BARRETT **MAHONY**
CIVIL & STRUCTURAL
CONSULTING ENGINEERS

Civil Engineering Infrastructure & Surface Water Management Report.

Project:

Development at
Gowan House, Carriglea
Business Park, Naas
Road, Dublin 12

DOCUMENT CONTROL

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1. INTRODUCTION

1.1 PROJECT DESCRIPTION

Barrett Mahony Consulting Engineers (BMCE) have been commissioned by Malclose Ltd to prepare a Civil Engineering Infrastructure and Surface Water Management report for a planning application for a large-scale residential development principally comprising student accommodation at their 0.962 Ha site at Gowan House, Carriglea Business Park, Naas Road, Dublin 12, D12 RCC4. This report has been prepared as part of the planning application package for the development.

Works to upgrade of the access road to the west of the site on an area measuring c. 0.081 Ha are also proposed comprising new surfacing to the carriageway, the provision of inbound and outbound bicycle lanes from the development entrance to the Naas Road, the provision of a controlled pedestrian crossing on the access road at the Naas Road junction, and the provision of a further uncontrolled pedestrian and bicycle crossing linking the subject site with the approved Concorde SHD development (ABP Ref: TA29S.312218) to the west.

On the Naas Road, works are proposed on an area measuring c. 0.086 Ha comprising the realignment and widening of the existing pedestrian footpath along the westbound carriageway of the Naas Road and the provision of linkages from the realigned footpath to the development site, and the provision of new controlled pedestrian crossings across the eastbound and westbound carriages of the Naas Road and the provision of a new uncontrolled crossing of the Luas tracks.

The development site area and roadworks areas will provide a total application site area of c. 1.13 Ha.

The proposed development will principally consist of: the demolition of the existing two-storey office/warehouse building and outbuilding (5,172 sq m); and the construction of a development in two blocks (Block 1 (eastern block) is part 2 No. storeys to part 15 No. storeys over lower ground floor and basement levels with roof plant over and Block 2 (western block) is part 9 No. storeys to part 11 No. storeys over basement with roof plant over) principally comprising 941 No. Student Accommodation bedspaces (871 No. standards rooms, 47 No. accessible studio rooms and 23 No. studios) with associated facilities, which will be utilised for short-term lets during student holiday periods. The 871 No. standard rooms are provided in 123 No. clusters ranging in size from 3 No. bedspaces to 8 No. bedspaces, and all clusters are served by a communal living/kitchen/dining room.

The development also provides: ancillary internal and external communal student amenity spaces and support facilities; cultural and community floor space (1,422 sq m internal and 131 sq m external) principally comprising a digital hub and co-working space with ancillary cafe; a retail unit (250 sq m); public open space; the daylighting of the culverted River Camac through the site; an elevated walkway above the River Camac at ground floor level; a pedestrian bridge link at first floor level between Blocks 1 and 2; vehicular access at the south-western corner; the provision of 7 No. car-parking spaces, 2 No. motorcycle parking spaces and 2 No. set down areas; bicycle stores at ground and lower ground floor levels; visitor cycle parking spaces; bin stores; substations; hard and soft landscaping; green and blue roofs; new telecommunications infrastructure at roof level of Block 1 including antennas and microwave link dishes, 18 No. antennas and 6 No. transmission dishes, together with all associated equipment; boundary treatments; plant; lift overruns; and all associated works above and below ground.

The gross floor area of the development is c. 33,140 sq m comprising c. 30,386 sq m above lower ground and basement level.

Figure 1.1: Site Location Map

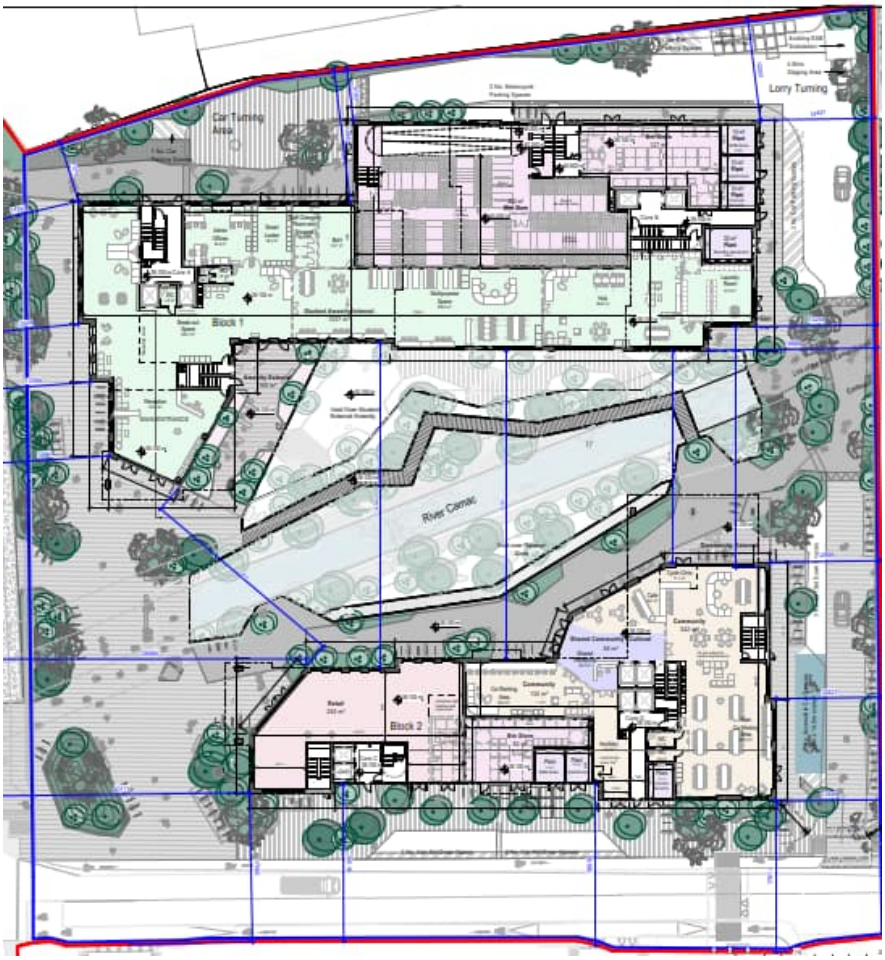


Figure 1.2: Site Layout Plan

1.2 PURPOSE OF THIS REPORT

This report considers the main infrastructure elements of the proposed development and how they connect to the public infrastructure serving the area. The report will outline and detail the proposed methods that will be used to comply with the local authority SuDS requirements (Sustainable Urban Drainage Systems). Foul and surface water drainage and water supply are addressed.

This report should be read in conjunction with the drawings listed in Section 1.3 and the following Reports submitted with the application under separate cover.

- 22.219-FRA-01 Flood Risk Assessment Report
- 22.219-BIA-01 Basement Impact Assessment Report
- 22.219-TA-01 Traffic Assessment Report
- 22.219-RTP-01 Residential Travel Plan Report
- 22.219-PMP-01 Parking Management Plan Report
- 22.219-DMURS-01 DMURS Compliance Report
- P23063-PMCE-XX-XX-RP-SA-RSA-3_ZZ_01 Stage 1 Road Safety Audit Report
- P23063-PMCE-XX-XX-RP-QA-GEN-1_00_01 Cycling Audit Report
- P23063-PMCE-XX-XX-RP-QA-GEN-1_00_02 Walking Audit Report
- Public Transport Capacity Assessment for Gowan Motor Site, Naas Road

1.3 DRAWINGS SUBMITTED

The following civil engineering drawings have been submitted with the Planning Application:

- GWH-BMD-ZZ-XX-DR-C-1000 Site Drainage & Watermain Plan
- GWH-BMD-ZZ-XX-DR-C-1001 Basement Drainage Plan
- GWH-BMD-ZZ-XX-DR-C-1002 Surface Water Management Strategy – Roof Level
- GWH-BMD-ZZ-XX-DR-C-1003 Surface Water Management Strategy – Ground Level
- GWH-BMD-ZZ-XX-DR-C-1004 Proposed Sightlines Layout
- GWH-BMD-ZZ-XX-DR-C-1005 Camac Culvert Daylighting Details
- GWH-BMD-ZZ-XX-DR-C-1006 Existing Topographical Survey
- GWH-BMD-ZZ-XX-DR-C-1007 Taking in Charge Layout
- GWH-BMD-ZZ-XX-DR-C-1010 Site Road Layout
- GWH-BMD-ZZ-XX-DR-C-1011 Access Road Upgrade Works
- GWH-BMD-ZZ-XX-DR-C-1012 Naas Road Footpath Realignment & Access Road Junction
- GWH-BMD-ZZ-XX-DR-C-1013 Camac Culvert Daylighting Structural Detail Sheet 1 of 2
- GWH-BMD-ZZ-XX-DR-C-1014 Camac Culvert Daylighting Structural Detail Sheet 2 of 2
- GWH-BMD-ZZ-XX-DR-C-1040 Autoroute Tracking – Refuse Vehicle & Fire Tender

- GWH-BMD-ZZ-XX-DR-C-1041 Autotroute Tracking – Private Car
- GWH-BMD-ZZ-XX-DR-C-1070 Land Proposed for Development
- GWH-BMD-ZZ-XX-DR-C-1121 Surface Water Long Sections
- GWH-BMD-ZZ-XX-DR-C-1122 Foul Water Long Sections
- GWH-BMD-ZZ-XX-DR-C-1150 Manhole S3.0 Connection to Culvert
- GWH-BMD-ZZ-XX-DR-C-12100 Roads Standard Details – Sheet 1
- GWH-BMD-ZZ-XX-DR-C-12101 Roads Standard Details – Sheet 2
- GWH-BMD-ZZ-XX-DR-C-12110 Footpath Standard Details – Sheet 1
- GWH-BMD-ZZ-XX-DR-C-12111 Footpath Standard Details – Sheet 2
- GWH-BMD-ZZ-XX-DR-C-12300 Permeable Paving Standard Details
- GWH-BMD-ZZ-XX-DR-C-12310 Soft & Hard Landscaping on Podium / Roof Areas Details
- GWH-BMD-ZZ-XX-DR-C-12320 SUDS Details – Bioretention & Tree Pits

1.4 TOPOGRAPHY

A topographical survey of the existing site was carried out by Murphy Geospatial. It was found that there is little variance in levels across the site, with the levels are generally between +38.9 and +39.50 mOD.

1.5 GROUND CONDITIONS

A detailed geotechnical and contamination site investigation has been carried out by Ground Investigations Ireland Ltd in April and May 2023. The typical sequence of stratigraphy is Fill / Overburden, overlying a sandy, gravelly clay layer overlying weak to medium weathered Rock. Further details of the ground conditions are included in section 2.2.
Refer to Appendix I for an extract from the report, or the full report is included in Appendix I of the Basement Impact Assessment report which is included with the planning application.

1.6 IRISH WATER

A Pre-Connection Enquiry (PCE) was submitted to Irish Water (Reference number CDS22007711). The application underwent the standard Irish Water internal procedure of checking the capacity of the Foul Network and Watermain network to which the site connects. A Confirmation of Feasibility letter was received from Irish Water on 30th November 2022 and is appended to this report. The proposed foul water connection from the site is feasible without system upgrades. However, the proposed water main connection will require the upgrade of 340m of existing 9" AC public main on the R112 road.

It is proposed that the foul drainage from the development will discharge into a new foul outfall manhole at the southeast boundary of the site. Flow from this manhole will discharge to the existing 1.350m diameter public sewer on the Carriglea Industrial Estate road to the south.

It is proposed to connect the watermain for the development to an existing 250mm diameter ductile iron main located along the south side of the Naas Road.

1.7 PRE-PLANNING MEETINGS

An LRD meeting was held with Dublin City Council on 20th June 2023.

A further discussion was held with DCC Transportation Planning on 27th July 2023 in relation to proposals for the Naas Road, upgrade works to the Access Road and the proposed pedestrian crossing of the Naas Road and Luas tracks. Subsequent to this meeting, there was ongoing email correspondence with the Transportation Planning Department in Dublin City Council in relation to the proposed road and pedestrian crossing layouts, ahead of the submission of the planning application.

A meeting was held on 1st August 2023 with Niamh Fitzgerald and Mary-Liz Walshe of DCC in relation to aspects of the drainage design and the proposed day-lighting of the Camac Culvert through the site.

2. SURFACE WATER MANAGEMENT REPORT

This report should be read in conjunction with the Barrett Mahony drainage drawings and details accompanying this report as part of the planning application, as outlined in section 1.3. Refer also to the accompanying Flood Risk Assessment Report for the development which concludes that the flood risk to the development is low.

We note also that the SuDS measures outlined in this report will be completed to DCC Taking-In-Charge standard in accordance with DCC Policy SI26.

2.1 SITE TOPOGRAPHY

A detailed topographical survey of the existing site was carried out by Murphy Geospatial and is included on drawing GWH-BMD-ZZ-XX-DR-C-1006. Overall, it was found that there is little variance in levels across the site, with the levels generally between +38.9 and +39.50 mOD. The site levels are summarised in Figure 2.1 below.

Figure 2.1: Summary of the Site Topography with Ordnance Datum Levels

2.2 GROUND CONDITIONS

A detailed geotechnical and contamination site investigation has been carried out by Ground Investigations Ireland Ltd (GII) in April and May 2023. Extracts from the final geotechnical investigation report, summarising the findings in the boreholes and trial pits, is contained in Appendix 1. The full geotechnical report is included in Appendix 1 of the BMCE Basement Impact Assessment Report which is included with the planning submission.

The typical sequence of stratigraphy is Fill / Overburden, overlying a sandy, gravelly clay layer overlying weak to medium weathered Rock. Each stratum is described below.

- Fill / Overburden - Made Ground: This comprises of brown / dark brown sandy gravelly clay with fragments of concrete, red brick, cobbles, varying in depth from 5.4m to 11.4m.

- Cohesive Deposits: This layer comprises brown / grey sandy gravelly Clay with frequent cobbles and boulders. It is noted that this layer was not present in all boreholes.

- Weathered Rock: The rotary core boreholes recovered weak to medium strong or medium strong dark grey very fine to fine grained thinly laminated Limestone, typical of the Calp Formation. The depth of rock varies from 9.1m BGL to a maximum of 14.5m BGL.

As noted in section 5.4 of the GII report 'Infiltration rates of f=5.974 x 10-5 m/s were calculated for the soakaway location AS02. At the location of SA09 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'.

2.3 EXISTING SURFACE WATER INFRASTRUCTURE

The Camac culvert runs through the site, entering at the northern boundary and exiting towards the Carriglea Residential development (under construction) to the southeast. The existing building on the site, along with the gullies serving the surface car park, connect to a local surface water system before discharging to the Camac culvert. Fig 2.2 below shows the arrangement of the existing drainage.

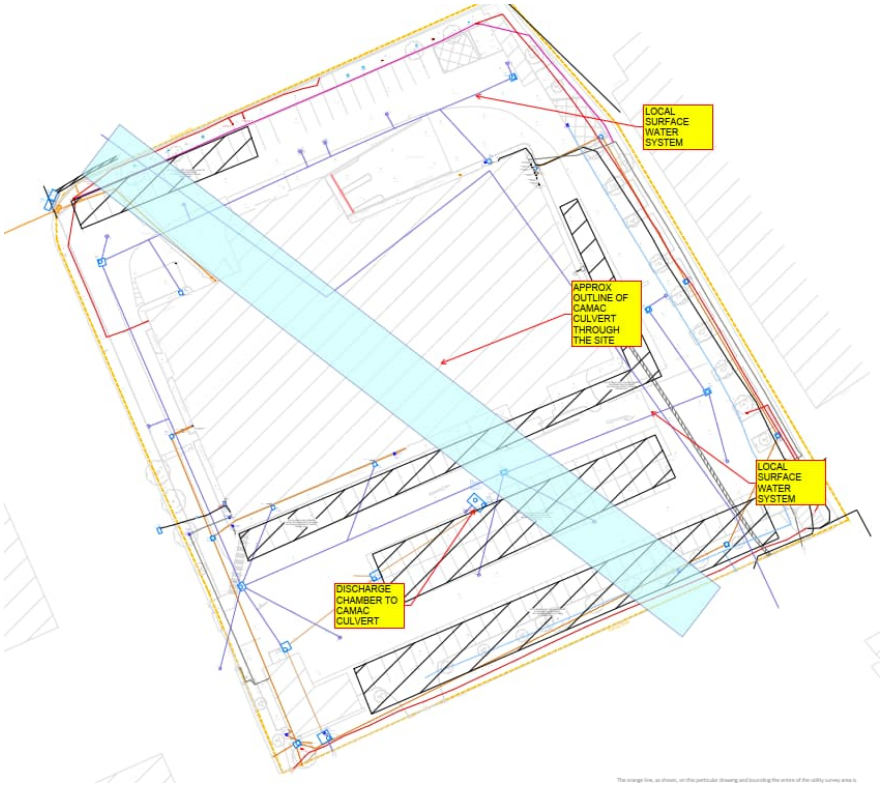


Figure 2.2: Utility Survey of Existing Surface Water Drainage

2.4 PROPOSED SURFACE WATER DRAINAGE SYSTEM

The proposed surface water drainage systems for the new development will be as follows:

- The development will be served by a new separate surface water gravity drainage system to collect runoff from the roof & paved areas.
- The proposed surface water network on site will connect to a new chamber to be constructed adjacent to the Camac culvert, on the west side of the site. Details of the proposed new chamber are included in the drawing GWH-BMD-ZZ-XX-DR-C-1150 which is included with the planning application.
- SuDS: The new buildings on site occupy approximately 36 % of the overall site footprint. At different levels, areas of blue or green roof will be provided over the roof areas outside of the roof level M&E plant compound. For the M&E plant area, a permeable paved finish will be installed over a drainage board, which will still facilitate the provision of interception storage in these areas.
- For the remainder of the site, permeable paving will be used for all pedestrian and non-trafficked hard surfaces. Where impermeable surfacing is proposed to facility heavy vehicle movements (e.g fire tender and refuse vehicles), recessed swale type features will be provided to discharge some of the water from these surfaces.
- A buried attenuation tank will be provided to the northwest corner of the site, to limit the surface water outflow from the site to 2 l/s for a 100-year storm + 20% climate change.
- All surface water drainage will be constructed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

2.5 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 x (0.01 x AREA)$^{0.89}$ x SAAR$^{1.17}$ x 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) Available from MET EIREANN: http://www.met.ie/climate/products03.asp. The rainfall data for the Irish Grid Coordinates closest to the site indicates a SAAR value of 708mm is appropriate.

For the site area of 0.96 ha, we propose a maximum surface water discharge rate of 2l/s for a 100-year storm + 20% climate change.

2.6 COMPLIANCE WITH THE PRINCIPLES OF THE CIRIA C573 SUDS MANUAL & THE 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 which will be the case here)

There are four main categories of benefits that can be achieved by SuDS as set out in the Ciria C753 the SuDS Manual:

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)

2.6.1 SuDS Measurement Selection

A blue or green roof will be provided over the majority of roof areas outside of the roof level M&E plant compound. For the M&E plant area, a permeable paved finish will be installed over a drainage board, which will still facilitate the provision of interception storage in these areas.

For the remainder of the site, permeable paving will be used for all pedestrian and non-trafficed hard surfaces. Where impermeable surfacing is proposed to facility heavy vehicle movements (e.g fire tender and refuse vehicles), recessed swale type features will be provided to discharge some of the water from these surfaces.

2.6.2 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. This ensures the two-stage treatment process.
The proposed SuDS management trains on this site are as follows:

- Type 1: Green/Blue Roof — Silt Trap — Attenuation Tank — Camac Culvert
- Type 2: Permeable Paving — Silt Trap — Attenuation Tank — Camac Culvert
- Type 2: Hard Landscaping — Swale — Attenuation Tank — Camac Culvert

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	
Pervious pavements	Y	Y		
Bioretention	Y	Y	Y	
Green roof	Y	Y		
Detention basin	Y	Y	Y	
Pond	[3]	Y[2]	Y	Y
Wetland	[3]	Y[2]	Y	Y
Infiltration system (soakaways/ trenches/ blankets/basins)	Y	Y	Y	Y
Attenuation storage tanks	Y[4]			
Proprietary treatment systems		Y[5]	Y[5]	Y[5]

Figure 2.3: Annotated mark-up of Table 26.7 from the CIRIA SuDS manual.

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 with rainfall percolating 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 of the rainfall percolating to the ground. To prevent this happening Criterion 1 requires that interception storage is provided so that the first 5mm of rainfall from the developed site is intercepted and retained on site thereby replicating the run-off characteristics of the pre-development greenfield site.

2.6.2.1 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 find its way to the receiving water.

In the case of the proposed development, interception storage will be provided to fully intercept surface water runoff. This will be an interception tray in the green roof build-up and beneath the M&E plant areas.

Table 1: Summary of Drained Areas

	Area Type	Area (m^2)
A	Gravel or open joint paved roof area*	1185
B	Intensive / Extensive Green Roof	1379
C	Intensive Green Roof on Blue Roof Storage	838
D = A+B+C	Total Roof	3402
E	Ground level external paving drained to the system	1658
F	Ground Level permeable paving	2173
G	Ground Level landscaping / swale areas	525
H	Riparian Area, incl Camac River	1864
F= D+E+F+G	Total Drained Area to Attenuation Tank	7758

* paved/gravel area with proprietary interception tray underlay.

Interception storage required = 7758m^2 x 5mm/1000 = 38.8 m^3

Interception storage for the proposed development will be provided in green roof and gravel/paved areas used a proprietary interception tray as shown on the typical SUDS details drawing accompanying this report. Permeable paving and swales will also be used to capture water as part of the interception approach. The typical details for these SUDS features are shown in figures 2.4 to 2.6 below.

The interception storage tray will provide storage at a rate of 10 l/m^2. It is also assumed that the permeable paving and landscaping features will store water at a rate of 10 l/m2, though these would typically be higher.

Interception storage provided = (3402 + 2173 + 525) x 10 /1000 = 61.0m^3 > 38.8m^3 required

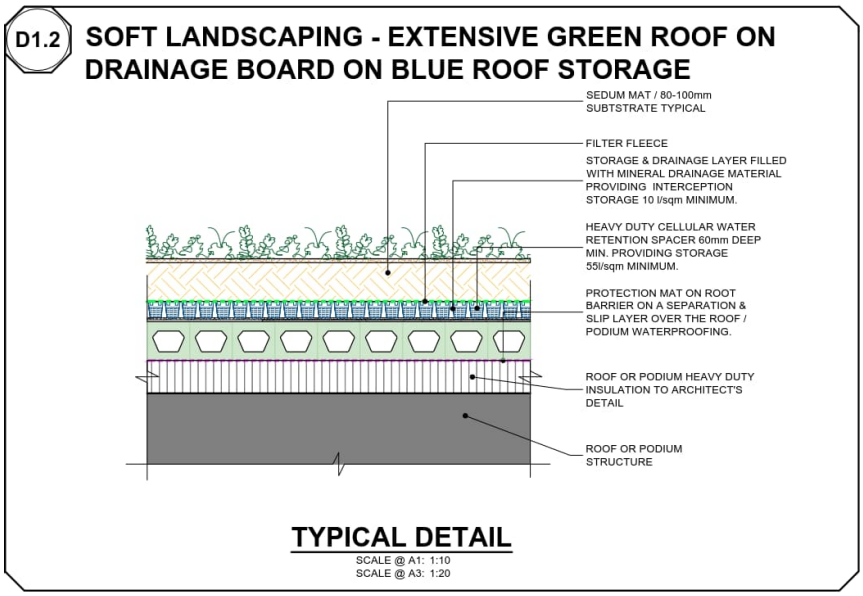


Figure 2.4: Extensive green/blue roof detail

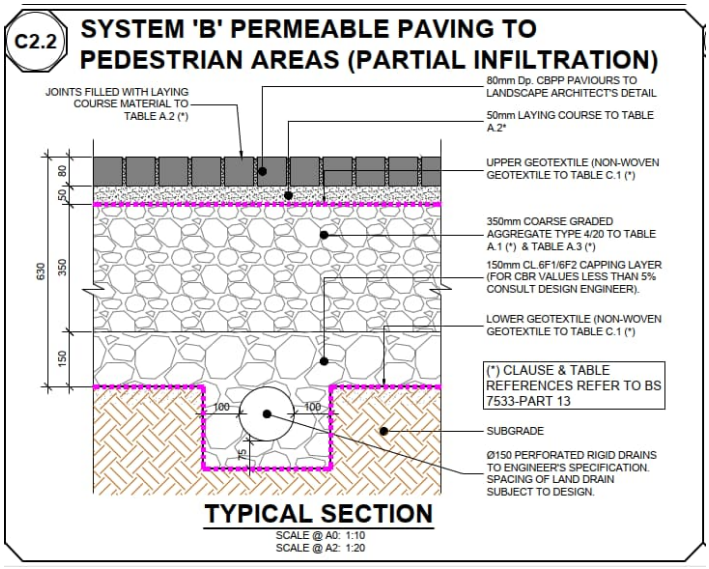


Figure 2.5: Permeable Paving detail

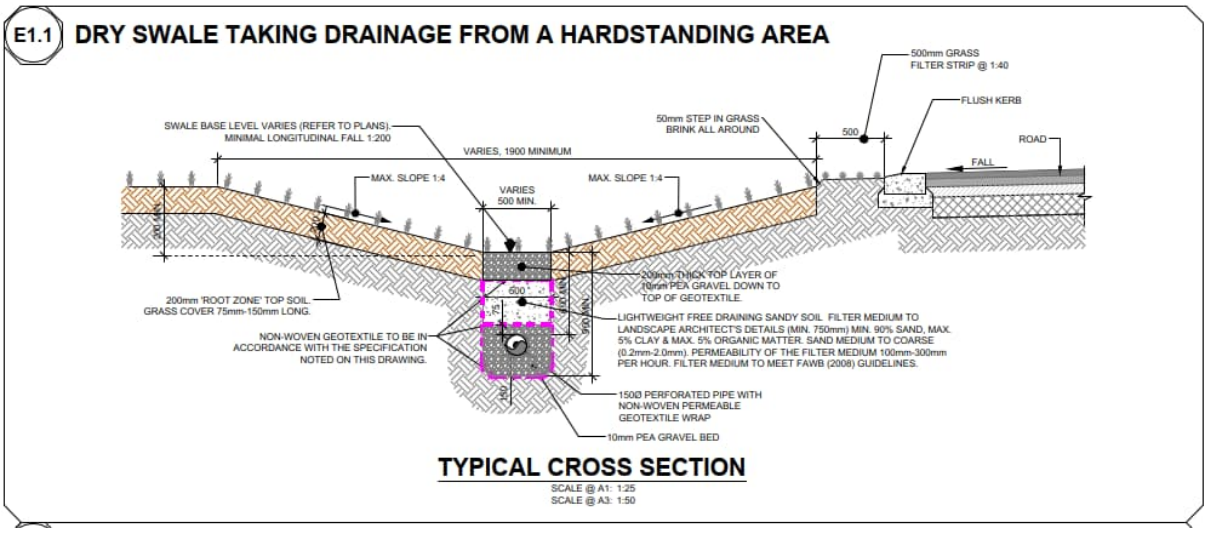


Figure 2.4: Swale detail

In terms of the provision of extensive or intensive green roofs to the development, the Dublin City Council development plan sets out the following requirements:

Type of green roof	Minimum coverage (% of total roof area being developed)
Extensive	70%
Intensive	50%

As indicated in Table 1 above, the area of green / blue roof provided is 1379 + 838 = 2217m^2 over the total roof area of 3402m^2, resulting in a total coverage of 65%. As the development combines a mix of extensive and intensive green roofs, it is considered that this is in compliance with the development plan requirements.

2.6.2.2 Attenuation Storage

Blue roof attenuation storage will attenuate rainwater at roof level. In total, 104m^3 of water will be attenuated through the provision of blue roof systems. Flow control devices will be provided on the outlets from the blue roofs to control the rate at which water will discharge off the roof down to the main surface water system. The outflows from the blue roofs on blocks 1 and 2 will be restricted to 13 l/s and 4.7 l/s respectively. Details of the proposed arrangement of the outlet from the blue roofs are shown on BMCE drawing GWH-BMD-ZZ-00-DR-C-12310.

Surface water from areas not attenuated by the blue roofs will drain down into the Aquacell attenuation tank before being discharged. While the DCC Development Plan would suggest that buried tank systems are not a preferred method for providing attenuation storage, the proposed development is quite restricted in terms of the available space for overland storage systems due to the proposal to open a 76m long section of the Camac culvert. The significant footprint required for the daylighting layout, as detailed in the drawings which accompany this application, combined with the requirement to provide an access route for servicing and fire tender vehicles around the development, has limited the potential for overground storage.

The attenuation tank will be provided beneath the open communal area at the northwest corner of the site to cater for a 1 in 100-year storm event plus 20% for climate change. Refer to Appendix II for the Flow calculations. The outflow from the attenuation tank will be controlled by a Hydrobrake

limited to 2.0 l/s max outflow and the tank storage volume is 480m^3, over a footprint of 391m^2. Tank details are provided on the engineering drawings accompanying this report.

2.6.2.3 Treatment Storage

In accordance with the GDSDS, interception storage & treatment storage are interchangeable. Since full interception storage has been provided, treatment storage is not required.

2.6.3 Criterion 3 GDSDS – Level of Service (Flooding) for the Site

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, therefore, be checked for such storms to ensure that no site flooding occurs. Although, partial surcharging of the system is allowed as long as 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. 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 following applies in the development:

- Pipework:. All buried drainage is designed not to surcharge for the 100-year event.
- Attenuation Tank: The 100yr storm level +20% in the tank at is 750mm approx. below ground floor slab level & footpath level i.e. >500mm.
- Basement Level: The lower ground floor level area toilets and showers are drained by a separate system that outfalls to a pump sump buried below the concrete slab as set out in Section 3.2 of this report. The drainage is pumped at high level to an outfall manhole and is not at risk of any backflow from the surface water system during storm conditions.

GDSDS Criterion 3 is therefore complied with.

2.6.4 Criterion 2 & 4 GDSDS – River Regime & 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. As discussed previously, the overall surface water drainage system has been designed to limit the surface water outflow from the site to 2 l/s for the 100 year storm + 20% climate change.

Criterion 4 the flood protection requirement is met by designing the system for a maximum outflow rate of 2.0 l/s.

3. CAMAC CULVERT DAYLIGHTING PROPOSAL

As part of the proposed development, it is proposed to reopen a section of the Camac culvert which runs through site from northwest to southeast. The existing culvert comprises a reinforced concrete pipe, approximately 5m in diameter, and at depths varying between 7.5 and 10m below the existing ground level (to the invert level of the culvert). The existing culvert commences approximately 360m north of the development site near Bluebell cemetery, crossing below the Naas Road, and extends through the adjacent Carriglea Residential Development, which is partly constructed. The culvert terminates at the boundary of the Carriglea Residential development, where the Camac then reverts to an open watercourse as it turns north through Lansdowne Valley and towards Inchicore.

It is proposed to reopen approximately 76m of the culvert as it passes through the site. It is proposed to maintain the lower concrete structure to the base and sides of the watercourse, but to remove the semi-circular roof and higher side walls. A planted riparian zone will be provided to both sides of the river channel, and concrete retaining walls will be provided to the outside of the riparian zone to provide flood protection to the proposed development. For further details of the permanent proposals for the daylighting, refer to the Stephen Diamond & Associates Landscaping drawings included with the planning application, along with BMCE drawings referenced in section 3.2 below.

3.1 SURVEYS

A visual survey of the culvert was carried out in 2020 as part of the adjacent Carriglea Residential Development, and submitted to Dublin City Council as part of the Planning Compliance process (Planning Reference ABP-311606-21). It was found that the concrete culvert is in very good condition, with no significant signs of deterioration of the structure. Figure 3.1 below shows a camera image from the survey carried out within the culvert.

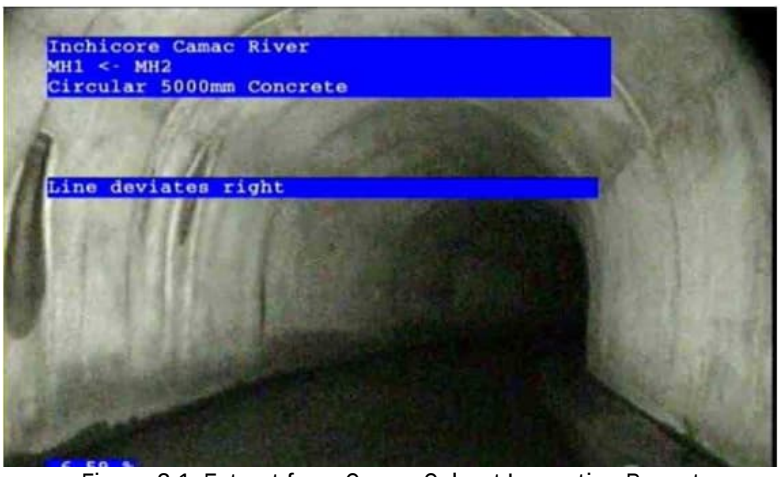


Figure 3.1: Extract from Camac Culvert Inspection Report

A separate level survey of the culvert was carried out by Lenmar Group to determine the existing profile of the culvert through the site. The level survey established the soffit levels and invert levels of the culvert at several points, as well as the cross-section profile of the pipe. Extracts from the Lenmar survey drawing are shown in Figures 3.2 and 3.3 below.

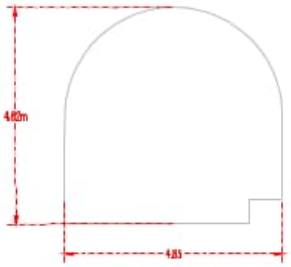


Figure 3.2: Cross Section Profile from the Lenmar survey drawing

Figure 3.3: Extract from Camac Culvert Level Survey

3.2 CHANNEL DESIGN

Once the profile of the existing culvert was established by means of the surveys noted in section 3.1 above, a hydraulic assessment of the flows in the culvert was prepared. The analysis was carried out using the HEC RAS water flow modelling software.

In terms of the storm water flows through the culvert, the following flow information has been taken from the CFRAMS study map for this location:

- For 10 % AEP Rainfall event, flow = 24.03 m^3/s.
- For 1 % AEP Rainfall event, flow = 36.1 m^3/s
- For 0.1 % AEP Rainfall event, flow = 47.69 m^3/s

[Note that the CFRAMS map is included in Appendix 2 of the Flood Risk Assessment report which is included with the planning application.]

It is not clear whether increased flows would need to be considered to allow for climate change increases. Conservatively, it has been assumed that a 20% increase in the storm flows needs to be allowed for, which results in the following design flows in the channel:

- For 10 % AEP Rainfall event, increased flow = 24.03 * 1.2 = 28.84m^3/s
- For 1 % AEP Rainfall event, increased flow = 36.1 m^3/s * 1.2 = 43.32m^3/s
- For 0.1 % AEP Rainfall event, increased flow = 47.69 m^3/s * 1.2 = 57.3m^3/s

In terms of the extents of the hydraulic model, it was considered that the impacts from the remaining culverted sections of the Camac river would need to be considered. As a result, the river was modelled for a length of 665m, from the entrance to the culvert at Bluebell cemetery to the end of the culvert as it reverts to an open watercourse at the boundary of the Carriglea Residential development. Figure 3.4 below shows the extent of the HEC RAS model which was prepared. The solid sections either side represent the culverted sections either side of the open channel through the site.

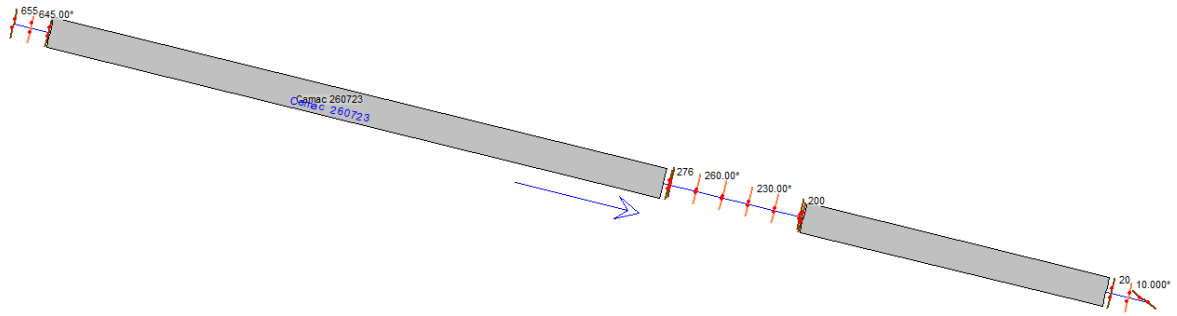


Figure 3.4: Extract from HEC RAS

For the design cross section of the open channel section through the site, consideration was given to the effects from the additional Bio-Engineering features which are proposed as part of the day-lighting works. While the existing concrete culvert is just under 5m wide, the river channel was reduced in line with the design proposals. Figure 3.5 below shows the typical cross section of the open channel.

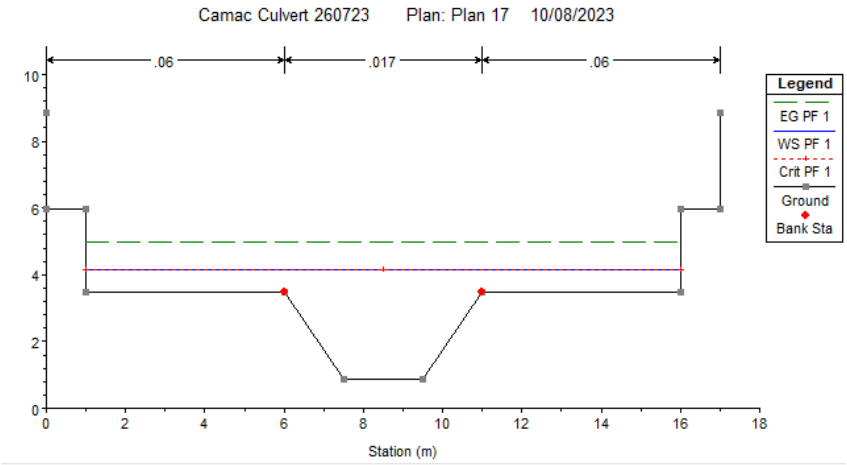


Figure 3.5: Typical Open Channel Section

Based on the HEC RAS analysis which was carried out, for the extreme 0.1% AEP storm event, the flood flows will rise to a level approximately 700 – 800mm above the riparian planting zone – see figure 3.6 below showing extract from the channel design. The approximate flood level will be +32.700 mOD.

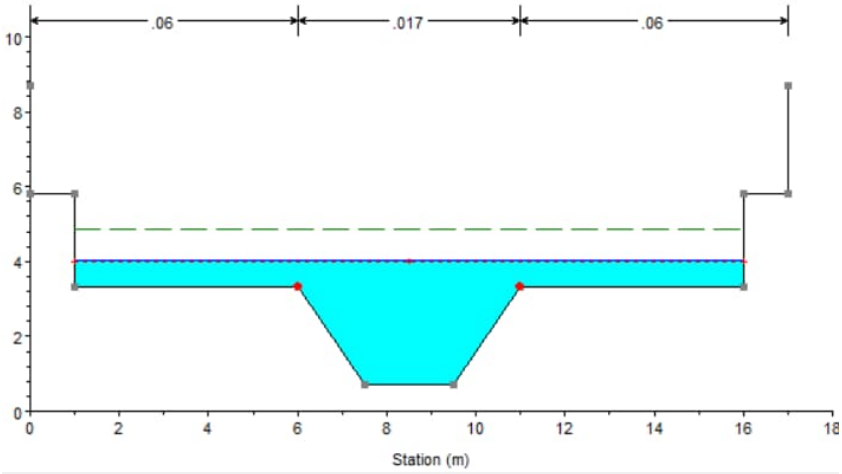


Figure 3.5: Channel Flow Design Level for 0.1% AEP storm event

The basement level for the new development is set at +35.100 mOD. Hence the 0.1% AEP flood event water level will still be 2.40m below the basement slab level.

3.3 Potential Blockage

Consideration was also given to a potential partial blockage of the downstream culvert, to determine if this would have a significant impact on the flood levels through the open channel. A further iteration of the channel flow design for the 0.1% AEP storm event was carried out, but with the width of the downstream culvert reduced by 1m to simulate a potential blockage of the culvert. This is effectively considering a 20% reduction in the cross section of the remaining culvert through the Carriglea residential development. It is considered that such a blockage would be highly unlikely given the size of the culvert.

In such a case, it was found that the water level in the channel rises to approximately 2m above the riparian zone, but critically the flood water is still contained within the channel – refer to Figure 3.6 below. A free-board of just under 1m remains between the basement floor level and the flood water level in such an event.

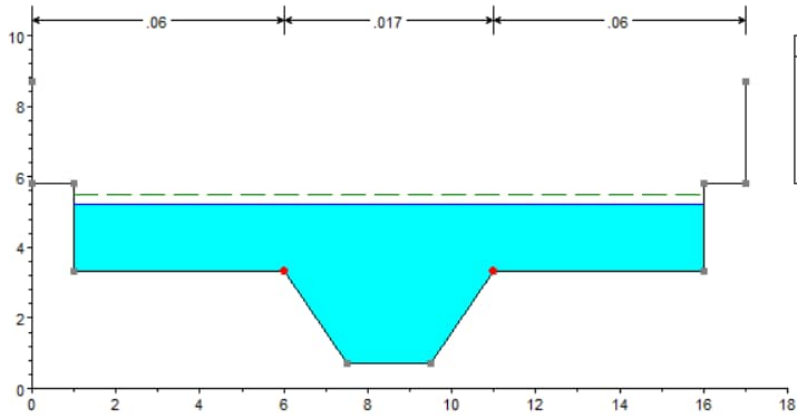


Figure 3.6: Channel Flow Design Level for 0.1% AEP storm event

3.4 SCREEN REQUIREMENTS

The requirement for a screen was considered in line with the guidance provided in the CIRIA document C786 – 'Culvert, Screen and Outfall Manual'. Chapter 4 of that document outlines the typical functions of the screen and general considerations that need to be taken in to account. The document notes that the 'onus is on the promoter and / or designer of a screen to demonstrate by calculation or description that the screen will actually reduce flood risk and / or improve overall safety.' The general commentary in the document would suggest that a screen should not be provided, unless there is a compelling reason for including one, that cannot be mitigated.

The reasons for typically providing a screen on a pipe or culvert are either as a method of preventing blockages of the culvert within the barrel of the culvert, or to act as a security screen to prevent unauthorised or accidental access to the culvert.

In relation to the proposed development, it is not considered that a screen would be needed as a method of preventing blockages. As confirmed by the surveys which were carried out, the culvert is between 4 and 5 metres wide, and of a similar height, so there is unlikely to be any significant blockages within the channel. The CIRIA document does note that 'Debris completely blocking a culvert barrel of more than a metre or so in height is relatively rare and is much less common than the same material blocking a screen'. So it is effectively noting that blockages are more likely to occur due to smaller debris by the introduction of a screen.

And in relation to unauthorised access, it is noted that access to the riparian area will be restricted to maintenance personnel only. The only means of access to the culvert level will be by means of a ladder which will be secure and controlled by the developments management.

In summary, based on the assessment carried out of the typical reasons for providing a screen at the inlet to a culvert, it is not proposed to include a screen as part of the daylighting proposals.

3.5 PROPOSED CONSTRUCTION METHODOLOGY

The preliminary Construction Methodology to execute the proposed daylighting of the culvert is indicated on Barrett Mahony drawings GWH-BMD-ZZ-XX-DR-C-1005, 1013 and 1014 which accompany this report.

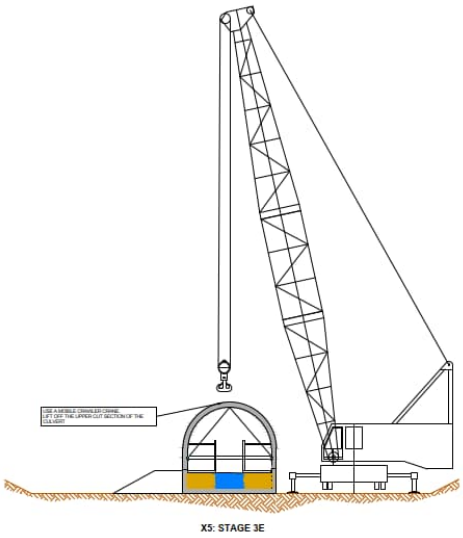


Figure 3.7: Extract from Camac Culvert Reopening Works drawings

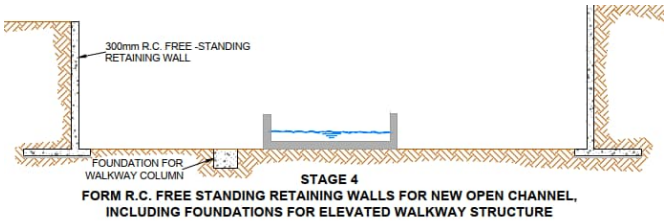


Figure 3.8: Extract from Camac Culvert Reopening Works drawings

It is proposed to remove the upper concrete section from the existing culvert. To carry out these works, it is proposed that the existing channel will be temporarily sand-bagged to restrict the flow in the culvert. This will allow a safe working platform to be constructed within the channel, to facilitate the demolition works. A temporary cover will be installed across the top of the river channel to prevent any dirt or debris from entering the water.

Steel bracing members and temporary propping will be installed within the channel to stabilize the concrete walls, after which the existing walls will be saw-cut in sections. A mobile crane will be used to lift off the sections of the culvert roof in a sequential process. New concrete retaining walls will be constructed to the sides of the river to form a new closed channel to contain any potential flood waters.

The new elevated walkway will be a combined timber and steel structure, constructed off new foundations which will be integrated with the concrete slab below the riparian planting.

4. FOUL DRAINAGE SYSTEM

4.1 EXISTING FOUL SEWER INFRASTRUCTURE

The Irish Water maps indicate that there are two existing public foul water sewers located in the Carriglea Industrial Estate Road to the west; a 1350mm sewer and a 225mm diameter sewer. Both of these sewers flow towards Drimnagh Castle to the south. Figure 4.1 below shows an extract from the Irish Water map. This is also included in Appendix III of this report

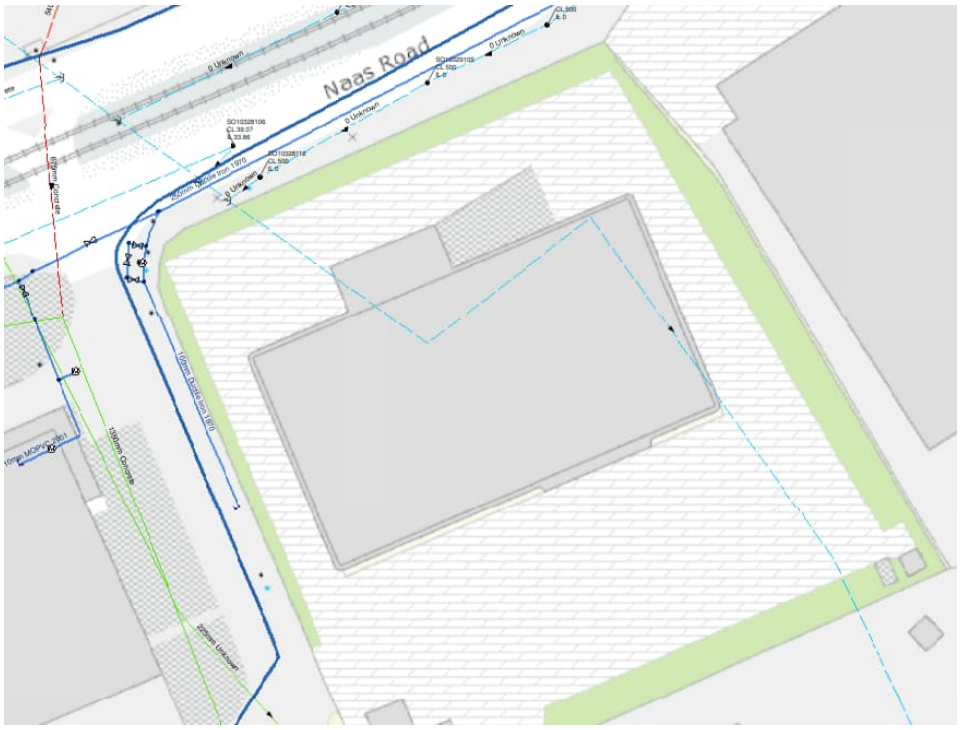


Figure 4.1: Extract from Irish Water Map

The underground utility survey which was carried out on the site indicates that the existing foul water drainage from the building flows to a chamber at the southwest corner of the site, where it then leaves the site to the west, presumably connecting to one of the existing sewers.

4.2 PROPOSED FOUL SEWER SYSTEM

It is proposed that the new foul drainage system for the student accommodation development will connect to the existing 1350mm foul sewer in the road to the west, as shown on Barrett Mahony drawing GWH-BMD-ZZ-XX-DR-C-1000. The foul drainage from the upper levels of the buildings will be collected in the new underground sewer system, all falling by gravity towards a discharge manhole at the southwest corner of the site.

A buried foul drainage network at lower ground floor level will take flows from showers and toilets at this level into a pump sump under the slab from where it will be pumped up to the gravity drainage system.

All works will be in accordance with Irish Water standard details. A Confirmation of Feasibility has been received from Irish Water in relation to this application and can be found in Appendix IV. No upgrades to the wastewater sewer system are requested.

The foul effluent from the proposed development is calculated in accordance with the Irish Water Code of Practice for Wastewater Infrastructure (Dec 2017). The Dry Weather Flow (DWF) has been increased by 10% to account for infiltration.

Total Estimated Wastewater Discharge:

The estimated wastewater discharge for the various uses is as follows:

- Student Accommodation Residences
  941 # Student Bed Spaces * 150 l/p/day = 141,150 l / day

- Retail Space
  (250m^2 / 18) * 50 l/p/day = 694 l/day

- Cultural / Community Space
  (1422m^2 / 12) * 50 l/p/day = 5925 l/day

- Student Amenity Space
  (4027m^2 / 12) * 50 l/p/day = 16,780 l/day
  [Note: Re space assumes 1 person per 18m^2; Cultural / Community and Student Amenity Spaces assumes 1 person per 12m^2. 50 l/p/day allowed for each of these spaces]

Total Daily Flow = 164,549 l/day * 1.1 = 181,004 l/day

Total Average Flow = 181004 / (24 * 60 * 60) = 2.09 l/s

Total Peak Flow = 13 l/s

Foul Sewer Network Pipe Sizes

The outfall pipe from the building will be a 225mm diameter pipe. The 225mm diameter pipe has a capacity of 37.95 l/s at the minimum fall of 1:150, the total peak flow is 13 l/s.

5. WATER SUPPLY SYSTEM

5.1 EXISTING WATER SUPPLY INFRASTRUCTURE

The existing building is currently served by a 250mm diameter ductile iron watermain on the south side of the Naas Road. Details of the existing public water mains are shown on the Irish Water Map extract in Figure 2.1.

5.2 PROPOSED WATER SUPPLY SYSTEM

It is proposed that the new student accommodation development will connect via a new 200mm diameter connecting main into the existing 250mm diameter ductile iron watermain on the south side of the Naas Road.

As part of the Confirmation of Feasbility, Irish Water noted that the proposed water main connection will require the upgrade of 340m of existing 9" AC public main on the R112 road.

All works will be in accordance with Irish Water standard details. A Confirmation of Feasibility has been received from Irish Water in relation to this application and can be found in Appendix IV. No upgrades to the public watermain system are requested.

The water demand for the proposed development has been calculated in accordance with the Irish Water Code of Practice for Water Infrastructure July 2020 (Revision 2). Occupancy figures are as calculated previously in section 4.2

The Water Demand calculations are summarized below.

Total Estimated Water Demand:

Total Daily Demand = 164,549 l /day

Total Average Demand = 1.90 l/s

Total Peak Demand = 11.9 l/s

6. ROADS ENGINEERING

6.1 EXISTING ACCESS

There is one existing entrance to the site located at the southwest corner and accessed from the Carriglea Industrial Estate Road. This road is accessed off the Naas Road via a signalized junction.

6.2 PROPOSED ACCESS

It is proposed that the access point at the southwest corner of the site will be maintained to cater for all vehicular traffic associated with the proposed development, though it is not envisaged that there will be a significant quantum of vehicular traffic. 7 No. car spaces are being provided, and these will cater for the student residential, commercial retail and cultural / community areas. The car parking provision is discussed further in the separate Residential Travel Plan report submitted with this application.

It is proposed that pedestrians accessing or leaving the site will be permitted to enter or exit directly onto the Naas Road footpath to the northwest, providing good connectivity to the surrounding areas. Connectivity will also be provided through the adjacent Carriglea Residential Development, facilitating pedestrians travelling southeast towards Drimnagh Castle. It is proposed to realign the existing footpath along the outbound carriage of the Naas Road, to provide a continuous, unimpeded 2m wide path for pedestrians. The realignment is proposed to cater for a potential future cycle lane along the Naas Road, as part of the Naas Road – Inchicore Active Travel Route. A new signalized pedestrian crossing of the access road at the junction with the Naas Road is proposed, similar to the crossing which was permitted as part of the Concorde SHD development planning application.

Following discussions with Dublin City Council Transportation Planning, it is proposed that cyclists will enter the site from the access road to the west of the development, via the main junction with the Naas Road. New cycle lanes will be provided in both directions along the access road. A new cyclist waiting area will be provided at the junction with the Naas Road for cyclists wishing to turn right or left. A Smart Micro Detection System will be provided at the junction to prevent excessive waiting times for cyclists planning to join the Naas Road.

As per DMURS Guidelines, any new kerb radii will be designed to 4.5m and the entrance road carriageway will be limited to 6m wide and the proposed pedestrian footways will be a minimum of 1.8m wide. A shared surface 'homezone' is proposed for a section of the access road along the east of the development.

Fire tender vehicles needing to access the development will do so from the main access point. The fire tender will travel along the access road at the south of the development, along the eastern boundary and then down to the main plaza area to manouevre back the way it came. Removable bollards are proposed to provide the fire tender route around this route, while restricting access for private vehicles.

Two set down areas are being provided as part of the development. The first is located alongside the commercial space to the west. The second set-down area will be provided within the development. These areas will be controlled by the management company for the development. During periods of heavier traffic, e.g. at start of term, it is considered that the bin staging area will be available to use as a temporary set-down area.

Note that the servicing strategy for the development is outlined in the AWN report which accompanies the planning application.

6.3 Proposed New Pedestrian Crossing of Naas Road and Luas Tracks

As part of the development, it is proposed to construct a new pedestrian crossing of the Naas Road and Luas Tracks. This will involve new signal-controlled crossings of the inbound and outbound carriageways of the Naas Road, and an uncontrolled crossing of the Luas tracks, all with the appropriate facilities for vulnerable road users.

The new crossing will facilitate residents of the proposed development who will be looking to utilise public transport from the north side of the Naas Road. It will also provide better pedestrian linkages for residents to travelling north from the development.

As the works proposed to the construct the new pedestrian crossing are outside our clients site curtilage, a Letter of Consent has been obtained from Dublin City Council for carrying out these works. The Letter of Consent is included in Appendix V of the report.

6.4 Vehicle Tracking

Vehicle tracking for standard cars, for refuse vehicles and for fire tenders has been carried out to demonstrate that all required vehicles can manoeuvre satisfactorily within the development. The tracking details are included on drawings GWH-BMD-ZZ-XX-DR-C-1040 and GWH-BMD-ZZ-XX-DR-C-1041 which are included with the planning application.

6.5 Traffic & Transportation

For details of the Traffic and Transportation impacts of the development, refer to the Traffic Assessment report which has been submitted with the planning application.

6.6 Mobility Management

For details of the Mobility Management aspects of the development, refer to the Residential Travel Plan report which has been submitted with the planning application.

6.7 Road Safety Audit

A Stage 1 Road Safety Audit was carried out by Peter Monahan Consulting Engineers, and is included with the planning application. The issues raised in the report have all been addressed in the final site layouts.

6.8 Walking & Cycling Audits

Walking & Cycling Audits were carried out by Peter Monahan Consulting Engineers, and are included with the planning application. The issues raised in the reports have all been addressed in the final site layouts.

BARRETT MAHONY
CIVIL & STRUCTURAL
CONSULTING ENGINEERS

APPENDIX

I

SI Report Extract

Ground Investigations Ireland Ltd
www.gii.ie

Site Gowan Motors Site Naas Road			**Borehole Number** RC02
Machine : Beretta T44 **Flush :** Water **Core Dia :** 96 mm **Method :** Rotary Cored	**Casing Diameter** 100mm cased to 14.90m	**Ground Level (mOD)**	**Client** Hollybrook Homes Ltd	**Job Number** 12689-03-23
	Location	**Dates** 08/05/2023	**Engineer** Barrett Mahony	**Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00											
	20						(2.30)	Drillers notes: Tarmac, gravelly Fill and Concrete. Recovery consists of: MADE GROUND: Dark grey slightly sandy very gravelly Clay with low cobbles, tarmac and concrete. Gravel is subangular to angular fine to coarse. (RC02 carried out adjacent to BH02, see BH02 for further description)			
2.30							2.30				
	12							Drillers notes: Gravelly Fill. Recovery consists of: MADE GROUND: Brown slightly sandy gravelly Clay with concrete and styrofoam. Gravel is subangular to angular fine to coarse. (RC02 carried out adjacent to BH02, see BH02 for further description)			
3.80											
	5						(4.10)				
5.30											
	10										
6.80							6.40	Drillers notes: Gravelly Fill. Recovery consists of: MADE GROUND: Brown slightly sandy gravelly Clay with concrete and styrofoam. Gravel is subangular to angular fine to coarse.			
	8						(1.90)				
8.30							8.30	Drillers notes: Brownish grey boulder Clay. Recovery consists of: Greyish brown slightly sandy gravelly CLAY with medium cobbles. Gravel is subangular to subrounded fine to coarse.			
	35						(1.50)				
9.80					18,17/18,22,10		9.80				
9.80-10.25					SPT(C) N=50			Drillers notes: Black boulder Clay. Recovery			

Remarks
Rotary coring techniques carried out to 14.90m BGL.
RC02 carried out adjacent to BH02.
Standpipe installed in borehole upon completion.
Slotted standpipe with gravel surround from 14.90m BGL to 1.0m BGL, plain standpipe with gravel surround from 1.0m BGL to GL complete with flush cover.

Scale (approx)	Logged By
1:50	LM

Figure No. 12689-03-23.RC02

Ground Investigations Ireland Ltd
www.gii.ie

Site Gowan Motors Site Naas Road			**Borehole Number** RC02
Machine : Beretta T44 **Flush :** Water **Core Dia :** 96 mm **Method :** Rotary Cored	**Casing Diameter** 100mm cased to 14.90m	**Ground Level (mOD)**	**Client** Hollybrook Homes Ltd	**Job Number** 12689-03-23
	Location	**Dates** 08/05/2023	**Engineer** Barrett Mahony	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	57						(1.85)	consists of: Dark grey slightly sandy gravelly CLAY with medium cobbles. Gravel is subangular to subrounded fine to coarse. (Very stiff)			
11.30 11.30-11.75	74				19,21/50 SPT(C) N=50		11.65				
11.65	100	65	37	20				Strong dark grey thinly laminated fine grained argillaceous LIMESTONE, slightly to partially weathered interbedded with moderately weak to weak dark grey thinly bedded fine grained calcareous MUDSTONE, moderately weathered to destructed with occasional calcite veining. 11.78m to 11.80m BGL: Clay band 11.65m to 12.80m BGL: Sequence consists of 2 fracture sets: F1: Very close to closely spaced fractures, dipping 05-15 degrees, planar smooth with occasional clay smearing. F2: Medium to closely spaced fractures, dipping 70-80 degrees, planar smooth with occasional clay smearing. 12.62m to 12.66m BGL: Clay band 12.80m to 13.08m BGL: Clay band			
12.80				NI							
13.20	93	54	36	9			(3.25)				
14.30	100	65	17	13				13.20m to 14.90m BGL: Sequence consists of 2 fracture sets: F1: Very close to closely spaced fractures, dipping 05-15 degrees, planar smooth with occasional clay smearing. F2: Medium to closely spaced fractures, dipping 70-80 degrees, planar smooth with occasional clay smearing. 14.12m to 14.44m BGL: Clay band			
14.90							14.90	Complete at 14.90m			

Remarks

Scale (approx)	Logged By
1:50	LM

Figure No. 12689-03-23.RC02

Ground Investigations Ireland Ltd
www.gii.ie

Site Gowan Motors Site Naas Road			**Borehole Number** BH01
Machine : Dando 2000 and Beretta T44 **Method :** Cable Percussion with rotary core follow-on	**Casing Diameter** 200mm cased to 7.60m 100mm cased to 12.40m	**Ground Level (mOD)**	**Client** Hollybrook Homes Ltd	**Job Number** 12689-03-23
	Location	**Dates** 08/05/2023-09/05/2023	**Engineer** Barrett Mahony	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.20) 0.20	TARMACADAM			
0.50	B1						MADE GROUND: Dark brownish grey slightly sandy gravelly Clay with low rootlets, red brick, concrete and metal fragments.			
1.00-1.45 1.00	SPT(C) N=8 B2			1,1/2,2,2,2						
2.00-2.45 2.00	SPT(C) N=9 B3			1,2/2,2,2,3						
3.00-3.45 3.00	SPT(C) N=9 B4			2,1/2,2,3,2		(5.80)				
4.00-4.45 4.00	SPT(C) N=8 B5			2,2/2,2,2,2						
5.00-5.45 5.00	SPT(C) N=10 B6			2,3/2,3,3,2						
6.00-6.45 6.00	SPT(C) N=13 B7			2,3/3,3,4,3		6.00	POSSIBLE MADE GROUND: Brown slightly gravelly Clay.			
7.00-7.45 7.00	SPT(C) N=50 B8			2,4/10,40		(1.30)				
	TCR / **SCR** / **RQD** / **FI**					7.30	Recovery consists of: Brownish grey to dark grey slightly gravelly CLAY. Gravels are medium to coarse subangular to subrounded. (Very stiff)			
7.60	45					(0.83)				
8.13	100 / 6 / 0					8.13	Very strong to strong dark grey thinly laminated fine grained argillaceous LIMESTONE, slightly weathered interbedded with moderately weak to weak dark grey thinly bedded fine grained calcareous MUDSTONE, highly weathered to destructed with occasional calcite veining and rare pyrite mineralisation.			
8.30	83 / 45 / 19 / 20						8.13m to 9.80m BGL: Sequence consists of closely spaced fractures, dipping 20-30 degrees, planar smooth with occasional clay smearing.			
9.80							9.70m to 9.80m BGL: Clay band			

Remarks
Cable percussive techniques carried out to 7.60m BGL with rotary core follow-on to 12.40m BGL.
Standpipe installed in borehole upon completion.
Slotted standpipe with gravel surround from 12.40m BGL to 1.0m BGL, plain standpipe with gravel surround from 1.0m BGL to GL complete with flush cover.
Chiselling from 7.30m to 7.60m for 1 hour.

Scale (approx)	**Logged By**
1:50	LM

Figure No. 12689-03-23.BH01

Ground Investigations Ireland Ltd
www.gii.ie

Site Gowan Motors Site Naas Road			**Borehole Number** BH01
Machine : Dando 2000 and Beretta T44 **Flush :** Water **Core Dia :** 96 mm **Method :** Cable Percussion with rotary core follow-on	**Casing Diameter** 200mm cased to 7.60m 100mm cased to 12.40m	**Ground Level (mOD)**	**Client** Hollybrook Homes Ltd	**Job Number** 12689-03-23
	Location	**Dates** 08/05/2023-09/05/2023	**Engineer** Barrett Mahony	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	100	78	39	11			(4.27)	9.80m to 11.0m BGL: Sequence consists of medium to closley spaced fractures, dipping 0-10 degrees, planar smooth with occasional clay smearing.			
11.00				NI							
11.30 11.35	100	51	63	7				11.0m to 11.35m BGL: Non-intact with clay bands 11.67m to 11.74m BGL: Clay band 11.94m BGL: Pyrite mineralisation 11.0m to 12.40m BGL: Sequence contains 2 fracture sets: F1: Medium to closley spaced fractures, dipping 0-10 degrees, planar smooth with occasional clay smearing. F2: Medium to closely spaced fractures, dipping 60-70 degrees, planar smooth with occasional clay smearing.			
12.40							12.40	Complete at 12.40m			

Remarks

Scale (approx)	Logged By
1:50	LM

Figure No. 12689-03-23.BH01

Ground Investigations Ireland Ltd
www.gii.ie

Site Gowan Motors Site Naas Road			**Borehole Number** BH02
Machine : Dando 2000 **Method :** Cable Cable Percussion	**Casing Diameter** 200mm cased to 6.40m	**Ground Level (mOD)**	**Client** Hollybrook Homes Ltd	**Job Number** 12689-03-23
	Location	**Dates** 09/05/2023	**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
						(0.20) 0.20	TARMACADAM		
0.50	B1					(0.60) 0.80	MADE GROUND: Dark grey clayey slightly sandy subangular to angular fine to coarse Gravel.		
1.00-1.45 1.00	SPT(C) N=7 B2			1,1/1,2,2,2			MADE GROUND: Dark grey to greyish brown sandy gravelly Clay with low plastic concrete and red brick fragments. Gravel is subrounded to angular fine to coarse.		
2.00-2.45 2.00	SPT(C) N=8 B3			1,2/2,2,2,2		(2.20)			
3.00-3.45 3.00	SPT(C) N=8 B4			1,1/1,2,3,2		3.00	MADE GROUND: Brown sandy gravelly Clay with low subangular cobbles, plastic and red brick fragments. Gravel is rounded to angular fine to coarse.		
4.00-4.45 4.00	SPT(C) N=10 B5			2,2/2,3,3,2		(2.80)			▼1
5.00-5.45 5.00	SPT(C) N=8 B6			2,3/2,2,2,2 Water strike(1) at 5.20m, rose to 4.70m in 20 mins.					▽1
6.00-6.45 6.00	SPT(C) N=50 B7			14,3/9,10,31		5.80 (0.60) 6.40	POSSIBLE MADE GROUND: Greyish brown slightly sandy gravelly Clay with low subrounded cobbles. Gravel is rounded to angular fine to coarse.		
							Complete at 6.40m		

Remarks
Cable percussive techniques carried out to 6.40m BGL.
Groundwater encountered at 5.20m BGL.
BH02 carried out adjacent to RC02.
Chiselling from 6.40m to 6.70m for 1 hour.

Scale (approx)	Logged By
1:50	LM

Figure No. 12689-03-23.BH01

Ground Investigations Ireland Ltd
www.gii.ie

Site Gowan Motors Site Naas Road			**Borehole Number** BH03
Machine : Dando 2000 and Beretta T44 **Method :** Cable Percussion with rotary core follow-on	**Casing Diameter** 200mm cased to 10.00m 100mm cased to 16.60m	**Ground Level (mOD)**	**Client** Hollybrook Homes Ltd	**Job Number** 12689-03-23
	Location	**Dates** 08/05/2023	**Engineer** Barrett Mahony	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.20) 0.20	TARMACADAM		
0.50	B1						MADE GROUND: Dark grey slightly clayey slightly sandy angular to subangular fine to coarse Gravel.		
1.00-1.45 1.00	SPT(C) N=8 B2			1,2/2,2,2,2		(2.10)			▼1
2.00-2.45 2.00	SPT(C) N=9 B3			2,2/2,3,2,2		2.30	MADE GROUND: Brown sandy very gravelly CLAY with low red brick fragments.		
				Water strike(1) at 2.70m, rose to 1.50m in 20 mins.		(0.70)			▽1
3.00 3.00-3.45	B4 SPT(C) N=11			2,3/4,2,2,3		3.00	POSSIBLE MADE GROUND: Brown sandy gravelly CLAY with low cobbles. Gravels are subangular to rounded fine to coarse.		
4.00-4.45 4.00	SPT(C) N=10 B5			2,3/3,2,2,3		(3.00)			
5.00-5.45 5.00	SPT(C) N=12 B6			2,3/3,3,3,3					
6.00-6.45 6.00	SPT(C) N=10 B7			2,2/2,2,3,3		6.00	Firm dark grey slightly sandy slightly gravelly CLAY/SILT. Gravels are subangular to rounded fine to coarse.		
7.00-7.45 7.00	SPT(C) N=11 B8			2,3/3,3,3,2		(2.00)			
8.00-8.45 8.00	SPT(C) N=11 B9			2,2/3,3,2,3		8.00	Medium dense dark grey clayey slightly sandy subangular to rounded fine to coarse GRAVEL with high subrounded to subangular cobbles.		
						(1.00)			
9.00-9.45 9.00	SPT(C) N=50 B10			8,11/13,17,19,1		9.00	Dense dark grey clayey slightly sandy subangular to rounded fine to coarse GRAVEL with high subrounded to subangular cobbles.		
						(1.00)			
10.00									

Remarks
Cable percussive techniques carried out to 7.60m BGL with rotary core follow-on to 16.6m BGL.
Groundwater encountered at 2.70m BGL.

Scale (approx)	Logged By
1:50	LM

Figure No. 12689-03-23.BH01

Ground Investigations Ireland Ltd
www.gii.ie

Site Gowan Motors Site Naas Road			**Borehole Number** BH03
Machine : Dando 2000 and Beretta T44 **Flush :** Water **Core Dia :** 96 mm **Method :** Cable Percussion with rotary core follow-on	**Casing Diameter** 200mm cased to 10.00m 100mm cased to 16.60m **Location**	**Ground Level (mOD)** **Dates** 08/05/2023	**Client** Hollybrook Homes Ltd **Engineer** Barrett Mahony	**Job Number** 12689-03-23 **Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00					B11					
10.00-10.45	28				SPT(C) N=50 9,14/15,19,16		10.00	Recovery consists of: Dark grey clayey slightly sandy subrounded to angular fine to coarse GRAVEL with low cobbles.		
11.30-11.45					10,19/50 SPT(C) 50/0		(2.80)			
11.30	56									
12.80-12.88					50/50 SPT(C) 50*/75 50/0		12.80			
12.80	49						(0.74)	Recovery consists of: Dark grey slightly sandy gravelly CLAY. Gravels are subangular to angular fine to coarse. (Very stiff)		
13.54	100	51	18	15			13.54	Strong dark grey thinly laminated fine grained argillaceous LIMESTONE, moderately weathered interbedded with moderately weak dark grey thinly bedded fine grained calcareous MUDSTONE, highly to distinctly weathered with occasional calcite veining. 13.54m to 14.59m BGL: Sequence consists of closely spaced fractures, dipping 20-40 degrees, planar smooth.		
14.30										
14.59				NI			(2.29)	14.49m to 14.80m BGL: Non-intact		
14.80	100	37	27	13				14.94m to 14.97m BGL: Clay band 14.80m to 15.80m BGL: Sequence consists of 2 fracture sets: F1: Medium to closely spaced fractures, dipping 05-15 degrees, planar smooth with occasional clay smearing. F2: Medium spaced fractures, dipping 80-90 degrees, planar to undulating smooth with occasional clay smearing.		
15.80	73	36	8	20			15.83 (0.77)	Weak dark grey thinly bedded fine grained calcareous MUDSTONE, highly weathered to destructed with occasional calcite veining and rare pyrite mineralisation. 15.80m to 16.60m BGL: Sequence consists of very close to closely spaced fractures, dipping 0-10 degrees, planar smooth with occasional clay smearing. 16.15m BGL: Pyrite mineralisation 16.20m to 16.24m BGL: Clay band		
16.60							16.60	Complete at 16.60m		

Remarks

Scale (approx)	Logged By
1:50	LM

Figure No. 12689-03-23.BH01

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	SA02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	3.10m x 0.60m x 3.30m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 20/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.30)	MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill		
					0.40			
0.70-1.60	B1				(0.50)	MADE GROUND: Dark brown to black silty sandy gravelly Clay with cobbles and fragments of concrete and plastic.		
					0.90			
1.90	B2				(2.40)	MADE GROUND: Dark greyish brown silty sandy clayey Gravel with cobbles boulders and fragments of plastic, metal tie straps, tar and wood		
3.20	B3				3.30	Complete at 3.30m		

Plan

Remarks

No groundwater encountered.
Spalling sidewalls below 2.50m.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.SA02

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	SA09

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.70m x 0.60m x 1.90m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 20/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.50) 0.60	MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill with some rootlets		
0.60-1.50	B1				(0.90) 1.50	MADE GROUND: Brown sandy slightly clayey Gravel with some rootlets and subangular to subrounded cobbles, concrete blocks, plastic and metal. Gravel is fine to coarse subangular to subrounded.		
1.70	B2				(0.30) 1.80	Firm to stiff light brown sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
1.90	B3				(0.10) 1.90	Stiff grey sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
						Complete at 1.90m		

Plan

Remarks

No groundwater encountered.
Some spalling on sidewalls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP09

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.60m x 0.80m x 2.60m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 20/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.30) 0.40	MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill		
0.60-1.20	B1				(2.20)	MADE GROUND: Dark grey clayey sandy Gravel with cobbles and fragments of red brick and plastic. Gravel is fine to coarse subangular to subrounded.		
1.90	B2							
2.50	B3				2.60	Complete at 2.60m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Obstruction at 2.60m, possible rock or boulders.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP01

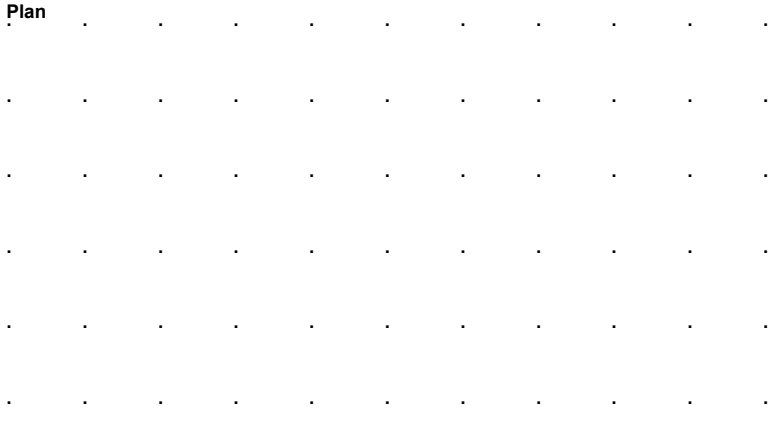
Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	3.10m x 0.60m x 3.30m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 20/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.30)	MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill		
					0.40			
					(0.50)	MADE GROUND: Dark brown to black silty sandy gravelly Clay with cobbles and fragments of concrete and plastic.		
0.70-1.60	B1							
					0.90			
1.90	B2				(2.40)	MADE GROUND: Dark greyish brown silty sandy clayey Gravel with cobbles boulders and fragments of plastic, metal tie straps, tar and wood		
3.20	B3				3.30	Complete at 3.30m		

Plan



Remarks

No groundwater encountered.
Spalling sidewalls below 2.50m.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP02

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.60m x 0.80m x 2.70m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 20/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.70) 0.80	MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill with fragmnets of metal rebar and plastic		
0.80-1.20	B1				(0.40) 1.20	MADE GROUND: Brown slightly sandy silty clayey Gravel with cobbles. Gravel is fine to coarse subangular to subrounded.		
1.50	B2				(0.50) 1.70	MADE GROUND: Brown mottled black gravelly Clay. Gravel is fine to coarse subangular to subrounded.		
2.40	B3				(1.00) 2.70	MADE GROUND: Brown slightly gravelly Clay with wood and plastic pipe fragments. Gravel is fine to coarse subangular to subrounded.		
2.70	B4					Complete at 2.70m		

Plan

Remarks

No groundwater encountered.
Slight spalling on sidewalls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP03

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	3.00m x 0.70m x 3.40m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 20/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
						MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill		
					(0.60) 0.70			
						MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill with fragments of tar, red brick and large concrete block pillars with metal rebar and wire.		
1.10	B1				(0.80) 1.50			
1.50	B2					MADE GROUND: Light brown silty sandy gravelly Clay with subangular to subrounded cobbles and fragments of red brick, plastic and tar. Gravel is fine to coarse subangular to subrounded.		
1.90	B3				(0.40) 1.90			
						MADE GROUND: Yellowish brown mottled black slightly silty slightly sandy gravelly Clay with occasional subrounded cobbles and fragments of red brick, plastic and tar. Gravel is fine to coarse subangular to subrounded.		
3.20	B4				(1.50) 3.40			
						Complete at 3.40m		

Plan

Remarks

No groundwater encountered.
Some spalling on sidewalls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP04

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.80m x 0.80m x 3.00m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 19/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.30) 0.40	MADE GROUND: Grey to dark grey slightly clayey slightly sandy Gravel with occasional subangular cobbles and fragments of brick, plastic and concrete. Gravel is fine to coarse angular to subangular.		
0.50	B1					MADE GROUND: Light brown to greyish brown sandy slightly gravelly Clay with roots and many subangular to subrounded cobbles and fragments of brick, metal and glass.		
1.00	B2				(1.40)			
					1.80	Stiff grey brown to brown slightly sandy slightly gravelly CLAY with many subangular cobbles and boulders.		
2.00	B3				(1.20)			
3.00	B4				3.00	Complete at 3.00m		

Plan

Remarks

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

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP05

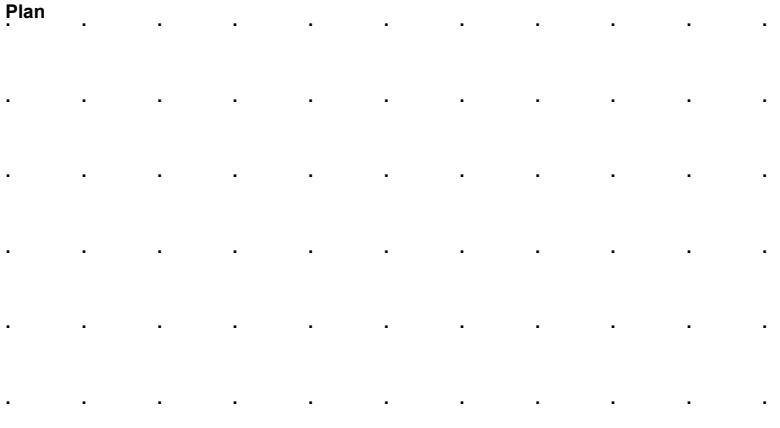
Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP06

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.40m x 0.80m x 0.90m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 19/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.30) 0.40	MADE GROUND: Grey to dark grey slightly clayey slightly sandy fine to coarse angular to subangular Gravel with many subangular cobbles and some fragments of brick.		
0.50	B1				(0.50) 0.90	MADE GROUND: Grey to brown slightly clayey gravelly Sand with occasional subangular cobbles and some fragments of brick, plastic, metal and concrete. Concrete presenting along pit sidewalls at 0.65m.		
						Complete at 0.90m		

Plan



Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated due to services at 0.90m.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP06

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP07

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.40m x 0.70m x 3.00m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 19/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.30) 0.40	MADE GROUND: Grey to dark grey slightly clayey slightly sandy fine to coarse angular to subangular Gravel with occasional subangular cobbles and some fragments of brick, wood and plastic.		
0.50	B1				(0.45) 0.85	MADE GROUND: Grey to brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles and fragments of brick and plastic.		
1.00	B2				(1.25) 2.10	Stiff brown slightly sandy slightly gravelly CLAY with many subangular to subrounded cobbles.		
2.00	B3				(0.90) 3.00	Stiff dark brown mottled brown slightly sandy slightly gravelly CLAY with many angular to subangular cobbles and boulders.		
3.00	B4					Complete at 3.00m		

Plan

Remarks

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

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP07

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP08

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.4m x 0.70m x 2.80m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 19/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.30)	MADE GROUND: Dark grey slightly clayey slightly sandy fine to coarse angular to subangular Gravel with many subangular cobbles.		
					0.40			
0.50	B1					MADE GROUND: Brown to grey stiff slight;y sandy gravelly CLAY with frequent subangular cobbles and fragments of brick, metal, concrete and plastic.		
1.00	B2				(1.30)			
					1.70			
2.00	B3					MADE GROUND: Grey mottled brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and fragments of brick, glass and plastic. Large concrete boulder at 2.50m.		
					(1.10)			
					2.80			
2.80	B4					Complete at 2.80m		

Plan

Remarks

No groundwater encountered.
Trial pit collapsing from 1.70m.
Trial pit terminated due to sidewall collapse.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP08

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP09

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.70m x 0.60m x 1.90m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 20/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.50) 0.60	MADE GROUND: Grey fine to coarse subangular to subrounded crushed rock fill with some rootlets		
0.60-1.50	B1				(0.90) 1.50	MADE GROUND: Brown sandy slightly clayey Gravel with some rootlets and subangular to subrounded cobbles, concrete blocks, plastic and metal. Gravel is fine to coarse subangular to subrounded.		
1.70	B2				(0.30) 1.80	Firm to stiff light brown sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
1.90	B3				(0.10) 1.90	Stiff grey sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
						Complete at 1.90m		

Plan

Remarks

No groundwater encountered.
Some spalling on sidewalls.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP09

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Gowan Motors Site Naas Road	TP10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.60m x 0.70m x 2.00m (L x W x D)		Hollybrook Homes Ltd	12689-03-23
	Location	**Dates** 19/04/2023	**Engineer** Barrett Mahony	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	TARMAC		
					(0.60)	MADE GROUND: Grey to black slightly clayey slightly sandy fine to coarse angular to subangular Gravel with occasional subangular cobbles, roots and fragments of brick, metal, cloth, ceramic and concrete.		
0.50	B1				0.70			
1.00	B2				(0.80)	MADE GROUND: Grey to brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles and fragments of brick, cloth, ceramic and plastic. Black 100mm plastic pipe with gravel surround located at edge of trial pit at 0.80m.		
					1.50			
					(0.50)	Very stiff black slightly sandy slightly gravelly CLAY with occasional subrounded cobbles.		
2.00	B3				2.00			
						Complete at 2.00m		

Plan

Remarks

No groundwater encountered.
Trial pit stable.
Trial pit terminated due to obstruction at 2.00m.
Trial pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	AM	12689-03-23.TP10

BARRETT MAHONY
CIVIL & STRUCTURAL
CONSULTING ENGINEERS

APPENDIX

II

SURFACE WATER CALCULATIONS

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 Soffits
M5-60 (mm)	16.800	Minimum Backdrop Height (m)	0.200
Ratio-R	0.276	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1.0A	0.068	4.00	39.000	1200	-356.310	26.330	1.000
S1.1A	0.009	4.00	39.000	1200	-405.770	23.250	1.249
S1.2A	0.002	4.00	40.000	1200	-405.770	14.480	2.292
S1.3A	0.032	4.00	39.000	1200	-438.380	14.030	1.455
S1.4A	0.011	4.00	39.000	1200	-438.390	-4.490	1.547
S1.5A	0.049	4.00	39.000	1200	-437.480	-23.390	1.642
S1.7A	0.027	4.00	39.000	1200	-441.911	-48.053	2.500
S2.0A	0.023	4.00	39.000	1200	-349.120	-13.100	1.000
S2.1A	0.016	4.00	41.000	1200	-354.480	-42.330	3.148
S2.2A	0.024	4.00	39.000	1200	-354.520	-62.510	1.249
S2.3A	0.019	4.00	39.000	1200	-380.150	-61.890	1.377
S2.4A	0.010	4.00	39.000	1200	-414.120	-62.010	1.550
S1.6A	0.011	4.00	39.000	1200	-434.510	-43.230	1.756
Outfall			39.000		-447.678	-51.607	2.534
S2.5A	0.031	4.00	39.000	1200	-434.510	-43.230	1.689
Blue Roof 1	0.180	4.00	41.000	1200	-395.435	9.026	1.000
Blue Roof 2	0.100	4.00	41.000	1200	-364.666	-36.512	1.000

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S1.0A	S1.0A	S1.1A	49.700	0.600	38.000	37.751	0.249	200.0	225	4.90	50.0
S1.1A	S1.1A	S1.2A	8.700	0.600	37.752	37.708	0.044	200.0	225	5.06	50.0
S1.2A	S1.2A	S1.3A	32.600	0.600	37.708	37.545	0.163	200.0	225	5.65	50.0
S1.3A	S1.3A	S1.4A	18.500	0.600	37.545	37.453	0.092	200.0	225	5.98	50.0
S1.4A	S1.4A	S1.5A	18.850	0.600	37.453	37.359	0.094	200.0	225	6.32	50.0
S1.5A	S1.5A	S1.6A	22.900	0.600	37.358	37.244	0.114	200.0	225	6.74	50.0
S2.0A	S2.0A	S2.1A	29.700	0.600	38.000	37.852	0.148	200.0	225	4.54	50.0
S2.1A	S2.1A	S2.2A	20.170	0.600	37.852	37.751	0.101	200.0	225	4.90	50.0
S2.2A	S2.2A	S2.3A	25.630	0.600	37.751	37.623	0.128	200.0	225	5.37	50.0
S2.3A	S2.3A	S2.4A	33.970	0.600	37.623	37.453	0.170	200.0	225	5.98	50.0
S2.4A	S2.4A	S2.5A	27.721	0.600	37.450	37.311	0.139	200.0	225	6.48	50.0
S1.7A	S1.7A	Outfall	6.774	0.600	36.500	36.466	0.034	200.0	225	7.02	50.0
S1.6A	S1.6A	S1.7A	8.834	0.600	37.260	37.216	0.044	200.0	225	6.90	50.0
S2.5A	S2.5A	S1.7A	8.834	0.600	37.400	37.356	0.044	200.0	225	6.64	50.0
Blue Roof 1	Blue Roof 1	S1.2A	11.686	0.600	40.000	37.708	2.292	5.1	150	4.04	50.0
Blue Roof 2	Blue Roof 2	S2.1A	11.730	0.600	40.000	38.000	2.000	5.9	150	4.05	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
S1.0A	0.921	36.6	12.3	0.775	1.024	0.068	0.0
S1.1A	0.921	36.6	13.9	1.023	2.067	0.077	0.0
S1.2A	0.921	36.6	46.8	2.067	1.230	0.259	0.0
S1.3A	0.921	36.6	52.6	1.230	1.322	0.291	0.0
S1.4A	0.921	36.6	54.6	1.322	1.416	0.302	0.0
S1.5A	0.921	36.6	63.4	1.417	1.531	0.351	0.0
S2.0A	0.921	36.6	4.2	0.775	2.923	0.023	0.0
S2.1A	0.921	36.6	25.1	2.923	1.024	0.139	0.0
S2.2A	0.921	36.6	29.5	1.024	1.152	0.163	0.0
S2.3A	0.921	36.6	32.9	1.152	1.322	0.182	0.0
S2.4A	0.921	36.6	34.7	1.325	1.464	0.192	0.0
S1.7A	0.921	36.6	110.6	2.275	2.309	0.612	0.0
S1.6A	0.921	36.6	65.4	1.515	1.559	0.362	0.0
S2.5A	0.921	36.6	40.3	1.375	1.419	0.223	0.0
Blue Roof 1	4.493	79.4	32.5	0.850	2.142	0.180	0.0
Blue Roof 2	4.188	74.0	18.1	0.850	2.850	0.100	0.0

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)
S1.0A	49.700	200.0	225	Circular	39.000	38.000	0.775	39.000	37.751	1.024
S1.1A	8.700	200.0	225	Circular	39.000	37.752	1.023	40.000	37.708	2.067
S1.2A	32.600	200.0	225	Circular	40.000	37.708	2.067	39.000	37.545	1.230
S1.3A	18.500	200.0	225	Circular	39.000	37.545	1.230	39.000	37.453	1.322
S1.4A	18.850	200.0	225	Circular	39.000	37.453	1.322	39.000	37.359	1.416
S1.5A	22.900	200.0	225	Circular	39.000	37.358	1.417	39.000	37.244	1.531
S2.0A	29.700	200.0	225	Circular	39.000	38.000	0.775	41.000	37.852	2.923
S2.1A	20.170	200.0	225	Circular	41.000	37.852	2.923	39.000	37.751	1.024
S2.2A	25.630	200.0	225	Circular	39.000	37.751	1.024	39.000	37.623	1.152
S2.3A	33.970	200.0	225	Circular	39.000	37.623	1.152	39.000	37.453	1.322
S2.4A	27.721	200.0	225	Circular	39.000	37.450	1.325	39.000	37.311	1.464
S1.7A	6.774	200.0	225	Circular	39.000	36.500	2.275	39.000	36.466	2.309
S1.6A	8.834	200.0	225	Circular	39.000	37.260	1.515	39.000	37.216	1.559
S2.5A	8.834	200.0	225	Circular	39.000	37.400	1.375	39.000	37.356	1.419
Blue Roof 1	11.686	5.1	150	Circular	41.000	40.000	0.850	40.000	37.708	2.142
Blue Roof 2	11.730	5.9	150	Circular	41.000	40.000	0.850	41.000	38.000	2.850

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S1.0A	S1.0A	1200	Manhole	Adoptable	S1.1A	1200	Manhole	Adoptable
S1.1A	S1.1A	1200	Manhole	Adoptable	S1.2A	1200	Manhole	Adoptable
S1.2A	S1.2A	1200	Manhole	Adoptable	S1.3A	1200	Manhole	Adoptable
S1.3A	S1.3A	1200	Manhole	Adoptable	S1.4A	1200	Manhole	Adoptable
S1.4A	S1.4A	1200	Manhole	Adoptable	S1.5A	1200	Manhole	Adoptable
S1.5A	S1.5A	1200	Manhole	Adoptable	S1.6A	1200	Manhole	Adoptable
S2.0A	S2.0A	1200	Manhole	Adoptable	S2.1A	1200	Manhole	Adoptable
S2.1A	S2.1A	1200	Manhole	Adoptable	S2.2A	1200	Manhole	Adoptable
S2.2A	S2.2A	1200	Manhole	Adoptable	S2.3A	1200	Manhole	Adoptable
S2.3A	S2.3A	1200	Manhole	Adoptable	S2.4A	1200	Manhole	Adoptable
S2.4A	S2.4A	1200	Manhole	Adoptable	S2.5A	1200	Manhole	Adoptable
S1.7A	S1.7A	1200	Manhole	Adoptable	Outfall		Manhole	Adoptable
S1.6A	S1.6A	1200	Manhole	Adoptable	S1.7A	1200	Manhole	Adoptable
S2.5A	S2.5A	1200	Manhole	Adoptable	S1.7A	1200	Manhole	Adoptable
Blue Roof 1	Blue Roof 1	1200	Manhole	Adoptable	S1.2A	1200	Manhole	Adoptable
Blue Roof 2	Blue Roof 2	1200	Manhole	Adoptable	S2.1A	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1.0A	-356.310	26.330	39.000	1.000	1200	0	S1.0A	38.000	225
S1.1A	-405.770	23.250	39.000	1.249	1200	1 0	S1.0A S1.1A	37.751 37.752	225 225
S1.2A	-405.770	14.480	40.000	2.292	1200	1 2 0	Blue Roof 1 S1.1A S1.2A	37.708 37.708 37.708	150 225 225
S1.3A	-438.380	14.030	39.000	1.455	1200	1 0	S1.2A S1.3A	37.545 37.545	225 225
S1.4A	-438.390	-4.490	39.000	1.547	1200	1 0	S1.3A S1.4A	37.453 37.453	225 225
S1.5A	-437.480	-23.390	39.000	1.642	1200	1 0	S1.4A S1.5A	37.359 37.358	225 225
S1.7A	-441.911	-48.053	39.000	2.500	1200	1 2 0	S2.5A S1.6A S1.7A	37.356 37.216 36.500	225 225 225
S2.0A	-349.120	-13.100	39.000	1.000	1200	0	S2.0A	38.000	225
S2.1A	-354.480	-42.330	41.000	3.148	1200	1 2 0	Blue Roof 2 S2.0A S2.1A	38.000 37.852 37.852	150 225 225
S2.2A	-354.520	-62.510	39.000	1.249	1200	1 0	S2.1A S2.2A	37.751 37.751	225 225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S2.3A	-380.150	-61.890	39.000	1.377	1200	1	S2.2A	37.623	225
						0	S2.3A	37.623	225
S2.4A	-414.120	-62.010	39.000	1.550	1200	1	S2.3A	37.453	225
						0	S2.4A	37.450	225
S1.6A	-434.510	-43.230	39.000	1.756	1200	1	S1.5A	37.244	225
						0	S1.6A	37.260	225
Outfall	-447.678	-51.607	39.000	2.534		1	S1.7A	36.466	225
S2.5A	-434.510	-43.230	39.000	1.689	1200	1	S2.4A	37.311	225
						0	S2.5A	37.400	225
Blue Roof 1	-395.435	9.026	41.000	1.000	1200				
						0	Blue Roof 1	40.000	150
Blue Roof 2	-364.666	-36.512	41.000	1.000	1200				
						0	Blue Roof 2	40.000	150

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Additional Storage (m³/ha)	20.0
FSR Region	Scotland and Ireland	Analysis Speed	Detailed	Check Discharge Rate(s)	x
M5-60 (mm)	16.800	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.276	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 %)
100	20	0	0

Node S1.7A Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	36.500	Product Number	CTL-SHE-0057-2000-2000-2000
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node Blue Roof 1 Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	40.000	Design Flow (l/s)	14.0
Replaces Downstream Link	✓	Design Depth (m)	0.125		

Depth (m)	Flow (l/s)
0.125	14.000

Node Blue Roof 2 Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	40.000	Design Flow (l/s)	5.0
Replaces Downstream Link	✓	Design Depth (m)	0.125		

Depth (m)	Flow (l/s)
0.125	5.000

Node S1.7A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	36.500
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	250.0	0.0	2.000	250.0	0.0	2.010	0.0	0.0

Node Blue Roof 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	40.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.90	Time to half empty (mins)	64

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	500.0	0.0	0.125	500.0	0.0	0.126	0.0	0.0

Node Blue Roof 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	40.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.90	Time to half empty (mins)	124

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	334.0	0.0	0.125	334.0	0.0	0.126	0.0	0.0

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	S1.0A	20	38.812	0.812	35.5	2.0239	0.0000	FLOOD RISK
30 minute summer	S1.1A	20	38.720	0.969	36.0	1.2353	0.0000	FLOOD RISK
30 minute summer	S1.2A	20	38.690	0.982	34.8	1.1270	0.0000	SURCHARGED
30 minute summer	S1.3A	20	38.511	0.966	45.3	1.5171	0.0000	SURCHARGED
2880 minute summer	S1.4A	2400	38.501	1.048	7.6	1.3343	0.0000	SURCHARGED
2880 minute summer	S1.5A	2400	38.501	1.143	8.9	1.9753	0.0000	SURCHARGED
2880 minute summer	S1.7A	2400	38.501	2.001	14.9	502.9147	0.0000	SURCHARGED
2880 minute summer	S2.0A	2400	38.501	0.501	0.6	0.7974	0.0000	SURCHARGED
2880 minute summer	S2.1A	2400	38.501	0.649	3.3	0.8005	0.0000	SURCHARGED
2880 minute summer	S2.2A	2400	38.501	0.750	4.0	1.1365	0.0000	SURCHARGED
2880 minute summer	S2.3A	2400	38.501	0.878	4.5	1.2355	0.0000	SURCHARGED
2880 minute summer	S2.4A	2400	38.501	1.051	4.8	1.3243	0.0000	SURCHARGED
2880 minute summer	S1.6A	2400	38.501	1.257	9.0	1.5788	0.0000	SURCHARGED
2880 minute summer	Outfall	2400	36.501	0.035	2.0	0.0000	0.0000	OK
2880 minute summer	S2.5A	2400	38.501	1.190	5.4	1.7826	0.0000	SURCHARGED
120 minute summer	Blue Roof 1	80	40.116	0.116	47.2	52.9078	0.0000	OK
240 minute summer	Blue Roof 2	156	40.118	0.118	16.3	35.7761	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	S1.0A	S1.0A	S1.1A	31.6	0.895	0.862	1.9766	
30 minute summer	S1.1A	S1.1A	S1.2A	25.0	0.865	0.683	0.3460	
30 minute summer	S1.2A	S1.2A	S1.3A	36.0	0.905	0.983	1.2965	
30 minute summer	S1.3A	S1.3A	S1.4A	45.4	1.143	1.241	0.7358	
2880 minute summer	S1.4A	S1.4A	S1.5A	7.5	0.647	0.204	0.7497	
2880 minute summer	S1.5A	S1.5A	S1.6A	8.7	0.591	0.238	0.9108	
2880 minute summer	S1.7A	S1.7A	Outfall	2.0	0.485	0.054	0.0278	274.3
2880 minute summer	S2.0A	S2.0A	S2.1A	0.6	0.176	0.016	1.1812	
2880 minute summer	S2.1A	S2.1A	S2.2A	3.3	0.532	0.090	0.8022	
2880 minute summer	S2.2A	S2.2A	S2.3A	4.0	0.582	0.109	1.0193	
2880 minute summer	S2.3A	S2.3A	S2.4A	4.5	0.614	0.123	1.3510	
2880 minute summer	S2.4A	S2.4A	S2.5A	4.5	0.258	0.122	1.1025	
2880 minute summer	S1.6A	S1.6A	S1.7A	9.0	0.703	0.245	0.3513	
2880 minute summer	S2.5A	S2.5A	S1.7A	5.3	0.608	0.145	0.3513	
120 minute summer	Blue Roof 1	Depth/Flow	S1.2A	13.0				
240 minute summer	Blue Roof 2	Depth/Flow	S2.1A	4.7				

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APPENDIX III

IRISH WATER MAP

UISCE ÉIREANN : IRISH WATER

Legend

- Unknown Meter ; Other Meter
- Sluice Valve Open
- Double Air Control Valve

Water Hydrants

Hydrant Function

- Fire Hydrant
- Telemetry Kiosk
- Cap
- Other Fittings

Water Distribution Mains

Owned By

- Distribution Water Main
- Trunk Water Main

Sewer Discharge Points

Discharge Type

- Other; Unknown
- Pump Station
- Gravity - Combined
- Gravity - Foul
- Gravity - Overflow
- Pumping - Foul

Storm Manholes

Manhole Type

- Standard

Storm Discharge Points

Discharge Type

- Outfall
- Surface Gravity Mains

1:500 at A0

Last edited: 12/06/2018

Metres

0 25 50 100

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APPENDIX

IV

IRISH WATER CONFIRMATION OF FEASIBILITY

CONFIRMATION OF FEASIBILITY

Uisce Éireann
Bosca OP448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

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

www.water.ie

John Considine

Barrett Mahony
Sandwith House
52-54 Lower Sandwith Street
Dublin 2
Co. Dublin

30 November 2022

Our Ref: CDS22007711 Pre-Connection Enquiry
Gowan House, Naas Road, Dublin

Dear Applicant/Agent,

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

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 1750sqm office and 1130no. student beds at Gowan House, Naas Road, Dublin, (the **Development)**.

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

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

- In order to accommodate the proposed connection, approximately 340m of the existing 9'' AC main in R112 road (highlighted in red below) has to be replaced with a new 300mm ID main due to headlosses exceeding 3m per km with the development in place. These works are not currently on Irish Water investment plan therefore, the applicant will be required to fund these local upgrades. The fee will be calculated at a connection application stage.

- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water

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

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

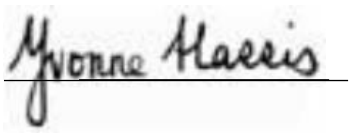
Where can you find more information?

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

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

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

Yours sincerely,



Yvonne Harris
Head of Customer Operations

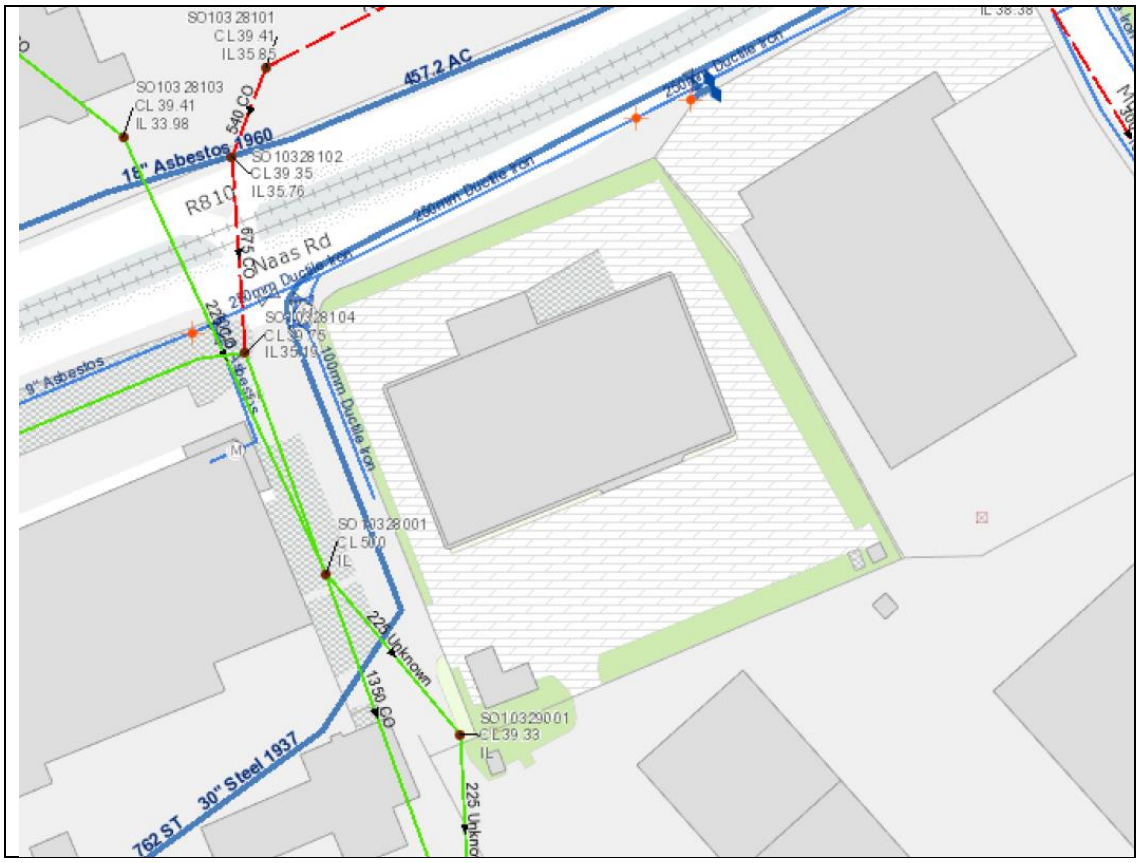
Section A - What is important to know?

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

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

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

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



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

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

BARRETT MAHONY
CIVIL & STRUCTURAL
CONSULTING ENGINEERS

APPENDIX

V

DCC LETTER OF CONSENT

Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

Environment and Transportation Department,
Civic Offices, Wood Quay, Dublin 8

Roinn Comhshaoil agus Iompair, Oifigí na Cathrach
An Ché Adhmaid, Baile Átha Cliath 8
T.(01) 2222046 E: transportplanning@dublincity.ie

Barrett Mahony Consulting Engineers,

Sandwith House,

52-54 Sandwith Street Lower

Dublin

D02 WR26

19th October 2023

Re: Letter of Consent to Large Scale Residential Planning Application

Site: Gowan House, Carriglea Business Park, Naas Road, Dublin 12, D12 RCC4.

To Whom It May Concern,

I refer to the above intended planning application, the site of which includes lands in the control of Dublin City Council, specifically lands within the roadway and footpath of the Naas Road as highlighted in blue on the attached drawing, GWH-BMD-ZZ-XX-DR-C-1070 revision PL1.

I wish to confirm that the City Council has no objection to the inclusion of these lands for the purpose of making a planning application. This is without prejudice to the outcome of the planning application process.

In the event that planning permission is granted and the development requires acquisition of Dublin City Council property including air rights, disposal will be subject to terms and conditions agreed with the Chief Valuer's Office. Any disposal of Dublin City Council property is also subject to Council approval under Section 183 of the Local Government Act 2001(as amended).

Yours faithfully,

_____

Dermot Collins

Executive Manager

Barrett Mahony Consulting Engineers

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