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CONSULTING ENGINEERS

CIVIL ENGINEERING INFRASTRUCTURE REPORT FOR PLANNING

Project:

BAILEY GIBSON SHD 2
PROPOSED STRATEGIC HOUSING DEVELOPMENT AT;
FORMER BAILEY GIBSON SITE, 326-328 SOUTH CIRCULAR ROAD, DUBLIN CITY COUNCIL LAND (FORMERLY BOYS BRIGADE SITE AND PART OF ST. TERESA'S GARDENS (ALL WITHIN STRATEGIC DEVELOPMENT REGENERATION AREA 12)

DOCUMENT CONTROL

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1.0 INTRODUCTION

1.1 GENERAL DESCRIPTION

This application relates to a proposed mixed-use strategic housing development (SHD) on a site of approx. 5.5 hectares in Dublin 8. It includes all of the former Bailey Gibson site and a small portion of the former Player Wills site, both of which are owned by the Applicant, CWTC Multi Family ICAV acting solely in respect of its sub fun DTBR SCR1 Fund. The balance of the proposed development site relates to land owned by Dublin City Council (DCC) known locally as the 'Boys Brigade pitch' and part of the St. Teresa's Gardens site, together with DCC controlled public roads.
The application area is predominately within Strategic Development Regeneration Area (SDRA) 12, St. Teresa's Gardens & Environs as identified in the Dublin City Development Plan 2016-2022. The part of the proposed development site not within SDRA 12 relate to works proposed in the public roads surrounding the site, South Circular Road, Donore Avenue and Rehoboth Place.
A comprehensive description of the proposed development is set out in the Planning Statement. The Statutory Notices should also be referenced.

Briefly, it is proposed to demolish the existing vacant buildings and structures on the Bailey Gibson site to make way for development of 345 new homes across 5 blocks, BG 1 - BG 5, ranging in height from 2-7 storeys. The residential blocks will be contained within the Bailey Gibson site. The typology is predominantly apartments with 4 townhouses proposed in block BG5.
This is a mixed tenure scheme, with 292 units proposed as Build to Rent (BtR) across blocks BG1-BG3 and 53 units proposed as Build to Sell (BtS) in blocks BG4 and BG5. It is proposed to deliver 34 social and affordable homes as part of the overall total.

All apartments have private amenity space. At ground floor this is in the form of terraces and on upper levels, balconies. Each of BG1-BG4 have communal amenity areas either as a courtyard or podium area.

Tenant amenities and facilities are proposed in the BtR blocks and include a gym, co-working space, kitchen/lounge areas, concierge, and waste facilities.

Over 2 hectares of public open space including a multi-sport play pitch, a playground, 'St. Teresa's Playground', a boulevard, 'St. Teresa's Boulevard', a park, 'Players Park', a plaza, 'Rehoboth Plaza'. The proposed non-residential uses include in blocks BG1 and BG2 commercial units that have the capacity to support daily living needs e.g., a shop, pharmacy and professional services. A creche with capacity for approx. 60 children. In block BG2 the design includes floorspace for a café/restaurant/bar.

In total there are 89 car parking spaces allocated to the proposed apartments and all are contained within the Bailey Gibson site. Apart from 1 space at podium level, the parking is contained within a basement. Additionally, 10 'Go Car' spaces are proposed at podium level for residents use only. Each of the 4 townhouses has 1 on-curtilage car parking space.

Visitor parking is at street level and the proposed sport pitch will be serviced separately by new spaces on the public roads. The scheme includes set down parking for the creche, a loading bay for deliveries and coach parking area.

Provision is made for disabled parking, electric vehicle charging, a car sharing scheme and motorcycle parking.

784 spaces are proposed for cycle parking including secure residents parking, visitor parking and spaces for cargo bicycles.
Other works include the development of a network of streets across the proposed development site that will link with other sites within SDRA 12 and into the wider street network of Dublin 8. Improvement works within existing local streets to facilitate access and safe movement.

Ancillary development works includes the construction of electricity substations, meter rooms, plant rooms at basement level, waste storage areas, solar photovoltaics, drainage, landscaping, and lighting.

Figure 1.1: Google Maps Screenshot - Bailey Gibson Development Site

1.2 SITE TOPOGRAPHY

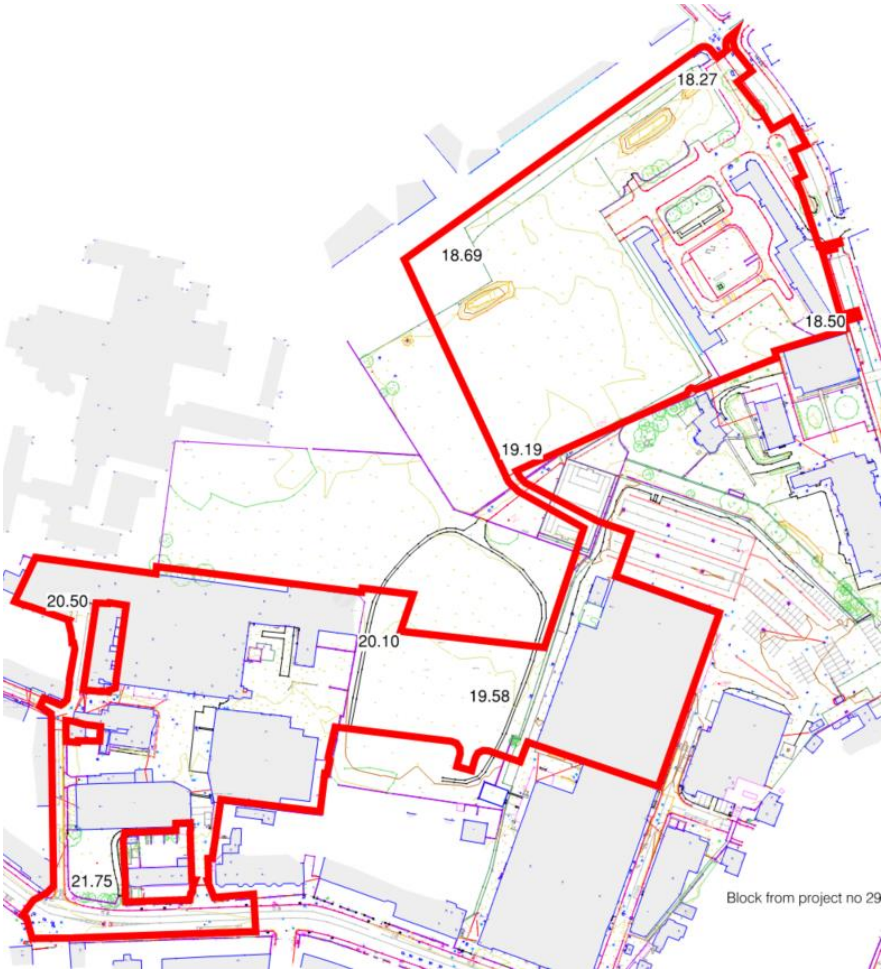

Figure 1.1 – Site Levels

1.3 SCOPE OF THIS REPORT

This report aims to consider the proposed development's surface water management, foul water drainage and water supply infrastructure elements and how they connect to the public infrastructure serving the area. The report will highlight methods that will be used to comply with the local authority requirements. The report will also demonstrate that the drainage and watermain requirements for the proposed development will be delivered in full without reliance or dependence on drainage or watermain works to be provided as part of any other planned or permitted developments on adjoining lands.

This report should be read in conjunction with the following drawings submitted with the planning application:

- C-1000 Site Location Plan
- C-1020 Proposed Drainage Plan Layout (Sheet 1 of 4)
- C-1021 Proposed Drainage Plan Layout (Sheet 2 of 4)
- C-1022 Proposed Drainage Plan Layout (Sheet 3 of 4)
- C-1023 Proposed Drainage Plan Layout (Sheet 4 of 4)
- C-1024 Foul and Surface Water Taking in Charge and Wayleaves Layout Plan
- C-1025 Proposed Basement Drainage Layout

- C-1026 Proposed Site Wide Drainage Strategy Plan (Application Area & Player Wills and DCC Sites)
- C-1030 Proposed Watermain Layout (Sheet 1 of 2)
- C-1031 Proposed Watermain Layout (Sheet 2 of 3)
- C-1032 Proposed Watermain Layout (Sheet 3 of 3)
- C-1033 Watermain Taking in Charge and Wayleaves Layout Plan
- C-1034 Proposed Site Wide Watermain Strategy Plan (Application Area & Player Wills and DCC Sites)
- C-1050 Proposed SuDS Scheme Site Plan Layout
- C-1120 Foul Drainage Long Sections (Sheet 1 of 2)
- C-1121 Foul Drainage Long Sections (Sheet 2 of 2)
- C-1122 Surface Water Long Sections (Sheet 1 of 2)
- C-1123 Surface Water Long Sections (Sheet 2 of 2)
- C-1220 Surface Water Standard Details (Sheet 1 of 2)
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- C-1250 Proposed SuDS Details (Sheet 1 of 3)
- C-1251 Proposed SuDS Details (Sheet 2 of 3)
- C-1252 Proposed SuDS Details (Sheet 3 of 3)
- S-4000 Basement Pile Retention System Layout Plan
- S-4001 Ground Floor Level Foundation Pile Layout Plan

1.4 Site Investigation Information

A site-specific site investigation was carried out on the Bailey Gibson site by Ground Investigations Ireland between May and July 2019. This report found reasonably consistent ground conditions summarised as, Surfacing/Topsoil to 0-0.2m BGL, over Fill to 0.4-0.5m BGL, over Made Ground to 0.4-1.3m BGL, over Cohesive Deposits to 3.5 to 4.4m BGL over Bedrock.
Further geotechnical testing was carried out on the proposed multi-sport playing pitch and Players Park sites between July and November 2020. This report found reasonably consistent ground conditions summarised as, Surfacing/Topsoil to 0-0.3m BGL, over Made Ground, over Cohesive Deposits. Across the multi-sport playing pitch site, the depth of Made Ground varied from between 0.9-3m+ BGL. In the proposed Players Park site, the cohesive deposits were encountered from 0.3-0.4m.
The full Ground Investigations Ireland Geotechnical Site Investigation Reports are included in Appendix IV.

1.5 Pre-planning Discussions

Dublin City Council Drainage Planning Department provided comments on the civil engineering documentation submitted as part of the Pre-Application process for this application in their report to An Board Pleanála, dated 07.12.21 which was issued by DCC, via email on 13.12.21. They did not have any objection to the proposed development, nor the proposals for surface water management.

A tri-partite meeting was held with An Bord Pleanála on 11.03.22 and the subsequent Bord Opinion – Case Reference: ABP-311959-21 provided comments in relation to the development infrastructure proposals. Section 2.10 of the Bords Opinion states the following is required:

A report demonstrating that the proposed water supply and drainage arrangements can be implemented without any dependency on works permitted under separate planning permissions on adjoining lands. The report should also address the matters raised in report of the Dublin City Council Engineering Department – Drainage Division, dated 07.12.2022.

The following sections of this report outline how this requirement is achieved. Specifically in relation to foul water flows, a condition of the Irish Water Confirmation of Feasibility for the proposed development requires a reduction in surface water runoff to the combined sewer culvert in Donore Avenue in order to ensure capacity is available for the proposed development foul flows. To comply with this condition, a section of the permitted Player Wills development site is included within the proposed Bailey Gibson development application boundary. The requirement to include this area within the application site is explained in detail in 2.4.1 of this report. Apart from the provision of new stormwater drainage infrastructure on this overlapping area, which is all external to existing structures, there are no other alterations proposed to the fabric of the existing buildings or external surfaces as part of this planning application.

There are two extant permissions which are relevant to this application (The Bailey Gibson SHD - An Bord Pleanála Ref: 307221-20 and The Player Wills SHD – An Bord Pleanála Ref:308917-20). Extensive pre-planning consultation occurred with Dublin City Council Drainage Planning Department in relation to stormwater management for both of those planning applications. The dedicated stormwater infrastructure pre-planning meetings were held in the office of Dublin City Council on the following dates and with the following DCC Drainage Planning Department representatives.

10.06.2019 – Ms. Maria Treacy and Mr. Gabriel Koncal

12.07.2019 – Mr. Gabriel Koncal.

26.07.2019 – Ms. Niamh Fitzgerald and Mr. Gabriel Koncal.

11.12.2019 – Ms. Maria Treacy and Mr. Gabriel Koncal

Pre-planning consultation was also undertaken in conjunction with the landscape architects with Dublin City Council Parks Department in relation to the design of the proposed SuDS tree pit locations, types and size. The most recent meetings were held via online meeting platforms, due to the current Covid19 movement restrictions, on the following dates and DCC representatives.

01.04.2020 – Ms Suzanne O'Connell and Mr. Gareth Toolan

24.04.2020 – Ms. Suzanne O'Connell and Mr. Peter Leonard

Pre-planning consultation specific to this application was held with DCC drainage planning department engineers via email on 01.11.2021. The main issues discussed with the drainage department for both the proposed development and extant permissions, together with the conditions attached to the extant permissions informed this proposed drainage strategy.

Pre-planning consultation has also taken place with Irish Water in relation to foul water drainage and water supply. A Pre-Connection Enquiry application was lodged with Irish Water on 29.04.2022 and a Confirmation of Feasibility was received from Irish Water on 11.05.2022 .
A diversions application was lodged with Irish Water on 21.12.2021 for foul sewer and watermain diversions necessary to facilitate the proposed development. A Diversions Confirmation of Feasibility was received from Irish Water on 11.03.2022.
A Statement of Design Acceptance was issued by Irish Water on 02.06.2022

2.0 SURFACE WATER DRAINAGE SYSTEM

2.1 INTRODUCTION

This chapter will follow the guidelines set out in the Greater Dublin Strategic Drainage Study (GDSDS) and the CIRIA 2015 SuDS Manual.

The aim of any SuDS strategy is to ensure that a new development does not negatively affect the surrounding watercourse system, existing surface water network and groundwater system. The SuDS strategy will aim to achieve this by using a variety of SuDS measures within the site. These measures include water interception, water treatment and water attenuation.

The SuDS strategy will be developed with the following steps:

- The existing run-off of the proposed development site will be calculated and used as the minimum benchmark for the SuDS design. Thus, the post development run-off will not exceed the existing run-off.
- A set of SuDS measures will be chosen based on their applicability and usage for the site.
- A "Causeway Flow" model will be created to analyse the rainfall on the site and the effectiveness of the proposed SuDS measures.
- If effective, these SuDs measures will be implemented on the site.

2.2 EXISTING SURFACE WATER INFRASTRUCTURE

2.2.1 Street Network

A full copy of the Irish Water Record map is included in Appendix II. The Bailey Gibson site is bounded by DCC owned lands to the north and east, private residences and Rehoboth Place to the west and private residences and The South Circular Road to the south. The proposed multi-sport playing pitch site, is bounded by further DCC lands and The Coombe hospital to the west, a recently completed DCC residential development to the north, Donore Avenue to the east and St. Teresa's church grounds to the southeast. There are no public surface water drains located in either the South Circular Road or Rehoboth Place, which abut the Bailey Gibson site to the south and west. A 1060mm brick combined sewer is located within the South Circular Road (Reference 1 in Figure 2.1). A 150mm diameter combined sewer is located within Rehoboth Place (Reference 2 in Figure 2.1). Surface Water runoff from the former Bailey Gibson salvage yard area of the site currently discharges, untreated and unattenuated, to both the combined sewer culvert in the South Circular Road and to the 150mm diameter combined sewer in Rehoboth Place. There is a 910-1210mm stormwater culvert in Donore Avenue (Reference 3 in Figure 2.1). The culvert extends under Donore Avenue from near the junction with Merton Avenue, flowing northwards along Donore Avenue until it turns east and leaves Donore Avenue, flowing eastwards between Ebenezer Terrace and Harman St. This culvert is historically known as the Abbey Stream, a distributary from the original river Poddle. It once traversed the St. Teresa's Gardens SDRA, entering at the south corner of St. Teresa's church, but was diverted to continue beneath Donore Avenue to the east of the church many years ago. Due to drainage works which have occurred upstream, this culvert now carries the main river Poddle flow. This is discussed further in 2.2.2.2.

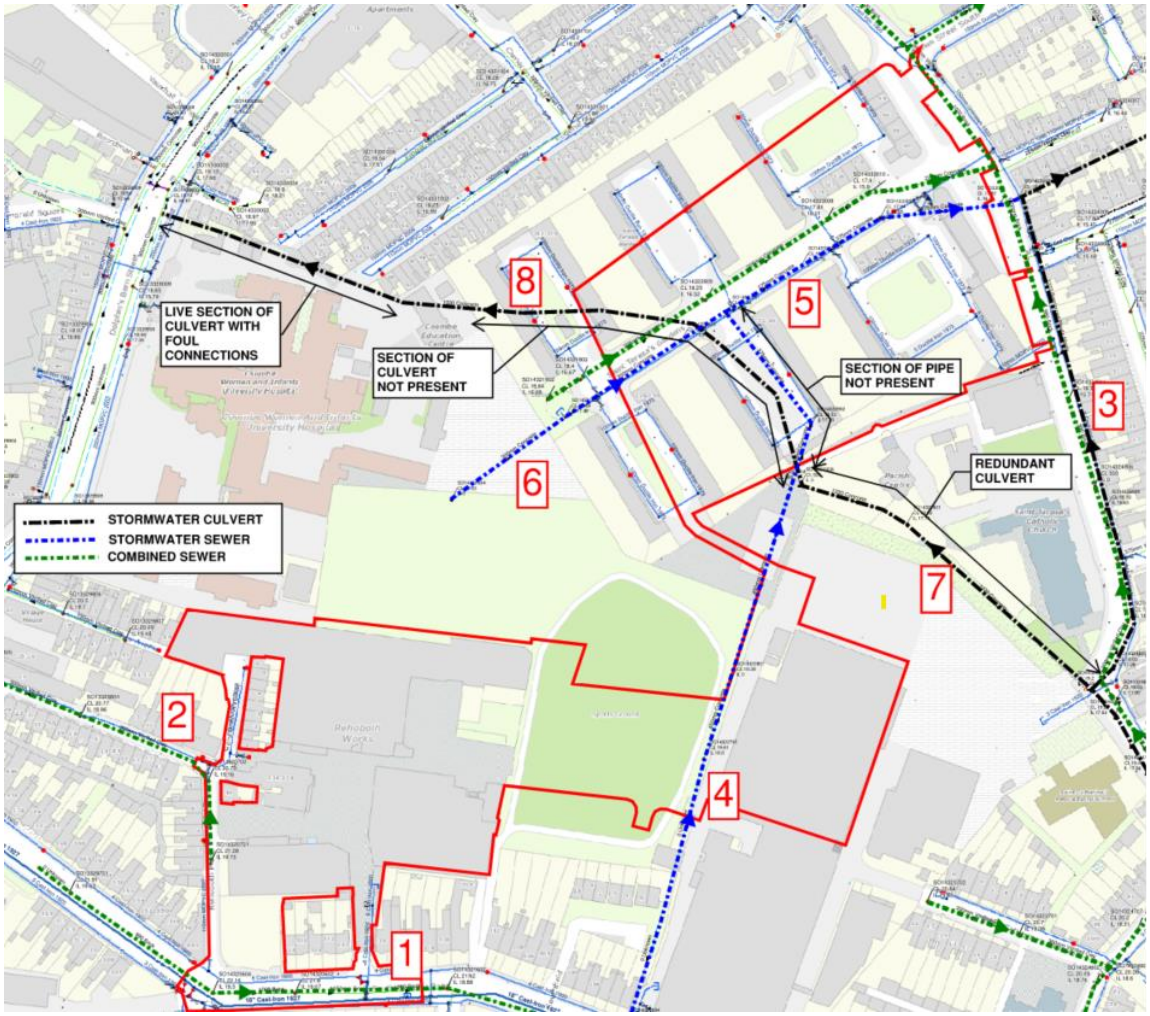


Figure 2-1: Reference Plan of Existing Sewers - IW Record Map Extract

2.2.2 *Internal to SDRA 12*

2.2.2.1 450mm Diameter Stormwater Drain

Reference 4 in Figure 2.1 is a 450mm diameter stormwater drain which runs parallel to the west boundary of the Player Wills site . It enters the Players Wills site at the rear of the adjacent domestic residence to the southwest of the old Player Wills Factory and extends generally northwards. At the north-west corner of the Player Wills site, this drain is shown connecting to a 375mm stormwater drain (Reference 5 in Figure 2.1) which extends through the now demolished St. Teresa's Gardens flats complex and, subsequently, connects to the stormwater culvert in Donore Avenue. In meetings with DCC Drainage Planning Department engineers, we were informed that Dublin City Council's maintenance division carried out exploratory work in the general area around the St. Teresa's Gardens flats in 2019. They advised that the connection shown on the local authority map between the 450mm diameter drain and 375mm diameter drain is not present. DCC also noted that there was no indication of issues with flooding because of this lack of a downstream connection for the 450mm diameter pipe. Subsequent exploratory works and CCTV surveys carried out by the Applicant on the 450mm diameter pipe have proved it to be a very shallow pipe which is exposed to the ground surface in parts, has root ingress and is blocked in several locations. The final manhole which could be accessed on this sewer is located at the intersection of the northwest corner of the Players Wills site and the St. Teresa's church site. This manhole was permanently flooded, with no flow observed. This correlates with advice from DCC Drainage Planning that the connection downstream from this drain was no longer present.

It has been established that there are live connections into the 450mm diameter pipe from at least one road gulley within the private estate directly to the west of the old Players Factory and that this pipe has one incoming pipe feeding from the south side of the South Circular Road which is not on the current Local Authority record map.

2.2.2.2 1050mm Stormwater Culvert

References 7 and 8 in Figure 2.1 is a 1030mm concrete stormwater culvert shown extending east to northwest across the full extent of SDRA 12 - St. Teresa's Gardens and Environs. It enters the SDRA along the boundary separating the Player Wills site and the adjacent church site. This culvert extends north-west through the DCC lands and continues into the Coombe Hospital site. Exploratory works carried out by DCC maintenance division in 2019 confirmed that the 1030mm concrete culvert is not present between its intersection with the 450mm diameter pipe at the north-west corner of the Player Wills site and the boundary with the Coombe hospital.

The Flood Risk Assessment prepared by JJ Campbell & Associates Consulting Structural and Civil Engineers and Archaeological Desktop Report, prepared by Archaeology Plan, both of which were submitted as part of DCC planning reference 2475/18 for the Dublin City Council residential development, which has recently completed along the north of the SDRA, indicate that the 1030mm culvert crossing the site was once a main culverted watercourse of the Abbey Stream (a historical man-made distributary of the Poddle River), but that the Abbey Stream flow was diverted to the stormwater culvert in Donore Avenue many years ago, with only an overflow connection to the culvert crossing the SDRA remaining. Both above accounts are in agreement with the description of the Abbey Stream and nearby watercourses provided in the textbook, The Rivers of Dublin - Clair L. Sweeney, Gerard O'Connell & Michael Curtis 2017.

During pre-planning discussions with DCC Drainage Planning Department, it was agreed that the extent of the stormwater culvert crossing the southern boundary of the St. Teresa's church property (Reference 7 in Figure 2.1) would be surveyed to establish flow rates within the culvert, its condition and to confirm if any private connections to the culvert exist. This survey work was carried out between August and November 2019 and established the following:

- The starting point of this culvert at the southern corner of the church property does not have an access manhole. There is a 225mm diameter pipe through an end wall connecting the end of the culvert to the manhole on the stormwater culvert in Donore Avenue. The pipe invert is approximately 700mm above outfall invert of the manhole.
- On opening the manhole which is located within the adjacent church grounds, standing water was present in the culvert to a height of approximately 750mm below surface level. There was no flow observed in the culvert. This indicates that there is no downstream outflow from the culvert and that the water entering the culvert either from direct drainage connections or because of groundwater seepage, is static at the overflow level of the manhole connecting this culvert to the culvert in Donore Avenue, which acts as the outflow point for any water flows into the culvert. As part of the survey works, the culvert was pumped out, a significant amount of silt was removed to facilitate a CCTV survey.
- The CCTV survey discovered that a concrete wall is present in the culvert at the west boundary church property. The wall closes off this end of the culvert except for a 225mm diameter outfall pipe which connects to a manhole on the 450mm diameter line running south to north along the west boundary of the Player Wills site. As referenced earlier, that manhole is permanently flooded, with no downstream connection.

- A drainage survey was also carried out within the adjacent church property. This survey confirmed that all the drainage lines within the church property connect to a combined sewer within Donore Avenue and that there are no connections to the stormwater culvert.

In summary, it has been established that the extent of the culvert shown on the local authority maps which extends across the boundary between the Player Wills site and the adjacent church property exists, but is permanently flooded to the level of the overflow into the culvert in Donore Avenue and that the culvert caters for surface water runoff only from the northern area of the Player Wills car park surface and discharges this runoff via the overflow connection to the stormwater culvert in Donore Avenue.

2.2.2.3 Drainage Within Area of Demolished St. Theresa's Gardens Flats

Reference 6 in Figure 2.1 is a 300/375mm diameter stormwater pipe which extends from the boundary with the rear of the Coombe hospital, through the old St. Teresa's Gardens flats. It flows in a north-east direction and connects to the stormwater culvert in Donore Avenue. DCC have advised that while this line required removal of silt and some repair work during the exploratory works carried out in 2019, it remains a live sewer.

2.3 Other Developments Planned and Under Construction

The Bailey Gibson site is located within SDRA 12 lands that also encompass the Player Wills Site, and Dublin City Council (DCC) lands and the Coombe Hospital Site. A portion of the DCC lands, along the northern boundary of the SDRA, have recently been developed with multi-storey residential accommodation – DCC Planning Ref 2475/18. An integrated drainage strategy has been developed for the relevant sections of the SDRA with plans for development, covering the Bailey Gibson site, the Player Wills site and the adjacent DCC owned land which is the location for the proposed Land Development Agency residential development, known as the LDA Donore Project. This site wide strategy includes proposals for integrated site wide stormwater management and foul drainage. A site wide drainage strategy layout which details how this integrated approach will be achieved, while also allowing for separate and development of each of the sites, is included with the submitted civil engineering drawings. This strategy ensures that the proposed Bailey Gibson development can be delivered in full has no reliance on planning permissions on adjacent development sites.

2.4 Proposed New Site Wide Surface Water Drainage System Overview

DCC Drainage Planning Department required that consideration be given to provision of integrated stormwater management across the proposed development site, the adjacent Player Wills site and adjoining LDA Donore Project site, all contained within SDRA 12, not only the individual sites. As outlined in 2.3, a drainage strategy has been developed and presented to DCC drainage planning department representatives and this strategy plan is provided as part of submitted civil engineering drawings. Development of these sites will occur in different stages and as a result, the stormwater management and drainage strategy includes provision to account for this staging, while also ensuring that each stage can be delivered in its permanent end stage without reliance on works associated with planning applications or planned works on adjacent development sites.

2.4.1 Bailey Gibson Site

The Bailey Gibson site is located in the south-west corner of SDRA 12. The natural fall across the site is from south-west to north-east. As noted in 2.1, there are no public stormwater drains in the streets directly adjacent to the site.

To facilitate a gravity connection to the public stormwater network and ensure no stormwater flows from any part of the proposed development site are directed to the combined sewer network, the new stormwater drainage system for the Bailey Gibson development will flow generally northeast, through Players Park to the east of the Bailey Gibson site and the multi-sport playing pitch and its surrounds, before finally discharging to the existing stormwater culvert in Donore Avenue, close to Ebenezer Terrace. This stormwater drainage system has also been designed to cater for stormwater runoff from the LDA Donore Project land in the northwest and west section of SDRA 12.

The multi-sport playing pitch surface which forms part of this application, shall be a fast-draining synthetic or similar type surface. Runoff from the pitch shall be attenuated by means of a hydrobrake located in the final manhole prior to discharge to the main surface water network upstream of the pitch side attenuation tank. Attenuation storage for the surface area of the pitch only shall be provided by a minimum 250mm deep crushed rock layer (minimum 25% void ratio) beneath the pitch surface.

The proposed Players Park to the east of the Bailey Gibson site, which also forms part of this application, will have a significant area of soft landscaping throughout. Hard paved surfaces forming footpaths through the park will all drain to filter strips located along the verge/kerbline of each footpath or to tree-pits. From here, the stormwater will filter into the permeable hardcore build-up beneath the full area of the paved surface above. Essentially, this shall ensure that all stormwater in the park shall be capable of discharging to ground over the full surface area of the park. Due to the poor permeability of the boulder clays which are present at this site, and to ensure the ongoing functionality of the park during and after high intensity storm events, the filter strips will incorporate a land drain which will have an overflow connection to the main surface water network.

Part of the stormwater management strategy includes the construction of a stormwater attenuation tank to the north side of the proposed multi-sport playing pitch. As discussed in the following sections of this report, this attenuation tank has been sized to cater for the full Bailey Gibson site, the LDA Donore project site to the west and northwest of the SDRA and any runoff from Players Park to the east of the Bailey Gibson site. The Causeway Flow network model and tank sizing calculations are included in Appendix III of this report.

As indicated most clearly on drawing C1026 – Proposed Site Wide Drainage Strategy Plan (Application Area and Player Wills and LDA Donore Project Sites), there is an area within the proposed Bailey Gibson development application boundary which is also included within the permitted Player Wills development site. A condition of the Irish Water Confirmation of Feasibility for the proposed Bailey Gibson development requires that stormwater runoff over an area of 4326m2 (refer to 3.2 for area calculation), which currently discharges to the combined sewer culvert in Donore Avenue, be redirected to the surface water drainage network, thereby facilitating the extra foul flows which will be generated by the Bailey Gibson development. Except for the overlapping area within the permitted Player Wills development site, there is no direct stormwater runoff from the proposed development site to the combined sewer culvert in Donore Avenue. However, a significant proportion of the permitted Player Wills site does currently discharge stormwater to the combined sewer in Donore Avenue. By including this overlapping area of the permitted Player Wills SHD site in the Bailey Gibson planning application, this ensures that the required area of stormwater removal can be carried out within the proposed development planning permission, and thus maintain complete independence from reliance on any other planning permissions. The stormwater runoff from this overlapping area shall be attenuated through its own

attenuation tank and flow control device with outflow from the tank limited to 2l/s prior to discharge to the main surface water network for the proposed development. The provision of an attenuation tank for runoff from this area will eliminate an otherwise significant impact on the size of the pitch side attenuation tank, which will attenuate flow from the remainder of the development. It also provides a level of independence from the remainder of the Bailey Gibson stormwater network which is required due to the interaction with the permitted Player Wills development.

If the permitted Player Wills development was to proceed after the Bailey Gibson development, the tank and upstream drainage infrastructure in this area could be removed and the new drainage infrastructure pertaining to the Player Wills development constructed, with no impact on the remainder of the Bailey Gibson development drainage infrastructure. As outlined in 2.4.2, the new drainage infrastructure for the Player Wills development will result in a much greater area of stormwater removal from the combined sewer in Donore Avenue, thus maintaining compliance with Irish Water's requirements.

Conversely, if the Player Wills development were to be constructed prior to the Bailey Gibson development, the required removal of stormwater would occur as a result of the construction of the Player Wills development. The drainage infrastructure related to the Bailey Gibson development shown in this area would then not be required and there would be no impact on the remaining Bailey Gibson drainage infrastructure.

Therefore, in all potential scenarios, the provision of this area of the permitted Player Wills development site within the proposed Bailey Gibson site boundary will ensure that the drainage infrastructure for each development can be constructed in full compliance with the planning permission, the DCC drainage planning department requirements and Irish Water Confirmation of Feasibility conditions.

2.4.2 Player Wills Development Site

The Player Wills development site which recently received planning permission from An Bord Pleanála, covering an area of 2.78 hectares, is located to the southeast of SDRA 12. The Player Wills development will have its own stormwater drainage system, independent of the remainder of the SDRA 12, with its own independent discharge connection to the stormwater culvert in Donore Avenue, at the northeast corner of that site. The permitted Player Wills SHD includes provision of separate foul and surface water drainage systems, which will result in removal of all stormwater runoff from the site entering the public combined sewer culvert in Donore Avenue. As outlined previously, the delivery of the permitted Player Wills development will render the proposed surface water drainage infrastructure in the overlapping area between the proposed Bailey Gibson development and the permitted Player Wills development redundant, and the delivery of the permitted Player Wills development will maintain compliance with the Irish Water condition for removal of stormwater runoff from the combined sewer in Donore Avenue.

2.4.3 Dublin City Council SDRA 12 Lands

2.4.3.1 Part 8 DCC Housing Development Under Construction

A portion of the DCC lands, along the northern boundary of the SDRA, have recently been developed – DCC Planning Ref 2475/18. The stormwater drainage system for that development, designed by others, is a standalone system, with stormwater attenuation and other SuDS measures applicable to that site only. The new stormwater drainage for that development serves the new road parallel to the northern boundary, along with the buildings themselves. The design and levels of that stormwater system mean there will be no significant interaction with the drainage network for the proposed development.

2.4.3.2 LDA Donore Project Development Site

As outlined in 2.4.1 the stormwater drainage network within LDA Donore Project development site will connect with the stormwater sewer to be constructed between the Bailey Gibson site and the multi-sport playing pitch. Stormwater attenuation for the LDA Donore Project will be catered for within the proposed attenuation tank to be constructed to the north of the pitch, which forms part of this application. BMCE have been engaged extensively with the LDA's design team to produce an integrated and coordinated design for stormwater management.

2.4.4 Proposed Sewer Diversions

- To facilitate the development, various pipe diversions are necessary. Refer to drawing C-1026 Proposed Site Wide Drainage Strategy Plan (Application Area & Player Wills and DCC Sites) which has been submitted as part of this planning application.

As outlined in 2.2.2.1, there is a 450mm diameter stormwater pipe which runs from south to north and is located along the boundary between the Players Wills site and DCC lands. Given that this pipe has live upstream connections and currently has no downstream connection to the public sewer network, this pipe will be diverted into a new stormwater drain which will be constructed as part of the Bailey Gibson development, from where it will be discharged into the stormwater culvert in Donore Avenue.

As outlined in 2.2.2.3, the 300/375mm diameter stormwater sewer which extends through the old St. Teresa's Gardens flats area is still live. To facilitate development of the proposed multi-sport playing pitch, this drain will be diverted to the north of the pitch before reconnecting to its existing outfall connection to the stormwater culvert in Donore Avenue.

2.5 PROPOSED NEW SURFACE WATER DRAINAGE SYSTEM – BAILEY GIBSON SITE

The proposed surface water drainage system is designed to comply with the 'Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Technical Document – Volume 2, New Developments, 2005' and the 'Greater Dublin Regional Code of Practice for Drainage Works, V6.0 2005'. CIRIA Design Manuals C753, C697 and C609 have also been used to design the surface water drainage system within the site.

2.5.1 Catchment Area

The catchment area of the new stormwater drainage system is 6.667ha (total drained area) in size. This catchment covers the Bailey Gibson development site, the proposed Player Park and multi-sport playing pitch site and also the adjacent LDA Donore Project site. The different drained areas within the catchment will have different SuDS measures which will have an influence on the runoff coefficients for each area. The more porous the material, the lower the runoff coefficient. Materials in the area will consist of, but not limited to; Green roof structures, solid roofs, impermeable hard landscaped areas, landscaped tree pits incorporating filter strips, rain gardens and a swale. Stormwater runoff from the entire catchment will be collected in an underground pipe network.

2.5.2 Estimation of Greenfield Runoff Rate

In accordance with the IH124 method, the greenfield runoff for existing undeveloped sites measuring less than 50ha can be estimated using the following formula:

$Qbar_{rural}$ (in m^3/s) = $0.00108 \times (0.01 \times AREA)^{0.89} \times SAAR^{1.17} \times SPR^{2.17}$

where:

- $Qbar_{rural}$ is the mean annual flood flow from a catchment
- AREA is the area of the catchment in ha.
- SAAR is the standard average annual rainfall for the period 1981-2010 Annual Average Rainfall Grid produced by Met Éireann.

- SPR is Standard Percentage Runoff coefficient for the SOIL category – geotechnical report.

Rainfall data for the site was sourced from an Annual Average Rainfall (AAR) Grid (1981-2010) produced by Met Éireann (Available from: http://www.met.ie/climate/products03.asp). The rainfall data for the Irish Grid Coordinates closest to the site indicates a SAAR value of 721mm is appropriate.

Based on the site investigation referenced above, low permeability clays are present at the subject site. On this basis, it is appropriate to use a SOIL Type 4 for the calculations.

Therefore, $Qbar_{rural}$ for a 50ha site has been calculated as follows:

$Qbar_{rural}$ (for a 50ha site) $= 0.00108 \times (0.01 \times 50)^{0.89} \times 721^{1.17} \times 0.45^{2.17}$

$Qbar_{rural}$ (for a 50ha site) $= 0.22738\ m^3/s$

$= 227.385\ l/s$

Interpolating linearly, and excluding the overlapping area with the permitted Player Wills site (as this may potentially be removed from the catchment by future development), this corresponds with a Qbar figure for the drained area (6.67Ha total area – 0.447Ha overlap drained area with Player Wills site = 6.22ha) of 28.3l/s.

2.5.3 Flow Network Model Inputs

In addition to the SAAR value given above, the Causeway Flow software used for the surface water network modelling, requires inputs to accurately model the design rainfall events for the site. The following process is used to obtain the data;

- A request was submitted to Met Eireann for the Rainfall Return Period table relating to the Irish Grid Coordinates of the subject site.
- The value in the table that corresponded with 5 year return period and 60 minute storm duration was taken as the M5-60, which is 16.4 for the subject site.
- The value in the table that corresponded with 5 year return period and 2 day storm duration was taken as the M5-2D, which is 59.1 for the subject site.
- Dividing M5-60 by M5-2D, the Ratio-R was calculated as 0.277.

Full calculations for each of the two attenuation tanks on this site and the relevant pipe networks are provided in Appendix III.

2.5.4 Discharge Strategy

Stormwater runoff within the catchment of the proposed development, including the Bailey Gibson, Players Park and multi-sport playing pitch sites, all of which are included in this application, as well as the LDA Donore Project site to the west, will be attenuated in a below ground attenuation tank, to be located to the northern side of the multi-sport playing pitch. Stormwater will finally discharge at an attenuated rate of QBar for the site, to the stormwater culvert in Donore Avenue.

2.6 Compliance with the Principles of Sustainable Drainage Systems

2.6.1 Compliance with the Principles of GDSDS

The proposed development will be designed in accordance with the principles of Sustainable Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS) and will significantly reduce run-off rates and improve storm water quality discharging to the public storm water system. The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimize the impact of

urbanization by replicating the run-off characteristics of the greenfield site. The criteria provide a consistent approach to addressing the increase in both rate and volume of run-off, as well as ensuring the environment is protected from any pollution from roads and buildings. These drainage design criteria are as follows:

- Criterion 1 – River Water Quality Protection
- Criterion 2 – River Regime Protection
- Criterion 3 – Flood Risk Assessment
- Criterion 4 – River Flood Protection

The requirements of SuDS are typically addressed by provision of the following:

- Interception storage
- Treatment storage (commonly addressed in interception storage)
- Attenuation storage
- Long term storage (not applicable if growth factors are not applied to Qbar when designing attenuation storage)

2.6.2 Compliance with the principles of the CIRIA C753 SuDS Manual

The C753 SuDS Manual explains that the primary function of SuDS measures is to protect watercourses from any impact due to the new development. However, SuDS can also improve the quality of life in a new development and urban spaces by making them more vibrant, visually attractive, sustainable and more resilient to change. That document explains the wider social context of SuDS and how SuDS can deliver high quality drainage while supporting urban areas to cope better with severe rainfall both in the present and the future.

There are four main categories of benefits that can be achieved by SuDS:

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

2.6.3 SuDS Measure Selection

Below are the applicable SuDS measures which have been chosen for the site. The runoff generated from the site will be attenuated in a below ground attenuation structure located to the north of the multi-sport playing pitch. The total runoff will be controlled below Qbar for the site. Refer to BMCE drawings C1050, C1250, C1251 and C1252 for plans and details of the full list of proposed SuDS measures and refer to the Causeway Flow calculations appended on this report.

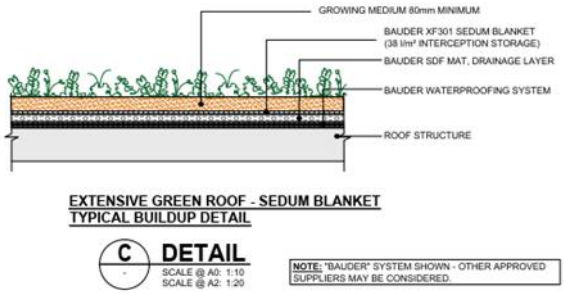
2.6.3.1 Green Roofs – General

Green roofs are areas of living vegetation, installed on the top of buildings. They provide water quality, water quantity, amenity and biodiversity benefits. Green roofs also intercept rainfall at source reducing the reliance on attenuation storage structures.

2.6.3.2 Green Roofs – Extensive

Extensive green roofs have low substrate depths and therefore low loadings on the building structure, they are lightweight and have low cost to maintain. These systems cover the roof area with hardy, slow growing, drought resistant, low maintenance plants and vegetation, such as sedums. The planting usually matures slowly, with the long-term biodiverse benefits being the

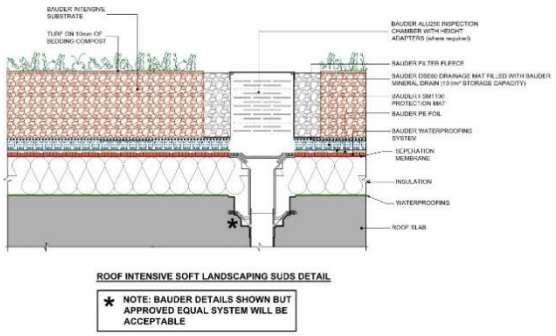
sought-after results. These roofs are typically only accessed for maintenance and are usually comprised of between 20mm – 150mm overall total depth.



Extensive green roofs have the effect of providing some initial storage of rainwater, while also reducing the rate at which rainwater from heavier rainfall events will discharge to the main attenuation tank. It can also help to filter the run-off from heavier rainfall events which will discharge to the main attenuation tank. It can also help to filter the run-off, removing any pollutants and resulting in a higher quality of water discharging to the drainage system. A "Bauder Sedum Blanket" system, or similar, will be provided on the roof to intercept and retain 38 litres/m^2 (i.e. 38mm). Since these roofs are exposed to the Irish climate, there is a high probability will not be completely dry, and the storage capacity will be compromised. Thus, the more conservative approach of using 12 litres/m^2 will be used in the modelling software. Please refer to drawing C1250 for the detailed section.

2.6.3.3 Green Roofs – Intensive

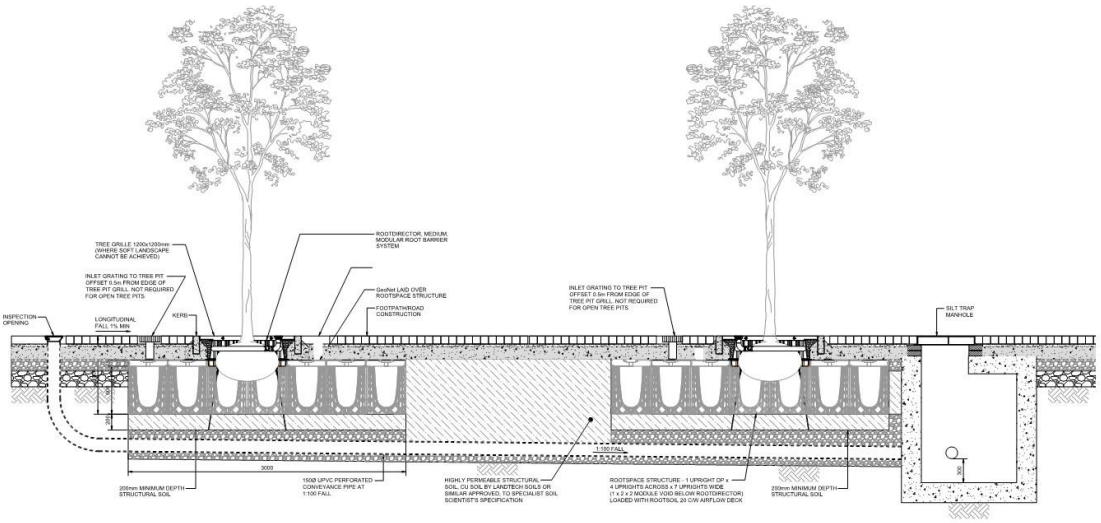
Intensive green roofs are designed to sustain more complex landscaped environments that can provide high amenity and biodiverse benefits. They are planted with a range of plants, including grasses, shrubs, trees and may also include water features, as well as hard landscape paved areas. They are designed to be accessible and normally require regular maintenance.



Intensive paved roofs will be proposed on some of the blocks roofs, in the public amenity areas, and in the courtyard podium areas over the basement. The use of intensive green roofs will also allow for the planting of large shrubs, small trees, and small water features.

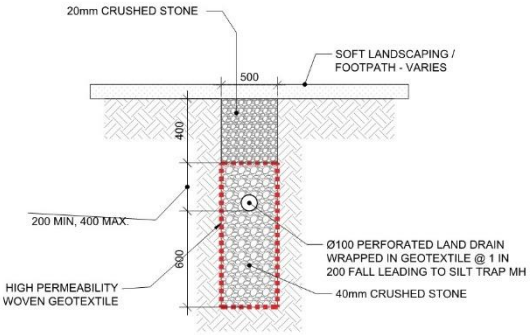
2.6.3.4 Interconnected Tree Pits

The site contains tree pits to treat and intercept runoff from neighbouring road surfaces. These systems also allow some direct infiltration to the ground since they will be lined with permeable geotextile material and founded at a low level. In each case there is a slotted drainage pipe above the base which collects and re-directs filtered excess runoff to the stormwater network.



2.6.3.5 Infiltration/Filter Trenches

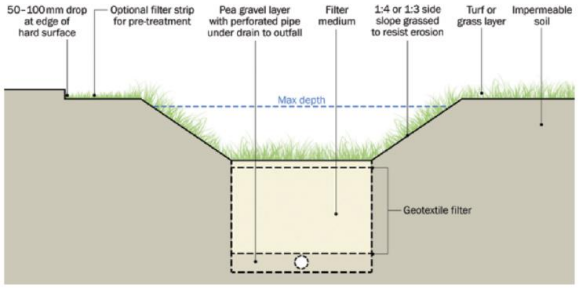
Infiltration trench systems are shallow landscaped depressions adjacent to the roadway. The trenches collect, intercept and treat the road runoff. Filter trenches can reduce the runoff rates and volumes of surface water. They treat pollution using engineered soils and vegetation. They are very effective in delivering interception and treatment storage. By including filter strips within the depression, the effectiveness of the overall system, in meeting the requirements of water quality, water quantity, amenity and biodiversity is significantly improved.



INFILTRATION TRENCH DETAILS

2.6.3.6 Swales

Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat and often attenuate surface water runoff. When incorporated into the site design, they can enhance the natural landscape and provide aesthetic and biodiversity benefits.



2.6.3.7 Attenuation Tanks

Attenuation tanks are used to create below-ground void space for the temporary storage of surface water before infiltration or controlled release to the public sewerage system. It is proposed to provide an attenuation system in the north of the proposed multi-sport playing pitch. The proposed storage system will be designed to accommodate a 1 in 100-year storm with 20% climate change and will form the last part of the SuDS management train. A flow control device will be fitted downstream of the attenuation system in order to restrict the flow QBar for the proposed development. A second attenuation tank will be located in the southeast area of the site to with a flow control to restrict outflow from the overlapping area of the Player Wills site to 2l/s before discharge to the main Baley Gibson surface water network.

2.6.4 SuDS Management Train

The SuDS measures proposed are linked in series, and this is commonly known as a SuDS Management Train, (SMT). The SMT ensures that rainwater falling on a site is captured, conveyed, stored, intercepted, and removed of pollutant correctly and efficiently before it is discharged back into the surrounding water course of network. A robust SMT will ensure that the most effective measures are utilised in the correct sequence throughout the site. Table 26.7 (Figure 2.2 below) in the CIRIA, SuDS Manual (2015) illustrates the effectiveness of each SuDS measure along the SMT.

TABLE 26.7 Indicative suitability of SuDS components within the Management Train

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

Figure 2-2: C753 SuDS Manual Table 26.7

Proposed SuDS management trains on this site are as follows:

Type 1:

Type 2:

Type 3:

Type 4:

Figure 2-3: C753 SuDS Manual Table 26.3 Extract

2.6.5 SuDS Pollutant Analysis

To ensure that the SuDS measures proposed are sufficient in removing pollutants from the generated run-off, a SuDS pollutant analysis has been carried out. This is performed in conjunction with the guidelines and steps set out in Section 26.7 of CIRIA SuDS Manual (2015).

The form of pollutant to the proposed development is from surface water run-off from any roofs or hard landscaped surfaces within the development. Table 26.2 highlights the pollution hazards for different land uses (extract below Figure 2.4). The pollution hazards on site are generally 'Very Low'.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

Figure 2-4: C753 SuDS Manual Table 26.2

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters			
	Mitigation indices[1]		
Type of SuDS component	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 2-5: C753 SuDS Manual Table 26.3

Giving the low pollution index the 'Simple Index Approach' is applied and can be summarised below;

Total SuDS Mitigation Index ≥ Pollution Hazard Index
Using Table 26.2 and Table 26.3, from the SuDS manual, we can compare the mitigation index for interconnected bioretention tree pits with the hazard index for hard paved surfaces. The results are outlined in table 2.1.

Table 2-1: Pollution Hazard Assessment

	Total SuDS Mitigation Index		Pollution Hazard Index	Status
Total Suspended Solids	0.8	>	0.5	O.K.
Metals	0.8	>	0.4	O.K.
Hydrocarbons	0.8	>	0.4	O.K.

From table 2.1 above it is clear that the SuDS strategy for the site is effective in removing pollutants from the surface water and therefore protecting the watercourse. A similar review for building roofs shows an acceptable level of mitigation from building green roofs.

2.6.6 Surface Water Attenuation Storage

The GDSDS requires that flood waters be managed within the site for a 1 in 100-year flood. The combined discharge from the system will be less than the site Qbar. The surface water will flow into a below surface attenuation tank, which has been designed for the combined Bailey Gibson, Players Park, multi-sport playing pitch and future LDA Donore Project sites.

The new surface water system within the site has been hydraulically modelled in Causeway Flow software. The system has been designed to ensure that the discharge rate from the new development catchment does not exceed the previous discharge rate from the site.

As mentioned in section 2.5.1 – the positively drained area on the full catchment area, inclusive of this application and the future DCC development site, is 6.667ha. With the runoff coefficients applied – the area reduces to 3.3ha. Please refer to the tables below for the breakdown of the calculations.

2.6.6.1 Attenuation Tank Storage

Tanked attenuation will be used for most of the flow generated on the proposed development site. The main network attenuation tank will be located to the north of the proposed multi-sport playing pitch. The secondary attenuation tank will be located to the east of the site and cater for runoff from the overlapping area with the permitted Players Wills development site only prior to attenuated discharge to the main network.
The contributing areas are as follows:

Table 2-2: Tanked Attenuation Storage – Main Network Tank Adjacent to Multi-Sport Playing Pitch

Type of areas	Areas (Hectares)	Run-off Factor Applied	Drained areas with the run-off applied
Soft Landscaping (incl pitch)	1.7275	0.15	0.2591
Hard Landscaping (Impermeable Surfaces drained typically to tree pits/swales/infiltrations trenches)	1.5043	0.8	1.2034
Green roof – Extensive	1.5609	0.7	1.0926
Courtyard or mixed hard and soft landscaping	0.2668	0.6	0.1600
Raingarden and pavement draining to raingardens	1.1687	0.5	0.5843
Total Area to Tank	6.228		
Total Drained Area to Tank (ha)			3.2994

Table 2-3: Tanked Attenuation Storage – Tank to East of Players Park within overlap area with the Player Wills site

Type of areas	Areas (Hectares)	Run-off Factor Applied	Drained areas with the run-off applied
Conventionally drained roof and hard landscaped surfaces	0.4470	0.9	0.4023
Total Drained Area to Tank (ha)			0.4023

2.6.7 Interception Storage

The GDSDs requires that Interception storage, where provided, should ensure that at a minimum the first 5mm and preferably the first 10mm of rainfall is intercepted on site and does not directly pass to the receiving watercourse.

Interception storage can be attained using SuDS features which allow the rainwater to infiltrate into the ground, evaporate into the atmosphere or transpire through vegetation.

Table 2-4: Interception Storage: Required & Provided

Interception Storage Required	
Total Impermeable Area within Proposed Development Site	66753m^2
Minimum required level of interception storage as per GDSDS Table 6.3	5mm
∴ Minimum Required Interception Storage = (0.005 x 62 283) = 311.415m^3	
Minimum Required Interception Storage	**333.765m^3**
Interception Storage Provided	
Extensive and Intensive Green Roof: Area = 15 609m^2 (Technical Data states up to 12 litres/m^2 storage)	187.308m^3
Raingarden and associated paving: Area = 11 687m^2 (Providing up to 15 litres/m^2 storage)	175.305m^3

Interception Storage Provided	**362.613m^3**

2.6.8 GDSDS Criterion Compliance

2.6.8.1 Criterion 1 GDSDS – River Water Quality Protection

Run-off from natural greenfield areas contributes very little pollution and sediment to rivers and for most rainfall events direct run-off from greenfield sites to rivers does not take place as rainfall percolates into the ground. By contrast, urban run-off, when drained by pipe systems, results in run-off from virtually every rainfall event with high levels of pollution, particularly in the first phase of run-off, with little rainfall percolating to the ground. To prevent this happening, Criterion 1 requires that interception storage and/or treatment storage is provided, thereby replicating the run-off characteristics of the pre-development greenfield site.
As discussed in section 2.6.7 interception storage is provided for the site by a variety of measures.

2.6.8.2 Criterion 3 GDSDS – Site Flooding

The GDSDS requires that no flooding should occur on site for storms up to and including the 1 in 30-year event. The pipe network and the attenuation storage volumes should be designed to accommodate such storms to ensure that no site flooding occurs although partial surcharging of the system is allowed if it does not threaten to flood.

For the 1 in 100-year event, the pipe network can fully surcharge and cause site flooding, but the top water level due to any such flooding must be at least 500mm below any vulnerable internal floor levels, and the flood waters should be contained within the site boundaries. In addition, the top water level in any attenuation device during the 100-year storm must be at least 500mm below any vulnerable internal floor levels.

The pipe network is limited in extent due to the medium-rise nature of the proposed development. Therefore, the pipes have been oversized to ensure the following:

- The system does not surcharge for the 1-year event
- The system surcharges but does not flood for the 30-year event.
- The system surcharges but does not flood for the 100-year event.

The surcharging of the system is based on the system being allowed to fill as the attenuation tank fills, because the invert of the incoming pipes is below the top of the attenuation tank. This is not a function of the pipe size.

Detailed modelling of the sewer network has been carried out using Causeway Flow software to confirm the above criteria is adequately met. The outputs are included in Appendix III.

2.6.8.3 Criterion 2 & Criterion 4 GDSDS – River Regime and Flood Protection

Regardless of the rainfall event, unchecked run-off from the developed site through traditional pipe networks will discharge into receiving waters at rates that are an order of magnitude greater than that prior to development. This can cause flash flow in the outfall river / stream that can cause scour, erosion & downstream flooding. Attenuation storage is provided to prevent this occurring by limiting the rate of run-off to that which took place from the pre-development greenfield site. In the design, all the calculations were adjusted with 20% increased volumes to account for climate change. The rate at which storm drainage is discharged into the public system should not exceed the greenfield runoff rate calculated in the chapters above. The greenfield run-off rate, QBAR, can be adjusted upwards by factors appropriate to the various return periods (given in the Flood Studies Report) if long term storage is provided. Notwithstanding that significant long-term storage will be

provided in the form of interception storage, this does not equate to full long-term storage volume provision and so growth factors will not be applied to QBAR when calculating the attenuation storage volume required.

Qbar for the full catchment has been calculated in Section 2.5.2. A hydrobrake will restrict discharge downstream of the attenuation tank. As the surface runoff flow rate generated on site will not exceed Qbar, there is no requirement for long-term storage to limit the impact on the receiving watercourse and future development.

Criterion 4 is intended to prevent flooding of the receiving system / watercourse by either;

a) limiting the volume of run-off to the pre-development greenfield volume using 'long-term storage' (Option 1) or by limiting the rate of run-off for the 1 in 100-year storm to QBAR without applying growth factors using 'extended attenuation storage' (Option 2).

Option (2) has therefore been used to comply with Criterion 4 and an attenuation volume will be provided in the proposed attenuation tank to limit the rate of discharge in the 1 in 100-year storm +20% event to QBAR without growth factors applied.

2.6.9 CIRIA SuDS Manual Pillars of Design

2.6.9.1 Water Quantity

The "Water Quantity" design objective is to ensure that the surface water runoff from a developed site does not have a detrimental impact on people, property, or the environment, it is important to control:

- How fast the runoff is discharged from the site (i.e. the peak runoff rate) and
- How much runoff is discharged from the site (i.e. the runoff volume)

Per section 2.6.2, the attenuation tank has been designed to ensure that the new peak flow does not exceed the existing peak runoff rate. The various other SuDS measures have been implemented to limit the amount of runoff volume in accordance with the guidelines within the site boundary, by the use of interception storage.

2.6.9.2 Water Quality

The "Water Quality" design object seeks to ensure the surface water runoff from the site does not compromise the groundwater or surrounding water courses relating to the site.
A pollutant analysis was performed in 2.6.5 of this report which demonstrates that the water quality at discharge point to the public sewer meets with the recommendations of Section 26.7 of CIRIA SuDS Manual (2015).

2.6.9.3 Amenity

The "Amenity" design objective aims to deliver attractive, pleasant, useful and above all liveable urban environments. SuDS measures should be designed to replicate the existing natural environment and blend in with the urban development.

BMCE have worked closely with the architect and landscape architect throughout the SuDS strategy design process to ensure that the measures which have been suggested and incorporated have a high sense of public use.

2.6.9.4 Biodiversity

The encouragement of biodiverse environments within urban environments is incredibly important. The SuDS measures must not only replicate the pre-development surface water runoff and treatment for rainfall, but they must replicate the existing habitats pre-development. By incorporating landscaped areas, filter strips and green roofs, bio-diversity is promoted.

2.6.10 SuDS Conclusion

This section of the report has comprehensively discussed the various SuDS measures which can be applied to the proposed development site and then incorporated them based on the site layout. A pollutant analysis and a series of SuDS management trains have then been developed based upon these SuDS measures to ensure the collected water is adequately treated.

Finally, the chosen SuDS measures and pipe network has been analysed using Causeway Flow Software for various rainfall scenarios to ensure that all the relevant GDSDS and Ciria C753 design criteria are met.

2.7 BASEMENT DRAINAGE

Refer to Section 3.3 for basement drainage, which will be discharged to the foul sewer system in accordance with the requirements of the Greater Dublin Area Regional Code of Practice for Drainage.

3.0 FOUL DRAINAGE SYSTEM

3.1 EXISTING FOUL SEWER INFRASTRUCTURE

A 1060mm brick combined sewer is located within the South Circular Road with a flow direction of west to east, parallel to the southern boundary of the site. A 150mm diameter combined sewer is located in Rehoboth Place to the west of the site. The southwest corner of the proposed development site which is the site of the former Bailey Gibson salvage yard, includes a combined sewer connection to each of these public sewers. There is a combined sewer located within Donore Avenue, to the east of the Player Wills site and the proposed multi-sport playing pitch. This sewer is a 300mm diameter vitrified clay sewer up to the southeast corner of St. Teresa's church. Here, it increases in size to a 990 Brick sewer culvert. It increases again to a 1020 culvert further north along Donore Avenue as it flows towards Cork St. There is an existing 225mm diameter concrete combined sewer which extends from the Coombe hospital site, through the proposed multi-sport playing pitch site and connects to the combined sewer culvert in Donore Avenue.

Refer to Appendix II(a) for existing local authority record drawings.

3.2 PROPOSED FOUL SEWER SYSTEM

The local area gradually falls from southwest to northeast. Hence, the Bailey Gibson site is located at a lower elevation than the South Circular Road, making a gravity connection for foul sewerage to the brick culvert in the South Circular Road unworkable. To facilitate a gravity connection to the public sewerage network, the new foul drainage system for the development will be constructed across the SDRA 12 Lands, connecting to the combined sewer culvert in Donore Avenue, to the east of the multi-sport playing pitch. Given that the development site has a direct connection to the designated discharge point, the foul drainage system for the proposed development will be completed in full, without reliance on drainage infrastructure to be provided as part of any other proposed or permitted development.

The existing 225mm combined sewer, which is currently located within the multi-sport playing pitch site, will be diverted to the north side of the multi-sport playing pitch and increased in size to cater for the proposed Bailey Gibson development flows as well as the adjacent LDA Donore Project flows. The foul sewer design has been carried out in accordance with the Irish Water Code of Practice for Wastewater.

A Pre-connection Enquiry was submitted to Irish Water on 29.04.2022 with details of the development proposals and foul flow calculations. A response to the Pre-Connection Enquiry was received on 11.05.2022 and confirms feasibility of a connection to the Irish Water network at this location. A copy of the Pre-Connection Enquiry and Irish Water's Confirmation of Feasibility response is included in Appendix II. To ensure that the proposed development foul flows can be catered for in the public foul drainage system, Irish Water require the removal of surface water runoff from the receiving combined sewer. As outlined in 2.4.1, the proposed development includes for removal of this area of surface water runoff to the combined public sewer in Donore Avenue and diversion of same to the stormwater drainage network. The minimum area of stormwater discharge to be removed from the combined sewer is calculated as follows:

Peak Flow Offset Ratio 3 Surface Water: 1 Foul Water
Rainfall Intensity from 1Year 15minute storm = 5.8mm
Runoff Coefficient = 0.9 (Conventionally drained impermeable pavement and roof)
Offset Area = 8.363l/s (peak foul flow. Refer to 3.2.2.7) *3/5.8/4*60*60/0.9 = $\underline{4326m^2}$

The developed design was submitted to Irish Water for design vetting on 01.06.2022. Irish Water issued a Statement of Design Acceptance on 02.06.2022. A copy of the Statement of Design Acceptance letter is included in Appendix II.

A diversion application for the proposed diversion of the existing combined sewer which currently runs beneath the proposed multi-sport playing pitch was submitted to Irish Water on 21.12.2021. Irish Water issued a Diversion Confirmation of Feasibility on 11.03.2022. A copy of the Diversion Confirmation of Feasibility is included in Appendix II.

3.2.1 Foul Flow Calculations

Bailey Gibson Site

Using Colebrook White Equation and Flow Charts for foul pipes with a roughness coefficient, ks = 1.5, a 225mm diameter pipe, with a gradient of 1:180 has a flow capacity of 36.5 L/s and velocity of 1.02 m/s. The Relative Velocity and Flow in Circular Pipe for any Depth of Flow chart confirms that for a peak discharge of 8.363 L/s, this gives a depth of flow of 0.23 and proportional velocity of 0.75. Therefore, actual velocity at peak flow = 1.02 * 0.75 = 0.765m/s. This is between the required 0.75-2 m/s and is therefore considered adequate.

Bailey Gibson & LDA Donore Project

Using Colebrook White Equation and Flow Charts for foul pipes with a roughness coefficient, ks = 1.5, a 225mm diameter pipe, with a gradient of 1:180 has a flow capacity of 36.5 L/s and velocity of 1.02 m/s. The relative velocity and Flow in Circular Pipe for any Depth of Flow confirms that for a peak discharge of 17.12 L/s (combined flow from Bailey Gibson and LDA Donore Project sites), this gives a depth of flow of 0.469 and a proportional velocity of 0.97. Therefore, actual velocity at peak flow = 0.97*1.02 = 0.989 m/s. This is between the required 0.75 – 2 m/s and therefore considered adequate.

Combined Sewer from The Coombe Hospital – Estimated Existing Flow

The combined sewer coming from the Coombe Hospital is a 225mm diameter pipe travelling at a gradient of approximately 1:170, Using the Colebrook White Equation and Flow Charts, it has been determined that this combined sewer has a peak discharge capacity of 37L/s. It can conservatively be assumed that this pipe is working at 80% of its capacity, therefore the flow from the Coombe Hospital is estimated to be approximately 29.6 l/s.

Combined Sewer for Bailey Gibson Site, LDA Donore Project & Coombe Hospital

Using Colebrook White Equation and Flow Charts for foul pipes with a roughness coefficient, ks = 1.5, a 300mm diameter pipe, with a gradient of 1:265 has a flow capacity of 61 L/s and velocity of 0.91 m/s. The relative velocity and Flow in Circular Pipe for any Depth of Flow confirms that for a peak discharge of 46.72 L/s (combined flows from Bailey Gibson and LDA Donore Project sites, and estimated Coombe hospital flow), this gives a depth of flow of 0.77 and a proportional velocity of 1.13. Therefore, actual velocity at peak flow = 1.13*0.91 = 1.028 m/s. this is between the required 0.75 – 2 m/s and therefore considered adequate.

3.2.2 Foul Flow Summary

3.2.2.1 Foul Flow Calculations

Residential

Population Equivalent = Units*2.7
Domestic Discharge Rate = 150 litres/person/day
Daily Discharge = Population Equivalent * Domestic Discharge Rate * 1.1
Average Discharge = Daily Discharge/86400

Peak Discharge (750<Population<1000) = Average Discharge * 4.5

Retail
Population Equivalent = Occupancy rate of 1/19m^2
Domestic Discharge Rate = 90 litres/person/day
Daily Discharge = Population Equivalent * Domestic Discharge Rate * 1.1
Average Discharge = Daily Discharge/86400
Peak Discharge = Average Discharge * 4.5

Childcare
Population Equivalent = 80
Domestic Discharge Rate = 50 litres/person/day
Daily Discharge = Population Equivalent * Domestic Discharge Rate * 1.1
Average Discharge = Daily Discharge/86400
Peak Discharge = Average Discharge * 4.5

3.2.2.2 BG1 Foul Network Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	151 Units	67320	0.779	3.506
Childcare	74 Persons	4070	0.047	0.212
Commercial	322m^2	1683	0.019	0.086

3.2.2.3 BG2 Foul Network Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	89 Units	39765	0.460	2.071
Commercial	163m^2	891	0.010	0.045

3.2.2.4 BG3 Foul Network Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential &Ancillary	52 Units	23265	0.269	1.212

3.2.2.5 BG4 Foul Network Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	49 Units	21945	0.254	1.143

3.2.2.6 BG5 Foul Network Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	4 Units	1815	0.021	0.095

3.2.2.7 Bailey Gibson Total Network Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	345 Units	153780	1.783	8.027
Childcare	74 Persons	4070	0.047	0.212
Commercial	485m^2	2574	0.029	0.131
Total	-	160424	1.859	8.363

3.3 PROPOSED BASEMENT DRAINAGE SYSTEM

The basement car park will be a concrete structure designed to withstand hydrostatic water pressures. The basement will have a series of gullies and drainage channels cast into the floor slab which will cater for the limited amount of run-off that enters the through ramps, service openings and from vehicles. These channels will connect to a buried gravity pipe network that will fall to a petrol interceptor. The outflow from the petrol interceptor will flow to a sump with duty and standby pumps from where it will be pumped through a rising main, to the nearest foul manhole on the main gravity system, via a standoff manhole.

4.0 WATER SUPPLY

4.1 EXISTING WATER SUPPLY INFRASTRUCTURE

There is an existing 110MOPVC watermain within Rehoboth Place to the west of the site. There are two number 6inch cast iron watermains located in the South Circular Road to the south of the site. There is also an 18inch cast iron watermain located in the South Circular Road. There is a 6inch cast iron watermain located in Donore Avenue to the east of the development site. There is a 110mm MOPVC watermain in Rehoboth Avenue/Rehoboth Place to the west of the development site.

There is an existing watermain which extends through the proposed multi-sport playing pitch site and has a service connection to the Coombe Hospital. This watermain also serves the remaining blocks of St. Teresa's Gardens flats which have planning permission to be demolished.

Refer to Appendix II for existing watermain records.

4.2 PROPOSED WATER SUPPLY SYSTEM

In accordance with Irish Water Code of Practice for Water Infrastructure, a new 250mm diameter watermain is proposed to service the Bailey Gibson development with a connection to the 18inch cast iron watermain in the South Circular Road.

Hydrants will be provided on the loop main in accordance with Part B of the Building Regulations and the Fire Safety Certificate's Requirements. Sluice valves will be provided at appropriate locations to facilitate isolation and purging of the system.

Twenty-four-hour storage will be provided to cater for possible shut-downs in the system.

To facilitate construction of the multi-sport playing pitch, the existing watermain, which has a live connection to the Coombe hospital, will be diverted to the south and west of the pitch, with the connection to the Coombe hospital maintained from the diverted main.

A Pre-connection Enquiry was submitted to Irish Water on 29.04.2022 with details of the development proposals and water demand calculations. A response to the Pre-Connection Enquiry was received on 11.05.2022 and confirms feasibility of a connection to the Irish Water network. A copy of the Pre-Connection Enquiry and Irish Waters letter of feasibility is included in Appendix II.

The developed design was submitted to Irish Water for design vetting on 01.06.2022. Irish Water issued a Statement of Design Acceptance on 02.06.2022. A copy of the Statement of Design Acceptance letter is included in Appendix II.

A diversion application for the proposed diversion of the existing watermain which currently runs beneath the proposed multi-sport playing pitch was submitted to Irish Water on 21.12.2021. Irish Water issued a Diversion Confirmation of Feasibility on 11.03.2022. A copy of the Diversion Confirmation of Feasibility is included in Appendix II.

At the northern end of the Bailey Gibson salvage yard end of the site, a dead end will be provided for future extension of the water supply into the LDA Donore Project site.

4.2.1 Water Demand Summary

4.2.1.1 Water Demand Calculations

Residential
Population Equivalent = Units*2.7
Domestic Discharge Rate = 150 litres/person/day
Daily Discharge = Population Equivalent * Domestic Discharge Rate * 1.25
Average Discharge = Daily Discharge/86400
Peak Discharge (<750) = Average Discharge * 5

Retail
Population Equivalent = Occupancy rate of 1/19m^2
Domestic Discharge Rate = 90 litres/person/day
Daily Discharge = Population Equivalent * Domestic Discharge Rate * 1.25
Average Discharge = Daily Discharge/86400
Peak Discharge = Average Discharge * 5

Childcare
Population Equivalent = 80
Domestic Discharge Rate = 50 litres/person/day
Daily Discharge = Population Equivalent * Domestic Discharge Rate * 1.25
Average Discharge = Daily Discharge/86400
Peak Discharge = Average Discharge * 5

4.2.1.2 BG1 Watermain Supply Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	151 Units	76500	0.889	4.427
Childcare	74 Persons	4625	0.054	0.270
Commercial	322m^2	1913	0.022	0.110

4.2.1.3 BG2 Watermain Supply Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	89 Units	45188	0.523	2.615
Commercial	163m^2	1013	0.012	0.060

4.2.1.4 BG3 Watermain Supply Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	52 Units	26438	0.306	1.530

4.2.1.5 BG4 Watermain Supply Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	49 Units	24938	0.289	1.443

4.2.1.6 BG5 Watermain Supply Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	4 Units	2063	0.024	0.119

4.2.1.7 Watermain Supply Summary

Development Mix	Units	Daily Flow (l/day)	Average Flow (l/s)	Peak Flow (l/s)
Residential & Ancillary	345 Units	174750	2.031	10.134
Childcare	74 Persons	4625	0.054	0.270
Commercial	485m^2	2925	0.034	0.170
Total	-	182300	2.119	10.574

5.0 SITE FLOOD RISK ASSESSMENT

5.1 INTRODUCTION

This flood risk assessment is carried out in accordance with guidelines outlined in the OPW publication "*The Planning System and Flood Risk Assessment Guidelines for Planning Authorities*". The stages involved in the assessment of flood risk are listed in that publication as follows:

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

The OPW publication also outlines a Sequential Approach for determining whether a particular development is appropriate for a specified location in terms of flood risk. The categorization of the subject site in terms of the OPW's sequential approach is further outlined in Section 5.2 below.
This Flood Risk Assessment addresses the Bailey Gibson and adjacent Players Park sites as well as the multi-sport playing pitch.

5.2 FLOOD RISK IDENTIFICATION

Stage 1 identifies whether there are any flooding or surface water management issues related to the site i.e. it identifies whether a flood risk assessment is required.
The first source considered is the OPW Flood Hazard Mapping service. The OPW map report for the site shows no flood incidents have been recorded on the site or the areas adjacent to the site. The nearest, most recent flood event occurred in June 1963 on Clanbrassil Street, approximately 700m to the East of the development, and is not indicative of reoccurring events within the site area.
However, the CFRAMS flood mapping shows there is a risk of flooding from the Poddle River (stormwater culvert in Donore Avenue) between the 10% the 1% and Annual Exceedance Events (1 in 10 and 1 in 100 year events respectively), occurring within the proposed multi-sport playing pitch area to the north of the site, and the existing church grounds site to the south of the multi-sport playing pitch site. The flood extents to the north of the site are clearly influenced by the layout of the St Teresa's Gardens complex, which has been significantly altered by the demolition of the majority of the blocks of flats since the flood mapping exercises were completed. Similarly, this area is at a lower elevation than the rest of the development, minimising any risk from overland flow. However, the flooding which occurs will be assumed to remain a risk for the proposed development. The relevant maps are provided in Appendix I.
All rain falling on the site will undergo two stage treatment, and all stormwater drains will be sized based on stormwater flows calculated using the simulation package Causeway Flow. Therefore, the risk of pluvial flooding within the site is negligible.
The possibility of Fluvial or Tidal flooding on the site is considered utilizing the guidelines outlined in Chapter 3 of the OPW publication referenced in section 5.1 and with the Eastern CFRAMS (Catchment Flood Risk Assessment and Management) study, which is an overall study undertaken by the OPW.

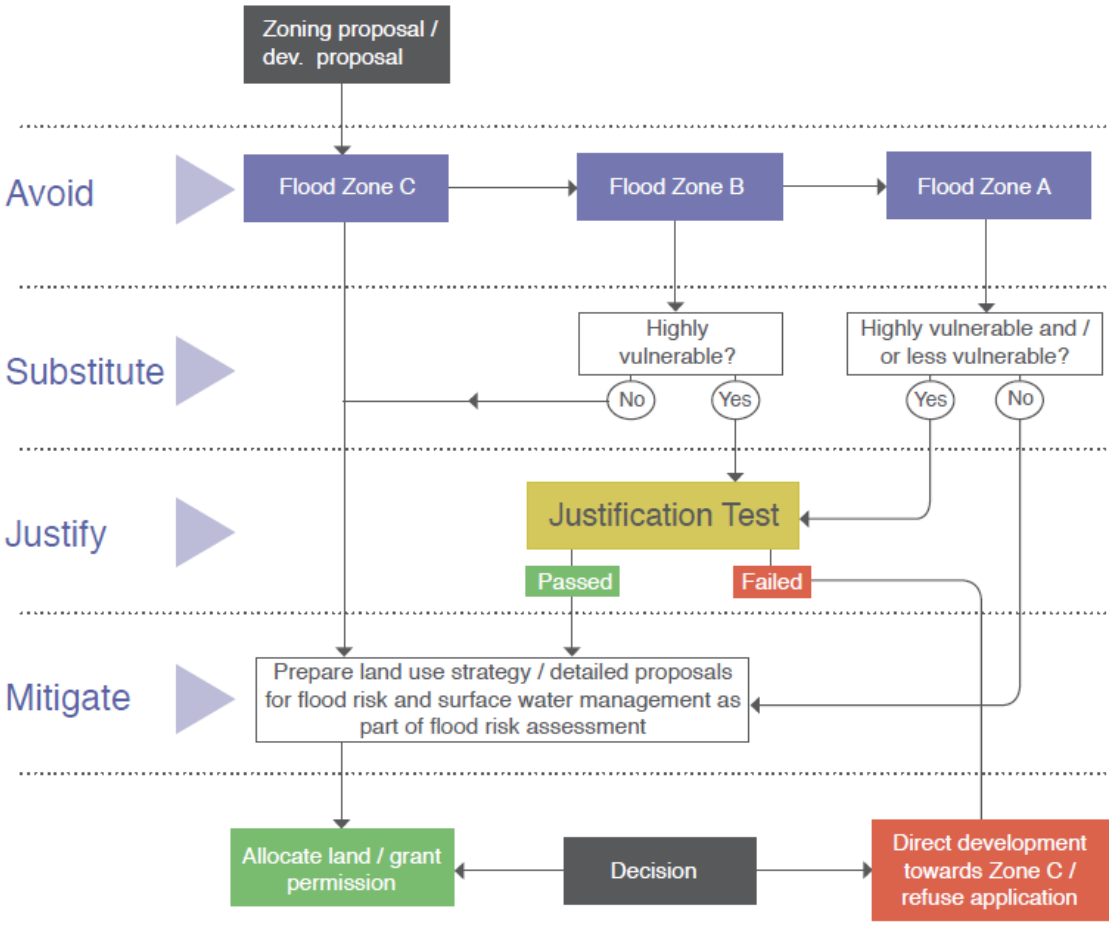


Figure 5.1 – Sequential approach mechanism in the planning process

As outlined in the OPW publication, new developments are divided into three categories which are as follows:

- Highly Vulnerable Development
- Less Vulnerable Development
- Water-compatible Development

The residential component of the proposed development comes under the heading of Highly Vulnerable Development. The portion of the development where the multi-sport playing pitch and surrounding landscaping is proposed, comes under the heading Water Compatible Development. Geographical areas are similarly divided into three categories, based on their risk of river and tidal flooding. The three categories are as follows:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding i.e. all areas which are not within zone A or B).

Good data is available on possible flooding of the surrounding area to the site in the Eastern CFRAM Study by the OPW. The study is a requirement of the EU 'Floods' Directive (2007/60/EC). The PFRA map is also available and considers flood risk arising from any major source of flooding, including natural sources such as river, sea, groundwater and rainfall as well as infrastructural sources such as urban drainage systems, reservoirs, water supply systems, ESB and Waterways Ireland.
Both the OPW Flood Hazard Mapping service and the Dublin City Development Plan 2016-2022 Strategic Flood Risk Assessment (SFRA) Composite Flood Map indicate that the multi-sport playing pitch and surrounding landscaping at the north of the pitch are in Zone A, with the probability of flooding from rivers and the sea is between 10% - High Probability and 1% - Medium Probability.
OPW Flood Hazard mapping indicated that flood depths in the worst case of a 0.1% Fluvial Flood event are limited to between 0-250mm above surface level for the almost the entirety of both the proposed multi-sport playing pitch, with a small area within the multi-sport playing pitch having a predicted flood depth of 250-500mm.
The Bailey Gibson and Players Park sites, are located within Flood Zone C. That is, they are not at risk of flooding from sea or rivers in events at least up to 0.1% - low probability.
The matrix shown in Figure 5.1, which is an extract from the OPW document, states whether a particular development is deemed 'Appropriate' for a geographical location.

Table 5.1 – Matrix of vulnerability versus flood zone

Development Vulnerability	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Given that the development is proposed for various uses, incorporating both external amenity development as well as residential development, the assessment of 'appropriateness' will be applied to the different types of development within the site. In accordance with the flood zone definitions outlined above, the proposed multi-sport playing pitch is located in Flood Zone A. As a water compatible development, in accordance with Figure 3.1, this is deemed Appropriate.
The Bailey Gibson and Players Park sites are both within Flood Zone C. Hence, both of these sections of the development are deemed Appropriate.

5.2.1 River Poddle Flood Alleviation Scheme

A planning application has been lodged on behalf of Dublin City Council and South Dublin County Council to An Bord Pleanála, Ref 306725-20, with proposals for Flood Alleviation works on the River Poddle. The proposed works include various flood alleviation measures, principal among them being flow controls and additional flood storage upstream of the development site. The planning documentation, which is available at the website http://www.poddlefas.ie/, includes predicated flood depth maps, based on the completed proposed flood alleviation works. Map No: E09PE_DPOCD_C1 Revision 0, dated Nov'18, indicates that no flooding is present across the entire St. Teresa's Gardens SDRA or the surrounding street network for the 1% AEP event. Essentially, this indicates that the proposed Poddle Flood Alleviation Scheme will result in a reduced flood risk on the proposed development site, when compared against current conditions. Since the proposed Poddle Flood Alleviation Scheme is still subject to a planning application and it is unknown at what stage the proposed works will be completed, this Flood Risk Assessment will be based upon the current CFRAM flood map information, in the knowledge that the Poddle Flood Alleviation Scheme, once completed, will result in a reduced flood risk at the proposed development site. Based on the

latest information on the above referenced website, A decision for this application was targeted for the 26.03.2021 but has been extended on 4 occasions due to the current An Bord Pleanála workload. The latest target date for a decision stated on the website is the 24.11.2021 and has expired.

5.3 INITIAL FLOOD RISK ASSESSMENT

The initial flood risk assessment should ensure that all relevant flood risk issues are assessed in relation to the decisions to be made and potential conflicts between flood risk and development are addressed. It should assess the adequacy of existing information and any flood defences.
The possible sources of flood water are assessed in the table below using the "Source – Pathway – Receptor Model".

Table5.2: The possible sources of flood water

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Tidal	Overtop Breach	People Property	Very Remote	Very high	Very Low
Fluvial	Overtop Breach	People Property	Remote	High	Low
Pluvial Surface water	Overflow / Blockage	People Property	Unlikely	High	Low
Groundwater	Rising groundwater levels	People Property	Unlikely	Low	Low

5.3.1 Appraisal of the Availability and Adequacy of Existing Information and Flood Zone Maps

a) Tidal / Fluvial

Good data is available on possible tidal / fluvial flood risks. As discussed in detail in Section 5.2 previously, the predictive flood maps published by the OPW as part of the PRFA study provides detailed information on possible flooding of the site. These indicate that the entirety of the residential component of the proposed development site is within Flood Zone C, meaning that is not subject to flooding in events up to the 1000Year AEP event, and is therefore deemed Appropriate.

b) Pluvial / Surface Water

The GDSDS includes extensive information on the storm and combined sewer network for this area. Performance Maps are available giving flooding prediction and cataloguing existing hydraulic deficiencies in the network in this area – see GDSDS map given in Appendix I of this document. An extract from the 2031 System Performance Assessment Maps is also shown in Figure 3.1 below.
The colour coding is as follows:

- Brown Line: Foul/Combined Sewer floods for 30year return period or less.
- Pink Line: Foul/Combined Sewer surcharges for 1 or 2year return period events
- Dark Green Line: Foul/Combined Sewer does not surcharge for 1 or 2year return period event and does not flood for a 30year return period event or below.
- Green Dot: Modelled Manhole does not flood for 5year Return Period Event

- Light Green Line: Stormwater Sewer does not surcharge for 1 or 2year return period event and does not flood for a 30year return period event or below.
- Light Blue Line: Stormwater Sewer surcharges for 1 or 2year return period events
- Dark Blue Line: Stormwater Sewer floods for the 30year return period or less.

The development site is bounded by:

1. A 1050mm concrete stormwater sewer pipe running along the south boundary of the St. Teresa's church grounds. The Stormwater Sewer does not surcharge for 1 or 2year return period and the Modelled Manhole does not flood for 5year Return Period Event.
2. A 300mm combined sewer in Donore Avenue which surcharges for the 1 or 2year return period events. The proposed development will result in removal of stormwater over a surface area of 4470m^2 discharging into this combined sewer. All stormwater from the developed site will be attenuated before being discharged to the stormwater culvert in Donore Avenue. No stormwater from the proposed development will be discharged to the combined sewer.
3. A 450mm diameter stormwater sewer in adjoining DCC lands parallel to the east boundary of the Player Park, which does not surcharge for the 1 or 2year return period event and does not flood for a 30year return period event or below and the other half of which Floods for the 30year return period or less. Modelled Manhole does not flood for 5year Return Period Event. This sewer is planned to be diverted as part of the proposed development and will be connected through that development site into the stormwater culvert in Donore Avenue.
4. A 910-1210mm concrete culvert in Donore Avenue to the northeast of the development which does not surcharge for the 1 or 2year return period event and does not flood for a 30year return period event or below.
5. A 300mm diameter stormwater sewer which flows through the St. Teresa's Gardens site. The hydraulic performance map indicates that the portion of the sewer which extends through the St. Teresa's Gardens Flats floods in the 30Year event or less but that both upstream and downstream, the sewer surcharges in the 1Year or 2Year events. The maps consider the contribution of the full unattenuated hardstand area of the St. Teresa's gardens flats in the flow in this sewer. As part of this development, the sewer shall be diverted around the proposed multi-sport playing pitch. All unattenuated stormwater previously received from the St. Teresa's Gardens Flats will be removed from this sewer and no new stormwater flows from any part of the proposed development will contribute to flow in the pipe.

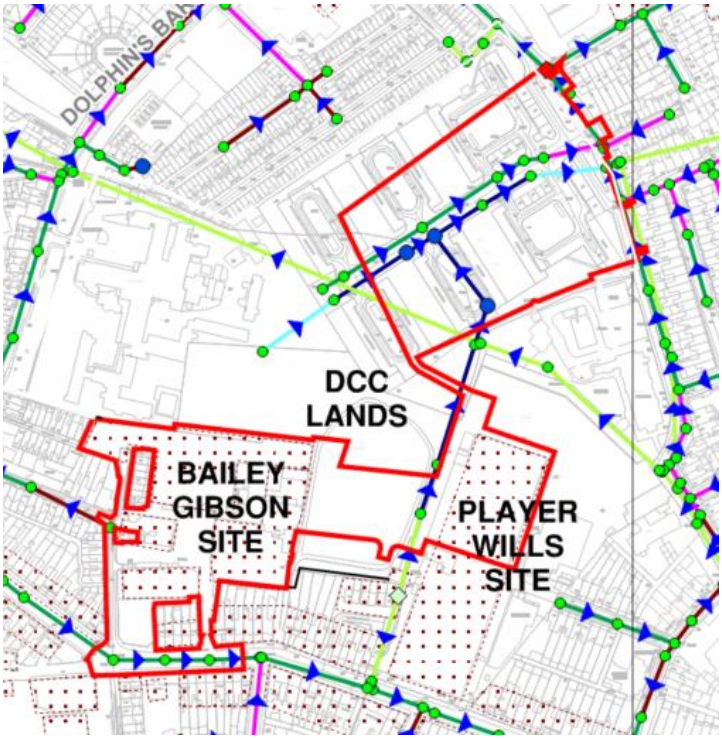


Figure 5.2 Extract from GDSDS Existing Hydraulic Performance Map 2031

5.3.2 Determination of What Technical Studies are Appropriate

Given the comprehensive and detailed nature of the existing information available regarding flooding, it is not considered necessary to carry out any further analysis of the risk of tidal and fluvial flooding.

5.4 Detailed Flood Risk Assessment

Stage 3 involves examining potential residual risks in detail and proposing measures to mitigate or eliminate same. A detailed flood risk assessment involves the estimation of the level of flooding on the site and the performance of the development under these conditions so that a "fit for purpose" development can be delivered. Once the likely maximum flood level has been estimated, the design should be developed so that the internal ground floor levels are at a minimum, 500mm above this level. Residual flood risk may remain in other areas that for operational reasons have to be below the maximum flood level (street access, bin stores, etc.) and these areas will have to incorporate flood resilient design features and flood risk management procedures so that the risk is mitigated in so far as possible.

5.4.1 Maximum Flood Levels

Maximum flood levels for the site have been established from the CFRAMS flood level and flood extents maps which is included in Appendix I. In the area to the north of the proposed development site, the 0.1% AEP (low probability) flood level map shows flood depths within part of the area of the proposed multi-sport playing pitch varying from 0-250mm and 250-500mm. The zone with flood depth of 250-500mm is limited to a localized area with existing surface level of approximately 18.00m, indicating a maximum flood level of up to 18.50m in this area. The majority of the St. Teresa's Gardens flats have been demolished since the flood study and flood maps were produced, with likely moderate changes in surface levels across the site. However, the surface levels in the area where predicted flood levels of 250-500mm in the 0.1% AEP event occurs, are unchanged from the time of preparation of the study, since the asphalt surface here forms the only vehicle entrance to the two remaining blocks of flats. Hence, the levels here are the most reliable in terms of estimating flood levels from the flood depths maps.

On the flood extents maps, there are nodal points at which tabulated data is provided, showing predicted flood levels in the 10%, 1% and 0.1% AEP events. The nodal point closest to the proposed development site is in Donore Avenue directly east of the existing St. Teresa's church. The predicted flood level in the 0.1% AEP event here is 18.49m. This correlates well with the predicted flood level from the flood depths map. Hence 18.49m is accepted as the applicable flood level across the site.

5.4.2 Check if Development Increases Flood Risk Elsewhere

The predicted flooding storage volumes within the St. Teresa's Gardens flats site was limited by the presence of the tower blocks on the site. The proposed multi-sport playing pitch, being a "Water Compatible" and hence 'Appropriate' development shall significantly increase the open surface area of the site. To ensure that flood storage is not decreased on the site, the proposed new multi-sport playing pitch levels will be maintained at or below the pre-demolition surface levels. This will effectively result in a significant increase in the available flood storage volume on the site in an area which is compatible with the predicted flooding frequency. While there is predicted flooding of the multi-sport playing pitch in events less than the 1% AEP event, it is also noted that there have been no recorded flood events at the site, to date. Hence, the proposed development will result in no change to flood storage or volumes on other sites.

Attenuation storage is to be provided on the site, designed to allow rainwater runoff from new impermeable areas to be discharged from the site at a controlled rate. The rate of discharge of the flow control, and the size of the attenuation tank, ensure there is no risk of flooding on the proposed site based on the simulation of the 1:1, 1:30 and 1:100yr storms + 20% Climate Change. The increased hard landscaped area shall be further limited by the provision of Sustainable Urban Drainage Systems, SuDS, such as green roofs, which, in conjunction with the attenuation storage, will reduce the runoff rate from the site in all storm events, further reducing the risk of flooding to other sites as a result of the development of this site.

5.4.3 Check Possibility of New Surface Water Network Flooding

As part of the surface water system design, to comply with GDSDS Criterion 3 (Site Flooding), a 1year, 30year & 100year storm stimulation has been carried out on the proposed drainage system using the Causeway Flow software. The input & output data for this simulation are included in Appendix III. A 20% climate change factor has been applied. According to the Greater Dublin Strategic Drainage Study, flooding in a stormwater sewer should not occur up to the 30year event and the flood levels during a 100year event should not reach within 500mm of the finished floor levels of any building. From the simulation results it can be shown that there is no site flooding in any storm event and in all cases during the 1 in 100year storm event the top water level of surcharged manholes, is at least 500mm below the nearest vulnerable internal ground floor level.

The proposed diversions and decommissioning of the existing stormwater sewers flowing through the site, shall further minimise the risk to flooding on the proposed development site.

5.4.4 Justification Testing

As outlined above, the proposed development can be split into three separate zones. The Bailey Gibson and Players Park sites to the south of the development, are within Flood Zone C. Development in these areas is 'Appropriate' and no justification test is required.

Development of the proposed multi-sport playing pitch and surrounding soft and hard landscaping is classed as water compatible development. In ensuring that the development of this site does not increase flood risk elsewhere by maintaining existing surface levels, development in this zone is also 'Appropriate'.

Finally, the Dublin City Development Plan 2016-2022 Strategic Flood Risk Assessment (SFRA) has carried out Justification Testing for the assorted flood zones within the urban area. The River Poddle catchment is addressed in Appendix 3 of the above document and has identified that development on this site is essential for regeneration and expansion while achieving compact and sustainable

urban growth, as a brownfield site, and no alternate suitable lands exist within the region. As such, Dublin City Council class development within this area as Justified despite the potential flooding risks.

5.5 CONCLUSION

The flood risk assessment has been carried out in accordance with the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities".
It has been shown that the entire residential portion of the development is within Flood Zone C and not subject to flooding in events up to the 1000Year event and, therefore, deemed 'Appropriate'. It has also been shown that the multi-sport playing pitch is in Flood Zone A, but also deemed 'Appropriate' based on its classification as Water Compatible Development.

Appendix I

Flood Maps

Appendix I (a)

OPW Historic Flood Mapping

OPW National Flood Hazard Mapping

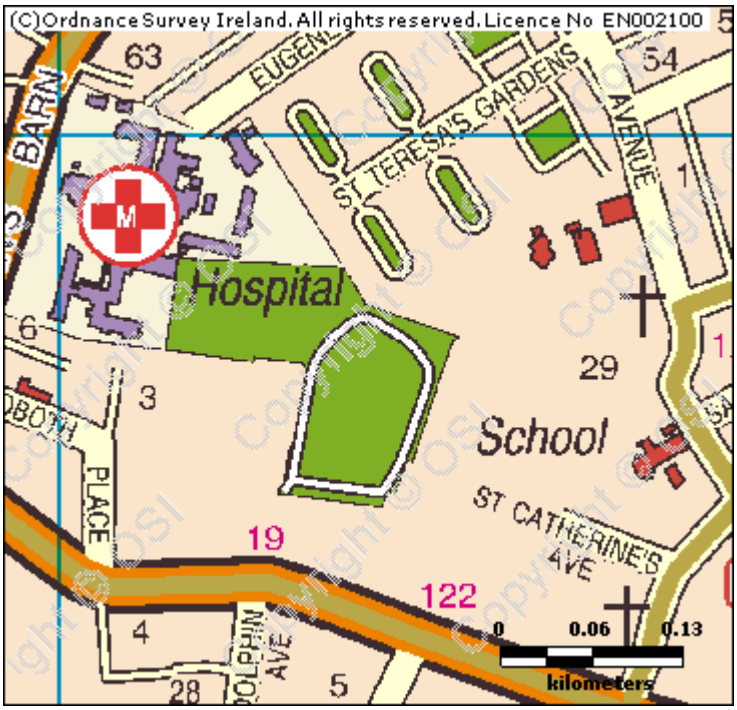
Summary Local Area Report

This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 142 328



Map Scale 1:5,229

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

30 Results

1. Flooding at Lady's Lane, Kilmainham, Co. Dublin on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information

2. Flooding at Kearns Place, Kilmainham, Dublin 8 on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information

3. Flooding at Harold's Cross, Dublin City on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

4. Flooding at Bow Lane, Kilmainham, Dublin 8 on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

5. Flooding at Blarney Park, Crumlin, Dublin 12 on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

6. Dublin City Tidal Feb 2002 — Start Date: 01/Feb/2002

County: Dublin — Flood Quality Code: 1

Additional Information: Photos (32) Reports (10) Press Archive (27) More Mapped Information

---

7. Liffey Lower - Dec 1954 — Start Date: 08/Dec/1954

County: Kildare, Dublin — Flood Quality Code: 2

Additional Information: Reports (4) Press Archive (2) More Mapped Information

---

8. Flooding at Mount Argus Road and Kimmage Road Lower on 24th Oct 2011 — Start Date: 24/Oct/2011

County: Dublin — Flood Quality Code: 2

Additional Information: Reports (1) More Mapped Information

9. Poddle August 1986 — Start Date: 25/Aug/1986

County: Dublin — Flood Quality Code: 2

Additional Information: Reports (9) Press Archive (1) More Mapped Information

---

10. Camac August 1986 — Start Date: 25/Aug/1986

County: Dublin — Flood Quality Code: 2

Additional Information: Reports (3) More Mapped Information

11. Camac Turvey Ave Recurring — Start Date:

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (1) More Mapped Information

12. Camac Bow Bridge Recurring — Start Date:

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (1) More Mapped Information

13. Camac Carrickfoyle Terrace Recurring — Start Date:

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (1) More Mapped Information

14. Camac Kearns Place Recurring — Start Date:

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (1) More Mapped Information

15. Clanbrassil Street June 1963 — Start Date: 11/Jun/1963

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (3) Press Archive (2) More Mapped Information

---

16. Rathmines Lower June 1963 — Start Date: 11/Jun/1963

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (3) Press Archive (2) More Mapped Information

---

17. Kimmage June 1963 — Start Date: 11/Jun/1963

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (3) Press Archive (2) More Mapped Information

---

18. Harold's Cross June 1963 — Start Date: 11/Jun/1963

County: Dublin — Flood Quality Code: 3

Additional Information: Reports (3) Press Archive (2) More Mapped Information

---

19. Mount Jerome Harold's Cross June 1963
County: Dublin
Start Date: 11/Jun/1963
Flood Quality Code:3
Additional Information: Reports (3) Press Archive (2) More Mapped Information

20. Kimmage Mount Argus June 1963
County: Dublin
Start Date: 11/Jun/1963
Flood Quality Code:3
Additional Information: Reports (3) Press Archive (2) More Mapped Information

21. Grafton Street June 1963
County: Dublin
Start Date: 11/Jun/1963
Flood Quality Code:3
Additional Information: Reports (3) Press Archive (2) More Mapped Information

22. Poddle Park Nov 2000
County: Dublin
Start Date: 05/Nov/2000
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

23. Poddle Tributary Marrowbone Lane Jan 1941
County: Dublin
Start Date: 21/Jan/1941
Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

24. Poddle St Claires Ave Sept 1931
County: Dublin
Start Date: 03/Sep/1931
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

25. Poddle Limekiln Lane Sept 1931
County: Dublin
Start Date: 03/Sep/1931
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

26. Poddle Limekiln Lane Aug 1905
County: Dublin
Start Date: 24/Aug/1905
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

27. Poddle Larkfield Mills Undated 1940s
County: Dublin
Start Date:
Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

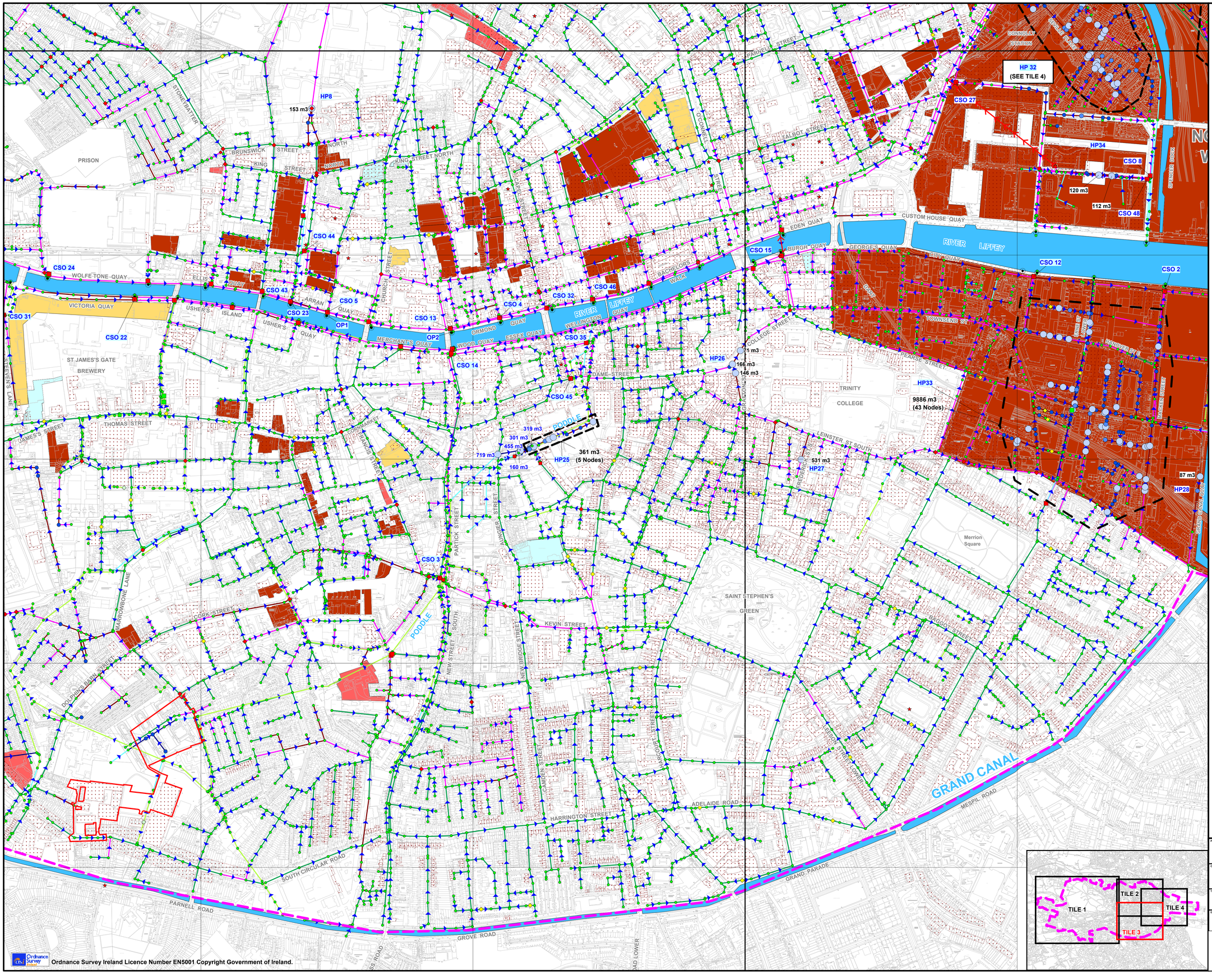
28. Poddle Harold's Cross undated 1940's
County: Dublin
Start Date:
Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

29. Flooding at Bridgewater Quay Apartments, Islandbridge, Dublin 8, on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information

30. Flooding at Ashling Hotel, Parkgate Street, Dublin 8 on 24th Oct 2011
County: Dublin
Start Date: 24/Oct/2011
Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information

Appendix I(b)

GDSDS 2011 & 2031 Hydraulic Performance Maps



Legend

- Wastewater Treatment Works
- County Council Boundaries
- Catchment Boundary
- Rising Main (Coloured as sewer)
- Sewer not included in hydraulic model
- Direction of Flow (on sewer line)
- River/Watercourse
- Culverted River/Watercourse
- 1:1000 OS Grid Line Boundaries
- 1:5000 OS Grid Line Boundaries
- Combined Sewer Overflow
- Foul/Combined Pumping Station
- Foul/Combined Bifurcation
- Foul/Combined Apex Manhole
- Foul/Combined Flow Management Chamber
- Storm Water Overflow to Foul/Combined
- Storm Water Bifurcation
- Storm Water Apex Manhole

Flooding Performance Key

- Flooding greater than 50m3 Volume for 5yr Return Period Event (Volume m3)
- Flooding between 25m3 and 50m3 Volume for 5yr Return Period Event
- Flooding less than 25m3 Volume for 5yr Return Period Event
- Modelled Manhole does not flood for 5 year Return Period Event
- 75m3 — 1:5 year Foul/Combined flood volume
- 75m3 — 1:5 year Storm flood volume
- Historically Reported Flooding Incidents caused by Hydraulic Overloading
- Outfall

Foul/Combined Hydraulic Performance Key

- Foul/Combined Sewer floods for 30 year return period or less.
- Foul/Combined Sewer surcharges for 1 or 2 year return period events
- Foul/Combined Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)

Storm Hydraulic Performance Key

- Storm Sewer floods for 30 year return period or less.
- Storm Sewer surcharges for 1 or 2 year return period events
- Storm Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)
- Area Covered by EDS/DCC Asset Survey

Important Hydraulic Considerations

- Location of Known Basements
- Zoned Residential Land
- Zoned Science/Technology Parks/Land
- Zoned Industrial Land
- Zoned Commercial Land
- Zoned Land for Mixed Development
- Recently Completed Developments

Catchment Deficiency Reference Key

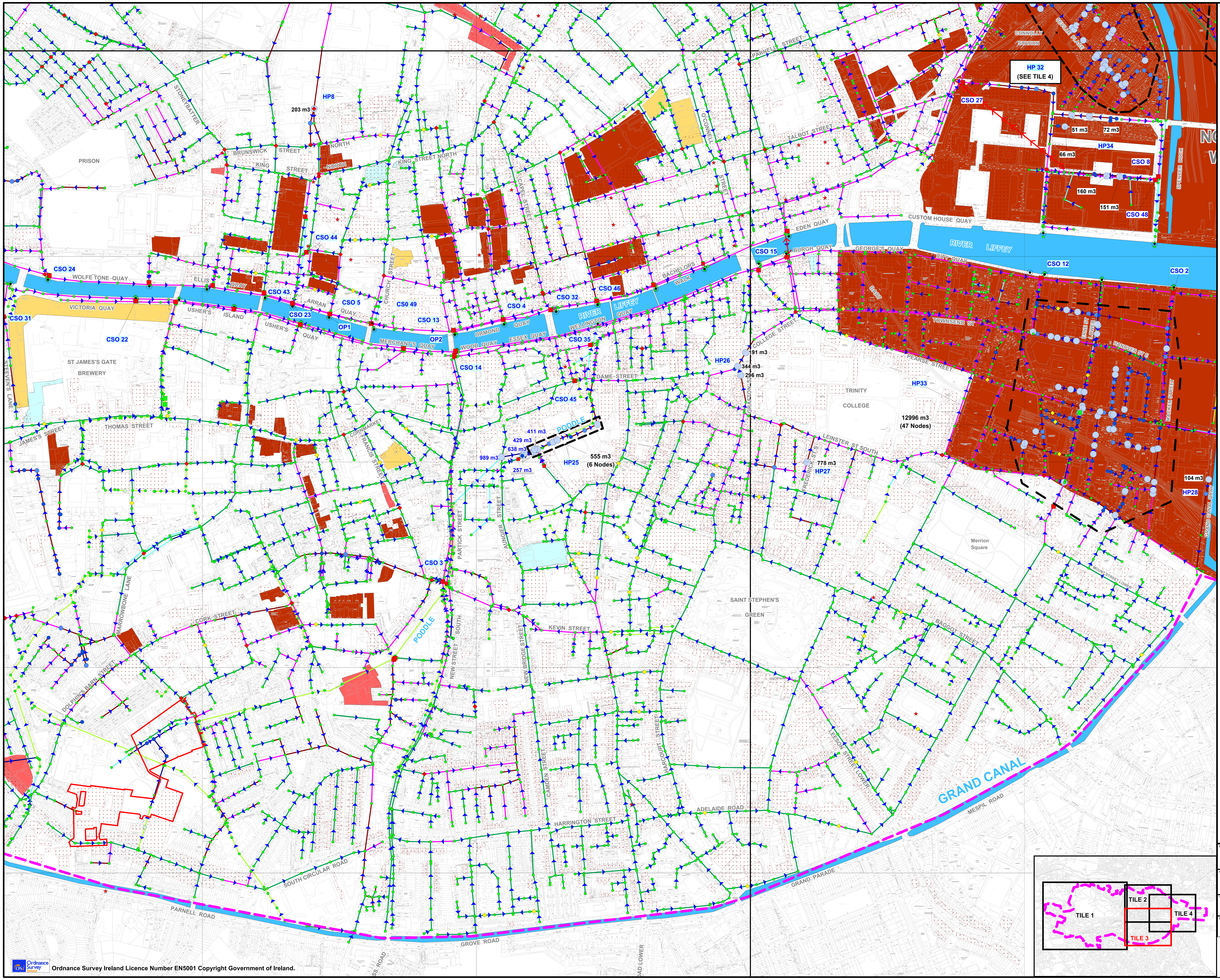
- HP 1 — Hydraulic Deficiency Reference No (Foul/Combined) (Not included for EDS/DCC Asset Survey area).
- CSO 1 — CSO Deficiency Reference No. (Hydraulic or Environmental)
- OP 1 — Operational Deficiency Reference No.

Notes

1. Results are based on assessment of sewer system under 1, 2, 5, 10, 20, 30, 50 and 100 year return period rainfall events.
2. For colour coding, flooding takes priority over surcharging.
3. Levels referenced in meters to Ordnance Survey Datum, which is Mean Sea Level at Malin Head, Co. Donegal (1970 Adjustment).

Project	GREATER DUBLIN STRATEGIC DRAINAGE STUDY
Catchment	CITY CENTRE/DOCKLANDS CATCHMENT
Title	PHASE 3 - 2011 System Performance Assessment
Drg. No.	GDSDS/MAR3079/F001/P3-002_Tile3
Drawn	JGA
Chk'd	MCB
Approved	MCB
Scale	N.T.S.
REVISION	A
Date	7/5/04

Dublin Drainage
A Strategic Study for Greater Dublin



Legend

- Wastewater Treatment Works
- County Council Boundaries
- Catchment Boundary
- Rising Main (Coloured as sewer)
- Sewer not included in hydraulic model
- Direction of Flow (on sewer line)
- River/Watercourse
- Culverted River/Watercourse
- 1:1000 OS Grid Line Boundaries
- 1:5000 OS Grid Line Boundaries
- Combined Sewer Overflow
- Foul/Combined Pumping Station
- Foul/Combined Bifurcation
- Foul/Combined Apex Manhole
- Foul/Combined Flow Management Chamber
- Storm Water Overflow to Foul/Combined
- Storm Water Bifurcation
- Storm Water Apex Manhole

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- Flooding greater than 50m3 Volume for 5yr Return Period Event (Volume m3)
- Flooding between 25m3 and 50m3 Volume for 5yr Return Period Event
- Flooding less than 25m3 Volume for 5yr Return Period Event
- Modelled Manhole does not flood for 5 year Return Period Event
- 75m3 1:5 year Foul/Combined flood volume
- 75m3 1:5 year Storm flood volume
- Historically Reported Flooding Incidents caused by Hydraulic Overloading
- Outfall

Foul/Combined Hydraulic Performance Key

- Foul/Combined Sewer floods for 30 year return period or less.
- Foul/Combined Sewer surcharges for 1 or 2 year return period events
- Foul/Combined Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)

Storm Hydraulic Performance Key

- Storm Sewer floods for 30 year return period or less.
- Storm Sewer surcharges for 1 or 2 year return period events
- Storm Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)
- Area Covered by EDS/DCC Asset Survey

Important Hydraulic Considerations

- Location of Known Basements
- Zoned Residential Land
- Zoned Science/Technology Parks/Land
- Zoned Industrial Land
- Zoned Commercial Land
- Zoned Land for Mixed Development
- Recently Completed Developments

Catchment Deficiency Reference Key

- HP 1 Hydraulic Deficiency Reference No (Foul/Combined) (Not included for EDS/DCC Asset Survey area).
- CSO 1 CSO Deficiency Reference No. (Hydraulic or Environmental)
- OP 1 Operational Deficiency Reference No.

Notes

1. Results are based on assessment of sewer system under 1, 2, 5, 10, 20, 30, 50 and 100 year return period rainfall events.
2. For colour coding, flooding takes priority over surcharging.
3. Levels referenced in meters to Ordnance Survey Datum, which is Mean Sea Level at Malin Head, Co. Donegal (1970 Adjustment).

Project: GREATER DUBLIN STRATEGIC DRAINAGE STUDY

Catchment: CITY CENTRE/DOCKLANDS CATCHMENT

Title: PHASE 3 - 2031 System Performance Assessment

Drg. No: GDSDS/MAR3079/F001/P3-003_Tile3

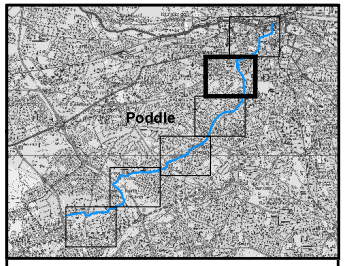
Drawn	JGA
Check	MCB
Approved	MCB
Scale	N.T.S.
Date	7/5/04
Revision	A

Dublin Drainage
A Strategic Study for Greater Dublin

Appendix I (c)

CFRAMS Predictive Flood Mapping

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09PODD00226I	24.72	2.69	25.13	4.59	25.51	6.69
SO14326409	12.9	2.32	13.13	5.88	13.33	9.88
SO14325501	19.63	1.56	19.72	1.68	19.91	1.8
SO14324909	18.27	1.59	18.37	1.63	18.49	1.66
SO14337104	15.42	1.74	15.44	1.78	15.47	1.82



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

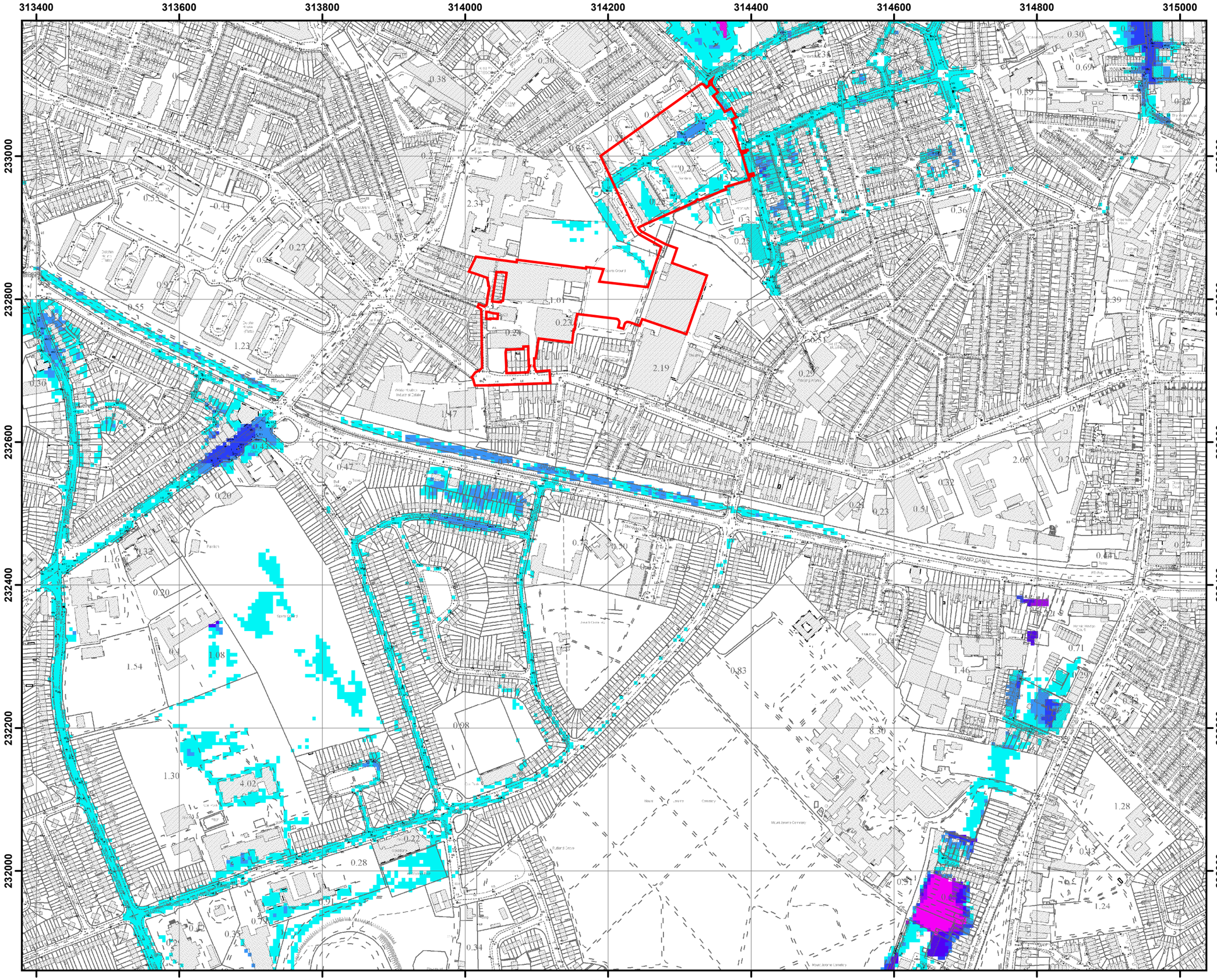
Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

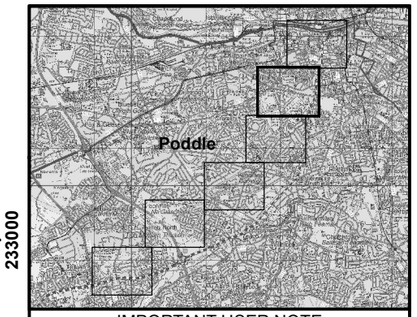
T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Poddle River Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : F.M.C.	Date : 11 August 2016
Checked By : A.S.	Date : 11 August 2016
Approved By : S.P.	Date : 11 August 2016
Drawing No. :	E09POD_EXFCD_F0_05
Map Series :	Page 5 of 6
Drawing Scale :	1:5,000 @A3

0 50 100 200 300 400 500 Metres





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

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F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

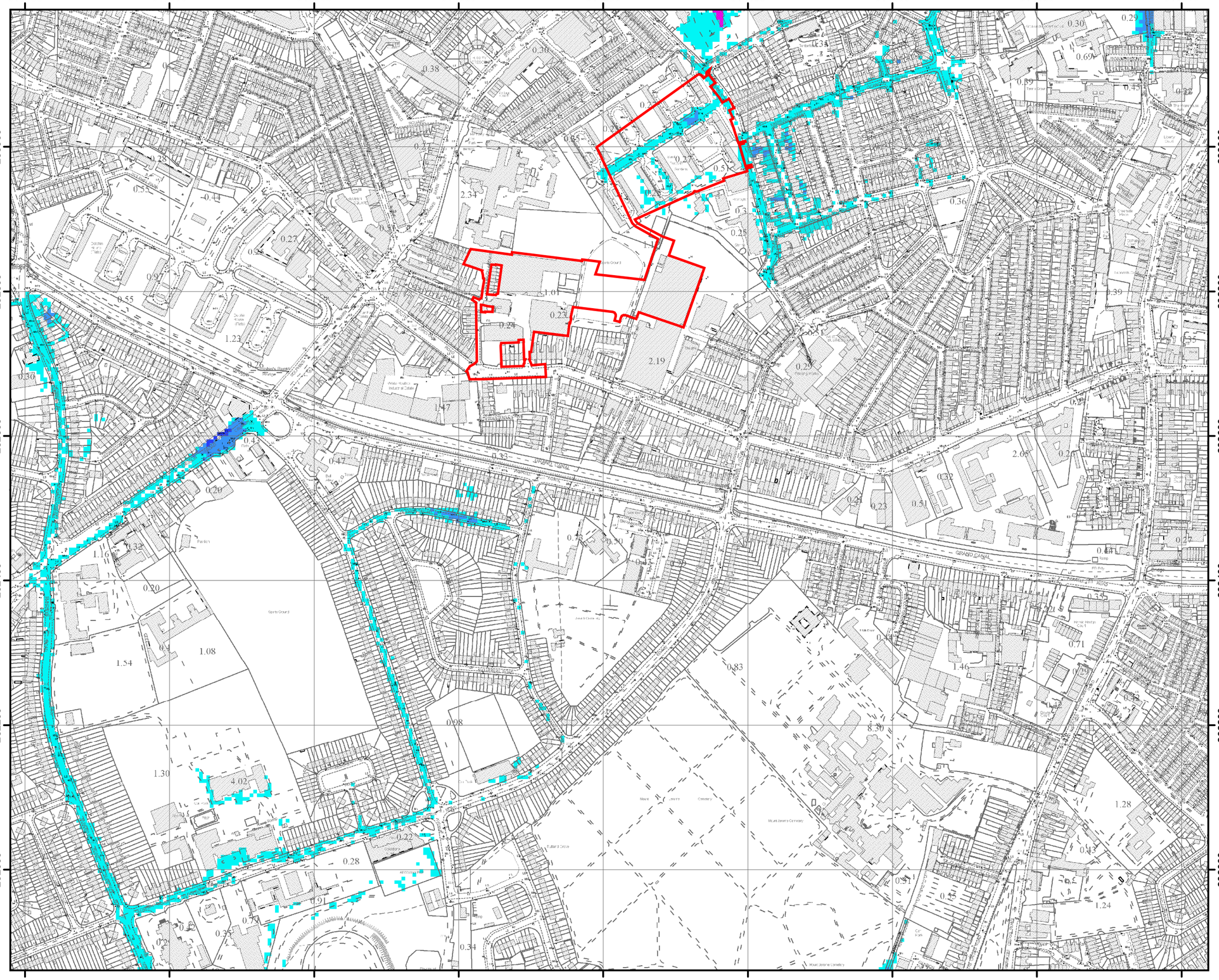
Map:
Poddle River Fluvial Flood Depths

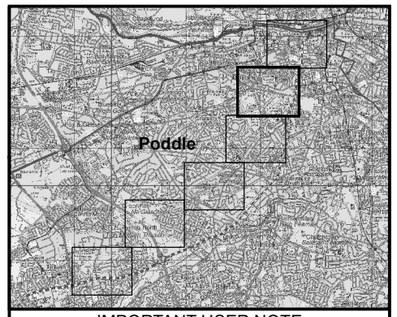
Map Type:	**DEPTH**	
Source:	**FLUVIAL**	
Map Area:	**HPW**	
Scenario:	**CURRENT**	
Drawn By :	**F.M.C.**	**Date : 20 October 2016**
Checked By :	**A.S.**	**Date : 20 October 2016**
Approved By :	**S.P.**	**Date : 20 October 2016**

Drawing No. :
E09POD_DPFCD001_F0_05

Map Series : Page 5 of 6

Drawing Scale : 1:5,000 @ A3





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poibli
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BT12 6RZ

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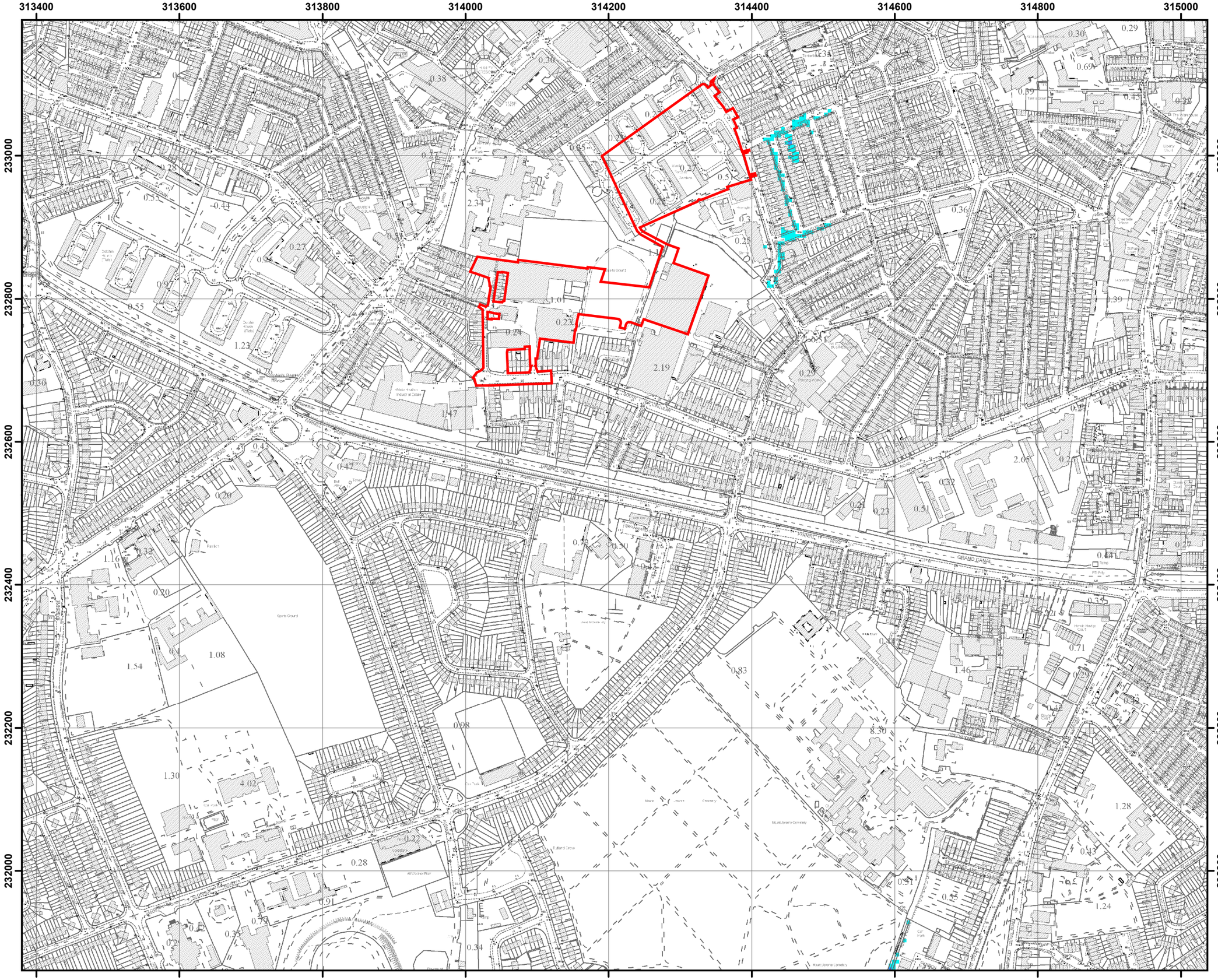
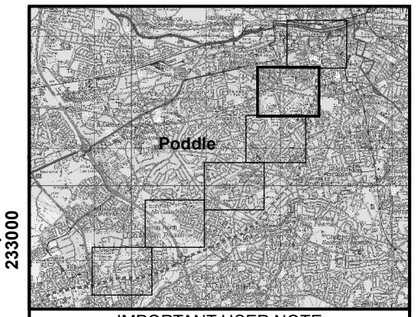
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:	**Poddle River Fluvial Flood Depths**
Map Type:	**DEPTH**
Source:	**FLUVIAL**
Map Area:	**HPW**
Scenario:	**CURRENT**
Drawn By :	**F.M.C.** **Date : 20 October 2016**
Checked By :	**A.S.** **Date : 20 October 2016**
Approved By :	**S.P.** **Date : 20 October 2016**
Drawing No. :	**E09POD_DPFCD010_F0_05**
Map Series :	**Page 5 of 6**
Drawing Scale :	**1:5,000 @ A3**





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

10% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
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The Office of Public Works

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F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Poddle River Fluvial Flood Depths

Map Type:	**DEPTH**	
Source:	**FLUVIAL**	
Map Area:	**HPW**	
Scenario:	**CURRENT**	
Drawn By :	**F.M.C.**	**Date : 20 October 2016**
Checked By :	**A.S.**	**Date : 20 October 2016**
Approved By :	**S.P.**	**Date : 20 October 2016**

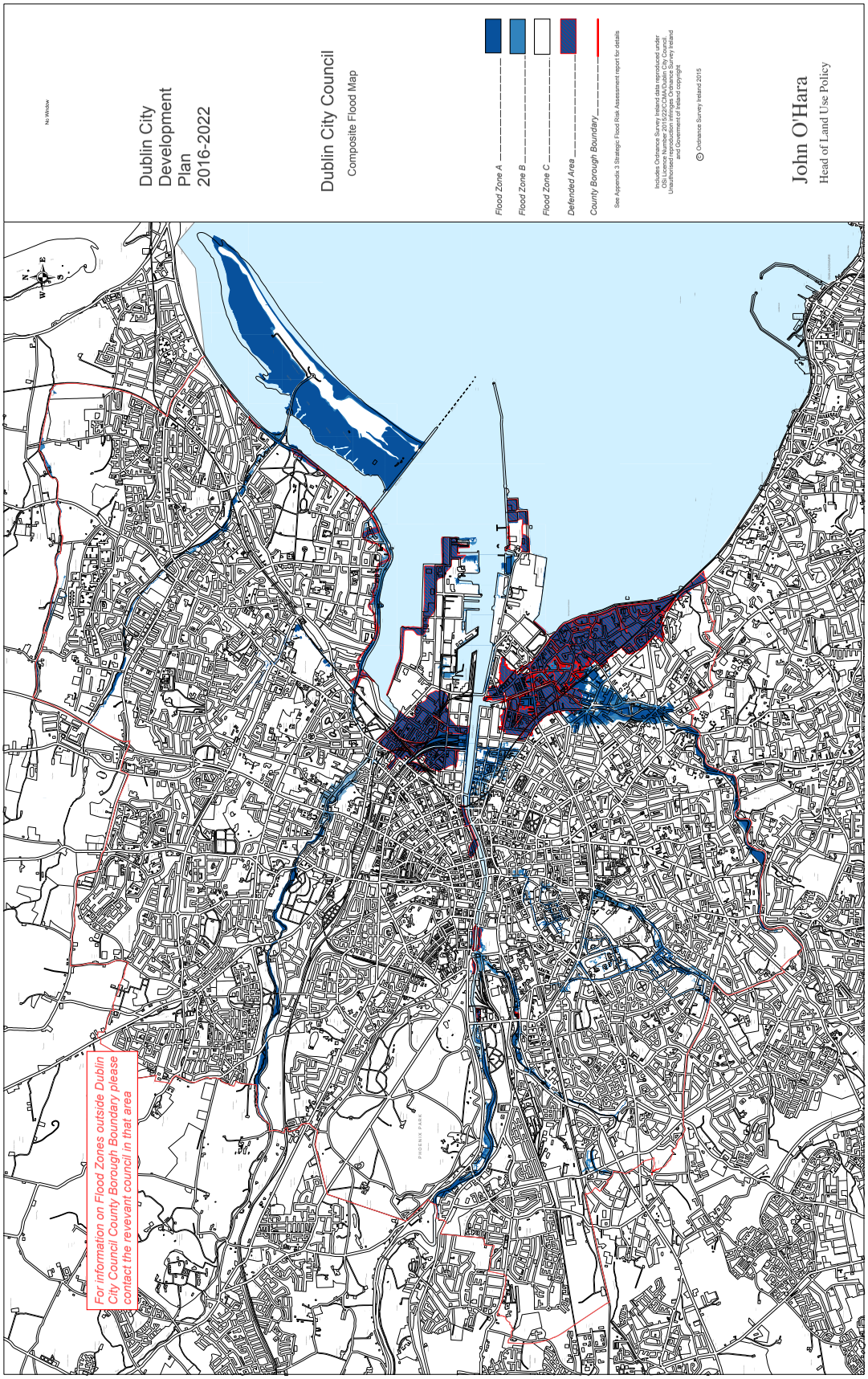
Drawing No. :
E09POD_DPFCD100_F0_05

Map Series : Page 5 of 6

Drawing Scale : 1:5,000 @ A3

Appendix I (d)

Dublin City Development Plan (2016 – 2022) SFRA – Composite Flood Map

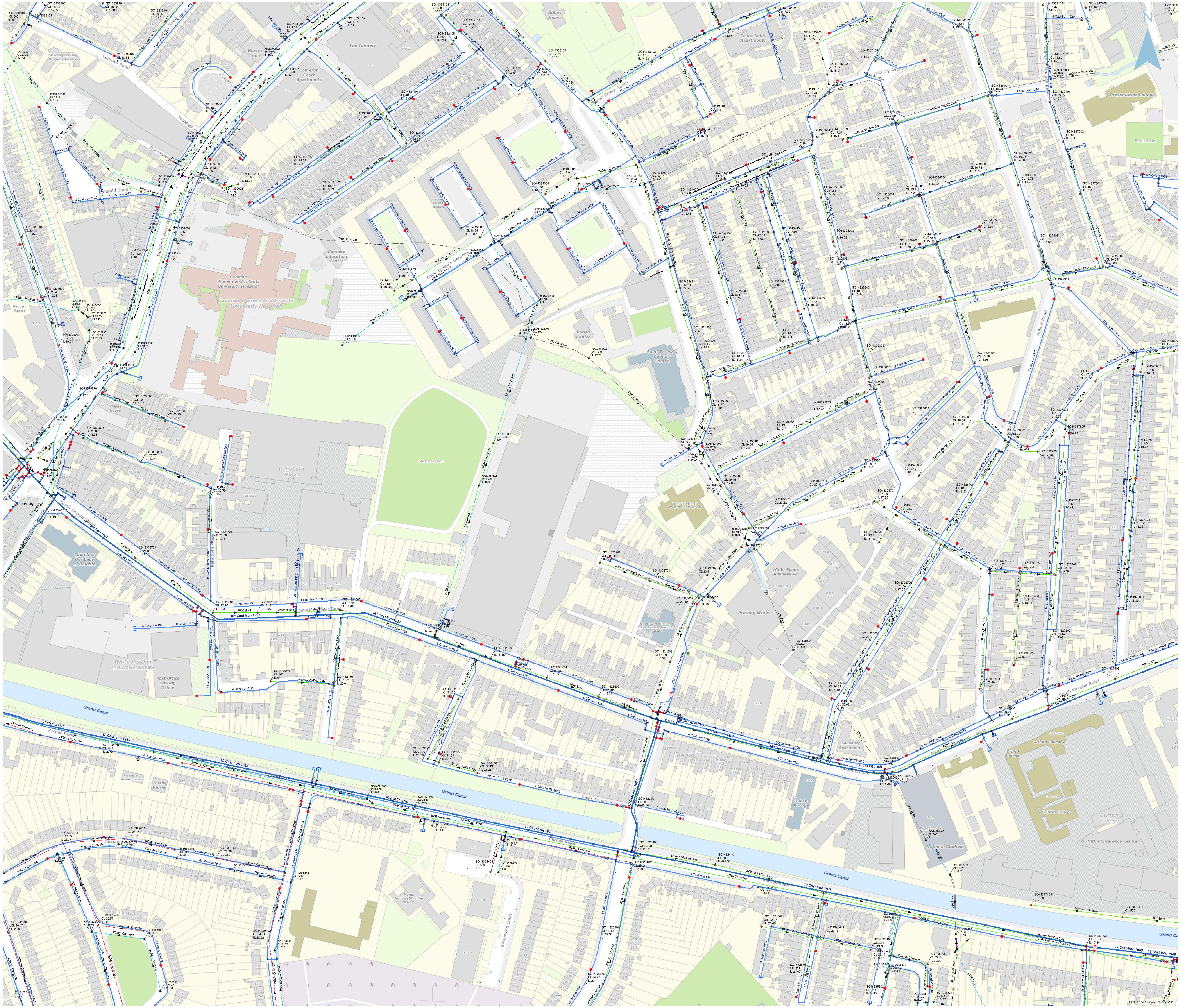

Dublin City Development Plan 2016-2022
Dublin City Council
Composite Flood Map
Flood Zone A
Flood Zone B
Flood Zone C
Defended Area
County Borough Boundary
See Appendix 3 Strategic Flood Risk Assessment report for details
John O'Hara
Head of Land Use Policy
For information on Flood Zones outside Dublin City Council County Borough Boundary please contact the revevant council in that area

Appendix II

Foul Drainage and Water Supply

Appendix II(a)

Public Record Map of Receiving Sewers and Watermains



Legend

UISCE ÉIREANN : IRISH WATER

- Boundary Meter
- Check Meter
- Unknown Meter ; Other Meter
- Non-Return
- Sluice Valve Open
- Sluice Valve Closed
- Butterfly Valve Open
- Sluice Valve Open
- Sluice Valve Closed

Water Hydrants

Hydrant Function

- Fire Hydrant
- Pump Stations
- Telemetry Kiosk
- Cap
- Other Fittings

Water Distribution Mains

Owned By

- Irish Water
- Irish Water
- Irish Water
- Water Abandoned Lines

Sewer Manholes

Manhole Type

- Standard
- Lamphole
- Other; Unknown

Sewer Discharge Points

Discharge Type

- Other; Unknown
- Gravity - Combined
- Gravity - Foul
- Gravity - Overflow

Storm Manholes

Manhole Type

- Standard
- Other; Unknown

Storm Discharge Points

Discharge Type

- Outfall
- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

Storm Inlets

Inlet Type

- Standard

Surface Fittings

Fitting Type

- Other; Unknown

1:1,000 at A0

Last edited: 04/02/2019

Metres

0 25 50 100

2. Whilst every care has been taken in its compilation, Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water.
Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions.This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network 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.

Appendix II (b)

Bailey Gibson Irish Water Pre-Connection Enquiry Application

Pre-connection enquiry form

Business developments, mixed use developments, housing developments

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

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

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

Section A | Applicant details

1 *Applicant details:

Registered company name (if applicable):

DBTR-SCR1 Fund, a Sub-Fund of the CWTC Multi Family ICAV

Trading name (if applicable):

Company registration number (if applicable):

Parent company registered company name (if applicable):

Parent company registration number (if applicable):

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

*Contact name: Claire Pomroy

*Postal address: 70 Sir John Rogersons Quay Dublin 2

*Eircode:

Please provide either a landline or a mobile number

Landline: 01 799 9900

*Mobile:

*Email: Claire.Pomroy@hines.com

2 Agent details (if applicable):

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

*Contact name: CIARAN O'RAFFERTY

Company name (if applicable): BARRETT MAHONY

*Postal address: SANDWITH HOUSE,

52-54 LWR SANDWITH STREET

*Eircode: D02WR26

Please provide either a landline or a mobile number

Landline: 0167732000

*Mobile

*Email: bmce@bmce.ie

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

Applicant ○ Agent ◉

Section B | Site details

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

326-328 SOUTH CIRCULAR ROAD

***Address 2**

***Address 3**

***City/Town** DUBLIN

***County** **Eircode** D08R8H3

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

Eastings (X) 314076 Northings (Y) 232798

Note: Values for Eastings must be between 015,900 and 340,000. Northings, between 029,000 and 362,000

Eg. co-ordinates of GPO, O'Connell St., Dublin: E(X) 315,878 N(Y) 234,619

6 *Local Authority where proposed development is located:

DUBLIN CITY COUNCIL

7 *Has full planning permission been granted? Yes ☐ No ☑

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

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

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

Eg. IDA, HSE, LDA, etc.

Section C | Development details

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

Domestic:

Property type	Number of units	Property type	Number of units
House		Apartments	345
Duplex		Number of Apartment Blocks	

Industry/business:

Property type	Number of units	Property type	Number of units
Agricultural		Brewery / Distillery	
Restaurant / Café / Pub		Car Wash / Valeting	
Creche	1	Data Centre	
Fire Hydrant		Fire Station	
Food Processing		Hotel Accommodation	
Industrial / Manufacturing		Laundry / Laundrette	
Office		Primary Care Centre	
Residential / Nursing Care Home		Retail	1
School		Sports Facility	
Student Accommodation		Warehouse	

Other (please specify type)		No. of Units	

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

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

1	0	8	3		

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

0	1	/	0	2	/	2	0	2	3

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

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

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

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

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

Water only ○ Please go to Section D

Wastewater only ○ Please go to Section E

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

Section D | Water connection and demand details

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

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

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

14 **Approximate date water connection is required:** 0 1 / 1 2 / 2 0 2 3

15 ***What diameter of water connection is required to service the development?** 2 5 0 mm

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

If 'Yes', how many? 3

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

Post-development peak hour water demand	10.75	**l/s**
Post-development average hour water demand	2.15	**l/s**

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

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

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

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

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

2 1 . 8 m

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

4 0 . 3 3 m

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

Please include calculations on the attached sheet provided.

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

Additional fire flow requirements over and above those identified in Q17-18	25	**l/s**

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

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

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

Section E | Wastewater connection and discharge details

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

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

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

25 ***Approximate date that wastewater connection is required:** 01 / 12 / 2023

26 ***What diameter of wastewater connection is required to service the development?** 300 mm

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

If 'Yes', how many?

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

Post-development peak discharge	8.52	**l/s**
Post-development average discharge	1.89	**l/s**

Please include calculations on the attached sheet provided.

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

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

Please include calculations on the attached sheet provided.

30 Wastewater organic load:

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

Temperature range	
pH range	

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

Yes ☐ No ☑

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

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

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

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

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

17.83 m

34 What is the lowest finished floor level on site above Malin Head Ordnance Datum? 19.90 m

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

15.68 m

Section F | Supporting documentation

Please provide the following additional information (all mandatory):

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

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

ii. The boundaries shall be delineated in red.

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

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

> Calculations (calculation sheets provided below). ☑

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

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

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

Section G | Declaration

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

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

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

I/We have enclosed all the necessary supporting documentation.

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

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

Signature: 

Date: 0 3 / 0 5 / 2 0 2 2

Your full name (in BLOCK CAPITALS):

C	I	A	R	A	N		O	'	R	A	F	F	E	R	T	Y															

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

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

Irish Water
PO Box 860
South City Delivery Office
Cork City

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

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

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

Calculations

Water demand

Residential Water Demand Calculation				
No. of Units	345	**with occupancy of**	2.7	
Population Equivalent	=	932	persons	
Domestic Demand Rate	=	150	litres/person/day	
Avg Day/Peak Weekly Demand	=	1.25		
Daily Demand	=	174750	L/day	
Average Demand	=	2.023	L/s	
Peaking Factor	=	5		
Peak Demand	=	10.113	L/s	

Creche Water Demand Calculation				
Area (m^2)	347	**number of children**	102	
No. of children	=	102	children	
1 Staff member per 4.5 children	=	23	staff	
Population Equivalent	=	125	persons	
Domestic Demand Rate	=	50	litres/person/day	
Avg Day/Peak Weekly Demand	=	1.25		
Daily Demand	=	7813	L/Day	
Average Demand	=	0.09	L/s	
Peaking Factor	=	5		
Peak Demand	=	0.450	L/s	

Commercial Water Demand Calculations				
Area (m^2)	485	**with occupancy of 1/19m^2**	19	
Population Equivalent	=	26	persons	
Domestic Demand Rate	=	90	litres/person/day	
Avg Day/Peak Weekly Demand	=	1.25		
Daily Demand	=	2925	L/day	
Average Demand	=	0.034	L/s	
Peaking Factor	=	5		
Peak Demand	=	0.17	L/s	

Water Demand Calculations		
Average Demand	=	2.15
Peak Demand	=	10.75

On-site storage

24 hour water demand storage break tank to MEP consultants details

Fire flow requirements

Standard 25l/s for street hydrants on the public watermains to be constructed in the street network on the site.

Residential Wastewater Discharge Calculation				
No. of Units	345	**with occupancy of**	2.7	
Population Equivalent	=		932	persons
Domestic Demand Rate	=		150	litre/person/day
Avg Day/Peak Weekly Demand	=		1.1	
Daily Demand	=		153780	L/day
Average Demand	=		1.780	L/s
Peaking Factor	=		4.5	
Peak Demand	=		8.009	L/s

Creche Wastewater Discharge Calculation				
Area (m^2)	347	**number of children**	102	
No. of children	=		102	children
1 Staff member per 4.5 children	=		23	staff
Population Equivalent	=		125	persons
Domestic Demand Rate	=		50	litres/person/day
Avg Day/Peak Weekly Demand	=		1.1	
Daily Demand	=		6875	L/Day
Average Demand	=		0.08	L/s
Peaking Factor	=		4.5	
Peak Demand	=		0.360	L/s

Commercial Wastewater Discharge Calculations				
Area (m^2)	485	**with occupancy of 1/19m^2**	19	
Population Equivalent	=		26	persons
Domestic Demand Rate	=		90	litres/person/day
Avg Day/Peak Weekly Demand	=		1.1	
Daily Demand	=		2574	L/day
Average Demand	=		0.03	L/s
Peaking Factor	=		4.5	
Peak Demand	=		0.135	L/s

Vastewater Discharge Calculation		
Average Demand	=	1.89
Peak Demand	=	8.52

Guide to completing the pre-connection enquiry form

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

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

Section A | Applicant Details

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

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

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

Section B | Site details

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

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

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

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

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

Section C | Development details

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

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

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

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

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

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

Section D | Water connection and demand details

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

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

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

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

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

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

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

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

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

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

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

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

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

Section E | Wastewater connection and discharge details

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Section F | Supporting documentation

Please provide additional information as listed.

Section G | Declaration

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

The first water connection is the main connection to provide potable water supply to the development. This is the connection to the 18Inch Cast Iron watermain in the South Circular Road.

The second water connection noted in the application is associated with the existing watermain which currently crosses the proposed pitch and serves the Coombe hospital. This will be diverted to the south side of the pitch to maintain the existing supply to the Coombe. (right hand side of C1032) A diversion Confirmation of Feasibility has already been issued by Irish Water for both the foul sewer and watermain diversions which are required to the north end of the site.

The third water connection is in Rehoboth Avenue (top left corner of drawing C1030). There is a requirement from the fire engineering consultant to provide two sources of supply to the hydrants providing coverage to the development. This connection will remain closed during normal operation, as noted on the drawing. This was agreed with the SODA team in their review.

To facilitate new peak foul flows from the proposed Bailey Gibson Development of 8.52l/s to the combined sewer culvert in Donore Avenue, an offset equivalent surface area with stormwater runoff currently discharging to the same culvert will be removed and directed to the surface water network with attenuated discharge details to be agreed with the local authority engineers. The surface area where SW drainage will be removed and redirected to the surface water network is calculated as follows:

Offset ration 3SW to 1F
Rainfall intensity from 1 Year 15min storm = 5.8mm
Runoff Coefficient = 0.9
Area = 8.52*3/5.8/4*60*60/.9=4470m2

The existing area of SW discharge to the combined sewer in Donore Avenue has been proven by dye testing and inspected by Mr. Colum Creaven of Irish Water already.

Notes

Appendix II (c)

Irish Water Confirmation of Feasibility Letter

Ciaran O'Rafferty

Barrett Mahony Consulting Engineers
52-54 Sandwith St. Lower
Dublin 2
D02WR26

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

11 May 2022

Re: CDS22003138 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 347 units at 326-328, South Circular Road, Dublin

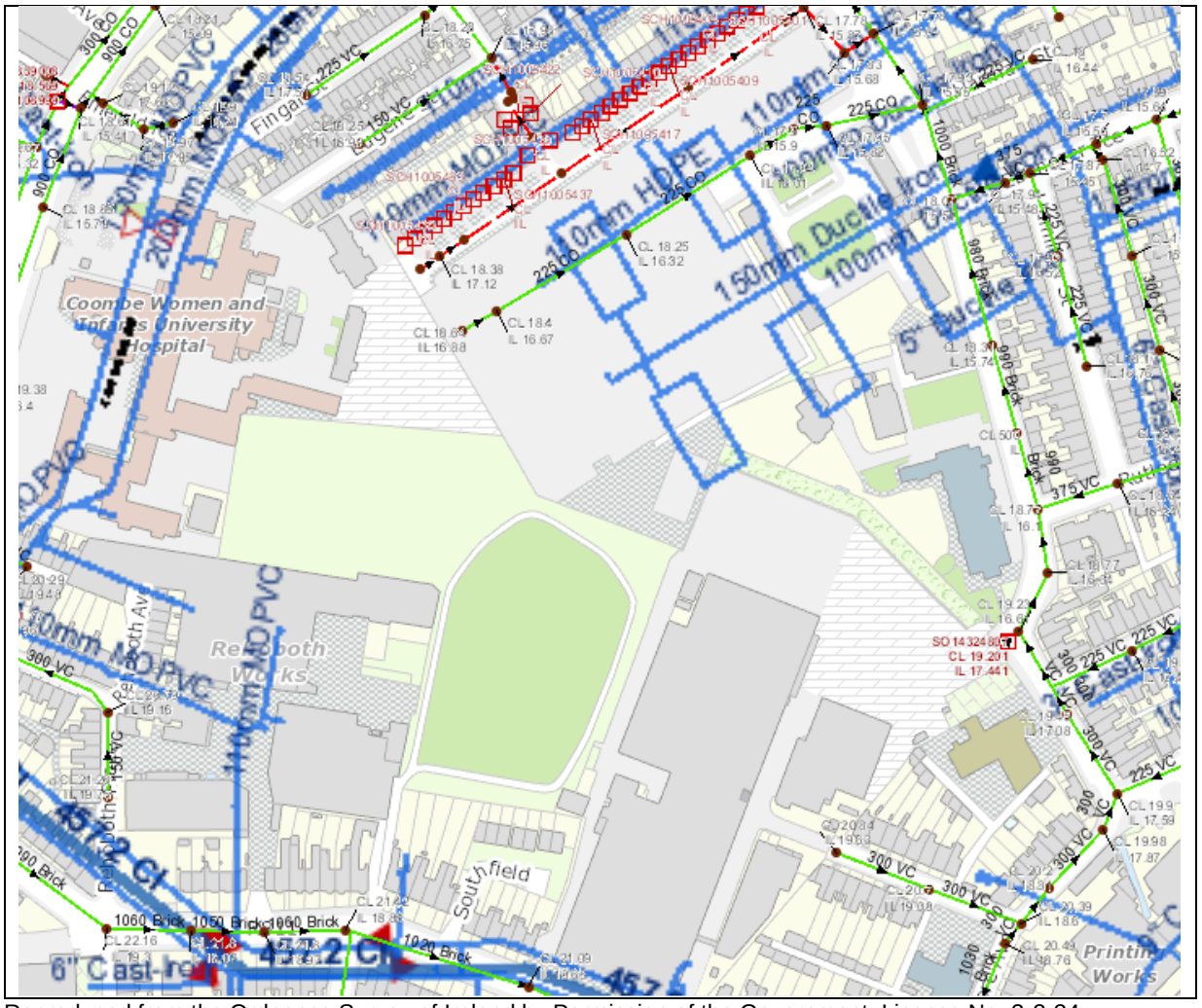
Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at 326-328, South Circular Road, Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
Water Connection	The proposed Development indicates that Irish Water assets are present on the site. The Developer has to demonstrate that proposed structures and works will not inhibit access for maintenance or endanger structural or functional integrity of the assets during and after the works. Drawings (showing clearance distances, changing to ground levels) and Method

	Statements should be included in the Detailed Design of the Development. A wayleave in favour of Irish Water will be required over the assets that are not located within the Public Space. For design submissions and queries related to diversion/build near or over, please contact IW Diversion Team via email address diversions@water.ie
Wastewater Connection	Removal of storm water in the existing combined network to facilitate the provision of capacity will be required. Minimum reduction should be at a ratio of 3 SW:1 WW-peak for design flow 1 in 1-year event. Further information, verified by surveys, should be provided at a connection application stage and before any existing infrastructure is demolished, regarding the current storm connection. Separate storm and foul water connection services should be provided for the Development. Storm water from the site must be discharged only into the existing storm water network or associated alternative to a combined drainage discharge. The connection arrangement should be agreed with Dublin City County Council Drainage Division. Proposed basement car park should be designed such that surface water from the site and/or surrounding areas cannot flow down to the car park. Wastewater from the car park (contaminated water generated from run off from cars/tyres) must be pumped to ground level to discharge by gravity to the Irish Water Network via a petrol interceptor. The proposed Development indicates that Irish Water assets are present on the site. The Developer has to demonstrate that proposed structures and works will not inhibit access for maintenance or endanger structural or functional integrity of the assets during and after the works. Drawings (showing clearance distances, changing to ground levels) and Method Statements should be included in the Detailed Design of the Development. A wayleave in favour of Irish Water will be required over the assets that are not located within the Public Space. For design submissions and queries related to diversion/build near or over, please contact IW Diversion Team via email address diversions@water.ie
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 that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.	

The map included below outlines the current Irish Water infrastructure adjacent to your site:



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

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network 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.

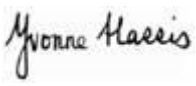
General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**

2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Marina Byrne from the design team via email mzbyrne@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations

Appendix II (d)

Irish Water Statement of Design Acceptance

Malcolm McCabe
70 Sir John Rogersons Quay
Dublin
Co. Dublin

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

2 June 2022

Re: Design Submission for 326-328 South Circular Road, Dublin, Co. Dublin (the "Development")
(the "Design Submission") / Connection Reference No: CDS22003138

Dear Malcolm McCabe,

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: Dario Alvarez
Email: dalvarez@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

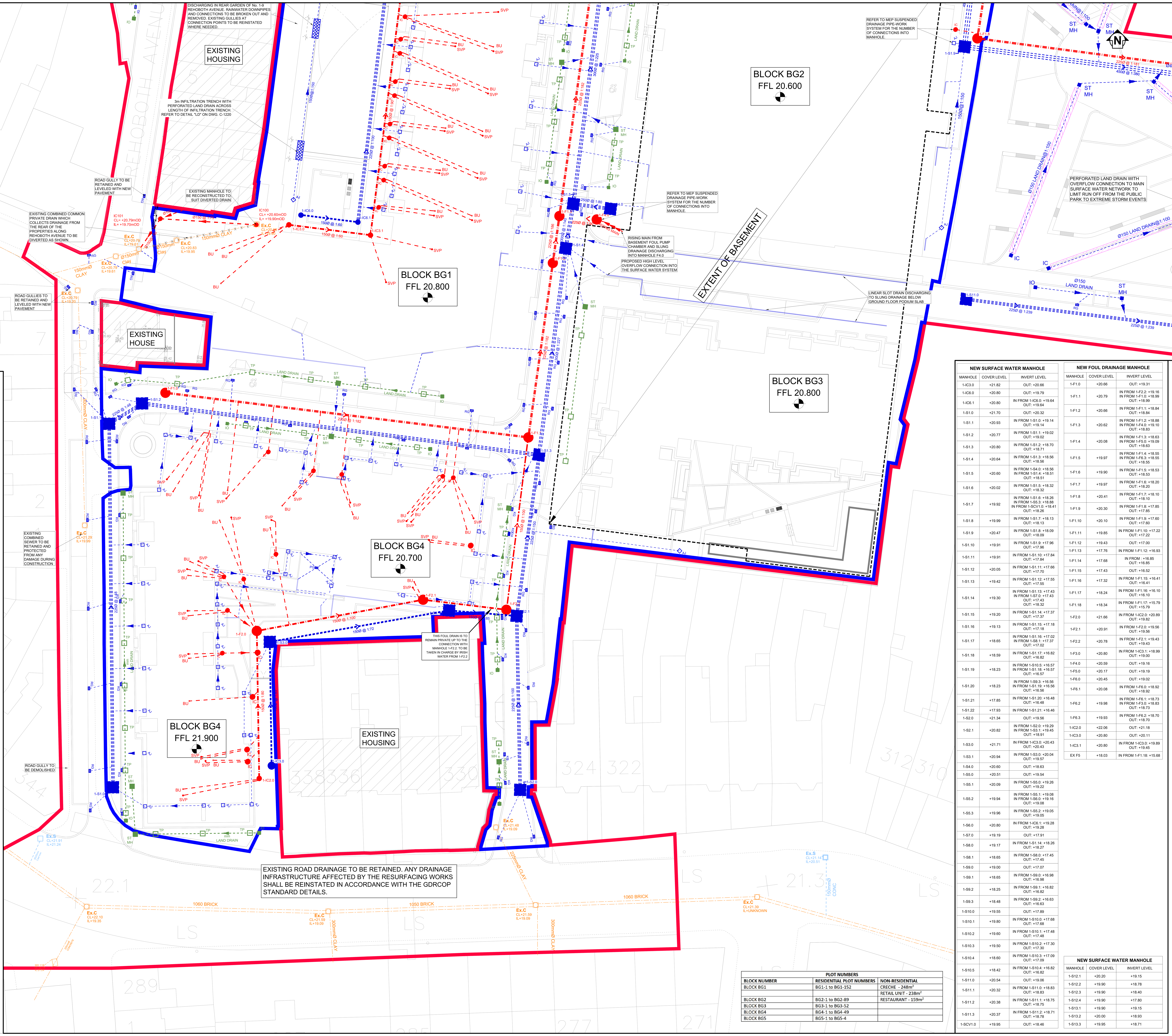
Document Title & Revision

- [**BGL-BMD-ZZ-00-DR-C-1030 Rev. PL6**]
- [**BGL-BMD-ZZ-00-DR-C-1031 Rev. PL6**]
- [**BGL-BMD-ZZ-00-DR-C-1032 Rev. PL6]**
- [**BGL-BMD-ZZ-00-DR-C-1020 Rev. PL6]**
- [**BGL-BMD-ZZ-00-DR-C-1021 Rev. PL6]**
- [**BGL-BMD-ZZ-00-DR-C-1022 Rev. PL6]**
- [**BGL-BMD-ZZ-00-DR-C-1120 Rev. PL4]**
- [**BGL-BMD-ZZ-00-DR-C-1121 Rev. PL4]**

Standard Details/Code of Practice Exemption: N/A

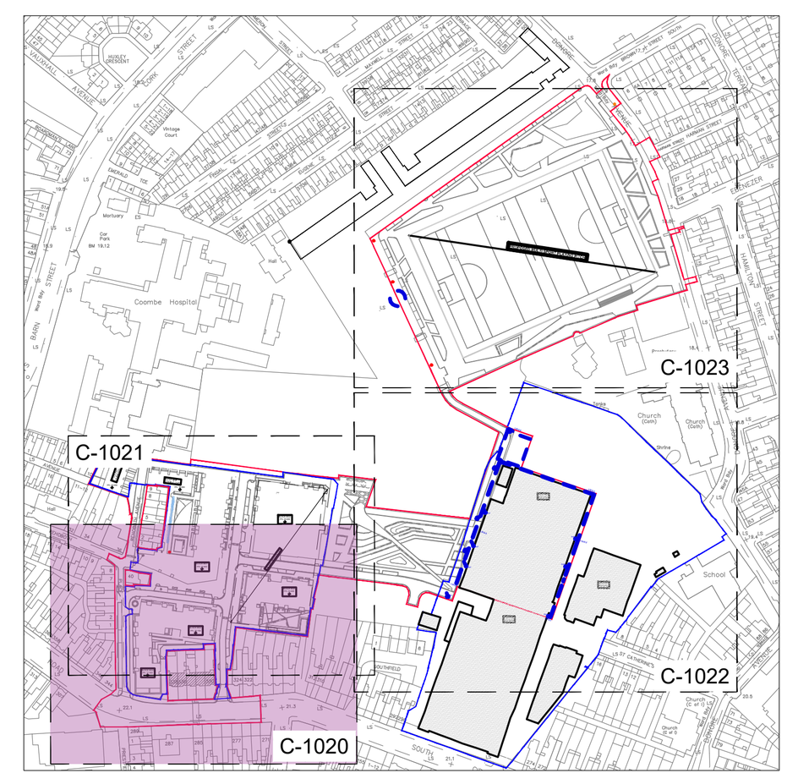
For further information, visit ***www.water.ie/connections***

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.



NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECT'S DRAWINGS.FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - `ASK'.
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.



KEY PLAN
SCALE @ A0: 1:5000
SCALE @ A2: 1:10000

DRAINAGE NOTES

1. SURFACE WATER DRAINS TO BE AS SPECIFIED ON DRAWING BGL-BMD-ZZ-ZZ-DR-C-1220 & 1222.
2. FOUL DRAINS TO BE UNPLASTICISED PVC PIPES TO IS EN 1401 2009/2012 CLASS SN8 IN LINE WITH THE REQUIREMENTS OF IRISH WATER CODE OF PRACTICE FOR WASTEWATER.
3. PIPE DIAMETERS SHOWN ON DRAINAGE LAYOUTS ARE REQUIRED MINIMUM INTERNAL DIAMETERS (MM).
4. ALL DRAINS WITH COVER LESS THAN 0.5M IN GARDENS/ PATHWAYS AND 1.2M UNDER ROADS TO BE BEDDED & SURROUNDED IN C16/20 CONCRETE AS PER BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1220 & 1222 AND SPECIFICATIONS.
5. DUBLIN CITY COUNCIL SURFACE WATER MANHOLES (LOCATED UNDER ALL ROADS) TO BE HIGH DENSITY BLOCKWORK TO IS 20 PART1:1987 OR CAST IN SITU CLASS 30N / 20MM IN LINE WITH THE GREATER DUBLIN REGION (GDR) CODE OF PRACTICE FOR DRAINAGE. REFER TO SUPPORTING DOCUMENTATION AND BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1220 & 1222. ALL MANHOLES TO BE WATERTIGHT STRUCTURES.
6. ALL FOUL DRAINAGE & WATERMAINS OUTSIDE THE BUILDING FOOTPRINT TO BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER DETAILS & CODES OF PRACTICE.
7. INSPECTION CHAMBERS (IC / AJ) TO BE POLYPROPYLENE 0.5M INTERNAL DIAMETER, MAXIMUM OF 1.0M DEEP. 150MM THICK C16 / 20 CONCRETE BED AND SURROUND.
8. SILT TRAP MANHOLES (ST MH) TO BE CAST IN SITU CONCRETE CL.30N / 20MM IN LINE WITH THE GREATER DUBLIN REGION (GDR) CODE OF PRACTICE FOR DRAINAGE. PIT TO BE 0.5M DEEP (BELOW OUTLET INVERT LEVEL).
9. TREE PITS (TP) TO BE PROPRIETARY UNITS, REFER TO BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1221. INSPECTION OPENINGS (IO) ADJACENT TO TREE PITS TO BE DUCTILE IRON COVERS/FRAMES, MIN CLASS D400 TO IS EN 124:2 2015.
10. MANHOLE COVERS IN TRAFFICKED AREAS TO BE MIN CLASS D400 TO IS EN 124:2 2015 DUCTILE IRON COVERS/ FRAMES, ALL OTHER AREAS TO BE MIN CLASS C250. MANHOLE COVERS IN CARRIAGEWAYS TO HAVE POLYESTER RESIN BEDDING MATERIAL FOR FIXING MANHOLE FRAMES AS PER BMCE CIVIL SPECIFICATION.
11. ROAD GULLIES TO BE CONSTRUCTED OF 215MM ENGINEERING BLOCKS OR 225MM MASS CONCRETE TO GDR CODE OF PRACTICE FOR DRIANAGE, COVER/FRAME TO BE DUCTILE IRON WITH MIN CLASS D400 TO IS EN 124:2 2015. REFER TO SUPPORTING DOCUMENTATION AND BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1210.
12. DRAINS FROM AJ's / IC's TO MAIN LINES TO BE 100mm DIAMETER UPVC (UNLESS OTHERWISE SHOWN ON LAYOUT), BED AND SURROUNDED IN 150mm CONCRETE.
13. LAND DRAIN TO BE 100 DIA. UPVC PERFORATED PIPES, BED & SURROUND IN 150MM THICK PEA GRAVEL & WRAPPED IN TERRAM 1000 OR SIMILAR APPROVED GEOTEXTILE.
14. INFILTRATION TRENCH TO BE GRANULAR FILL MATERIAL TO TII SPECIFICATION TO CLAUSE 505 TYPE B. TRENCH TO BE 400MM DEEP BY 700MM WIDE, UNLESS OTHERWISE SHOWN ON THIS DRAWING.
15. ALL TRENCHES IN ROADS TO BE BACKFILLED TO FORMATION LEVEL WITH CLAUSE 808 MATERIAL TO TII SPECIFICATION.
16. DIMENSIONED POSITION OF BUILDER'S UPSTAND (PU / SVP/ RWP) & STACKS TO BE PROVIDED BY THE ARCHITECT.
17. CONNECTIONS FROM PU'S / RWP'S TO BE 100 DIA. UPVC PIPES UNLESS OTHERWISE SHOWN. FOUL DRAIN CONNECTIONS FROM PU'S (WASTE AND OR SOIL) TO EXTERNAL MANHOLES OR INSPECTION CHAMBERS TO BE LAID TO A MINIMUM FALL OF 1 IN 40. RWP'S CONNECTIONS TO EXTERNAL SYSTEM TO BE LAID TO A MINIMUM FALL OF 1 IN 100.
18. MANHOLE COVERS / INSPECTION CHAMBERS TO MATCH FINISHED LEVELS OF EXTERNAL PAVING, ROAD, HARDSTANDING OR LANDSCAPED AREAS
    COVER LEVELS ARE INDICATIVE ONLY.
19. PRIOR TO COMPLETION OF DRAINAGE CONSTRUCTION ON SITE THE CONTRACTOR SHALL COMPLETE THE NEXT LIST OF WORKS IN ACCORDANCE WITH THE SPECIFICATION:
    - CLEANSE THE SYSTEM.
    - TEST ALL PIPE WORK
    - CARRY OUT A CCTV INSPECTION
    - COMPLETE A SET OF AS CONSTRUCTED DRAWINGS
20. THE CONTRACTOR SHALL BE ENTIRELY RESPONSIBLE FOR LOCATING THE POSITIONS OF ALL EXISTING SERVICES AND SHALL, IF REQUIRED BY THE ENGINEER/CLIENT, REPRESENTATIVE CARRY OUT A SURVEY OF THE SITE TO LOCATE THESE SERVICES INCLUDING WHERE REQUIRED RATES FOR CARRYING OUT EXCAVATION IN ROADS, AND ELSEWHERE WHERE SERVICES ARE ENCOUNTERED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIVERSION OF EXISTING SERVICES ENCOUNTERED DURING THE COURSE OF THE WORK.
21. ALL EXISTING SERVICES SHOWN ON THE GPR SURVEY PROVIDED IN THE SUPPORTING DOCUMENTATION AND NOT SHOWN ON THIS DRAWING, TO BE BROKEN AND REMOVED.
22. ALL EXISTING DCC AND IRISH WATER SEWERS TO BE MAINTAINED AND KEPT ALIVE DURING WORKS.
23. ALL STACKS TO BE RODDABLE ABOVE SLAB LEVEL.
24. MINIMUM DISTANCE BETWEEN BRANCH CONNECTIONS TO THE MAIN LINES TO BE 300mm.
25. ALL BRANCH CONNECTIONS TO MAIN LINE FOUL SEWER TO BE BY MEANS OF 45 DEGREE "Y" BRANCH CONNECTIONS ONLY.
26. ALL FINAL FOUL INSPECTION CHAMBERS WITHIN THE CURTILAGE OF EACH PROPERTY TO BE IN ACCORDANCE WITH IRISH WATER'S STANDARD DETAILS FOR INSPECTION CHAMBERS.
27. THE CONTRACTOR SHALL NOTE THE TESTING REQUIREMENTS, WHICH SHALL APPLY TO BOTH FOUL AND SURFACE WATER NETWORKS, AS OUTLINED IN THE IRISH WATER QUALITY ASSURANCE FIELD INSPECTION REQUIREMENTS MANUAL AND ALLOW FOR ALL COSTS ASSOCIATED WITH TESTING AND COMMISSIONING. THE CONTRACTOR SHALL NOTE THAT IRISH WATER NOW REQUIRE A CHARTERED ENGINEER TO CERTIFY INSTALLATION / TESTING, MATERIALS COMPLIANCE AND WORKMANSHIP.
28. THE CONTRACTOR SHALL PREPARE ALL FINAL DOCUMENTS PRIOR TO HANDOVER FOR SUBMISSION TO IRISH WATER AS OUTLINED IN APPENDIX 4 OF THE IRISH WATER QUALITY ASSURANCE FIELD INSPECTION REQUIREMENTS MANUAL. IN PARTICULAR, THE CONTRACTOR SHALL NOTE THE REQUIREMENTS FOR MANHOLE INTEGRITY TESTS, PIPELINE AIR TESTS, MANHOLE INSPECTION CARDS, CCTV SURVEYS OF COMPLETED PIPE WORK, AND AS CONSTRUCTED DRAWINGS.

PLOT NUMBERS

BLOCK NUMBER	RESIDENTIAL PLOT NUMBERS	NON-RESIDENTIAL
BLOCK BG1	BG1-1 to BG1-152	CRECHE - 248m²
		RETAIL UNIT - 238m²
BLOCK BG2	BG2-1 to BG2-89	RESTAURANT - 159m²
BLOCK BG3	BG3-1 to BG3-52	
BLOCK BG4	BG4-1 to BG4-49	
BLOCK BG5	BG5-1 to BG5-4	

NEW SURFACE WATER MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-IC3.0	+21.82	OUT: +20.66
1-IC6.0	+20.80	OUT: +19.79
1-IC6.1	+20.80	IN FROM 1-IC6.0: +19.64 OUT: +19.64
1-S1.0	+21.70	OUT: +20.32
1-S1.1	+20.93	IN FROM 1-S1.0: +19.14 OUT: +19.14
1-S1.2	+20.77	IN FROM 1-S1.1: +19.02 OUT: +19.02
1-S1.3	+20.80	IN FROM 1-S1.2: +18.70 OUT: +18.71
1-S1.4	+20.64	IN FROM 1-S1.3: +18.56 OUT: +18.56
1-S1.5	+20.60	IN FROM 1-S4.0: +18.56 IN FROM 1-S1.4: +18.51 OUT: +18.51
1-S1.6	+20.02	IN FROM 1-S1.5: +18.32 OUT: +18.32
1-S1.7	+19.92	IN FROM 1-S1.6: +18.26 IN FROM 1-S5.3: +18.88 IN FROM 1-SCV1.0: +18.41 OUT: +18.26
1-S1.8	+19.99	IN FROM 1-S1.7: +18.13 OUT: +18.13
1-S1.9	+20.47	IN FROM 1-S1.8: +18.09 OUT: +18.09
1-S1.10	+19.91	IN FROM 1-S1.9: +17.96 OUT: +17.96
1-S1.11	+19.91	IN FROM 1-S1.10: +17.84 OUT: +17.84
1-S1.12	+20.05	IN FROM 1-S1.11: +17.66 OUT: +17.70
1-S1.13	+19.42	IN FROM 1-S1.12: +17.55 OUT: +17.55
1-S1.14	+19.30	IN FROM 1-S1.13: +17.43 IN FROM 1-S7.0: +17.43 OUT: +17.43 OUT: +18.32
1-S1.15	+19.20	IN FROM 1-S1.14: +17.37 OUT: +17.37
1-S1.16	+19.13	IN FROM 1-S1.15: +17.18 OUT: +17.18
1-S1.17	+18.65	IN FROM 1-S1.16: +17.02 IN FROM 1-S8.1: +17.37 OUT: +17.02
1-S1.18	+18.59	IN FROM 1-S1.17: +16.82 OUT: +16.82
1-S1.19	+18.23	IN FROM 1-S10.5: +16.57 IN FROM 1-S1.18: +16.57 OUT: +16.57
1-S1.20	+18.23	IN FROM 1-S9.3: +16.56 IN FROM 1-S1.19: +16.56 OUT: +16.56
1-S1.21	+17.85	IN FROM 1-S1.20: +16.48 OUT: +16.48
1-S1.22	+17.93	IN FROM 1-S1.21: +16.46
1-S2.0	+21.34	OUT: +19.56
1-S2.1	+20.82	IN FROM 1-S2.0: +19.29 IN FROM 1-S3.1: +19.45 OUT: +18.91
1-S3.0	+21.71	IN FROM 1-IC3.0: +20.43 OUT: +20.43
1-S3.1	+20.94	IN FROM 1-S3.0: +20.04 OUT: +19.57
1-S4.0	+20.60	OUT: +18.63
1-S5.0	+20.51	OUT: +19.54
1-S5.1	+20.09	IN FROM 1-S5.0: +19.26 OUT: +19.22
1-S5.2	+19.94	IN FROM 1-S5.1: +19.08 IN FROM 1-S6.0: +19.16 OUT: +19.08
1-S5.3	+19.96	IN FROM 1-S5.2: +19.05 OUT: +19.05
1-S6.0	+20.80	IN FROM 1-IC6.1: +19.28 OUT: +19.28
1-S7.0	+19.19	OUT: +17.91
1-S8.0	+19.17	IN FROM 1-S1.14: +18.26 OUT: +18.27
1-S8.1	+18.65	IN FROM 1-S8.0: +17.45 OUT: +17.45
1-S9.0	+19.00	OUT: +17.07
1-S9.1	+18.65	IN FROM 1-S9.0: +16.98 OUT: +16.98
1-S9.2	+18.25	IN FROM 1-S9.1: +16.82 OUT: +16.82
1-S9.3	+18.48	IN FROM 1-S9.2: +16.63 OUT: +16.63
1-S10.0	+19.55	OUT: +17.89
1-S10.1	+19.80	IN FROM 1-S10.0: +17.68 OUT: +17.68
1-S10.2	+19.60	IN FROM 1-S10.1: +17.48 OUT: +17.48
1-S10.3	+19.50	IN FROM 1-S10.2: +17.30 OUT: +17.30
1-S10.4	+18.60	IN FROM 1-S10.3: +17.09 OUT: +17.09
1-S10.5	+18.42	IN FROM 1-S10.4: +16.82 OUT: +16.82
1-S11.0	+20.54	OUT: +19.06
1-S11.1	+20.32	IN FROM 1-S11.0: +18.83 OUT: +18.83
1-S11.2	+20.38	IN FROM 1-S11.1: +18.75 OUT: +18.75
1-S11.3	+20.37	IN FROM 1-S11.2: +18.71 OUT: +18.78
1-SCV1.0	+19.95	OUT: +18.46

NEW FOUL DRAINAGE MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-F1.0	+20.66	OUT: +19.31
1-F1.1	+20.79	IN FROM 1-F2.2: +19.16 IN FROM 1-F1.0: +18.99 OUT: +18.99
1-F1.2	+20.66	IN FROM 1-F1.1: +18.84 OUT: +18.84
1-F1.3	+20.62	IN FROM 1-F1.2: +18.88 IN FROM 1-F4.0: +19.10 OUT: +18.83
1-F1.4	+20.08	IN FROM 1-F1.3: +18.63 IN FROM 1-F5.0: +19.09 OUT: +18.63
1-F1.5	+19.97	IN FROM 1-F1.4: +18.55 IN FROM 1-F6.3: +18.55 OUT: +18.55
1-F1.6	+19.90	IN FROM 1-F1.5: +18.53 OUT: +18.53
1-F1.7	+19.97	IN FROM 1-F1.6: +18.20 OUT: +18.20
1-F1.8	+20.41	IN FROM 1-F1.7: +18.10 OUT: +18.10
1-F1.9	+20.30	IN FROM 1-F1.8: +17.85 OUT: +17.85
1-F1.10	+20.10	IN FROM 1-F1.9: +17.60 OUT: +17.60
1-F1.11	+19.85	IN FROM 1-F1.10: +17.22 OUT: +17.22
1-F1.12	+19.43	OUT: +17.00
1-F1.13	+17.76	IN FROM 1-F1.12: +16.93
1-F1.14	+17.68	IN FROM : +16.85 OUT: +16.85
1-F1.15	+17.43	OUT: +16.52
1-F1.16	+17.32	IN FROM 1-F1.15: +16.41 OUT: +16.41
1-F1.17	+18.24	IN FROM 1-F1.16: +16.10 OUT: +16.10
1-F1.18	+18.34	IN FROM 1-F1.17: +15.79 OUT: +15.79
1-F2.0	+21.66	IN FROM 1-IC2.0: +20.89 OUT: +19.82
1-F2.1	+20.91	IN FROM 1-F2.0: +19.56 OUT: +19.56
1-F2.2	+20.78	IN FROM 1-F2.1: +19.43 OUT: +19.43
1-F3.0	+20.80	IN FROM 1-IC3.1: +18.99 OUT: +19.00
1-F4.0	+20.59	OUT: +19.16
1-F5.0	+20.17	OUT: +19.19
1-F6.0	+20.45	OUT: +19.02
1-F6.1	+20.08	IN FROM 1-F6.0: +18.92 OUT: +18.92
1-F6.2	+19.98	IN FROM 1-F6.1: +18.73 IN FROM 1-F3.0: +18.83 OUT: +18.73
1-F6.3	+19.93	IN FROM 1-F6.2: +18.70 OUT: +18.70
1-IC2.0	+22.06	OUT: +21.18
1-IC3.0	+20.80	OUT: +20.11
1-IC3.1	+20.80	IN FROM 1-IC3.0: +19.89 OUT: +19.45
EX F5	+18.03	IN FROM 1-F1.18: +15.68

NEW SURFACE WATER MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-S12.1	+20.20	+19.15
1-S12.2	+19.90	+18.78
1-S12.3	+19.90	+18.40
1-S12.4	+19.90	+17.80
1-S13.1	+19.90	+19.15
1-S13.2	+20.00	+18.93
1-S13.3	+19.95	+18.71

CIVIL LEGEND

- NEW FOUL MANHOLE — F
- NEW FOUL PIPE — PIPE DESCRIPTION
- EX. SURFACE WATER MANHOLE — Ex.S
- EX. SURFACE WATER PIPE — PIPE DESCRIPTION
- NEW SURFACE WATER MANHOLE — S
- NEW SURFACE WATER PIPE — PIPE DESCRIPTION
- EX. COMBINED MANHOLE — Ex.C
- EX. COMBINED PIPE — PIPE DESCRIPTION
- NEW RISING MAIN — PIPE DESCRIPTION
- DECOMMISSIONED LINE — PIPE DESCRIPTION
- FOUL INSPECTION CHAMBER — IC
- SURFACE ACCESS JUNCTION — AJ
- RAINWATER PIPE — RWP
- SOIL VENT PIPE — SVP
- ROAD GULLEY — RG
- SURFACE RODDING EYE — RE
- GULLEY TRAP — GT
- NEW SIDE INLET KERB GULLY — KG
- PAVEMENT GULLY — PG
- DRAINAGE CHANNEL
- PROPOSED INSPECTION OPENING — IO
- 150mmØ PERFORATED uPVC CONVEYANCE PIPE BENEATH BASE OF TREE PIT
- NEW TREE PIT — TP
- SILT TRAP MANHOLE — ST MH
- EXISTING BUILDING
- BAILEY GIBSON SITE BOUNDARY
- OWNERSHIP LINE
- BASEMENT OUTLINE

ISSUE	DATE	DESCRIPTION	BY
PL6	31.05.22	PLANNING ISSUE	KS
PL5	16.03.22	UPDATED AS PER IW COMMENTS	TN
PL4	24.02.22	IW DIVERSIONS TEAM COMMENTS	TN
PL3	20.01.22	ISSUED FOR IW DESIGN VETTING	TN
PL2	10.12.21	ISSUED FOR IW DESIGN VETTING	TN
PL1	09.11.21	ISSUED FOR PRE-APPLICATION SUBMISSION	TN

Project Engineer: CIARAN O'RAFFERTY
Project Director: CIARAN KENNEDY

BM STAGE **PLANNING**

BARRETT MAHONY
Dublin Office:
Sandwith House, 52-54 Lower Sandwith Street, Dublin 2, Ireland.
Tel: (01) 677 3200 Fax: (01) 677 3164
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Consulting Engineers, Civil . Structural . Project Management.E-mail: bmce@bmce.ie Web: www.bmce.ie
QAS INTERNATIONAL ISO 9001:2008 REGISTERED COMPANY Certificate No. IRE1213
The Institution of Structural Engineers
ACEI
FIDIC International Federation of Consulting Engineers

CLIENT
CWTC MULTI FAMILY ICAV ACTING SOLELY IN RESPECT OF ITS SUB FUND DBTR SCR1 FUND

PROJECT TITLE
BAILEY GIBSON SHD 2

BM PROJECT No. **19117**

MODEL REFERENCE	SUITABILITY	REVISION
BGL-BMD-ZZ-00-DR-C-1020-1022 & 1120-1122	S1	P01

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT (SHEET 1 OF 4)

DWG DRAWING REFERENCE	STATUS	REVISION
BGL-BMD-ZZ-00-DR-C-1020	D2	PL6

PROPOSED DRAINAGE LAYOUT
SCALE @ A0: 1:200
SCALE @ A2: 1:400

NOTES

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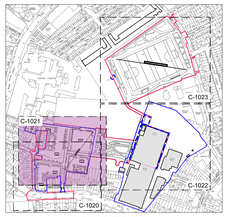
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.



KEY PLAN

SCALE @ A0: 1:5000
SCALE @ A2: 1:10000

CIVIL LEGEND

- NEW FOUL MANHOLE — F
- NEW FOUL PIPE — PIPE DESCRIPTION
- EX. SURFACE WATER MANHOLE — Ex.S
- EX. SURFACE WATER PIPE — PIPE DESCRIPTION
- NEW SURFACE WATER MANHOLE — S
- NEW SURFACE WATER PIPE — PIPE DESCRIPTION
- EX. COMBINED MANHOLE — Ex.C
- EX. COMBINED PIPE — PIPE DESCRIPTION
- NEW RISING MAIN — PIPE DESCRIPTION
- DECOMMISSIONED LINE — PIPE DESCRIPTION
- FOUL INSPECTION CHAMBER — IC
- SURFACE ACCESS JUNCTION — AJ
- RAINWATER PIPE — RWP
- SOIL VENT PIPE — SVP
- ROAD GULLEY — RG
- SURFACE RODDING EYE — RE
- GULLEY TRAP — GT
- NEW SIDE INLET KERB GULLY — KG
- PAVEMENT GULLY — PG
- DRAINAGE CHANNEL
- PROPOSED INSPECTION OPENING — IO
- 150mmØ PERFORATED uPVC CONVEYANCE PIPE BENEATH BASE OF TREE PIT — TP
- NEW TREE PIT
- SILT TRAP MANHOLE — ST MH
- EXISTING BUILDING
- BAILEY GIBSON SITE BOUNDARY
- OWNERSHIP LINE
- BASEMENT OUTLINE

DRAINAGE NOTES

1. SURFACE WATER DRAINS TO BE AS SPECIFIED ON DRAWING BGL-BMD-ZZ-ZZ-DR-C-1220 & 1222.
2. FOUL DRAINS TO BE UNPLASTICISED PVC PIPES TO IS EN 1401 2009/2012 CLASS SN8 IN LINE WITH THE REQUIREMENTS OF IRISH WATER CODE OF PRACTICE FOR WASTEWATER.
3. PIPE DIAMETERS SHOWN ON DRAINAGE LAYOUTS ARE REQUIRED MINIMUM INTERNAL DIAMETERS (MM).
4. ALL DRAINS WITH COVER LESS THAN 0.5M IN GARDENS/ PATHWAYS AND 1.2M UNDER ROADS TO BE BEDDED & SURROUNDED IN C16/20 CONCRETE AS PER BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1220 & 1222 AND SPECIFICATIONS.
5. DUBLIN CITY COUNCIL SURFACE WATER MANHOLES (LOCATED UNDER ALL ROADS) TO BE HIGH DENSITY BLOCKWORK TO IS 20 PART1:1987 OR CAST IN SITU CLASS 30N / 20MM IN LINE WITH THE GREATER DUBLIN REGION (GDR) CODE OF PRACTICE FOR DRAINAGE. REFER TO SUPPORTING DOCUMENTATION AND BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1220 & 1222. ALL MANHOLES TO BE WATERTIGHT STRUCTURES.
6. ALL FOUL DRAINAGE & WATERMAINS OUTSIDE THE BUILDING FOOTPRINT TO BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER DETAILS & CODES OF PRACTICE.
7. INSPECTION CHAMBERS (IC / AJ) TO BE POLYPROPYLENE 0.5M INTERNAL DIAMETER, MAXIMUM OF 1.0M DEEP. 150MM THICK C16 / 20 CONCRETE BED AND SURROUND.
8. SILT TRAP MANHOLES (ST MH) TO BE CAST IN SITU CONCRETE CL 30N / 20MM IN LINE WITH THE GREATER DUBLIN REGION (GDR) CODE OF PRACTICE FOR DRAINAGE. PIT TO BE 0.5M DEEP (BELOW OUTLET INVERT LEVEL).
9. TREE PITS (TP) TO BE PROPRIETARY UNITS, REFER TO BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1221. INSPECTION OPENINGS (IO) ADJACENT TO TREE PITS TO BE DUCTILE IRON COVERS/FRAMES, MIN CLASS D400 TO IS EN 124:2 2015.
10. MANHOLE COVERS IN TRAFFICKED AREAS TO BE MIN CLASS D400 TO IS EN 124:2 2015 DUCTILE IRON COVERS/ FRAMES. ALL OTHER AREAS TO BE MIN CLASS C250. MANHOLE COVERS IN CARRIAGEWAYS TO HAVE POLYESTER RESIN BEDDING MATERIAL FOR FIXING MANHOLE FRAMES AS PER BMCE CIVIL SPECIFICATION.
11. ROAD GULLIES TO BE CONSTRUCTED OF 215MM ENGINEERING BLOCKS OR 225MM MASS CONCRETE TO GDR CODE OF PRACTICE FOR DRINAAGE, COVER/FRAME TO BE DUCTILE IRON WITH MIN CLASS D400 TO IS EN 124:2 2015. REFER TO SUPPORTING DOCUMENTATION AND BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1210.
12. DRAINS FROM AJ's / IC's TO MAIN LINES TO BE 100mm DIAMETER UPVC (UNLESS OTHERWISE SHOWN ON LAYOUT), BED AND SURROUNDED IN 150mm CONCRETE.
13. LAND DRAIN TO BE 100 DIA. UPVC PERFORATED PIPES, BED & SURROUND IN 150MM THICK PEA GRAVEL & WRAPPED IN TERRAM 1000 OR SIMILAR APPROVED GEOTEXTILE.
14. INFILTRATION TRENCH TO BE GRANULAR FILL MATERIAL TO TII SPECIFICATION TO CLAUSE 505 TYPE B. TRENCH TO BE 400MM DEEP BY 700MM WIDE, UNLESS OTHERWISE SHOWN ON THIS DRAWING.
15. ALL TRENCHES IN ROADS TO BE BACKFILLED TO FORMATION LEVEL WITH CLAUSE 808 MATERIAL TO TII SPECIFICATION.
16. DIMENSIONED POSITION OF BUILDER'S UPSTAND (PU / SVP/ RWP) & STACKS TO BE PROVIDED BY THE ARCHITECT.
17. CONNECTIONS FROM PU'S / RWP'S TO BE 100 DIA. UPVC PIPES UNLESS OTHERWISE SHOWN. FOUL DRAIN CONNECTIONS FROM PU'S (WASTE AND OR SOIL) TO EXTERNAL MANHOLES OR INSPECTION CHAMBERS TO BE LAID TO A MINIMUM FALL OF 1 IN 40. RWP'S CONNECTIONS TO EXTERNAL SYSTEM TO BE LAID TO A MINIMUM FALL OF 1 IN 100.
18. MANHOLE COVERS / INSPECTION CHAMBERS TO MATCH FINISHED LEVELS OF EXTERNAL PAVING, ROAD, HARDSTANDING OR LANDSCAPED AREAS COVER LEVELS ARE INDICATIVE ONLY.
19. PRIOR TO COMPLETION OF DRAINAGE CONSTRUCTION ON SITE THE CONTRACTOR SHALL COMPLETE THE NEXT LIST OF WORKS IN ACCORDANCE WITH THE SPECIFICATION:
    - CLEANSE THE SYSTEM
    - TEST ALL PIPE WORK
    - CARRY OUT A CCTV INSPECTION
    - COMPLETE A SET OF AS CONSTRUCTED DRAWINGS
20. THE CONTRACTOR SHALL BE ENTIRELY RESPONSIBLE FOR LOCATING THE POSITIONS OF ALL EXISTING SERVICES AND SHALL, IF REQUIRED BY THE ENGINEER/CLIENT, REPRESENTATIVE CARRY OUT A SURVEY OF THE SITE TO LOCATE THESE SERVICES INCLUDING WHERE REQUIRED RATES FOR CARRYING OUT EXCAVATION IN ROADS, AND ELSEWHERE WHERE SERVICES ARE ENCOUNTERED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIVERSION OF EXISTING SERVICES ENCOUNTERED DURING THE COURSE OF THE WORK.
21. ALL EXISTING SERVICES SHOWN ON THE GPR SURVEY PROVIDED IN THE SUPPORTING DOCUMENTATION AND NOT SHOWN ON THIS DRAWING, TO BE BROKEN AND REMOVED.
22. ALL EXISTING DCC AND IRISH WATER SEWERS TO BE MAINTAINED AND KEPT ALIVE DURING WORKS.
23. ALL STACKS TO BE RODDABLE ABOVE SLAB LEVEL.
24. MINIMUM DISTANCE BETWEEN BRANCH CONNECTIONS TO THE MAIN LINES TO BE 300mm.
25. ALL BRANCH CONNECTIONS TO MAIN LINE FOUL SEWER TO BE BY MEANS OF 45 DEGREE "Y" BRANCH CONNECTIONS ONLY.
26. ALL FINAL FOUL INSPECTION CHAMBERS WITHIN THE CURTILAGE OF EACH PROPERTY TO BE IN ACCORDANCE WITH IRISH WATER'S STANDARD DETAILS FOR INSPECTION CHAMBERS.
27. THE CONTRACTOR SHALL NOTE THE TESTING REQUIREMENTS, WHICH SHALL APPLY TO BOTH FOUL AND SURFACE WATER NETWORKS, AS OUTLINED IN THE IRISH WATER QUALITY ASSURANCE FIELD INSPECTION REQUIREMENTS MANUAL AND ALLOW FOR ALL COSTS ASSOCIATED WITH TESTING AND COMMISSIONING. THE CONTRACTOR SHALL NOTE THAT IRISH WATER NOW REQUIRE A CHARTERED ENGINEER TO CERTIFY INSTALLATION / TESTING, MATERIALS COMPLIANCE AND WORKMANSHIP.
28. THE CONTRACTOR SHALL PREPARE ALL FINAL DOCUMENTS PRIOR TO HANDOVER FOR SUBMISSION TO IRISH WATER AS OUTLINED IN APPENDIX 4 OF THE IRISH WATER QUALITY ASSURANCE FIELD INSPECTION REQUIREMENTS MANUAL. IN PARTICULAR, THE CONTRACTOR SHALL NOTE THE REQUIREMENTS FOR MANHOLE INTEGRITY TESTS, PIPELINE AIR TESTS, MANHOLE INSPECTION CARDS, CCTV SURVEYS OF COMPLETED PIPE WORK, AND AS CONSTRUCTED DRAWINGS.

PROPOSED DRAINAGE LAYOUT

SCALE @ A0: 1:200
SCALE @ A2: 1:400

PLOT NUMBERS		
BLOCK NUMBER	RESIDENTIAL PLOT NUMBERS	NON-RESIDENTIAL
BLOCK BG1	BG1-1 to BG1-152	CRECHE - 248m²
		RETAIL UNIT - 238m²
BLOCK BG2	BG2-1 to BG2-89	RESTAURANT - 159m²
BLOCK BG3	BG3-1 to BG3-52	
BLOCK BG4	BG4-1 to BG4-49	
BLOCK BG5	BG5-1 to BG5-4	

NEW SURFACE WATER MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-IC3.0	+21.82	OUT: +20.66
1-IC6.0	+20.80	OUT: +19.79
1-IC6.1	+20.80	IN FROM 1-IC6.0: +19.64 OUT: +19.64
1-SI1.0	+21.70	OUT: +20.32
1-SI1.1	+20.93	IN FROM 1-SI1.0: +19.14 OUT: +19.14
1-SI1.2	+20.77	IN FROM 1-SI1.1: +19.02 OUT: +19.02
1-SI1.3	+20.80	IN FROM 1-SI1.2: +18.70 OUT: +18.71
1-SI1.4	+20.64	IN FROM 1-SI1.3: +18.56 OUT: +18.56
1-SI1.5	+20.60	IN FROM 1-SI4.0: +18.56 IN FROM 1-SI1.4: +18.51 OUT: +18.51
1-SI1.6	+20.02	IN FROM 1-SI1.5: +18.32 OUT: +18.32
1-SI1.7	+19.92	IN FROM 1-SI1.6: +18.26 IN FROM 1-SI5.3: +18.88 IN FROM 1-SCV1.0: +18.41 OUT: +18.26
1-SI1.8	+19.99	IN FROM 1-SI1.7: +18.13 OUT: +18.13
1-SI1.9	+20.47	IN FROM 1-SI1.8: +18.09 OUT: +18.09
1-SI1.10	+19.91	IN FROM 1-SI1.9: +17.96 OUT: +17.96
1-SI1.11	+19.91	IN FROM 1-SI1.10: +17.84 OUT: +17.84
1-SI1.12	+20.05	IN FROM 1-SI1.11: +17.66 OUT: +17.70
1-SI1.13	+19.42	IN FROM 1-SI1.12: +17.55 OUT: +17.55
1-SI1.14	+19.30	IN FROM 1-SI1.13: +17.43 IN FROM 1-SI7.0: +17.43 OUT: +17.43 OUT: +18.32
1-SI1.15	+19.20	IN FROM 1-SI1.14: +17.37 OUT: +17.37
1-SI1.16	+19.13	IN FROM 1-SI1.15: +17.18 OUT: +17.18
1-SI1.17	+18.65	IN FROM 1-SI1.16: +17.02 IN FROM 1-SI8.1: +17.37 OUT: +17.02
1-SI1.18	+18.59	IN FROM 1-SI1.17: +16.82 OUT: +16.82
1-SI1.19	+18.23	IN FROM 1-SI10.5: +16.57 IN FROM 1-SI1.18: +16.57 OUT: +16.57
1-SI1.20	+18.23	IN FROM 1-SI9.3: +16.56 IN FROM 1-SI1.19: +16.56 OUT: +16.56
1-SI1.21	+17.85	IN FROM 1-SI1.20: +16.48 OUT: +16.48
1-SI1.22	+17.93	IN FROM 1-SI1.21: +16.46
1-SI2.0	+21.34	OUT: +19.56
1-SI2.1	+20.82	IN FROM 1-SI2.0: +19.29 IN FROM 1-SI3.1: +19.45 OUT: +18.91
1-SI3.0	+21.71	IN FROM 1-IC3.0: +20.43 OUT: +20.43
1-SI3.1	+20.94	IN FROM 1-SI3.0: +20.04 OUT: +19.57
1-SI4.0	+20.60	OUT: +18.63
1-SI5.0	+20.51	OUT: +19.54
1-SI5.1	+20.09	IN FROM 1-SI5.0: +19.26 OUT: +19.22
1-SI5.2	+19.94	IN FROM 1-SI5.1: +19.08 IN FROM 1-SI6.0: +19.16 OUT: +19.08
1-SI5.3	+19.96	IN FROM 1-SI5.2: +19.05 OUT: +19.05
1-SI6.0	+20.80	IN FROM 1-IC6.1: +19.28 OUT: +19.28
1-SI7.0	+19.19	OUT: +17.91
1-SI8.0	+19.17	IN FROM 1-SI1.14: +18.26 OUT: +18.27
1-SI8.1	+18.65	IN FROM 1-SI8.0: +17.45 OUT: +17.45
1-SI9.0	+19.00	OUT: +17.07
1-SI9.1	+18.65	IN FROM 1-SI9.0: +16.98 OUT: +16.98
1-SI9.2	+18.25	IN FROM 1-SI9.1: +16.82 OUT: +16.82
1-SI9.3	+18.48	IN FROM 1-SI9.2: +16.63 OUT: +16.63
1-SI10.0	+19.55	OUT: +17.89
1-SI10.1	+19.80	IN FROM 1-SI10.0: +17.68 OUT: +17.68
1-SI10.2	+19.60	IN FROM 1-SI10.1: +17.48 OUT: +17.48
1-SI10.3	+19.50	IN FROM 1-SI10.2: +17.30 OUT: +17.20
1-SI10.4	+18.60	IN FROM 1-SI10.3: +17.09 OUT: +17.09
1-SI10.5	+18.42	IN FROM 1-SI10.4: +16.82 OUT: +16.82
1-SI11.0	+20.54	OUT: +19.06
1-SI11.1	+20.32	IN FROM 1-SI11.0: +18.83 OUT: +18.83
1-SI11.2	+20.38	IN FROM 1-SI11.1: +18.75 OUT: +18.75
1-SI11.3	+20.37	IN FROM 1-SI11.2: +18.71 OUT: +18.78
1-SCV1.0	+19.95	OUT: +18.46

NEW FOUL DRAINAGE MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-F1.0	+20.66	OUT: +19.31
1-F1.1	+20.79	IN FROM 1-F2.2: +19.16 IN FROM 1-F1.0: +18.99 OUT: +18.99
1-F1.2	+20.66	IN FROM 1-F1.1: +18.84 OUT: +18.84
1-F1.3	+20.62	IN FROM 1-F1.2: +18.88 IN FROM 1-F4.0: +19.10 OUT: +18.83
1-F1.4	+20.08	IN FROM 1-F1.3: +18.63 IN FROM 1-F5.0: +19.09 OUT: +18.63
1-F1.5	+19.97	IN FROM 1-F1.4: +18.55 IN FROM 1-F6.3: +18.55 OUT: +18.55
1-F1.6	+19.90	IN FROM 1-F1.5: +18.53 OUT: +18.53
1-F1.7	+19.97	IN FROM 1-F1.6: +18.20 OUT: +18.20
1-F1.8	+20.41	IN FROM 1-F1.7: +18.10 OUT: +18.10
1-F1.9	+20.30	IN FROM 1-F1.8: +17.85 OUT: +17.85
1-F1.10	+20.10	IN FROM 1-F1.9: +17.60 OUT: +17.60
1-F1.11	+19.85	IN FROM 1-F1.10: +17.22 OUT: +17.22
1-F1.12	+19.43	OUT: +17.00
1-F1.13	+17.76	IN FROM 1-F1.12: +16.93
1-F1.14	+17.68	IN FROM: +16.85 OUT: +16.85
1-F1.15	+17.43	OUT: +16.52
1-F1.16	+17.32	IN FROM 1-F1.15: +16.41 OUT: +16.41
1-F1.17	+18.24	IN FROM 1-F1.16: +16.10 OUT: +16.10
1-F1.18	+18.34	IN FROM 1-F1.17: +15.79 OUT: +15.79
1-F2.0	+21.66	IN FROM 1-IC2.0: +20.89 OUT: +19.82
1-F2.1	+20.91	IN FROM 1-F2.0: +19.56 OUT: +19.56
1-F2.2	+20.78	IN FROM 1-F2.1: +19.43 OUT: +19.43
1-F3.0	+20.80	IN FROM 1-IC3.1: +18.99 OUT: +19.00
1-F4.0	+20.59	OUT: +19.16
1-F5.0	+20.17	OUT: +19.19
1-F6.0	+20.45	OUT: +19.02
1-F6.1	+20.08	IN FROM 1-F6.0: +18.92 OUT: +18.92
1-F6.2	+19.98	IN FROM 1-F6.1: +18.73 IN FROM 1-F3.0: +18.83 OUT: +18.73
1-F6.3	+19.93	IN FROM 1-F6.2: +18.70 OUT: +18.70
1-IC2.0	+22.06	OUT: +21.18
1-IC3.0	+20.80	OUT: +20.11
1-IC3.1	+20.80	IN FROM 1-IC3.0: +19.69 OUT: +19.45
EX F5	+18.03	IN FROM 1-F1.18: +15.68

NEW SURFACE WATER MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-S12.1	+20.20	+19.15
1-S12.2	+19.90	+18.78
1-S12.3	+19.90	+18.40
1-S12.4	+19.90	+17.80
1-S13.1	+19.90	+19.15
1-S13.2	+20.00	+18.93
1-S13.3	+19.95	+18.71

ISSUE	DATE	DESCRIPTION	BY
PL6	31.05.22	PLANNING ISSUE	KS
PL5	16.03.22	UPDATED AS PER IW COMMENTS	TN
PL4	24.02.22	IW DIVERSIONS TEAM COMMENTS	TN
PL3	20.01.22	ISSUED FOR IW DESIGN VETTING	TN
PL2	10.12.21	ISSUED FOR IW DESIGN VETTING	TN
PL1	09.11.21	ISSUED FOR PRE-APPLICATION SUBMISSION	TN

Project Engineer: CIARAN O'RAFFERTY | Project Director: CIARAN KENNEDY

BM STAGE

PLANNING

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CLIENT
CWTC MULTI FAMILY ICAV ACTING SOLELY IN RESPECT OF ITS SUB FUND DBTR SCR1 FUND

PROJECT TITLE
BAILEY GIBSON SHD 2

BM PROJECT No.
19117

MODEL | REFERENCE: **BGL-BMD-ZZ-00-DR-C-1020-1022 & 1120-1122** | SUITABILITY: **S1** | REVISION: **P01**

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT (SHEET 2 OF 4)

DRG | DRAWING REFERENCE: **BGL-BMD-ZZ-00-DR-C-1021** | STATUS: **D2** | REVISION: **PL6**

DRAINAGE NOTES

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2. FOUL DRAINS TO BE UNPLASTICISED PVC PIPES TO IS EN 1401 2009/2012 CLASS SN8 IN LINE WITH THE REQUIREMENTS OF IRISH WATER CODE OF PRACTICE FOR WASTEWATER.
3. PIPE DIAMETERS SHOWN ON DRAINAGE LAYOUTS ARE REQUIRED MINIMUM INTERNAL DIAMETERS (MM).
4. ALL DRAINS WITH COVER LESS THAN 0.5M IN GARDENS/ PATHWAYS AND 1.2M UNDER ROADS TO BE BEDDED & SURROUNDED IN C16/20 CONCRETE AS PER BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1220 & 1222 AND SPECIFICATIONS.
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11. ROAD GULLIES TO BE CONSTRUCTED OF 215MM ENGINEERING BLOCKS OR 225MM MASS CONCRETE TO GDR CODE OF PRACTICE FOR DRIANAGE, COVER/FRAME TO BE DUCTILE IRON WITH MIN CLASS D400 TO IS EN 124:2 2015. REFER TO SUPPORTING DOCUMENTATION AND BMCE DRAWING BGL-BMD-ZZ-ZZ-DR-C-1210.
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13. LAND DRAIN TO BE 100 DIA. UPVC PERFORATED PIPES, BED & SURROUND IN 150MM THICK PEA GRAVEL & WRAPPED IN TERRAM 1000 OR SIMILAR APPROVED GEOTEXTILE.
14. INFILTRATION TRENCH TO BE GRANULAR FILL MATERIAL TO TII SPECIFICATION TO CLAUSE 505 TYPE B. TRENCH TO BE 400MM DEEP BY 700MM WIDE, UNLESS OTHERWISE SHOWN ON THIS DRAWING.
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23. ALL STACKS TO BE RODDABLE ABOVE SLAB LEVEL.
24. MINIMUM DISTANCE BETWEEN BRANCH CONNECTIONS TO THE MAIN LINES TO BE 300mm.
25. ALL BRANCH CONNECTIONS TO MAIN LINE FOUL SEWER TO BE BY MEANS OF 45 DEGREE "Y" BRANCH CONNECTIONS ONLY.
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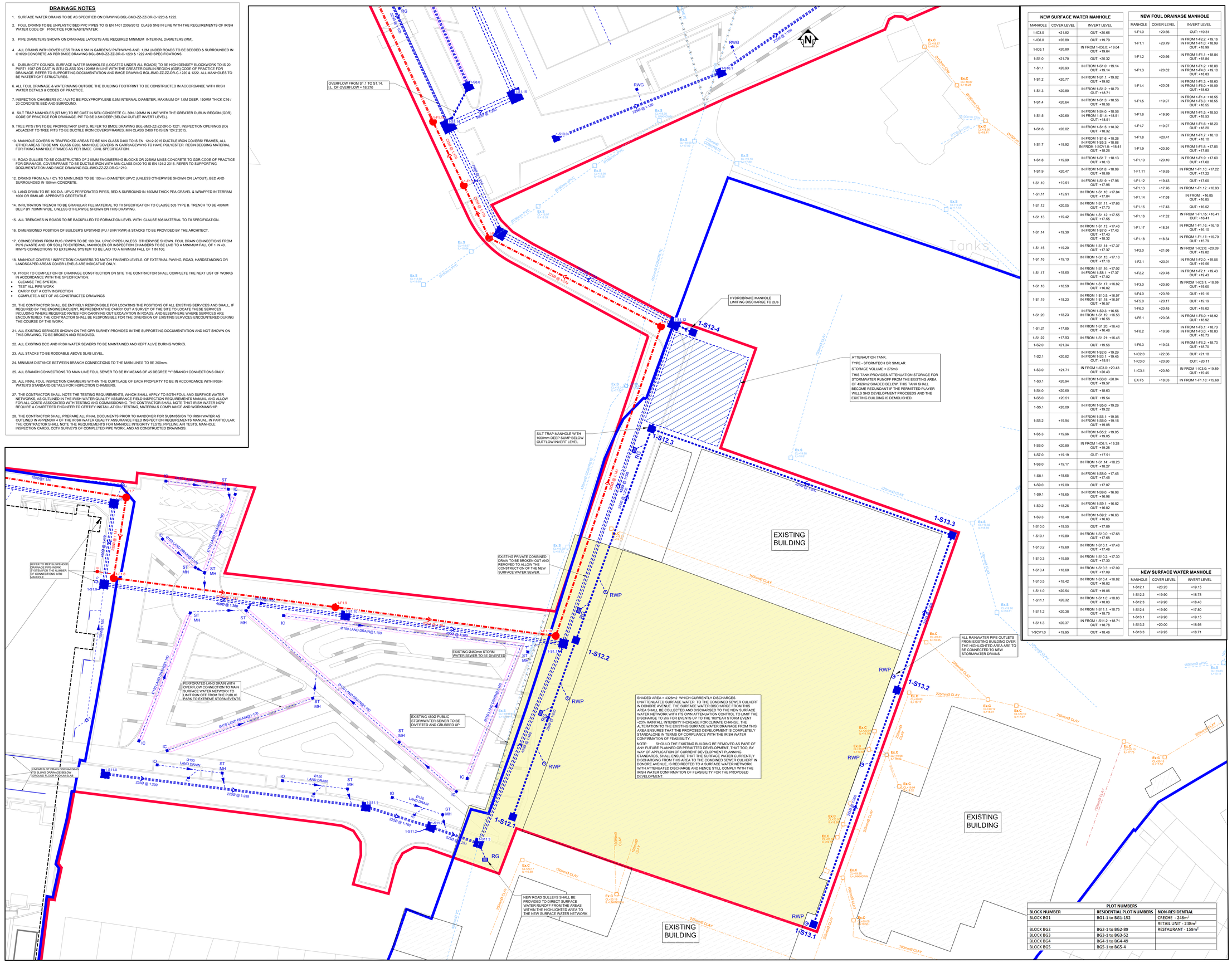
27. THE CONTRACTOR SHALL NOTE THE TESTING REQUIREMENTS, WHICH SHALL APPLY TO BOTH FOUL AND SURFACE WATER NETWORKS, AS OUTLINED IN THE IRISH WATER QUALITY ASSURANCE FIELD INSPECTION REQUIREMENTS MANUAL AND ALLOW FOR ALL COSTS ASSOCIATED WITH TESTING AND COMMISSIONING. THE CONTRACTOR SHALL NOTE THAT IRISH WATER NOW REQUIRE A CHARTERED ENGINEER TO CERTIFY INSTALLATION / TESTING, MATERIALS COMPLIANCE AND WORKMANSHIP.
28. THE CONTRACTOR SHALL PREPARE ALL FINAL DOCUMENTS PRIOR TO HANDOVER FOR SUBMISSION TO IRISH WATER AS OUTLINED IN APPENDIX 4 OF THE IRISH WATER QUALITY ASSURANCE FIELD INSPECTION REQUIREMENTS MANUAL. IN PARTICULAR, THE CONTRACTOR SHALL NOTE THE REQUIREMENTS FOR MANHOLE INTEGRITY TESTS, PIPELINE AIR TESTS, MANHOLE INSPECTION CARDS, CCTV SURVEYS OF COMPLETED PIPE WORK, AND AS CONSTRUCTED DRAWINGS.



PROPOSED DRAINAGE LAYOUT

SCALE @ A0: 1:250
SCALE @ A2: 1:500

NEW SURFACE WATER MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-IC3.0	+21.82	OUT: +20.66
1-IC6.0	+20.80	OUT: +19.79
1-IC6.1	+20.80	IN FROM 1-IC6.0: +19.64 OUT: +19.64
1-S1.0	+21.70	OUT: +20.32
1-S1.1	+20.93	IN FROM 1-S1.0: +19.14 OUT: +19.14
1-S1.2	+20.77	IN FROM 1-S1.1: +19.02 OUT: +19.02
1-S1.3	+20.80	IN FROM 1-S1.2: +18.70 OUT: +18.71
1-S1.4	+20.64	IN FROM 1-S1.3: +18.56 OUT: +18.56
1-S1.5	+20.60	IN FROM 1-S4.0: +18.56 IN FROM 1-S1.4: +18.51 OUT: +18.51
1-S1.6	+20.02	IN FROM 1-S1.5: +18.32 OUT: +18.32
1-S1.7	+19.92	IN FROM 1-S1.6: +18.26 IN FROM 1-S5.3: +18.88 IN FROM 1-SCV1.0: +18.41 OUT: +18.26
1-S1.8	+19.99	IN FROM 1-S1.7: +18.13 OUT: +18.13
1-S1.9	+20.47	IN FROM 1-S1.8: +18.09 OUT: +18.09
1-S1.10	+19.91	IN FROM 1-S1.9: +17.96 OUT: +17.96
1-S1.11	+19.91	IN FROM 1-S1.10: +17.84 OUT: +17.84
1-S1.12	+20.05	IN FROM 1-S1.11: +17.66 OUT: +17.66
1-S1.13	+19.42	IN FROM 1-S1.12: +17.55 OUT: +17.55
1-S1.14	+19.30	IN FROM 1-S1.13: +17.43 IN FROM 1-S7.0: +17.43 OUT: +17.43 OUT: +18.32
1-S1.15	+19.20	IN FROM 1-S1.14: +17.37 OUT: +17.37
1-S1.16	+19.13	IN FROM 1-S1.15: +17.18 OUT: +17.18
1-S1.17	+18.65	IN FROM 1-S1.16: +17.02 IN FROM 1-S8.1: +17.37 OUT: +17.02
1-S1.18	+18.59	IN FROM 1-S1.17: +16.82 OUT: +16.82
1-S1.19	+18.23	IN FROM 1-S10.5: +16.57 IN FROM 1-S1.18: +16.57 OUT: +16.57
1-S1.20	+18.23	IN FROM 1-S9.3: +16.56 IN FROM 1-S1.19: +16.56 OUT: +16.56
1-S1.21	+17.85	IN FROM 1-S1.20: +16.48 OUT: +16.48
1-S1.22	+17.93	IN FROM 1-S1.21: +16.46
1-S2.0	+21.34	OUT: +19.56
1-S2.1	+20.82	IN FROM 1-S2.0: +19.29 IN FROM 1-S3.1: +19.45 OUT: +18.91
1-S3.0	+21.71	IN FROM 1-IC3.0: +20.43 OUT: +20.43
1-S3.1	+20.94	IN FROM 1-S3.0: +20.04 OUT: +19.57
1-S4.0	+20.60	OUT: +18.63
1-S5.0	+20.51	OUT: +19.54
1-S5.1	+20.09	IN FROM 1-S5.0: +19.26 OUT: +19.22
1-S5.2	+19.94	IN FROM 1-S5.1: +19.08 IN FROM 1-S6.0: +19.16 OUT: +19.08
1-S5.3	+19.96	IN FROM 1-S5.2: +19.05 OUT: +19.05
1-S6.0	+20.80	IN FROM 1-IC6.1: +19.28 OUT: +19.28
1-S7.0	+19.19	OUT: +17.91
1-S8.0	+19.17	IN FROM 1-S1.14: +18.26 OUT: +18.27
1-S8.1	+18.65	IN FROM 1-S8.0: +17.45 OUT: +17.45
1-S9.0	+19.00	OUT: +17.07
1-S9.1	+18.65	IN FROM 1-S9.0: +16.98 OUT: +16.98
1-S9.2	+18.25	IN FROM 1-S9.1: +16.82 OUT: +16.82
1-S9.3	+18.48	IN FROM 1-S9.2: +16.63 OUT: +16.63
1-S10.0	+19.55	OUT: +17.89
1-S10.1	+19.80	IN FROM 1-S10.0: +17.68 OUT: +17.68
1-S10.2	+19.60	IN FROM 1-S10.1: +17.48 OUT: +17.48
1-S10.3	+19.50	IN FROM 1-S10.2: +17.30 OUT: +17.30
1-S10.4	+18.60	IN FROM 1-S10.3: +17.09 OUT: +17.09
1-S10.5	+18.42	IN FROM 1-S10.4: +16.82 OUT: +16.82
1-S11.0	+20.54	OUT: +19.06
1-S11.1	+20.32	IN FROM 1-S11.0: +18.83 OUT: +18.83
1-S11.2	+20.38	IN FROM 1-S11.1: +18.75 OUT: +18.75
1-S11.3	+20.37	IN FROM 1-S11.2: +18.71 OUT: +18.78
1-SCV1.0	+19.95	OUT: +18.46

NEW FOUL DRAINAGE MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-F1.0	+20.66	OUT: +19.31
1-F1.1	+20.79	IN FROM 1-F2.2: +19.16 IN FROM 1-F1.0: +18.99 OUT: +18.99
1-F1.2	+20.66	IN FROM 1-F1.1: +18.84 OUT: +18.84
1-F1.3	+20.62	IN FROM 1-F1.2: +18.88 IN FROM 1-F4.0: +19.10 OUT: +18.63
1-F1.4	+20.08	IN FROM 1-F1.3: +18.63 IN FROM 1-F5.0: +19.09 OUT: +18.63
1-F1.5	+19.97	IN FROM 1-F1.4: +18.55 IN FROM 1-F6.3: +18.55 OUT: +18.55
1-F1.6	+19.90	IN FROM 1-F1.5: +18.53 OUT: +18.53
1-F1.7	+19.97	IN FROM 1-F1.6: +18.20 OUT: +18.20
1-F1.8	+20.41	IN FROM 1-F1.7: +18.10 OUT: +18.10
1-F1.9	+20.30	IN FROM 1-F1.8: +17.85 OUT: +17.85
1-F1.10	+20.10	IN FROM 1-F1.9: +17.60 OUT: +17.60
1-F1.11	+19.85	IN FROM 1-F1.10: +17.22 OUT: +17.22
1-F1.12	+19.43	OUT: +17.00
1-F1.13	+17.76	IN FROM 1-F1.12: +16.93
1-F1.14	+17.68	IN FROM : +16.85 OUT: +16.85
1-F1.15	+17.43	OUT: +16.52
1-F1.16	+17.32	IN FROM 1-F1.15: +16.41 OUT: +16.41
1-F1.17	+18.24	IN FROM 1-F1.16: +16.10 OUT: +16.10
1-F1.18	+18.34	IN FROM 1-F1.17: +15.79 OUT: +15.79
1-F2.0	+21.66	IN FROM 1-IC2.0: +20.89 OUT: +19.82
1-F2.1	+20.91	IN FROM 1-F2.0: +19.56 OUT: +19.56
1-F2.2	+20.78	IN FROM 1-F2.1: +19.43 OUT: +19.43
1-F3.0	+20.80	IN FROM 1-IC3.1: +18.99 OUT: +19.00
1-F4.0	+20.59	OUT: +19.16
1-F5.0	+20.17	OUT: +19.19
1-F6.0	+20.45	OUT: +19.02
1-F6.1	+20.08	IN FROM 1-F6.0: +18.92 OUT: +18.92
1-F6.2	+19.98	IN FROM 1-F6.1: +18.73 IN FROM 1-F3.0: +18.83 OUT: +18.73
1-F6.3	+19.93	IN FROM 1-F6.2: +18.70 OUT: +18.70
1-IC2.0	+22.06	OUT: +21.18
1-IC3.0	+20.80	OUT: +20.11
1-IC3.1	+20.80	IN FROM 1-IC3.0: +19.89 OUT: +19.45
EX FS	+18.03	IN FROM 1-F1.18: +15.68

NEW SURFACE WATER MANHOLE

MANHOLE	COVER LEVEL	INVERT LEVEL
1-S12.1	+20.20	+19.15
1-S12.2	+19.90	+18.78
1-S12.3	+19.90	+18.40
1-S12.4	+19.90	+17.80
1-S13.1	+19.90	+19.15
1-S13.2	+20.00	+18.93
1-S13.3	+19.95	+18.71

PLOT NUMBERS

BLOCK NUMBER	RESIDENTIAL PLOT NUMBERS	NON-RESIDENTIAL
BLOCK BG1	BG1-1 to BG1-152	CRECHE - 248m²
		RETAIL UNIT - 238m²
BLOCK BG2	BG2-1 to BG2-89	RESTAURANT - 159m²
BLOCK BG3	BG3-1 to BG3-52	
BLOCK BG4	BG4-1 to BG4-49	
BLOCK BG5	BG5-1 to BG5-4	

NOTES

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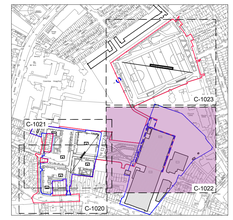
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.



KEY PLAN

SCALE @ A0: 1:5000
SCALE @ A2: 1:10000

CIVIL LEGEND

- NEW FOUL MANHOLE — F
- NEW FOUL PIPE — PIPE DESCRIPTION
- EX. SURFACE WATER MANHOLE — Ex.S
- EX. SURFACE WATER PIPE — PIPE DESCRIPTION
- NEW SURFACE WATER MANHOLE — S
- NEW SURFACE WATER PIPE — PIPE DESCRIPTION
- EX. COMBINED MANHOLE — Ex.C
- EX. COMBINED PIPE — PIPE DESCRIPTION
- NEW RISING MAIN — PIPE DESCRIPTION
- DECOMMISSIONED LINE — PIPE DESCRIPTION
- FOUL INSPECTION CHAMBER — IC
- SURFACE ACCESS JUNCTION — AJ
- RAINWATER PIPE — RWP
- SOIL VENT PIPE — SVP
- ROAD GULLEY — RG
- SURFACE RODDING EYE — RE
- GULLEY TRAP — GT
- NEW SIDE INLET KERB GULLY — KG
- PAVEMENT GULLY — PG
- DRAINAGE CHANNEL
- PROPOSED INSPECTION OPENING — IO
- 150mmØ PERFORATED uPVC CONVEYANCE PIPE BENEATH BASE OF TREE PIT
- NEW TREE PIT — TP
- SILT TRAP MANHOLE — ST MH
- EXISTING BUILDING
- BAILEY GIBSON SITE BOUNDARY
- OWNERSHIP LINE
- BASEMENT OUTLINE

ISSUE	DATE	DESCRIPTION	BY
PL6	31.05.22	PLANNING ISSUE	KS
PL5	16.03.22	UPDATED AS PER IW COMMENTS	TN
PL4	24.02.22	IW DIVERSIONS TEAM COMMENTS	TN
PL3	20.01.22	ISSUED FOR IW DESIGN VETTING	TN
PL2	10.12.21	ISSUED FOR IW DESIGN VETTING	TN
PL1	09.11.21	ISSUED FOR PRE-APPLICATION SUBMISSION	TN

Project Engineer: CIARAN O'RAFFERTY | Project Director: CIARAN KENNEDY

BM STAGE: **PLANNING**

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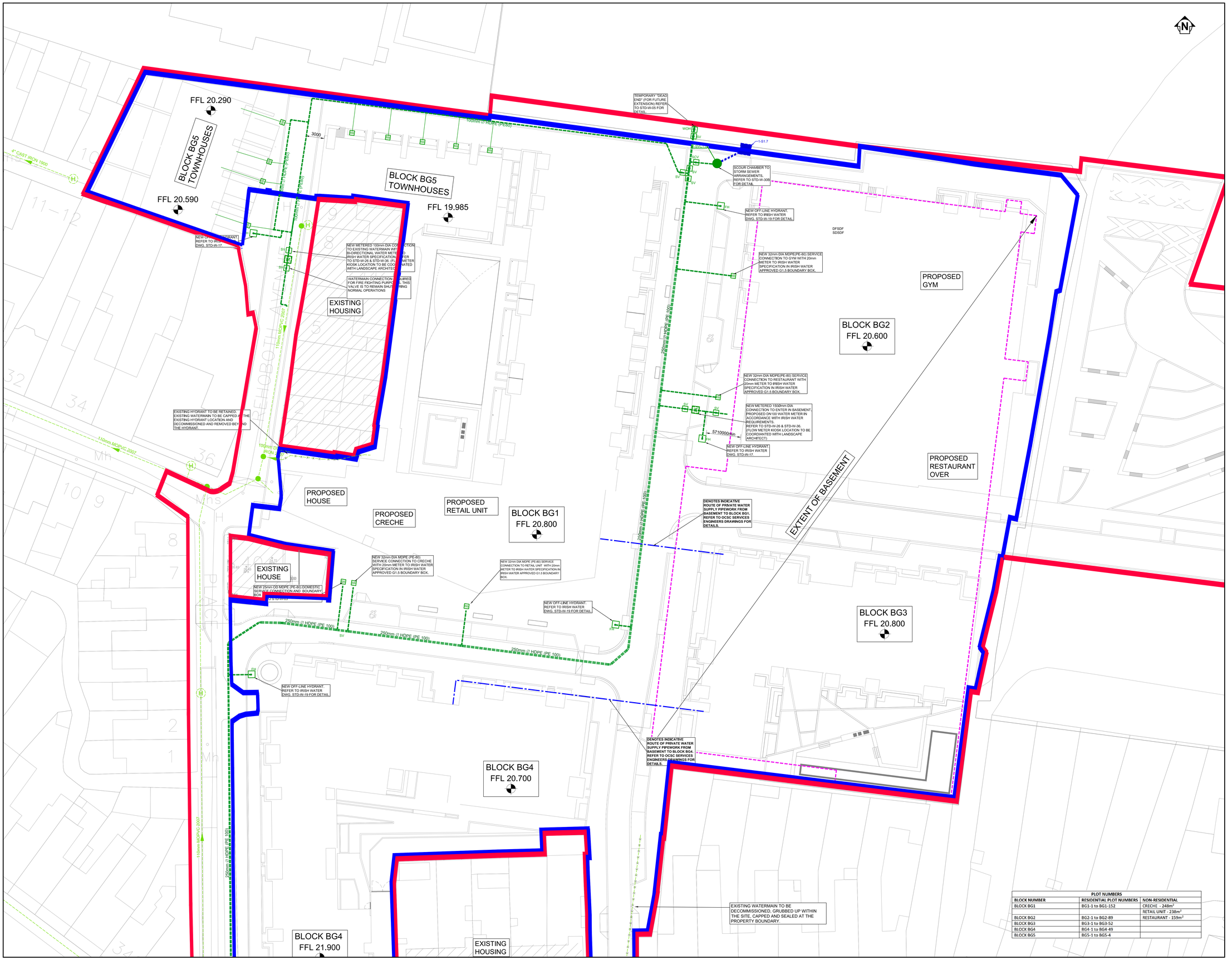
CLIENT: **CWTC MULTI FAMILY ICAV ACTING SOLELY IN RESPECT OF ITS SUB FUND DBTR SCR1 FUND**

PROJECT TITLE: **BAILEY GIBSON SHD 2** — BM PROJECT No.: **19117**

DRAWING REFERENCE: **BGL-BMD-ZZ-00-DR-C-1020-1022 & 1120-1122** — SUITABILITY: **S1** — REVISION: **P01**

DRAWING TITLE: **PROPOSED DRAINAGE LAYOUT (SHEET 3 OF 4)**

DRAWING REFERENCE: **BGL-BMD-ZZ-00-DR-C-1022** — STATUS: **D2** — REVISION: **PL6**



PROPOSED WATERMAIN LAYOUT
SCALE @ A0: 1:200
SCALE @ A2: 1:400

PLOT NUMBERS		
BLOCK NUMBER	RESIDENTIAL PLOT NUMBERS	NON-RESIDENTIAL
BLOCK BG1	BG1-1 to BG1-152	CRECHE - 248m²
		RETAIL UNIT - 238m²
BLOCK BG2	BG2-1 to BG2-89	RESTAURANT - 159m²
BLOCK BG3	BG3-1 to BG3-52	
BLOCK BG4	BG4-1 to BG4-49	
BLOCK BG5	BG5-1 to BG5-4	

NOTES

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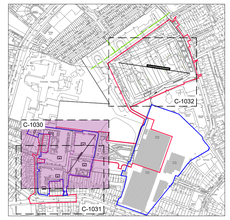
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.



KEY PLAN
SCALE @ A0: 1:5000
SCALE @ A2: 1:10000

CIVIL LEGEND

NEW WATERMAIN	
EXISTING WATERMAIN	
DECOMMISSIONED LINE	X X X X X X X X X X X
SLUICE VALVE	SV
AIR VALVE	AV
HYDRANT	H
I.W. APPROVED BOUNDARY BOX	BB
SCOUR VALVE CHAMBER	SCV
WASHOUT HYDRANT	WOH
FIRE HYDRANT	FH
ELECTROMAGNETIC METER CHAMBER	M
EXISTING BUILDING	
BAILEY GIBSON SITE BOUNDARY	
OWNERSHIP LINE	
BASEMENT OUTLINE	
PRIVATE WATER SUPPLY	

WATERMAIN NOTES

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS & MANUFACTURERS DRAWINGS & SPECIFICATIONS.
2. ALL PIPE DIAMETERS ARE NOMINAL.
3. WHERE CONNECTION IS REQUIRED TO AN EXISTING PUBLIC WATERMAIN, THE CONTRACTOR MUST ISSUE DETAILED DOCUMENTATION FOR APPROVAL TO THE RELEVANT LOCAL AUTHORITY AND IRISH WATER. THIS DOCUMENTATION MUST BE ISSUED AT LEAST 40 WORKING DAYS IN ADVANCE OF THE PLANNED WORKS OR AS AGREED WITH THE LOCAL AUTHORITY AND IRISH WATER.
4. ALL THRUST BLOCKS MUST BE CAST AGAINST UNDISTURBED GROUND. FLEXIBLE PIPES SHOULD BE WRAPPED IN ONE LAYER OF 1000 GAUGE POLYTHENE TO AVOID DIRECT CONTACT WITH THE CONCRETE. MARKER POSTS AND PLATES TO BE PROVIDED FOR ALL VALVES, METERS AND HYDRANTS.
5. CHLORINATION AND BACTERIOLOGICAL TESTS TO BE UNDERTAKEN BY EXTERNAL TESTER AND TEST CERTIFICATION TO BE SUBMITTED TO ENGINEER.
6. MARKER POSTS AND PLATES TO BE PROVIDED FOR ALL VALVES.
7. IN ADVANCE OF TESTING OF THE WATERMAINS, THE CONTRACTOR MUST PRESENT TO THE ENGINEER A CALIBRATION CERTIFICATE FOR THE APPARATUS TO BE USED IN THE TEST.
8. ALL DETAILS TO BE AGREED WITH LOCAL AUTHORITY
9. ALL EXISTING WATERMAINS TO BE ADEQUATELY PROTECTED. ANY WATERMAINS DAMAGED DURING THE COURSE OF CONSTRUCTION WILL BE REPLACED BY THE CONTRACTOR AT THEIR COST
10. COVERS OF ALL HYDRANT CHAMBERS TO BE PAINTED YELLOW WITH THE EXCEPTION OF HYDRANT THAT ARE NOT FOR FIRE SERVICES PROPOSES.
11. ALL ROCKER PIPES SHALL BE NO MORE THAN 150mm FROM THEIR ASSOCIATED CHAMBER
12. WHERE PIPE RUN IS LOCATED ADJACENT TO FOUNDATION AND IS AT A LEVEL BELOW UNDERSIDE OF THE FOUNDATION, PIPE TRENCH TO BE BACKFILLED TO FORMATION LEVEL WITH CLASS 15/20 CONCRETE.
13. PROVIDE ANCHOR/THRUST BLOCKS ON ALL BENDS EQUAL TO OR IN EXCESS OF 22.5°, DEAD ENDS AND TEES ON ALL PIPES
14. TRENCHES IN EXISTING SURFACES TO BE SAW CUT.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING OUT WATERMAINS & SLUICE VALVES TO ENSURE NO CLASHES WITH SERVICE DUCTS OR PIPES.

NOTES FOR CONNECTION TO IRISH WATER SERVICES

1. CONTRACTOR TO LIAISE WITH IRISH WATER PRIOR TO MOBILISATION ON SITE TO DETERMINE THE DURATION OF THE APPROVAL PROCESS AND WHAT DOCUMENTATION AND FEES ARE REQUIRED BY IRISH WATER AND THE LOCAL AUTHORITY AND PROGRAM THIS INTO THE CONSTRUCTION PROGRAM. CONTRACTOR TO CONFIRM EXTENT OF NOTICE REQUIRED BY IRISH WATER TO INSPECT WORKS AND ALSO PROGRAM INTO THE CONSTRUCTION PROGRAM
2. IRISH WATER TO BE CONTACTED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF ANY FOUL SEWER AND WATERMAIN WORKS. ALL DETAILS TO BE AGREED WITH IRISH WATER. IRISH WATER TO BE GIVEN 40 WORKING DAYS NOTICE FOR ALL FOUL SEWER AND WATERMAIN CONNECTION WORKS.
3. EXACT LOCATION AND DEPTH OF THE EXISTING FOUL SEWERS, RISING MAINS AND WATERMAINS SHOULD BE ESTABLISHED BY THE CONTRACTOR IN ADVANCE OF THE MAIN EXCAVATION FOR THE NEW FOUL SEWER AND WATERMAIN SO AS TO AVOID THE POSSIBILITY OF DAMAGE TO THE EXISTING FOUL SEWER, RISING MAINS AND WATERMAIN DURING CONSTRUCTION WORKS. SUIT TRENCHES TO BE UNDERTAKEN.
4. ALL EXISTING FOUL SEWERS, RISING MAINS AND WATERMAINS TO BE ADEQUATELY PROTECTED. ANY FOUL SEWERS, RISING MAINS OR WATERMAINS DAMAGED DURING THE COURSE OF CONSTRUCTION WILL BE REPLACED BY THE CONTRACTOR AT THEIR OWN COST.
5. THE CONTRACTOR SHALL APPLY FOR A ROAD OPENING LICENSE AND PAY THE REQUIRED ROAD OPENING LICENSE FEE. THIS FEE IS A NON-NEGOTIABLE AND NON-REFUNDABLE FIGURE. THE CONTRACTOR SHALL BE DEEMED TO HAVE INCLUDED IN HIS TENDER PRICE FOR ALL REQUIREMENTS SUCH AS CONTRIBUTION FOR CONNECTIONS TO PUBLIC INFRASTRUCTURE, LICENSE APPLICATION, PAYMENT OF FEE(S), STATUTORY TIME PERIODS, TRAFFIC MANAGEMENT PLANS AND APPLICATION, REINSTATEMENT, ETC.
6. ALL WATERMAIN EXTENSIONS CONSTRUCTED TO ALLOW FOR FUTURE CONNECTION TO FUTURE PHASES ARE TO BE TERMINATED IN BLANK ENDS WITH A SUITABLE THRUST BLOCK INSTALLED.

ISSUE	DATE	DESCRIPTION	BY
PL6	31.05.22	PLANNING ISSUE	KS
PL5	16.03.22	UPDATED AS PER IW COMMENTS	TN
PL4	24.02.22	IW DIVERSIONS TEAM COMMENTS	TN
PL3	20.01.22	ISSUED FOR IW DESIGN VETTING	TN
PL2	10.12.21	ISSUED FOR IW DESIGN VETTING	TN
PL1	09.11.21	ISSUED FOR PRE-APPLICATION SUBMISSION	TN

Project Engineer: CIARAN O'RAFFERTY | Project Director: CIARAN KENNEDY

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CLIENT
CWTC MULTI FAMILY ICAV ACTING SOLELY IN RESPECT OF ITS SUB FUND DBTR SCR1 FUND

PROJECT TITLE
BAILEY GIBSON SHD 2

BM PROJECT No.
19117

WORK	REFERENCE	SUITABILITY	REVISION
	BGL-BMD-ZZ-00-DR-C-1030-1031	S1	P01

DRAWING TITLE
PROPOSED WATERMAIN LAYOUT (SHEET 1 OF 3)

DWG	DRAWING REFERENCE	STATUS	REVISION
	BGL-BMD-ZZ-00-DR-C-1030	D2	PL6

EXISTING HYDRANT TO BE RETAINED. EXISTING WATERMAIN TO BE CAPPED AT THE EXISTING HYDRANT LOCATION AND DECOMMISSIONED AND REMOVED BEYOND THE HYDRANT.

110mm MDPVC 2007

100mm DI IRON

PROPOSED HOUSE

PROPOSED CRECHE

PROPOSED RETAIL UNIT

BLOCK BG1
FFL 20.800

EXISTING HOUSE

NEW 25mm OD MDPE (PE-80) DOMESTIC SERVICE CONNECTION AND BOUNDARY BOX

NEW 32mm DIA MDPE (PE-80) SERVICE CONNECTION TO CRECHE WITH 20mm METER TO IRISH WATER SPECIFICATION IN IRISH WATER APPROVED G1.5 BOUNDARY BOX.

NEW 32mm DIA MDPE (PE-80) SERVICE CONNECTION TO RETAIL UNIT WITH 20mm METER TO IRISH WATER SPECIFICATION IN IRISH WATER APPROVED G1.5 BOUNDARY BOX.

NEW OFF-LINE HYDRANT, REFER TO IRISH WATER DWG. STD-W-19 FOR DETAIL

250mm Ø HDPE (PE 100)

NEW OFF-LINE HYDRANT, REFER TO IRISH WATER DWG. STD-W-19 FOR DETAIL

NEW 32mm DIA MDPE(PE-80) SERVICE CONNECTION TO RESTAURANT WITH 20mm METER TO IRISH WATER SPECIFICATION IN IRISH WATER APPROVED G1.5 BOUNDARY BOX.

NEW METERED 1500mm DIA CONNECTION TO ENTER IN BASEMENT. PROPOSED DN100 WATER METER IN ACCORDANCE WITH IRISH WATER REQUIREMENTS. REFER TO STD-W-26 & STD-W-36 (FLOW METER KIOSK LOCATION TO BE COORDINATED WITH LANDSCAPE ARCHITECT).

571000cmin

NEW OFF-LINE HYDRANT, REFER TO IRISH WATER DWG. STD-W-17

DENOTES INDICATIVE ROUTE OF PRIVATE WATER SUPPLY PIPEWORK FROM BASEMENT TO BLOCK BG1. REFER TO OCSC SERVICES ENGINEERS DRAWINGS FOR DETAILS.

EXTENT OF BASEMENT

PROPOSED RESTAURANT OVER

BLOCK BG3
FFL 20.800

DENOTES INDICATIVE ROUTE OF PRIVATE WATER SUPPLY PIPEWORK FROM BASEMENT TO BLOCK BG4. REFER TO OCSC SERVICES ENGINEERS DRAWINGS FOR DETAILS.

BLOCK BG4
FFL 20.700

BLOCK BG4
FFL 21.900

EXISTING HOUSING

EXISTING WATERMAIN TO BE DECOMMISSIONED, GRUBBED UP WITHIN THE SITE, CAPPED AND SEALED AT THE PROPERTY BOUNDARY.

110mm MDPVC 2007

250mm Ø HDPE (PE 100)

4" CAST IRON 1890

16" CAST IRON 1927

ON-LINE AIR VALVE REFER TO STD-W-22 FOR DETAIL

NEW METERED 250mm DIA CONNECTION PROPOSED DN200 WATER METER IN ACCORDANCE WITH IRISH WATER REQUIREMENTS. REFER TO STD-W-26 & STD-W-36. (FLOW METER KIOSK LOCATION TO BE COORDINATED WITH LANDSCAPE ARCHITECT)

NEW OFF-LINE HYDRANT, REFER TO IRISH WATER DWG. STD-W-17 FOR DETAIL

250mm Ø HDPE (PE 100)

6" CAST IRON 1900

4" CAST IRON 1900

18" CAST IRON 1927

6" CAST IRON 1920

110mm MDPVC 2001

110mm MDPVC 2015

PLOT NUMBERS		
BLOCK NUMBER	RESIDENTIAL PLOT NUMBERS	NON-RESIDENTIAL
BLOCK BG1	BG1-1 to BG1-152	CRECHE - 248m²
		RETAIL UNIT - 238m²
BLOCK BG2	BG2-1 to BG2-89	RESTAURANT - 159m²
BLOCK BG3	BG3-1 to BG3-52	
BLOCK BG4	BG4-1 to BG4-49	
BLOCK BG5	BG5-1 to BG5-4	

PROPOSED WATERMAIN LAYOUT

SCALE @ A0: 1:200
SCALE @ A2: 1:400

NOTES

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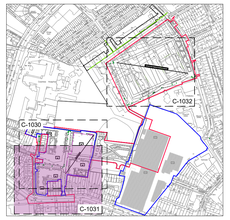


KEY PLAN

SCALE @ A0: 1:5000
SCALE @ A2: 1:10000

CIVIL LEGEND

NEW WATERMAIN	
EXISTING WATERMAIN	
DECOMMISSIONED LINE	X X X X X X X X X X X X
SLUICE VALVE	SV
AIR VALVE	AV
HYDRANT	H
I.W. APPROVED BOUNDARY BOX	BB
SCOUR VALVE CHAMBER	SCV
WASHOUT HYDRANT	WOH
FIRE HYDRANT	FH
ELECTROMAGNETIC METER CHAMBER	M
EXISTING BUILDING	
BAILEY GIBSON SITE BOUNDARY	
OWNERSHIP LINE	
BASEMENT OUTLINE	
PRIVATE WATER SUPPLY	

WATERMAIN NOTES

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS & MANUFACTURERS DRAWINGS & SPECIFICATIONS.
2. ALL PIPE DIAMETERS ARE NOMINAL.
3. WHERE CONNECTION IS REQUIRED TO AN EXISTING PUBLIC WATERMAIN, THE CONTRACTOR MUST ISSUE DETAILED DOCUMENTATION FOR APPROVAL TO THE RELEVANT LOCAL AUTHORITY AND IRISH WATER. THIS DOCUMENTATION MUST BE ISSUED AT LEAST 40 WORKING DAYS IN ADVANCE OF THE PLANNED WORKS OR AS AGREED WITH THE LOCAL AUTHORITY AND IRISH WATER.
4. ALL THRUST BLOCKS MUST BE CAST AGAINST UNDISTURBED GROUND. FLEXIBLE PIPES SHOULD BE WRAPPED IN ONE LAYER OF 1000 GAUGE POLYTHENE TO AVOID DIRECT CONTACT WITH THE CONCRETE. MARKER POSTS AND PLATES TO BE PROVIDED FOR ALL VALVES, METERS AND HYDRANTS.
5. CHLORINATION AND BACTERIOLOGICAL TESTS TO BE UNDERTAKEN BY EXTERNAL TESTER AND TEST CERTIFICATION TO BE SUBMITTED TO ENGINEER.
6. MARKER POSTS AND PLATES TO BE PROVIDED FOR ALL VALVES.
7. IN ADVANCE OF TESTING OF THE WATERMAINS, THE CONTRACTOR MUST PRESENT TO THE ENGINEER A CALIBRATION CERTIFICATE FOR THE APPARATUS TO BE USED IN THE TEST.
8. ALL DETAILS TO BE AGREED WITH LOCAL AUTHORITY
9. ALL EXISTING WATERMAINS TO BE ADEQUATELY PROTECTED. ANY WATERMAINS DAMAGED DURING THE COURSE OF CONSTRUCTION WILL BE REPLACED BY THE CONTRACTOR AT THEIR COST
10. COVERS OF ALL HYDRANT CHAMBERS TO BE PAINTED YELLOW WITH THE EXCEPTION OF HYDRANT THAT ARE NOT FOR FIRE SERVICES PROPOSES.
11. ALL ROCKER PIPES SHALL BE NO MORE THAN 150mm FROM THEIR ASSOCIATED CHAMBER
12. WHERE PIPE RUN IS LOCATED ADJACENT TO FOUNDATION AND IS AT A LEVEL BELOW UNDERSIDE OF THE FOUNDATION, PIPE TRENCH TO BE BACKFILLED TO FORMATION LEVEL WITH CLASS 15/20 CONCRETE
13. PROVIDE ANCHOR/THRUST BLOCKS ON ALL BENDS EQUAL TO OR IN EXCESS OF 22.5°, DEAD ENDS AND TEES ON ALL PIPES
14. TRENCHES IN EXISTING SURFACES TO BE SAW CUT.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING OUT WATERMAINS & SLUICE VALVES TO ENSURE NO CLASHES WITH SERVICE DUCTS OR PIPES.

NOTES FOR CONNECTION TO IRISH WATER SERVICES

1. CONTRACTOR TO LIAISE WITH IRISH WATER PRIOR TO MOBILISATION ON SITE TO DETERMINE THE DURATION OF THE APPROVAL PROCESS AND WHAT DOCUMENTATION AND FEES ARE REQUIRED BY IRISH WATER AND THE LOCAL AUTHORITY AND PROGRAM THIS INTO THE CONSTRUCTION PROGRAM. CONTRACTOR TO CONFIRM EXTENT OF NOTICE REQUIRED BY IRISH WATER TO INSPECT WORKS AND ALSO PROGRAM INTO THE CONSTRUCTION PROGRAM
2. IRISH WATER TO BE CONTACTED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF ANY FOUL SEWER AND WATERMAIN WORKS. ALL DETAILS TO BE AGREED WITH IRISH WATER. IRISH WATER TO BE GIVEN 40 WORKING DAYS NOTICE FOR ALL FOUL SEWER AND WATERMAIN CONNECTION WORKS.
3. EXACT LOCATION AND DEPTH OF THE EXISTING FOUL SEWERS, RISING MAINS AND WATERMAINS SHOULD BE ESTABLISHED BY THE CONTRACTOR IN ADVANCE OF THE MAIN EXCAVATION FOR THE NEW FOUL SEWER AND WATERMAIN SO AS TO AVOID THE POSSIBILITY OF DAMAGE TO THE EXISTING FOUL SEWER, RISING MAINS AND WATERMAIN DURING CONSTRUCTION WORKS SLIT TRENCHES TO BE UNDERTAKEN.
4. ALL EXISTING FOUL SEWERS, RISING MAINS AND WATERMAINS TO BE ADEQUATELY PROTECTED. ANY FOUL SEWERS, RISING MAINS OR WATERMAINS DAMAGED DURING THE COURSE OF CONSTRUCTION WILL BE REPLACED BY THE CONTRACTOR AT THEIR OWN COST.
5. THE CONTRACTOR SHALL APPLY FOR A ROAD OPENING LICENSE AND PAY THE REQUIRED ROAD OPENING LICENSE FEE. THIS FEE IS A NON-NEGOTIABLE AND NON-REFUNDABLE FIGURE. THE CONTRACTOR SHALL BE DEEMED TO HAVE INCLUDED IN HIS TENDER PRICE FOR ALL REQUIREMENTS SUCH AS CONTRIBUTION FOR CONNECTIONS TO PUBLIC INFRASTRUCTURE, LICENSE APPLICATION, PAYMENT OF FEE(S), STATUTORY TIME PERIODS, TRAFFIC MANAGEMENT PLANS AND APPLICATION, REINSTATEMENT, ETC.
6. ALL WATERMAIN EXTENSIONS CONSTRUCTED TO ALLOW FOR FUTURE CONNECTION TO FUTURE PHASES ARE TO BE TERMINATED IN BLANK ENDS WITH A SUITABLE THRUST BLOCK INSTALLED.

ISSUE	DATE	DESCRIPTION	BY
PL6	31.05.22	PLANNING ISSUE	KS
PL5	16.03.22	UPDATED AS PER IW COMMENTS	TN
PL4	24.02.22	IW DIVERSIONS TEAM COMMENTS	TN
PL3	20.01.22	ISSUED FOR IW DESIGN VETTING	TN
PL2	10.12.21	ISSUED FOR IW DESIGN VETTING	TN
PL1	09.11.21	ISSUED FOR PRE-APPLICATION SUBMISSION	TN

Project Engineer: CIARAN O'RAFFERTY | Project Director: CIARAN KENNEDY

BM STAGE

PLANNING

BM BARRETT MAHONY
Dublin Office: Sandwith House, 52-54 Lower Sandwith Street, Dublin 2, Ireland. Tel: (01) 677 3200 Fax: (01) 677 3164
London Office: 12 Mill Street, London SE1 2AY, United Kingdom Tel: (0044) 084 5413 2722
Consulting Engineers, Civil . Structural . Project Management.E-mail: bmce@bmce.ie Web: www.bmce.ie

CLIENT
CWTC MULTI FAMILY ICAV ACTING SOLELY IN RESPECT OF ITS SUB FUND DBTR SCR1 FUND

PROJECT TITLE
BAILEY GIBSON SHD 2

BM PROJECT No. **19117**

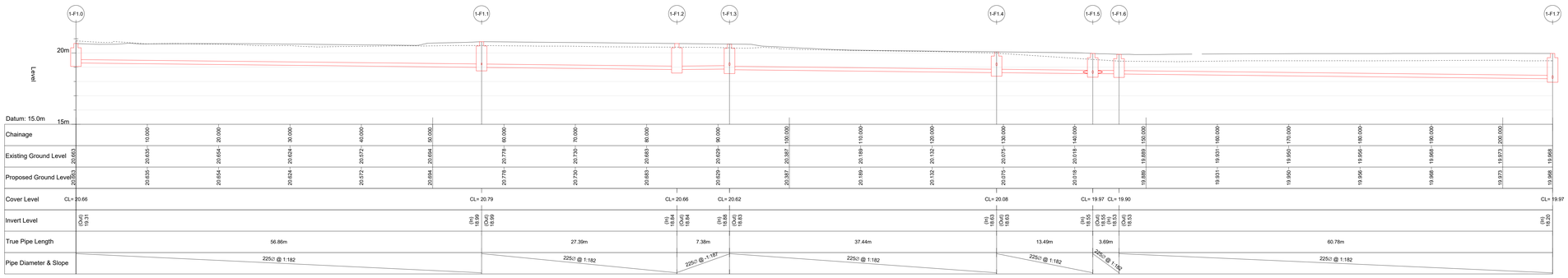
REFERENCE	SUITABILITY	REVISION
BGL-BMD-ZZ-00-DR-C-1030-1031	**S1**	**P01**

DRAWING TITLE
PROPOSED WATERMAIN LAYOUT (SHEET 2 OF 3)

DRAWING REFERENCE	STATUS	REVISION
BGL-BMD-ZZ-00-DR-C-1031	**D2**	**PL6**

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECT'S DRAWINGS.FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - ASK.
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.



F1 SECTION

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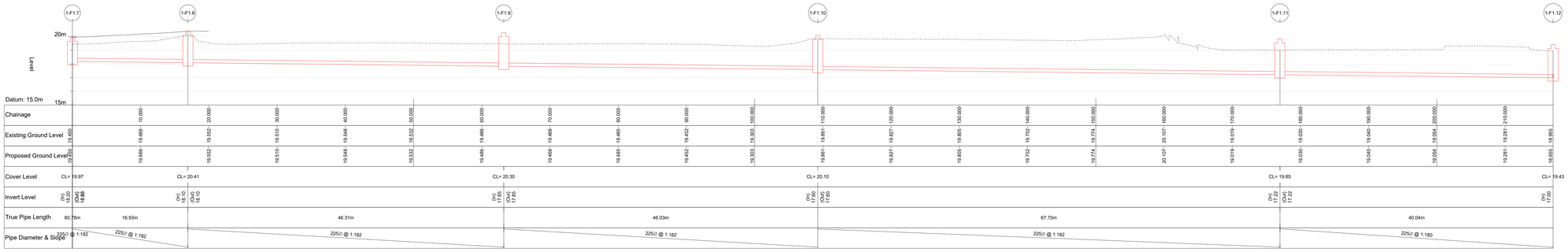
SCALE @ A2: H=1:500 ; V=1:250



F1 SECTION

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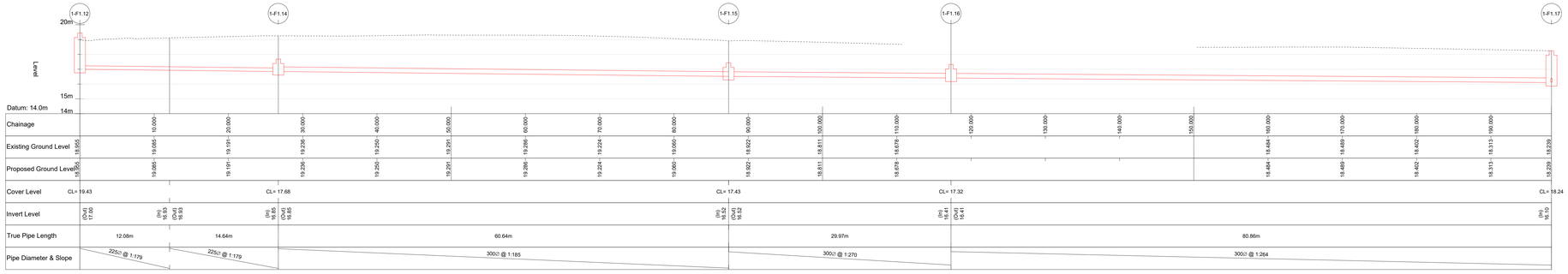
SCALE @ A2: H=1:500 ; V=1:250



F1 SECTION

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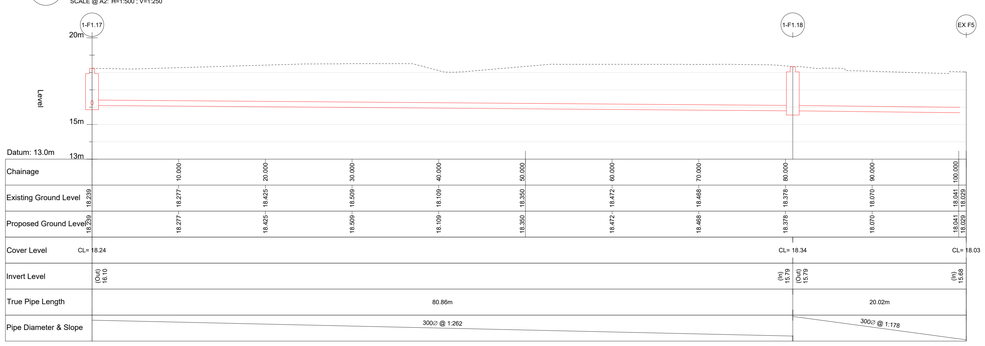

F1 SECTION

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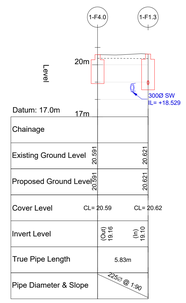

F4 SECTION

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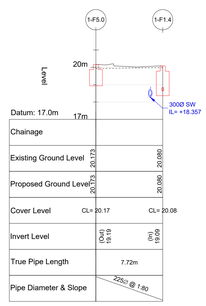
SCALE @ A2: H=1:500 ; V=1:250



F5 SECTION

SCALE @ A0: H=1:250 ; V=1:125
SCALE @ A2: H=1:500 ; V=1:250

ISSUE	DATE	DESCRIPTION	BY
PL4	31.05.22	PLANNING ISSUE	KS
PL3	24.02.22	IW DIVERSIONS TEAM COMMENTS	TN
PL2	20.01.22	ISSUED FOR IW DESIGN VETTING	TN
PL1	10.12.21	ISSUED FOR IW DESIGN VETTING	TN

Project Engineer: CIARAN O'RAFFERTY | Project Director: CIARAN KENNEDY

BM STAGE

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CLIENT
CWTC MULTI FAMILY ICAV ACTING SOLELY IN RESPECT OF ITS SUB FUND DBTR SCR1 FUND

PROJECT TITLE
BAILEY GIBSON SHD 2

BM PROJECT No.
19117

ORIGINAL

REFERENCE
BGL-BMD-ZZ-00-DR-C-1020-1022 & 1120-1122

SUITABILITY
S1

REVISION
P01

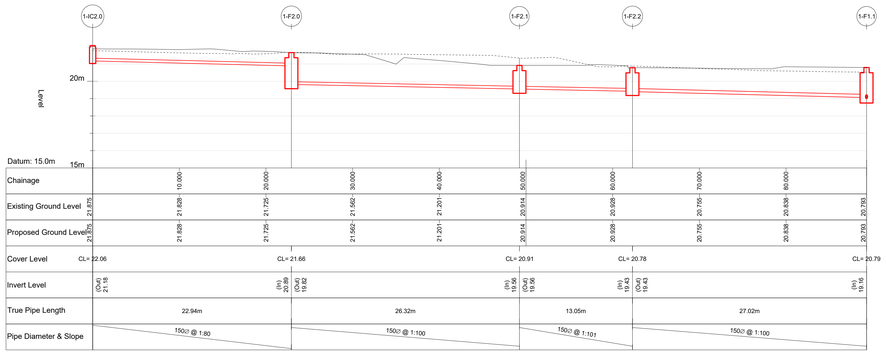
DRAWING TITLE
FOUL DRAINAGE LONG SECTIONS (SHEET 1 OF 2)

COPY

DRAWING REFERENCE
BGL-BMD-ZZ-ZZ-DR-C-1120

STATUS
D2

REVISION
PL4



F2 SECTION

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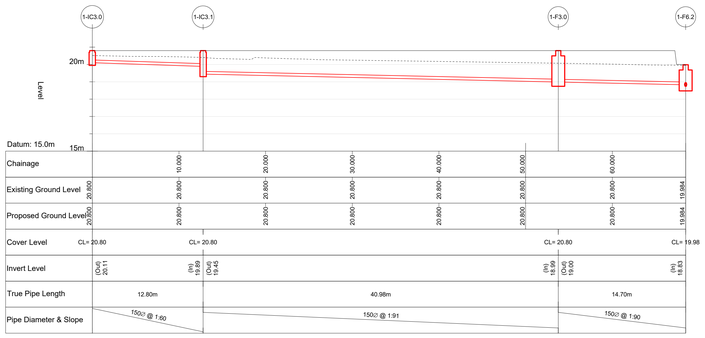

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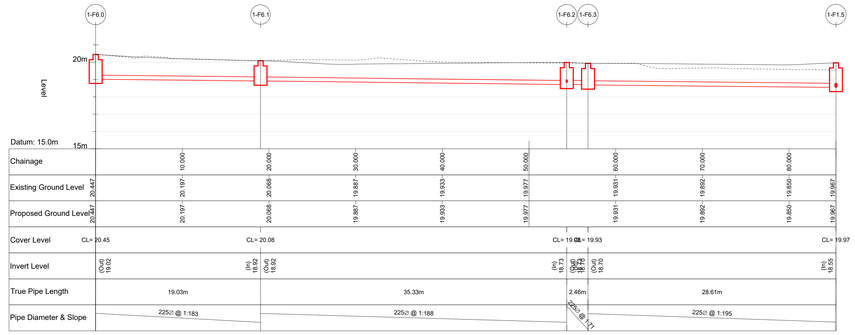

F6 SECTION

SCALE @ A0: H=1:250 ; V=1:125
SCALE @ A2: H=1:500 ; V=1:250

NOTES

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2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.

ISSUE	DATE	DESCRIPTION	BY
PL4	31.05.22	PLANNING ISSUE	KS
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PL1	10.12.21	ISSUED FOR IW DESIGN VETTING	TN

Project Engineer: CIARAN O'RAFFERTY | Project Director: CIARAN KENNEDY

BM STAGE

PLANNING

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E-mail: bmce@bmce.ie Web: www.bmce.ie

CLIENT
CWTC MULTI FAMILY ICAV ACTING SOLELY IN RESPECT OF ITS SUB FUND DBTR SCR1 FUND

PROJECT TITLE
BAILEY GIBSON SHD 2

BM PROJECT No.
19117

WORK
REFERENCE: **BGL-BMD-ZZ-00-DR-C-1020-1022 & 1120-1122**
SUITABILITY: **S1**
REVISION: **P01**

DRAWING TITLE
FOUL DRAINAGE LONG SECTIONS (SHEET 2 OF 2)

DWG
DRAWING REFERENCE: **BGL-BMD-ZZ-ZZ-DR-C-1121**
STATUS: **D2**
REVISION: **PL4**

Appendix II (e)

Irish Water Diversions 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

Claire Pomroy
C/O DBTR-SCR1 Fund, a Sub-Fund of the CWTC Multi Family ICAV
70 Sir John Rogerson's Quay
Dublin 2
D02 R296

11 March 2022

Dear Claire

Re: DIV21315 – 326-328 South Circular Road, Dublin 8, Dublin– Diversion enquiry.

Irish Water has reviewed your enquiry in relation to the diversion of existing 225mm concrete foul main and 150mm DI water main to facilitate the new housing development at 326-328 South Circular Road, Dublin 8, Dublin as indicated on drawings 1023 rev. PL4, 1032 rev. PL5 & 1120 rev. PL3.

Based upon the details you have provided with your enquiry and as assessed by Irish Water, we wish to advise you that, in this instance, Irish Water will accept the proposed diversion of existing 225mm concrete foul main with new 300mm uPVC foul main and existing 150mm DI water main with new 150mm HDPE water main to accommodate the new housing development. Subject to the conditions set out below being in place.

1. The construction shall be constructed in strict accordance to drawings 1023 rev. PL4, 1032 rev. PL5 & 1120 rev. PL3.
2. Applicant has to upgrade the existing 300mm to 375mm foul crossing road main section on Donore Ave.
3. Applicant has to register new wayleaves over the new diverted mains.
4. Coombe Women and Infants University Hospital is being fed from the proposal 150mm DI water main. Hospital will need to be notified in advance for the proposal diversion works.

You are advised that this correspondence does not constitute an agreement in whole or in part to provide a diversion of Irish Water infrastructure and is provided subject to diversion agreement being executed at a later date.

If you have any further questions, please contact Juan Antonio Gragera Rubio from the diversions team on email diversions@water.ie. For further information, visit **www.water.ie/connections**

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix III

Surface Water Drainage

Computer Output for Full Network Simulation for the 1, 30 and 100 Year Storm Events

0.277

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 314256, Northing: 232888,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.4,	3.5,	4.1,	5.0,	5.6,	6.1,	7.7,	9.6,	10.8,	12.6,	14.1,	15.4,	17.3,	18.8,	20.0,	N/A ,
10 mins	3.4,	4.9,	5.7,	7.0,	7.9,	8.5,	10.8,	13.3,	15.1,	17.5,	19.7,	21.4,	24.1,	26.1,	27.9,	N/A ,
15 mins	4.0,	5.8,	6.8,	8.2,	9.3,	10.0,	12.7,	15.7,	17.7,	20.6,	23.2,	25.2,	28.3,	30.7,	32.8,	N/A ,
30 mins	5.3,	7.5,	8.8,	10.6,	11.9,	12.8,	16.1,	19.7,	22.2,	25.6,	28.7,	31.1,	34.8,	37.7,	40.1,	N/A ,
1 hours	7.0,	9.8,	11.4,	13.7,	15.2,	16.4,	20.4,	24.8,	27.8,	31.9,	35.6,	38.5,	42.9,	46.3,	49.1,	N/A ,
2 hours	9.2,	12.8,	14.7,	17.6,	19.5,	21.0,	25.8,	31.2,	34.8,	39.8,	44.2,	47.6,	52.8,	56.8,	60.2,	N/A ,
3 hours	10.9,	15.0,	17.2,	20.4,	22.5,	24.2,	29.6,	35.7,	39.7,	45.2,	50.1,	53.9,	59.6,	64.1,	67.8,	N/A ,
4 hours	12.2,	16.7,	19.1,	22.6,	25.0,	26.8,	32.7,	39.3,	43.5,	49.5,	54.8,	58.8,	65.0,	69.8,	73.7,	N/A ,
6 hours	14.4,	19.5,	22.2,	26.2,	28.9,	31.0,	37.6,	44.9,	49.7,	56.3,	62.1,	66.6,	73.4,	78.6,	83.0,	N/A ,
9 hours	16.9,	22.8,	25.9,	30.4,	33.4,	35.7,	43.2,	51.4,	56.7,	64.0,	70.4,	75.4,	82.9,	88.7,	93.4,	N/A ,
12 hours	19.0,	25.5,	28.8,	33.8,	37.1,	39.6,	47.6,	56.5,	62.2,	70.1,	77.0,	82.3,	90.4,	96.5,	101.6,	N/A ,
18 hours	22.4,	29.8,	33.6,	39.2,	42.9,	45.7,	54.7,	64.6,	70.9,	79.7,	87.4,	93.2,	102.0,	108.8,	114.4,	N/A ,
24 hours	25.1,	33.2,	37.4,	43.5,	47.5,	50.6,	60.4,	71.0,	77.9,	87.3,	95.5,	101.8,	111.2,	118.5,	124.4,	144.7,
2 days	30.8,	40.0,	44.6,	51.4,	55.8,	59.1,	69.7,	81.1,	88.4,	98.3,	106.9,	113.4,	123.2,	130.7,	136.8,	157.5,
3 days	35.4,	45.4,	50.5,	57.7,	62.5,	66.1,	77.3,	89.4,	97.1,	107.5,	116.5,	123.2,	133.4,	141.1,	147.4,	168.7,
4 days	39.4,	50.1,	55.6,	63.3,	68.3,	72.1,	84.0,	96.7,	104.7,	115.5,	124.8,	131.9,	142.4,	150.4,	156.9,	178.8,
6 days	46.4,	58.4,	64.4,	72.9,	78.4,	82.6,	95.5,	109.2,	117.8,	129.5,	139.4,	146.9,	158.1,	166.5,	173.3,	196.3,
8 days	52.5,	65.7,	72.2,	81.4,	87.3,	91.7,	105.6,	120.2,	129.3,	141.6,	152.1,	160.0,	171.7,	180.5,	187.7,	211.7,
10 days	58.2,	72.3,	79.2,	89.0,	95.3,	100.0,	114.7,	130.1,	139.7,	152.6,	163.5,	171.8,	184.0,	193.2,	200.6,	225.6,
12 days	63.4,	78.4,	85.7,	96.1,	102.7,	107.7,	123.1,	139.2,	149.2,	162.7,	174.1,	182.6,	195.4,	204.9,	212.6,	238.3,
16 days	73.1,	89.7,	97.8,	109.1,	116.3,	121.8,	138.5,	155.9,	166.7,	181.1,	193.3,	202.4,	216.0,	226.1,	234.3,	261.6,
20 days	82.1,	100.0,	108.8,	121.0,	128.8,	134.6,	152.5,	171.0,	182.5,	197.8,	210.7,	220.4,	234.6,	245.3,	253.9,	282.5,
25 days	92.5,	112.1,	121.6,	134.8,	143.2,	149.4,	168.6,	188.4,	200.7,	217.0,	230.7,	240.9,	256.0,	267.3,	276.4,	306.5,

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

MAIN NETWORK AND PITCH SIDE ATTENUATION TANK

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	16.400	Minimum Backdrop Height (m)	0.200
Ratio-R	0.277	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Circular Link Type

Shape	Circular	Barrels	1	Auto Increment (mm)	75	Follow Ground	x

Available Diameters (mm)

100 | 150

(Trench) Link Type

Shape	Rectangular	Height (mm)	1725	Follow Ground	x
Barrels	1	Auto Increment (mm)	75		

Available Diameters (mm)

100

(Trench) Link Type

Shape	Rectangular	Height (mm)	900	Follow Ground	x
Barrels	1	Auto Increment (mm)	75		

Available Diameters (mm)

100

(Trench) Link Type

Shape	Rectangular	Height (mm)	1838	Follow Ground	x
Barrels	1	Auto Increment (mm)	75		

Available Diameters (mm)
100

(Trench) Link Type

Shape	Rectangular	Height (mm)	1838	Follow Ground	x
Barrels	1	Auto Increment (mm)	75		

Available Diameters (mm)
100

(Trench) Link Type

Shape	Rectangular	Height (mm)	1323	Follow Ground	x
Barrels	1	Auto Increment (mm)	75		

Available Diameters (mm)
100

(Trench) Link Type

Shape	Rectangular	Height (mm)	1610	Follow Ground	x
Barrels	1	Auto Increment (mm)	75		

Available Diameters (mm)
100

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
✓	1-S1.10			20.025	Manhole	Adoptable	1200	714140.677	732840.912	2.044
✓	1-S1.11			19.898	Manhole	Adoptable	1350	714186.401	732835.447	2.008
✓	1-S1.12	0.178	4.00	20.053	Manhole	Adoptable	1350	714208.512	732896.868	2.350
✓	1-S1.13	0.047	4.00	19.850	Manhole	Adoptable	1500	714174.394	732916.481	2.278
✓	DCC_S1.0	0.176	4.00	19.800	Manhole	Adoptable	1500	714040.144	732900.742	1.425
✓	DCC_S1.1	0.052	4.00	19.800	Manhole	Adoptable	1500	714043.940	732930.904	1.594
✓	DCC_S1.2	0.434	4.00	19.800	Manhole	Adoptable	1500	714125.586	732926.048	2.048
✓	1-S1.14	0.505	4.00	19.300	Manhole	Adoptable	1500	714161.987	732942.365	1.824
✓	1-S1.15	0.014	4.00	19.200	Manhole	Adoptable	1500	714175.823	732948.556	1.775
✓	1-S1.16	0.000		19.300	Manhole	Adoptable	1500	714156.128	732992.789	2.036
✓	1-S8.0	0.110	4.00	19.170	Manhole	Adoptable	1500	714166.138	732950.517	0.900
✓	1-S8.1	0.000		18.650	Manhole	Adoptable	1500	714132.776	733025.449	1.196
✓	1-S1.17	0.042	4.00	18.650	Manhole	Adoptable	1500	714140.145	733028.688	1.517
✓	1-S1.18	0.087	4.00	18.590	Manhole	Adoptable	1500	714186.037	733048.740	1.624
✓	1-S10.0	0.035	4.00	19.250	Manhole	Adoptable	750	714184.268	732939.780	0.900
✓	1-S10.1	0.038	4.00	19.700	Manhole	Adoptable	1500	714218.415	732953.407	1.589
✓	1-S10.2	0.029	4.00	19.600	Manhole	Adoptable	1500	714248.301	732973.800	1.725
✓	1-S10.3	0.025	4.00	19.500	Manhole	Adoptable	1500	714280.361	732981.019	1.838
✓	1-S10.4	0.036	4.00	18.600	Manhole	Adoptable	1500	714311.560	733001.855	1.182
✓	1-S10.5	0.042	4.00	18.415	Manhole	Adoptable	1500	714290.727	733046.995	1.323
✓	1-S1.19	0.065	4.00	18.410	Manhole	Adoptable	1800	714272.398	733086.706	1.758
✓	1-S1.20	0.042	4.00	18.250	Manhole	Adoptable	1500	714278.895	733089.595	1.622
✓	1-S1.21			18.325	Manhole	Adoptable	1500	714302.118	733066.558	1.806
✓	1-S4.0	0.175	4.00	20.600	Manhole	Adoptable	1200	714035.858	732822.105	1.970
✓	1-S3.1	0.095	4.00	20.940	Manhole	Adoptable	1200	714010.299	732759.711	1.370
✓	1-S2.0	0.034	4.00	21.340	Manhole	Adoptable	1200	714021.622	732731.676	1.780
✓	1-S2.1	0.019	4.00	20.820	Manhole	Adoptable	1200	714021.026	732758.674	1.530
✓	1-S1.0	0.075	4.00	21.700	Manhole	Adoptable	1200	713958.265	732733.098	1.380
✓	1-S1.1	0.059	4.00	20.930	Manhole	Adoptable	1200	713957.681	732788.737	1.769
✓	1-S1.2	0.046	4.00	20.770	Manhole	Adoptable	1200	713962.785	732791.803	1.733
✓	1-S1.3	0.170	4.00	20.810	Manhole	Adoptable	1350	714024.123	732784.179	2.082

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
✓	1-S1.4	0.007	4.00	20.640	Manhole	Adoptable	1350	714028.662	732815.929	2.055
✓	1-S1.5	0.065	4.00	20.600	Manhole	Adoptable	1350	714029.822	732822.844	2.065
✓	1-S1.6	0.030	4.00	20.020	Manhole	Adoptable	1350	714035.293	732865.476	1.676
✓	1-S5.0	0.050	4.00	20.510	Manhole	Adoptable	1200	713964.471	732855.975	0.970
✓	1-S5.1	0.048	4.00	20.090	Manhole	Adoptable	1200	713967.439	732879.507	0.829
✓	1-S5.2	0.035	4.00	19.940	Manhole	Adoptable	1200	714002.549	732875.135	0.915
✓	1-S5.3	0.065	4.00	19.960	Manhole	Adoptable	1200	714007.563	732877.193	0.962
✓	1-S1.7	0.050	4.00	19.920	Manhole	Adoptable	1500	714041.873	732872.233	1.643
✓	1-S1.8	0.034	4.00	19.990	Manhole	Adoptable	1500	714092.873	732864.122	1.836
✓	1-S1.9	0.031	4.00	20.470	Manhole	Adoptable	1500	714090.662	732847.303	2.356

Links (Results)

	Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
?	1.010	1-S1.10	1-S1.11	1.049	227.1	189.1	1.508	1.483	1.483	1.508	1.088	0.0	368	1.168
✓	1.011	1-S1.11	1-S1.12	1.191	257.9	173.0	1.483	1.825	1.483	1.825	1.088	0.0	316	1.273
✓	1.012	1-S1.12	1-S1.13	1.288	278.8	199.0	1.825	1.753	1.753	1.825	1.266	0.0	329	1.394
?	1.013	1-S1.13	1-S1.14	1.542	593.5	205.0	1.578	1.124	1.124	1.578	1.313	0.0	283	1.406
?	6.000	DCC_S1.0	DCC_S1.1	1.666	360.7	31.8	0.900	1.069	0.900	1.069	0.176	0.0	104	1.044
?	6.001	DCC_S1.1	DCC_S1.2	1.666	360.7	41.2	1.069	1.523	1.069	1.523	0.228	0.0	119	1.124
✓	6.002	DCC_S1.2	1-S1.14	1.666	360.7	119.6	1.523	1.245	1.245	1.523	0.662	0.0	207	1.503
?	1.014	1-S1.14	1-S1.15	1.803	1147.3	384.5	0.924	0.875	0.875	0.924	2.480	0.0	357	1.633
?	1.015	1-S1.15	1-S1.16	1.803	1147.3	379.7	0.875	1.136	0.875	1.136	2.494	0.0	355	1.627
?	1.016	1-S1.16	1-S1.17	1.803	1147.3	370.4	1.136	0.617	0.617	1.136	2.494	0.0	350	1.618
?	7.000	1-S1.14	1-S8.0	0.648	25.7	0.0	0.550	0.443	0.443	0.550	0.000	0.0	0	0.000
?	7.001	1-S8.0	1-S8.1	1.000	39.8	19.9	0.675	0.638	0.638	0.675	0.110	0.0	112	0.999
?	7.002	1-S8.1	1-S1.17	1.173	46.7	19.9	0.971	1.036	0.971	1.036	0.110	0.0	102	1.127
?	1.017	1-S1.17	1-S1.18	1.803	1147.3	382.5	0.617	0.724	0.617	0.724	2.646	0.0	356	1.631
?	1.018	1-S1.18	1-S1.19	1.803	1147.3	385.2	0.724	0.858	0.724	0.858	2.733	0.0	358	1.634
?	8.000	1-S10.0	1-S10.1	1.052	41.8	6.3	0.675	1.364	0.675	1.364	0.035	0.0	59	0.765

Links (Results)

	Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
✓	8.001	1-S10.1	1-S10.2	1.053	41.9	13.2	1.364	1.500	1.364	1.500	0.073	0.0	87	0.935
✓	8.002	1-S10.2	1-S10.3	1.050	41.7	18.4	1.500	1.613	1.500	1.613	0.102	0.0	105	1.020
?	8.003	1-S10.3	1-S10.4	1.052	41.8	22.9	1.613	0.957	0.957	1.613	0.127	0.0	119	1.076
?	8.004	1-S10.4	1-S10.5	1.056	42.0	29.5	0.957	1.098	0.957	1.098	0.163	0.0	139	1.141
?	8.005	1-S10.5	1-S1.19	1.065	42.3	37.0	1.098	1.385	1.098	1.385	0.205	0.0	164	1.197
?	1.019	1-S1.19	1-S1.20	0.750	29.8	417.8	1.533	1.397	1.397	1.533	3.003	0.0	225	0.763
?	1.020	1-S1.20	1-S1.21	1.041	114.9	423.7	1.247	1.431	1.247	1.431	3.045	0.0	375	1.054
✓	4.000	1-S4.0	1-S1.5	1.463	58.2	31.6	1.745	1.821	1.745	1.821	0.175	0.0	118	1.492
?	3.000	1-S3.1	1-S2.1	1.419	56.4	17.2	1.145	1.152	1.145	1.152	0.095	0.0	85	1.248
✓	2.000	1-S2.0	1-S2.1	1.307	52.0	6.1	1.555	1.305	1.305	1.555	0.034	0.0	52	0.886
✓	2.001	1-S2.1	1-S1.3	1.065	42.3	26.7	1.305	1.466	1.305	1.466	0.148	0.0	130	1.124
?	1.000	1-S1.0	1-S1.1	1.892	75.2	13.6	1.155	1.544	1.155	1.544	0.075	0.0	65	1.445
✓	1.001	1-S1.1	1-S1.2	1.892	75.2	24.2	1.544	1.508	1.508	1.544	0.134	0.0	87	1.690
✓	1.002	1-S1.2	1-S1.3	1.277	141.1	32.5	1.358	1.707	1.358	1.707	0.180	0.0	122	1.045
✓	1.003	1-S1.3	1-S1.4	1.351	214.9	90.0	1.632	1.605	1.605	1.632	0.498	0.0	203	1.293
✓	1.004	1-S1.4	1-S1.5	1.716	272.9	91.3	1.605	1.615	1.605	1.615	0.505	0.0	179	1.552
✓	1.005	1-S1.5	1-S1.6	1.351	214.9	134.6	1.615	1.226	1.226	1.615	0.745	0.0	259	1.423
?	1.006	1-S1.6	1-S1.7	1.716	272.9	140.0	1.226	1.193	1.193	1.226	0.775	0.0	229	1.728
?	5.000	1-S5.0	1-S5.1	1.419	56.4	9.0	0.745	0.604	0.604	0.745	0.050	0.0	60	1.042
?	5.001	1-S5.1	1-S5.2	1.281	90.6	17.7	0.529	0.615	0.529	0.615	0.098	0.0	89	0.999
?	5.002	1-S5.2	1-S5.3	1.277	141.1	24.0	0.540	0.587	0.540	0.587	0.133	0.0	104	0.962
?	5.003	1-S5.3	1-S1.7	1.434	228.0	35.8	0.512	0.645	0.512	0.645	0.198	0.0	120	1.057
?	1.007	1-S1.7	1-S1.8	1.088	235.5	184.9	1.118	1.311	1.118	1.311	1.023	0.0	352	1.199
✓	1.008	1-S1.8	1-S1.9	1.088	235.5	191.0	1.311	1.831	1.311	1.831	1.057	0.0	361	1.205
✓	1.009	1-S1.9	1-S1.10	1.143	247.4	196.2	1.831	1.519	1.519	1.831	1.088	0.0	355	1.262

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.010	46.049	450.0	525	Circular	20.025	17.992	1.508	19.898	17.890	1.483
1.011	65.280	350.0	525	Circular	19.898	17.890	1.483	20.053	17.703	1.825
1.012	39.354	300.0	525	Circular	20.053	17.703	1.825	19.850	17.572	1.753
1.013	28.704	300.0	700	Circular	19.850	17.572	1.578	19.300	17.476	1.124
6.000	30.400	180.0	525	Circular	19.800	18.375	0.900	19.800	18.206	1.069
6.001	81.790	180.0	525	Circular	19.800	18.206	1.069	19.800	17.752	1.523
6.002	39.891	180.0	525	Circular	19.800	17.752	1.523	19.300	17.530	1.245
1.014	15.158	300.0	900	Circular	19.300	17.476	0.924	19.200	17.425	0.875
1.015	48.420	300.0	900	Circular	19.200	17.425	0.875	19.300	17.264	1.136
1.016	39.296	300.0	900	Circular	19.300	17.264	1.136	18.650	17.133	0.617
7.000	9.148	400.0	225	Circular	19.300	18.525	0.550	19.170	18.502	0.443
7.001	82.023	169.8	225	Circular	19.170	18.270	0.675	18.650	17.787	0.638
7.002	8.049	123.8	225	Circular	18.650	17.454	0.971	18.650	17.389	1.036
1.017	50.082	300.0	900	Circular	18.650	17.133	0.617	18.590	16.966	0.724
1.018	94.338	300.0	900	Circular	18.590	16.966	0.724	18.410	16.652	0.858

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.010	1-S1.10	1200	Manhole	Adoptable	1-S1.11	1350	Manhole	Adoptable
1.011	1-S1.11	1350	Manhole	Adoptable	1-S1.12	1350	Manhole	Adoptable
1.012	1-S1.12	1350	Manhole	Adoptable	1-S1.13	1500	Manhole	Adoptable
1.013	1-S1.13	1500	Manhole	Adoptable	1-S1.14	1500	Manhole	Adoptable
6.000	DCC_S1.0	1500	Manhole	Adoptable	DCC_S1.1	1500	Manhole	Adoptable
6.001	DCC_S1.1	1500	Manhole	Adoptable	DCC_S1.2	1500	Manhole	Adoptable
6.002	DCC_S1.2	1500	Manhole	Adoptable	1-S1.14	1500	Manhole	Adoptable
1.014	1-S1.14	1500	Manhole	Adoptable	1-S1.15	1500	Manhole	Adoptable
1.015	1-S1.15	1500	Manhole	Adoptable	1-S1.16	1500	Manhole	Adoptable
1.016	1-S1.16	1500	Manhole	Adoptable	1-S1.17	1500	Manhole	Adoptable
7.000	1-S1.14	1500	Manhole	Adoptable	1-S8.0	1500	Manhole	Adoptable
7.001	1-S8.0	1500	Manhole	Adoptable	1-S8.1	1500	Manhole	Adoptable
7.002	1-S8.1	1500	Manhole	Adoptable	1-S1.17	1500	Manhole	Adoptable
1.017	1-S1.17	1500	Manhole	Adoptable	1-S1.18	1500	Manhole	Adoptable
1.018	1-S1.18	1500	Manhole	Adoptable	1-S1.19	1800	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
8.000	36.766	153.8	225	Circular	19.250	18.350	0.675	19.700	18.111	1.364
8.001	36.181	153.3	225	Circular	19.700	18.111	1.364	19.600	17.875	1.500
8.002	32.863	154.3	225	Circular	19.600	17.875	1.500	19.500	17.662	1.613
8.003	37.517	153.8	225	Circular	19.500	17.662	1.613	18.600	17.418	0.957
8.004	49.716	152.5	225	Circular	18.600	17.418	0.957	18.415	17.092	1.098
8.005	43.737	150.0	225	Circular	18.415	17.092	1.098	18.410	16.800	1.385
1.019	7.110	300.0	225	Circular	18.410	16.652	1.533	18.250	16.628	1.397
1.020	32.711	300.0	375	Circular	18.250	16.628	1.247	18.325	16.519	1.431
4.000	6.081	80.0	225	Circular	20.600	18.630	1.745	20.600	18.554	1.821
3.000	10.777	85.0	225	Circular	20.940	19.570	1.145	20.820	19.443	1.152
2.000	27.005	100.0	225	Circular	21.340	19.560	1.555	20.820	19.290	1.305
2.001	25.692	150.0	225	Circular	20.820	19.290	1.305	20.810	19.119	1.466
1.000	55.642	48.0	225	Circular	21.700	20.320	1.155	20.930	19.161	1.544
1.001	5.954	48.0	225	Circular	20.930	19.161	1.544	20.770	19.037	1.508

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
8.000	1-S10.0	750	Manhole	Adoptable	1-S10.1	1500	Manhole	Adoptable
8.001	1-S10.1	1500	Manhole	Adoptable	1-S10.2	1500	Manhole	Adoptable
8.002	1-S10.2	1500	Manhole	Adoptable	1-S10.3	1500	Manhole	Adoptable
8.003	1-S10.3	1500	Manhole	Adoptable	1-S10.4	1500	Manhole	Adoptable
8.004	1-S10.4	1500	Manhole	Adoptable	1-S10.5	1500	Manhole	Adoptable
8.005	1-S10.5	1500	Manhole	Adoptable	1-S1.19	1800	Manhole	Adoptable
1.019	1-S1.19	1800	Manhole	Adoptable	1-S1.20	1500	Manhole	Adoptable
1.020	1-S1.20	1500	Manhole	Adoptable	1-S1.21	1500	Manhole	Adoptable
4.000	1-S4.0	1200	Manhole	Adoptable	1-S1.5	1350	Manhole	Adoptable
3.000	1-S3.1	1200	Manhole	Adoptable	1-S2.1	1200	Manhole	Adoptable
2.000	1-S2.0	1200	Manhole	Adoptable	1-S2.1	1200	Manhole	Adoptable
2.001	1-S2.1	1200	Manhole	Adoptable	1-S1.3	1350	Manhole	Adoptable
1.000	1-S1.0	1200	Manhole	Adoptable	1-S1.1	1200	Manhole	Adoptable
1.001	1-S1.1	1200	Manhole	Adoptable	1-S1.2	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.002	61.810	200.0	375	Circular	20.770	19.037	1.358	20.810	18.728	1.707
1.003	32.073	225.0	450	Circular	20.810	18.728	1.632	20.640	18.585	1.605
1.004	7.012	140.0	450	Circular	20.640	18.585	1.605	20.600	18.535	1.615
1.005	42.982	225.0	450	Circular	20.600	18.535	1.615	20.020	18.344	1.226
1.006	9.432	140.0	450	Circular	20.020	18.344	1.226	19.920	18.277	1.193
5.000	23.718	85.0	225	Circular	20.510	19.540	0.745	20.090	19.261	0.604
5.001	35.381	150.0	300	Circular	20.090	19.261	0.529	19.940	19.025	0.615
5.002	5.420	200.0	375	Circular	19.940	19.025	0.540	19.960	18.998	0.587
5.003	34.667	200.0	450	Circular	19.960	18.998	0.512	19.920	18.825	0.645
1.007	51.641	419.0	525	Circular	19.920	18.277	1.118	19.990	18.154	1.311
1.008	16.964	419.0	525	Circular	19.990	18.154	1.311	20.470	18.114	1.831
1.009	50.570	380.0	525	Circular	20.470	18.114	1.831	20.025	17.981	1.519

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	1-S1.2	1200	Manhole	Adoptable	1-S1.3	1350	Manhole	Adoptable
1.003	1-S1.3	1350	Manhole	Adoptable	1-S1.4	1350	Manhole	Adoptable
1.004	1-S1.4	1350	Manhole	Adoptable	1-S1.5	1350	Manhole	Adoptable
1.005	1-S1.5	1350	Manhole	Adoptable	1-S1.6	1350	Manhole	Adoptable
1.006	1-S1.6	1350	Manhole	Adoptable	1-S1.7	1500	Manhole	Adoptable
5.000	1-S5.0	1200	Manhole	Adoptable	1-S5.1	1200	Manhole	Adoptable
5.001	1-S5.1	1200	Manhole	Adoptable	1-S5.2	1200	Manhole	Adoptable
5.002	1-S5.2	1200	Manhole	Adoptable	1-S5.3	1200	Manhole	Adoptable
5.003	1-S5.3	1200	Manhole	Adoptable	1-S1.7	1500	Manhole	Adoptable
1.007	1-S1.7	1500	Manhole	Adoptable	1-S1.8	1500	Manhole	Adoptable
1.008	1-S1.8	1500	Manhole	Adoptable	1-S1.9	1500	Manhole	Adoptable
1.009	1-S1.9	1500	Manhole	Adoptable	1-S1.10	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Additional Storage (m³/ha)	20.0
FSR Region	England and Wales	Analysis Speed	Normal	Check Discharge Rate(s)	x
M5-60 (mm)	16.400	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.277	Drain Down Time (mins)	240		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
5	20	0	0	100	20	0	0
30	20	0	0				

Node 1-S1.20 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.628	Product Number	CTL-SHE-0201-2230-1500-2230
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	22.3	Min Node Diameter (mm)	1500

Node 1-S1.19 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Safety Factor	2.0	Invert Level (m)	16.652
Side Inf Coefficient (m/hr)	0.03600	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1666.0	0.0	1.200	1666.0	0.0	1.201	0.0	0.0

Node 1-S10.2 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Porosity	0.40	Link	8.001
Side Inf Coefficient (m/hr)	0.03600	Invert Level (m)	17.875	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	4	Diameter (mm)	500

Node 1-S8.1 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Porosity	0.40	Link	7.001
Side Inf Coefficient (m/hr)	0.03600	Invert Level (m)	17.787	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	3	Diameter (mm)	850

Node 1-S10.3 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Porosity	0.40	Link	8.002
Side Inf Coefficient (m/hr)	0.03600	Invert Level (m)	17.662	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	5	Diameter (mm)	500

Node 1-S10.4 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Porosity	0.40	Link	8.003
Side Inf Coefficient (m/hr)	0.03600	Invert Level (m)	17.418	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	7	Diameter (mm)	500

Node 1-S10.5 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Porosity	0.40	Link	8.004
Side Inf Coefficient (m/hr)	0.03600	Invert Level (m)	17.092	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)		Diameter (mm)	500

Node 1-S1.19 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Porosity	0.40	Link	8.005
Side Inf Coefficient (m/hr)	0.03600	Invert Level (m)	16.800	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)		Diameter (mm)	500

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.10	13	18.454	0.473	244.9	0.5346	0.0000	OK
15 minute summer	1-S1.11	13	18.320	0.430	239.3	0.6160	0.0000	OK
30 minute summer	1-S1.12	20	18.151	0.448	253.6	1.3196	0.0000	OK
30 minute summer	1-S1.13	20	18.006	0.434	260.3	0.9454	0.0000	OK
15 minute summer	DCC_S1.0	10	18.514	0.139	51.2	0.5869	0.0000	OK
15 minute summer	DCC_S1.1	10	18.353	0.147	66.3	0.3559	0.0000	OK
15 minute summer	DCC_S1.2	10	18.041	0.289	190.4	1.7364	0.0000	OK
30 minute summer	1-S1.14	19	17.964	0.488	485.1	3.5617	0.0000	OK
15 minute summer	1-S1.15	13	17.881	0.456	467.5	0.8786	0.0000	OK
15 minute summer	1-S1.16	12	17.806	0.542	459.9	0.9576	0.0000	OK
15 minute summer	1-S8.0	10	18.414	0.144	32.0	0.6073	0.0000	OK
15 minute summer	1-S8.1	12	17.790	0.336	29.2	0.5945	0.0000	SURCHARGED
15 minute summer	1-S1.17	12	17.764	0.631	506.3	1.4651	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S1.10	1.010	1-S1.11	239.3	1.291	1.054	8.9964	
15 minute summer	1-S1.11	1.011	1-S1.12	234.1	1.236	0.908	12.5444	
30 minute summer	1-S1.12	1.012	1-S1.13	255.3	1.379	0.916	7.6164	
30 minute summer	1-S1.13	1.013	1-S1.14	266.9	1.137	0.450	7.6447	
15 minute summer	DCC_S1.0	6.000	DCC_S1.1	51.2	1.099	0.142	1.4418	
15 minute summer	DCC_S1.1	6.001	DCC_S1.2	64.2	0.758	0.178	7.0043	
15 minute summer	DCC_S1.2	6.002	1-S1.14	183.2	1.263	0.508	6.0024	
30 minute summer	1-S1.14	1.014	1-S1.15	480.0	1.437	0.418	5.0620	
30 minute summer	1-S1.14	7.000	1-S8.0	0.0	0.000	0.000	0.0000	
15 minute summer	1-S1.15	1.015	1-S1.16	459.9	1.457	0.401	17.3463	
15 minute summer	1-S1.16	1.016	1-S1.17	481.7	1.374	0.420	17.1725	
15 minute summer	1-S8.0	7.001	1-S8.1	29.2	1.100	0.735	2.1802	
15 minute summer	1-S8.1	7.002	1-S1.17	27.6	1.146	0.592	0.3201	
15 minute summer	1-S8.1	Infiltration		0.0				
15 minute summer	1-S1.17	1.017	1-S1.18	564.7	1.441	0.492	25.8540	

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.18	12	17.705	0.739	572.3	2.0988	0.0000	OK
15 minute summer	1-S10.0	10	18.425	0.075	10.2	0.0915	0.0000	OK
15 minute summer	1-S10.1	10	18.225	0.114	21.3	0.2552	0.0000	OK
15 minute summer	1-S10.2	11	18.015	0.140	29.4	0.4815	0.0000	OK
15 minute summer	1-S10.3	11	17.821	0.159	34.5	0.5690	0.0000	OK
15 minute summer	1-S10.4	11	17.600	0.182	42.9	0.7488	0.0000	OK
15 minute summer	1-S10.5	12	17.309	0.217	50.2	0.9807	0.0000	OK
960 minute summer	1-S1.19	660	17.183	0.531	104.8	888.0193	0.0000	SURCHARGED
960 minute summer	1-S1.20	660	17.162	0.534	22.3	1.2205	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S1.18	1.018	1-S1.19	653.0	3.162	0.569	26.6276	
15 minute summer	1-S10.0	8.000	1-S10.1	10.2	0.649	0.243	0.5822	
15 minute summer	1-S10.1	8.001	1-S10.2	21.0	0.919	0.502	0.8277	
15 minute summer	1-S10.2	8.002	1-S10.3	28.4	1.015	0.681	0.9194	
15 minute summer	1-S10.2	Infiltration		0.1				
15 minute summer	1-S10.3	8.003	1-S10.4	34.2	1.058	0.817	1.2098	
15 minute summer	1-S10.3	Infiltration		0.1				
15 minute summer	1-S10.4	8.004	1-S10.5	40.8	1.120	0.971	1.8265	
15 minute summer	1-S10.4	Infiltration		0.1				
15 minute summer	1-S10.5	8.005	1-S1.19	44.6	1.226	1.053	1.5908	
15 minute summer	1-S10.5	Infiltration		0.1				
960 minute summer	1-S1.19	1.019	1-S1.20	22.2	0.559	0.746	0.2828	
960 minute summer	1-S1.19	Infiltration		0.0				
960 minute summer	1-S1.19	Infiltration		0.2				
960 minute summer	1-S1.20	Hydro-Brake®	1-S1.21	22.3				1156.1

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.21	1	16.519	0.000	18.7	0.0000	0.0000	OK
15 minute summer	1-S4.0	11	19.067	0.437	50.9	1.2698	0.0000	SURCHARGED
15 minute summer	1-S3.1	10	19.692	0.122	27.6	0.3072	0.0000	OK
15 minute summer	1-S2.0	10	19.626	0.066	9.9	0.1000	0.0000	OK
15 minute summer	1-S2.1	10	19.487	0.197	43.0	0.2722	0.0000	OK
15 minute summer	1-S1.0	10	20.402	0.082	21.8	0.1828	0.0000	OK
15 minute summer	1-S1.1	10	19.302	0.141	39.0	0.2537	0.0000	OK
15 minute summer	1-S1.2	10	19.190	0.153	52.0	0.2546	0.0000	OK
15 minute summer	1-S1.3	11	19.038	0.310	141.9	0.9494	0.0000	OK
15 minute summer	1-S1.4	11	19.024	0.439	135.9	0.6588	0.0000	OK
15 minute summer	1-S1.5	11	19.002	0.467	193.6	0.9618	0.0000	SURCHARGED
15 minute summer	1-S1.6	11	18.844	0.500	191.6	0.8941	0.0000	SURCHARGED
15 minute summer	1-S5.0	10	19.617	0.077	14.5	0.1671	0.0000	OK
15 minute summer	1-S5.1	10	19.375	0.114	28.5	0.2612	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S4.0	4.000	1-S1.5	47.8	1.202	0.822	0.2418	
15 minute summer	1-S3.1	3.000	1-S2.1	27.6	1.337	0.489	0.2224	
15 minute summer	1-S2.0	2.000	1-S2.1	9.9	0.451	0.190	0.6298	
15 minute summer	1-S2.1	2.001	1-S1.3	41.6	1.203	0.983	0.8904	
15 minute summer	1-S1.0	1.000	1-S1.1	21.8	1.126	0.289	1.0949	
15 minute summer	1-S1.1	1.001	1-S1.2	38.6	1.403	0.513	0.1637	
15 minute summer	1-S1.2	1.002	1-S1.3	50.9	0.743	0.361	4.2782	
15 minute summer	1-S1.3	1.003	1-S1.4	133.9	1.112	0.623	4.3917	
15 minute summer	1-S1.4	1.004	1-S1.5	126.9	0.924	0.465	1.1075	
15 minute summer	1-S1.5	1.005	1-S1.6	182.9	1.235	0.851	6.8102	
15 minute summer	1-S1.6	1.006	1-S1.7	180.3	1.138	0.661	1.4944	
15 minute summer	1-S5.0	5.000	1-S5.1	14.5	0.902	0.257	0.3825	
15 minute summer	1-S5.1	5.001	1-S5.2	28.4	0.895	0.314	1.1257	

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S5.2	10	19.188	0.163	38.6	0.3088	0.0000	OK
15 minute summer	1-S5.3	10	19.156	0.158	56.9	0.3915	0.0000	OK
15 minute summer	1-S1.7	11	18.781	0.504	247.4	1.1967	0.0000	OK
15 minute summer	1-S1.8	12	18.656	0.502	249.8	1.0725	0.0000	OK
15 minute summer	1-S1.9	12	18.588	0.474	252.5	0.9612	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S5.2	5.002	1-S5.3	38.0	0.847	0.270	0.2435	
15 minute summer	1-S5.3	5.003	1-S1.7	55.3	1.178	0.243	1.6467	
15 minute summer	1-S1.7	1.007	1-S1.8	241.6	1.185	1.026	10.9509	
15 minute summer	1-S1.8	1.008	1-S1.9	245.0	1.192	1.040	3.5429	
15 minute summer	1-S1.9	1.009	1-S1.10	244.9	1.249	0.990	10.3639	

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1-S1.10	19	18.819	0.838	274.7	0.9479	0.0000	SURCHARGED
15 minute summer	1-S1.11	11	18.630	0.740	271.5	1.0590	0.0000	SURCHARGED
15 minute summer	1-S1.12	11	18.422	0.719	315.7	2.1180	0.0000	SURCHARGED
15 minute summer	1-S1.13	11	18.173	0.601	338.1	1.3095	0.0000	OK
15 minute summer	DCC_S1.0	10	18.544	0.169	73.5	0.7163	0.0000	OK
15 minute summer	DCC_S1.1	10	18.384	0.178	95.1	0.4313	0.0000	OK
30 minute summer	DCC_S1.2	19	18.183	0.431	250.8	2.5859	0.0000	OK
15 minute summer	1-S1.14	12	18.133	0.657	732.1	4.7999	0.0000	OK
15 minute summer	1-S1.15	12	18.093	0.668	705.1	1.2865	0.0000	OK
15 minute summer	1-S1.16	12	18.022	0.758	653.4	1.3398	0.0000	OK
15 minute summer	1-S8.0	11	18.469	0.199	46.0	0.8399	0.0000	OK
15 minute summer	1-S8.1	12	18.023	0.569	40.8	2.2996	0.0000	SURCHARGED
15 minute summer	1-S1.17	12	17.950	0.817	722.9	1.8974	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	1-S1.10	1.010	1-S1.11	276.2	1.297	1.216	9.9481	
15 minute summer	1-S1.11	1.011	1-S1.12	274.7	1.272	1.065	14.1026	
15 minute summer	1-S1.12	1.012	1-S1.13	321.9	1.490	1.155	8.5018	
15 minute summer	1-S1.13	1.013	1-S1.14	333.7	1.241	0.562	10.3082	
15 minute summer	DCC_S1.0	6.000	DCC_S1.1	73.5	1.197	0.204	1.8929	
15 minute summer	DCC_S1.1	6.001	DCC_S1.2	93.1	0.786	0.258	9.9342	
30 minute summer	DCC_S1.2	6.002	1-S1.14	223.3	1.178	0.619	8.0901	
15 minute summer	1-S1.14	1.014	1-S1.15	700.3	1.534	0.610	7.5867	
15 minute summer	1-S1.14	7.000	1-S8.0	0.0	0.000	0.000	0.0000	
15 minute summer	1-S1.15	1.015	1-S1.16	653.4	1.541	0.570	26.0235	
15 minute summer	1-S1.16	1.016	1-S1.17	668.5	1.475	0.583	23.0862	
15 minute summer	1-S8.0	7.001	1-S8.1	40.8	1.172	1.027	2.8430	
15 minute summer	1-S8.1	7.002	1-S1.17	49.1	1.236	1.053	0.3201	
15 minute summer	1-S8.1	Infiltration		0.3				
15 minute summer	1-S1.17	1.017	1-S1.18	784.9	1.619	0.684	30.8249	

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.18	11	17.876	0.910	795.7	2.5835	0.0000	SURCHARGED
15 minute summer	1-S10.0	10	18.441	0.091	14.6	0.1109	0.0000	OK
15 minute summer	1-S10.1	10	18.254	0.143	30.5	0.3207	0.0000	OK
15 minute summer	1-S10.2	12	18.071	0.196	42.4	0.7823	0.0000	OK
15 minute summer	1-S10.3	12	17.960	0.298	49.0	1.5172	0.0000	SURCHARGED
30 minute summer	1-S10.4	20	17.766	0.348	52.8	2.0864	0.0000	SURCHARGED
960 minute summer	1-S10.5	735	17.480	0.388	10.3	2.6865	0.0000	SURCHARGED
960 minute summer	1-S1.19	735	17.480	0.828	150.3	1386.0390	0.0000	SURCHARGED
960 minute summer	1-S1.20	735	17.462	0.834	22.4	1.9050	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S1.18	1.018	1-S1.19	928.5	3.466	0.809	30.3209	
15 minute summer	1-S10.0	8.000	1-S10.1	14.6	0.706	0.349	0.7645	
15 minute summer	1-S10.1	8.001	1-S10.2	30.3	0.987	0.725	1.1056	
15 minute summer	1-S10.2	8.002	1-S10.3	38.6	1.073	0.926	1.2578	
15 minute summer	1-S10.2	Infiltration		0.1				
15 minute summer	1-S10.3	8.003	1-S10.4	41.6	1.065	0.996	1.4921	
15 minute summer	1-S10.3	Infiltration		0.1				
30 minute summer	1-S10.4	8.004	1-S10.5	43.1	1.094	1.027	1.9773	
30 minute summer	1-S10.4	Infiltration		0.2				
960 minute summer	1-S10.5	8.005	1-S1.19	10.0	0.670	0.236	1.7395	
960 minute summer	1-S10.5	Infiltration		0.2				
960 minute summer	1-S1.19	1.019	1-S1.20	21.9	0.550	0.734	0.2828	
960 minute summer	1-S1.19	Infiltration		0.0				
960 minute summer	1-S1.19	Infiltration		0.3				
960 minute summer	1-S1.20	Hydro-Brake®	1-S1.21	22.3				1188.6

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.21	1	16.519	0.000	21.4	0.0000	0.0000	OK
30 minute summer	1-S4.0	19	19.647	1.017	67.7	2.9575	0.0000	SURCHARGED
15 minute summer	1-S3.1	12	19.836	0.266	39.7	0.6710	0.0000	SURCHARGED
15 minute summer	1-S2.0	12	19.820	0.260	14.2	0.3938	0.0000	SURCHARGED
15 minute summer	1-S2.1	12	19.804	0.514	59.7	0.7094	0.0000	SURCHARGED
15 minute summer	1-S1.0	10	20.420	0.100	31.3	0.2229	0.0000	OK
15 minute summer	1-S1.1	12	19.745	0.584	56.0	1.0509	0.0000	SURCHARGED
15 minute summer	1-S1.2	12	19.687	0.650	69.6	1.0805	0.0000	SURCHARGED
30 minute summer	1-S1.3	19	19.645	0.917	167.8	2.8097	0.0000	SURCHARGED
30 minute summer	1-S1.4	19	19.576	0.991	144.2	1.4862	0.0000	SURCHARGED
30 minute summer	1-S1.5	19	19.546	1.011	206.7	2.0845	0.0000	SURCHARGED
30 minute summer	1-S1.6	20	19.344	1.000	205.5	1.7890	0.0000	SURCHARGED
15 minute summer	1-S5.0	10	19.636	0.096	20.9	0.2071	0.0000	OK
15 minute summer	1-S5.1	10	19.401	0.140	41.0	0.3208	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	1-S4.0	4.000	1-S1.5	59.5	1.495	1.022	0.2418	
15 minute summer	1-S3.1	3.000	1-S2.1	38.6	1.396	0.685	0.4286	
15 minute summer	1-S2.0	2.000	1-S2.1	13.7	0.475	0.263	1.0740	
15 minute summer	1-S2.1	2.001	1-S1.3	49.6	1.264	1.172	1.0218	
15 minute summer	1-S1.0	1.000	1-S1.1	31.3	1.192	0.416	1.5360	
15 minute summer	1-S1.1	1.001	1-S1.2	50.4	1.528	0.669	0.2368	
15 minute summer	1-S1.2	1.002	1-S1.3	67.0	0.790	0.475	6.8175	
30 minute summer	1-S1.3	1.003	1-S1.4	141.6	1.101	0.659	5.0818	
30 minute summer	1-S1.4	1.004	1-S1.5	131.3	0.903	0.481	1.1110	
30 minute summer	1-S1.5	1.005	1-S1.6	196.6	1.241	0.915	6.8102	
30 minute summer	1-S1.6	1.006	1-S1.7	206.4	1.303	0.756	1.4944	
15 minute summer	1-S5.0	5.000	1-S5.1	20.9	0.992	0.371	0.4992	
15 minute summer	1-S5.1	5.001	1-S5.2	41.2	0.983	0.455	1.6339	

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S5.2	12	19.311	0.286	55.8	0.5413	0.0000	OK
15 minute summer	1-S5.3	12	19.286	0.288	82.4	0.7144	0.0000	OK
30 minute summer	1-S1.7	20	19.272	0.995	291.8	2.3648	0.0000	SURCHARGED
15 minute summer	1-S1.8	11	19.122	0.968	300.4	2.0705	0.0000	SURCHARGED
15 minute summer	1-S1.9	11	19.032	0.918	306.2	1.8644	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S5.2	5.002	1-S5.3	55.2	0.971	0.392	0.4899	
15 minute summer	1-S5.3	5.003	1-S1.7	80.6	1.205	0.353	4.4618	
30 minute summer	1-S1.7	1.007	1-S1.8	269.6	1.248	1.145	11.1561	
15 minute summer	1-S1.8	1.008	1-S1.9	293.2	1.357	1.245	3.6648	
15 minute summer	1-S1.9	1.009	1-S1.10	294.8	1.365	1.192	10.9248	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.10	12	19.293	1.312	317.4	1.4843	0.0000	SURCHARGED
15 minute summer	1-S1.11	12	19.053	1.163	320.5	1.6647	0.0000	SURCHARGED
15 minute summer	1-S1.12	11	18.727	1.024	353.9	3.0170	0.0000	SURCHARGED
15 minute summer	1-S1.13	11	18.560	0.988	374.7	2.1549	0.0000	SURCHARGED
15 minute summer	DCC_S1.0	10	18.570	0.195	94.2	0.8250	0.0000	OK
15 minute summer	DCC_S1.1	12	18.572	0.366	121.8	0.8863	0.0000	OK
15 minute summer	DCC_S1.2	11	18.496	0.744	352.0	4.4697	0.0000	SURCHARGED
15 minute summer	1-S1.14	11	18.495	1.019	861.4	7.4444	0.0000	SURCHARGED
15 minute summer	1-S1.15	11	18.447	1.022	810.0	1.9668	0.0000	SURCHARGED
15 minute summer	1-S1.16	11	18.341	1.077	815.3	1.9026	0.0000	SURCHARGED
15 minute summer	1-S8.0	11	18.621	0.351	58.8	1.4788	0.0000	SURCHARGED
15 minute summer	1-S8.1	12	18.225	0.771	76.8	6.3028	0.0000	SURCHARGED
15 minute summer	1-S1.17	11	18.240	1.107	900.5	2.5702	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S1.10	1.010	1-S1.11	320.5	1.484	1.411	9.9481	
15 minute summer	1-S1.11	1.011	1-S1.12	324.4	1.502	1.258	14.1026	
15 minute summer	1-S1.12	1.012	1-S1.13	362.2	1.677	1.299	8.5018	
15 minute summer	1-S1.13	1.013	1-S1.14	382.8	1.296	0.645	11.0049	
15 minute summer	DCC_S1.0	6.000	DCC_S1.1	94.0	1.268	0.261	3.1288	
15 minute summer	DCC_S1.1	6.001	DCC_S1.2	141.7	0.806	0.393	15.4128	
15 minute summer	DCC_S1.2	6.002	1-S1.14	282.9	1.361	0.784	8.6178	
15 minute summer	1-S1.14	1.014	1-S1.15	802.5	1.616	0.699	9.6067	
15 minute summer	1-S1.14	7.000	1-S8.0	-6.6	-0.429	-0.255	0.1412	
15 minute summer	1-S1.15	1.015	1-S1.16	815.3	1.579	0.711	30.6873	
15 minute summer	1-S1.16	1.016	1-S1.17	827.1	1.543	0.721	24.9048	
15 minute summer	1-S8.0	7.001	1-S8.1	45.1	1.159	1.134	3.2621	
15 minute summer	1-S8.1	7.002	1-S1.17	68.7	1.728	1.473	0.3201	
15 minute summer	1-S8.1	Infiltration		0.5				
15 minute summer	1-S1.17	1.017	1-S1.18	959.7	1.774	0.836	31.7407	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.18	11	18.105	1.139	973.6	3.2332	0.0000	SURCHARGED
15 minute summer	1-S10.0	10	18.454	0.104	18.7	0.1273	0.0000	OK
15 minute summer	1-S10.1	12	18.328	0.217	39.0	0.4883	0.0000	OK
30 minute summer	1-S10.2	20	18.248	0.373	50.0	2.1559	0.0000	SURCHARGED
30 minute summer	1-S10.3	21	18.113	0.451	48.4	2.6581	0.0000	SURCHARGED
30 minute summer	1-S10.4	21	17.902	0.484	56.8	3.2722	0.0000	SURCHARGED
960 minute summer	1-S10.5	825	17.767	0.675	12.9	5.9242	0.0000	SURCHARGED
960 minute summer	1-S1.19	825	17.767	1.115	183.8	1867.9410	0.0000	SURCHARGED
960 minute summer	1-S1.20	825	17.751	1.123	22.4	2.5664	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1-S1.18	1.018	1-S1.19	1103.2	3.555	0.962	31.2807	
15 minute summer	1-S10.0	8.000	1-S10.1	18.7	0.743	0.447	0.9988	
15 minute summer	1-S10.1	8.001	1-S10.2	36.7	1.023	0.876	1.4312	
30 minute summer	1-S10.2	8.002	1-S10.3	36.5	1.066	0.873	1.3070	
30 minute summer	1-S10.2	Infiltration		0.2				
30 minute summer	1-S10.3	8.003	1-S10.4	39.8	1.068	0.951	1.4921	
30 minute summer	1-S10.3	Infiltration		0.2				
30 minute summer	1-S10.4	8.004	1-S10.5	44.5	1.119	1.059	1.9773	
30 minute summer	1-S10.4	Infiltration		0.2				
960 minute summer	1-S10.5	8.005	1-S1.19	11.7	0.630	0.276	1.7395	
960 minute summer	1-S10.5	Infiltration		0.4				
960 minute summer	1-S1.19	1.019	1-S1.20	20.5	0.515	0.687	0.2828	
960 minute summer	1-S1.19	Infiltration		0.0				
960 minute summer	1-S1.19	Infiltration		0.5				
960 minute summer	1-S1.20	Hydro-Brake®	1-S1.21	22.3				1155.4

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1-S1.21	1	16.519	0.000	22.0	0.0000	0.0000	OK
30 minute summer	1-S4.0	20	20.379	1.749	87.8	5.0870	0.0000	FLOOD RISK
30 minute summer	1-S3.1	20	20.669	1.099	47.7	2.7682	0.0000	FLOOD RISK
30 minute summer	1-S2.0	20	20.639	1.079	17.1	1.6319	0.0000	SURCHARGED
30 minute summer	1-S2.1	20	20.624	1.334	64.7	1.8396	0.0000	FLOOD RISK
30 minute summer	1-S1.0	20	20.603	0.283	37.6	0.6275	0.0000	SURCHARGED
30 minute summer	1-S1.1	20	20.491	1.329	66.7	2.3904	0.0000	SURCHARGED
30 minute summer	1-S1.2	20	20.439	1.402	77.4	2.3294	0.0000	SURCHARGED
30 minute summer	1-S1.3	20	20.391	1.663	181.9	5.0941	0.0000	SURCHARGED
30 minute summer	1-S1.4	20	20.307	1.722	156.7	2.5823	0.0000	SURCHARGED
30 minute summer	1-S1.5	20	20.269	1.734	244.1	3.5746	0.0000	SURCHARGED
30 minute summer	1-S1.6	20	20.019	1.675	243.4	2.9964	0.0000	FLOOD RISK
30 minute summer	1-S5.0	20	19.994	0.454	25.1	0.9820	0.0000	SURCHARGED
15 minute summer	1-S5.1	12	19.977	0.716	58.3	1.6387	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	1-S4.0	4.000	1-S1.5	69.1	1.738	1.188	0.2418	
30 minute summer	1-S3.1	3.000	1-S2.1	42.5	1.388	0.753	0.4286	
30 minute summer	1-S2.0	2.000	1-S2.1	13.2	0.448	0.253	1.0740	
30 minute summer	1-S2.1	2.001	1-S1.3	54.2	1.362	1.279	1.0218	
30 minute summer	1-S1.0	1.000	1-S1.1	37.1	1.202	0.493	2.2129	
30 minute summer	1-S1.1	1.001	1-S1.2	55.7	1.498	0.740	0.2368	
30 minute summer	1-S1.2	1.002	1-S1.3	67.1	0.767	0.475	6.8175	
30 minute summer	1-S1.3	1.003	1-S1.4	153.4	1.111	0.714	5.0818	
30 minute summer	1-S1.4	1.004	1-S1.5	152.1	0.960	0.557	1.1110	
30 minute summer	1-S1.5	1.005	1-S1.6	229.2	1.447	1.067	6.8102	
30 minute summer	1-S1.6	1.006	1-S1.7	239.8	1.514	0.879	1.4944	
30 minute summer	1-S5.0	5.000	1-S5.1	24.8	1.031	0.439	0.9433	
15 minute summer	1-S5.1	5.001	1-S5.2	52.5	1.047	0.580	2.4915	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1-S5.2	20	19.940	0.915	65.5	1.7348	0.0430	FLOOD
30 minute summer	1-S5.3	20	19.934	0.936	98.5	2.3229	0.0000	FLOOD RISK
30 minute summer	1-S1.7	20	19.916	1.639	326.8	3.8937	0.0000	FLOOD RISK
30 minute summer	1-S1.8	20	19.657	1.503	315.5	3.2134	0.0000	SURCHARGED
15 minute summer	1-S1.9	12	19.541	1.427	323.3	2.8977	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	1-S5.2	5.002	1-S5.3	65.9	1.007	0.467	0.5978	
30 minute summer	1-S5.3	5.003	1-S1.7	94.2	1.255	0.413	5.4928	
30 minute summer	1-S1.7	1.007	1-S1.8	306.0	1.417	1.300	11.1561	
30 minute summer	1-S1.8	1.008	1-S1.9	317.6	1.470	1.349	3.6648	
15 minute summer	1-S1.9	1.009	1-S1.10	317.4	1.469	1.283	10.9248	

ATTENUATION TANK FOR DIVERTED SW FLOW FROM EXISTING PW SITE FACTORY BUILDING

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Inverts
M5-60 (mm)	16.400	Minimum Backdrop Height (m)	0.200
Ratio-R	0.277	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Easting (m)	Northing (m)	Depth (m)
PW Attenuation Tank on BG Planning	0.389	4.00	19.900	Junction	40.755	87.000	2.100

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Additional Storage (m³/ha)	20.0
FSR Region	Scotland and Ireland	Analysis Speed	Normal	Check Discharge Rate(s)	x
M5-60 (mm)	16.400	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.277	Drain Down Time (mins)	240		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
5	20	0	0	100	20	0	0
30	20	0	0				

Node PW Attenuation Tank on BG Planning Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	17.800	Product Number	CTL-SHE-0056-2000-2100-2000
Design Depth (m)	2.100	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node PW Attenuation Tank on BG Planning Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	17.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	131.0	0.0	2.100	131.0	0.0	2.101	0.0	0.0

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	PW Attenuation Tank on BG Planning	1500	18.875	1.075	7.6	144.7497	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
2160 minute summer	PW Attenuation Tank on BG Planning	Hydro-Brake®	1.5	163.3

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	PW Attenuation Tank on BG Planning	1560	19.374	1.574	10.2	212.0186	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
2160 minute summer	PW Attenuation Tank on BG Planning	Hydro-Brake®	1.8	192.8

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	PW Attenuation Tank on BG Planning	1200	19.843	2.043	17.3	275.2474	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute summer	PW Attenuation Tank on BG Planning	Hydro-Brake®	2.0	154.6

Appendix IV

Site Investigation Report

Appendix IV (a)

Bailey Gibson Site Investigation Report

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Ground Investigations Ireland

Bailey Gibson Site

Factual Ground Investigation Report

DOCUMENT CONTROL SHEET

Project Title	Bailey Gibson
Engineer	Barrett Mahony
Project No	8656-04-19
Document Title	Factual Ground Investigation Report

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GROUND INVESTIGATIONS IRELAND

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CONTENTS

APPENDICES

1.0 Preamble

On the instructions of Barrett Mahony Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between May and July 2019 at the site of a proposed residential development in Bailey Gibson Site, Dublin 8.

2.0 Overview

2.1. Background

It is proposed to construct a new multi storey residential development with associated services, access roads and car parking at the proposed site. The site is currently occupied by an existing commercial salvage yard with multiple storage buildings and is situated on the South Circular Rd, Dublin 8.

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 7 No. Trial Pits to a maximum depth of 3.0m BGL
- Carry out 1 No. Soakaway to determine a soil infiltration value to BRE digest 365
- Carry out 26 No. Window Sample Boreholes to recover soil samples
- Carry out 7 No. Cable Percussion boreholes to a maximum depth of 4.0m BGL
- Carry out 3 No. Rotary Core Boreholes to a maximum depth of 9.70m BGL
- Installation of 5 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 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 and associated photos which are provided in Appendix 2 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 3 of this Report.

3.4. Window Sampling

The window sampling was carried out at the locations shown in the location plan in Appendix 1 using a Dando Terrier/Tecop Tec 10 percussion drilling rig. The window sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 50kg weight falling a height of 500mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by an Environmental Engineer. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging. The environmental sampling was undertaken on site by O' Callaghan Moran & Associates and the window sample data and test results will be provided in a separate environmental report.

3.5. 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 4 of this Report.

3.6. 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.

3.7. 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 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. 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. pH and sulphate testing was carried out by Jones Environmental Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer and Undrained Triaxial tests were carried out in NMTL's Geotechnical Laboratory in Carlow.
Rock strength testing including Point Load (Is50) and Unconfined Compressive Strength (UCS) testing was carried out in Trinity College Dublin's Geotechnical Laboratory.
The results of the laboratory testing are included in Appendix 5 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 are generally comprised;

- Surfacing/Topsoil
- Fill
- Made Ground
- Cohesive Deposits
- LIMESTONE rock

SURFACING/TOPSOIL: Concrete surfacing was encountered in the majority of exploratory holes and was present to a maximum depth of 0.2m BGL. Topsoil was present to a depth of 0.2m BGL in TP08.

FILL: Granular fill deposits were encountered beneath concrete surfacing and was present to a relatively consistent depth of between 0.4m and 0.5m BGL. These deposits were described generally as *Grey slightly sandy fine to coarse angular Gravel.*

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil/Surfacing/Fill and was present to a relatively consistent depth of between 0.4m and 1.3m BGL. These deposits were described generally as *Brown slightly sandy slightly gravelly Clay with rare cobbles and contained occasional fragments of concrete, red brick and bitumen.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and were described typically as *Soft to firm brown grey mottled slightly sandy slightly gravelly CLAY with occasional cobbles* overlying a *Firm to stiff grey dark brown slightly sandy slightly 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. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

BEDROCK: Bedrock consisting of LIMESTONE and CALCAREOUS MUDSTONE was encountered in BH03, BH04, and BH06 at between 3.50mBGL and 4.40mBGL. The rock was generally medium strong in LIMESTONE bands and weaker in the MUDSTONE, with recovery increasing with depth.

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 BH02, BH03, BH04, BH06 and BH08 to allow the equilibrium groundwater level to be determined.

4.3. 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 20% and 46.4% generally with fines contents of 5.9 to 49%.

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.

The results from the completed laboratory testing is included in Appendix 5 of this report.

4.4. Soakaway Design

At the locations of SA1 the water level dropped too slowly to allow calculation of ‘f’ the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

APPENDIX 1 - Site Location Plan

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECTS DRAWINGS.FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - 'ASK'.
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.

LEGEND

- BH1 — BOREHOLES TO BE TAKEN TO REFUSAL USING CABLE PERCUSSION (+RC) FOLLOW ON ROTARY CORE TO PROVE UP TO 5m OF ROCK (EXACT LENGTH WILL BE SHOWN ON SCHEDULES)
- TP1 — TRIAL PITS (TO OBTAIN SAMPLES FOR ENVIRONMENTAL TESTING AND EARTHWORKS (4m DEEP)
- SA01 — SOAKAWAY PIT (1.5m DEEP)
- *DENOTES STANDPIPE LOCATION (PROVIDE COVER APPROPRIATE TO LOCATION)
- **DENOTES TRAIL PITS WHERE PLATE LOAD TEST IS TO BE DONE AT 0.5mBGL.
- WS1 — WINDOW SAMPLE (TO OBTAIN SAMPLES FOR ENVIRONMENTAL TESTING AND EARTHWORKS (4m DEEP)

ISSUE	DATE	DESCRIPTION	DRN / ORIG	P.E. / P.D.
0	14.05.19	ISSUED FOR CONSTRUCTION	TMG / PS	PS / PS
T2	29.03.19	ISSUED FOR TENDER	TMG / PS	PS / PS
T1	28.03.19	ISSUED FOR TENDER	TMG / PS	PS / PS

DRAWING STAGE: **CONSTRUCTION**

BM BARRETT MAHONY
Dublin Office: Sandwith House, 52-54 Lower Sandwith Street, Dublin 2, Ireland. Tel: (01) 677 3200 Fax: (01) 677 3164
London Office: 12 Mill Street, London SE1 2AY, United Kingdom Tel: (0044) 084 5413 2722
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CLIENT: **VIRTUS**

PROJECT TITLE: **BAILEY GIBSON SITE** | BM PROJECT No.: **19.117**

MODEL REFERENCE | MODEL REV. | SUITABILITY

DRAWING TITLE: **SITE INVESTIGATION PLAN**

DRAWING No.: **C1500** | ISSUE: **0**

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Bailey Gibson Site			**Trial Pit Number** SA1
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** (L x W x D) 2.0 x 0.25 x 2.0 m	**Ground Level (mOD)** 20.42	**Client**	**Job Number** 8656-04-19
	Location 714003.6 E 732808.6 N	**Dates** 16/05/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	REINFORCED CONCRETE		
				20.22	0.20			
					(0.30)	FILL: Grey sandy angular Gravel		
0.50	B			19.92	0.50			
					(0.80)	MADE GROUND: Brown grey slightly sandy slightly gravelly Clay with rare cobbles and occasional fragment of red brick.		
1.00	B							
				19.12	1.30			
					(0.70)	Soft to firm grey brown mottled slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
1.90	B		Water strike(1) at 1.90m.					▽1
				18.42	2.00	Complete at 2.00m		

Plan

Remarks

Groundwater encountered 1.9m BGL.
Trial Pit sidewalls are stable.
SA1 undertaken in Trial Pit. See Se Soakaway Test Results
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.SA1

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Bailey Gibson Site	TP05

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD)	Client	Job Number
		20.17		8656-04-19
	Location	Dates	Engineer	Sheet
	714060.6 E 732842.3 N	17/05/2019	Barrett Mahony	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	CONCRETE		
				19.97	0.20	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and occasional fragments of redbrick, mortar and organic matter.		
					(0.90)			
				19.07	1.10	Soft brown grey mottled slightly sandy slightly gravelly CLAY with rare subangular to subrounded cobbles.		
1.20	B				(0.20)			
				18.87	1.30	Firm grey brown silty slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0.40)			
			Water strike(1) at 1.70m.	18.47	1.70	Firm grey sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		▽1
2.00	B				(0.90)			
				17.57	2.60	Terminated 2.6m BGL due to continual sidewall collapse.		
						Complete at 2.60m		

Plan

Remarks

Groundwater encountered 1.7m BGL in Trial Pit.
Trial Pit sidewalls collapsing 1.0m BGL.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.TP5

Ground Investigations Ireland Ltd
www.gii.ie

Site Bailey Gibson Site			**Trial Pit Number** TP06
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 20.69	**Client**	**Job Number** 8656-04-19
	Location 713974 E 732787.4 N	**Dates** 16/05/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	REINFORCED CONCRETE		
				20.49	0.20			
					(0.10)	MADE GROUND: Grey brown black slightly sandy clayey Gravel with fragments of bitumen and redbrick.		
				20.39	0.30			
					(0.60)	Firm brown grey slightly sandy slightly gravelly CLAY with rare subangular to subrounded cobbles.		
				19.79	0.90			
1.00	B				(0.80)	Firm to stiff grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
				18.99	1.70			
			Water strike(1) at 1.85m.			Stiff dark brown grey slightly sandy slightly gravelly CLAY with frequent subangular to subrounded cobbles and rare boulders.		▽1
2.00	B				(0.80)			
				18.19	2.50	Refusal at 2.5m BGL due to boulder.		
						Complete at 2.50m		

Plan

Remarks

Groundwater encountered 1.85m BGL in Trial Pit.
Trial Pit sidewalls are stable.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.TP6

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Bailey Gibson Site	TP07

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD)	Client	Job Number
		20.48		8656-04-19
	Location	**Dates**	**Engineer**	**Sheet**
	714006.4 E 732790.5 N	16/05/2019	Barrett Mahony	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	REINFORCED CONCRETE		
				20.28	0.20	FILL: Grey sandy angular Gravel		
					(0.30)			
				19.98	0.50	Soft orange brown silty slightly sandy slightly gravelly CLAY.		
0.60	B				(0.30)			
				19.68	0.80	Firm grey brown mottled silty slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
1.20	B							
			Water strike(1) at 1.80m.		(1.40)			▽1
				18.28	2.20	Firm to stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0.30)			
2.50	B			17.98	2.50	Terminated due to continual sidewall collapse.		
						Complete at 2.50m		

Plan

Remarks

Groundwater encountered 1.8m BGL in Trial Pit.
Trial Pit sidewalls collapsing 1.0m BGL.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.TP7

Ground Investigations Ireland Ltd
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Site	Trial Pit Number
Bailey Gibson Site	TP08

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD) 21.68	Client	Job Number 8656-04-19
	Location	Dates 17/05/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				21.58	(0.10) 0.10	TOPSOIL: Brown slightly sandy slightly gravelly Clay with rootlets.		
						MADE GROUND: Brown black slightly sandy slightly gravelly Clay with occasional fragments of red brick and ceramic.		
					(0.60)			
				20.98	0.70	Firm grey brown mottled slightly sandy slightly gravelly CLAY with rare subangular to subrounded cobbles.		
					(0.40)			
				20.58	1.10	Firm to stiff grey brown mottled slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
1.30	B				(0.80)			
				19.78	1.90	Stiff grey brown mottled slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0.90)			
				18.88	2.80	Stiff dark grey slightly sandy slightly gravelly CLAY with frequent subangular to subrounded cobbles and rare boulder.		▽1
2.90	B		Water strike(1) at 2.80m.		(0.20)			
				18.68	3.00	Refusal at 3.0m BGL due to boulder.		
						Complete at 3.00m		

Plan

Remarks

Groundwater encountered 2.8m BGL in Trial Pit.
Trial Pit sidewalls collapsing 1.6m BGL.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.TP8

Ground Investigations Ireland Ltd
www.gii.ie

Site Bailey Gibson Site			**Trial Pit Number** TP09
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 20.07	**Client**	**Job Number** 8656-04-19
	Location 714085.8 E 732840.8 N	**Dates** 17/05/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	CONCRETE		
				19.87	0.20	MADE GROUND: Grey slightly clayey sandy Gravel with rare fragments of redbrick.		
					(0.20)			
				19.67	0.40	MADE GROUND: Brown black slightly sandy slightly gravelly Clay with occasional fragments of red brick.		
					(0.70)			
				18.97	1.10	Firm grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0.40)			
				18.57	1.50	Firm grey sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
			Water strike(1) at 1.70m.					▽1
					(0.80)			
2.20	B			17.77	2.30	Terminated 2.3m BGL due to continual sidewall collapse.		
						Complete at 2.30m		

Plan

Remarks

Groundwater encountered 1.7m BGL in Trial Pit.
Trial Pit sidewalls collapsing 1.3m BGL.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.TP9

Ground Investigations Ireland Ltd
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Site	Trial Pit Number
Bailey Gibson Site	TP10

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD)	Client	Job Number
		21.06		8656-04-19
	Location	**Dates**	**Engineer**	**Sheet**
	714025.2 E 732750.3 N	16/05/2019	Barrett Mahony	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	CONCRETE		
				20.86	0.20	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick.		
					(0.20)			
				20.66	0.40	Firm to stiff grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(1.40)			
1.20	B							
				19.26	1.80	Stiff grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0.40)			▽1
2.20	B		Water strike(1) at 2.10m.	18.86	2.20	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulder.		
					(0.30)			
				18.56	2.50	Refusal at 2.5m BGL due to boulder.		
						Complete at 2.50m		

Plan

Remarks

Groundwater encountered 2.1m BGL in Trial Pit.
Trial Pit sidewalls are stable.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.TP10

Ground Investigations Ireland Ltd
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Site	Trial Pit Number
Bailey Gibson Site	TP11

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD)	Client	Job Number
		20.52		8656-04-19
	Location	**Dates**	**Engineer**	**Sheet**
	714078.6 E 732802.7 N	17/05/2019	Barrett Mahony	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	CONCRETE		
				20.32	0.20	MADE GROUND: Brown black slightly sandy slightly gravelly Clay with occasional fragments of red brick.		
					(0.80)			
				19.52	1.00	Soft to firm grey brown mottled slightly sandy slightly gravelly CLAY with rare subangular to subrounded cobbles.		
1.30	B				(0.50)			
				19.02	1.50	Firm grey brown sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
			Water strike(1) at 1.90m.		(0.70)			▽1
				18.32	2.20	Stiff dark grey slightly sandy slightly gravelly CLAY with frequent subangular to subrounded cobbles.		
2.30	B				(0.30)			
				18.02	2.50	Terminated 2.5m BGL due to continual sidewall collapse.		
						Complete at 2.50m		

Plan

Remarks

Groundwater encountered 1.9m BGL in Trial Pit.
Trial Pit sidewalls collapsing 1.4m BGL.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	CCostigan	8656-04-19.TP11

APPENDIX 3 – Soakaway Test Results

SA01

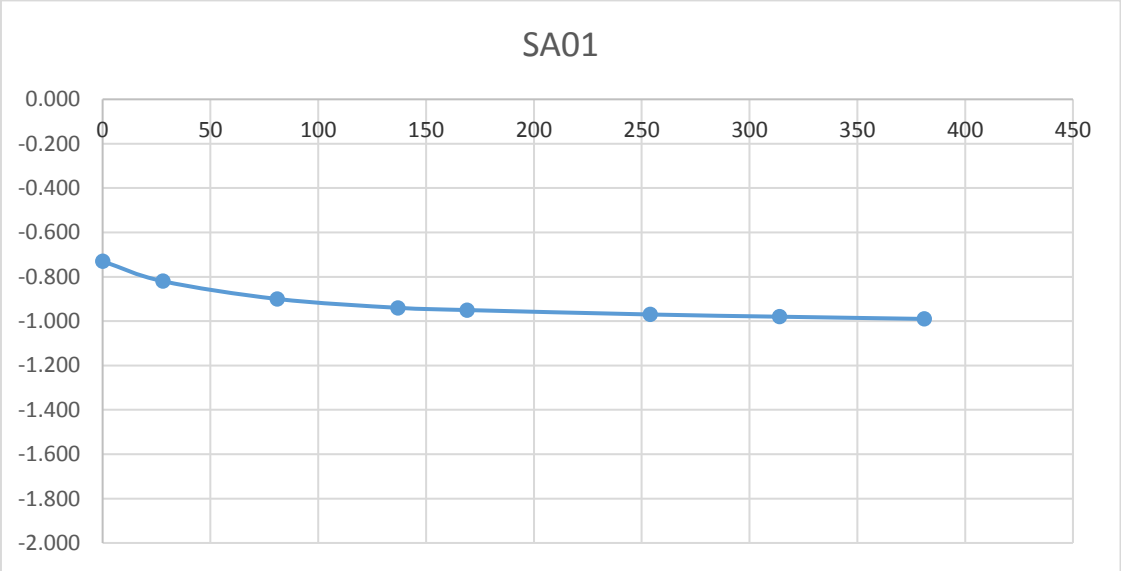
Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 2.0m x 0.25m 2.0m (L x W x D)

Date	Time	Water level (m bgl)
16/05/2019	0	-0.730
16/05/2019	28	-0.820
16/05/2019	81	-0.900
16/05/2019	137	-0.940
16/05/2019	169	-0.950
16/05/2019	254	-0.970
16/05/2019	314	-0.980
16/05/2019	381	-0.990

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.73	2.000	1.270	1.0475	1.6825



APPENDIX 4 - Borehole Records

Ground Investigations Ireland Ltd
www.gii.ie

Site	Borehole Number
Bailey Gibson Site	BH02

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Dando 2000	200 mm to 3.3 m	20.06		8656-04-19
Method : Cable Percussion	**Location** 714045.9 E 732849.1 N	**Dates** 06/06/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					19.86	(0.20) 0.20	CONCRETE		
0.50	B						MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick.		
1.00-1.45 1.00	SPT(C) N=9 B			1,2/2,2,2,3		(1.40)			
					18.46	1.60	Soft to firm grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		▼1
2.00-2.45 2.00	SPT(C) N=7 B			1,1/2,1,2,2 Water strike(1) at 2.10m, rose to 1.80m in 20 mins.		(0.90)			▽1
					17.56	2.50	Stiff to very stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulder.		
3.00-3.30 3.00	SPT(C) 50/150 B			4,7/25,25		(0.80)			
					16.76	3.30	Refusal at 3.3m due to boulder/rock.		
							Complete at 3.30m		

Remarks
Groundwater encountered at 2.1m BGL in Borehole.
Borehole backfilled upon completion.
Chiselling from 3.30m to 3.30m for 1.0 hour.

Scale (approx)	Logged By
1:50	CCostigan

Figure No. 8656-04-19.BH02

Ground Investigations Ireland Ltd
www.gii.ie

Site Bailey Gibson Site			**Borehole Number** BH03
Machine : Dando 2000 & Beretta T44 **Method :** Cable Percussion with Rotary Core follow on	**Casing Diameter** 200 mm to 3.70 m 98mm to 9.70 m	**Ground Level (mOD)** 20.00	**Client**	**Job Number** 8656-04-19
	Location 714087.5 E 732837.3 N	**Dates** 06/06/2019-18/06/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
									19.70	(0.30) 0.30	CONCRETE			
0.50	B										MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick.			
1.00 1.00-1.45	B SPT(C) N=9							1,1/2,2,3,2		(1.00)				
									18.70	1.30	Soft to firm grey dark brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		▼1	
2.00 2.00-2.45	B SPT(C) N=8							1,1/2,2,2,2 Water strike(1) at 2.10m, rose to 1.70m in 20 mins.		(1.20)			▽1	
									17.50	2.50	Firm grey dark brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulder.			
3.00 3.00-3.45	B SPT(C) N=10							2,3/2,2,3,3		(1.10)				
3.60									16.40	3.60	OVERBURDEN: Poor recovery - recovery consists of: Black gravelly slightly sandy CLAY. Driller's Notes: Black boulder CLAY (Very Stiff)			
										(0.60)				
		90	0	0	NI				15.80	4.20	Weak fine grained thinly laminated calcareous MUDSTONE. Distinctly weathered with occasional residual bands 3.70-5.20m BGL: Mostly Non Intact			
										(1.00)				
5.20									14.80	5.20	Weak to medium strong fine grained thinly laminated dark grey calcareous MUDSTONE with occasional calcite veining and pyrite specs. Partially to distinctly weathered with clay on fracture surfaces			
		100	67	32	9					(1.30)	5.20-6.50m BGL - F1: Very closely to medium spaced, subhorizontal to 10 degrees, planar smooth			
6.50					NI				13.50	6.50	Medium strong fine grained LIMESTONE with occasional calcite veining. Distinctly weathered to destructured			
										(0.40)				
6.70									13.10	6.90	6.50-6.70m BGL - Mostly Non Intact			
		100	79	55	21						Weak fine grained calcareous MUDSTONE. Distintly weathered with clay staining on fracture surfaces, occasional specs of pyrite and residual bands			
8.20										(2.80)	6.70-9.70m BGL - F1: Very closely to medium spaced, subhorizontal to 10 degrees, planar smooth			
		100	100	72										
9.70									10.30	9.70	Complete at 9.70m			

Remarks
Groundwater encountered at 2.1m BGL during cable percussion drilling
Rotary Core follow on from 3.60m BGL
50mm slotted standpipe installed from 4.00m to 1.00m with pea gravel surround, plain pipe installed from 1.00m to ground level with bentonite seal and flush cover.
Chiselling from 3.60m to 3.60m for 1.0 hour.

Scale (approx)	Logged By
1:50	CC & PC

Figure No. 8656-04-19.BH03

Ground Investigations Ireland Ltd
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Site Bailey Gibson Site			**Borehole Number** BH04
Machine : Dando 2000 & Beretta T44 **Method :** Cable Percussion with rotary core follow on	**Casing Diameter** 200 mm to 3.30 m 98mm to 8.80m	**Ground Level (mOD)** 20.81	**Client**	**Job Number** 8656-04-19
	Location 713972 E 732819.7 N	**Dates** 07/06/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					20.61	(0.20) 0.20	CONCRETE			
0.50	B						MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick.			
1.00	B					(1.10)				
1.00-1.45	SPT(C) N=6			1,1/1,2,2,1	19.51	1.30	Soft to firm brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		▼1	
				Water strike(1) at 1.80m, rose to 1.50m in 20 mins.		(0.80)			▽1	
2.00	B			1,2/2,3,2,2	18.71	2.10	Firm grey dark brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.			
2.00-2.45	SPT(C) N=9					(0.90)				
3.00	B				17.81	3.00	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulder.			
3.00-3.30	SPT(C) 50/150			5,6/11,39		(0.50)				
3.30	TCR 50 / SCR 38 / RQD 30		FI		17.31	3.50	Medium strong fine grained thinly laminated dark grey LIMESTONE. Partially weathered with calcite veining interbedded with a weak fine grained calcareous Mudstone 3.50-6.30m BGL - F1: Very closely to medium spaced, 25 to 45 degrees, undulose rough to stepped			
3.70	TCR 100 / SCR 47 / RQD 33		24							
5.20	TCR 100 / SCR 58 / RQD 53					(2.80)				
6.30			NI		14.51	6.30	Weak fine grained thinly laminated calcareous MUDSTONE interlaminated with a medium strong fine grained thinly laminated grey LIMESTONE. Distinctly weathered with calcite veining, pyritic concretions and residually weathered bands. 6.30-6.60m BGL - Mostly Non Intact			
6.60										
6.70	TCR 100 / SCR 78 / RQD 71		5							
7.50			NI			(2.50)	6.60-8.20m BGL - F1: Closely to medium spaced, 10 to 30 degrees, planar smooth 7.50-7.80m BGL - Mostly Non Intact			
7.80			2							
8.20	TCR 100 / SCR 30 / RQD 0		NI				8.20-8.80m BGL - Mostly Non Intact			
8.80					12.01	8.80	Complete at 8.80m			

Remarks
Groundwater encountered at 1.8m BGL in Borehole.
Rotary Core follow on from 3.30m BGL
50mm slotted standpipe installed from 3.50m to 1.00m with pea gravel surround, plain pipe installed from 1.00m to ground level with bentonite seal and flush cover.
Chiselling from 3.30m to 3.30m for 1.0 hour.

Scale (approx)	Logged By
1:50	CC & PC

Figure No. 8656-04-19.BH04

Ground Investigations Ireland Ltd
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Site	Borehole Number
Bailey Gibson Site	BH05

Machine : Dando 2000 Method : Cable Percussion	Casing Diameter 200 mm to 3.1 m	Ground Level (mOD) 20.33	Client	Job Number 8656-04-19
	Location 714019.9 E 732818.2 N	Dates 07/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					20.13	(0.20) 0.20	CONCRETE		
0.50	B					(1.00)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick and concrete.		
1.00-1.45 1.00	SPT(C) N=5 B			1,1/1,2,1,1	19.13	1.20	Soft to firm grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		▼1
2.00 2.00-2.45	B SPT(C) N=7			Water strike(1) at 1.80m, rose to 1.50m in 20 mins. 1,1/1,2,2,2		(1.50)			▽1
					17.63	2.70	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulder.		
3.00-3.10 3.00	SPT(C) 50*/100 50/0 B			25,25/50	17.23	(0.40) 3.10	Refusal at 3.1m due to boulder.		
							Complete at 3.10m		

Remarks
Groundwater encountered at 2.0m BGL in Borehole.
Borehole backfilled upon completion.
Chiselling from 3.10m to 3.10m for 1.0 hour.

Scale (approx)	Logged By
1:50	CCostigan

Figure No.
8656-04-19.BH05

Ground Investigations Ireland Ltd
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Site Bailey Gibson Site			**Borehole Number** BH06
Machine : Dando 2000 & Beretta T44 **Method :** Cable Percussion with rotary core follow on	**Casing Diameter** 200 mm to 4.0 m 98mm to 9.70 m	**Ground Level (mOD)** 20.48	**Client**	**Job Number** 8656-04-19
	Location 714075.6 E 732806.8 N	**Dates** 04/06/2019-18/06/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
									20.28	(0.20) 0.20	CONCRETE			
0.50	B									(1.00)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick and concrete.			
1.00 1.00-1.45	B SPT(C) N=10							1,2/3,3,2,2	19.28	1.20	Firm grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.			
2.00 2.00-2.45	B SPT(C) N=8							1,1/1,1,3,3		(1.40)				
3.00 3.00-3.45	B SPT(C) N=27							5,8/7,5,7,8	17.88	2.60	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.			
4.00 4.00-4.00	B SPT(C) 50*/0 50/0							25,25/50	16.98	3.50	Very stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulder.			
									16.48	(0.90) (0.50) 4.00	OVERBURDEN: Poor recovery - recovery consists of very stiff black slightly sandy slightly gravelly CLAY with some cobbles and boulder fragments:			
4.00		74	16	0	NI				16.08	(0.40) 4.40	Weak fine grained dark grey calcareous MUDSTONE. Distinctly weathered 4.00-5.10m BGL: Mostly Non Intact			
5.10		100	83	55	3				15.38	(0.70) 5.10	Strong fine grained thinly laminated dark grey LIMESTONE. Partially weathered with some calcite veining interbedded with a weak fine grained thinly laminated black calcareous MUDSTONE. Distinctly weathered with occasional pyrite specs and residual bands 5.10-5.90m BGL: F1: Closely to medium spaced, sub horizontal to 10 degrees, planar smooth 5.90-6.30m BGL: Mostly Non Intact			
5.90					NI									
6.30										(2.10)				
6.70		100	40	40	8						6.30-7.20m BGL: F1: Closely to medium spaced, subhorizontal to 10 degrees, planar smooth			
7.20									13.28	7.20	Weak fine grained dark grey / black calcareous MUDSTONE. Distinclty weathered to residual with occasional pyrite specs 7.20-9.70m BGL: Mostly Non Intact			
8.20		100	10	10	NI					(2.50)				
9.70									10.78	9.70	Complete at 9.70m			

Remarks
N groundwater encountered during cable percussion drilling
Rotary Core follow on from 4.00m BGL
50mm slotted standpipe installed from 4.00m to 1.00m with pea gravel surround, plain pipe installed from 1.00m to ground level with bentonite seal and flush cover.
Chiselling from 4.00m to 4.00m for 1.0 hour.

Scale (approx)	Logged By
1:50	CC & PC

Figure No. 8656-04-19.BH06

Ground Investigations Ireland Ltd
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Site	Borehole Number
Bailey Gibson Site	BH07

Machine : Dando 2000 Method : Cable Percussion	Casing Diameter 200 mm to 3.20 m	Ground Level (mOD) 20.73	Client	Job Number 8656-04-19
	Location 714019 E 732768.1 N	Dates 07/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					20.53	(0.20) 0.20	TARMACADAM		
0.50	B					(0.70)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick.		
1.00-1.45 1.00	SPT(C) N=9 B			1,2/2,3,2,2	19.83	0.90	Firm grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
						(1.60)			
2.00-2.45 2.00	SPT(C) N=8 B			1,1/2,2,2,2					
					18.23	2.50	Firm to stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
						(0.50)			
3.00-3.18 3.00	SPT(C) 50/25 B			25,25/50	17.73 17.53	3.00 (0.20) 3.20	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulders. Refusal at 3.2m due to boulder.		
							Complete at 3.20m		

Remarks
No groundwater encountered in Borehole.
Borehole backfilled upon completion.
Chiselling from 3.20m to 3.20m for 1.0 hour.

Scale (approx)	Logged By
1:50	CCostigan

Figure No.
8656-04-19.BH07

Ground Investigations Ireland Ltd
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Site Bailey Gibson Site			**Borehole Number** BH08
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200 mm to 2.80 m	**Ground Level (mOD)** 21.68	**Client**	**Job Number** 8656-04-19
	Location	**Dates** 05/06/2019	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					21.48	(0.20) 0.20	TOPSOIL: Brown slightly sandy slight			
0.50	B					(1.00)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rare cobble and rare fragments of redbrick.			
1.00-1.45 1.00	SPT(C) N=12 B			2,2/2,3,3,4	20.48	1.20	Firm to stiff grey brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.			
						(1.10)				
2.00-2.45 2.00	SPT(C) N=17 B			1,1/1,2,6,8	19.38	2.30	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and rare boulders.			
						(0.50)				
2.80	B				18.88	2.80	Refusal at 2.80m due to boulder.			
							Complete at 2.80m			

Remarks
No groundwater encountered in Borehole.
Borehole backfilled upon completion.
50mm Standpipe installed 2.8m BGL in Borehole.
Chiselling from 2.80m to 2.80m for 1.0 hour.

Scale (approx)	Logged By
1:50	CCostigan

Figure No. 8656-04-19.BH08

Appendix IV (b)

Player Wills/ Multi-Sport Playing Pitch Site Investigation Report

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Ground Investigations Ireland

Player Wills

Barrett Mahony

Factual Ground Investigation Report

November 2020

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DOCUMENT CONTROL SHEET

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Engineer	Barrett Mahony
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Document Title	Ground Investigation Report

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B	Final	A Browne	D MagLochlainn	C Finnerty	Dublin	12 November 2020

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

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APPENDICES

1.0 Preamble

On the instructions of Barret Mahony Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between July and November 2020 at the site of the proposed Residential development at the site of the Player Wills Factory, Saint Catherine's, South Circular Road.

2.0 Overview

2.1. Background

It is proposed to construct new Apartment Complexes with associated services, basements, access roads and car parking at the proposed site. The site is currently occupied by derelict industrial buildings and is situated between the South Circular Road and Donore Avenue in the south of Dublin City. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant and basements.

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 18 No. Trial Pits to a maximum depth of 3.20m BGL
- Carry out 2 No. Foundation Inspection Pits to determine existing foundation details
- Carry out 2 No. Plate Bearing Test to determine the subgrade modulus
- Carry out 2 No. Window Sample Boreholes to recover soil samples
- Carry out 4 No. Rotary Core Boreholes to a maximum depth of 10.40m BGL
- Installation of 3 No. Groundwater monitoring wells
- Installation of 1 No Pump Test Well
- 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.

3.3. 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.

3.1. 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 4 of this Report.

3.2. Window Sampling

The window sampling was carried out at the locations shown in the location plan in Appendix 1 using a Tecopsa SPT Tec 10 percussion drilling rig. The window sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 50kg weight falling a height of 500mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by a Geotechnical Engineer/Engineering Geologist. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging. The window sample records are provided in Appendix 5 of this Report.

3.3. 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 6 of this Report.

3.4. Surveying

The exploratory hole locations have been recorded using a Geomax Zenith 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.

3.5. Groundwater Monitoring Installations

Groundwater 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 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.

3.6. Variable Head Permeability Testing

Rising head permeability testing was carried out in the boreholes or standpipes as requested to determine the permeability of the ground. The initial water level was recorded where possible, or the base of the borehole test zone used where no groundwater was encountered. The casing is cleaned out and wither retracted or left flush with the base of the borehole and the hole filled with water from a bowser to ground level and the drop-in water level was recorded at regular intervals. The recorded test data was interpreted

to calculate the permeability value based on the methods outlined in B.S. 5930:2015 and IS EN ISO 22282-2:2012. The results of this testing are provided in Appendix 7 of this Report.

3.7. 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.
Environmental & Chemical testing as required by the specification, including the 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, tests were carried out in NMTL's Geotechnical Laboratory in Carlow.
Rock strength testing including Point Load (Is_{50}) and Unconfined Compressive Strength (UCS) testing was carried out in PROSOILS Geotechnical Laboratory.
The results of the laboratory testing are included in Appendix 8 of this Report.

3.1. Pump Testing

The pump test equipment was installed, and the test commenced on the 16th October 2020. The test was then run for 24 hrs of pumping from 8.00am on the 16h October 2020 to 13.50pm on the 17th October 2020. The pump test was completed by ADF Groundwater with the water levels monitored in the pump well and data loggers were installed in eight monitoring wells, MW1, MW2, MW3, CH01, CH03, BH11, BH14 and BH16 at intervals of five minutes during the test to provide groundwater response information.
The pump used during the test was a high volume low pressure submersible pump and was placed with a non-return valve at bottom of the pump well which due to the limited depth of the pump well enabled the water level to be drawn down to a depth of 9.70m below the ground level. The well was pumped at a rate of 324L/hr from 14.30pm on Friday the 16th October 2020. This rate was maintained with the water level in the pump well remaining constant.
A small drawdown of 0.32m was noted in the adjacent MW3 with only a 0.01m drop noted in MW2. The monitoring well in BH11 did not record any change during the test. The pump test data is included in Appendix 9 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 variable across the site and are generally comprised;

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

TOPSOIL: Topsoil was encountered in the majority of exploratory holes and was present to a maximum depth of 0.30m BGL. The exploratory holes around St. Teresa's Church encountered concrete surfacing was present typically to a depth of 0.10m BGL and Tarmacadam where present was 0.05m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil/Surfacing and were present to a depth varying between 0.40m and 3.90m BGL. These deposits were described generally as *dark brown or brown mottled grey slightly sandy slightly gravelly CLAY with frequent cobbles and boulders and contained occasional fragments of concrete, red brick, glass and plastic.*

At location TP01 and TP02 concrete foundations were encountered beneath the Made Ground at 1.60m and 1.70m BGL

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and were described typically as *brown slightly sandy gravelly CLAY with occasional cobbles and boulders* overlying a *stiff dark grey slightly 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. 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 in exploratory holes around the St Teresa's Church Grounds and were encountered within the cohesive deposits and were typically described as G*rey brown clayey sandy subangular to subrounded fine to coarse GRAVEL with occasional cobbles* or G*rey clayey gravelly fine to medium SAND with occasional cobbles.* 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 and become dense with depth. It should be noted that many 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

BEDROCK: The rotary core boreholes recovered Weak to Medium strong dark grey fine 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 pyrite veins were noted during logging which are typically present within the Calp Limestone.
The depth to rock varies from 5.40m BGL in CH02 to a maximum of 7.80m BGL in CH01. 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

No groundwater was noted during the investigation however 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 time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in CH01 and CH03 to allow the equilibrium groundwater level to be determined. The groundwater monitoring from CH01and CH03, as well as historic ground water monitoring wells 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 9.5% and 38.1% generally with fines contents of 35.4 to 60.2%.
The Particle Size Distribution tests confirm that generally the granular deposits are well-graded with percentages of sands/gravels and silt/clay typically between 23.7% and 30% with a gravel/sand content of typically 26% to 50.3%.

4.3.1. 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.

4.3.1. Environmental Laboratory Testing

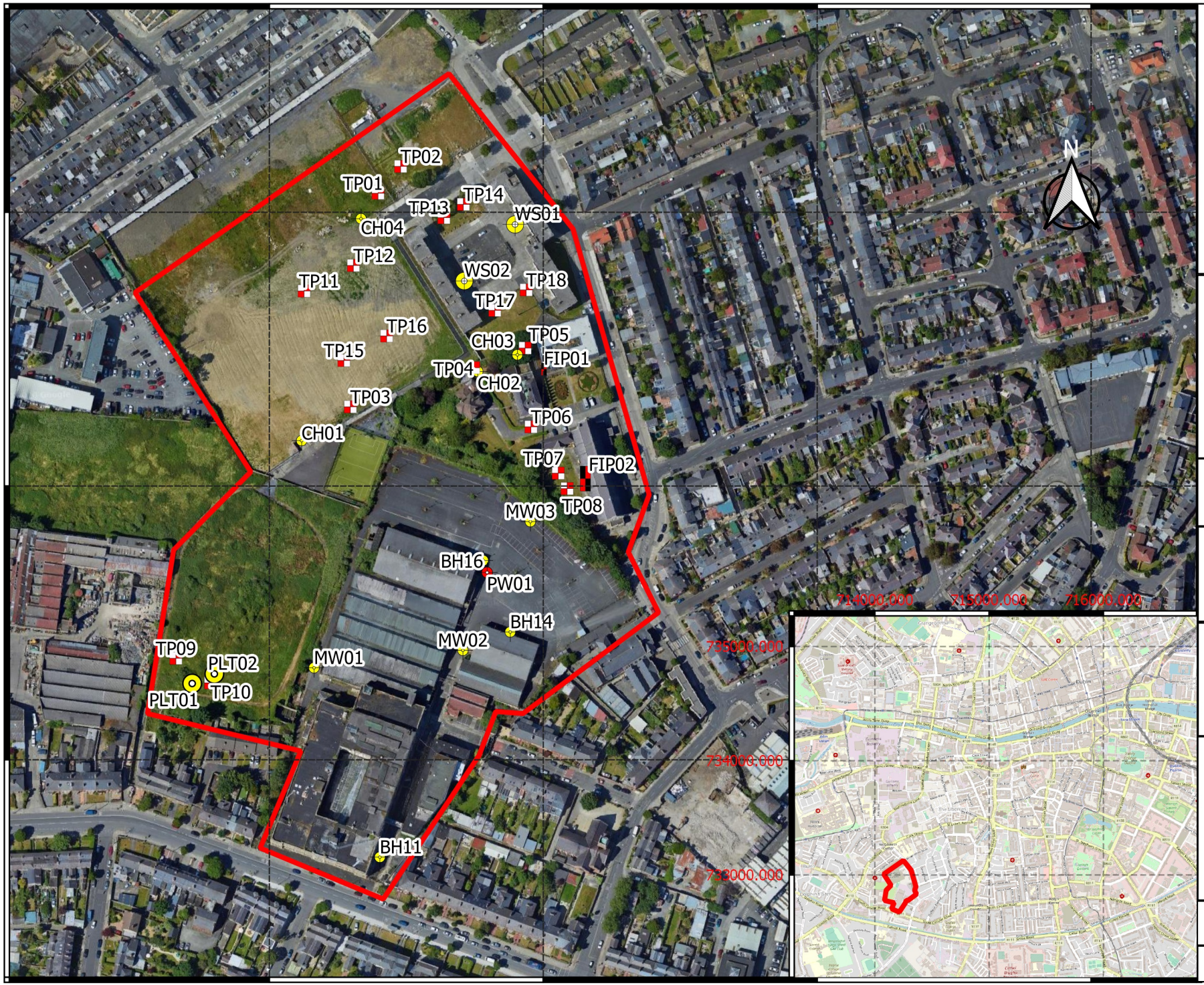
Environmental testing was carried out by OCM Environmental Consultants and the waste classification report is included under the cover of a sperate report by OCM Environmental Consultants

4.3.1. Rock Laboratory Testing

The rock testing carried out on samples recovered from the boreholes reported Unconfined Compressive Strength (UCS) values ranging between 15.8 and 17.1 MPa while the point load testing gave Is50 values ranging between 3.50 to 7.14 MPa.

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

APPENDIX 1 - Site Location Plan



Site Boundary
RC Borehole
Foundation Pit
CBR Test
Pump Test Borehole
Trial Pit

Client:

BM
BARRETT MAHONY

Project Code:
9748-07-20

Project Title:
Player Wills

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 25 50 75 100 125 m

Drawn By:	Date:
AB	12/11/20

Site Boundary
RC Borehole
Pump Test Borehole

Client:

BM
BARRETT MAHONY

Project Code:
9748-07-20

Project Title:
Player Wills

Drawing Title:
Figure 2 Groundwater Monitoring Locations

GROUND INVESTIGATIONS IRELAND
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0 15 30 45 60 75 m

Drawn By:	Date:
AB	12/11/20

APPENDIX 2 – Trial Pit Records

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Site Player Wills			**Trial Pit Number** TP01
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 6.0m x 0.8m x 1.7m (L x W x D)	**Ground Level (mOD)** 18.10	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714209.4 E 733059.8 N	**Dates** 27/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				17.90	0.20	MADE GROUND: Brown slightly sandy slightly gravelly Clay with red brick, concrete, metal and plastic fragments.		
0.50	B				(0.60)			
				17.30	0.80	MADE GROUND: Dark grey slightly sandy slightly gravelly Clay with red brick, concrete and metal fragments.		
1.00	B				(0.30)			
				17.00	1.10	MADE GROUND: Grey mottled black slightly sandy silty Clay with red brick and concrete fragments.		
					(0.50)			
1.50	B			16.50	1.60			
			Slow(1) at 1.70m.	16.40	(0.10) 1.70	OBSTRUCTION: Due to concrete.		▽1
						Terminated at 1.70m		

Plan

Remarks

Groundwater encountered at 1.70m BGL
Trial pit stable.
Trial pit terminated at 1.70m BGL due to concrete.
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP01

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Site Player Wills			**Trial Pit Number** TP02
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 4.4m x 0.5m x 1.8m (L x W x D)	**Ground Level (mOD)** 18.43	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714221.8 E 733074.6 N	**Dates** 27/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				18.23	0.20	MADE GROUND: Brown slightly sandy slightly gravelly Clay with red brick, concrete, metal and plastic fragments.		
0.50	B				(0.50)			
				17.73	0.70	MADE GROUND: Dark brown/grey slightly gravelly sandy Clay with red brick, concrete and plastic fragments.		
1.00	B				(0.60)			
				17.13	1.30	MADE GROUND: Grey mottled black slightly sandy silty Clay with red brick and concrete fragments.		
1.50	B				(0.40)			
				16.73	1.70	OBSTRUCTION: Due to concrete.		
				16.63	(0.10) 1.80	Terminated at 1.80m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated at 1.8m BGL due to concrete.
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP02

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Site Player Wills			**Trial Pit Number** TP03
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 4.50m x 0.40m x 3.00m (L x W x D)	**Ground Level (mOD)**	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location	**Dates** 27/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.90)	MADE GROUND: Dark brown slightly sandy gravelly Clay with fragments of red brick, concrete and plastic		
0.50	B				0.90			
1.00	B		Medium Ingress(1) at 1.00m.		(0.80)	Soft grey mottled brown silty CLAY with occasional subrounded cobbles (Possible Made Ground)		▽1
1.50	B				1.70			
2.00	B		Medium Ingress(2) at 2.00m.		(1.30)	Firm brownish grey slightly sandy gravelly CLAY with occasional subrounded cobbles		▽2
3.00	B				3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 1.00m BGL and 2.00m BGL
Old clay pipe struck at 1.30m BGL
Trial pit spalling below 2.00m BGL
Trial pit complete at 3.00m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP03

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Site Player Wills			**Trial Pit Number** TP04
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 0.40m x 2.10m (L x W x D)	**Ground Level (mOD)** 18.99	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714261.8 E 732964.2 N	**Dates** 28/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				18.94	0.05	TARMACADAM		
						MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with fragments of red brick, concrete, plastic, glass, ceramic		
0.50	B				(0.85)			
				18.09	0.90	MADE GROUND: Brown slightly sandy slightly gravelly Clay with fragments of charcoal and ceramic		
1.00	B		Slow(1) at 1.00m.		(0.60)			▽1
1.50	B		Medium(2) at 1.60m.	17.49	1.50	Soft greyish brown slightly sandy slightly gravelly CLAY with occasional cobbles		▽2
					(0.60)			
2.00	B		Fast(3) at 2.00m.					▽3
				16.89	2.10	Complete at 2.10m		

Plan

Remarks

Groundwater encountered at 1.00m BGL, 1.60m BGL and 2.00m BGL
Trial pit spalling below 1.50m BGL
Trial pit terminated at 2.10m BGL due to excess groundwater
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP04

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Site Player Wills			**Trial Pit Number** TP05
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.50m x 0.40m x 2.70m (L x W x D)	**Ground Level (mOD)**	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location	**Dates** 28/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	TARMACADAM		
						MADE GROUND: Brown slightly sandy slightly gravelly Clay with large roots and fragments of red brick, concrete, plastic, glass, ceramic, charcoal and tar		
0.50	B				(1.35)			
1.00	B							
					1.40	Soft brownish grey slighty sandy slightly gravelly CLAY with occasional rootlets (Possible Made Ground)		
1.50	B				(0.60)			
2.00	B				2.00	Soft to firm grey mottled brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles		
			Slow(1) at 2.30m.		(0.70)			▽1
2.60	B				2.70	Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 2.30m BGL
Trial pit stable
Trial pit complete at 2.70m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP05

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Site Player Wills			**Trial Pit Number** TP06
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 0.50m x 2.90m (L x W x D)	**Ground Level (mOD)** 18.90	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714293.2 E 732931.9 N	**Dates** 28/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	MADE GROUND: Dark brown slightly sandy gravelly Clay with many subrounded cobbles and boulders, and fragments of red brick, concrete, ceramic, wood, plastic and mortar		
0.50	B			18.30	0.60			
					(0.50)	MADE GROUND: Dark brown/grey slightly sandy slightly gravelly Clay with fragments of red brick, concrete, ceramic and charcoal		
1.00	B			17.80	1.10			
					(0.20)	Soft brownish grey slightly sandy slightly gravelly CLAY (Possible Made Ground)		
			Slow(1) at 1.30m.	17.60	1.30			▽1
						Soft to firm grey mottled brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles		
1.50	B				(0.50)			
				17.10	1.80			
2.00	B		Slow(2) at 2.10m.			Firm brown mottled grey slightly sandy gravelly CLAY wih some subangular cobbles. Gravel is finne to coarse, angular to subangular		▽2
					(1.10)			
2.90	B			16.00	2.90			
						Complete at 2.90m		

Plan

Remarks

Groundwater encountered at 1.30m BGL and 2.10m BGL
Trial pit stable
Trial pit complete at 2.90m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP06

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Site Player Wills			**Trial Pit Number** TP07
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.80m x 0.40m x 2.70m (L x W x D)	**Ground Level (mOD)**	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location	**Dates** 28/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30	MADE GROUND: Dark brown slightly sandy gravelly Clay with fragments of red brick, concrete and ceramic		
0.50	B				(0.90)			
1.00	B				1.20			
					(0.50)	Soft grey mottled brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles (Possible Made Ground)		▽1
1.50	B		Slow(1) at 1.50m.		1.70			
					(0.30)	Soft to firm grey mottled brown slightly sandy slightly gravelly CLAY with some subrounded to subangular cobbles		
2.00	B				2.00			
					(0.30)	Firm grey mottled brown slightly sandy gravelly CLAY with some subangular cobbles. Gravel is fine to coarse, angular to subangular		
			Medium(2) at 2.30m.		2.30			▽2
					(0.40)	Grey clayey gravelly fine to medium SAND with occasional subangular cobbles. Gravel is fine to coarse, angular to subangular		
2.70	B				2.70			
						Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 1.50m BGL and 2.30m BGL
Trial pit spalling below 2.30m BGL
Trial pit terminated at 2.70m BGL due to spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP07

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Site Player Wills			**Trial Pit Number** TP08
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 0.40m x 2.80m (L x W x D)	**Ground Level (mOD)**	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location	**Dates** 28/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30			
0.50	B				(0.50)	MADE GROUND: Dark brown slightly sandy gravelly Clay with fragments of red brick, concrete, ceramic, glass, plastic and shells		
					0.80			
1.00	B				(0.50)	Soft grey mottled brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles and shell fragments		
					1.30			
1.50	B				(0.70)	Soft to firm grey mottled brown slightly sandy slightly gravelly CLAY with some subangular cobbles and boulders		
					2.00			
2.00	B				(0.60)	Firm to stiff brown slightly sandy gravellt CLAY with some subrounded cobbles and boulders. Gravel is fine to coarse, angular to subangular		
					2.60			▽1
2.70	B		Slow(1) at 2.60m.		(0.20)	Stiff dark grey slightly sandy gravelly CLAY with some subrounded cobbles and boulders. Gravel is fine to coarse, angular to subangular		
					2.80	Complete at 2.80m		

Plan

Remarks

Groundwater encountered at 2.60m BGL
Trial pit spalling below 2.00m BGL
Trial pit complete at 2.80m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP08

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Site Player Wills			**Trial Pit Number** TP09
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 3.50m x 0.50m x 2.30m (L x Wx D)	**Ground Level (mOD)** 19.93	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714098.8 E 732805 N	**Dates** 29/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	TOPSOIL		
				19.78	0.15			
					(0.15)	MADE GROUND: Dark brown slightly sandy slightly gravelly CLAY with concrete, rubble and old pipe fragments.		
				19.63	0.30			
0.50	B					Firm grey mottled brown slightly sandy slightly gravelly CLAY with occasional cobbles (Possible Made Ground)		
					(0.70)			
1.00	B			18.93	1.00			
			Slow(1) at 1.20m.		(0.40)	Firm to stiff grey mottled brown slightly sandy gravelly CLAY with many subangular cobbles and boulders. Gravel is fine to coarse, angular to subangular		▽1
				18.53	1.40			
1.50	B				(0.30)	Soft brownish grey sandy gravelly CLAY with many subangular cobbles and boulders. Gravel is fine to coarse, angular to subangular		
				18.23	1.70			
2.00	B				(0.60)	Stiff dark grey slightly sandy gravelly CLAY with some subangular cobbles and boulders. Gravel is fine to coarse, angular to subangular		
				17.63	2.30			
						Complete at 2.30m		

Plan

Remarks

Groundwater encountered at 1.20m BGL
Trial pit stable.
Trial pit terminated at 2.30m BGL due to cobbles and boulders
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP09

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Site Player Wills			**Trial Pit Number** TP10
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 4.5m x 0.9m x 1.15m (L x Wx D)	**Ground Level (mOD)** 19.89	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714117.8 E 732791.6 N	**Dates** 29/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				19.74	(0.15) 0.15	TOPSOIL		
0.50	B		Slow(1) at 0.80m.		(0.85)	MADE GROUND: Dark brown slightly sandy very gravelly CLAY with concrete, rubble and old pipe fragments.		▽1
1.00	B			18.89	1.00 (0.15)	MADE GROUND: Old Foundation.		
				18.74	1.15	Terminated at 1.15m		

Plan

Remarks

Groundwater encountered at 0.8m BGL.
Trial pit stable.
Trial pit backfilled on completion.
Trial pit terminated at 1.15m BGL due to old foundation.

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP10

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Site Player Wills			**Trial Pit Number** TP10A
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 3.5m x 0.4m x 2.30m (L x Wx D)	**Ground Level (mOD)**	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location	**Dates** 29/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	TOPSOIL		
					(0.25) 0.40	MADE GROUND: Dark brown slightly sandy slightly gravelly CLAY with concrete, rubble and old pipe fragments.		
0.50	B				(0.60) 1.00	Firm grey mottled brown slightly sandy slightly gravelly CLAY with occasional cobbles (Possible Made Ground)		
1.00	B		Slow(1) at 1.30m.		(1.00) 2.00	Firm to stiff grey mottled brown slightly sandy gravelly CLAY with many subangular cobbles and boulders. Gravel is fine to coarse, angular to subangular		▽1
1.50	B		Slow(2) at 1.80m.					▽2
2.00	B				(0.30) 2.30	Stiff dark grey slightly sandy gravelly CLAY with many subangular cobbles and boulders. gravel is fine to coarse, angular to subangular		
						Complete at 2.30m		

Plan

Remarks

Groundwater encountered at 1.30m BGL and 1.80m BGL
Trial pit stable.
Trial pit terminated at 2.30m BGL due to cobbles and boulders
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP10A

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Site Player Wills			**Trial Pit Number** TP11
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 3.80m x 0.50m x 3.20m (L x W x D)	**Ground Level (mOD)** 18.70	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714168.9 E 733006.3 N	**Dates** 27/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	MADE GROUND: Brown slightly sandy gravelly Clay with rootlets and fragments of red brick, concrete, wood and rebar		
				18.30	0.40			
0.50	B				(0.60)	MADE GROUND: Dark grey sandy gravelly Clay with red brick and concrete		
1.00	B			17.70	1.00			
					(0.70)	MADE GROUND: Grey mottled brown slightly sandy silty Clay with old rootlets		
1.50	B			17.00	1.70			
2.00	B				(1.50)	MADE GROUND: Grey slightly sandy slightly gravelly Clay with occasional cobbles, seashells and fragments of red brick and concrete		
3.00	B			15.50	3.20			
						Complete at 3.20m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit complete at 3.20m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP11

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Site Player Wills			**Trial Pit Number** TP12
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 3.80m x 0.50m x 3.10m (L x W x D)	**Ground Level (mOD)** 18.52	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714195.9 E 733020.3 N	**Dates** 27/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	MADE GROUND: Brown slightly sandy gravelly Clay with fragments of red brick, concrete, wood and rebar		
				18.12	0.40			
0.50	B				(0.70)	MADE GROUND: Dark brown/black slightly sandy slightly gravelly Clay with red brick, metal and concrete		
1.00	B			17.42	1.10			
1.50	B				(0.70)	MADE GROUND: Grey mottled brown slightly sandy silty Clay with old rootlets, concrete and shell fragments		
				16.72	1.80			
2.00	B				(1.30)	Firm brown mottled grey slightly sandy slightly gravelly CLAY with occasional subrounded cobbles		
3.00	B			15.42	3.10			
						Complete at 3.10m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit complete at 3.10m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP12

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Site Player Wills			**Trial Pit Number** TP13
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.30m x 0.40m x 2.80m (L x W x D)	**Ground Level (mOD)** 18.33	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714245.5 E 733046.4 N	**Dates** 07/10/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				18.23	(0.10) 0.10	Brown slightly sandy slightly gravelly TOPSOIL		
0.50	B				(1.00)	MADE GROUND: Dark brown slightly sandy gravelly Clay with fragments of red brick, concrete, mortar, plpastic and glass		
1.00	B		Medium Seepage(1) at 1.00m.	17.23	1.10			▽1
					(0.50)	MADE GROUND: Grey mottled brown slightly sandy slightly gravelly CLAY with occasional fragments of red brick		
1.50	B		Slow Seepage(2) at 1.50m.	16.73	1.60			▽2
					(0.50)	Firm brown mottled grey slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is fine to coarse, angular to subangular		
2.00	B			16.23	2.10			
					(0.20)	Soft grey mottled black slightly sandy gravelly CLAY with occasional subangular cobbles and organic matter		
				16.03	2.30			
					(0.50)	Firm to stiff brown mottled grey slightly sandy gravelly CLAY with many subangular cobbles. Gravel is fine to coarse, angular to subangular		
2.80	B			15.53	2.80			
						Complete at 2.80m		

Plan

Remarks

Groundwater encountered at 1.00m BGL and 1.50m BGL
Trial pit stable
Trial pit complete at 2.80m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP13

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Site Player Wills			**Trial Pit Number** TP14
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.40m x 0.40m x 2.50m (L x W x D)	**Ground Level (mOD)** 18.39	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714256.2 E 733053.8 N	**Dates** 07/10/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	Brown slightly sandy slightly gravelly TOPSOIL		
				18.24	0.15	MADE GROUND: Dark brown slightly sandy gravelly Clay with fragments of red brick, concrete, mortar, plpastic and glass		
0.50	B				(0.95)			
1.00	B			17.29	1.10	Soft to firm light brown mottled grey slightly sandy slightly gravelly CLAY		
1.50	B				(0.60)			
				16.69	1.70	Soft to firm brown mottled grey slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is fine to coarse, angular to subangular		
2.00	B				(0.80)			
			Slow Seepage(1) at 2.30m.					▽1
2.50	B			15.89	2.50	Complete at 2.50m		

Plan

Remarks

Groundwater encountered at 2.30m BGL
Trial pit spalling below 1.80m BGL
Trial pit complete at 2.50m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP14

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Site Player Wills			**Trial Pit Number** TP15
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 4.0m x 0.6m x 3.0m (L x W x D)	**Ground Level (mOD)** 18.75	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714190.8 E 732968.2 N	**Dates** 27/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				18.55	0.20	MADE GROUND: Grey/brown slightly sandy slightly gravelly Clay with red brick, concrete, plastic and metal fragments.		
					(0.40)			
0.50	B			18.15	0.60	MADE GROUND: Dark grey/brown slightly sandy slightly gravelly Clay with red brick, concrete, plastic and rebar fragments.		
1.00	B		Medium Ingress(1) at 1.20m.		(0.90)			▽1
1.50	B			17.25	1.50	MADE GROUND: Grey mottled brown slightly sandy gravelly Clay with occasional rebar, red brick and concrete fragments.		
2.00	B				(1.50)			
3.00	B			15.75	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 1.2m BGL.
Trial pit spalling at 1.5m BGL.
Trial pit complete at 3.00m BGL
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP15

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Site Player Wills			**Trial Pit Number** TP16
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 4.20m x 0.40m x 3.20m (L x W x D)	**Ground Level (mOD)** 18.72	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714214.2 E 732981.6 N	**Dates** 27/07/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	MADE GROUND: Brown slightly sandy gravelly Clay with rootlets and fragments of red brick, concrete, wood and rebar		
0.50	B			18.12	0.60			
					(0.60)	MADE GROUND: Dark brown/black slightly sandy gravelly Clay with fragments of red brick, concrete, rebar and mortar		
1.00	B			17.52	1.20			
					(0.40)	Soft grey mottled brown slightly sandy silty CLAY with occasional subrounded cobbles (Possible Made Ground)		
1.50	B			17.12	1.60			
					(0.70)	Soft to firm grey mottled black slightly sandy slightly gravelly silty CLAY with shells and organic odour		
2.00	B			16.42	2.30			
					(0.90)	Firm grey mottled brown slightly sandy gravelly CLAY with some subangular cobbles and boulders. Gravel is fine to coarse, angular to subangular		
3.00	B			15.52	3.20			
						Complete at 3.20m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit complete at 3.20m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP16

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Site Player Wills			**Trial Pit Number** TP17
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.00m x 0.40m x 2.60m (L x W x D)	**Ground Level (mOD)** 18.52	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714273.4 E 732995.7 N	**Dates** 07/10/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy slightly gravelly TOPSOIL		
				18.22	0.30	MADE GROUND: Dark brown slightly sandy gravelly Clay with fragments of red brick, concrete, mortar, plpastic and glass		
0.50	B				(0.80)			
1.00	B			17.42	1.10	Firm brown mottled grey slightly sandy slightly gravelly CLAY		
1.50	B				(0.70)			
				16.72	1.80	Firm brown slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is fine to coarse, angular to subangular		
2.00	B				(0.40)			
				16.32	2.20	Stiff dark grey slightly sandy slightly gravelly CLAY with many subangular cobbles and occasional boulders		
					(0.40)			
2.60	B			15.92	2.60	Complete at 2.60m		

Plan

Remarks

No Groundwater encountered
Trial pit stable
Trial pit complete at 2.60m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP17

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Site Player Wills			**Trial Pit Number** TP18
Machine : 3T Excavator **Method :** Trial Pit	**Dimensions** 2.40m x 0.40m x 2.50m (L x W x D)	**Ground Level (mOD)** 18.49	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714290.6 E 733006.9 N	**Dates** 07/10/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				18.44	0.05	MADE GROUND: Brown medium Sand		
				18.39	0.10	FILL: Dark grey medium angular Gravel (Crushed Rock Fill)		
				18.38	0.11	GEOTEXTILE		
0.50	B				(0.99)	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with red brick, concrete and mortar fragments		
1.00	B			17.39	1.10	Soft to firm brown mottled red slightly sandy slightly gravelly CLAY		
					(0.40)			
1.50	B			16.99	1.50	Soft to firm brown slightly sandy gravelly CLAY with many subangular cobbles. Gravel is fine to coarse, angular to subangular		
2.00	B				(1.00)			
			Slow Seepage(1) at 2.30m.					▽1
2.50	B			15.99	2.50	Complete at 2.50m		

Plan

Remarks

Groundwater encountered at 2.30m BGL
Trial pit stable
Trial pit complete at 2.50m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	AB	9748-07-20.TP18

APPENDIX 3 – Foundation Pit Records

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
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Tel: 01 601 5175 / 5176
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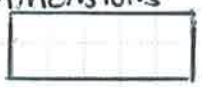
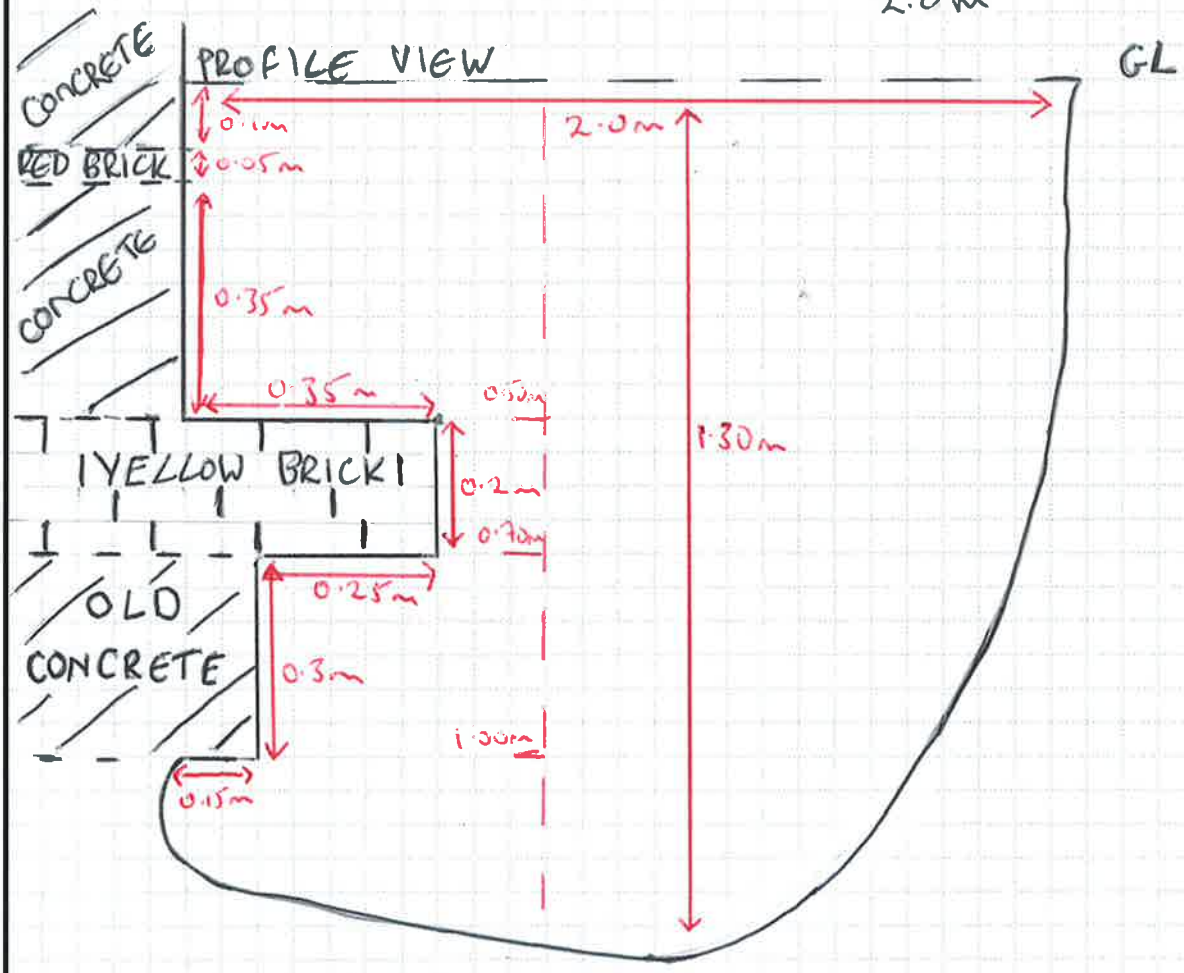
Web: www.gii.ie

FOUNDATION PIT DIMENSIONS





0.0-0.10 : CONCRETE
0.10-0.15 : RED BRICK
0.15-0.70 : MADE GROUND : BROWN SLIGHTLY SANDY SLIGHTLY GRAVELLY CLAY WITH CONCRETE FRAGMENTS
0.70-1.30 : MADE GROUND : BROWN SLIGHTLY SANDY GRAVELLY SILTY CLAY WITH SOME COBBLES AND BOULDERS

- GROUNDWATER ENCOUNTERED AT 1.20M BGL (SLOW).
- FOUNDATION PIT STABLE

Project	PLAYER WILLS
Client	BARRETT MAHONEY
Contractor	Ground Investigations Ireland Ltd

FP02

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

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Hazelhatch Road,
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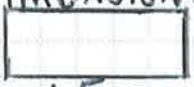
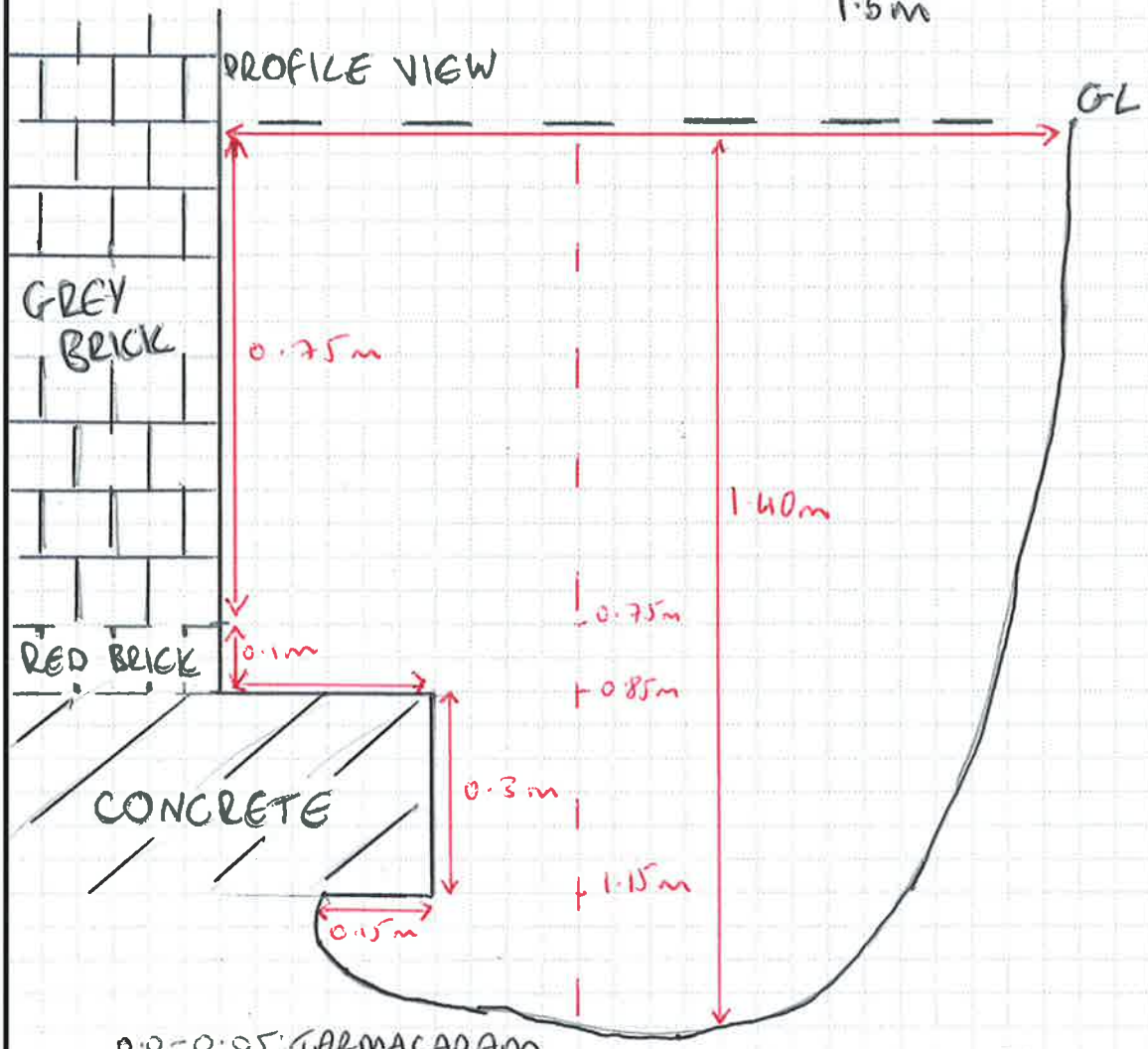
- GROUNDWATER ENCOUNTERED AT 1.00m BGL (SLOW)
- FOUNDATION PIT STABLE

FOUNDATION PIT DIMENSIONS





0.0-0.05: TARMACADAM
0.05-0.15: FILL: GREY COARSE ANGULAR GRAVEL (CRUSHED ROCK FILL)
0.15-0.85: MADE GROUND: DARK GREY CLAYEY SANDY FINE TO COARSE ANGULAR TO SUBANGULAR GRAVEL WITH METAL FRAGMENTS
0.85-1.40: FIRM TO STIFF BROWN MOTTLED GREY SLIGHTLY SANDY SLIGHTLY GRAVELLY CLAY WITH OCCASIONAL SUBROUNDED COBBLES (POSSIBLE MADE GROUND)

Project	PLAYER WILLS
Client	BARRETT MAHONEY
Contractor	Ground Investigations Ireland Ltd

FP01

FP01

FP01

FP02

FP02

APPENDIX 4 – Window Sample Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Player Wills			**Number** WS01
Machine : Tecop 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 88mm to 3.00m 68mm to 4.00m	**Ground Level (mOD)** 17.88	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714284.4 E 733043.2 N	**Dates** 07/10/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	B			17.83	0.05 (0.10)	CONCRETE		
				17.73	0.15	FILL: Dark grey sandy medium angular Gravel (Crushed Rock Fill)		
					(0.85)	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with fragments of red brick, concrete and mortar		
1.00-2.00	B			16.88	1.00	Soft to firm brown mottled grey slightly sandy slightly gravelly CLAY		
					(0.90)			
2.00-4.00	B			15.98	1.90	Soft brown mottled grey slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is finne to coarse, angular to subangular		
					(0.90)			
				15.08	2.80	Firm to stiff dark grey slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is fine to coarse, angular to subangular		
					(1.20)			
				13.88	4.00	Complete at 4.00m		

Remarks
Cored from 0.00m BGL to 0.15m BGL
0.15m-1.00m BGL: 85% Recovery
1.00m-2.00m BGL: 90% Recovery
2.00m-3.00m BGL: 100% Recovery
3.00m-4.00m BGL: 50% Recovery

Scale (approx)	Logged By
1:25	AB

Figure No. 9748-07-20.WS01

Ground Investigations Ireland Ltd
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Site Player Wills			**Number** WS02
Machine : Tecop 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 88mm to 3.00m 68mm to 4.00m	**Ground Level (mOD)** 18.13	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714256.6 E 733012.3 N	**Dates** 07/10/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	B			18.08	0.05 (0.10)	CONCRETE		
				17.98	0.15	FILL: Dark grey sandy medium angular Gravel (Crushed Rock Fill)		
					(0.95)	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with fragments of red brick, concrete and mortar		
1.00-2.00	B			17.03	1.10	Firm brown slightly sandy slightly gravelly Clay with occasional cobbles		
					(1.00)			
2.00-4.00	B			16.03	2.10	Firm to stiff dark brown slightly sandy gravelly CLAY with some subangular cobbles. Gravel is fine to coarse, angular to subangular		
					(0.90)			
				15.13	3.00	Stiff dark grey slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is fine to coarse, angular to subangular		
					(1.00)			
				14.13	4.00	Complete at 4.00m		

Remarks
Cored from 0.00m BGL to 0.15m BGL
0.15m-1.00m BGL: 60% Recovery
1.00m-2.00m BGL: 100% Recovery
2.00m-3.00m BGL: 100% Recovery
3.00m-4.00m BGL: 70% Recovery

Scale (approx)	Logged By
1:25	AB

Figure No. 9748-07-20.WS02

Player Wills
WS Photos
WS01 (0.00m-1.00m)

WS01 (1.00m-2.00m)

WS01 (2.00m-3.00m)

WS01 (3.00m-4.00m)

WS02 (0.00m-1.00m)

WS02 (1.00m-2.00m)

WS02 (2.00m-3.00m)

WS02 (3.00m-4.00m)

APPENDIX 5 – Plate Bearing Test Results

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.805
69	-3.47
138	-5.505
0	-4.425
69	-5.195
138	-5.79
0	-4.69

GROUND INVESTIGATIONS IRELAND
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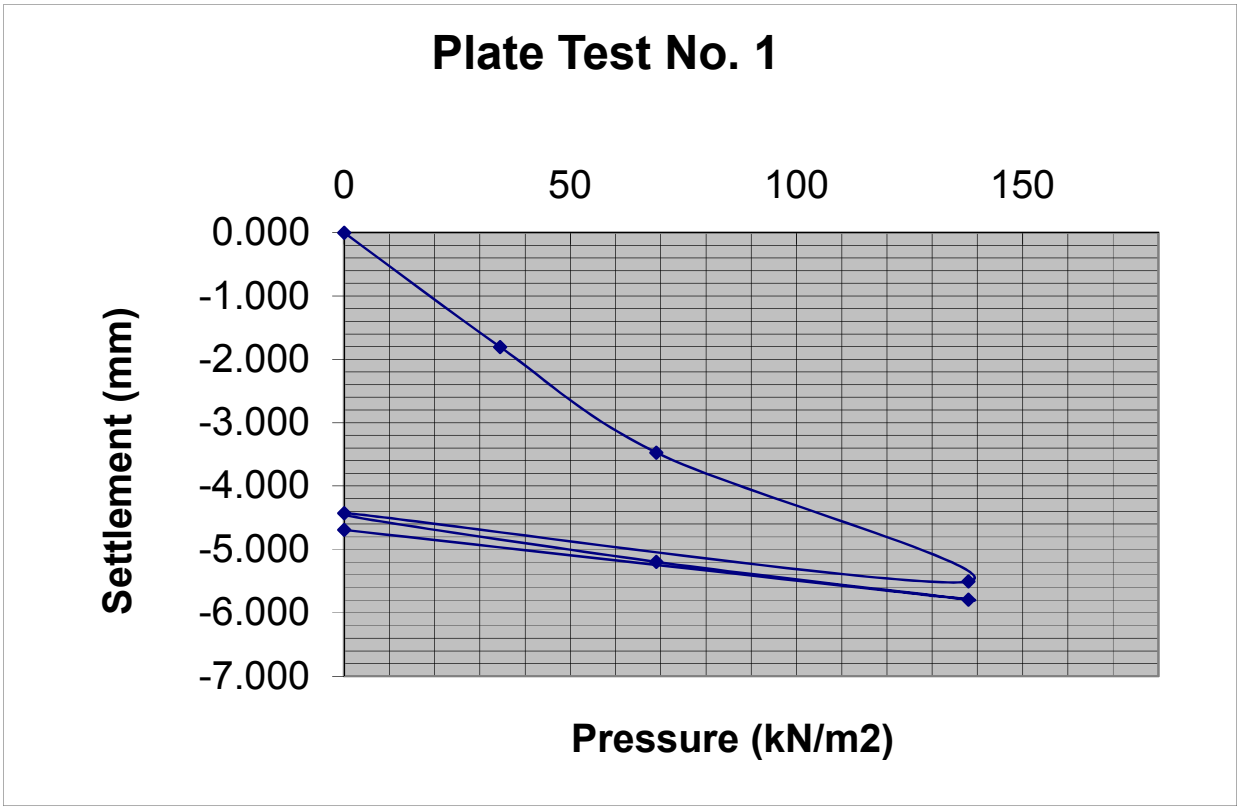
LOCATION	Player Wills	**MATERIAL**	MADE GROUND: Brown slightly sandy slightly gravelly Clay with red brick, concrete and boulders.
CONTRACT NO.	9748-07-20		
DATE	29/07/2020		
CLIENT	Barrett Mahony	**DEPTH**	0.5m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	PBT01	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **13.44 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **60.55 MN/m2/m**

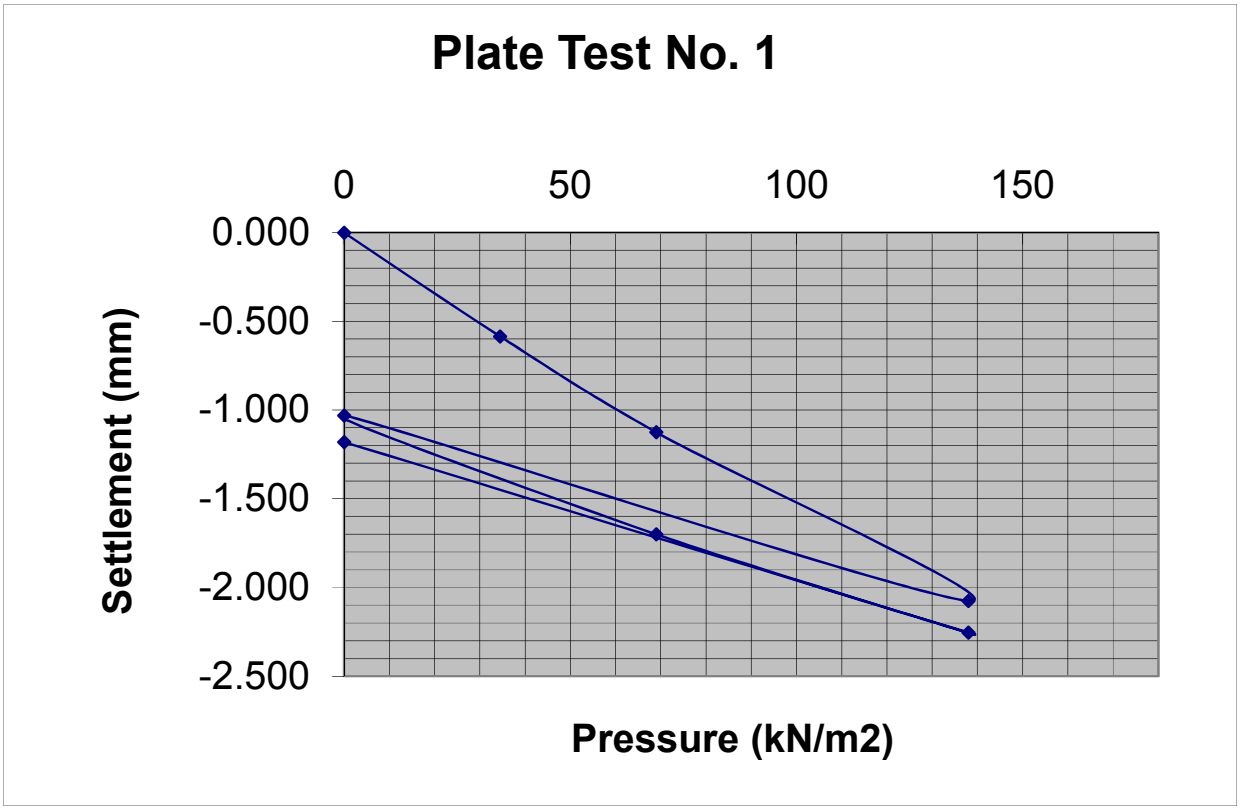
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.87 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **11.82 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.585
69	-1.125
138	-2.075
0	-1.03
69	-1.7
138	-2.255
0	-1.18

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Player Wills	**MATERIAL**	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with red brick and concrete.
CONTRACT NO.	9748-07-20		
DATE	29/07/2020		
CLIENT	Barrett Mahony	**DEPTH**	0.5m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	PBT02	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **41.44 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **69.59 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **6.13 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **15.05 %**

APPENDIX 6 – Rotary Core Borehole Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Player Wills				**Borehole Number** CH01
Machine : Dando 2000 **Flush :** Water **Core Dia :** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm to 9.90m	**Ground Level (mOD)** 19.05	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location 714167.6 E 732924.4 N	**Dates** 11/09/2020	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00						18.95	0.10	CONCRETE.			
	16						(2.30)	Poor recovery. Recovery consists of MADE GROUND: Dark grey subangular to subrounded fine to coarse Gravel with subangular to subrounded cobbles, red brick and mortar fragments.			
2.40 2.40-2.55	16				17,25/50 SPT(C) 50/0	16.65	2.40 (1.50)	Poor recovery. Recovery consists of dense dark grey subangular to subrounded fine to coarse GRAVEL with occasional subangular to subrounded cobbles.			
3.90 3.90-4.25	100				7,9/14,27,9 SPT(C) 50/200	15.15	3.90	Very stiff grey slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles and boulders.			
5.40 5.40-5.42	100				26/50 SPT(C) 26*/10 50/10		(3.90)				
6.90 6.90-6.92	93	32	32		25/50 SPT(C) 25*/10 50/10						
7.80				4		11.25	7.80	Medium strong dark grey thinly bedded fine grained LIMESTONE unweathered to partially weathered, interbedded with very weak black thinly bedded fine grained MUDSTONE partially weathered.			
8.30 8.40				NI							
8.70	100	86	40	10			(2.10)	7.80m - 9.90m BGL: 2 Fracture sets. F1: 0 - 10 degrees, closely to medium spaced, undulating, smooth. F2: 40 - 50 degrees, medium spaced, planar, smooth.			
9.90						9.15	9.90				

Remarks
Plain pipe with bentonite seal from GL to 6.20m BGL, slotted pipe with pea gravel surround from 6.20m to 9.90m BGL. Finished with a raised cover.
No groundwater encountered.
Borehole terminated at 9.90m BGL.

Scale (approx)	Logged By
1:50	JS & JMD

Figure No. 9748-07-20.RC01

Ground Investigations Ireland Ltd
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Site Player Wills			**Borehole Number** CH02
Machine : Dando 2000 **Flush :** Water **Core Dia :** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm to 8.40m **Location** 714264.1 E 732962.4 N	**Ground Level (mOD)** 18.97 **Dates** 15/09/2020-16/09/2020	**Client** Barrett Mahony **Engineer**	**Job Number** 9748-07-20 **Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00						18.91	0.06	TARMACADAM.			
	6						(3.84)	Poor recovery. Recovery consists of MADE GROUND: Brown slightly sandy gravelly Clay with subangular cobbles.			
2.40 2.40-2.85	13				2,3/3,2,4,3 SPT(C) N=12						
3.90 3.90-4.35	56				2,3/3,4,6,7 SPT(C) N=20	15.07	3.90	Stiff greyish brown slightly sandy gravelly CLAY with subangular to subrounded cobbles.			
							(1.50)				
5.40 5.40-5.42	91	60	52	9	14,26/50 SPT(C) 40*/10 50/10	13.57	5.40	Weak to medium strong dark grey thinly bedded fine grained LIMESTONE unweathered to partially weathered, interbedded with weak dark grey thinly bedded fine grained MUDSTONE partially weathered.			
6.90	83	58	51.3				(3.00)	5.40m - 8.40m BGL: 2 Fracture sets. F1: 0 - 10 degrees, very closely to closely spaced, undulating, smooth, some clay smearing. F2: 80 - 90 degrees, medium spaced, undulating, rough, some clay smearing and calcite.			
8.40						10.57	8.40	Complete at 8.40m			

Remarks
Plain pipe with bentonite seal from GL to 4.40m BGL, slotted pipe with pea gravel surround from 4.40m to 8.40m BGL. Finished with a raised cover.
No groundwater encountered.
Borehole terminated at 8.40m BGL.

Scale (approx)	Logged By
1:50	JS & JMD

Figure No. 9748-07-20.RC02

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Site Player Wills			**Borehole Number** CH03
Machine : Dando 2000 **Flush :** Water **Core Dia :** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm to 10.20m **Location**	**Ground Level (mOD)** **Dates** 14/09/2020-15/09/2020	**Client** Barrett Mahony **Engineer**	**Job Number** 9748-07-20 **Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00							0.02	TARMACADAM.			
	31						(2.18)	MADE GROUND: Dark grey slightly sandy slightly gravelly Clay with red brick fragments.			
2.40							2.20				
2.40-2.85	64				5,7/6,8,11,17 SPT(C) N=42		(1.70)	Very stiff brown slightly sandy slightly gravelly CLAY.			
3.90							3.90				
3.90-4.35	28				4,6/4,9,11,14 SPT(C) N=38		(1.30)	Dense greyish brown clayey sandy fine to coarse subrounded GRAVEL.			
5.40							5.20				
5.40-5.80	84				8,12/9,14,26 SPT(C) 49/250		(1.90)	Very stiff dark brown slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles.			
6.90							7.10				
7.20				22				Medium strong to very strong dark grey thinly bedded fine grained LIMESTONE partially weathered, interbedded with very weak black thinly bedded fine grained MUDSTONE occasionally destructured, recovered as black slightly clayey SILT.			
7.55	100	56	36	NI							
7.70				16				7.10m - 10.20m BGL: 2 Fracture sets. F1: 0 - 20 degrees, closely spaced, undulating, smooth, some clay smearing. F2: 40 - 50 degrees, medium spaced, undulating, rough, some clay smearing.			
8.00				NI							
8.20											
8.40				8			(3.10)				
9.20	90	66	58	NI							
9.40				13							
9.90											
10.00											

Remarks
Plain pipe with bentonite seal from GL to 5.60m BGL, slotted pipe with pea gravel surround from 5.60m to 10.20m BGL. Finished with a flush cover.
No groundwater encountered.
Borehole terminated at 10.20m BGL.

Scale (approx)	Logged By
1:50	JS & JMD

Figure No. 9748-07-20.RC03

Ground Investigations Ireland Ltd
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Site Player Wills				**Borehole Number** CH03
Machine : Dando 2000 **Flush :** Water **Core Dia:** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm to 10.20m	**Ground Level (mOD)**	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location	**Dates** 14/09/2020-15/09/2020	**Engineer**	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	100	50	0	NI			10.20				
10.20								Complete at 10.20m			

Remarks

Scale (approx)	Logged By
1:50	JS & JMD

Figure No. 9748-07-20.RC03

Ground Investigations Ireland Ltd
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Site Player Wills			**Borehole Number** CH04
Machine : Dando 2000 **Flush :** Water **Core Dia :** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm to 10.40m **Location**	**Ground Level (mOD)** **Dates** 10/09/2020	**Client** Barrett Mahony **Engineer**	**Job Number** 9748-07-20 **Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00							0.10	TOPSOIL: Brown slightly sandy slightly gravelly Clay with grass rootlets.		
	16						(2.30)	Poor recovery. Recovery consists of MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with red brick and concrete fragments.		
2.40 2.40-2.85	31				2,2/2,2,3,4 SPT(C) N=11		2.40 (0.20) 2.60	Poor recovery. Recovery consists of brown slightly sandy slightly gravelly CLAY.		
							(1.30)	Firm to stiff brown slightly sandy gravelly CLAY.		
3.90 3.90-4.35	94				12,10/13,14,18,5 SPT(C) N=50		3.90	Very stiff dark grey slightly sandy gravelly CLAY.		
							(1.10)			
5.40 5.40-5.55	38				17,21/50 SPT(C) 50/0		5.00 (1.00)	Very stiff grey slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles.		
							6.00	Very stiff brown slightly sandy gravelly CLAY.		
6.90 6.90-7.05					16,15/50 SPT(C) 50/0		(0.90) 6.90 (0.40)	Very stiff black slightly sandy gravelly CLAY.		
7.30	100	74	40				7.30	Medium strong to strong dark grey thinly bedded fine to medium grained LIMESTONE partially weathered, interbedded with weak black thinly bedded fine grained MUDSTONE partially weathered.		
8.40	96	83	46	10			(3.10)	7.30m - 10.40m BGL: 2 Fracture sets. F1: 0 - 10 degrees, closely spaced, undulating, rough, some clay smearing. F2: 80 - 90 degrees, undulating, rough, some clay smearing.		
9.90										

Remarks
Borehole terminated at 10.40m BGL.
Backfilled on completion.
No groundwater encountered.

Scale (approx)	Logged By
1:50	JS & JMD

Figure No. 9748-07-20.RC04

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Site Player Wills			**Borehole Number** CH04
Machine : Dando 2000 **Flush :** Water **Core Dia:** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm to 10.40m	**Ground Level (mOD)**	**Client** Barrett Mahony	**Job Number** 9748-07-20
	Location	**Dates** 10/09/2020	**Engineer**	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100	94	50				10.40			
10.40								Complete at 10.40m		

Remarks

Scale (approx)	Logged By
1:50	JS & JMD

Figure No. 9748-07-20.RC04

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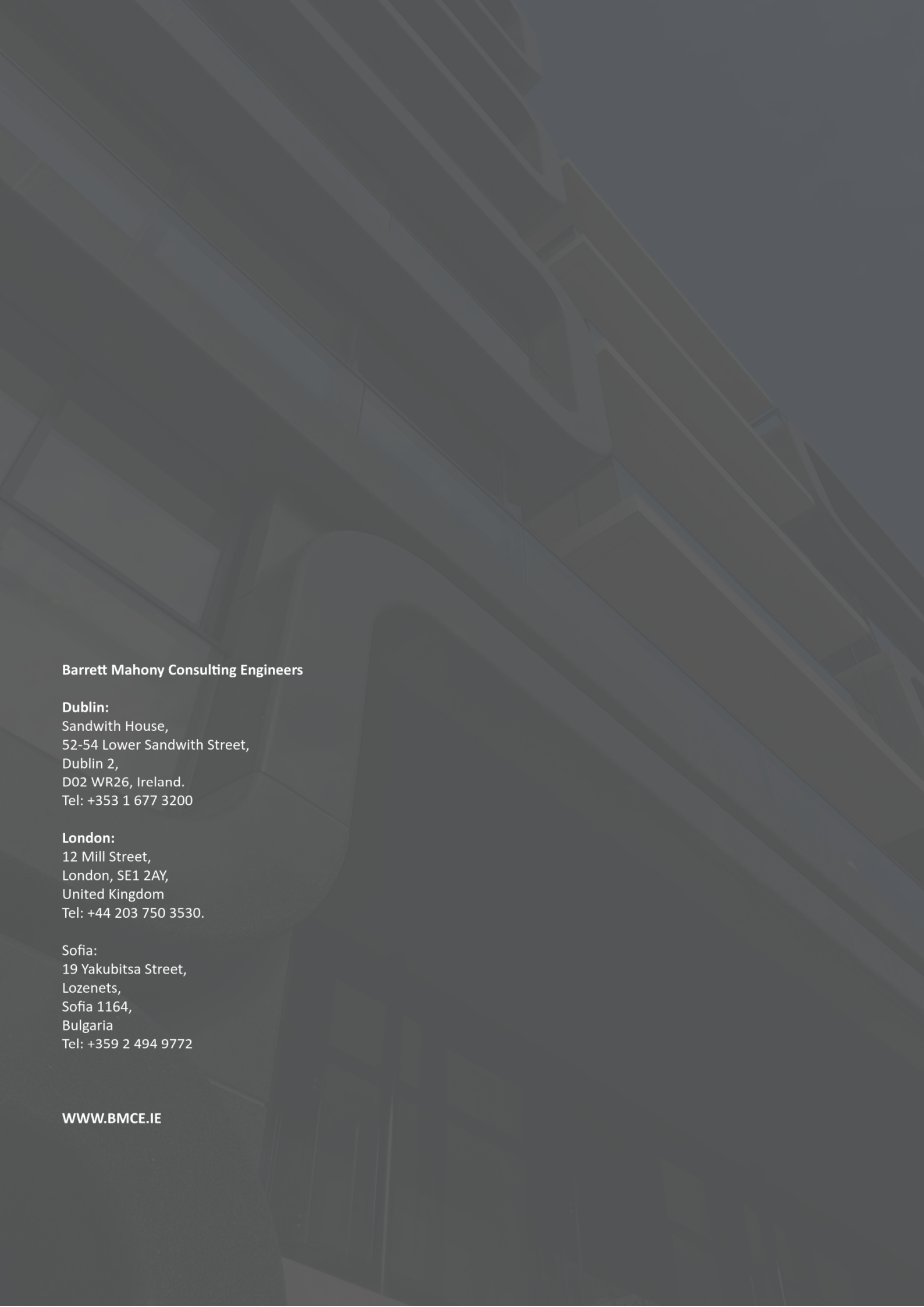
Site Player Wills			**Borehole Number** PW01
Machine : **Flush :** Water **Core Dia:** 200 mm **Method :** Open Hole Drilling	**Casing Diameter** 200mm to 9.70m **Location** (dGPS) 714269.2 E 732852.4 N	**Ground Level (mOD)** 20.01 **Dates** 10/09/2020	**Client** Barrett Mahony **Engineer**	**Job Number** 9748-07-20 **Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(4.00)	Overburden			
						16.01	4.00	ROCK			
							(5.70)				
						10.31	9.70	Complete at 9.70m			

Remarks
Borehole terminated at 9.70m BGL.
165mm slotted standpipe installed from 9.70m to 3.50m with pea gravel surround, plain pipe installed from 3.50m to ground level with bentonite seal and flush cover.

Scale (approx)	Logged By
1:50	AB

Figure No. 9748-07-20.PW01



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