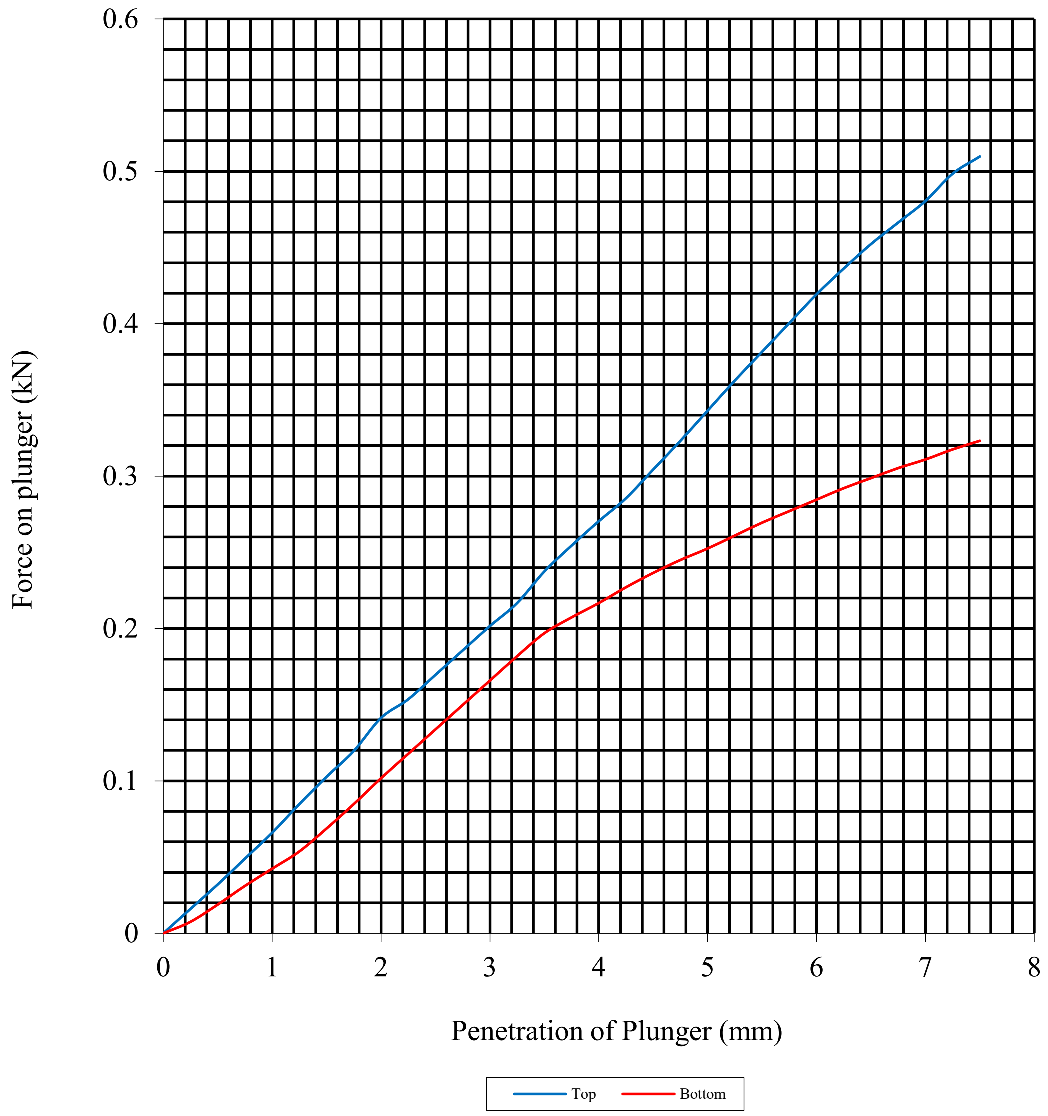
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH16 **Top Depth (m):** 4.00

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	9.5	Surcharge Kg:	4.20	Sample Top	9.4	Sample Top	1.7
Bulk Density Mg/m3:	2.29	Soaking Time hrs	0	Sample Bottom	9.6	Sample Bottom	1.3
Dry Density Mg/m3:	2.09	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			21				
Compaction Conditions		2.5kg					

UKAS TESTING 4043	PSL Professional Soils Laboratory	St Vincent's Fairview	Contract No: PSL21/9612 Client Ref: 10927-08-21

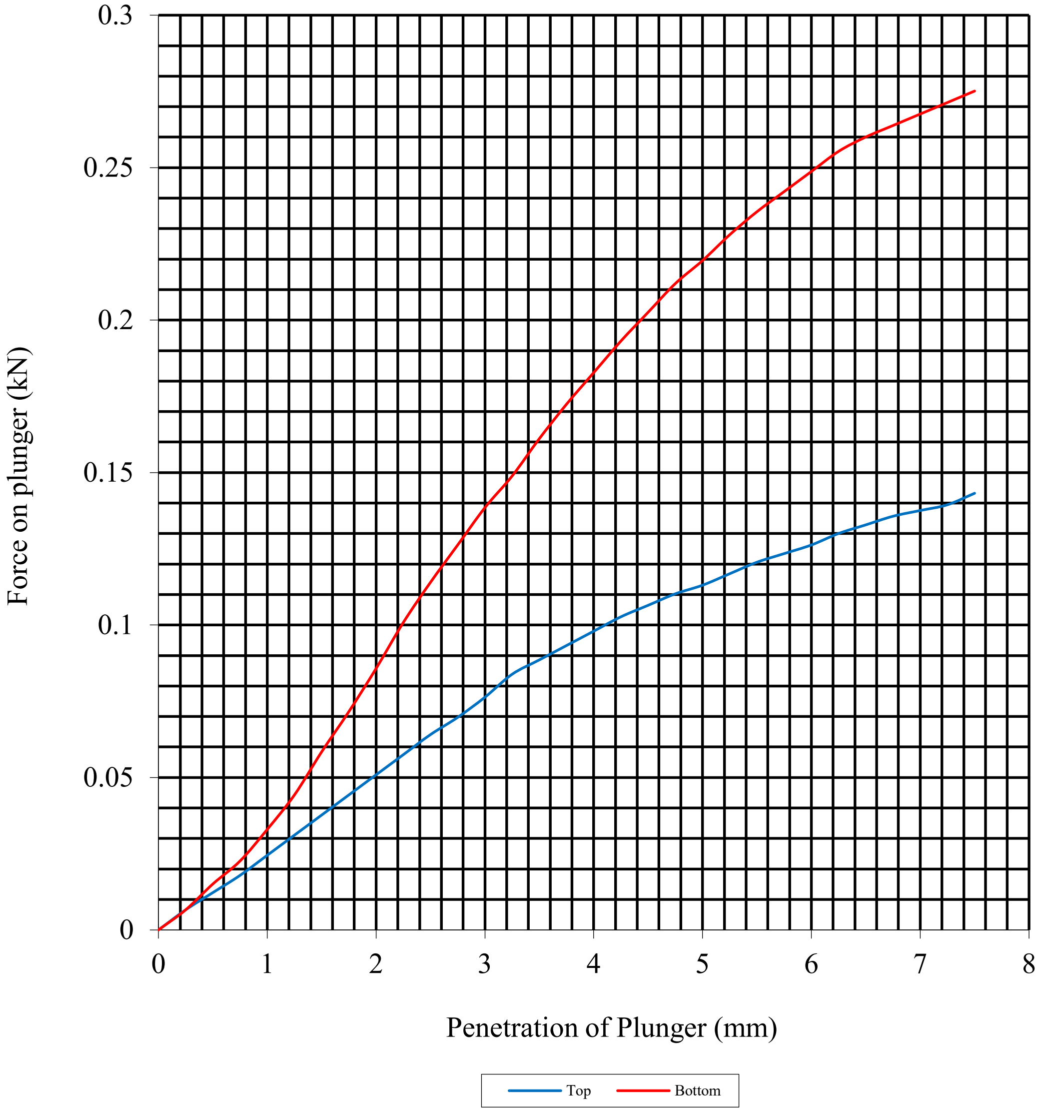
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH17 **Top Depth (m):** 3.00

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	16	Surcharge Kg:	4.20	Sample Top	16	Sample Top	0.6
Bulk Density Mg/m3:	2.06	Soaking Time hrs	0	Sample Bottom	16	Sample Bottom	1.1
Dry Density Mg/m3:	1.77	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			6				
Compaction Conditions		2.5kg					

UKAS TESTING 4043	PSL Professional Soils Laboratory	St Vincent's Fairview	Contract No: PSL21/9612 Client Ref: 10927-08-21

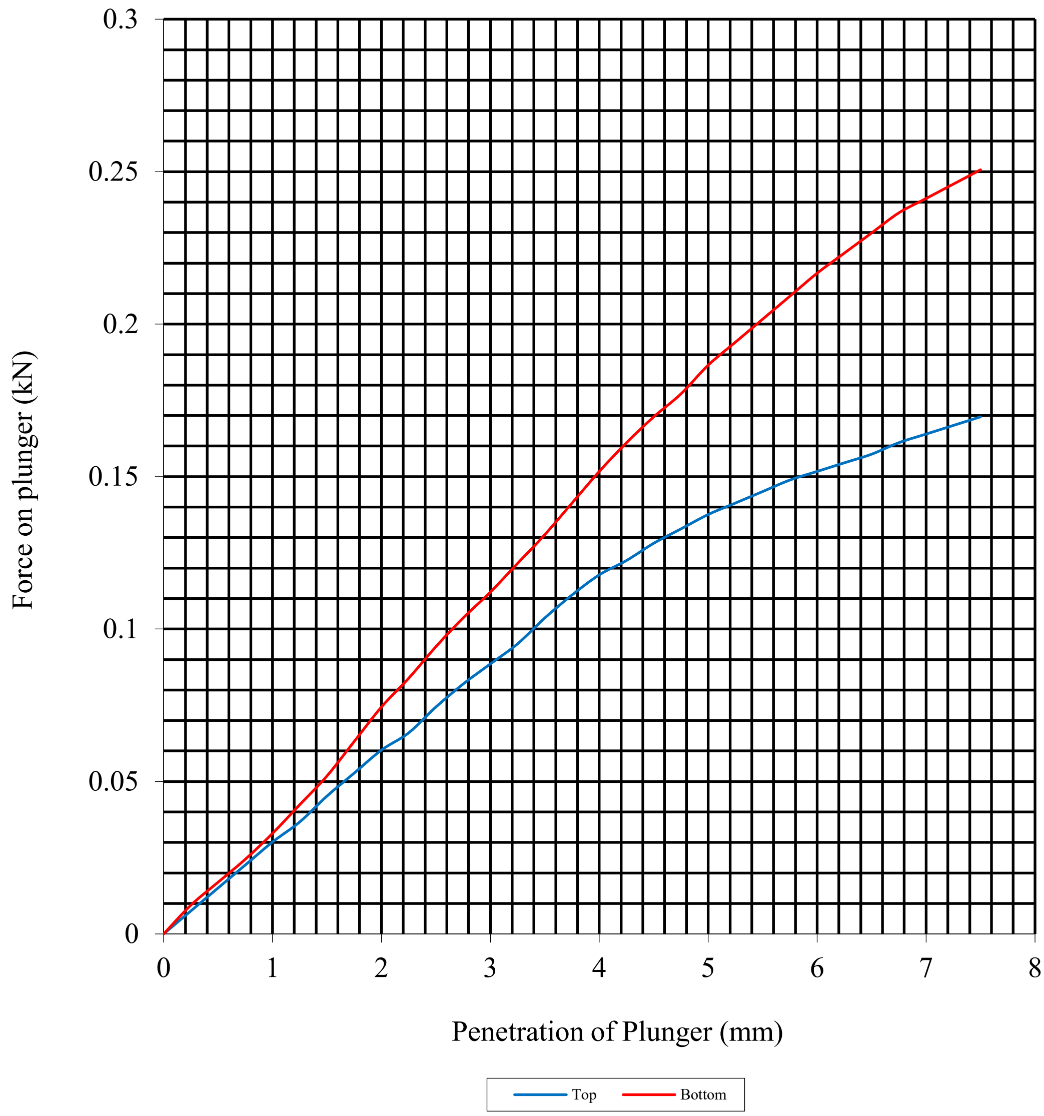
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH19 **Top Depth (m):** 4.00

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	10	Surcharge Kg:	4.20	Sample Top	10	Sample Top	0.7
Bulk Density Mg/m3:	2.21	Soaking Time hrs	0	Sample Bottom	10	Sample Bottom	0.9
Dry Density Mg/m3:	2.00	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043	PSL Professional Soils Laboratory	St Vincent's Fairview	Contract No: PSL21/9612 Client Ref: 10927-08-21

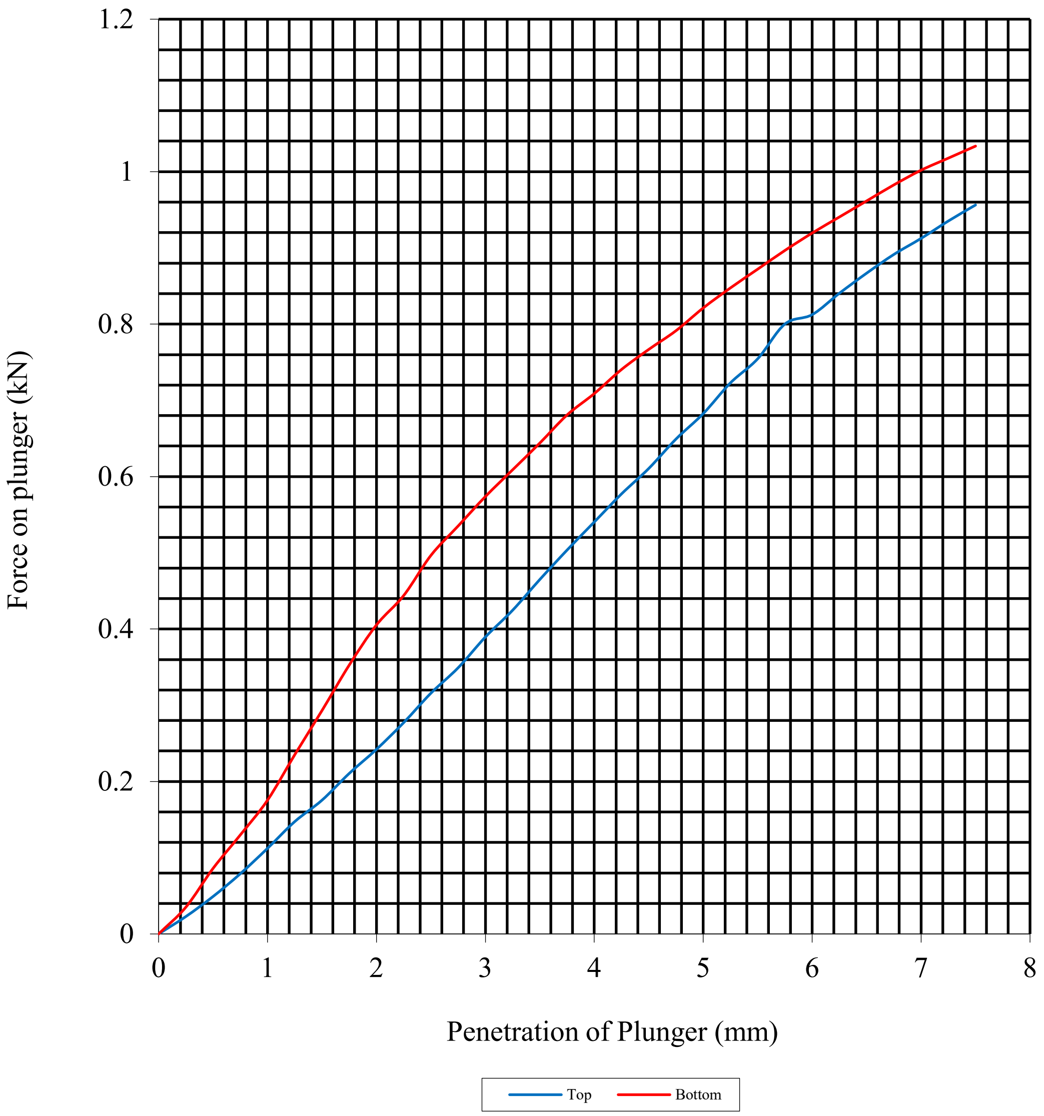
CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number: BH21 **Top Depth (m):** 0.50

Sample Number: **Base Depth (m):**

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	20	Surcharge Kg:	4.20	Sample Top	20	Sample Top	3.4
Bulk Density Mg/m3:	2.02	Soaking Time hrs	0	Sample Bottom	20	Sample Bottom	4.1
Dry Density Mg/m3:	1.68	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043	PSL Professional Soils Laboratory	St Vincent's Fairview	Contract No: PSL21/9612 Client Ref: 10927-08-21

LABORATORY REPORT

4043

Contract Number: PSL22/0106

Report Date: 24 February 2022

Client's Reference: 10927-08-21

Client Name: Ground Investigations Ireland Ltd
Catherinestown House
Hazelhatch Road
Newcastle
Co Dublin
D22 YD52

For the attention of: Michael Sutton

Contract Title: St Vincents

Date Received: 5/1/2022
Date Commenced: 5/1/2022
Date Completed: 24/2/2022

Notes: **Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. 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 other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

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SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation Par / Perp	Dimensions (mm) W	D	Area (mm2)	D_e^2	D_e (mm)	Failure Load (P) (Mpa)	(kN)	I_s (MPa)	Corr Fac F	I_{s50} (MPa)	Failure Type	Remarks
BH05A	20.00		A	Perp	63	42	2646	3368.99	58.04	-	27.28	8.10	1.069	8.66	Valid	
BH05A	19.82		A	Perp	63	45	2835	3609.63	60.08	-	19.47	5.39	1.086	5.86	Valid	
BH10	21.50		A	Perp	63	36	2268	2887.71	53.74	-	15.21	5.27	1.033	5.44	Valid	
BH10	21.07		A	Perp	63	39	2457	3128.35	55.93	-	23.55	7.53	1.052	7.92	Valid	
BH13	17.53		A	Perp	63	43	2709	3449.21	58.73	-	24.28	7.04	1.075	7.57	Valid	
BH13	17.15		A	Perp	63	41	2583	3288.78	57.35	-	15.18	4.62	1.064	4.91	Valid	
BH17	23.38		A	Perp	63	40	2520	3208.56	56.64	-	25.22	7.86	1.058	8.31	Valid	
BH17	22.28		A	Perp	63	44	2772	3529.42	59.41	-	26.93	7.63	1.081	8.25	Valid	
BH20	19.55		A	Perp	63	38	2394	3048.14	55.21	-	23.07	7.57	1.046	7.91	Valid	
BH20	19.16		A	Perp	63	39	2457	3128.35	55.93	-	21.33	6.82	1.052	7.17	Valid	
BH21	24.90		A	Perp	63	41	2583	3288.78	57.35	-	20.09	6.11	1.064	6.50	Valid	
BH21	23.15		A	Perp	63	35	2205	2807.49	52.99	-	7.82	2.79	1.026	2.86	Valid	

Note All testing carried out on samples at as received water content   Par = parallel, Perp = perpendicular, U = Random   A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

St Vincents

Contract No:
PSL22/0106
Client Ref:
10927-08-21

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH05A	20.00		D	Par	-	63	3969	63.00	-	23.79	5.994	1.110	6.65	Valid	
BH05A	19.82		D	Par	-	63	3969	63.00	-	16.85	4.245	1.110	4.71	Valid	
BH10	21.50		D	Par	-	63	3969	63.00	-	13.65	3.439	1.110	3.82	Valid	
BH10	21.07		D	Par	-	63	3969	63.00	-	21.98	5.538	1.110	6.14	Valid	
BH13	17.53		D	Par	-	63	3969	63.00	-	21.92	5.523	1.110	6.13	Valid	
BH13	17.15		D	Par	-	63	3969	63.00	-	12.27	3.091	1.110	3.43	Valid	
BH17	23.38		D	Par	-	63	3969	63.00	-	23.15	5.833	1.110	6.47	Valid	
BH17	22.28		D	Par	-	63	3969	63.00	-	24.41	6.150	1.110	6.82	Valid	
BH20	19.55		D	Par	-	63	3969	63.00	-	21.60	5.442	1.110	6.04	Valid	
BH20	19.16		D	Par	-	63	3969	63.00	-	19.26	4.853	1.110	5.38	Valid	
BH21	24.90		D	Par	-	63	3969	63.00	-	17.04	4.293	1.110	4.76	Valid	
BH21	23.15		D	Par	-	63	3969	63.00	-	6.93	1.746	1.110	1.94	Valid	

Note All testing carried out on samples at as received water content   Par = parallel, Perp = perpendicular, U = Random

UKAS TESTING 4043

PSL Professional Soils Laboratory

St Vincents

Contract No:	PSL22/0106
Client Ref:	10927-08-21

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
BH05A		C	20.22	20.50	63	125	2.0	1024	2.63	1.3	2.59	123.2	39.5	Brittle	22/02/22	
BH10		C	21.67	21.82	63	127	2.0	1075	2.72	1.6	2.67	108.9	34.9	Brittle	22/02/22	
BH13		C	16.70	16.90	63	128	2.0	1076	2.70	1.5	2.66	50.8	16.3	Brittle	22/02/22	
BH17		C	22.57	22.93	63	126	2.0	1058	2.69	1.0	2.67	63.4	20.3	Brittle	22/02/22	
BH20		C	19.70	20.00	63	126	2.0	1080	2.75	0.6	2.73	154.9	49.7	Brittle	22/02/22	
BH21		C	24.15	24.50	63	127	2.0	1076	2.72	1.3	2.68	148.9	47.8	Brittle	22/02/22	

PSL Professional Soils Laboratory	St Vincents	Contract No: PSL22/0106
		Client Ref: 10927-08-21

APPENDIX 8 – Groundwater Monitoring

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

GROUNDWATER MONITORING

St. Vincent's Hospital, Fairview

BOREHOLE	DATE	TIME	GROUNDWATER (m BGL)	Comments
BH01	14/12/2021	09:23	3.38	
BH02	14/12/2021	09:19	2.87	
BH05	14/12/2021	09:29	6.05	
BH06	14/12/2021	09:34	3.41	
BH07	14/12/2021	09:40	4.63	
BH10	14/12/2021	10:09	DRY	Base of pipe at 2.0m BGL
BH12	14/12/2021	09:50	1.78	
BH13	14/12/2021	10:00	+0.24	
BH14	14/12/2021	10:04	0.00	
BH15	14/12/2021	10:12	5.14	
BH16	14/12/2021	10:15	4.88	
BH17	14/12/2021	10:19	5.10	
BH18	14/12/2021	10:28	1.85	
BH19	14/12/2021	10:25	1.95	
BH20	14/12/2021	10:42	5.62	
BH21	14/12/2021	10:33	6.03	
BH22	14/12/2021	10:38	4.66	

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
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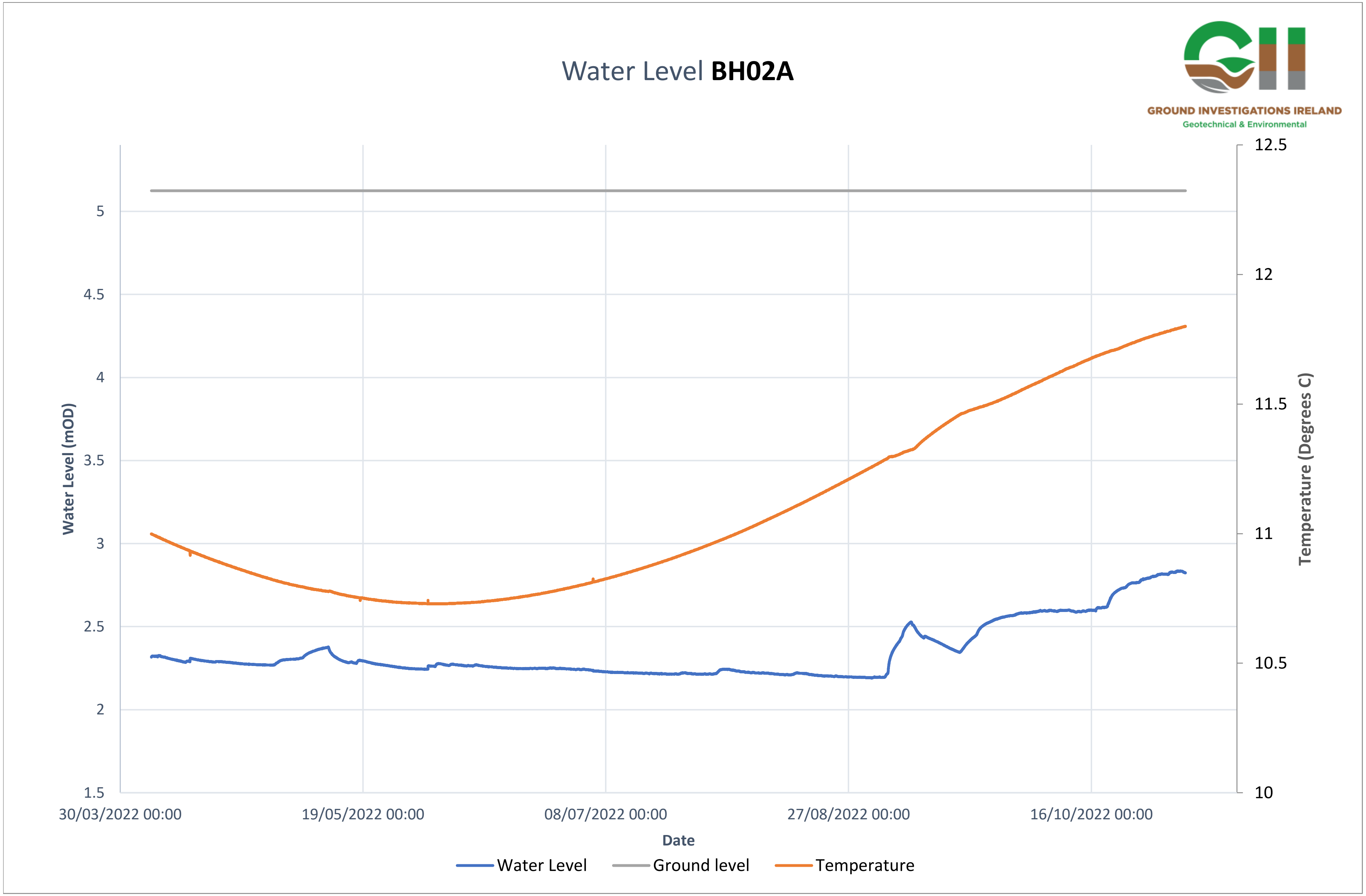
Web: www.gii.ie

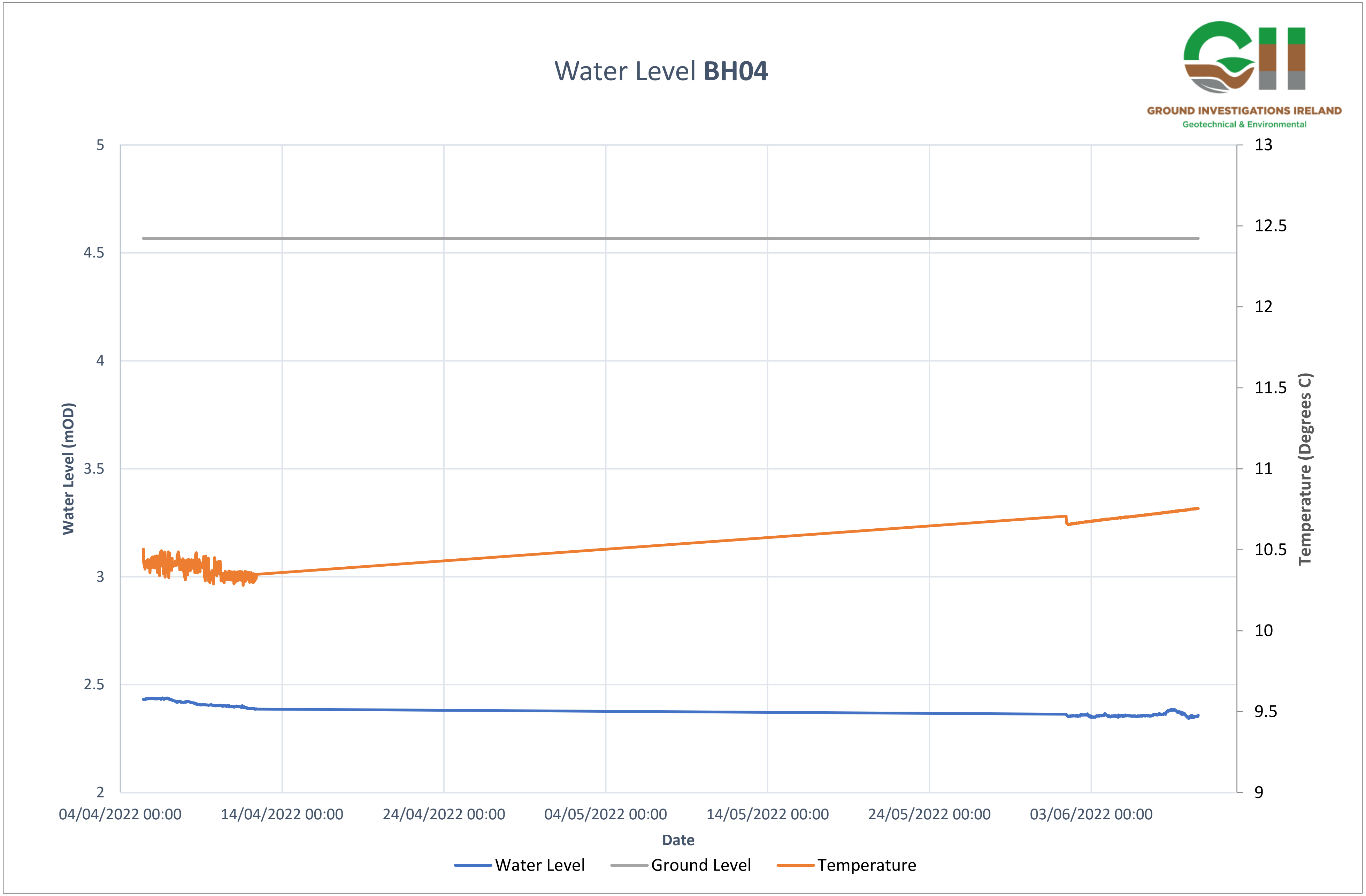
GROUNDWATER MONITORING

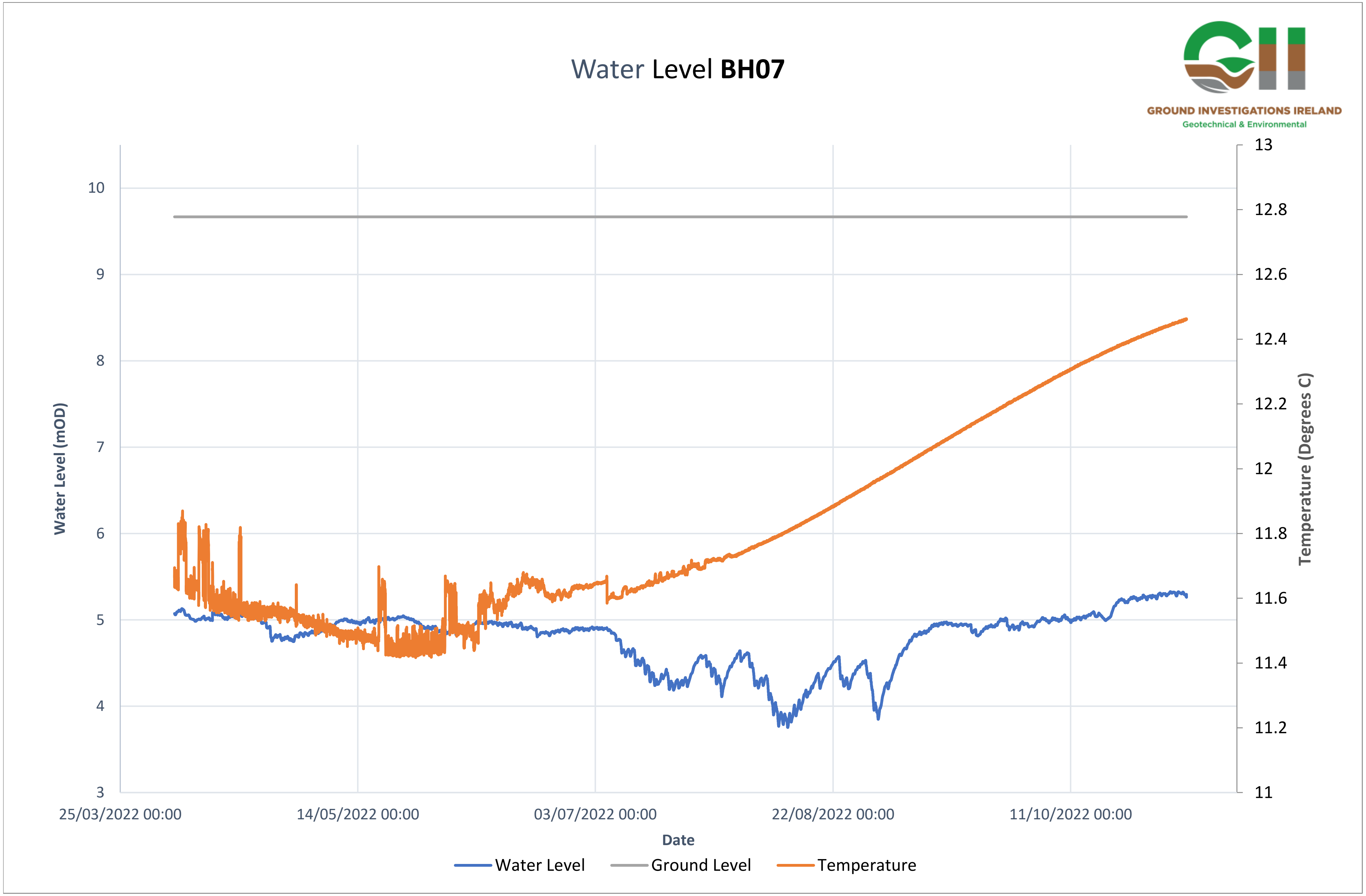
St. Vincent's Hospital, Fairview

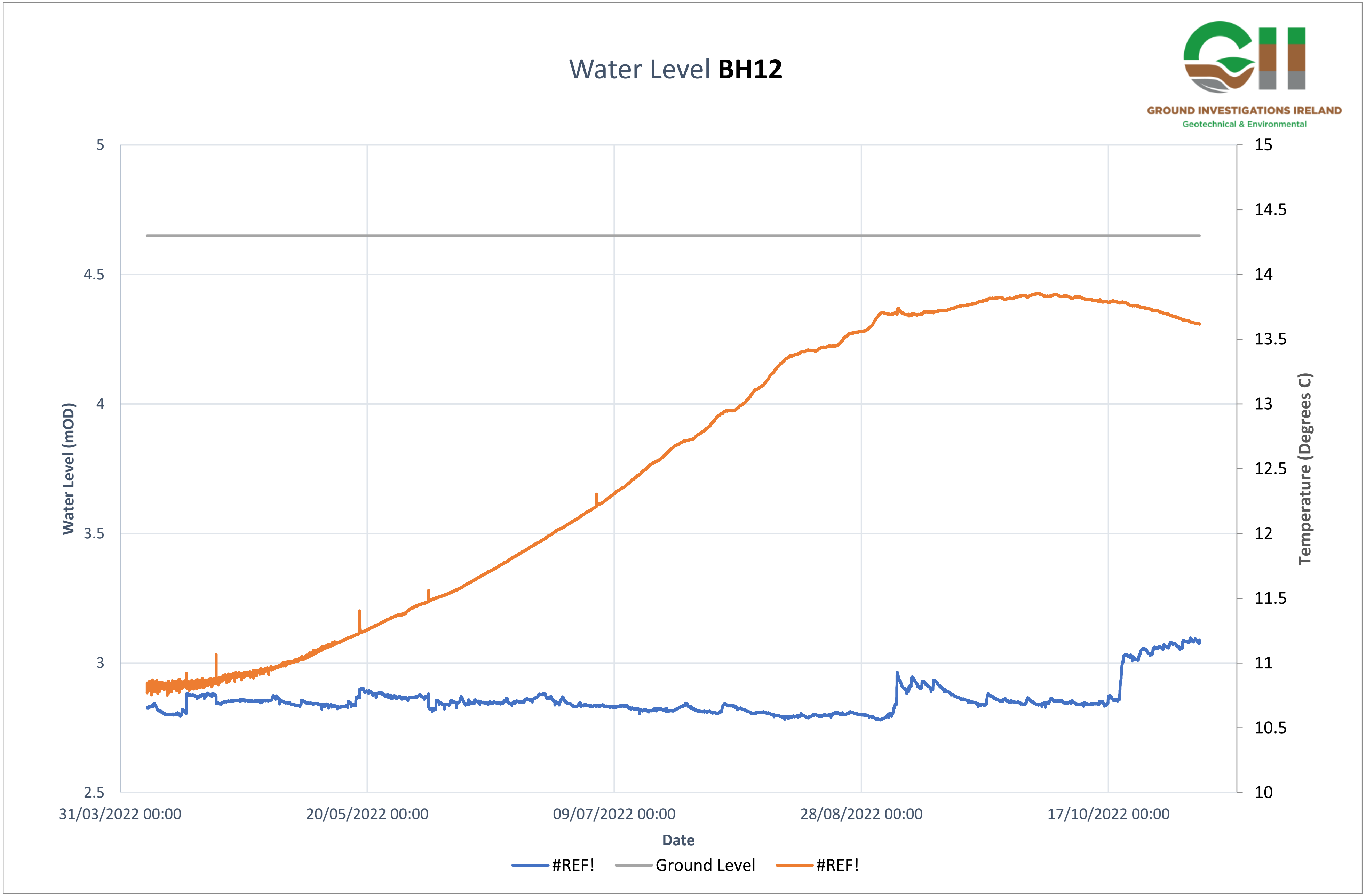
BOREHOLE	DATE	TIME	GROUNDWATER (m BGL)	Comments
BH01	05/04/2022	09:33	3.32	
BH02	05/04/2022	08:51	2.78	Logger installed
BH03				Blocked at 1.40m
BH04	05/04/2022	09:49	2.03	Logger installed
BH05	05/04/2022	09:29	5.93	
BH06	05/04/2022	09:25	3.30	
BH07	05/04/2022	09:09	4.42	Logger installed
BH10	05/04/2022	10:32	DRY	Base of pipe at 2.0m BGL
BH12	05/04/2022	10:11	1.75	Logger installed
BH13	05/04/2022	10:00	Above GL	
BH14	05/04/2022	10:27	Above GL	Logger installed
BH15	05/04/2022	10:51	4.57	
BH16	05/04/2022	11:01	4.06	
BH17	05/04/2022	10:51	4.90	
BH18	05/04/2022	10:46	1.23	
BH19	05/04/2022	10:49	1.05	
BH20	05/04/2022	10:37	5.39	
BH21	05/04/2022	10:44	5.66	
BH22	05/04/2022	10:41	4.24	



Water Level BH02A
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
5
4.5
4
3.5
3
2.5
2
1.5
Temperature (Degrees C)
12.5
12
11.5
11
10.5
10
30/03/2022 00:00
19/05/2022 00:00
08/07/2022 00:00
27/08/2022 00:00
16/10/2022 00:00
Date
Water Level
Ground level
Temperature

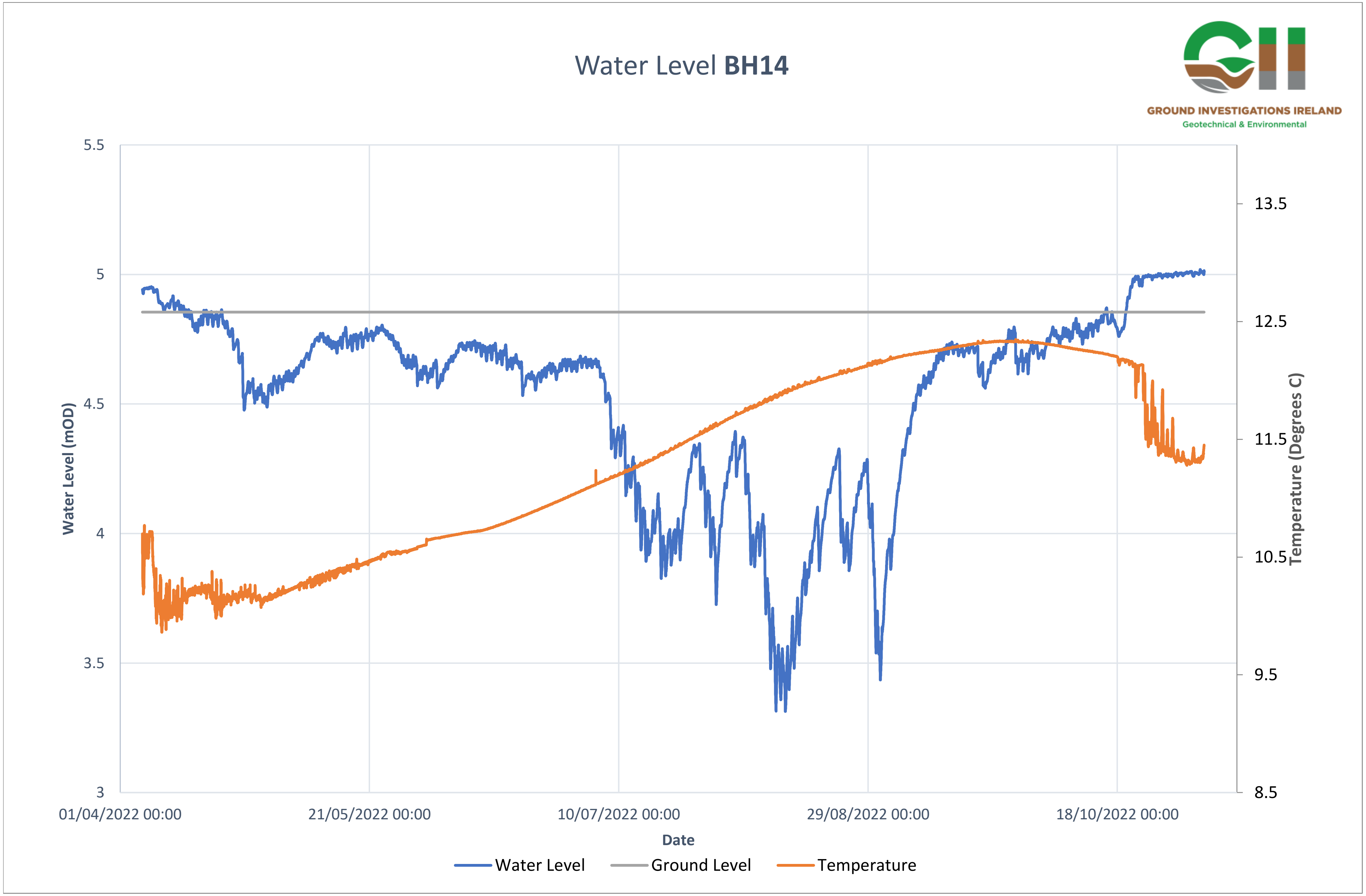

Water Level BH04
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
5
4.5
4
3.5
3
2.5
2
Temperature (Degrees C)
13
12.5
12
11.5
11
10.5
10
9.5
9
04/04/2022 00:00
14/04/2022 00:00
24/04/2022 00:00
04/05/2022 00:00
14/05/2022 00:00
24/05/2022 00:00
03/06/2022 00:00
Date
Water Level
Ground Level
Temperature


Water Level BH07
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
10
9
8
7
6
5
4
3
13
12.8
12.6
12.4
12.2
12
11.8
11.6
11.4
11.2
11
Temperature (Degrees C)
25/03/2022 00:00
14/05/2022 00:00
03/07/2022 00:00
22/08/2022 00:00
11/10/2022 00:00
Date
Water Level
Ground Level
Temperature


Water Level BH12
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
Temperature (Degrees C)
5
4.5
4
3.5
3
2.5
15
14.5
14
13.5
13
12.5
12
11.5
11
10.5
10
31/03/2022 00:00
20/05/2022 00:00
09/07/2022 00:00
28/08/2022 00:00
17/10/2022 00:00
Date
#REF!
Ground Level
#REF!

PROJECT NAME

PROJECT NUMBER



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