Waterman Moylan
Engineering Consultants

Engineering Assessment Report

Proposed Residential Development Site at Cross Guns Bridge, Phibsborough, Dublin 7.

January 2021

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Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015)

Issue	Date	Prepared by	Checked by	Approved by
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Comments

Disclaimer

Content

1. Introduction

This Engineering Assessment Report has been prepared by Waterman Moylan as part of the documentation in support of a Strategic Housing Development application for a proposed residential development at Cross Guns Bridge, Phibsborough, Dublin 7.

1.1 Site Location

The site is located in Phibsborough, Dublin 7, bounded to the north by the Royal Canal, to the east by the R108/Phibsborough Road and to the south and west by existing residential developments. The exact site location is shown on Waterman Moylan Drawing No. 20-011-P010

Refer to Figure 1 for the location of the proposed development.

Figure 1: Site Location (image taken from Google Earth)

1.2 Proposed Development and Site Description

Bindford Ltd. intend to apply to An Bord Pleanála for permission for a strategic housing development at this c. 0.73 ha site at Cross Guns Bridge, Phibsborough, Dublin 7.

The proposal is for a Strategic Housing Development for Build -To-Rent apartments and will comprise the demolition of all derelict buildings on site and the construction of a new residential development comprising 3 no. blocks ranging in height up to 12 storeys consisting of 205 no. dwellings and associated residential amenities, basement and surface carparking with vehicular and pedestrian access from the eastern end of the site off Phibsborough Road. Additional pedestrian only accesses to the north of the site off the Royal Canal Way. A new café/ retail area will be located at ground floor level of block C along with a new public open space to the east of the site. All associated site development works, landscaping and boundary

treatment, children's play area, cycle parking, bin stores, substation, and services provision. A full description is set out in the statutory notices.

The total area of the proposed development, including roads, roofs, and green area, is approximately 0.73Ha.

The site falls from west to east ranging in levels from 28.31m to 25.95m OD Malin, as well as from north to south ranging in levels from 29.25m to 28.11m OD Malin. The subject site is zoned as "Zone Z1: To protect, provide and improve residential amenities" in the Dublin City Development Plan 2016-2022.

1.3 Background of Report and Summary

This report describes the criteria used to design and detail the options available for the disposal of storm water (subject to a restriction to the discharge rate), disposal of foul water, water supply and roads from the developed site.

Foul Water

It is proposed that the foul water will drain via gravity and connect to the existing 450mm combined sewer along the existing R108/Phibsborough Road to the east of the subject site. The drainage, in basement areas, will generally drain by gravity via slung drainage to be strapped to the underside of the ground floor slab within a dedicated service zone. All other areas will drain by gravity below ground to the outfall location. The foul drainage in the basements will be pumped to a standoff manhole before draining by gravity to the existing 450mm combined sewer along the existing R108/Phibsborough Road to the east of the subject site.

Surface Water

Surface water from the subject site will drain via gravity and discharge at a restricted rate to the existing 450mm combined sewer along the existing R108/Phibsborough Road to the east of the subject site. Surface water runoff from the site will be restricted to 2 l/s/Ha as recommended by Dublin City Council (DCC). This is in accordance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS). Surface water attenuation will be provided within an underground surface water storage tank adjacent the basement, prior to discharging to the existing 450mm diameter combined water sewer.

Surface water drains within the basement will be strapped to the underside of the ground floor slab within a dedicated service zone and in all other areas by gravity below ground to its outfall location.

The attenuation of surface water is necessary to ensure that there is no impact on the existing drainage infrastructure, either in terms of quality or volume of runoff, as a result of the site development works. This will offer a significant benefit to the existing drainage network surrounding the subject site as the existing site is currently discharging all surface water to the existing 450mm diameter combined sewer without any restriction or attenuation on the flow. In this regard, the peak surface water runoff from the existing development is 89.79 l/sec. The proposed development will reduce the runoff by 98% to 2.0l/sec.

Water Supply

It is proposed to connect the site watermain into the existing 150mm cast-iron watermain network running along R108/Phibsborough Road to the east of the subject site. All water supply details shall be in accordance with Irish Water and Dublin City Council's requirements.

2. Foul Water Drainage

2.1 Receiving Environment

It is proposed that the foul water will drain via gravity and connect to the existing 450mm combined sewer along the existing R108/Phibsborough Road to the east of the subject site. The drainage within basement areas will generally drain by gravity via slung drainage to be strapped to the underside of the ground floor slab within a dedicated service zone and by gravity below ground to its outfall location in all other areas. The foul drainage in the basements will be pumped to a standoff manhole before draining by gravity to the existing 450mm combined sewer along the existing R108/Phibsborough Road to the east of the subject site.

The drainage network discharges to the Regional Waste Water Treatment Plant at Ringsend. Irish Water commenced work on an €80 million, 400,000 population equivalent upgrade to the Ringsend Wastewater Treatment Plant in February 2018. Ringsend is the largest wastewater treatment plant in Ireland and was built to treat the wastewater for the equivalent of 1.64 million people. Currently the plant services over 40% of the national population and is treating wastewater for the equivalent of 1.9 million people.

This upgrade will take approximately two years to construct and will accommodate the current demand, support planned housing and economic growth in the Dublin Region and will improve the quality of the treated wastewater discharged to the Liffey Estuary.

This capacity upgrade is one part of an overall investment of €400 million by Irish Water in the Ringsend Wastewater Treatment Plant Upgrade Project. Subject to planning permission, the overall upgrade project will enable full treatment of wastewater for the equivalent of 2.4 million people, meeting all foreseeable development needs to at least 2025.

A Pre-Connection Enquiry form was submitted to Irish Water on 21st of January 2020 which outlined the foul water discharge proposal. A response was received on 30th of January 2020 which confirmed that capacity is available and a connection to the local infrastructure can be facilitated. Irish Water have also accepted the foul drainage proposals as demonstrated by the Statement of Design Acceptance.

Please refer to Appendix A for Irish Water confirmation of feasibility and Statement of Design Acceptance letter.

Refer to Waterman Moylan Drawing 20-011-P200 which shows the proposed foul network for the subject site.

2.2 Foul Water - General

Drains, in basement areas, will generally consist of Ductile Iron pipework where they are fixed to the underside of the ground floor slab. Drains in other areas will be PE to Irish Water specification or concrete socket and spigot pipes (to IS 6). Drains will be laid to comply with the Requirement of the Building Regulations 2010, and in accordance with the recommendations contained in the Technical Guidance Documents, Section H.

Foul water sewers will consist of structured uPVC or concrete socket and spigot pipes (to IS 6) and will be laid strictly in accordance with Irish Water requirements for taking in charge.

All manholes will be watertight to prevent ground water ingress into the foul drainage system. Construction details for the proposed drainage systems are included in the accompanying planning submission drawings.

The foul drainage in the basements will be pumped to a standoff manhole before draining by gravity to the foul water drainage network.

In accordance with the Irish Water "Code of Practice for Wastewater Supply", 150mm nominal internal diameter sewers have been proposed for carrying wastewater from 20 properties or less; whilst 225mm nominal internal diameter carrying Wastewater from more than 20 properties. Furthermore, where there are at least ten dwelling units connected, the 150mm diameter pipes are laid at a minimum gradient of 1:150 and at the steeper gradient of 1:60 for up to nine connected dwelling units.

2.3 Foul Water Calculations

The design of the foul water drainage has been based on Irish Water – Code of Practice for Wastewater Infrastructure (December 2017). Pipe capacities and velocities have been calculated using Colebrook-White formula with a roughness coefficient (Ks) of 1.5mm.

The estimated foul flows generated from the proposed development are as follows:

Table 1: Calculation of proposed foul water flow

Description	No. of Units / Floor Area	Population Per unit	PE	Flow l/h/d	Infiltration Rate	Total Discharge (l/d)
Residential	205 Units	2.7 per unit	554	150	1.1	91,410
				Total		**91,410**

Calculation of Proposed Peak Foul Flow		
Total Daily Discharge *(from Table 1.)*	91,410	l/d
Dry Weather Flow (DWF)	1.06	l/s
Peak Foul Flow (= 6* x DWF)	***6.35***	***l/s***

* Domestic Wastewater Peaking Factors: For the design of new or upgraded wastewater networks, the peaking factors applied to domestic wastewater flows (PfDom) are to be in accordance with the Table below.

Population	Peaking Factor (Pf_{Dom})
0 to 750	6
751 to 1,000	4.5
1001 to 5,000	3.0
5,001 to 10,000	2.5

As shown on the table above the peak flow from the proposed foul network will be 6.35l/s. The proposed foul network is designed with a minimum gradient at a range of 1:60 and 1:200 and with a diameter in a range of 150mm and 225mm throughout the network. The outfall pipe from the development is a 225mm-diameter pipe laid at a minimum gradient of 1:200 which gives a capacity of 32 l/s. Therefore, there is adequate capacity in the public foul sewer available to cater for the proposed development. The proposed foul network has been designed with Flow software and will discharge via gravity. Please see Appendix B for details of the foul water design calculations.

2.4 Basement Foul Water Pumping Station and Preliminary Specification

2.4.1 General

The basement foul pump station will take foul drainage from the basement level only. This will include water runoff/ snow melt from cars and drains in stores and plant rooms. This pump station will be a private pump station, within the building basement, that will be operated by the client.

2.4.2 Emergency Storage

The total volume of storage available in the pump sump is 3.5 m^3 which will provide the required 24-hour storage.

2.4.3 Pumping Station Equipment to be provided

Mechanical and electrical equipment for the proposed pumping chamber is to be provided by an approved specialist contractor to include features as detailed on the pumping chamber drawings.

The following is a checklist of the equipment proposed (or similar approved).

a) Pump Sets

2 No. submersible pumps, 1 duty 1 standby. The pumps are to be fitted with impellers capable of pumping 100-mm diameter solids. The pump motor is to be suitable for 400V/3ph/50Hz electricity power supply. The unit is fitted with over temperature protection, as well as mechanical seal monitoring.

The pumps shall be supplied complete with quick couple release mechanisms for removal and reinstallation of the pumps, 50mm diameter twin galvanised guide rails, holding brackets lifting chains etc.

b) Pipework & Valves

Pump pipework is to be 110 mm ductile iron, complete with couplings, riser pipes, bends and tee pieces, tapers etc as required, all complete with flange sets, consisting of zinc plated nuts, bolts, washers and gaskets.

100mm-diameter cast iron non-return valves and gate valves complete with handwheels for clockwise closing as required.

c) Electrical Equipment

- Pump power cables complete with cable glands.
- Earth spike and bonding.
- ESB distribution board in kiosk.

d) Control Equipment Panel

Ultrasonic level controller, complete with 5 programmable output relays for automatic stop and start of pumps.

Ultrasonic transducer head complete with 10m of signal cable and mounting brackets.

Control panel containing the following: -

- Cyclic relay for alternating duty pump
- Ammeters
- Hour run meters
- Hand, off, Auto switches.
- Run/trip/alarm lights
- DI relays for seal monitoring
- High level alarm beacon

e) Control Kiosk

A control kiosk shall be provided adjacent to the pumping station.

2.4.4 Emergency Equipment and Procedures

The pumping station is being provided with the following emergency equipment and procedures: -

- Standby pump in the event of a pump failure
- Telemetry system to facilitate Management Company monitoring of the station, who will be responsible for the maintenance of the overall development, including the pumping station.
- High level alarms to warn of increases in level of effluent in the pump sump
- Storage capacity within the sump and pipe network in excess of 24 hours
- Over-pumping facilities on the rising main to facilitate the installation of a temporary external pump to empty the sump directly into the rising main

The above emergency equipment and procedures provide a very high level of redundancy and backup in the event of a failure in the mechanical systems in the pumping station.

3. Surface Water Drainage

3.1 Surface Water - Existing

The subject site is currently 100% hardstanding with surface water drains on site draining unrestricted to the existing 450mm combined sewer along the existing R108/Phibsborough Road to the east of the subject site.

Rainfall values for the subject site have been acquired from the Met Eireann Website and are reflected in Appendix D and are summarised below.

Site Location: Easting 314890 Northing 236318

1 in 100 Year 60 min Storm 36.9mm

1 in 100 Year 60 min Storm with 20% Climate Change 44.28mm (0.04428m)

Based on a site area of c. 0.73 Hectares, the peak outfall rate in a 1 in 100 Year 60 min Storm with 20% Climate Change allowed for is as follows:

7,300m^2 x 0.04428m = 323.244m^3/hour = 323,244l/hour = 89.79l/sec unrestricted flow.

3.2 Surface Water - Proposed

Surface water from the subject site will drain via gravity and discharge at a restricted rate to the existing 450mm combined sewer along the existing R108/Phibsborough Road to the east of the subject site. Surface water runoff from the site will be restricted to 2 l/s/Ha (2.0l/s for site based on site area) as recommended by Dublin City Council (DCC). This is in accordance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS).

Surface water drains in basement areas will be ductile iron strapped to the underside of the ground floor slab within a dedicated service zone. All other surface water drains will be uPVC or concrete spigot and socket pipes and will be laid below ground and drain by gravity to the outfall location. Surface water runoff to the public sewer will be restricted to 2l/s. Excess storm water runoff will be stored in a proposed underground tank before outfalling by gravity to the existing 450mm diameter combined sewer, once the storm event has passed. Surface water drains will be laid to comply with the Requirement of the Building Regulations 2010, and in accordance with the recommendations contained in the Technical Guidance Documents, Section H.

The attenuation of surface water is necessary to ensure that there is no impact on the existing drainage infrastructure, either in terms of quality or volume of runoff, as a result of the site development works. This will offer a significant benefit to the existing drainage network as the existing site is currently discharging all surface water to the existing large diameter combined sewer on Phibsborough Road to the east without any restriction or attenuation on the flow. In this regard, the peak surface water runoff from the existing development is 89.79 l/sec. The proposed development will reduce the runoff by 97% to 2.0l/sec.

Green roofs will be provided on the some of the roof areas of the proposed buildings. The green roof areas have been maximized as much as possible. Green roofs will also provide attenuation of surface water. This complies with Dublin City Council policy.

The layout of the proposed surface water drainage network is shown on Waterman Moylan Drawing No. 20-011-P200.

3.3 Site Characteristics

The site characteristics are specified in the following sections.

Soil type 2 has been used for attenuation calculations below. Additionally, see extract from Soil Map of Ireland below with Site Location shown:

Figure 2: Soil Map of Ireland

Table 3: Proposed Development Areas

	Catchment
Total Area	7,300m^2

Table 4: Surface Water Catchment Details

	Catchment
Site Area (Catchment) – Ha	0.730
Impermeable Area - Ha	0.585

% Hardstanding	80%
SAAR - mm	739
SOIL Index	0.3
Climate Change	20%

3.4 Outflow Limits

The outflow limits are calculated in accordance with the Institute of Hydrology report No 124 “Flood Estimation for Small Catchments”, where:

- Qbar = $0.00108(\text{Area})^{0.89} \times (\text{SAAR})^{1.17} \times (\text{SOIL})^{2.17}$
- Greenfield Run-off = Qbar x ("n-year" factor)
- Allowable Discharge = Greenfield Run-off x Area

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- Area = Site area in km2 (Or 50 Hectares if site is less than 50 Hectares)
- SAAR = Taken from “Extreme Rainfall in Ireland” maps (739mm)
- SOIL = Runoff constant (Varies between 0.1 and 0.53)
  - $Qbar_{rural} = 0.00108(0.5)^{0.89} \times (739)^{1.17} \times (0.3)^{2.17}$
  - $Qbar_{rural}$ =97.09 l/s (For a 50 Hectares site)
  - $Qbar_{rural}$ = 1.94 l/s/Ha

The Greater Dublin Regional Code of Practice for Drainage Works mandates per the Greater Dublin Strategic Drainage Study that outfall be restricted to either the greenfield QBAR rate or to 2l/s/ha, whichever is greater. As the greenfield QBAR for this site is 1.94 l/s/ha, the minimum of 2l/s/ha will be used.

Therefore, the permitted outflow for varying return periods has been calculated as follows:

Table 5: Surface Water Outflows

	Catchment
Site Area (Catchment) - Ha	0.730
$Qbar_{rural}$ – l/s	1.42

The site area of the proposed development as it pertains to drainage is 0.730Ha, therefore the calculated Qbar from the proposed development is 1.42l/s. However, it is advised to run a Hydrobrake with a minimum outfall rate of 2l/s to ensure proper functionality. Therefore, the actual outfall on site will be restricted to a rate of 2l/s.

3.5 SUDS Selection Criteria

Sustainable Urban Drainage systems (SUDS) have been developed and are in use to alleviate the detrimental effects of traditional urban storm water drainage practice that typically consisted of piping runoff of rainfall from developments to the nearest receiving watercourse. Surface water drainage methods that take account of quantity, quality and amenity issues are collectively referred to as sustainable urban

drainage systems; they are typically made up of one or more structures built to manage surface water runoff.

The proposed surface water drainage system for this development has been designed as a sustainable urban drainage system and uses, filter drains, green roof, blue roof, storage tank, permeable paving together with flow control device and petrol interceptor to:

- Treat runoff and remove pollutants to improve quality
- Restrict outflow and to control quantity
- Increase amenity value

The surface water drainage system was designed with reference to the Sustainable Urban Drainage Systems 'SuDS' published by the Construction Industry Research and Information Association. This is in accordance with Dublin City Council's initiative that all new developments will conform to Best Management Practices (BMP) for urban storm water drainage and as set out in the GDSDS. This complies with Dublin City Council Drainage policy.

Sustainable drainage systems aim towards maintaining or restoring a more natural hydrological regime, such that the impact of urbanisation on downstream flooding and water quality is minimised. Originally, SuDS were introduced primarily as single-purpose facilities however this has now evolved into more integrated systems which serve a variety of purposes, including habitat and amenity enhancement. The main advantages of an integrated SuDS facility are the savings on land-take and maintenance.

SuDS minimise the impacts of urban runoff by capturing runoff as close to the source as possible and then releasing it slowly. The use of SuDS to control runoff also provides the additional benefit of reducing pollutants in the surface water by settling out suspended solids, and in some cases providing biological treatment.

A stormwater management or treatment train approach assures that runoff quantity and quality are addressed. The following objectives of the treatment train provide an integrated and balanced approach to help mitigate the changes in stormwater runoff flows that occur as land is urbanised and to help mitigate the impacts of stormwater quality on receiving systems:

1) **Source control:** conveyance and infiltration of runoff;
2) **Site Control:** reduction in volume and rate of surface runoff, with some additional treatment provided; and

The applicant has considered the use of all appropriate SUDS devices as part of the site SUDS strategy;

Source Control:

1. Permeable Paving

Permeable pavements are alternative paving surfaces to standard finishes that allow stormwater runoff to filter through voids in the pavement surface into an underlying stone reservoir, where it is temporarily stored and/or infiltrated. The permeable paving system on site has been designed as a Type A Permeable Paving System with full infiltration to ground. The permeable paving build-up was designed in accordance with BS7533:13 and calculations are shown below:

In accordance with Table 3 in Section 5 of BS7533:13:

M60 = 9.9mm

R= 0.3

For a 1 in 100-year event plus 20% climate change 210mm of storage is required below the preamble paving.

The ratio of total of paved surfaces to area of permeable paving is as follows:

⇨ $785m^2/472m^2 = 1.67$

Therefore, a total base thickness of 350mm is required (1.67 x 210mm), this is indicated on Waterman Moylan Drawing No. 20-011-P190 Road Construction Details. See typical detail below from SuDS Manual below:

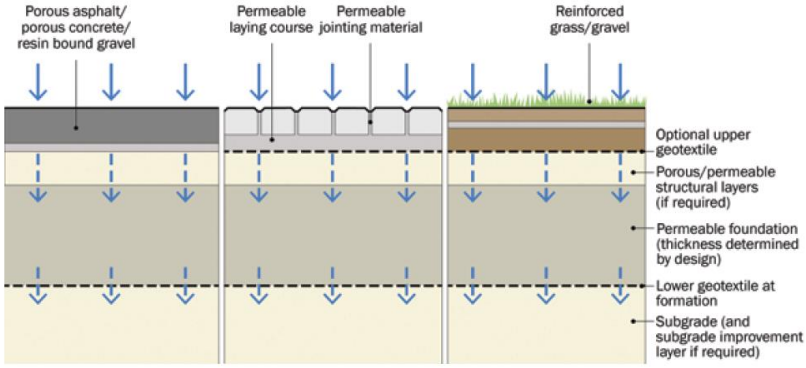


Figure 20.12 Pervious pavement system types: Type A – total infiltration

Maintenance of the proposed permeable paving to be in accordance with Table 20.15, Part D, of the Ciria SuDS Manual C753, which sets out maintenance requirements and schedule.

Figure 3 – Table 20.15 from Ciria SuDS Manual 2015

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

2. Green Roof

Green roofs are multi-layered system that covers the roof of a building or podium structure with vegetation over a drainage layer. Green roofs are used to reduce the volume and rate of runoff from development roofs, and hence reduce the amount of hardstanding resulting from a development. The green roof areas are shown on Waterman Moylan Drawing No. 20-011-P202. As per drawing, see area summary below:

Table 6: Green Roof Areas

	Green Roof Area(m^2)
Roof 1	270.1
Roof 2	239.4
Roof 3	167.1
Total	676.6

See typical detail below from SuDS Manual below:

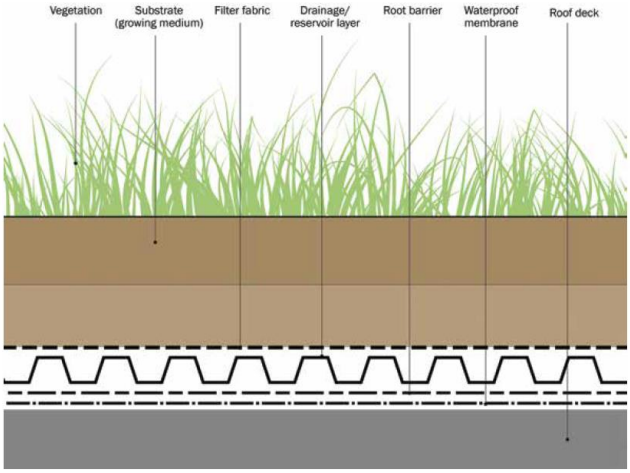


Figure 12.1 Section showing typical extensive green roof components

Maintenance of the proposed green roofs to be in accordance with Table 12.5, Part D, of the Ciria SuDS Manual C753, which sets out maintenance requirements and schedule.

Figure 4 - Table 12.5 from Ciria SuDS Manual 2015

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

3. Filter Drains

Filter drains are uniformly graded and gently sloping strip of grass or other dense vegetation that are designed to treat runoff from adjacent impermeable areas by promoting sedimentation, filtration and infiltration. The filter drain will not be lined as it is located within a sandy gravelly layer which promotes infiltration of water to ground. At low to moderate velocities, filter drains effectively reduce particulate pollutant levels by removing sediments organic materials and heavy sediments.

Details of the proposed filter drain are shown on our Drawing No. 20-011-P230 enclosed with this application.

See typical detail below from SuDS Manual below:

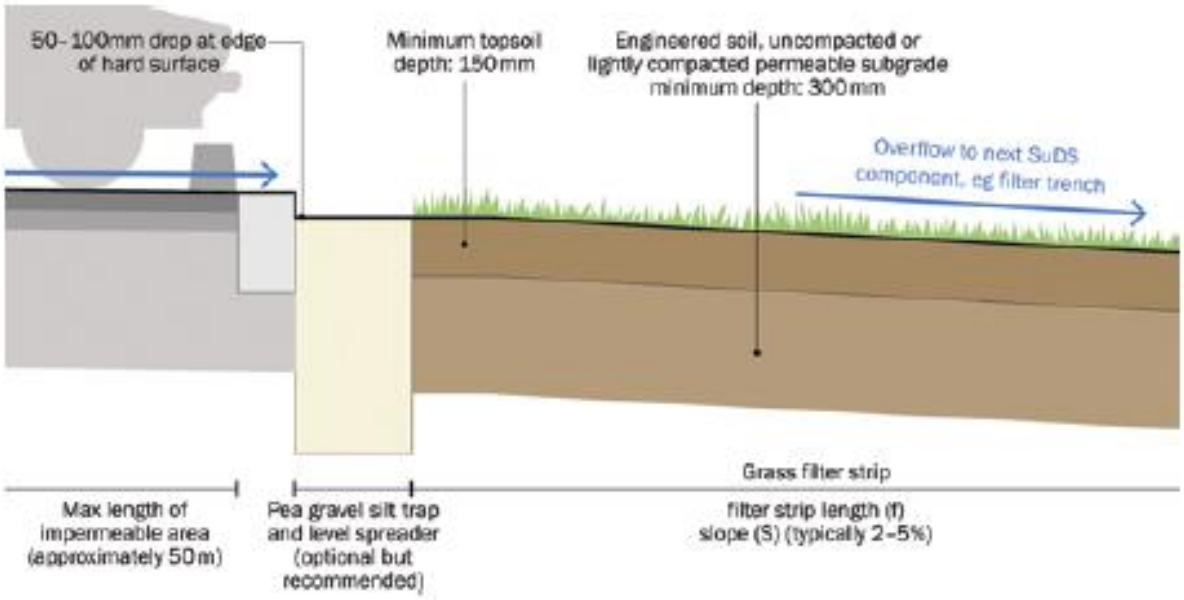


Figure 15.2 Filter strip schematic

Maintenance of the proposed filter drains to be in accordance with Table 16.1, Part D, of the Ciria SuDS Manual C753, which sets out maintenance requirements and schedule.

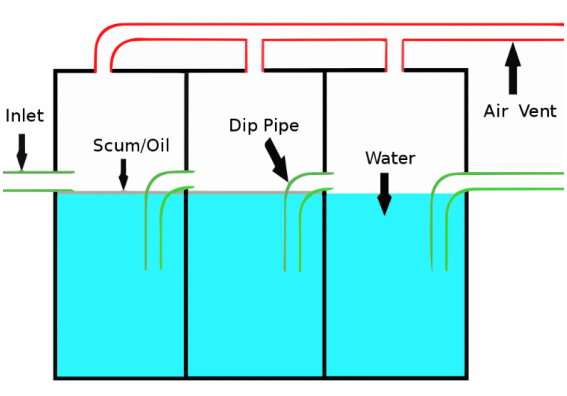
Figure 5 – Table 16.1 from Ciria SuDS Manual 2015

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Site Control

4. Petrol Interceptor

A petrol interceptor is a trap used to filter out hydrocarbon pollutants from rainwater runoff. It is typically used in road construction to prevent fuel contamination of water courses carrying away the runoff.



Petrol interceptors work on the premise that some hydrocarbons such as petroleum and diesel float on the top of water. The contaminated water enters the interceptor typically after flowing off roads and entering a channel drain before being deposited into the first tank inside the interceptor. The first tank builds up a layer of the hydrocarbon as well as other scum preventing it from entering the water course. Details of the proposed Petrol interceptor are shown on Waterman Moylan Drawing No. 20-011-P215.

5. Attenuation Tank

The proposed underground concrete attenuation tank located in the basement will attenuate surface water to restrict the outflow to the equivalent of the existing agricultural runoff. This ensures the development will not give rise to any impact downstream of the site. Details of the proposed Attenuation Tank are shown on Waterman Moylan Drawing No. 20-011-P200.

In conclusion, the water quality from this catchment should be of a high quality due to the above-mentioned measures, which are applied in a treatment train to treat the water before discharge at a restricted rate to the local network. Details of the overall SuDS measures are shown on Waterman Moylan Drawing No. 20-011-P200.

Maintenance of the proposed treatment systems to be in accordance with Table 14.2, Part D, of the Ciria SuDS Manual C753, which sets out maintenance requirements and schedule.

Figure 6 – Table 14.2 from Ciria SuDS Manual 2015

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

3.6 Storm Water Calculation

The total impermeable area of proposed development, including roofs and roads, is approximately 5850m² (0.585 Ha). The permitted outflow for the site is 2l/s in accordance with the criteria set out in Section 3.4.

Calculations for pipe sizes and gradients are based on storm water runoff from the roofs and surfaced areas using the Rational Method for surface water design (Bilhams Formula), with a storm return period (N) of 5 years.

Pipe capacities and velocities have been calculated using Colebrook-White formula with a roughness coefficient (Ks) of 0.6mm.

Excess stormwater shall be attenuated via an underground storage tank on site as indicated in Waterman Moylan Drawing No. 20-011-P200. The proposed storage system will gradually fill up during storm events and will release water after the storm at a controlled rate via Hydrobrake.

The calculations for the storage design are included in Appendix D of this report; these indicate that for a return period of 100 years, the 1,440-minute winter storm is the critical storm and requires a storage volume of approximately 455m³ which includes 20% storage to facilitate climate change.

Refer to Waterman Moylan Drawing 20-011-P210 for details of this attenuation tank and Drawing 20-011-P200 for the corresponding drainage layout proposals. Please see Appendix C for details of the surface water design calculations.

4. Water Supply

4.1 Water Supply – General

It is proposed to connect the site watermain into the existing 150mm cast-iron watermain network running along R108/Phibsborough Road to the east of the subject site. All water supply details shall be in accordance with Irish Water and Dublin City Council's requirements.

A Pre-Connection Enquiry form was also submitted to Irish Water on 21st of January 2020 which outlined the foul water discharge proposal. A response was received on 30th of January 2020 which confirmed that capacity is available and a connection to the local infrastructure can be facilitated. Irish Water have also accepted the water supply proposals as demonstrated by the Statement of Design Acceptance.

Please refer to Appendix A for Irish Water confirmation of feasibility and Statement of Design Acceptance letter.

Water Mains suitable for Works and approved by Irish Water shall be either ductile iron (DI) or polyethylene (PE), with PE80 or PE100 rating (MDPE, HDPE or HPPE).

The minimum depth of cover from the finished ground level to the external crown of a Water Main shall be 900mm. A greater depth of cover and/or greater strength pipe and/or a higher class of bedding may be required where high traffic loading is anticipated. Depths may be altered to avoid obstructions, including separation distances between other utility services. The desirable maximum cover for a Service Connection pipe or a Water Main should be 1200mm, where practicable.

Please refer to Waterman Moylan Drawing 21-011-P300 for details of the watermain to serve the subject lands.

4.2 Water Demand Calculation

An estimate of water demand from the public water supply system for the proposed site has been based on the development of 205 units with an average occupancy of 2.7 persons (in compliance with Irish Water – Code of Practice for Water Infrastructure). Details are shown below.

Table 8: Calculation of proposed Water Demand

Development Description	PE	Flow (l/h/day)	Total Water Demand (l/day)
Residential	554	150	83,025

The average daily demand from the public supply for the development is estimated at 83.03 m^3/day.

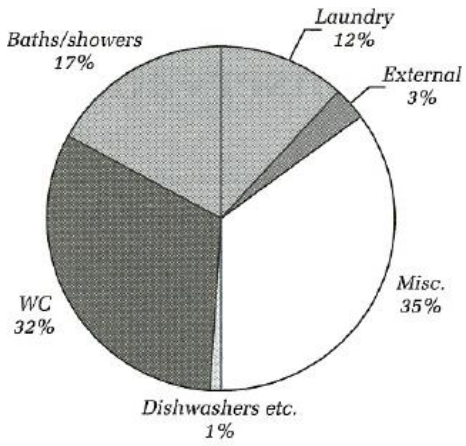
4.3 Water Conservation

The water demand for the development can be subdivided as follows:

- Potable / Non-potable Breakdown

Detailed studies have quantified the breakdown between potable and non-potable uses for residential uses.

The following diagram illustrates the current percentage breakdown of water usage in domestic circumstances and is from Griggs and Shouler 1994 as published in Chapter 11 of 'Water, Sanitary & Waste Services for Buildings' by Wise and Sheffield.



In addition, water conservation measures will be used, to further reduce overall water demand, including:

- Low volume flush / dual flush WC's
- Aerated shower heads
- Spray taps
- Draw off tap controls
- Rainwater reuse – water butts, as outlined above
- Leak detection measures – through the metering of supply

APPENDICES

A. Irish Water Response to Pre-Connection Enquiry

Stephen Dent-Neville
Waterman Moylan
Eastpoint Business Park
Block S
Alfie Byrne Road
Dublin 3
D03H3F4

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

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

www.water.ie

30 January 2020

Dear Stephen Dent-Neville,

Re: Connection Reference No CDS20000427 pre-connection enquiry -
Subject to contract | Contract denied

Connection for Housing Development of 200 unit(s) at Phibsborough Road, Dublin 7.

Irish Water has reviewed your pre-connection enquiry in relation to a water and wastewater connection at Phibsborough Road, Dublin 7.

Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network(s) can be facilitated.

Water:

New connection to the existing network is feasible without upgrade.

This Confirmation of Feasibility to connect to the Irish Water infrastructure also does not extend to your fire flow requirements. Please note that Irish Water cannot guarantee a flow rate to meet fire flow requirements and in order to guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development.

Wastewater:

New connection to the existing network is feasible without upgrade.

The development has to incorporate **Sustainable Drainage Systems/ Attenuation** in the management of stormwater and to reduce surface water inflow into the receiving combined sewer. Full details of these have to be agreed with Dublin City Council.

Strategic Housing Development:

Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. In advance of submitting your full application to An Bord Pleanála for assessment, you must have reviewed this development with Irish Water and received a Statement of Design Acceptance in relation to the layout of water and wastewater services.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details. A design proposal for the water and/or wastewater infrastructure should be submitted to Irish Water for assessment. Prior to submitting your planning application, you are required to submit these detailed design proposals to Irish Water for review.

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

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities.

If you have any further questions, please contact Deirdre Ryan from the design team on 022 54620 or email deiryan@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Stephen Dent-Neville
Eastpoint Business Park,
Block S, Alfie Byrne Road
Dublin 3, Co. Dublin D03H3F4

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

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

www.water.ie

20 January 2021

Re: Design Submission for Phibsborough Road, Dublin 7, Dublin (the "Development") (the "Design Submission") / Connection Reference No: CDS20000427

Dear Stephen Dent-Neville,

Many thanks for your recent Design Submission.

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

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

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

If you have any further questions, please contact your Irish Water representative:
Name: Alvaro Garcia
Email: agarcia@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

Document Title & Revision

20-011 - P010 - Proposed Site Location Map
20-011 - P200 - Proposed Drainage Layout
20-011 - P201 - Proposed Basement Drainage Layout
20-011 - P232 - Public Foul Water Drainage Details - Sheet 1 of 2
20-011 - P233 - Public Foul Water Drainage Details - Sheet 2 of 2
20-011 - P300 - Proposed Watermain Layout
20-011 - P330 - Water Supply Details - Sheet 1 of 3
20-011 - P331 - Water Supply Details - Sheet 2 of 3
20-011 - P332 - Water Supply Details - Sheet 3 of 3

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

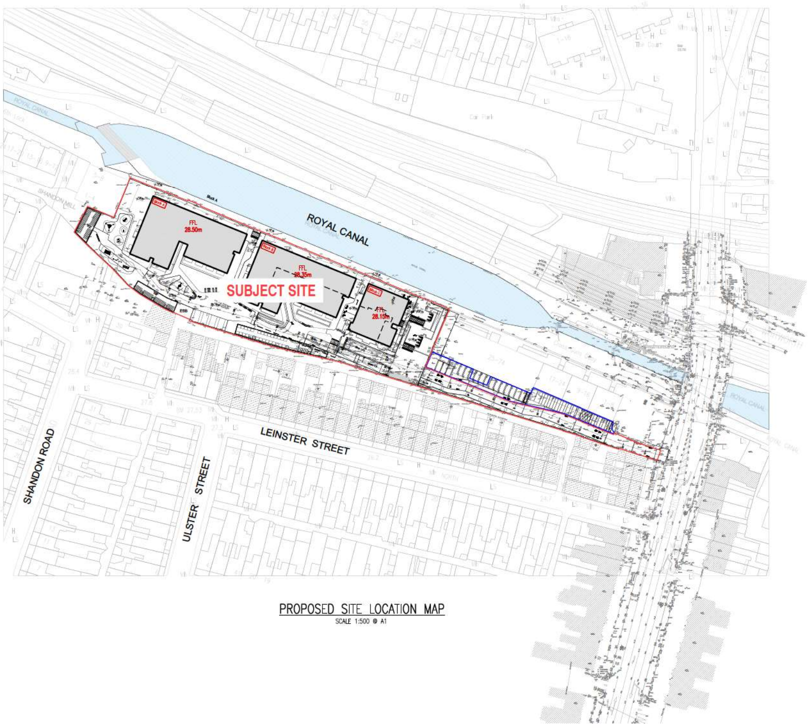
Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements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

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.

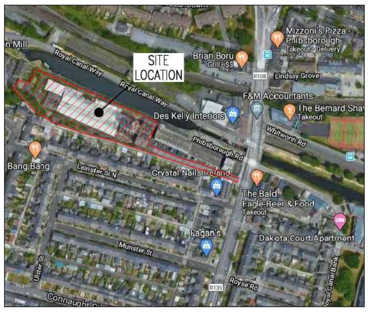
LEGEND:

SITE BOUNDARY SUBJECT TO PLANNING APPLICATION



PROPOSED SITE LOCATION MAP

SCALE 1:500 @ A1



SITE LOCATION PLAN

N.T.S

1:1000 0 20.0 40.0 60.0 80.0 100.0m

1:1 0 10 20 30 40 50 60 70 80 90 100

REV.	DATE	AMENDMENT	DRN	APPD

STATUS **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

Waterman Moylan
Engineering Consultants
BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD, DUBLIN D03 H3F4 IRELAND.
Tel: (01) 664 8900 Fax: (01) 661 3618
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CLIENT BINDFORD LIMITED

ARCHITECT O MAHONY PIKE ARCHITECTS

PROJECT CROSS GUN'S BRIDGE, PHIBSBOROUGH, DUBLIN 7.

TITLE PROPOSED SITE LOCATION MAP

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JG	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
1:1000 @ A1	20-011	P010	

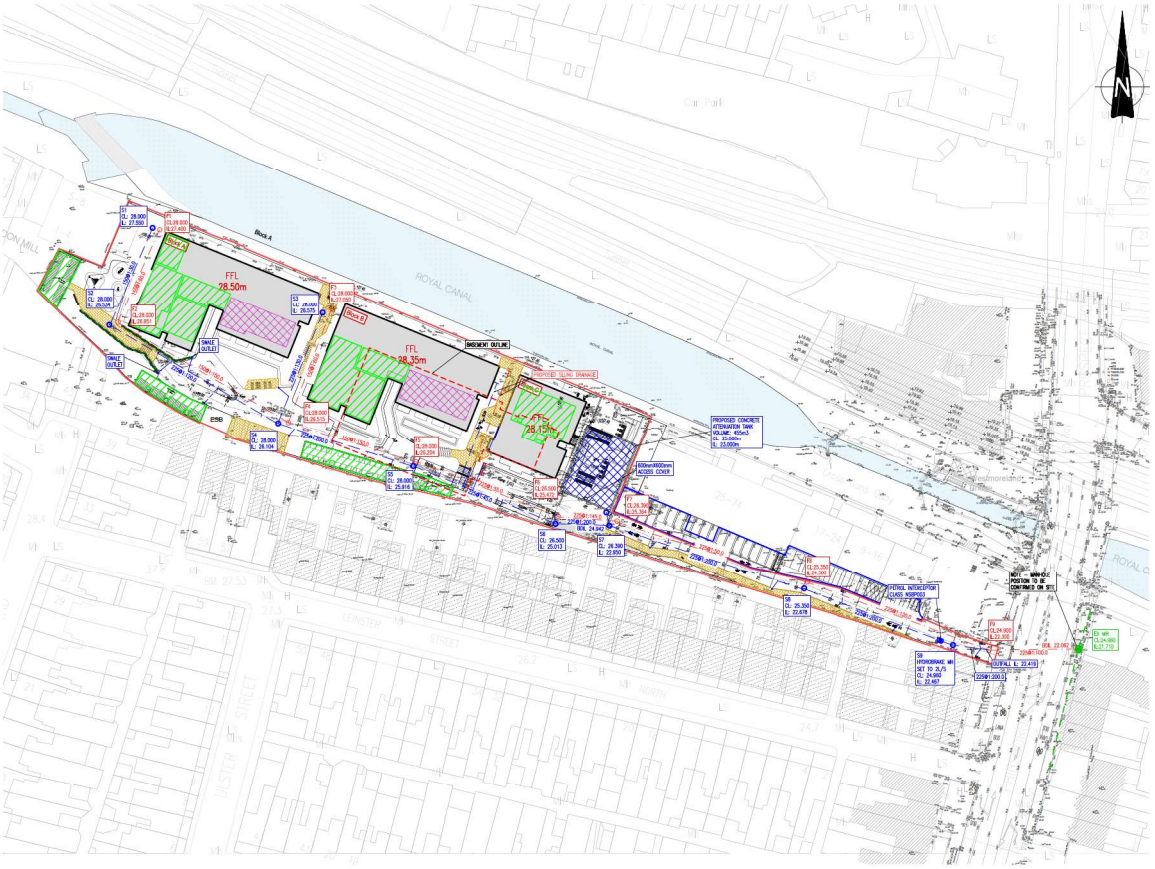
Nov 26, 2020 - 3:37pm Drawing Location: M:\Projects\20\20-011 - Cross Guns Bridge\Drawings\Waterman Moylan\Civil\Planning\Autocad Drawings\20-011 - P010 - Proposed Site Location Map.dwg

NOTE:
PUBLIC FOUL PIPE MATERIAL TO BE U-PVC (STIFFNESS CLASS 8) AND IN COMPLIANCE WITH SECTION 3.13 OF IRISH WATER CODE OF PRACTICE.

NOTE:
FOUL SEWERS TO BE CONSTRUCTED WITH CONCRETE SURROUND IN ACCORDANCE WITH IRISH WATER STD-WW-08 WHERE VERTICAL CLEARANCE FROM SURFACE WATER IS LESS THAN 300mm AND WHERE DEPTH OF COVER TO ROAD IS LESS THAN 1.2m

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.



LEGEND

- PROPOSED uPVC FOUL WATER SEWER WITH PIPE, MANHOLE REF. AND INVERT LEVEL
- PROPOSED SURFACE WATER SEWER WITH PIPE SIZE, GRADE, MANHOLE REF. AND INVERT LEVEL
- INDICATES PROPOSED ROAD GULLY AND CONNECTION
- INDICATES NSBP/003 PETROL INTERCEPTOR
- INDICATES PROPOSED PERMEABLE PAVING DRAINAGE CONNECTION
- BASEMENT BOUNDARY
- INDICATES PROPOSED SWALE WITH LAND DRAIN
- INDICATES EXISTING COMBINED SEWER
- INDICATES PROPOSED GREEN ROOF
- INDICATES PROPOSED BLUE ROOF
- INDICATES PROPOSED PERMEABLE PAVING

1:500 0 10.0 20.0 30.0 40.0 50.0m
1:1 0 10 20 30 40 50 60 70 80 90 100

REV.	DATE	AMENDMENT	DRN	APPD

STATUS: **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

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CLIENT	BINDFORD LIMITED
ARCHITECT	O MAHONY PIKE ARCHITECTS
PROJECT	CROSS GUN'S BRIDGE, PHIBSBOROUGH, DUBLIN 7.
TITLE	PROPOSED DRAINAGE LAYOUT

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JC	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
1:500 @A1	20-011	P200	

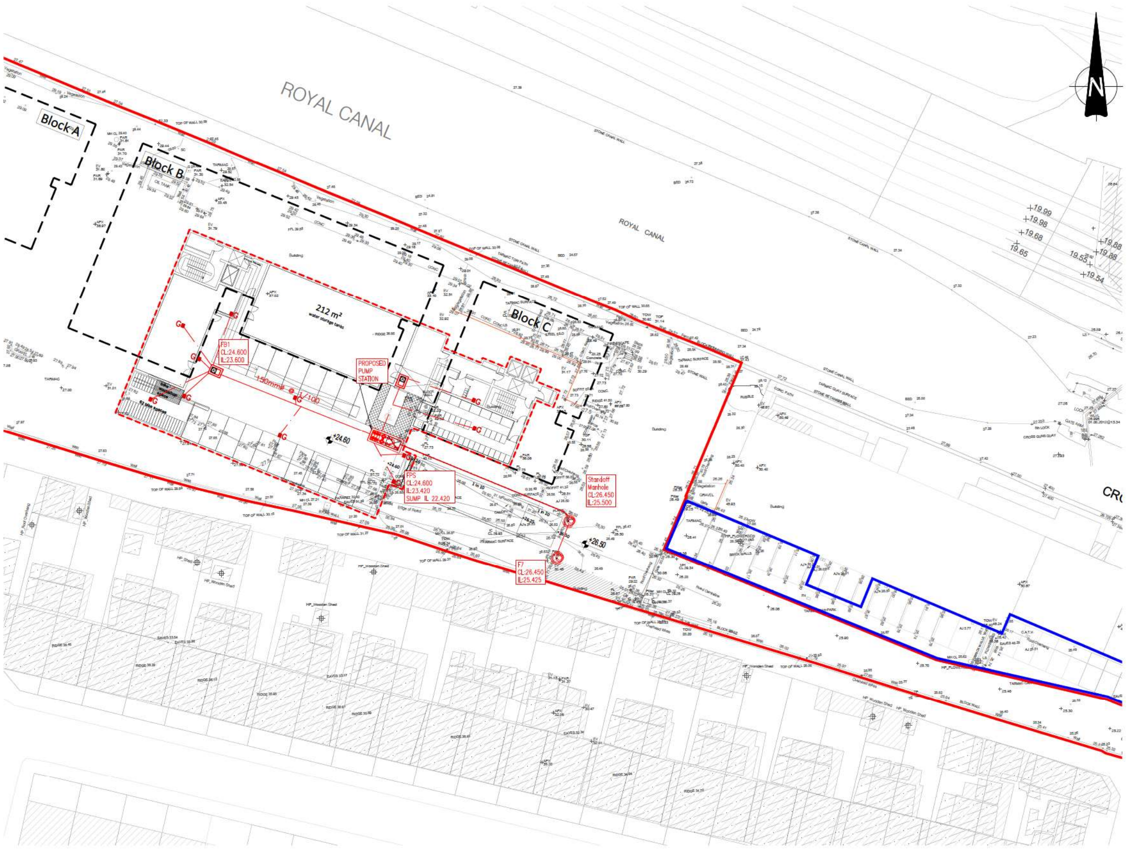
PROPOSED DRAINAGE LAYOUT
SCALE 1:500 @ A1

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.

LEGEND

FB1 CL 7.160m IL 5.150m 150mm. @ 1:150	INDICATES PROPOSED FOUL WATER SEWER, MANHOLE, PIPE SIZE COVER AND INVERT LEVELS.
F1 CL 7.16 IL 5.15 150mmø @1:200	PROPOSED uPVC FOUL WATER SEWER WITH PIPE SIZE, GRADE, MANHOLE REF. AND INVERT LEVEL.
G	INDICATES PROPOSED GULLY AND CONNECTION
	INDICATES PROPOSED RISING MAIN
	BASEMENT BOUNDARY



PROPOSED BASEMENT DRAINAGE LAYOUT

SCALE 1:250 @ A1

1:250 0 5.0 10.0 15.0 20.0 25.0m

1:1 0 10 20 30 40 50 60 70 80 90 100

REV.	DATE	AMENDMENT	DRN	APPD

STATUS **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

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Engineering Consultants

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CLIENT BINDFORD LIMITED

ARCHITECT O MAHONY PIKE ARCHITECTS

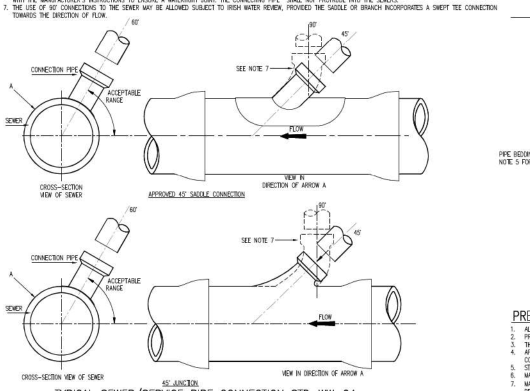
PROJECT CROSS GUN'S BRIDGE, PHIBSBOROUGH, DUBLIN 7.

TITLE PROPOSED BASEMENT DRAINAGE LAYOUT

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JG	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
1:250 @A1	20-011	P201	

SEWER PIPE CONNECTION NOTES:

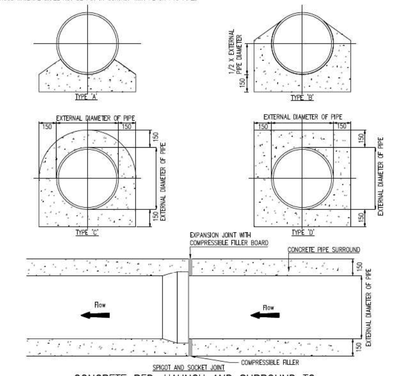
1. ALL DIMENSIONS ARE IN MILLIMETERS(mm) UNLESS NOTED OTHERWISE
2. AS FAR AS PRACTICABLE, JUNCTIONS AND SERVICE CONNECTIONS SHALL BE BUILT IN FOR ALL PLANNED USERS WHEN THE SEWER IS BEING CONSTRUCTED. WHERE IT IS NECESSARY TO MAKE A POST–CONSTRUCTION CONNECTION THE DEVELOPER SHALL BRING THE SEWER TO THE INSPECTION CHAMBER, INSTALL THE INSPECTION CHAMBER AND SEAL THE UPSTREAM END UNTIL THE CONNECTION IS REQUIRED.
3. THE VERTICAL ANGLE BETWEEN THE SERVICE CONNECTING PIPE & THE HORIZONTAL SHALL BE GREATER THAN 0° AND NOT MORE THAN 60°
4. WHERE THE CONNECTION IS BEING MADE TO A SEWER WITH A NOMINAL INTERNAL DIAMETER OF 300mm DIAMETER OR LESS, CONNECTION SHALL BE MADE USING 45° ANGLE JUNCTIONS
5. WHERE THE CONNECTION IS BEING MADE TO A SEWER WITH A NOMINAL INTERNAL DIAMETER GREATER THAN 300mm
   A. IF THE DIAMETER OF THE CONNECTING PIPE IS GREATER THAN HALF THE DIAMETER OF THE SEWER, AN ACCESS MANHOLE SHALL BE CONSTRUCTED TO FORM THE CONNECTION POINT. OR
   B. IF THE DIAMETER OF THE CONNECTING PIPE IS LESS THAN OR EQUAL TO HALF THE DIAMETER OF THE SEWER, THEN THE CONNECTION SHALL BE MADE USING A PREFORMED SADDLE FITTING WITH A SLOW BEND BETWEEN THE SADDLE AND THE CONNECTING SEWER/DRAIN.
6. CONNECTIONS MADE WITH SADDLE FITTINGS SHALL BE MADE BY CUTTING AND SAFELY REMOVING A CORE FROM THE PIPE AND JOINTING THE SADDLE FITTING TO THE PIPE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ENSURE A WATERTIGHT JOINT. THE CONNECTING PIPE SHALL NOT PROTRUDE INTO THE SEWERS.
7. THE USE OF 90° CONNECTIONS TO THE SEWER MAY BE ALLOWED SUBJECT TO IRISH WATER REVIEW, PROVIDED THE SADDLE OR BRANCH INCORPORATES A SWEPT TEE CONNECTION TOWARDS THE DIRECTION OF FLOW.



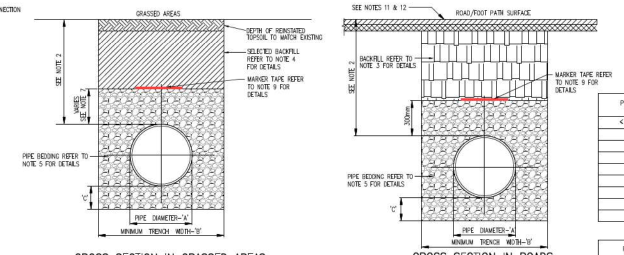
TYPICAL SEWER/SERVICE PIPE CONNECTION STD-WW-04
SCALE 1:25

SURROUND TO WASTEWATER PIPES NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS(mm) UNLESS NOTED OTHERWISE.
2. CONCRETE PIPE BEDS AND HAUNCHES MAY BE REQUIRED TO ADDRESS MINIMUM COVER SITUATIONS, AND SHALL BE SUBJECT TO SUBMISSION AND ASSESSMENT BY IRISH WATER BEFORE ADVANCING WITH THE WORKS.
3. CONCRETE PIPE BEDS AND HAUNCHES SHALL HAVE A MINIMUM THICKNESS OF 150mm WITH AN ABSOLUTE MINIMUM DEPTH OF COVER ABOVE THE EXTERNAL CROWN OF THE PIPE OF 750mm.
4. CONCRETE TO BE IN ACCORDANCE WITH IS EN 206 AND TO BE CLASS C16/20.
5. THE HAUNCHES AND SURROUNDS TO BE FORMED USING FORM WORK TO PROVIDE A ROUGH CAST FINISH.
6. EXPANSION JOINTS IN THE CONCRETE SHALL BE PROVIDED AT ALL PIPE JOINTS TO ALLOW FOR PIPE FLEXIBILITY, COMPRESSIBLE FILLER BOARD TO BE IN ACCORDANCE WITH BS EN 622–1 AND BS EN 622–4, AND TO BE 18mm THICK.
7. POLYETHYLENE PIPES SHALL BE WRAPPED IN PLASTIC SHEETING HAVING A COMPOSITION IN ACCORDANCE WITH BS 6076 BEFORE BEING CAST INTO CONCRETE.
8. BITUMINOUS MATERIAL SHALL NOT BE PUT IN CONTACT WITH PE OR PVC PIPES



CONCRETE BED, HAUNCH AND SURROUND TO WASTEWATER PIPES STD-WW-08
SCALE 1:25



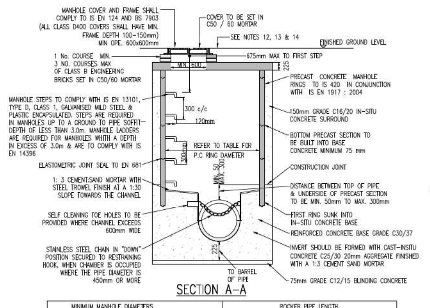
PIPE DIAMETER 'A' (mm)	TRENCH WIDTH 'B' (mm)
< 80 RISING MAIN	SEE NOTE 10
100	500
150	600
200	600
250	750
300	750
350	750
400	900
450	900

PIPE DIAMETER 'A' (mm)	DEPTH OF BEDDING 'C' (mm)
< 100	100
150 – 450	200

TRENCH BACKFILL AND BEDDING STD-WW-07
SCALE 1:25

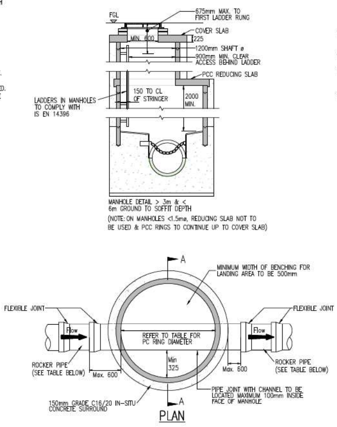
PRE-CAST CONCRETE MANHOLE NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. PRE-CAST MANHOLES UNITS: COMPLYING WITH REQUIREMENTS OF IS EN 1917 AND BS 5911–PART 3.
3. THICKER MANHOLE BASES REQUIRED FOR SEWERS IN EXCESS OF 3m DEEP WHERE THE SIZE IS GREATER THAN THE STANDARD MINIMUM SIZE.
4. APPROVED PRE–CAST CONCRETE BASES MAY BE USED INCORPORATING CHANNELS, BENCHING ETC. SUBJECT TO IRISH WATER REVIEW AND COMPLYING WITH BS 5911–PART 4 2002.
5. STRUCTURAL DESIGN AND REINFORCEMENT DETAILS TO BE PROVIDED BY THE DEVELOPER AND SUBMITTED TO IRISH WATER FOR REVIEW.
6. MANHOLES GREATER THAN 3m IN DEPTH WILL REQUIRE A DETAILED STRUCTURAL DESIGN AND BE SUBJECT TO IRISH WATER REVIEW.
7. MANHOLE ROOFS SHALL CONSIST OF A RE–INFORCED CONCRETE SLAB OF IN–SITU CONCRETE, C30/37, WITH A MINIMUM THICKNESS OF 225mm DESIGNED TO CARRY ALL LIVE AND DEAD LOADS. ALTERNATIVELY, APPROVED PRE–CAST CONCRETE ROOF SLABS MAY BE USED SUBJECT TO IRISH WATER REVIEW AND COMPLIANCE WITH BS 5911 PART 4: 2002.
8. COVERS AND FRAMES SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS SUBJECT TO REVIEW BY IRISH WATER.
9. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH AROUND COVERS IN GREEN AREAS.
10. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO REVIEW BY IRISH WATER.
11. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206 : 2013.
12. ANY SPECIAL ROAD REINSTATEMENT AROUND COVER & FRAME SHALL BE TO ROAD AUTHORITY'S REQUIREMENTS.
13. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
14. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.
15. IF DEPTH FROM GROUND TO PIPE SOFFIT IS GREATER THAN 6m DEEP, A SITE SPECIFIC ENGINEERED SOLUTION FOR ACCESS SHALL BE PROVIDED.
16. PROPRIETARY WATERTIGHT PCC MANHOLE RING SYSTEMS WITH A WALL THICKNESS > 125mm, & A WATER TIGHT JOINT SEALING SYSTEM, MAY BE USED WITHOUT CONCRETE SURROUND, SUBJECT TO THE GROUND WATER LEVEL AT THE MANHOLE BEING LOW, & SUBJECT TO REVIEW BY IRISH WATER.



SECTION A-A

MINIMUM MANHOLE DIAMETERS		ROCKER PIPE LENGTH	
DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)	DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200	150 TO 600	600
375 TO 450	1350	GREATER THAN 600 TO 750	1000
500 TO 750	1500	GREATER THAN 750	1250



PRE-CAST CONCRETE MANHOLE STD-WW-10
SCALE 1:25

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. THE MINIMUM DEPTH OF COVER FROM THE FINISHED SURFACE TO THE CROWN OF GRAVITY PIPES WITHOUT PROTECTION SHOULD BE AS FOLLOWS:
   a. GARDENS AND PATHWAYS WITHOUT ANY POSSIBILITY OF VEHICULAR ACCESS – DEPTH NOT LESS THAN 0.5 M. (THIS WOULD NORMALLY RELATE TO DRAINS IN PRIVATE PROPERTY, SHALLOW PIPES OF THIS NATURE ARE UNDESIRABLE AND SHOULD BE INSTALLED IN ACCORDANCE WITH THE CURRENT BUILDING REGULATIONS).
   b. DRIVEWAYS, PARKING AREAS AND YARDS WITH HEIGHT RESTRICTIONS TO PREVENT ENTRY BY VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES – DEPTH NOT LESS THAN 0.75 M.
   c. DRIVEWAYS, PARKING AREAS AND NARROW STREETS WITHOUT FOOTWAYS (E.G. MEWS DEVELOPMENTS) WITH LIMITED ACCESS FOR VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES – DEPTH NOT LESS THAN 0.9 M.
   d. DEPTHS OF SEWERS IN GATED ESTATES SHALL BE SIMILAR TO THAT OUTLINED ABOVE.
   e. AGRICULTURAL LAND AND PUBLIC OPEN SPACE – DEPTH NOT LESS THAN 0.9 M.
   f. OTHER HIGHWAYS AND PARKING AREAS WITH UNRESTRICTED ACCESS TO VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES – DEPTH NOT LESS THAN 1.2 M.
3. CLAUSE 804/808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS IS TO BE USED AS BACKFILL MATERIAL WHERE THE SEWER MAIN IS LOCATED IN ROADS, FOOTPATHS OR WHEN THE NEAREST PART OF THE TRENCH IS WITHIN 1m OF THE PAVED EDGE OF THE ROADWAY. CLAUSE 804/808 IS TO BE COMPACTED AS PER CLAUSE 802 OF THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS. CLAUSE 808 IS TO BE USED WITHIN 500mm OF CEMENT BOUND MATERIALS, CONCRETE PAVEMENTS, CONCRETE STRUCTURES OR CONCRETE PRODUCTS. OTHERWISE CLAUSE 804 MAY BE USED. ALTERNATIVE BACKFILL MATERIAL TO THAT DESCRIBED ABOVE (CLAUSE 804 OR CLAUSE 808) OF THE PIPE TRENCH WILL ONLY BE ALLOWED BY IRISH WATER WHERE THE ROADS AUTHORITY IN WHOSE FUNCTIONAL AREA THE DEVELOPMENT IS LOCATED, PROVIDES WRITTEN APPROVAL TO THE DEVELOPER TO USE SUCH ALTERNATIVE MATERIAL.
4. SELECTED EXCAVATED MATERIAL MAY BE USED IN GREEN–FIELD AREAS ABOVE GRANULAR PIPE SURROUND MATERIAL SUBJECT TO THE APPROVAL OF IRISH WATER.
5. PIPE BEDDING SHALL COMPLY WITH WIS 4–08–02 AND IGN 4–08–01 GRANULAR MATERIAL SHALL BE 14mm TO 5mm GRADED AGGREGATE OR 10mm SINGLE SIZED AGGREGATE IS EN 13242 CONCRETE BED HAUNCH & SURROUND WHERE REQUIRED SHALL BE TO STD–WW–08.
6. IN SOFT GROUND CONDITIONS (CBR < 5) THE MATERIAL SHOULD BE EXCAVATED AND DISPOSED OF IN ACCORDANCE WITH THE WASTE MANAGEMENT ACT AND CLAUSE 808 MATERIAL IN ACCORDANCE WITH THE THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS SHALL REPLACE THE EXCAVATED MATERIAL, WRAPPED IN GEO–TEXTILE WRAPPING. ALTERNATIVELY, SPECIAL PIPE SUPPORT ARRANGEMENTS, INCLUDING PILING ETC. MAY BE REQUIRED WHERE THE DEPTH OF SOFT MATERIAL IS EXCESSIVE. SUCH ARRANGEMENTS SHALL BE SUBJECT TO ASSESSMENT BY IRISH WATER BEFORE ADVANCING WITH THE WORK.
7. IN GREEN FIELD AREAS, TYPE B BACKFILL (SELECTED EXCAVATED MATERIAL) WILL BE ALLOWED ABOVE THE SIDE HAUNCH GRANULAR MATERIAL IN THE CASE OF RIGID PIPES. A GRANULAR SURROUND OF A MINIMUM DEPTH OF 150mm ABOVE THE CROWN OF THE PIPE IS REQUIRED FOR FLEXIBLE PIPES , AND TYPE B MATERIAL MAY BE USED AS BACKFILL ABOVE THIS. ALL RISING MAINS IN GREENFIELD AREAS SHALL HAVE A MINIMUM COVER OF 300mm OF GRANULAR MATERIAL ABOVE THE EXTERNAL CROWN OF THE PIPE.
8. PIPES SHALL NOT BE SUPPORTED ON STONES, ROCKS OR ANY HARD OBJECTS AT ANY POINT ALONG THE TRENCH. ROCK SHALL BE EXCAVATED TO A DEPTH OF 150mm BELOW THE ACTUAL DEPTH OF THE TRENCH WITH THE VOID FILLED WITH CLAUSE 808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS. THE GRANULAR MATERIAL SHALL BE LAID ABOVE THIS VOID BACKFILL MATERIAL.
9. NON DEGRADABLE MARKER TAPE SHOULD BE INSTALLED 350mm FROM THE SURFACE OF THE ROAD. IN THE CASE OF NON METAL PIPE MATERIAL, THE MARKER TAPE SHOULD INCORPORATE A TRACE WIRE WHICH IS LINKED TO FITTINGS AND TERMINATED AT THE WASTE WATER PUMPING STATION AND THE DISCHARGE MANHOLE.
10. TRENCH WIDTH FOR PIPE SIZE <80mm MAY BE <500mm SUBJECT TO CONSIDERATION BEING GIVEN TO THE TRENCH DEPTH, HEALTH & SAFETY, CONSTRUCTION ACCESS REQUIREMENTS.
11. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
12. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENING IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.
13. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT ALL WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE IRISH WATER CODE OF PRACTICE AND STANDARD DETAILS. THE CODE OF PRACTICE AND STANDARD DETAILS ARE AVAILABLE TO DOWNLOAD FROM THE IRISH WATER WEB SITE AT WWW.WATER.IE/CONNECTIONS/DEVELOPER-SERVICES/ WHERE THE DETAILS CONTAINED ON THIS DRAWING DIFFER FROM THE IRISH WATER CODE OF PRACTICE OR STANDARD DETAILS THIS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY. IRISH WATER STANDARDS WILL TAKE PRECEDENCE

1:25 0 0.5 1.0 1.5 2.0 2.5m
1:1 0 10 20 30 40 50 60 70 80 90 100m

REV.	DATE	AMENDMENT	DRN	APPD

STATUS **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

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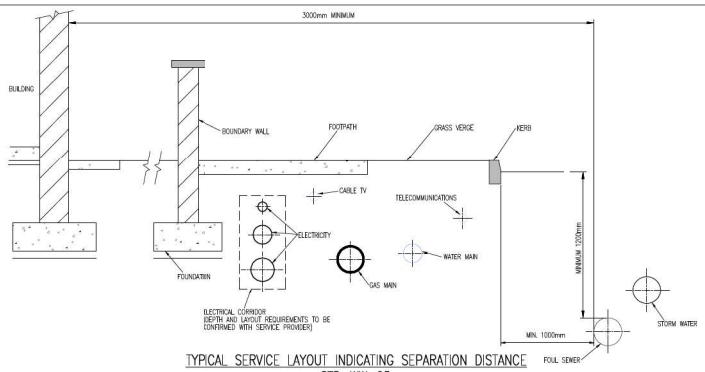
CLIENT BINDFORD LIMITED
ARCHITECT O MAHONY PIKE ARCHITECTS
PROJECT CROSS GUN'S BRIDGE, PHIBSBOROUGH, DUBLIN 7
TITLE PUBLIC FOUL WATER DRAINAGE DETAILS SHEET 1 OF 2

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JG	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
1:25 @A1	20-011	P232	

SERVICE LAYOUT NOTES:

1. THE SEPARATION DISTANCES OUTLINED ARE MINIMUM REQUIREMENTS.
2. SPECIFIC SEPARATION CLEARANCE DISTANCES IN EXCESS OF THESE MINIMA SHALL BE PROVIDED FOR SERVICES SUCH AS GAS, ELECTRICITY, FIBRE-OPTIC OR OIL FILLED CABLES AS THE CASE MAY BE. THE PARTICULAR UTILITY PROVIDERS SHALL BE CONSULTED TO DETERMINE THESE MINIMUM SEPARATION DISTANCES AND EVIDENCE OF THIS CONSULTATION, WITH THE SPECIFIED SEPARATION DISTANCES, SHALL BE PROVIDED TO IRISH WATER AT DESIGN STAGE.
3. NOTIFICATION IN WRITING IS REQUIRED SHOULD WORKS BE WITHIN THE FOLLOWING DISTANCES FROM AN EXISTING WATER MAIN OR WASTEWATER RISING MAIN:– HORIZONTAL:
   1m AT EITHER SIDE OF AN EXISTING MAIN LESS THAN 200mm IN DIAMETER.
   2m AT EITHER SIDE OF AN EXISTING MAIN OF 200mm TO 350mm IN DIAMETER.
   5m AT EITHER SIDE OF AN EXISTING MAIN OF 350mm OR GREATER IN DIAMETER.
   WHERE DUCTS OR PIPES ARE TO BE LAID CLOSE TO AN EXISTING WATERMAIN OR SEWER IN THE OWNERSHIP OF IRISH WATER, NOTIFICATION IN WRITING SHALL BE PROVIDED A MINIMUM OF 10 DAYS AHEAD OF ADVANCEMENT OF THE WORK.
   NOTIFICATION IN WRITING IS REQUIRED SHOULD WORKS BE WITHIN 1.5m DISTANCE OF A WASTEWATER SEWER.
   REQUIREMENTS SHALL ALSO APPLY TO TRIAL HOLES OR SLIT TRENCHES TO LOCATE THE MAIN OR GAIN GROUND INFO DATA.
   LARGER DIAMETERS >350mm DISTRIBUTION AND TRUNK MAINS, IRISH WATER MUST BE NOTIFIED AT LEAST 1 MONTH IN ADVANCE.
   DEVELOPERS SHALL ALSO COMPLY WITH ANY NOTIFICATION REQUIREMENTS OF OTHER UTILITY PROVIDERS (ESB, GAS MAIN, TELECOMMUNICATION ETC.).
4. DETAILED PROPOSALS, INCLUDING WORK METHOD STATEMENTS, INSURANCE CONFIRMATION AND DETAILS OF WORK COMPLETED OF A SIMILAR NATURE MUST BE SUBMITTED TO IRISH WATER FOR ITS CONSIDERATION BEFORE AGREEMENT WILL ISSUE.ALL SUCH WORKS IN THE VICINITY OF ARTERIAL WATER MAINS AND SEWERS (MAINS GREATER THAN 400mm) SHALL BE SUBJECT TO WRITTEN AGREEMENT WITH IRISH WATER BEFORE CONSTRUCTION COMMENCES ON SITE. THIS AGREEMENT SHALL ALSO INCLUDE ANY NECESSARY PROTECTION FOR WATER MAINS.
5. ANY DAMAGE SHALL BE NOTIFIED IMMEDIATELY TO IRISH WATER. THE PERSON WHO CAUSES THE DAMAGE TO A SEWER MAIN OR FITTING WILL BE DEEMED TO HAVE COMMITTED AN OFFENCE UNDER SECTION 45 OF THE WATER SERVICES ACT 2007.
6. UNDER NO CIRCUMSTANCES WILL IRISH WATER ACCEPT SEWER MAIN INSTALLATIONS UNDER STRUCTURES, EXISTING OR PROPOSED, OR IN CLOSE PROXIMITY TO ANY EXISTING STRUCTURES OR FEATURES THAT WILL INHIBIT ACCESS FOR POST INSTALLATION MAINTENANCE AND ACCESS.
7. THE MINIMUM CLEAR DISTANCE WILL BE INCREASED IF THE SEWER IS GREATER THAN 3m DEEP OR IF THE DIAMETER IS GREATER THAN 375mm. THE MINIMUM CLEAR DISTANCE IN THESE SITUATIONS SHALL BE > DEPTH TO INVERT OR 10 TIMES THE SEWER DIAMETER, WHICH EVER IS GREATER.
8. THE EXTERNAL FACES OF MANHOLE SHALL BE AT LEAST 0.5m FROM KERB LINE
9. WHERE DESIGN DEVIATES FROM TYPICAL DETAILS, THE LAYOUT IS SUBJECT TO REVIEW BY IRISH WATER.



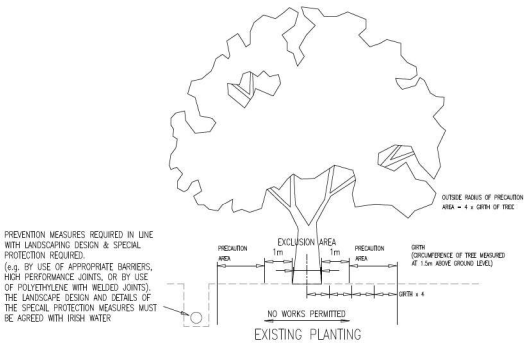
TYPICAL SERVICE LAYOUT INDICATING SEPARATION DISTANCE
STD–WW–05
NTS

NOTES:
1. DO NOT SCALE USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.

METHOD STATEMENTS: ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH BS 5837 AND INFORMED BY NJUG VOLUME 4.

PRECAUTION AREA: EXCAVATIONS FOR PIPEWORK SHOULD NOT BE UNDERTAKEN WITHIN THIS AREA, UNLESS AGREED WITH IRISH WATER. WORKS WITHIN THE PRECAUTION ZONE MUST BE SUPERVISED BY A QUALIFIED ARBORIST. WORKS SHALL BE SUBJECT OF A CLEAR METHOD STATEMENT OUTLINING ALL WORKS ADJACENT TO THE TREES/SHRUBS WHICH IS TO BE PREPARED & AGREED IN ADVANCE OF THE WORKS. MATERIAL, PLANT & SPOIL SHALL NOT BE STORED WITHIN THIS ZONE.

EXCLUSION AREA: WORKS IN THIS AREA ARE TO BE AVOIDED, UNLESS ABSOLUTELY NECESSARY & AGREED WITH IRISH WATER. EXCAVATIONS FOR PIPEWORK SHOULD NOT BE UNDERTAKEN WITHIN THIS AREA, UNLESS NECESSARY AND NO OTHER OPTIONS AVAILABLE. WORKS WITHIN THE EXCLUSION ZONE MUST BE SUPERVISED BY A QUALIFIED ARBORIST AND AGREED WITH IRISH WATER. WORKS SHALL BE SUBJECT OF AN ARBORICULTURAL IMPACT ASSESSMENT AS PER BS 5837 & A CLEAR METHOD STATEMENT OUTLINING ALL WORKS ADJACENT TO THE TREES/SHRUBS IS TO BE PREPARED AND AGREED IN ADVANCE OF THE WORKS. MATERIAL, PLANT & SPOIL SHALL NOT BE STORED WITHIN THIS ZONE.



RESTRICTION ON WASTEWATER INFRASTRUCTURE WORKS ADJACENT TO TREES
STD–WW–06
NTS

THE DISTANCES GIVEN IN TABLE A.1. OF BS 5837 MUST BE FURTHER INFORMED BY THE SPECIES & IN DIAGRAM 2 BELOW. DIAGRAM 1 ABOVE PROVIDES A FLOW CHART TO THE DECISION PROCESS WHILST DIAGRAM 2 BELOW IS TO BE USED TO INFORM THE PLANTING REGIME.

PLEASE NOTE THAT TABLE A.1. OF BS 5837 (BELOW) IS TO BE USED TO CALCULATE THE ABSOLUTE MINIMUM DISTANCE BETWEEN NEW TREE PLANTING FROM THE WASTEWATER INFRASTRUCTURE (THE SERVICES). THE DISTANCE IS REQUIRED TO AVOID DIRECT DAMAGE TO THE INFRASTRUCTURE FROM FUTURE GROWTH. THE DISTANCE IS A FUNCTION OF THE DEPTH OF THE SERVICES AND THE (FINAL EXPECTED) STEM DIAMETER OF THE TREE AT MATURITY (i.e. FINAL EXPECTED GROWTH).

TABLE A.1. BS 5837	Minimum distance between young trees or new planting & structures, in metres (m)		
	Final stem dia. < 300mm	Final stem dia. 300mm to 600mm	Final stem dia. > 600mm
Services			
< 1m deep	0.5	1.5	3.0
> 1m deep	—	1.0	2.0

THUS FOR EXAMPLE:
- FOR A SERVICE LESS THAN 1 METRE DEEP, THE MINIMUM DISTANCE IS TO BE 1.5m FOR A TREE BETWEEN 300 AND 600mm STEM DIAMETER AT MATURITY.
- FOR A SERVICE GREATER THAN 1 METRE DEEP, THE MINIMUM DISTANCE IS TO BE 1.0m FOR A TREE BETWEEN 300 AND 600mm STEM DIAMETER AT MATURITY.

NOTE: RESTRICTIONS RELATE TO INFRASTRUCTURE WITHOUT ROOT INTRUSION PROTECTION.

THE DESIGN OF LANDSCAPING SHALL BE UNDERTAKEN IN CONJUNCTION WITH THE DESIGN OF WASTEWATER INFRASTRUCTURE, ETC. THE TREE/BUSH/SHRUB SHALL NOT BE LOCATED CLOSER TO THE WASTEWATER INFRASTRUCTURE THAN INDICATED ABOVE, EXCEPT WHERE SPECIAL PROTECTION MEASURES ARE PROVIDED. WHERE THERE IS A RISK OF TREE/ROOT INTRUSION, THE WASTEWATER INFRASTRUCTURE SHALL BE RESISTANT TO TREE ROOT INGRESS (e.g. BY USE OF APPROPRIATE BARRIERS, HIGH PERFORMANCE JOINTS, OR BY USE OF POLYETHYLENE WITH WELDED JOINTS FOR RISING MAINS). THE LANDSCAPE DESIGN AND DETAILS OF THE SPECIAL PROTECTION MEASURES MUST BE AGREED WITH IRISH WATER.

A TREE SHALL NOT BE PLANTED DIRECTLY OVER WASTEWATER INFRASTRUCTURE WHERE EXCAVATION OF THE INFRASTRUCTURE WOULD REQUIRE REMOVAL OF THE TREE UNLESS SUCH PLANTING IS AGREED WITH IRISH WATER AND IN GENERAL ONLY SHALLOW ROOTING SHRUBS SHALL BE PLANTED CLOSE TO WASTEWATER INFRASTRUCTURE.

PLEASE ENSURE THAT THESE DISTANCES ARE ADHERED TO IN ORDER TO PROTECT THE TREES FROM ANY FUTURE MAINTENANCE. REFERENCE SHOULD ALSO BE MADE TO BS 5837, BS 8545 AND THE NJUG GUIDELINES VOLUME 4 FOR FURTHER INFORMATION.

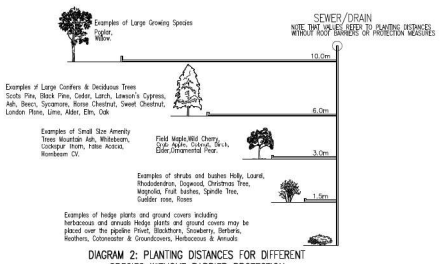


DIAGRAM 2: PLANTING DISTANCES FOR DIFFERENT SPECIES WITHOUT BARRIER PROTECTION

REV.	DATE	AMENDMENT	DRN	APPD

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CLIENT: BINDFORD LIMITED

ARCHITECT: O MAHONY PIKE ARCHITECTS

PROJECT: CROSS GUN'S BRIDGE, PHIBSBOROUGH, DUBLIN 7.

TITLE: PUBLIC FOUL WATER DRAINAGE DETAILS SHEET 2 OF 2

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JC	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
N.T.S.	20–011	P233	

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.

LEGEND

- SITE BOUNDARY
- PROPOSED 150mmØ PE WATERMAIN
- SV — PROPOSED SLUICE VALVE
- H — PROPOSED HYDRANT
- PROPOSED BULK WATER METER
- AV — PROPOSED AIR VALVE
- EX XXXmm Ø — EXISTING WATERMAIN

NOTE:
WATERMAIN MATERIAL TO BE PE 100 (SDR 11 OR 17) IN COMPLIANCE WITH SECTION 3.9 OF IRISH WATER, 'WATER SUPPLY INFRASTRUCTURE CODE OF PRACTICE'

NOTE:
AIR VALVE AND HYDRANTS COVERS, WHERE LOCATED IN GRASS AREAS, SHALL BE SURROUNDED BY A CONCRETE PLINTH IN COMPLIANCE WITH SECTION 3.18 OF IRISH WATER, 'WATER SUPPLY INFRASTRUCTURE CODE OF PRACTICE'

NOTE:
THRUST BLOCKS TO BE PROVIDED AT EACH BEND ALONG THE COURSE OF THE WATERMAIN IN COMPLIANCE WITH SECTION 4.6 OF IRISH WATER, 'WATER SUPPLY INFRASTRUCTURE CODE OF PRACTICE'

NOTE:
ENSURE DEPTH OF COVER TO WATERMAIN CROWN IS ACHIEVED IN COMPLIANCE WITH SECTION 3.11 OF IRISH WATER, 'WATER SUPPLY INFRASTRUCTURE CODE OF PRACTICE'

1:500 0 10.0 20.0 30.0 40.0 50.0m
1:1 0 10 20 30 40 50 60 70 80 90 100

REV.	DATE	AMENDMENT	DRN	APPD

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CLIENT BINDFORD LIMITED
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PROJECT
CROSS GUN'S BRIDGE,
PHIBSBOROUGH,
DUBLIN 7.

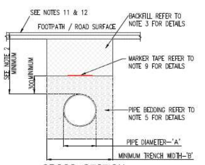
TITLE
PROPOSED WATERMAIN LAYOUT

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JG	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
1:500 @A1	20-011	P300	

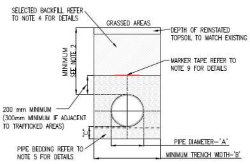
PROPOSED WATERMAIN LAYOUT

SCALE 1:500 @ A1

Nov 26, 2020 - 6:06pm Drawing Location: M:\Projects\20\20-011 - Cross Guns Bridge\Drawings\Waterman Moylan\Civil\Planning\Autocad Drawings\20-011 - P300 - Proposed Watermain Layout.dwg



CROSS SECTION IN ROADWAY



CROSS SECTION IN GRASSED AREA

NOTE:
ALL ROAD JOINTS TO BE SAW CUT AND SEALED WITH BITUMEN

TRENCH BACKFILL AND BEDDING
STD-W-13

PIPE DIAMETER 'A' (mm)	TRENCH WIDTH 'B' (mm)
< 80	SEE NOTE 10
100	500
150	600
200	600
250	750
300	750
350	750
400	900
450	900

PIPE DIAMETER 'A' (mm)	DEPTH OF BEDDING 'C' (mm)
< 200	150
> 250	200

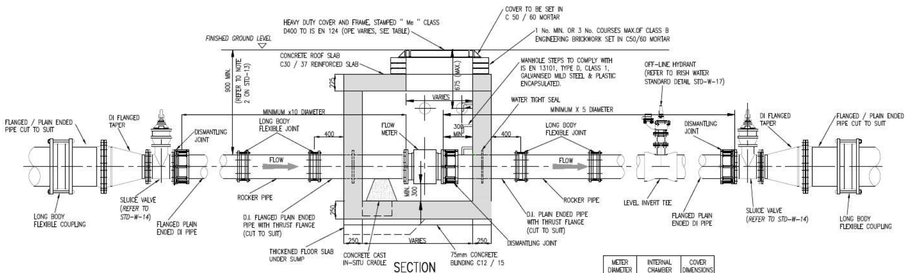
PIPE BEDDING NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. THE MINIMUM DEPTH OF COVER FROM THE FINISHED GROUND LEVEL TO THE EXTERNAL CROWN OF THE PIPE SHALL BE 900mm WHERE THE PIPE IS TO BE LOCATED IN HOUSING ESTATE ROADS. GREATER DEPTHS OF COVER AND/OR PIPE STRENGTH AND/OR A HIGHER CLASS OF BEDDING MATERIAL MAY BE REQUIRED WHERE HIGH TRAFFIC LOADING IS ANTICIPATED. THE DESIRABLE COVER FOR A WATERMAIN SHOULD BE 1200mm, WHERE PRACTICABLE & SHOULD NOT EXCEED 3.0m.
3. CLAUSE 804 / 808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS IS TO BE USED AS BACKFILL MATERIAL WHERE THE WATER MAIN IS LOCATED IN ROADS, FOOTPATHS OR WHEN THE NEAREST PART OF THE TRENCH IS WITHIN 1m OF THE PAVED EDGE OF THE ROADWAY. CLAUSE 804 / 808 IS TO BE COMPACTED AS PER CLAUSE 802 OF THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS. CLAUSE 808 IS TO BE USED WITHIN 500mm OF CEMENT BOUND MATERIALS, CONCRETE PAVEMENTS, CONCRETE STRUCTURES OR CONCRETE PRODUCTS. OTHERWISE CLAUSE 804 MAY BE USED. ALTERNATIVE BACKFILL MATERIAL TO THAT DESCRIBED ABOVE (CLAUSE 804 OR CLAUSE 808) OF THE PIPE TRENCH WILL ONLY BE ALLOWED BY IRISH WATER WHERE THE ROADS AUTHORITY IN WHOSE FUNCTIONAL AREA THE DEVELOPMENT IS LOCATED, PROVIDES WRITTEN APPROVAL TO THE DEVELOPER TO THE USE SUCH ALTERNATIVE MATERIAL.
4. SELECTED EXCAVATED MATERIAL MAY BE USED IN GREEN-FIELD AREAS ABOVE GRANULAR PIPE SURROUND MATERIAL SUBJECT TO REVIEW BY IRISH WATER.
5. PIPE BEDDING SHALL COMPLY WITH WIS 4-08-02 AND IGN 4-08-01 GRANULAR MATERIAL SHALL BE 14mm TO 5mm GRADED AGGREGATE OR 10mm SINGLE SIZED AGGREGATE TO IS EN 13242.
6. IN SOFT GROUND CONDITIONS (CBR < 5) THE MATERIAL SHOULD BE EXCAVATED OUT AND DISPOSED OF IN ACCORDANCE WITH THE WASTE MANAGEMENT ACT AND CLAUSE 804 / 808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS SHALL REPLACE THE EXCAVATED MATERIAL, WRAPPED IN GEO-TEXTILE WRAPPING. ALTERNATIVELY, SPECIAL PIPE SUPPORT ARRANGEMENTS, INCLUDING PILING ETC. MAY BE REQUIRED WHERE THE DEPTH OF SOFT MATERIAL IS EXCESSIVE. SUCH ARRANGEMENTS SHALL BE SUBJECT TO ASSESSMENT BY IRISH WATER BEFORE ADVANCING WITH THE WORK.
7. PIPES SHALL NOT BE SUPPORTED ON STONES OR ROCKS, OR ANY HARD OBJECT AT ANY POINT ALONG THE TRENCH. ROCK SHALL BE EXCAVATED TO A DEPTH OF 150mm BELOW THE ACTUAL DEPTH OF THE TRENCH WITH THE VOID FILLED WITH CLAUSE 804 / 808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS. THE GRANULAR MATERIAL SHALL BE LAID ABOVE THIS VOID BACKFILL MATERIAL.
8. SHOULD MINIMUM COVER NOT BE ACHIEVABLE, CONCRETE GRADE C8/10 SHALL BE USED AS BACKFILL MATERIAL.
9. MARKER TAPE TO BE 400mm WIDE BLUE POLYETHYLENE MATERIAL IN ACCORDANCE WITH EN 12163, PLASTIC PIPES SHALL HAVE WARNING TAPE INCORPORATED A REINFORCED BAND BRACING WIRE. SERVICE PIPES SHALL HAVE 200mm WIDE MESH TAPE. MARKER TAPE TO BE LAID AT TOP OF PIPE BEDDING LAYER.
10. TRENCH WIDTHS FOR PIPE SIZES ≤80mm MAY BE <500mm, SUBJECT TO CONSIDERATION BEING GIVEN TO THE TRENCH DEPTH, HEALTH & SAFETY & CONSTRUCTION ACCESS REQUIREMENTS.
11. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
12. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.

NOTES:
1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.
3. WATERMAINS SHALL BE LAID IN ACCORDANCE WITH THE LOCAL AUTHORITY / IRISH WATER SPECIFICATION FOR THE LAYING OF NEW WATERMAINS AND BYLAWS WHICH OVER-RIDE THESE NOTES. THE CONSTRUCTION OF THE WATERMAIN SHALL BE IN ACCORDANCE WITH THE BEST CURRENT PRACTICE AND THE LATEST EDITIONS OF THE RELEVANT STANDARDS AND CODES OF PRACTICE.
4. WATERMAINS SHALL NOT BE LAID UNDER WALLS OR AREAS DESIGNATED FOR TREES/SHRUBS/FLOWERS.
5. PIPES SHALL BE HDPE (BLUE PIPE) UNLESS NOTED OTHERWISE BY AGREEMENT WITH THE LOCAL AUTHORITY. DUCTILE IRON PIPES SHALL BE USED UNDER ROADS OF CLASSIFICATION "DISTRICT DISTRIBUTOR" UPWARDS UNLESS NOTED OTHERWISE.
6. PIPES SHALL CONFORM TO THE UK WATER INDUSTRY SPECIFICATION OR EQUIVALENT E.U. SPECIFICATION.
7. DUCTILE IRON (DI) PIPES SHALL CONFORM TO IS EN 545 AND SHALL HAVE MINIMUM C40 PRESSURE RATING. DUCTILE IRON FITTINGS SHALL HAVE 16 BAR RATING AT LEAST DI PIPEWORK SHALL BE COATED INTERNALLY WITH A BLAST FURNACE CEMENT LINING WHICH COMPRISES WITH THE REQUIREMENTS OF BS 6920. EXTERNAL PROTECTION SHALL INCLUDE AN ALLOY OF 70NC AND ALUMINUM WITH A MINIMUM 15% ALUMINUM WITH OR WITHOUT OTHER MATERIALS HAVING A MASS OF 400g/m² COMPETE WITH A FINISHING LAYER OF BLUE FUSION BONDED EPOXY IN ACCORDANCE WITH IS EN 14901.
8. WATERMAINS SHALL BE LAID UNDER FOOTPATHS PREFERABLY OR GRASS MARGINS WHERE APPROVED. NO PIPE, CONDUIT, CABLE OR OTHER SERVICE SHALL BE LAID LONGITUDINALLY OVER THE LINE OF A WATERMAIN. NO CABINET POLES, JUNCTION BOXES OR CHAMBERS SHALL BE CONSTRUCTED OVER A WATERMAIN.
9. CONNECTIONS TO THE MAINS WHICH ARE THE PROPERTY OF THE IRISH WATER CAN BE MADE BY THE IRISH WATER ONLY. NO OTHER PERSON MAY INTERFERE IN ANY WAY WITH THESE MAINS. SUCH CONNECTIONS WILL BE MADE BY IRISH WATER AT THE EXPENSE OF THE PERSONS REQUIRING THEM. THE ESTIMATED COST OF SUCH CONNECTIONS MUST BE LODGED WITH IRISH WATER BEFORE THE WORK IS UNDERTAKEN.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT ALL WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE IRISH WATER CODE OF PRACTICE AND STANDARD DETAILS. THE CODE OF PRACTICE AND STANDARD DETAILS ARE AVAILABLE TO DOWNLOAD FROM THE IRISH WATER WEB SITE AT WWW.WATER.IE/CONNECTIONS/DEVELOPER-SERVICES/ WHERE THE DETAILS CONTAINED ON THIS DRAWING DIFFER FROM THE IRISH WATER CODE OF PRACTICE OR STANDARD DETAILS THIS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY. IRISH WATER STANDARDS WILL TAKE PRECEDENCE

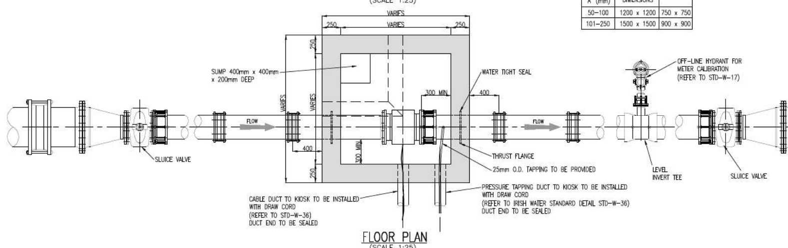
MARKER PLATES NOTES

1. WHERE PRACTICAL MARKER PLATES SHALL BE FIXED TO ADJACENT WALLS OR ALTERNATIVELY ATTACHED TO MARKER POSTS.
2. PLATES TO BE FIXED IN POSITION USING WALL PLUGS AND STAINLESS STEEL SCREWS.
3. MARKER PLATES TO BE MANUFACTURED IN ACCORDANCE WITH BS 3251.
4. FOR HYDRANT PLATE ALL CHARACTERS SHOULD BE BLACK AND THE REMAINDER OF THE FRONT FACE SHOULD CONFORM TO COLOUR REFERENCE No. 309 (CANARY YELLOW) OF BS 381C.
5. PIPE DIAMETER ON HYDRANT PLATE TO REFER TO WATERMAIN NOT BRANCH.
6. SLUICE VALVE, AIR VALVE, SCOUR VALVE, WASHOUT HYDRANT AND METER PLATES SHOULD BE CAST IRON. ALL CHARACTERS SHOULD BE BLACK ON WHITE PAINT BACKGROUND. ALTERNATIVE MATERIAL MAY BE USED SUBJECT TO ACCEPTANCE BY IRISH WATER.
7. CONCRETE SURROUND TO MARKER POST TO BE GRADE C25 / 30 AND IN ACCORDANCE WITH IS EN 206/2013.
8. PLASTIC MARKER POSTS ARE NOT ACCEPTABLE.
9. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.



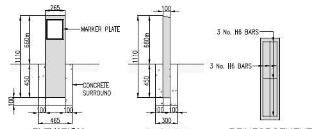
SECTION
(SCALE 1:25)

METER DIAMETER "A" (mm)	INTERNAL CHAMBER DIMENSIONS	COVER DIMENSIONS
50-100	1200 x 1200	750 x 750
101-250	1500 x 1500	900 x 900

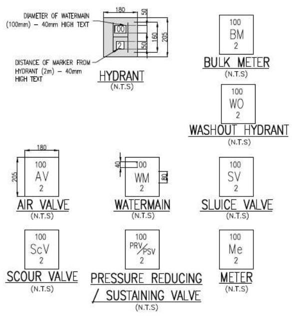


FLOOR PLAN
(SCALE 1:25)

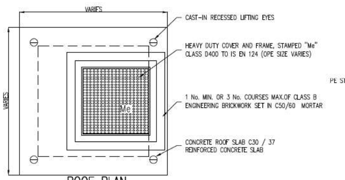
PROPOSED BULK WATER METER
STD-W-26



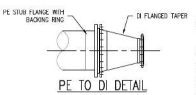
ELEVATION (SCALE 1:25) | SECTION (SCALE 1:25) | REINFORCEMENT DETAILS (SCALE 1:25)



MARKER POST/PLATE DETAILS
STD-W-27



ROOF PLAN



PE TO DI DETAIL

BULK WATER METER NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. STRUCTURAL DESIGN AND REINFORCEMENT DETAIL TO BE PROVIDED BY THE DEVELOPER AND SUBMITTED TO IRISH WATER FOR REVIEW. ROOF SLABS SHALL BE DESIGNED TO CARRY ALL LIVE LOADS & DEAD LOADS, & CONSIST OF A REINFORCED CONCRETE SLAB OF IN-SITU CONCRETE, GRADE C30/37, WITH A MINIMUM THICKNESS OF 225mm. ALTERNATIVELY, PRE-CAST CONCRETE ROOFS MAY BE USED, SUBJECT TO IRISH WATER REVIEW, & COMPLIANCE WITH BS 5911, Part 4.
3. CONCRETE FOR FLOW METER CHAMBER TO BE C30/37.
4. PRECAST UNITS COMPLETED WITH RUBBER SEALING GASKET BETWEEN UNITS, COMPLYING WITH THE REQUIREMENTS OF IS EN 1917 AND BS 5911-PART 3, COMPLETE WITH 150mm CONCRETE SURROUND MAY BE USED AS AN ACCEPTABLE ALTERNATIVE. CONCRETE SURROUND TO BE GRADE C16/20 IN ACCORDANCE WITH IS EN 206.
5. METER CHAMBER SHALL BE COVERED WITH APPROVED HEAVY DUTY METAL COVERS TO IS EN 124: 1994 RATING D400. COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO REVIEW BY IRISH WATER.
6. 200mm ALL ROUND, 100mm DEEP CONCRETE PLINTH AROUND COVER IN GRASS AREAS.
7. ANTI CORROSION TAPE TO BE PROVIDED AROUND BURIED FLANGES.
8. DUCTILE IRON PIPES AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 545. PE PIPES AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 12201:2011.
9. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO REVIEW BY IRISH WATER.
10. PIPEWORK TO BE DOWNSIZED TO ACCOMMODATE THE REQUIRED RANGE OF THE FLOW METER. STRAIGHT PIPE LENGTHS UPSTREAM AND DOWNSTREAM OF THE METER TO BE PROVIDED. THE METER SHALL BE CAPABLE OF ACCURATE NIGHT FLOW MEASURAMENTS.
11. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.
12. ANY SPECIAL ROAD REINSTATEMENT AROUND COVER & FRAME SHALL BE TO ROAD AUTHORITY'S REQUIREMENTS.
13. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
14. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENING IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.

REV.	DATE	AMENDMENT	DRN	APPD

STATUS: **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

Waterman Moylan
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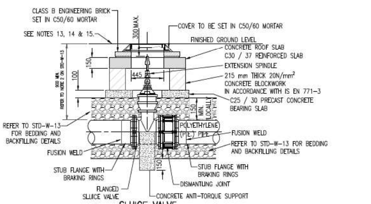
CLIENT: BINDFORD LIMITED
ARCHITECT: O MAHONY PIKE ARCHITECTS
PROJECT: CROSS GUN'S BRIDGE PHIBSBOROUGH, DUBLIN 7
TITLE: WATER SUPPLY DETAILS SHEET 1 OF 3

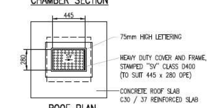
DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JG	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
1:25 @A1	20-011	P330	

SLUICE VALVE NOTES:

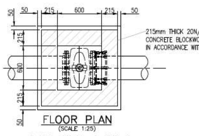
1. ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. SLUICE VALVE CHAMBERS SHALL BE COVERED WITH APPROVED HEAVY DUTY METAL COVERS TO IS 261 OR BS 5834. COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO REVIEW BY IRISH WATER.
3. SLUICE VALVES SHALL BE RESILIENT SEATED AND SHALL COMPLY WITH BS 5163–1, BS 5163–2, IS EN 1074–1, IS EN 1074–2, OR EQUIVALENT E.U. SPECIFICATIONS.
4. ALL SLUICE VALVES SHALL BE ANTI–CLOCKWISE CLOSING.
5. VALVE CHAMBER TO BE CONSTRUCTED OF PRECAST CONCRETE UNITS OR HIGH DENSITY BLOCKWORK. ALTERNATIVELY PROPRIETARY PREFABRICATED CHAMBER UNITS MAY ALSO BE USED, SUBJECT TO REVIEW BY IRISH WATER. ROOF SLABS SHALL BE DESIGNED TO CARRY ALL LIVE LOADS & DEAD LOADS, & CONSIST OF A REINFORCED CONCRETE SLAB OF IN–SITU CONCRETE, GRADE C30/37, WITH A MINIMUM THICKNESS OF 150mm. ALTERNATIVELY, PRE–CAST CONCRETE ROOFS MAY BE USED, SUBJECT TO IRISH WATER REVIEW, & COMPLIANCE WITH BS 5911, Part 4.
6. CONCRETE CHAMBERS SHALL BE SURROUNDED BY A MINIMUM OF 150mm COMPACTED CLAUSE 808 MATERIAL AS PER STD–W–13.
7. DUCTILE IRON PIPES AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 545. PE PIPES AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 12201:2011.
8. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH AROUND COVERS IN GREEN AREAS.
9. THRUST BLOCKS (NOT SHOWN ON DRAWING), TO BE PROVIDED AS PER STANDARD DRAWING STD–W–28 AT ALL TEES, BENDS, TAPERS, DEAD ENDS AND PIPES AT STEEP SLOPES.
10. ANTI–CORROSION TAPE TO BE PROVIDED AROUND BURIED FLANGES.
11. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.
12. 450 x 450mm INTERNAL DIMENSION CHAMBERS MAY BE PROVIDED SUBJECT TO REVIEW BY IW. SUCH CHAMBERS SHALL BE PROVIDED WITH GRADE "A" HEAVY DUTY COVER & FRAME & STAMPED "SV".
13. ANY SPECIAL ROAD REINSTATEMENT AROUND COVER & FRAME SHALL BE TO ROAD AUTHORITY'S REQUIREMENTS.
14. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
15. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.



SLUICE VALVE CHAMBER SECTION

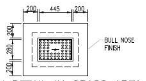


ROOF PLAN



FLOOR PLAN
(SCALE 1:25)

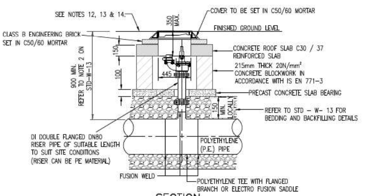
SLUICE VALVE CHAMBER
POLYETHYLENE (PE) PIPE
(BLOCKWORK CONSTRUCTION)



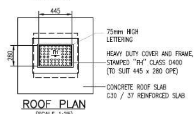
PLINTH DETAIL IN GRASS AREA
(SCALE 1:25)

HYDRANT NOTES:

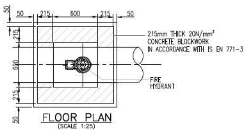
1. ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. HYDRANT CHAMBERS SHALL BE COVERED WITH APPROVED HEAVY DUTY METAL COVERS TO IS 261 OR BS 5834 COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO REVIEW BY IRISH WATER.
3. ALL HYDRANTS, SURFACE BOX FRAMES & COVERS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF IS EN 14339, IS EN 1074–6 & BS 750. FIRE HYDRANTS SHALL BE TYPE 2. THE HYDRANT INLET SHALL BE 80mm DIAMETER WITH PN16.
4. ALL HYDRANTS SHALL BE CLOCKWISE CLOSING.
5. HYDRANT CHAMBER TO BE CONSTRUCTED OF PRECAST CONCRETE UNITS OR HIGH DENSITY BLOCKWORK. ALTERNATIVELY PROPRIETARY PREFABRICATED CHAMBER UNITS MAY ALSO BE USED, SUBJECT TO REVIEW BY IRISH WATER. ROOF SLABS SHALL BE DESIGNED TO CARRY ALL LIVE LOADS & DEAD LOADS, & CONSIST OF A REINFORCED CONCRETE SLAB OF IN–SITU CONCRETE, GRADE C30/37, WITH A MINIMUM THICKNESS OF 150mm. ALTERNATIVELY, PRE–CAST CONCRETE ROOFS MAY BE USED, SUBJECT TO IRISH WATER REVIEW, & COMPLIANCE WITH BS 5911, Part 4.
6. CONCRETE CHAMBERS SHALL BE SURROUNDED BY A MINIMUM OF 150mm COMPACTED CLAUSE 808 MATERIAL AS PER STD–W–13.
7. DUCTILE IRON PIPES AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 545. PE PIPES AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 12201:2011.
8. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH AROUND COVERS IN GREEN AREAS.
9. THRUST BLOCKS (NOT SHOWN ON DRAWING), TO BE PROVIDED AS PER STANDARD DRAWING STD–W–28 AT ALL TEES, BENDS, TAPERS, DEAD ENDS AND PIPES AT STEEP SLOPES.
10. ANTI CORROSION TAPE TO BE PROVIDED AROUND BURIED FLANGES.
11. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.
12. ANY SPECIAL ROAD REINSTATEMENT AROUND COVER & FRAME SHALL BE TO ROAD AUTHORITY'S REQUIREMENTS.
13. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
14. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.



SECTION
(SCALE 1:25)



ROOF PLAN
(SCALE 1:25)

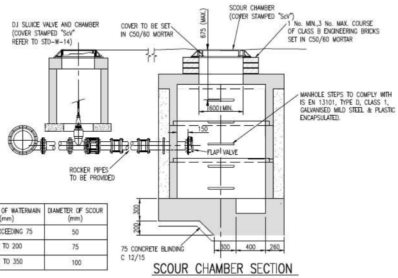


FLOOR PLAN
(SCALE 1:25)

FIRE HYDRANT CHAMBER FOR
POLYETHYLENE (PE) PIPE
(BLOCKWORK CONSTRUCTION)
STD–W–18

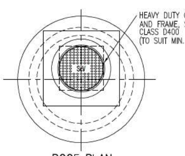
SCOUR VALVE NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. STRUCTURAL REINFORCEMENT AND DESIGN DETAIL TO BE PROVIDED BY THE DEVELOPER AND SUBMITTED TO IRISH WATER FOR REVIEW. ROOF SLABS SHALL BE DESIGNED TO CARRY ALL LIVE LOADS & DEAD LOADS, & CONSIST OF A REINFORCED CONCRETE SLAB OF IN–SITU CONCRETE, GRADE C30/37, WITH A MINIMUM THICKNESS OF 225mm. ALTERNATIVELY, PRE–CAST CONCRETE ROOFS MAY BE USED, SUBJECT TO IRISH WATER REVIEW, & COMPLIANCE WITH BS 5911, Part 4.
3. CONCRETE FOR SCOUR CHAMBER AND HEADWALL TO BE C30 / 37.
4. PREFABRICATED CHAMBER AND HEADWALL MAY ALSO BE USED, SUBJECT TO REVIEW FROM IRISH WATER.
5. SCOUR CHAMBER SHALL BE COVERED WITH APPROVED HEAVY DUTY METAL COVERS TO IS EN 124 RATING D400. COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO REVIEW IRISH WATER.
6. 200mm ALL ROUND, 100mm DEEP CONCRETE PLINTH AROUND COVERS IN GRASS AREAS.
7. FINAL DETAIL TO BE REVIEWED BY IRISH WATER AND RELEVANT REGULATORY AUTHORITIES.
8. THRUST BLOCKS (NOT SHOWN ON DRAWING), TO BE PROVIDED AS PER STANDARD DRAWING STD–W–28 AT ALL TEES, BENDS, TAPERS, DEAD ENDS AND PIPES AT STEEP SLOPES.
9. ANTI CORROSION TAPE TO BE PROVIDED AROUND BURIED FLANGES.
10. ALL PIPEWORK AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 545. PE PIPES AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 12201:2011.
11. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO AGREEMENT WITH IRISH WATER.
12. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.
13. BACKFILL AND REINSTATEMENT OF RIVER BED AND BANK TO BE SUBJECT TO AGREEMENT WITH IRISH WATER & RELEVANT AUTHORITIES.

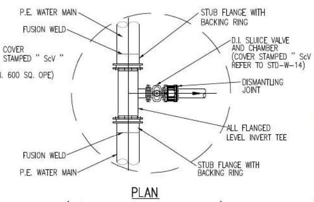


DIAMETER OF WATERMAIN (mm)	DIAMETER OF SCOUR (mm)
NOT EXCEEDING 75	50
100 TO 200	75
200 TO 350	100

SCOUR CHAMBER SECTION
STD–W–30
(SCALE 1:25)



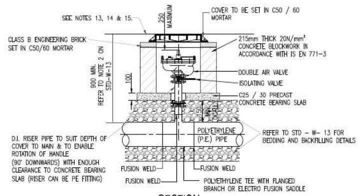
ROOF PLAN
(SCALE 1:25)



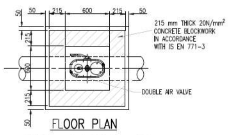
PLAN
(POLYETHYLENE WATER MAIN)
(SCALE 1:25)

AIR VALVE NOTES:

1. ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. AIR VALVE CHAMBERS SHALL BE COVERED WITH APPROVED VENTILATED HEAVY DUTY DUCTILE IRON COVERS TO IS EN 124 RATING D400. COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO REVIEW BY IRISH WATER.
3. AIR VALVES SHALL COMPLY WITH THE REQUIREMENTS OF IS EN 1074–4. AIR VALVES SHALL BE DOUBLE ORIFICE TYPE AND SHALL INCLUDE AN ISOLATING VALVE. THE ISOLATING VALVE SHALL BE EITHER A GATE VALVE CONFORMING TO IS EN 1074–2 & SHALL BE OF A BOLTLESS BONNET DESIGN, OR A BUTTERFLY VALVE TO IS EN 1074–2.
4. SERVICE CONNECTIONS SHALL NOT BE PROVIDED WITHIN 2m OF THE AIR VALVE LOCATION.
5. AIR VALVE CHAMBERS TO BE OF PRECAST CONCRETE UNITS OR HIGH DENSITY BLOCKWORK. ALTERNATIVE PROPRIETARY PREFABRICATED CHAMBER UNITS MAY ALSO BE USED, SUBJECT TO REVIEW BY IRISH WATER.
6. PRECAST CONCRETE CHAMBERS SHALL BE SURROUNDED BY A MINIMUM OF 150mm COMPACTED CLAUSE 808 MATERIAL AS PER STD–W–13.
7. DUCTILE IRON PIPES / FITTINGS AND PE PIPES / FITTINGS TO BE IN ACCORDANCE WITH IS EN 545 AND IS EN 12201:2011.
8. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH AROUND COVERS IN GREEN AREAS.
9. THRUST BLOCKS (NOT SHOWN ON DRAWING), TO BE PROVIDED AS PER STANDARD DRAWING STD–W–28 AT ALL TEES, BENDS, TAPERS, DEAD ENDS AND PIPES AT STEEP SLOPES.
10. ANTI CORROSION TAPE TO BE PROVIDED AROUND BURIED FLANGES.
11. THE LOCATION OF THE AIR VALVE SHALL BE THE SUBJECT OF PARTICULAR AGREEMENT WITH IRISH WATER TO ENSURE THAT THE RISK OF CONTAMINATION THROUGH THE VALVE IS ELIMINATED.
12. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.
13. ANY SPECIAL ROAD REINSTATEMENT AROUND COVER & FRAME SHALL BE TO ROAD AUTHORITY'S REQUIREMENTS.
14. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
15. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.

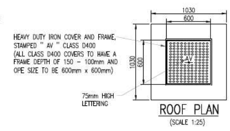


SECTION
(SCALE 1:25)



FLOOR PLAN

DOUBLE AIR VALVE FOR
POLYETHYLENE (PE) PIPE
(BLOCKWORK CONSTRUCTION)
STD–W–22
(SCALE 1:25)



ROOF PLAN
(SCALE 1:25)

DIAMETER OF MAIN	UP TO 250 (mm)	250 TO 350 (mm)
DIAMETER OF BRANCH	80mm	100mm
BORE OF VALVE INLET	80mm	100mm

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.
3. WATERMAINS SHALL BE LAID IN ACCORDANCE WITH THE LOCAL AUTHORITY / IRISH WATER SPECIFICATION FOR THE LAYING OF NEW WATERMAINS AND BYLAWS WHICH OVER–RIDE THESE NOTES. THE CONSTRUCTION OF THE WATERMAIN SHALL BE IN ACCORDANCE WITH THE BEST CURRENT PRACTICE AND THE LATEST EDITIONS OF THE RELEVANT STANDARDS AND CODES OF PRACTICE.
4. WATERMAINS SHALL NOT BE LAID UNDER WALLS OR AREAS DESIGNATED FOR TREES/SHRUBS/FLOWERS.
5. PIPES SHALL BE HDPE (BLUE PIPE) UNLESS NOTED OTHERWISE BY AGREEMENT WITH THE LOCAL AUTHORITY. DUCTILE IRON PIPES SHALL BE USED UNDER ROADS OF CLASSIFICATION "DISTRICT DISTRIBUTOR" UPWARDS UNLESS NOTED OTHERWISE.
6. PIPES SHALL CONFORM TO THE UK WATER INDUSTRY SPECIFICATION OR EQUIVALENT E.U. SPECIFICATION.
7. DUCTILE IRON (DI) PIPES SHALL CONFORM TO IS EN 545 AND SHALL HAVE MINIMUM C40 PRESSURE RATING. DUCTILE IRON FITTINGS SHALL HAVE 16 BAR RATING AT LEAST DI PIPEWORK SHALL BE COATED INTERNALLY WITH A BLAST FURNACE CEMENT LINING WHICH COMPRISES WITH THE REQUIREMENTS OF BS 6920. EXTERNAL PROTECTION SHALL INCLUDE AN ALLOY OF 70NC AND ALUMINUM WITH A MINIMUM 15% ALUMINUM WITH OR WITHOUT OTHER MATERIALS HAVING A MASS OF 400g/m² COMPETE WITH A FINISHING LAYER OF BLUE FUSION BONDED EPOXY IN ACCORDANCE WITH IS EN 14901.
8. WATERMAINS SHALL BE LAID UNDER FOOTPATHS PREFERABLY OR GRASS MARGINS WHERE APPROVED. NO PIPE, CONDUIT, CABLE OR OTHER SERVICE SHALL BE LAID LONGITUDINALLY OVER THE LINE OF A WATERMAIN. NO CABINET POLES, JUNCTION BOXES OR CHAMBERS SHALL BE CONSTRUCTED OVER A WATERMAIN.
9. CONNECTIONS TO THE MAINS WHICH ARE THE PROPERTY OF THE IRISH WATER CAN BE MADE BY THE IRISH WATER ONLY. NO OTHER PERSON MAY INTERFERE IN ANY WAY WITH THESE MAINS. SUCH CONNECTIONS WILL BE MADE BY IRISH WATER AT THE EXPENSE OF THE PERSONS REQUIRING THEM. THE ESTIMATED COST OF SUCH CONNECTIONS MUST BE LODGED WITH IRISH WATER BEFORE THE WORK IS UNDERTAKEN.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT ALL WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE IRISH WATER CODE OF PRACTICE AND STANDARD DETAILS. THE CODE OF PRACTICE AND STANDARD DETAILS ARE AVAILABLE TO DOWNLOAD FROM THE IRISH WATER WEB SITE AT WWW.WATER.IE/CONNECTIONS/DEVELOPER–SERVICES/ WHERE THE DETAILS CONTAINED ON THIS DRAWING DIFFER FROM THE IRISH WATER CODE OF PRACTICE OR STANDARD DETAILS THIS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY. IRISH WATER STANDARDS WILL TAKE PRECEDENCE

1:25 0 0.5 1.0 1.5 2.0 2.5m
1:1 0 10 20 30 40 50 60 70 80 90 100m

REV.	DATE	AMENDMENT	DRN	APPD

STATUS **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

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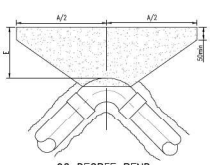
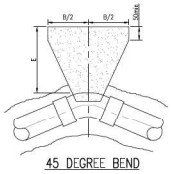
CLIENT BINDFORD LIMITED
ARCHITECT O MAHONY PIKE ARCHITECTS
PROJECT CROSS GUN'S BRIDGE PHIBSBOROUGH, DUBLIN 7.
TITLE WATER SUPPLY DETAILS SHEET 2 OF 3

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JG	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
1:25 @A1	20–011	P331	

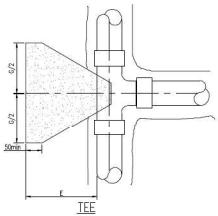
NOTES:
1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.
3. WATERMAINS SHALL BE LAID IN ACCORDANCE WITH THE LOCAL AUTHORITY / IRISH WATER SPECIFICATION FOR THE LAYING OF NEW WATERMAINS AND BYLAWS WHICH OVER-RIDE THESE NOTES. THE CONSTRUCTION OF THE WATERMAIN SHALL BE IN ACCORDANCE WITH THE BEST CURRENT PRACTICE AND THE LATEST EDITIONS OF THE RELEVANT STANDARDS AND CODES OF PRACTICE.
4. WATERMAINS SHALL NOT BE LAID UNDER WALLS OR AREAS DESIGNATED FOR TREES/SHRUBS/FLOWERS.
5. PIPES SHALL BE HDPE (BLUE PIPE) UNLESS NOTED OTHERWISE BY AGREEMENT WITH THE LOCAL AUTHORITY. DUCTILE IRON PIPES SHALL BE USED UNDER ROADS OF CLASSIFICATION "DISTRICT DISTRIBUTOR" UPWARDS UNLESS NOTED OTHERWISE.
6. PIPES SHALL CONFORM TO THE UK WATER INDUSTRY SPECIFICATION OR EQUIVALENT E.U. SPECIFICATION.
7. DUCTILE IRON (DI) PIPES SHALL CONFORM TO IS EN 545 AND SHALL HAVE MINIMUM C40 PRESSURE RATING. DUCTILE IRON FITTINGS SHALL HAVE 16 BAR RATING AT LEAST (I PIPEWORK SHALL BE COATED INTERNALLY WITH A BLAST FURNACE CEMENT LINING WHICH COMPRISES WITH THE REQUIREMENTS OF BS 6920. EXTERNAL PROTECTION SHALL INCLUDE AN ALLOY OF ZONC AND ALUMINIUM WITH A MINIMUM 15% ALUMINIUM WITH OR WITHOUT OTHER MATERIALS HAVING A MASS OF 400g/m² COMPETE WITH A FINISHING LAYER OF BLUE FUSION BONDED EPOXY IN ACCORDANCE WITH IS EN 14901.
8. WATERMAINS SHALL BE LAID UNDER FOOTPATHS PREFERABLY OR GRASS MARGINS WHERE APPROVED. NO PIPE, CONDUIT, CABLE OR OTHER SERVICE SHALL BE LAID LONGITUDINALLY OVER THE LINE OF A WATERMAIN. NO CABINET POLES, JUNCTION BOXES OR CHAMBERS SHALL BE CONSTRUCTED OVER A WATERMAIN.
9. CONNECTIONS TO THE MAINS WHICH ARE THE PROPERTY OF THE IRISH WATER CAN BE MADE BY THE IRISH WATER ONLY. NO OTHER PERSON MAY INTERFERE IN ANY WAY WITH THESE MAINS. SUCH CONNECTIONS WILL BE MADE BY IRISH WATER AT THE EXPENSE OF THE PERSONS REQUIRING THEM. THE ESTIMATED COST OF SUCH CONNECTIONS MUST BE LODGED WITH IRISH WATER BEFORE THE WORK IS UNDERTAKEN.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT ALL WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE IRISH WATER CODE OF PRACTICE AND STANDARD DETAILS. THE CODE OF PRACTICE AND STANDARD DETAILS ARE AVAILABLE TO DOWNLOAD FROM THE IRISH WATER WEB SITE AT WWW.WATERFORCONNECTIONS.IE/DEVELOPERS-SERVICES/ WHERE THE DETAILS CONTAINED ON THIS DRAWING DIFFER FROM THE IRISH WATER CODE OF PRACTICE OR STANDARD DETAILS THIS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY IRISH WATER STANDARDS WILL TAKE PRECEDENCE



90 DEGREE BEND



45 DEGREE BEND



TEE

TABLE OF DIMENSIONS FOR STEEPLY INCLINED PIPELINES	
GRADIENT	SPACING
1 IN 2 & STEEPER	5.5m
BELOW 1 IN 2 TO 1 IN 4	11.0m
1 IN 4 TO 1 IN 5	16.4m
1 IN 5 TO 1 IN 6	22.0m

< 12 BAR TEST PRESSURE

NOM. DIA (mm)	DIMENSIONS			
	A	B	E	G
100	600	330	200	390
150	950	510	225	660
200	1150	600	300	790
250	1350	750	300	970
300	1580	850	320	1110
350	2100	1150	450	1450
400	2550	1400	500	1800
450	3000	1630	680	2130
500	3590	1950	800	2540
600	4100	2200	850	2880

12 BAR TO 15 BAR TEST PRESSURE

NOM. DIA (mm)	DIMENSIONS			
	A	B	E	G
100	700	380	200	510
150	1135	620	225	760
200	1400	750	300	980
250	1730	940	320	1210
300	2090	1130	380	1480
350	2600	1410	500	1840
400	2980	1610	750	2110
450	3400	1840	900	2330
500	4080	2210	1000	2880
600	5010*	2710*	1000	3550*

15 BAR TO 18 BAR TEST PRESSURE

NOM. DIA (mm)	DIMENSIONS			
	A	B	E	G
100	750	400	222	530
150	1250	700	253	890
200	1650	890	322	1170
250	1960	1060	352	1370
300	2300	1200	502	1630
350	2930	1580	752	2070
400	3510	1900	1000	2490
450	3810	2270	1000	2970
500	4340*	2380	1000	3700
600	6370*	3450*	1000	4500*

WATERMAIN NOTES:

1. ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. CONCRETE THRUST BLOCKS (ANCHORAGE) SHALL BE POSITIONED SYMMETRICALLY WITH RESPECT TO THE CONNECTING PIPE & BENDS.
3. TRENCH DIMENSIONS : REFER TO DRAWING No's. STD-W-13.
4. THRUST BLOCKS SHALL BEAR ON UNDISTURBED SOIL. IF FOR ANY REASON THEY CANNOT THEN THE DEVELOPER SHALL NOTIFY IRISH WATER IMMEDIATELY WITH A PROPOSED SOLUTION.
5. THRUST BLOCK REINFORCEMENT REQUIRES SPECIFIC DESIGN.
6. FOR TEST PRESSURES GREATER THAN 18 BAR, THRUST BLOCK DESIGN IS TO BE SUBMITTED TO IRISH WATER FOR REVIEW.
7. THRUST BLOCKS ARE DESIGNED FOR AN AVERAGE BEARING PRESSURE OF 100 KN/m (TYPICAL FOR SOFT CLAY) FOR OTHER CONDITIONS, ACTUAL DIMENSIONS MAY BE ALTERED ON INSTRUCTIONS FROM IRISH WATER.
8. CONCRETE IN THRUST BLOCKS SHALL BE GRADE C20/25.
9. COMPRESSIBLE FILLER FOR CONCRETE PROTECTION TO BE IN ACCORDANCE WITH BS EN 622-1 AND BS EN 622-4. BITUMINOUS MATERIAL SHALL NOT BE PUT IN CONTACT WITH PLASTIC PIPES. THE THICKNESS OF COMPRESSIBLE FILLER FOR MAINS < 450mm IN DIAMETER IS TO BE 19mm.
10. CONCRETE THRUST BLOCKS FOR POLYETHYLENE PIPE TO COMPLY WITH THE MANUFACTURES REQUIREMENTS.
11. POLYETHYLENE PIPES SHALL BE WRAPPED IN PLASTIC SHEETING HAVING A COMPOSITION IN ACCORDANCE WITH BS 6076 BEFORE BEING CAST INTO CONCRETE.
12. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.

WATERMAIN TRUST AND SUPPORT BLOCKS

REV.	DATE	AMENDMENT	DRN	APPD

STATUS **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

Waterman Moylan
Engineering Consultants
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CLIENT	BINDFORD LIMITED
ARCHITECT	O MAHONY PIKE ARCHITECTS
PROJECT	CROSS GUN'S BRIDGE, PHIBSBOROUGH, DUBLIN 7
TITLE	WATER SUPPLY DETAILS SHEET 3 OF 3

DRAWN	DESIGNED	APPROVED	DATE
SJ	BG	JG	NOV. '20
SCALE	JOB NO.	DRG. NO.	REVISION
N.T.S.	20-011	P332	

B. Foul Water Calculations

Design Settings

Frequency of use (kDU)	1.00	Minimum Velocity (m/s)	1.00
Flow per dwelling per day (l/day)	4000	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	1.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	1.0	Preferred Cover Depth (m)	0.800
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
10	28.000	Adoptable	714825.601	736359.069	0.950
9	28.000	Adoptable	714780.051	736380.015	0.600
6	28.000	Adoptable	714847.868	736318.505	1.796
5	26.500	Adoptable	714885.467	736304.188	1.028
4	26.390	Adoptable	714901.089	736302.887	1.026
2	24.900	Adoptable	714999.646	736268.683	2.600
1	24.980	Adoptable	715023.395	736268.908	2.918
11	25.350	Adoptable	714951.670	736286.645	1.050
12	28.000	Adoptable	714814.087	736329.085	1.485
13	28.000	Adoptable	714769.042	736355.433	1.049

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.007	2	1	23.752	1.500	22.300	22.062	0.238	100.0	225
1.006	11	2	51.237	1.500	24.300	23.873	0.427	120.0	225
1.005	4	11	53.213	1.500	25.364	24.300	1.064	50.0	225
1.004	5	4	15.707	1.500	25.472	25.364	0.108	145.0	225
1.003	6	5	40.251	1.500	26.204	25.472	0.732	55.0	225
1.002	12	6	35.414	1.500	26.515	26.279	0.236	150.0	150
2.000	10	12	32.119	1.500	27.050	26.515	0.535	60.0	150
1.001	13	12	52.221	1.500	26.951	26.603	0.348	150.0	150
1.000	9	13	26.944	1.500	27.400	26.951	0.449	60.0	150

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.007	23.752	100.0	225	Circular	24.900	22.300	2.375	24.980	22.062	2.693
1.006	51.237	120.0	225	Circular	25.350	24.300	0.825	24.900	23.873	0.802
1.005	53.213	50.0	225	Circular	26.390	25.364	0.801	25.350	24.300	0.825
1.004	15.707	145.0	225	Circular	26.500	25.472	0.803	26.390	25.364	0.801
1.003	40.251	55.0	225	Circular	28.000	26.204	1.571	26.500	25.472	0.803
1.002	35.414	150.0	150	Circular	28.000	26.515	1.335	28.000	26.279	1.571

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.007	2	1200	Manhole	Adoptable	1	1200	Manhole	Adoptable
1.006	11	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.005	4	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
1.004	5	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.003	6	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.002	12	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	32.119	60.0	150	Circular	28.000	27.050	0.800	28.000	26.515	1.335
1.001	52.221	150.0	150	Circular	28.000	26.951	0.899	28.000	26.603	1.247
1.000	26.944	60.0	150	Circular	28.000	27.400	0.450	28.000	26.951	0.899

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	10	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
1.001	13	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
1.000	9	1200	Manhole	Adoptable	13	1200	Manhole	Adoptable

C. Surface Water Calculations

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 314959, Northing: 236278,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.5,	4.1,	5.0,	5.6,	6.0,	7.6,	9.3,	10.5,	12.1,	13.6,	14.7,	16.5,	17.9,	19.0,	N/A ,
10 mins	3.4,	4.9,	5.7,	6.9,	7.8,	8.4,	10.5,	13.0,	14.6,	16.9,	18.9,	20.5,	23.0,	24.9,	26.5,	N/A ,
15 mins	4.1,	5.8,	6.7,	8.2,	9.1,	9.9,	12.4,	15.3,	17.2,	19.9,	22.3,	24.1,	27.0,	29.3,	31.2,	N/A ,
30 mins	5.4,	7.6,	8.7,	10.5,	11.7,	12.7,	15.7,	19.2,	21.5,	24.7,	27.6,	29.8,	33.3,	36.0,	38.2,	N/A ,
1 hours	7.1,	9.9,	11.3,	13.6,	15.0,	16.2,	19.9,	24.2,	26.9,	30.8,	34.2,	36.9,	41.0,	44.1,	46.7,	N/A ,
2 hours	9.4,	12.9,	14.7,	17.5,	19.3,	20.7,	25.3,	30.4,	33.7,	38.4,	42.5,	45.6,	50.4,	54.2,	57.2,	N/A ,
3 hours	11.0,	15.0,	17.1,	20.2,	22.3,	23.9,	29.0,	34.7,	38.5,	43.6,	48.2,	51.6,	57.0,	61.1,	64.4,	N/A ,
4 hours	12.4,	16.8,	19.1,	22.5,	24.7,	26.5,	32.0,	38.2,	42.2,	47.8,	52.7,	56.4,	62.1,	66.5,	70.1,	N/A ,
6 hours	14.6,	19.6,	22.2,	26.0,	28.6,	30.5,	36.8,	43.7,	48.2,	54.3,	59.7,	63.8,	70.1,	75.0,	78.9,	N/A ,
9 hours	17.2,	22.9,	25.9,	30.2,	33.1,	35.3,	42.3,	50.0,	54.9,	61.8,	67.7,	72.3,	79.2,	84.5,	88.8,	N/A ,
12 hours	19.3,	25.6,	28.8,	33.5,	36.7,	39.0,	46.6,	55.0,	60.3,	67.7,	74.1,	78.9,	86.3,	92.0,	96.6,	N/A ,
18 hours	22.7,	29.9,	33.5,	38.9,	42.4,	45.1,	53.6,	62.8,	68.8,	76.9,	84.0,	89.4,	97.5,	103.7,	108.8,	N/A ,
24 hours	25.5,	33.3,	37.4,	43.2,	47.0,	49.9,	59.1,	69.1,	75.5,	84.3,	91.8,	97.6,	106.3,	112.9,	118.3,	136.8,
2 days	31.2,	40.1,	44.6,	51.0,	55.2,	58.4,	68.4,	79.1,	85.9,	95.1,	103.1,	109.1,	118.1,	125.0,	130.6,	149.5,
3 days	35.9,	45.6,	50.5,	57.4,	61.9,	65.3,	76.0,	87.3,	94.5,	104.2,	112.5,	118.8,	128.2,	135.3,	141.0,	160.5,
4 days	39.9,	50.4,	55.6,	63.0,	67.7,	71.3,	82.6,	94.5,	102.0,	112.1,	120.7,	127.3,	137.0,	144.3,	150.3,	170.4,
6 days	47.0,	58.7,	64.4,	72.6,	77.8,	81.8,	94.0,	106.9,	115.0,	125.8,	135.1,	142.0,	152.3,	160.1,	166.4,	187.5,
8 days	53.2,	65.9,	72.2,	81.0,	86.6,	90.9,	104.0,	117.7,	126.3,	137.8,	147.5,	154.8,	165.7,	173.9,	180.5,	202.5,
10 days	58.9,	72.6,	79.2,	88.6,	94.6,	99.1,	113.0,	127.5,	136.5,	148.6,	158.8,	166.4,	177.8,	186.3,	193.1,	216.1,
12 days	64.3,	78.7,	85.8,	95.7,	102.0,	106.8,	121.3,	136.5,	145.9,	158.5,	169.1,	177.1,	188.9,	197.7,	204.8,	228.5,
16 days	74.1,	90.1,	97.8,	108.7,	115.6,	120.8,	136.6,	153.0,	163.1,	176.6,	188.0,	196.5,	209.1,	218.5,	226.0,	251.2,
20 days	83.2,	100.5,	108.9,	120.6,	128.0,	133.5,	150.5,	167.9,	178.7,	193.1,	205.1,	214.1,	227.4,	237.3,	245.2,	271.7,
25 days	93.7,	112.6,	121.7,	134.3,	142.3,	148.3,	166.5,	185.2,	196.7,	212.0,	224.8,	234.3,	248.4,	258.8,	267.2,	295.1,

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

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	16.200	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	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)
10		4.00	28.000	1200	714823.150	736357.952	1.425
9		4.00	28.000	1200	714778.171	736380.493	0.450
8	0.018	4.00	28.000	1200	714766.716	736354.732	1.466
7	0.055	4.00	28.000	1200	714811.397	736328.881	1.896
5	0.012	4.00	26.500	1200	714884.803	736302.194	1.487
4	0.038	4.00	26.390	1200	714899.069	736301.703	3.440
3	0.026	4.00	25.350	1200	714950.822	736284.945	2.672
2	0.020	4.00	24.960	1200	714990.161	736269.967	2.493
1	0.001		24.900	1200	714999.693	736268.541	2.481
11	0.043	4.00	28.000	1200	714847.132	736317.406	2.084

Links (Input)

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)
1.007	2	1	9.670	0.600	22.467	22.419	0.048	200.0	225	8.19	51.7
1.006	3	2	42.112	0.600	22.678	22.467	0.211	200.0	225	8.01	52.2
1.005	4	3	54.493	0.600	22.950	22.678	0.272	200.0	225	7.25	54.5
1.004	5	4	14.287	0.600	25.013	24.942	0.071	200.0	225	6.26	58.0
1.003	11	5	40.630	0.600	25.916	25.013	0.903	45.0	225	6.00	59.0
1.002	7	11	37.541	0.600	26.104	25.916	0.188	200.0	225	5.66	60.4
2.000	10	7	31.366	0.600	26.575	26.334	0.241	130.0	225	4.46	66.1
1.001	8	7	51.634	0.600	26.534	26.104	0.430	120.0	225	4.98	63.5
1.000	9	8	28.225	0.600	27.550	26.609	0.941	30.0	150	4.26	67.2

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.007	9.670	200.0	225	Circular	24.960	22.467	2.268	24.900	22.419	2.256
1.006	42.112	200.0	225	Circular	25.350	22.678	2.447	24.960	22.467	2.268
1.005	54.493	200.0	225	Circular	26.390	22.950	3.215	25.350	22.678	2.447
1.004	14.287	200.0	225	Circular	26.500	25.013	1.262	26.390	24.942	1.223

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.007	2	1200	Manhole	Adoptable	1	1200	Manhole	Adoptable
1.006	3	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.005	4	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.004	5	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.003	40.630	45.0	225	Circular	28.000	25.916	1.859	26.500	25.013	1.262
1.002	37.541	200.0	225	Circular	28.000	26.104	1.671	28.000	25.916	1.859
2.000	31.366	130.0	225	Circular	28.000	26.575	1.200	28.000	26.334	1.441
1.001	51.634	120.0	225	Circular	28.000	26.534	1.241	28.000	26.104	1.671
1.000	28.225	30.0	150	Circular	28.000	27.550	0.300	28.000	26.609	1.241

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.003	11	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.002	7	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
2.000	10	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
1.001	8	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
1.000	9	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	240
M5-60 (mm)	16.200	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

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 %)
5	20	0	0
30	20	0	0
100	20	0	0

D. Surface Water Attenuation Calculations

Column1	Proposed Developme
Site Area (Catchment) – Ha	0.730
Impermeable Area - Ha	0.585
% Hardstanding	80%
SAAR - mm	739
SOIL Index	0.3
Climate Change	20%

Soil Type	SOIL
1	0.1
2	0.3
3	0.37
4	0.47
5	0.53

QBAR (50 Hectares) 97.09 l/s
QBAR per Hectare 1.94 l/s/Ha

Column1	Proposed Developme nt
Site Area (Catchment)	0.73
$Qbar_{rural}$	2.00

Imp Area 5850

Rainfall (mm) https://www.met.ie/climate/services

Duration	Insert Rainfall Data					
(min)	1	5	10	20	50	100
30	7.6	12.7	15.7	19.2	24.7	29.8
60	9.9	16.2	19.9	24.2	30.8	36.9
120	12.9	20.7	25.3	30.4	38.4	45.6
240	16.8	26.5	32	38.2	47.8	56.4
360	19.6	30.5	36.8	43.7	54.3	63.8
720	25.6	39	46.6	55	67.7	78.9
1,440	33.3	49.9	59.1	69.1	84.3	97.6
2,880	40.1	58.4	68.4	79.1	95.1	109.1

Inflow (m3)

Duration	Return Period (Years)					
(min)	1	5	10	20	50	100
30.00	48.91	81.72	101.03	123.55	158.94	191.76
60.00	63.71	104.25	128.06	155.73	198.20	237.45
120.00	83.01	133.20	162.81	195.62	247.10	293.44
240.00	108.11	170.53	205.92	245.82	307.59	362.93
360.00	126.13	196.27	236.81	281.21	349.42	410.55
720.00	164.74	250.97	299.87	353.93	435.65	507.72
1,440.00	214.29	321.11	380.31	444.66	542.47	628.06
2,880.00	258.04	375.80	440.15	509.01	611.97	702.06

Outflow (m3)

Duration	Return Period (Years)					
(min)	1	5	10	20	50	100
30.00	3.60	3.60	3.60	3.60	3.60	3.60
60.00	7.20	7.20	7.20	7.20	7.20	7.20
120.00	14.40	14.40	14.40	14.40	14.40	14.40
240.00	28.80	28.80	28.80	28.80	28.80	28.80
360.00	43.20	43.20	43.20	43.20	43.20	43.20
720.00	86.40	86.40	86.40	86.40	86.40	86.40
1,440.00	172.80	172.80	172.80	172.80	172.80	172.80
2,880.00	345.60	345.60	345.60	345.60	345.60	345.60

Storage Reqd. (m3)

Duration	Return Period (Years)					
(min)	1	5	10	20	50	100
30.00	45.31	78.12	97.43	119.95	155.34	188.16
60.00	56.51	97.05	120.86	148.53	191.00	230.25
120.00	68.61	118.80	148.41	181.22	232.70	279.04
240.00	79.31	141.73	177.12	217.02	278.79	334.13
360.00	82.93	153.07	193.61	238.01	306.22	367.35
720.00	78.34	164.57	213.47	267.53	349.25	421.32
1,440.00	41.49	148.31	207.51	271.86	369.67	455.26
2,880.00	0.00	30.20	94.55	163.41	266.37	356.46

UK and Ireland Office Locations