

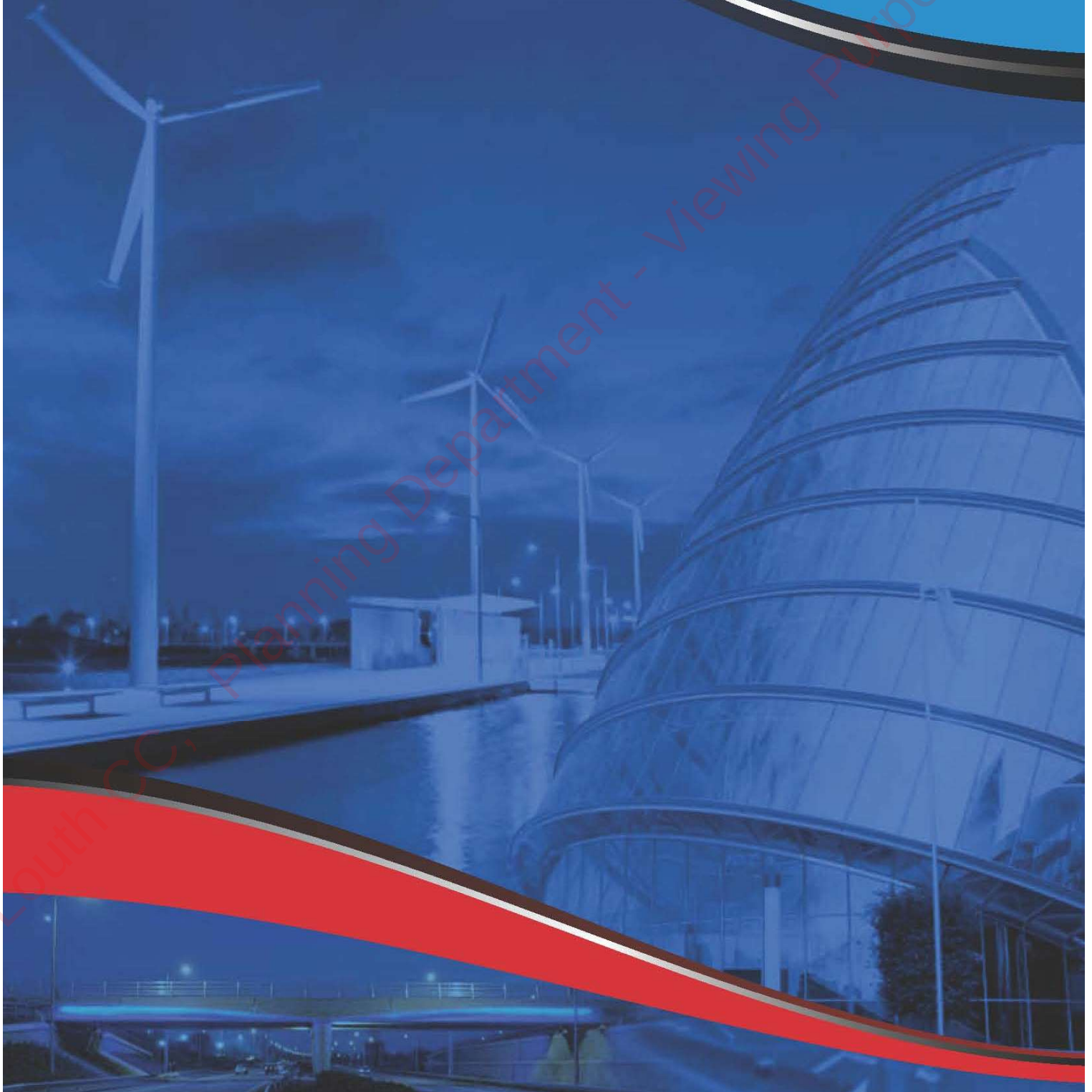
ENGINEERING SERVICES REPORT

ST ITA'S SPECIAL SCHOOL AND ST. MARY'S SPECIAL
SCHOOL, DROGHEDA

Department of Education

PROJECT NO. A612

13 July 2023



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for

**St ITA's SPECIAL SCHOOL AND ST. MARY'S
SPECIAL SCHOOL, DROGHEDA**



OCSC

O'CONNOR | SUTTON | CRONIN

Multidisciplinary
Consulting Engineers

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ENGINEERING SERVICES REPORT

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1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by The Department of Education to carry out the design of the Civil Engineering services for the site associated with St Ita's Special School and St. Mary's Special School Drogheda, County Louth. This report carries the design of the Wastewater, Surface water and the Watermain services.

1.2 Administrative Jurisdiction

The proposed development is in the jurisdiction of the Louth County Council (LCC) and therefore the engineering services design was carried out with reference to the following:

- Louth County Development Plan (2021-2027)
- Greater Dublin Strategic Drainage Study (GDSDS)
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government and the Office of Public Works).

1.3 Site Location

The subject site is located at Cement Road, Drogheda, County Louth. It is primarily bounded by residential dwellings (to the north, south and east), Cement Road (to the north), a pitch and putt course (to the west) and the greenfield site (to the southeast). Please refer to Figure.1 on page 2 for the site location map.

1.4 Existing Site Overview

The development site is a green field site with an approximate area of 2.18ha. The proposed school site slopes predominantly from north to south, with ground levels ranging from +36.0m AOD at the northern boundary to levels of +32.0m AOD at the southern edge of the site. It is also observed that part of the land near the southern edge of the boundary is flat with ground levels lying

in the range of +32.0m AOD. Please refer to the Figure. 3 on page 3 for the existing site overview map.



Figure 1: Site Location Map



Figure 2: Existing Site Aerial Image



Figure 3: Existing Site Overview

1.5 Proposed Development Description

The development will consist of a new school building for St. Ita's and St Mary's Special Schools, provided in a part single, two and three-storey building arranged as 2 linked blocks, including upgraded access road to be constructed for shared use with the adjacent Pitch & Putt club.

The proposed building will contain 20 no. classrooms for St. Ita's, 17 no. classrooms for St. Mary's, associated clinician and educational support rooms, external rooftop play areas, hydrotherapy pool and all ancillary spaces with total floor area of circa 9586 sqm.

Proposed site works to include the construction of new hard and soft play areas, Multi Use Games Area and multisensory gardens, together with all associated paths and paving, 145 no. car-parking spaces, 8 no. covered minibus set-down bays and a further 12 no. queuing spaces, together with boundary treatments, 20 no. bicycle stands, ancillary infrastructure works, ESB sub-station and landscaping

Diversion of the combined sewer running in the southern side of the site will be completed under the project in order to comply with the applicable wayleave requirements. The proposed development also include upgrade of approximately 60m existing surface water network in the Riverview Estate.

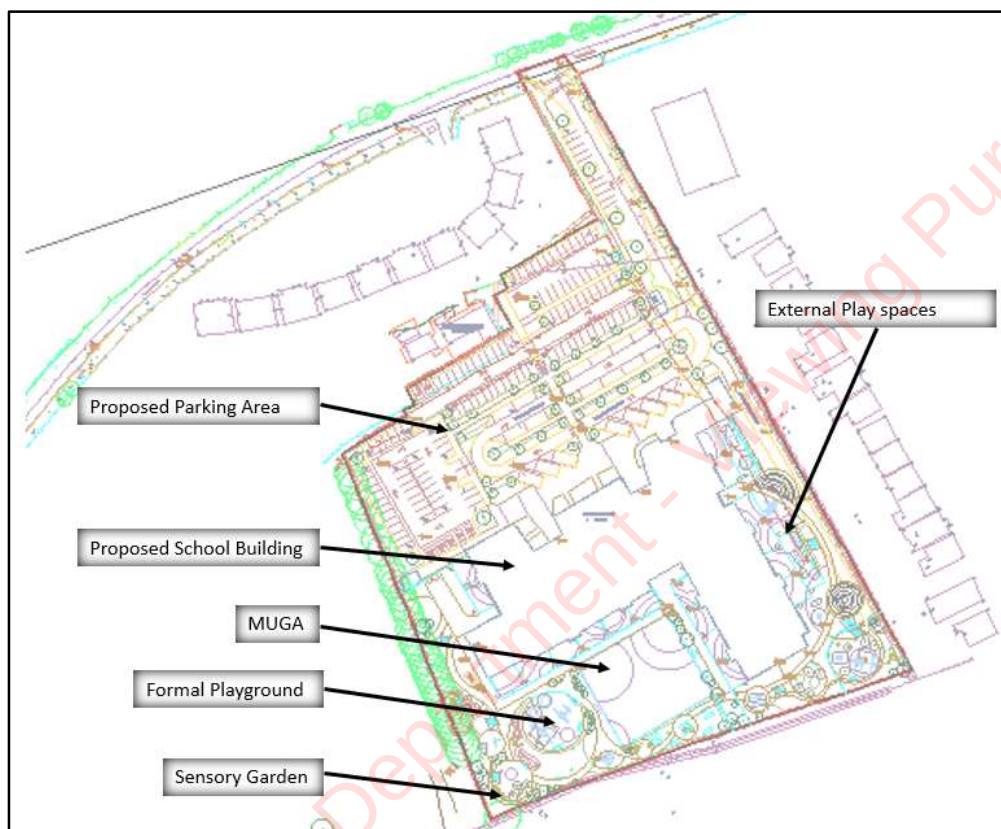


Figure 4: Proposed Site Layout

2 SCOPE OF THE DESIGN REPORT

This Engineering Services Report (ESR) is prepared by reviewing the available data from the local authority sources and the national bodies such as Louth County Council, Irish Water, The Office of Public Works (OPW), and the wider design team. The following services are addressed within the report, with respect to the proposed development:

- Surfacewater Drainage;
- Wastewater Drainage;
- Potable Water Supply.

An assessment on the potential flood risks associated with, and because of, the proposed development is provided under a separate cover, as part of this application. Refer to document **A612-OCSC-XX-XX-RP-C-0012** for details of the Site-Specific Flood Risk Assessment. Traffic Impact Assessment is covered under the cover **A612-OCSC-XX-XX-RP-C-0002** and the mobility management plan under **A612-OCSC-XX-XX-RP-C-0001**.

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

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

- Louth County Development Plan (2021-2027)
- Greater Dublin Strategic Drainage Study (GDSDS)
- Irish water Code of Practice for Wastewater, IW-CDS-5030-03.
- Irish Water Code of Practice for Water Supply, IW-CDS-5020-03.
- The Building Regulations – Technical Guidance Document Part H.
- BE EN 752 – Drainage Outside Buildings.
- BS 7533-13 – Guide for Design of Permeable Pavements
- The SUDs Manual, CIRIA:C753

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

3 EXISTING DRAINAGE INFRASTRUCTURE

Existing records for the local area have been obtained from Irish Water and are included in **Appendix A** of this report. Additional site investigation works were commissioned at the stage 1 of the project included carrying out GPR survey to establish the extent, location and condition of existing infrastructure within the site and connecting to the public network.

It was established from the GPR survey that an existing combined (surface and foul sewer network) sewer runs in the southwestern corner of the site.

The building footprint passes over the combined sewer. Since this violates the 3m wayleave requirements, the combined sewer has been proposed to divert away from the building to comply with the applicable wayleave requirement. Please refer to the Section 5 of this report for more details of the proposed diversion of the combined sewer.

An existing watermain was also found running along the existing footpath to the north of the subject site, adjacent to the Cement Road.

Considering the development site topography, the existing 150 mm diameter surfacewater network within the Riverview housing development is considered appropriate outfall to discharge the attenuated runoff. The ultimate outfall of the said surface water network in Riverview estate is into River Boyne via a 600mm diameter pipe.

4 SURFACEWATER DRAINAGE

4.1 Design Guidelines Overview

Any planning permission sought on the subject lands are required to adhere to the Local Authority requirements *i.e.*, the Louth County Council Development Plan, and as such, the Greater Dublin Strategic Drainage Study (Dublin City Council, 2005).

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

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

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

All SuDS are designed in accordance with Louth County Development Plan, and the CIRIA C753 (The SuDS Manual) guidance material, with development discharge rates restricted to greenfield runoff equivalent.

4.2 Existing Site Drainage

4.2.1 Existing Surfacewater Drainage Infrastructure

Public records received indicates that there is no existing surface water network serving the greenfield site. The site currently drains the surfacewater runoff naturally into the ground. However, there is a 150mm diameter existing surfacewater network that serves the Riverview housing estate located immediately south of the proposed development. The said surfacewater network runs along the Fountain Hill Road, before it crosses the Lower Mell Road and discharge into the river Boyne via 600mm diameter concrete pipe.

A 375 mm diameter combined sewer also runs across the proposed development at its southern edge, the combined sewer ultimately discharge into the Drogheda Wastewater Treatment Plant.

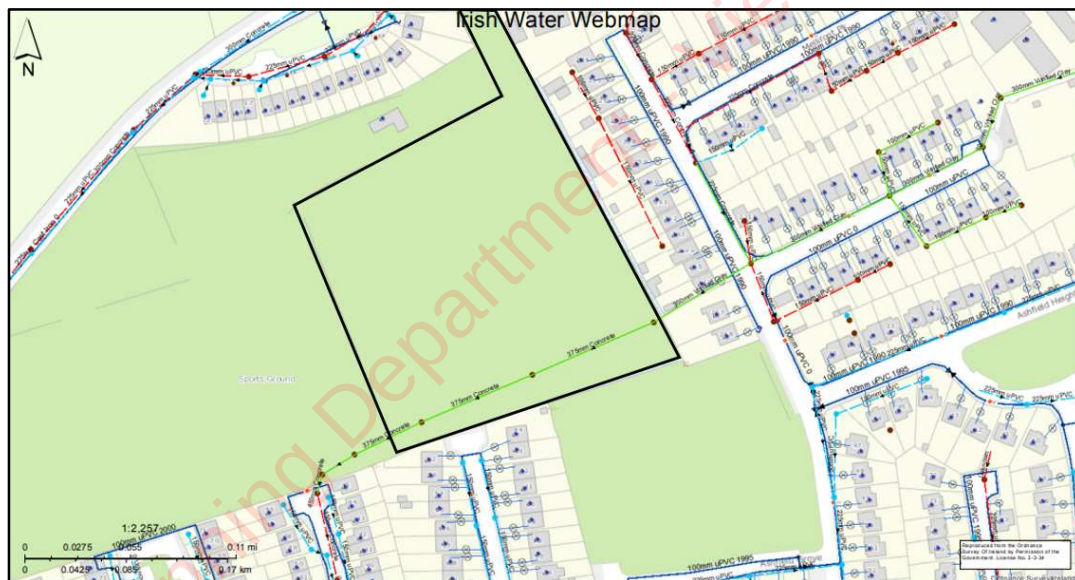


Figure 5: Existing Site Utilities

4.2.2 Existing Site Rainfall Runoff

As stated in the above sections, the proposed 2.18 ha development is located within the Greenfield site and in the absence of the surface water infrastructure, the runoff from the existing site is believed to pond in the natural depressions and then infiltrates slowly into the ground.

The soil value can be calculated from Figure 1.4.18 (Institute of Hydrology, 1978) which shows the various soil types. The soil classifications are also available from the Wallingford Procedure, Volume 3, Maps, "Winter rain acceptance potential". The equation was first published in FSSR 16, 1985. Refer to Figure 6 for the "Soil" value in MicroDrainage that consider the SPR value, and it can be obtained at Greater Dublin Strategic Drainage Study – Regional Drainage Policies Volume 2 – New Development at section 6.7.2.

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

Figure 6: SPR Values for Soil (Excerpt from GDSDS: Table 6.7)

A site investigation, carried out in the June 2020 on behalf of the client, confirmed that the existing ground is unsuitable for infiltration, with poor water acceptance characteristics. A **Soil Type 4**, consistent with the confirmed soil material on the site was therefore applied in the runoff calculations.

The Standard Annual Average Rainfall (SAAR) equivalent of 797mm, as received from Met Éireann for the subject site, was used to determine the rainfall runoff rate. Refer to the **Appendix B** of this report for the Return Period Rainfall Depths for Sliding Durations from Met Éireann.

Using the ICPSuDS Input, {Flood Studies Report (FSR)} Method, the rainfall runoff discharging in its existing condition, has been calculated at greenfield runoff rate, **QBAR_{RURAL} = 5.6l/s/ha**. With the contributing area of 1.5ha, the maximum allowable discharge is going to be 8.4l/s.

Refer to Figure 7 of this report for an excerpt of the results from the MicroDrainage Runoff Calculator, which provides the calculated QBAR runoff rate along with the discharge rate for varying Annual Recurrence Interval

(ARI). Also, please refer to the **Appendix B** for the QBAR runoff calculation report.

Rural Runoff Calculator

ICP SUDS

ICP SUDS Input (FSR Method)

Return Period (Years): 100
Area (ha): 1.000
SAAR (mm): 797
Soil: 0.470
Growth Curve: (None)

Partly Urbanised Catchment (QBAR)

Urban: 0.000
Region: Ireland Greater Dublin

Results

QBAR rural (l/s): 5.6
QBAR urban (l/s): 5.6

Return Period Flood

Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 6/Region 7	5.6	17.9	4.8	12.7	17.9
Region 8	5.6	13.6	4.4	10.7	13.6
Region 9	5.6	12.3	4.9	9.9	12.3
Region 10	5.6	11.7	4.9	9.5	11.7
Ireland National	5.6	10.3	4.8	8.9	10.3
Ireland East	5.6	10.7	4.8	9.2	10.7
Ireland South	5.6	10.3	4.8	8.9	10.3
Ireland West	5.6	10.0	4.8	8.7	10.0
Ireland Greater Dublin	5.6	14.7	4.8	11.9	14.7

OK Cancel Help

Enter Soil between 0.150 and 0.500

Figure 7: Existing Site Runoff Calculator Results (MicroDrainage Excerpt)

4.3 Proposed Surfacewater Drainage Strategy

4.3.1 Proposed Surfacewater Strategy Overview

It is proposed to separate the surfacewater and wastewater drainage networks, which will serve the proposed development, and provide independent connections to the existing surfacewater network and local wastewater sewer network, respectively.

Refer to the included drawing **A612-OCSC-XX-XX-DR-C-0500** as part of this submission for the proposed drainage network layout, which is designed to serve the proposed development.

4.3.2 Climate Change Allowance

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

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

4.3.3 Proposed Surfacewater Management Plan

The surface water design will comply with the following standards and best practice guidance:

- Louth County Development Plan 2021-2027
- Climate Change Adaptation Strategy 2019 - 2024;
- Greater Dublin Strategic Drainage Study (GDSDS);
- Greater Dublin Regional Code of Practice for Drainage Works (GDR COP);
- Technical Guidance Document H – Drainage and Wastewater Disposal;
- The SUDs Manual, CIRIA: C753, 2015

A traditional gully, manhole and pipe network along with the various SUDs features are proposed for collection, conveyance, attenuation and disposal of the generated the surface water runoff.

The new development's surface water drainage network will comprise a sustainable drainage system that is integrated with the landscape features, wherever practicable. The sustainable drainage systems reduce the runoff volume discharging from site, as well as improves the water quality.

The proposed design provides consideration to both the Water Quantity and Quality aspect of the proposed runoff discharge from the development. A detailed impact assessment has been included in the section 4.8 of this report.

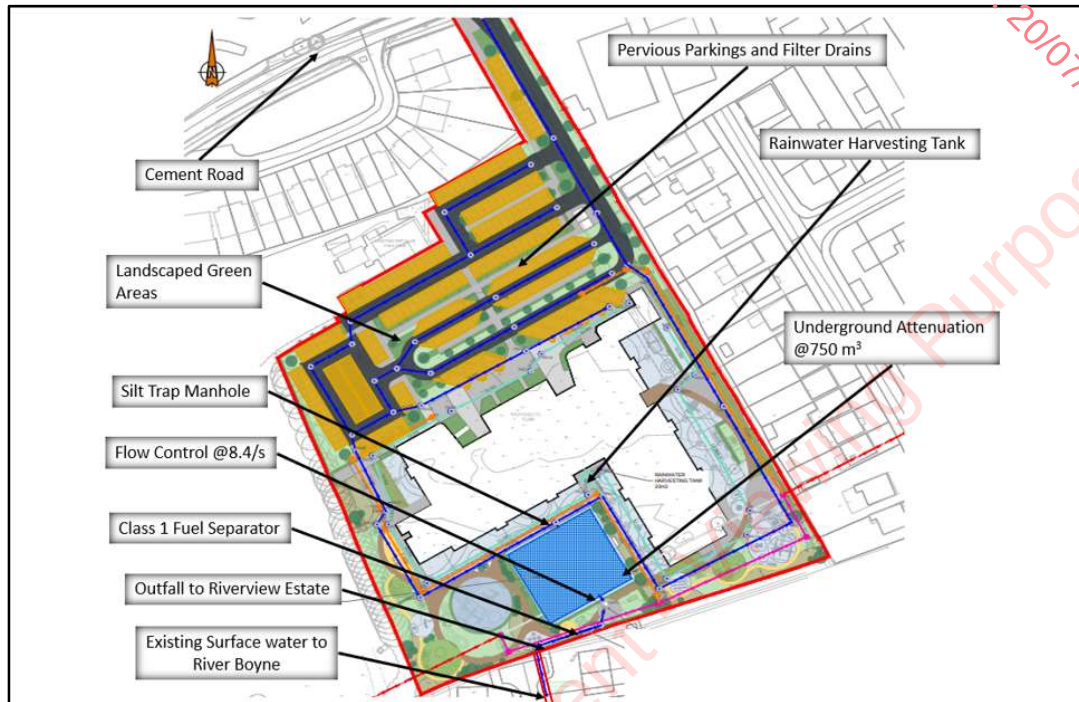


Figure 8: Proposed Surface water Drainage Strategy

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

4.3.3.1 Pervious Paving

Permeable concrete block paving has been proposed under the parking and set down bays. A Type C permeable paving is provided with a subbase thickness of 300 mm for providing the required storage for attenuation. Filter drain with appropriate flow control (orifices) will be provided under the permeable paving (at its low point) to convey the attenuated surface water runoff to the proposed gravity network.

There are several pervious surfaces available but all work by similar practice, with the surface allowing rainfall to pass through, with an open-graded base layer providing structural strength to the surface, while also allowing for 30% storage by volume within the void content.

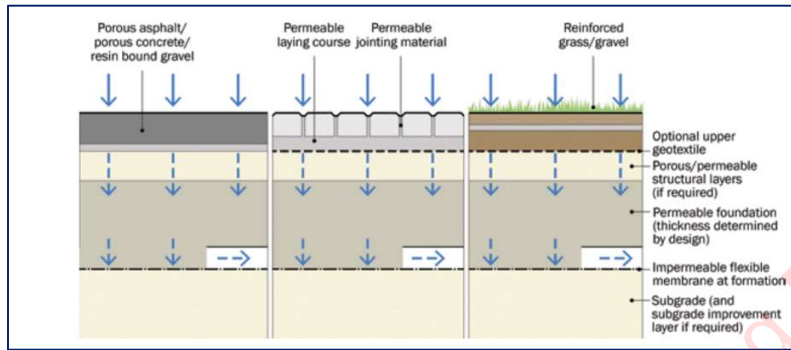


Figure 9: Detail of Type C Pervious Paving (CIRIA C753)

4.3.3.2 Filter Drains

A filter drain is an open graded stone filled trench, which can also include a perforated pipe to assist distribution and conveyance of rainfall runoff along its length. Since no infiltration is possible into the ground, the perforated pipe will be provided at the lower level of the proposed filter drain. Rainfall runoff can be stored within the void content of the stone trench, which should be wrapped in a fine geotextile to prevent fine sediment from entering the structure.

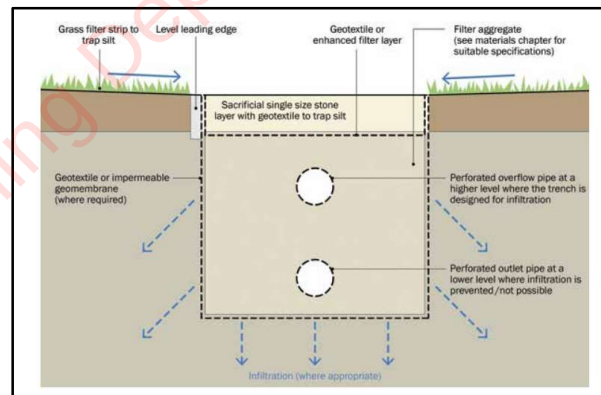


Figure 10: Filter Drain Illustration (DCC SuDS GUIDE)

4.3.3.3 Trapped Road Gullies

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

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

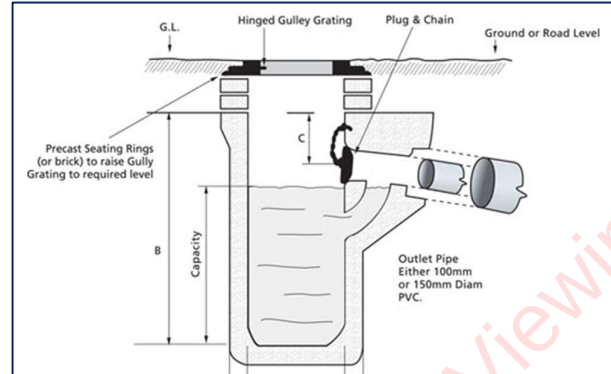


Figure 11: Trapped Road Gully

4.3.3.4 Silt Traps

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

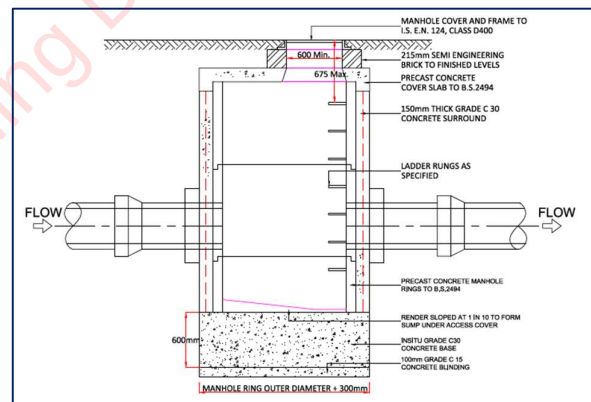


Figure 12: Typical detail of Silt Trap Manhole

4.3.3.5 Rainwater Harvesting

One 20m³ capacity underground rainwater harvesting tank is proposed to service both the schools. The Tank is manufactured from GRP. The system comprises of a main storage tank, leaf filter, stainless steel pump, floating filter, inline filter, float switches, depth rods, control panel and comes with an AA rated Air Gap system.

In accordance with TGD 030 Section 16 (g) rainwater is only collected from the roof surfaces through gutters and piped to the underground storage tank. The storage requirement of the tank is 20,000 litre as per the TGD-30 requirements to ensure that there is sufficient storage capacity whilst limiting the chances of stagnation occurring.

This roof drainage is collected via uPVC Wavin collector pipes and drained by gravity through a leaf filter prior to entering the main storage tank filter in compliance with TGD 30 Section 16(i). Provision has been made within the drainage layout for overflow pipes from the rainwater system to the storm system at both the leaf filter and the storage tank locations with a non-return valve to eliminate backflow into the harvesting tanks.



Figure 13: Typical Below Ground GRP 10,000l Rainwater Harvesting Tank

4.3.3.6 Oil Separators

Oil separators are designed to separate gross amounts of oil and large (>250µm) suspended solids from the surface water, mainly through sedimentation process. The previously outlined measures also provide mitigation in this regard. However, a Class 1 bypass fuel separator would be additional and final mitigation measure, prior to surface water discharge to the public network.

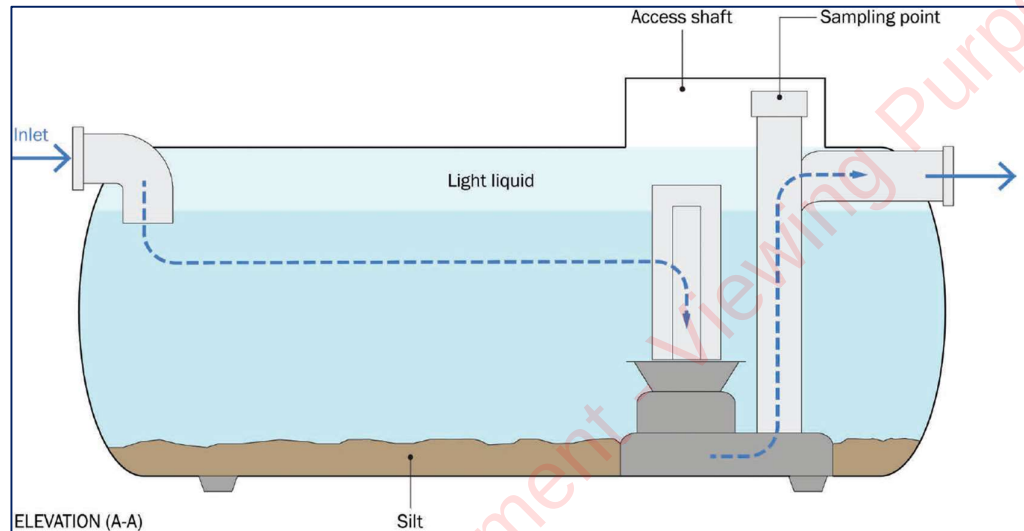


Figure 14: Typical Section Detail of Fuel Separator (CIRIA C753)

4.3.3.7 Attenuation Storage

Unlined proprietary poly-tunnel storage units (or similar approved) are to be provided, underground in the soft play area and the open green area, for the attenuation of rainfall runoff prior to discharge to the existing network within the Riverview housing estate. In addition to underground attenuation storage of 750m³ attenuation storage is provided under the previous paving where the water is stored temporarily and then released downstream at a controlled rate.

Please refer to the included Civil Engineering drawings with this submission for further details of the proposed attenuation.

These systems are to provide sufficient temporary storage volume for rainfall events up to, and including, the design 1% AEP rainfall event (including climate change). Typical poly-tunnel storage systems comprise plastic arch-units with

open-graded crushed rock bedding and surround. These units are arranged in rows, with an isolator row for efficient operation and maintenance.

These systems typically allows for interception of initial rainfall to be provided at the base of the system, by elevating the outlet relative to the systems base.

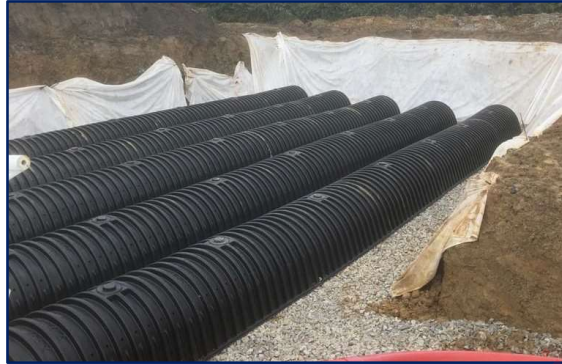


Figure 15: Typical Polytunnel Installation

4.3.3.8 Flow Control Devices

Flow Control devices provided immediately downstream of attenuation system, in order to restrict the surface water discharge from site to a flow rate equivalent, or below, the natural greenfield runoff rate.

A vortex-hydrobrake type flow control shall be provided at end-of-line manholes, to limit the catchment discharge rate to the greenfield equivalent rate of 8.4 l/s

All other flow control devices within the development – typically located immediately downstream of a SuDS structure – are to comprise *protected orifices*, as the restricted flow will typically be in the order of 2-8 l/s, and therefore a small aperture will be provided.



Figure 16: Vortex Hydro-Brake Flow Control Unit (Hydro International)

4.3.3.9 SuDS Tree Pits

SuDS Tree Pits collect the rainfall runoff laterally from the surrounding landscaping and paving, which allows the trees to be watered every time it rains, with the growing medium also being used to store water before being released slowly to the adjacent surface water system.

These systems may also include cellular layer, at base or surround, in order to store additional rainfall.

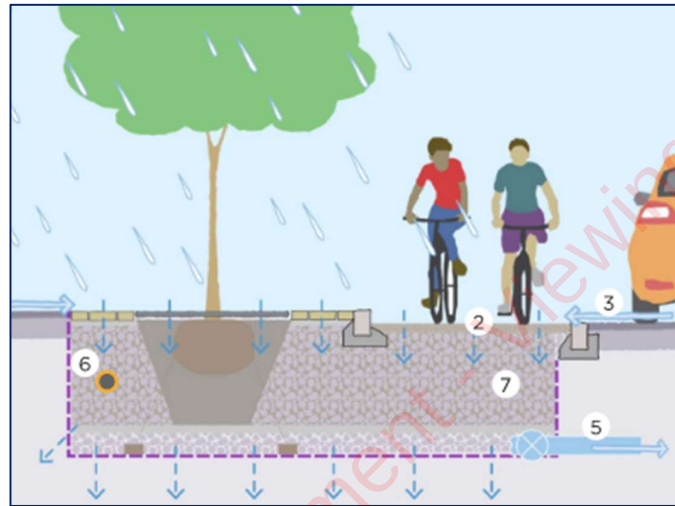


Figure 17: SuDS Tree Pit Illustration (DCC SuDS GUIDE)

4.4 Proposed Surfacewater Network Detailed Design

4.4.1 Software Design Criteria

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

The MicroDrainage Network Design software applies the Flood Studies Report (FSR) methodology for analysis of the rainfall profiles. However, the input design parameters that were used, as part of this design, were based on the available Flood Studies Update (FSU) data, i.e., the return period rainfall

depths for sliding durations, which determine the M5-60 and R values, and the standard annual average rainfall (SAAR); as sourced from Met Eireann.

Figure 18: Surfacewater Network Design Criteria (MicroDrainage Excerpt)

4.4.2 Proposed Surfacewater Catchment Area

The proposed finished levels of the development follows largely the same trend as the existing topography of the site as a result of which the proposed site continue to fall from its northern to southern edge resulting in a single catchment of 2.18 ha total area with a single outfall into the existing River View estate surfacewater area located south of the development.

Please refer to the drainage drawings included in the submission for further details.

4.4.3 Proposed Development Rainfall Runoff

It is proposed to reduce and restrict the rainfall runoff, discharging from the site of the proposed development to the greenfield equivalent, $Q_{BAR_{RURAL}}$,

runoff rate, as per the FSR ICP SuDS method, which is based on the IH124 method for catchments smaller than 25km² (25ha) in area.

This is to be achieved with the provision of a flow restrictor (Hydro-Brake Optimum by Hydro-International, or similar approved) prior to discharging to the existing storm sewers in the Riverview estate in the south with the appropriate measures of attenuation and sub-catchment management.

Sub-catchment flow-control devices and associated attenuation are also to be strategically provided, in order to maximise SuDS benefits and achieve the required water quality and quantity benefits.

Refer to Figure 7, in section 4.2.2 of this report, for an excerpt from the results MicroDrainage Runoff Calculator for the development catchment area (1.50ha Impervious area), which indicates the greenfield equivalent, $Q_{BAR_{RURAL}}$, value of **8.4 l/s** (@ 5.6 l/s/ha) along with the calculated runoff for varying Average Recurrence Intervals (ARI).

For the purpose of the surfacewater network design simulation, we have applied a runoff coefficient, C_v value, of 0.75 across the entire development, with a reduced percentage of permeability applied to the various surfaces.

4.4.4 Proposed Surface Water Pipe Network Design

The overall surface water drainage system, serving the proposed development, is to consist of a gravity sewer network that will convey the runoff from the roads and parking areas to the proposed underground storage and eventually to the designated outfall at a controlled rate. The proposed building roofs are connected via gravity sewer to a rainwater harvesting, overflow from which is connected to the gravity network which leads to the underground attenuation storage.

4.5 Proposed Surface Water Attenuation Storage

As described in the earlier sections, the attenuation storage enables the developer to comply with the greenfield runoff discharge rates. Attenuation and temporary storage has been strategically distributed across the

development site and largely provided as part of the proposed SuDS structures, which comprise:

- Pervious paving with filter drain;
- Rainwater harvesting tank;
- Filter drain;
- SuDS Tree Pits;
- Polytunnel Storage.

A minimum total storage volume of 1033 m³ is to be provided across the entire development, within the aforementioned SuDs structures. Please refer to **Appendix D** of this report for the details of the volume summary provided.

4.6 Surface Water Outfall Location

The drainage layout drawing **A612-OCSC-XX-XX-DR-C-0500** included in the submission shows the proposed outfall into the existing network in the Riverview estate. The discharge rate to the existing network is equal to greenfield equivalent rate, as described in the earlier sections.

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

4.7 Water Quality

The quality of the surface water discharging from site is to be improved through the following provisions, each of which is discussed in greater detail in section 4.3.3:

- Pervious Paving at car park areas;
- Filter Drains;
- Trapped road gullies on the road carriageway, to trap silt and gross pollutants;
- Silt trap to be provided on manhole immediately upstream of attenuation system, as a further preventative measure to trap silt and other gross pollutants;

All of the above sustainable drainage systems will provide significant treatment of the rainfall runoff across the new development site, resulting in increased water quality discharging from site ensuring a positive impact on the receiving watercourse i.e., the river Boyne, which is in line with the proposals in the Water Framework Directive.

4.8 Surface water Impact Assessment

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

- Criterion 1 -River Water Quality Protection;
- Criterion 2- River Regime Protection;
- Criterion 3- Level of Service (flooding) for the site and;
- Criterion 4 -River Flood Protection.

4.8.1 Criterion 1-River water Quality Protection

It is proposed that the overall drainage system, serving this development, will contain a range of surface water treatment methods, as outlined previously in Section 4.3.3, which will improve the quality of surface water being discharged from the proposed development to the river Boyne.

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

- a) Intensive landscaping, where practicable;
- b) All road gullies and linear channel drains are to be trapped;
- c) Silt-trap prior to attenuation storage area.
- d) Class-1 Oil Separator deployed prior to discharging into River view estate.

4.8.2 Criterion 2 - River Regime Protection

Surface water discharge from the overall development will be restricted to an equivalent rural runoff rate of **5.6 l/s/ha**, as per GDSDS and Louth County

Development Plan .Refer to Section 4.4.3 for further details of the proposed development rainfall runoff calculations.

This will be achieved with the provision of a flow control devices (Hydro-Brake Optimum, by Hydro-International, or similar approved) upstream of the outfall manhole. Refer to Section 4.3.3.8 for further details.

4.8.3 Criterion 3 - Level of Service (Flooding) Site

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

- Sub Criterion 3.1: No flooding on site except where planned (30-year high intensity rainfall event);
- Sub Criterion 3.2: No internal property flooding (100-year high intensity rainfall event);
- Sub Criterion 3.3: No internal property flooding (100-year river event and critical duration for site) and;
- Sub Criterion 3.4: No flood routing off site except where specifically planned. (100-year high intensity rainfall event).

4.8.3.1 Sub Criterion 3.1

The surface water drainage systems, serving the proposed development, have been designed to accommodate the 100-year return period rainfall event (including an allowance of 20% increase in rainfall intensity for climate change) without flooding. Therefore, the system has capacity for the 30-year return period rainfall event without flooding.

The performance of the proposed drainage system has been analysed for design rainfall events up to, and including, the 1% AEP event (including 20% climate change allowance) using the MicroDrainage Network Design Software, by Innovyze Inc. Refer to **Appendix D** of this report for details of design criteria, calculations and results. The analyses indicate that no flooding will occur for design rainfall events up to, and including, the 1% AEP (Annual Exceedance Probability)

4.8.3.2 Sub-Criterion 3.2

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

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

4.8.3.3 Sub-Criterion 3.3

Details of the flood risk assessment associated with the proposed development is outlined in the Site-Specific Flood Risk Assessment (Document Nr. **A612-OCSC-XX-XX-RP-C-0012**), which is submitted under separate cover, as part of this application.

4.8.3.4 Sub-Criterion 3.4

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

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

Details of the flood risk assessment associated with the proposed development is outlined in the Site-Specific Flood Risk Assessment (Document Nr. **A612-OCSC-XX-XX-RP-C-0012**), which is submitted under separate cover, as part of this application.

4.8.4 Criterion-4 River Flood Protection

As outlined in *Section 4.10* (Criterion 2), the surface water runoff from the development's catchment will be limited to a maximum of **5.6 l/s/ha**.

Refer to Section 4.4.3 of this report for further details on the limiting discharge rates. The GDSDS Volume 2, Appendix E states that this practice ensures "that sufficient stormwater runoff retention is achieved to protect the river during extreme events".

Attenuation storage is to be provided for the 100-year return period rainfall event (including an increased 20% rainfall intensity; to allow for climate change). Discharge from site is to be achieved through the use of a vortex flow control device (e.g., Hydro-Brake Optimum, by Hydro-International, or similar approved), which will reduce the risk of blockage present with other flow devices.

Refer to **Appendix D** of this report for details of hydraulic modelling calculations of attenuation and flow control facilities, as carried out using MicroDrainage software by Innovyze Inc.

4.9 Consultation

OCSC have been in consultation with the Louth County Council (LCC) regarding the surface water drainage strategy for this new development, and its proposed attenuated outfall to the existing infrastructure in the Riverview Estate. The council requested an assessment of the performance of the existing surface water network through this estate, which comprises of a network having 2nr. 150mm starting pipes that eventually converge, joining a 300mm pipe downstream. OCSC will continue to engage with LCC in order to ensure that the surface water drainage strategy and its outfall proposal are to their satisfaction.

4.10 Performance of the Existing Network in Riverview Estate

In response to the request of the LCC, a Microdrainage model of the existing network in the river view estate is developed. The existing network in the Riverview estate has two legs of network running on both side of the street,

starting with 150mm diameter pipe. After a stretch of approximately 120 m, the two network converge into 150 mm diameter pipe, and the network becomes 300mm diameter further downstream. The available existing network data has discontinuity and does not cover the network all the way to the river Boyne sea outfall, we have used the available data to model existing network to assess its performance. Please refer to Figure 18a showing the existing network.

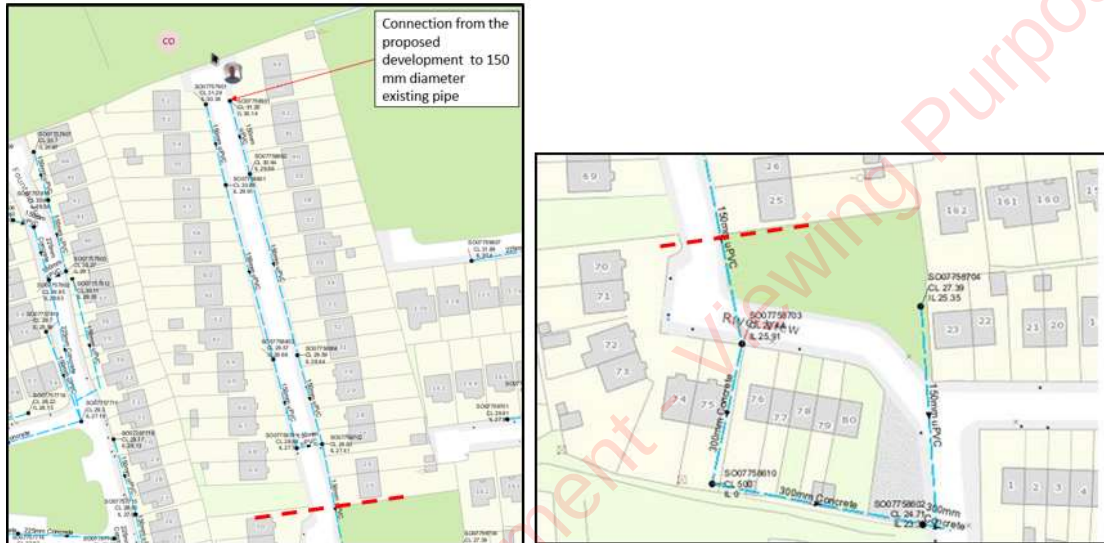


Figure 18a: Existing Surface water Network in Riverview Estate.

The existing network is simulated for 1 in 100 year all storm durations and the simulation criteria, performance of the existing pipes and the network results for the said simulation are included in the Appendix D of the report. Catchments considered in the simulation for the existing network are marked in the Figure 18b of this report.

The network shows flooding for high intensity short duration (15, 30 and 60 min). It is evident from the analysis of the results that the existing network in the river view estate does not have sufficient carrying capacity and requires network upgrades to relieve the flooding. Please refer to the figure 18c below for the snapshot of the result summary showing the flooded nodes for 1 in 100-year shorter duration events.



Figure 18b: Catchments Considered in the Existing Network

Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	Storm Rank	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Pipe Flow (l/s)	Status
27.000 8901		15 minute 100 year Winter I+20%	1	31.260	30.585	0.295	0.000	0.68	11.3	SURCHARGED
27.001 8802		15 minute 100 year Winter I+20%	1	30.940	30.495	0.465	0.000	0.79	19.1	SURCHARGED
27.002 8804		30 minute 100 year Winter I+20%	1	29.590	29.593	1.003	2.944	0.86	25.9	FLOOD
28.000 7901		15 minute 100 year Winter I+20%	1	31.290	31.051	0.521	0.000	0.73	15.2	FLOOD RISK
28.001 8801		15 minute 100 year Winter I+20%	1	30.850	30.850	0.790	0.045	1.00	23.2	FLOOD
28.002 8803		30 minute 100 year Winter I+20%	1	29.570	29.572	0.762	1.923	0.84	24.0	FLOOD
28.003 5870		60 minute 100 year Winter I+20%	1	28.880	28.900	1.050	20.453	1.25	36.7	FLOOD
27.003 8702		30 minute 100 year Winter I+20%	1	28.820	28.826	1.266	6.021	1.36	41.6	FLOOD
27.004 8703		15 minute 100 year Winter I+20%	1	27.440	26.118	-0.092	0.000	0.81	96.8	OK
27.005 8610		15 minute 100 year Winter I+20%	1	28.000	25.497	-0.152	0.000	0.48	103.0	OK
29.000 8704		15 minute 100 year Winter I+20%	1	27.390	25.393	-0.107	0.000	0.18	6.0	OK
27.006 8602		15 minute 100 year Winter I+20%	1	24.710	23.701	0.101	0.000	1.24	135.6	SURCHARGED

Figure 18c: Excerpt from Microdrainage Result Summary

4.11 Proposed Upgrades to the Existing Network

Upon establishing the performance of the existing network, we integrated the proposed development model with the existing river view estate network to assess the impact of proposed development discharge (8.4l/s) on the existing Riverview estate network.

The proposed connection does not have a significant adverse impact on the existing network as the integrated model shows flash floods which still clears up within few minutes after rain stops.

Based on our discussions with the LCC and above background, it is proposed to upgrade the parts of the existing network, so that it can be made flood free and can receive the discharge from the proposed development.

After detailed analysis of the existing network's simulation results, it is concluded that to remove the flooding, we need to upgrade 2 pipes (total 60 m length) from existing 150mm to 300 mm diameter. Please refer to the figure 18d below showing the location and extents of upgrades. Please refer to the Appendix D of this report for the detailed simulation results of the integrated (proposed development and existing Network). As advised by the council a road opening (RO) permit will be obtained and the appointed contractor shall submit a Traffic Diversion Plan(TDP) prior to start of construction

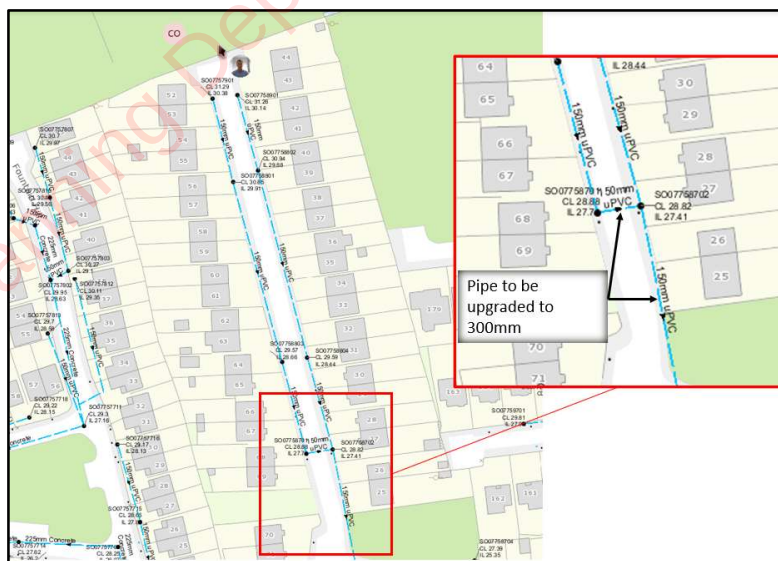


Figure 18d: Upgrades Proposed in the Existing Network

5 WASTEWATER DRAINAGE

5.1 Overview

All proposed wastewater sewer design has been carried out in accordance with Irish Water's Code of Practice for Wastewater Infrastructure (Revision 2 – July 2020). As described in the section 1.4 of the report, the proposed development site is green field area and thus has no existing connection to the public wastewater connection.

The proposed development is to be served by a gravity wastewater drainage network ultimately discharging into the existing combined sewer located at the southern boundary of the development.

5.2 Existing Combined Sewer

The proposed development site is served by a 375mm diameter combined sewer, as identified on the Irish Water Records reproduced as Figure 5 and verified by GPR/Utility survey. Refer to **Appendix A** of this report for the details of the Irish Water existing wastewater infrastructure records.



Figure 19: Existing Combined Sewer Overlap with Building Footprint

The footprint of the proposed school building overlaps the alignment of the existing combined sewer, which is a violation of the wayleave requirement of the Irish Water. A minimum of 3m offset from the building structure is required as per the said wayleave requirements. Please refer to Figure 19 above showing the said overlap. In order to comply with the Irish Water wayleave requirement, the existing combined sewer is proposed to be diverted away from the building structure.

5.3 Consultation

A Pre-Connection Enquiry Form (**IW Ref Nr. CDS20003516**) was submitted to Irish Water, with Confirmation of Feasibility subsequently confirmed by Irish Water, without the requirement for any upgrades however Irish water advised to comply with the wayleave requirement.

Refer to **Appendix F** of this report for a copy of the Confirmation of Feasibility Letter.

5.4 Proposed Wastewater Drainage Strategy

It is proposed to separate the wastewater and surface water drainage networks, which will serve the proposed development, and provide independent connections to the existing combined sewer and the available surface water network in the Riverview estate, respectively. The details of Surface water Strategy is detailed in section 4 of this report.

There is only one wastewater catchment for the proposed development which outfalls into the existing combined sewer running across the southern edge of the development. As discussed in the section 5.2 of this report, in order to comply with the wayleave requirements, the existing combined sewer is diverted away from the building.

Please refer to Figure 20 of this report and the included drainage drawing **A612-OCSC-XX-XX-DR-C-0500** for further details of the proposed wastewater network and the diversion proposal of the combined sewer.



Figure 20: Diversion of the Existing Combined Sewer

The proposed wastewater network has been designed in accordance with the Building Regulations Part H, and *Irish Water's Code of Practice for Wastewater Infrastructure (Revision 2 – July 2020)*.

5.5 Wastewater Network Design Calculations

Wastewater (volumetric) calculations have been complied in accordance with Irish Water's Code of Practice Wastewater Infrastructure, IW-CDS-5030-03 (Revision 2 – July 2020) and are included in **Appendix E** of this report.

5.6 Taking In Charge

It is proposed that all new wastewater drainage infrastructure installed to serve the proposed development within the redline boundary **is not** to be offered to Irish Water for to be taken-in-charge and is to be managed by the new development's building management.

6 POTABLE WATER SUPPLY

6.1 Overview

All proposed potable water design has been carried out in accordance with *Irish Water's Code of Practice for Water Infrastructure, IW-CDS-5020-03 (Revision 2 – July 2020)*.

6.2 Consultation

A Pre-Connection Enquiry Form (***IW Ref Nr. CDS20003516***) was submitted to Irish Water, with Confirmation of Feasibility subsequently confirmed by Irish Water, without the requirement for any upgrades. Please refer to **Appendix F** of this report for a copy of the confirmation of Feasibility letter.

6.3 Existing Water Main Infrastructure

As per the existing infrastructure records received from the Irish Water, a 225 mm diameter water main is identified to run along the cement road located north of the proposed development.

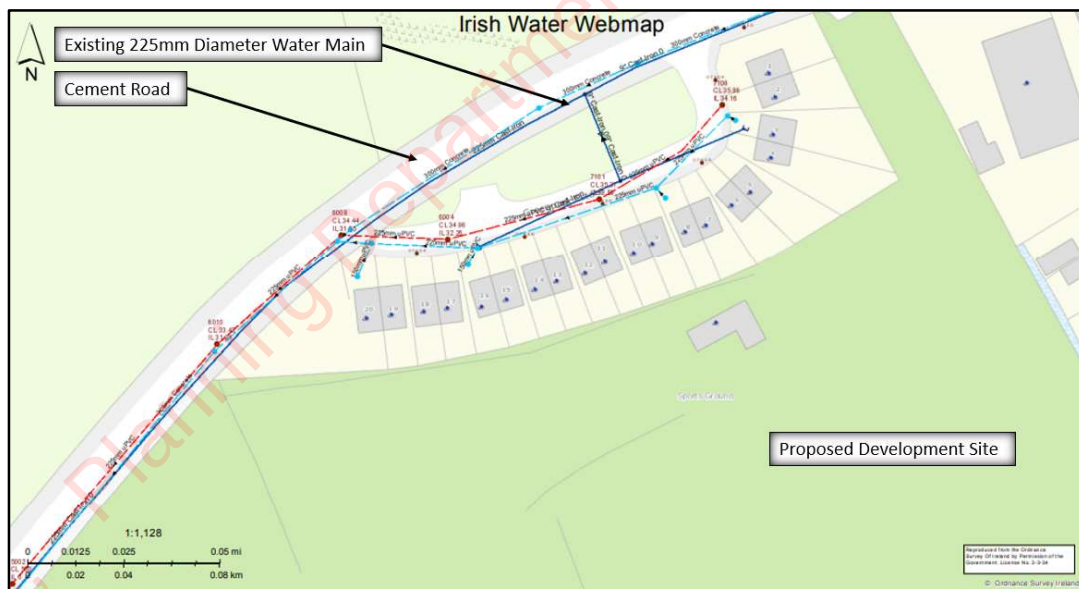


Figure 21: Existing Water Main

6.4 Connection to the Existing Network

It is proposed to serve the proposed development by providing a 150mm diameter connection to the existing 225 mm diameter watermain which is running adjacent to the cement road.

Additional 100mm branches to serve as a fire main (to be confirmed by the fire consultant), with a number of hydrants to be provided along its length at agreed locations.

Please refer to the watermain layout drawing **A612 -OCSC-XX-XX-DR-C-0550** included in this submission for further details on the watermain connection.

The proposed connection is to be carried out in accordance with *Irish Water's Code of Practice for Water Infrastructure (Revision 2 – July 2020)*, following a New Connection agreement with Irish Water.

6.5 Taking in Charge

All new watermain infrastructure, installed to serve the proposed development after the bulk meter **is not** to be offered to Irish Water for to be taken-in-charge. The development's internal water infrastructure is to be managed and maintained by the building management.



OCSC

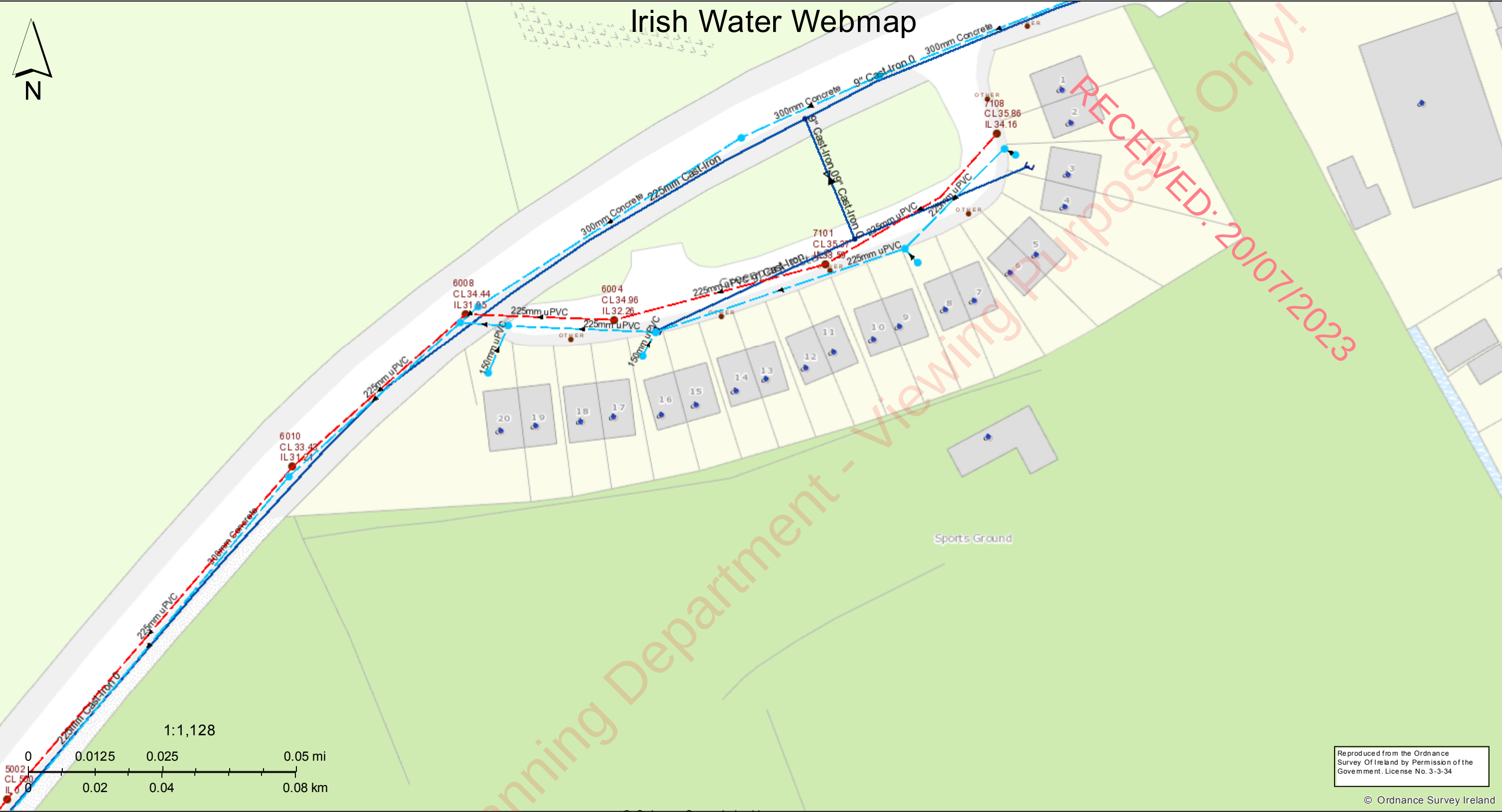
O'CONNOR | SUTTON | CRONIN

Multidisciplinary
Consulting Engineers

APPENDIX A. EXISTING DRAINAGE INFRASTRUCTURE RECORDS

Appendix A

EXISTING DRAINAGE INFRASTRUCTURE RECORDS



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Legend

- Stormwater Gravity Mains (Irish Water Owned)**

 - Surface
- Stormwater Gravity Mains (Non-Irish Water Owned)**

 - Surface
- Storm Manholes**

 - Cascade
 - Catchpit
 - Hatchbox
- Storm Inlets**

 - Gully
 - Standard
 - Other; Unknown
- Storm Fittings**

 - Vent/Col
 - Other; Unknown
- Storm Discharge Points**

 - Outfall
 - Overflow
 - Soakaway
 - Other; Unknown
- Storm Culverts**

 - Storm Clean Outs
- Sewer Gravity Mains (Irish Water owned)**

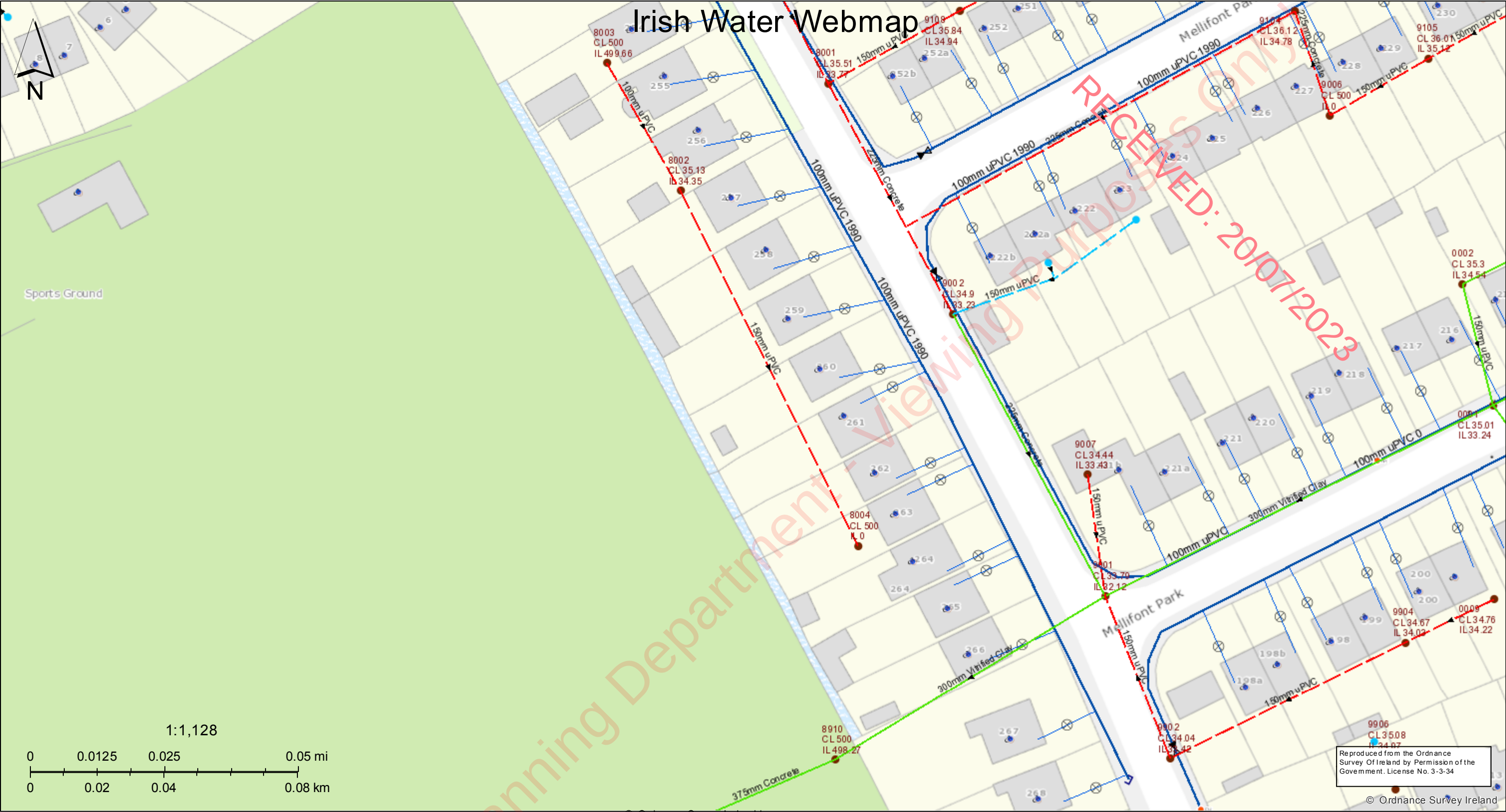
 - Combined
 - Foul
 - Overflow
 - Unknown
- Sewer Gravity Mains (Non-Irish Water owned)**

 - Combined
 - Foul
 - Overflow
 - Unknown

Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be anticipated. © Irish Water

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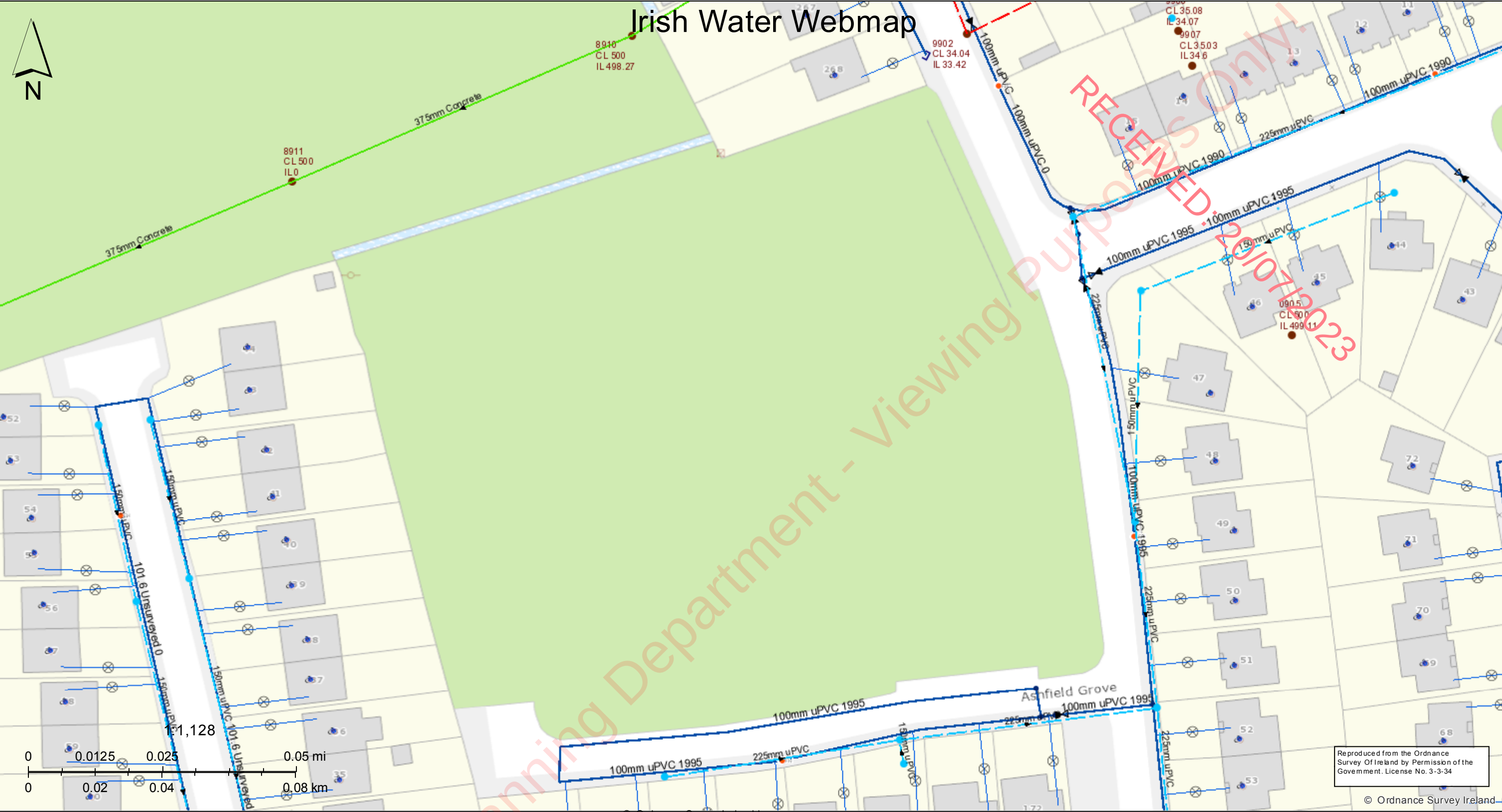
Legend

Stormwater Gravity Mains (Irish Water Owned)		Storm Fittings		Sewer Gravity Mains (Non-Irish Water owned)	
	Surface		Lamphole		Combined
	Standard		Vent/Col		Foul
	Other; Unknown		Other; Unknown		Overflow
Stormwater Gravity Mains (Non-Irish Water Owned)		Storm Discharge Points			Unknown
	Surface		Outfall	Sewer Gravity Mains (Irish Water owned)	
Storm Manholes			Overflow		Combined
	Cascade		Soakaway		Foul
	Catchpit		Other; Unknown		Overflow
	Hatchbox		Other; Unknown		Unknown

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Legend

- Stormwater Gravity Mains (Irish Water Owned)**

 - Surface
- Stormwater Gravity Mains (Non-Irish Water Owned)**

 - Surface
- Storm Manholes**

 - Cascade
 - Catchpit
 - Hatchbox
- Storm Inlets**

 - Gully
 - Standard
 - Other; Unknown
- Storm Fittings**

 - Vent/Col
 - Other; Unknown
- Storm Discharge Points**

 - Outfall
 - Overflow
 - Soakaway
 - Other; Unknown
- Storm Culverts**

 - Storm Clean Outs
- Sewer Gravity Mains (Irish Water owned)**

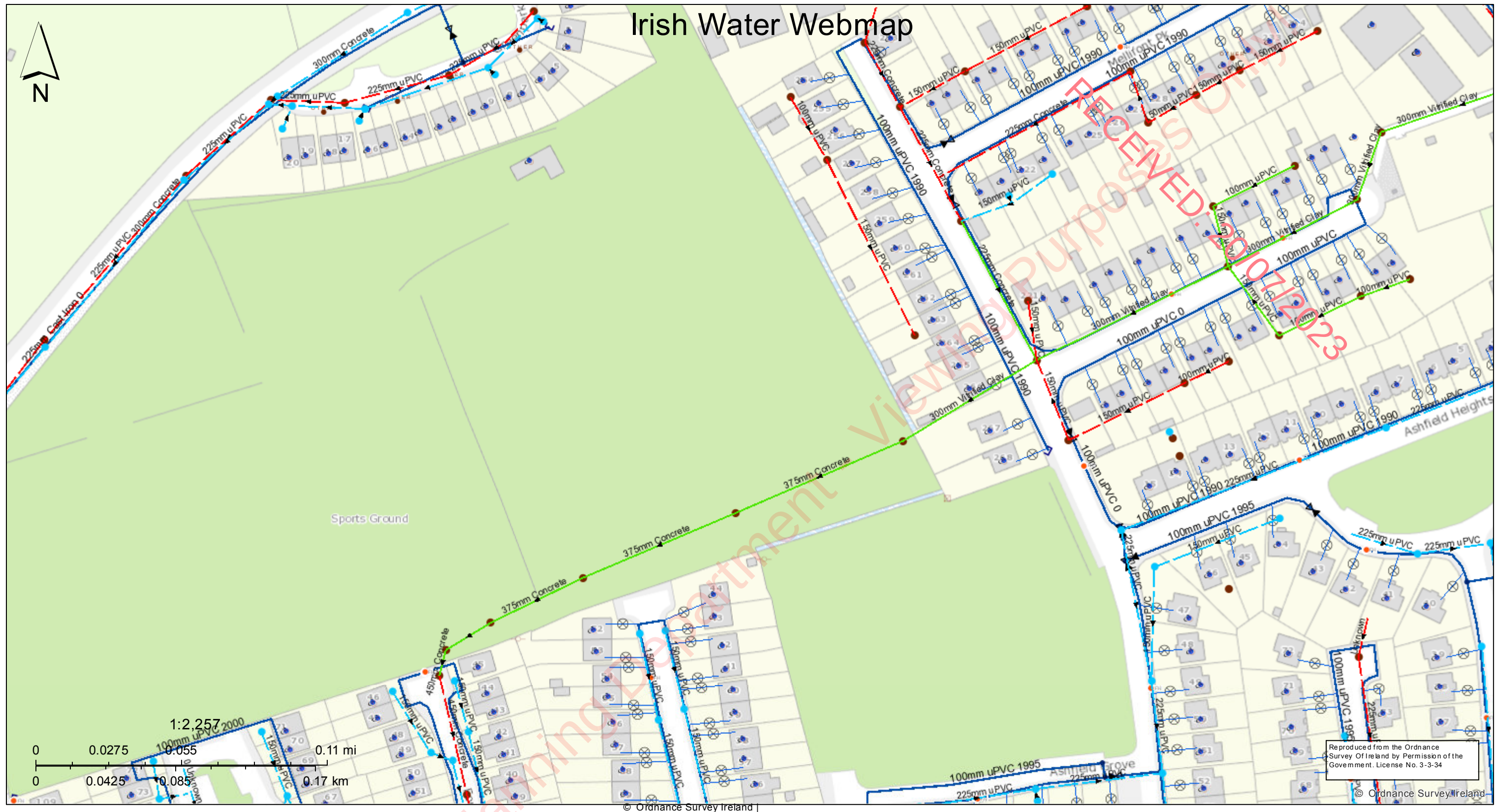
 - Combined
 - Foul
 - Overflow
 - Unknown
- Sewer Gravity Mains (Non-Irish Water owned)**

 - Combined
 - Foul
 - Overflow
 - Unknown

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Legend

Stormwater Gravity Mains (Irish Water Owned)

Surface

Stormwater Gravity Mains (Non-Irish Water Owned)

Surface

Storm Manholes

Cascade
Catchpit
Hatchbox

Lamphole
Standard
Other; Unknown

Storm Inlets

Gully
Standard
Other; Unknown

Storm Fittings

Vent/Col
Other; Unknown

Storm Discharge Points

Outfall
Overflow
Soakaway
Other; Unknown

Storm Culverts
Storm Clean Outs

Sewer Gravity Mains (Irish Water owned)

Combined
Foul
Overflow
Unknown

Sewer Gravity Mains (Non-Irish Water owned)

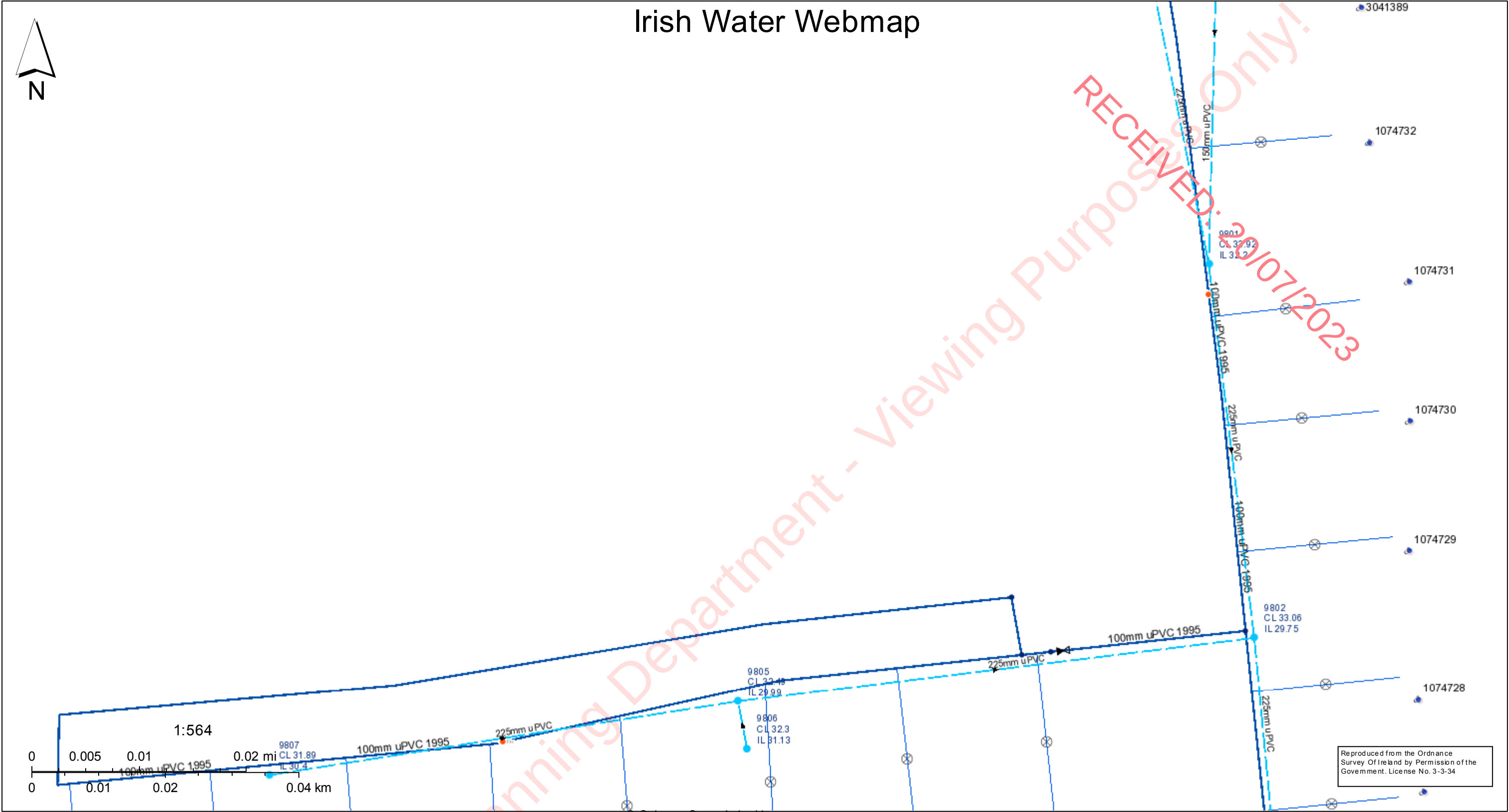
Combined
Foul
Overflow
Unknown

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Irish Water Webmap



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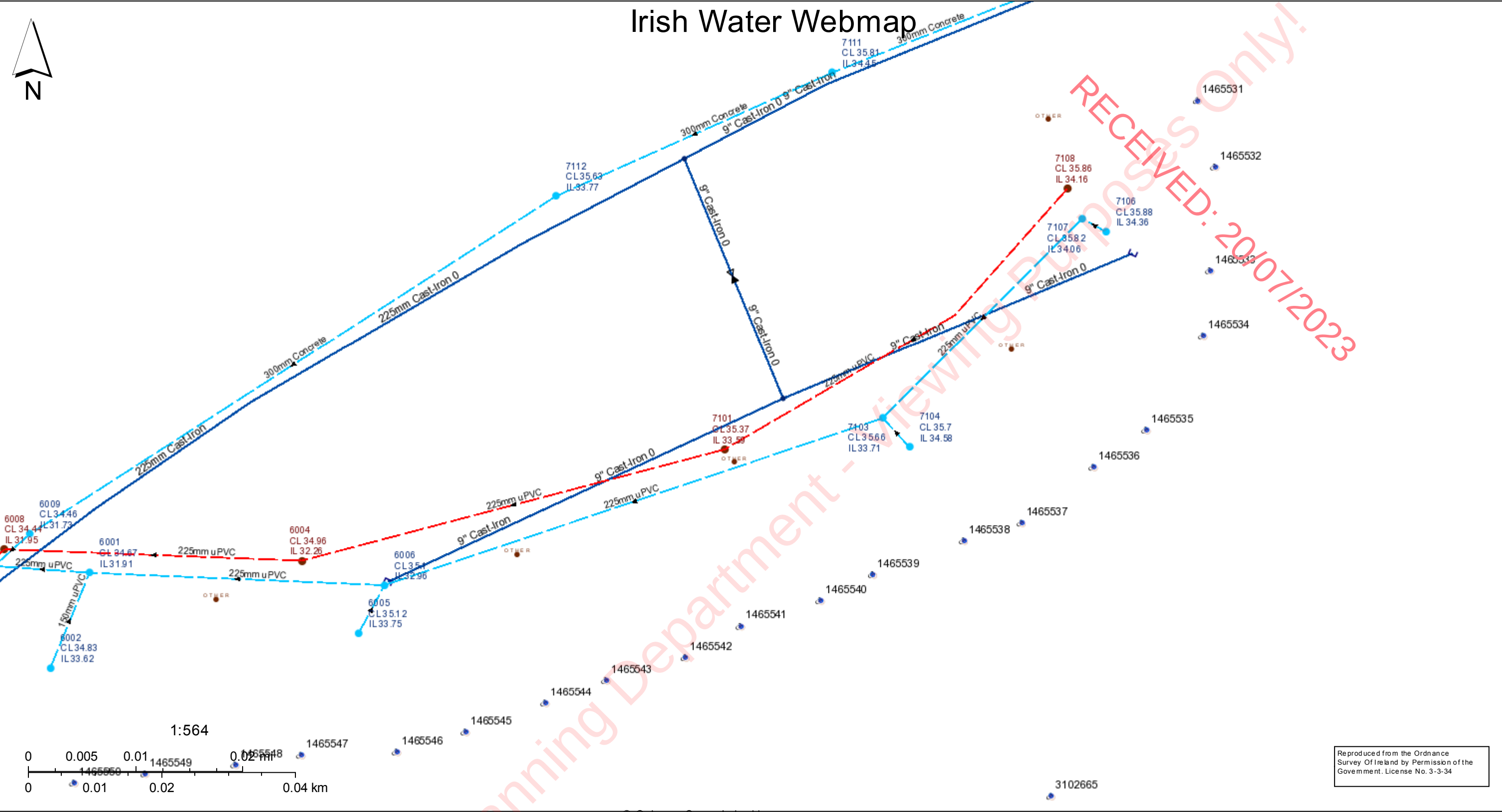
Legend

Stormwater Gravity Mains (Irish Water Owned)		 Lamphole	Storm Fittings		 Storm Culverts	Sewer Gravity Mains (Non-Irish Water owned)	
 Surface	 Standard	 Vent/Col			 Storm Clean Outs	 Combined	
Stormwater Gravity Mains (Non-Irish Water Owned)		 Other; Unknown	 Other; Unknown	Sewer Gravity Mains (Irish Water owned)		 Foul	
 Surface	Storm Inlets		Storm Discharge Points		 Combined	 Overflow	
Storm Manholes		 Gully	 Outfall			 Foul	 Unknown
 Cascade	 Standard	 Catchpit	 Overflow			 Overflow	
 Catchpit		 Other; Unknown	 Soakaway			 Unknown	
 Hatchbox			 Other; Unknown				

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Legend

Stormwater Gravity Mains (Irish Water Owned)

- Surface

Stormwater Gravity Mains (Non-Irish Water Owned)

- Surface

Storm Manholes

- Cascade
- Catchpit
- Hatchbox

Storm Inlets

- Gully
- Standard
- Other; Unknown

Storm Fittings

- Vent/Col
- Other; Unknown

Storm Discharge Points

- Outfall
- Overflow
- Soakaway
- Other; Unknown

Storm Culverts

- Storm Clean Outs

Sewer Gravity Mains (Irish Water owned)

- Combined
- Foul
- Overflow
- Unknown

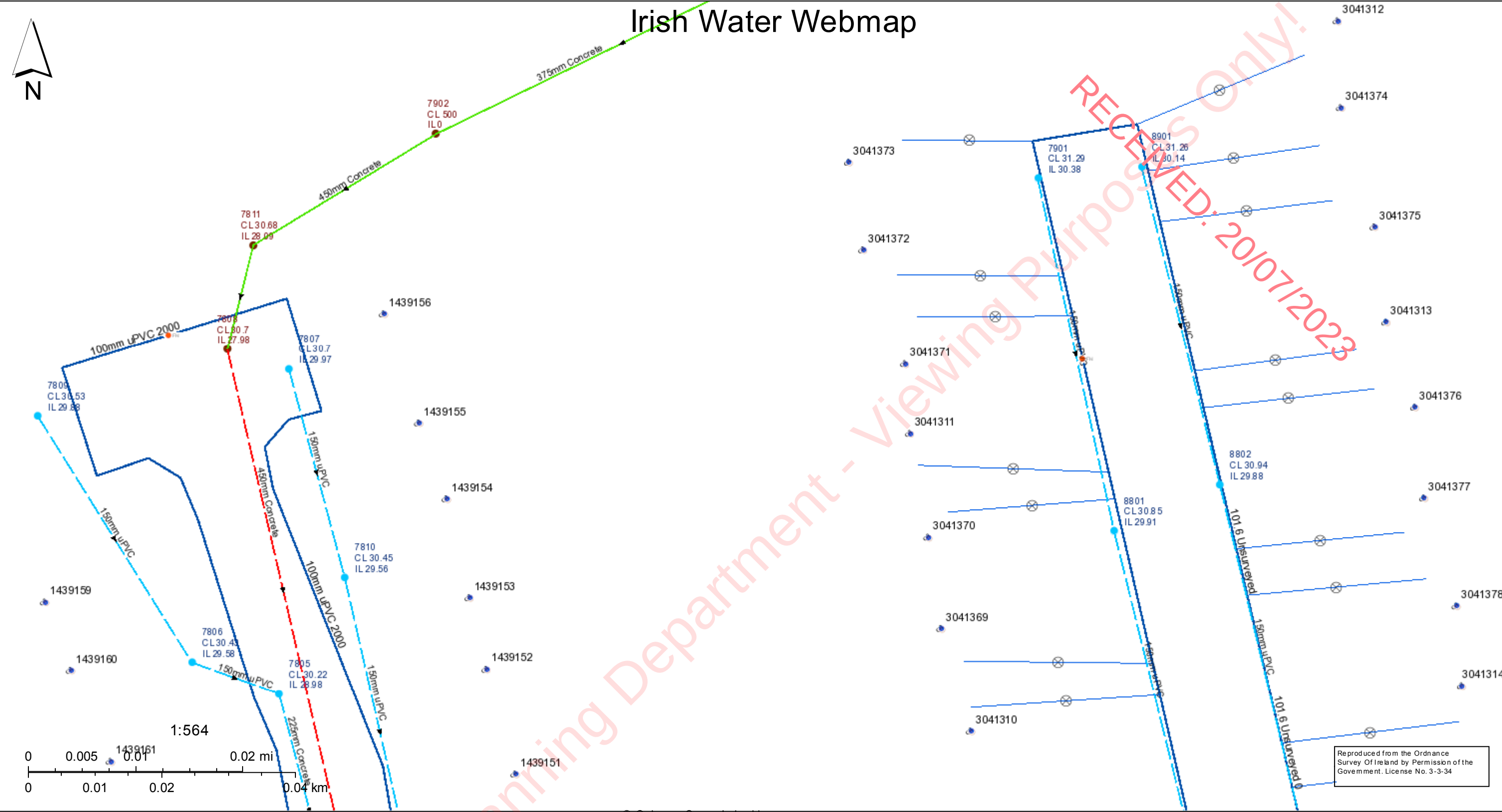
Sewer Gravity Mains (Non-Irish Water owned)

- Combined
- Foul
- Overflow
- Unknown

Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be anticipated. © Irish Water



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10/1/2019 10:05:45 AM

Legend

Stormwater Gravity Mains (Irish Water Owned)		Storm Fittings		Sewer Gravity Mains (Non-Irish Water owned)	
Surface	Lamphole	Vent/Col	Storm Culverts	Combined	Foul
Standard	Other; Unknown	Other; Unknown	Storm Clean Outs	Overflow	
Stormwater Gravity Mains (Non-Irish Water Owned)		Sewer Gravity Mains (Irish Water owned)		Unknown	
Surface	Storm Inlets	Storm Discharge Points	Combined		
Storm Manholes		Outfall	Foul		
Cascade	Gully	Overflow	Overflow		
Catchpit	Standard	Soakaway	Unknown		
Hatchbox	Other; Unknown	Other; Unknown			

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Connection from the proposed development to 150 mm diameter existing pipe





OCSC

O'CONNOR | SUTTON | CRONIN

Multidisciplinary
Consulting Engineers

APPENDIX B. RETURN PERIOD RAINFALL DEPTHS

Appendix B

RETURN PERIOD RAINFALL DEPTHS

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 307772, Northing: 276015,

DURATION	Interval		Years													
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.6,	3.5,	4.0,	4.7,	5.1,	5.5,	6.7,	8.0,	8.8,	10.0,	11.0,	11.8,	13.0,	13.9,	14.7,	N/A ,
10 mins	3.6,	4.9,	5.5,	6.5,	7.2,	7.7,	9.3,	11.1,	12.3,	13.9,	15.4,	16.5,	18.1,	19.4,	20.5,	N/A ,
15 mins	4.2,	5.7,	6.5,	7.7,	8.4,	9.0,	11.0,	13.1,	14.5,	16.4,	18.1,	19.4,	21.3,	22.9,	24.1,	N/A ,
30 mins	5.6,	7.4,	8.4,	9.9,	10.8,	11.6,	13.9,	16.5,	18.1,	20.4,	22.4,	23.9,	26.3,	28.1,	29.5,	N/A ,
1 hours	7.3,	9.7,	10.9,	12.7,	13.9,	14.8,	17.6,	20.7,	22.7,	25.4,	27.8,	29.6,	32.4,	34.4,	36.2,	N/A ,
2 hours	9.7,	12.7,	14.2,	16.4,	17.8,	18.9,	22.3,	26.0,	28.4,	31.7,	34.5,	36.6,	39.8,	42.3,	44.3,	N/A ,
3 hours	11.4,	14.8,	16.5,	19.0,	20.6,	21.8,	25.6,	29.8,	32.4,	36.0,	39.1,	41.4,	45.0,	47.7,	49.9,	N/A ,
4 hours	12.8,	16.5,	18.4,	21.1,	22.8,	24.1,	28.3,	32.7,	35.6,	39.4,	42.7,	45.3,	49.0,	51.9,	54.2,	N/A ,
6 hours	15.1,	19.3,	21.4,	24.4,	26.4,	27.9,	32.5,	37.4,	40.6,	44.8,	48.5,	51.2,	55.4,	58.5,	61.1,	N/A ,
9 hours	17.8,	22.5,	24.9,	28.3,	30.5,	32.2,	37.3,	42.8,	46.3,	51.0,	55.0,	58.0,	62.5,	66.0,	68.7,	N/A ,
12 hours	20.0,	25.2,	27.8,	31.4,	33.8,	35.6,	41.2,	47.1,	50.8,	55.8,	60.1,	63.3,	68.2,	71.8,	74.8,	N/A ,
18 hours	23.5,	29.4,	32.3,	36.4,	39.1,	41.1,	47.3,	53.9,	58.0,	63.5,	68.2,	71.7,	77.0,	81.0,	84.2,	N/A ,
24 hours	26.4,	32.8,	36.0,	40.5,	43.4,	45.5,	52.2,	59.2,	63.6,	69.5,	74.6,	78.3,	83.9,	88.1,	91.5,	103.0,
2 days	32.5,	40.0,	43.6,	48.8,	52.0,	54.5,	62.1,	70.0,	74.9,	81.5,	87.1,	91.3,	97.5,	102.2,	105.9,	118.4,
3 days	37.5,	45.8,	49.9,	55.6,	59.2,	61.9,	70.3,	79.0,	84.3,	91.5,	97.6,	102.1,	108.9,	113.9,	117.9,	131.4,
4 days	41.9,	51.0,	55.4,	61.6,	65.5,	68.5,	77.5,	86.8,	92.6,	100.3,	106.8,	111.7,	118.9,	124.2,	128.5,	142.9,
6 days	49.8,	60.2,	65.2,	72.3,	76.7,	80.0,	90.2,	100.7,	107.2,	115.8,	123.1,	128.5,	136.5,	142.4,	147.2,	163.1,
8 days	56.8,	68.4,	73.9,	81.7,	86.6,	90.3,	101.5,	113.0,	120.1,	129.5,	137.5,	143.3,	152.0,	158.5,	163.7,	181.0,
10 days	63.3,	75.9,	82.0,	90.4,	95.7,	99.7,	111.8,	124.3,	131.9,	142.1,	150.6,	156.9,	166.3,	173.2,	178.8,	197.2,
12 days	69.3,	82.9,	89.5,	98.5,	104.3,	108.5,	121.5,	134.8,	143.0,	153.8,	162.9,	169.6,	179.5,	186.9,	192.8,	212.4,
16 days	80.7,	96.1,	103.5,	113.7,	120.1,	124.9,	139.4,	154.3,	163.4,	175.5,	185.6,	193.0,	204.0,	212.2,	218.8,	240.4,
20 days	91.3,	108.3,	116.5,	127.7,	134.8,	140.1,	156.0,	172.3,	182.3,	195.5,	206.5,	214.6,	226.6,	235.5,	242.6,	266.1,
25 days	103.8,	122.8,	131.8,	144.2,	152.1,	157.9,	175.5,	193.4,	204.4,	218.8,	230.9,	239.8,	253.0,	262.7,	270.5,	296.1,

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

APPENDIX C. Q_{BAR} RUNOFF CALCULATIONS

Appendix C

Q_{BAR} RUNOFF CALCULATIONS

O'Connor Sutton Cronin		Page 1
9 Prussia Street Dublin 7 Ireland		
Date 18/04/2023 05:49 File	Designed by dharmesh.purohit Checked by	
XP Solutions Source Control 2020.1.3		

ICP SUDS Mean Annual Flood

Input			
Return Period (years)	100	Soil	0.470
Area (ha)	1.500	Urban	0.000
SAAR (mm)	797	Region Number	Ireland Greater Dublin

Results		l/s
QBAR Rural	8.4	
QBAR Urban	8.4	
Q100 years	22.0	
Q1 year	7.2	
Q30 years	17.9	
Q100 years	22.0	

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APPENDIX D. SURFACEWATER DESIGN CALCULATIONS

Appendix D

SURFACEWATER DESIGN CALCULATIONS

O'Connor Sutton Cronin		Page 1																																														
9 Prussia Street Dublin 7 Ireland																																																
Date 13/07/2023 03:13 File A612-OCSC-XX-XX-M2-C-0001_20230421.MDX																																																
Designed by dharmesh.purohit																																																
Checked by																																																
XP Solutions		Network 2020.1.3																																														
<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for Storm</u> Pipe Sizes GDSGS Manhole Sizes GDSGS FSR Rainfall Model - Scotland and Ireland <table border="0"> <tr> <td>Return Period (years)</td> <td>5</td> <td>PIMP (%)</td> <td>100</td> </tr> <tr> <td>M5-60 (mm)</td> <td>14.800</td> <td>Add Flow / Climate Change (%)</td> <td>20</td> </tr> <tr> <td>Ratio R</td> <td>0.272</td> <td>Minimum Backdrop Height (m)</td> <td>0.200</td> </tr> <tr> <td>Maximum Rainfall (mm/hr)</td> <td>50</td> <td>Maximum Backdrop Height (m)</td> <td>1.500</td> </tr> <tr> <td>Maximum Time of Concentration (mins)</td> <td>30</td> <td>Min Design Depth for Optimisation (m)</td> <td>0.900</td> </tr> <tr> <td>Foul Sewage (l/s/ha)</td> <td>0.000</td> <td>Min Vel for Auto Design only (m/s)</td> <td>1.00</td> </tr> <tr> <td>Volumetric Runoff Coeff.</td> <td>0.750</td> <td>Min Slope for Optimisation (1:X)</td> <td>500</td> </tr> </table> Designed with Level Soffits			Return Period (years)	5	PIMP (%)	100	M5-60 (mm)	14.800	Add Flow / Climate Change (%)	20	Ratio R	0.272	Minimum Backdrop Height (m)	0.200	Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500	Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900	Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00	Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																		
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<u>Network Design Table for Storm</u> « - Indicates pipe capacity < flow <table border="0"> <thead> <tr> <th>PN</th> <th>Length</th> <th>Fall</th> <th>Slope</th> <th>I.Area</th> <th>T.E.</th> <th>Base</th> <th>k</th> <th>HYD</th> <th>DIA</th> <th>Section Type</th> <th>Auto</th> </tr> <tr> <th>(m)</th> <th>(m)</th> <th>(1:X)</th> <th>(ha)</th> <th>(mins)</th> <th>Flow (l/s)</th> <th>(mm)</th> <th>SECT</th> <th>(mm)</th> <th></th> <th></th> <th>Design</th> </tr> </thead> </table> <u>Network Results Table</u> <table border="0"> <thead> <tr> <th>PN</th> <th>Rain</th> <th>T.C.</th> <th>US/IL</th> <th>Σ I.Area</th> <th>Σ Base</th> <th>Foul</th> <th>Add Flow</th> <th>Vel</th> <th>Cap</th> <th>Flow</th> </tr> <tr> <th></th> <th>(mm/hr)</th> <th>(mins)</th> <th>(m)</th> <th>(ha)</th> <th>Flow (l/s)</th> <th>(l/s)</th> <th>(l/s)</th> <th>(m/s)</th> <th>(l/s)</th> <th>(l/s)</th> </tr> </thead> </table> ©1982-2020 Innovyze			PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section Type	Auto	(m)	(m)	(1:X)	(ha)	(mins)	Flow (l/s)	(mm)	SECT	(mm)			Design	PN	Rain	T.C.	US/IL	Σ I.Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow		(mm/hr)	(mins)	(m)	(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)
PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section Type	Auto																																					
(m)	(m)	(1:X)	(ha)	(mins)	Flow (l/s)	(mm)	SECT	(mm)			Design																																					
PN	Rain	T.C.	US/IL	Σ I.Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow																																						
	(mm/hr)	(mins)	(m)	(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)																																						

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
27.000	50.713	1.537	33.0	0.072	5.00	0.0	0.600	o	225	Pipe/Conduit	
27.001	31.129	0.741	42.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
27.002	21.318	0.474	45.0	0.001	0.00	0.0	0.600	o	225	Pipe/Conduit	
27.003	8.565	0.571	15.0	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit	
27.004	53.587	0.244	220.0	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
27.005	48.295	0.121	399.1	0.051	0.00	0.0	0.600	o	225	Pipe/Conduit	
27.006	51.894	0.212	245.0	0.094	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.007	38.898	0.078	500.0	0.063	0.00	0.0	0.600	o	300	Pipe/Conduit	
28.000	19.481	0.115	170.0	0.004	5.00	0.0	0.600	o	225	Pipe/Conduit	
28.001	8.336	0.049	170.0	0.032	0.00	0.0	0.600	o	225	Pipe/Conduit	

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S27.000	50.00	5.37	34.850	0.072	0.0	0.0	1.9	2.29	90.9	11.6
S27.001	50.00	5.63	33.061	0.072	0.0	0.0	1.9	2.02	80.5	11.6
S27.002	50.00	5.81	32.750	0.073	0.0	0.0	2.0	1.96	77.7	11.9
S27.003	50.00	5.85	32.339	0.081	0.0	0.0	2.2	3.40	135.0	13.2
S27.004	48.71	6.87	31.768	0.108	0.0	0.0	2.8	0.88	34.9	17.1
S27.005	45.37	8.11	31.524	0.158	0.0	0.0	3.9	0.65	25.8	23.3
S27.006	43.36	8.97	31.328	0.252	0.0	0.0	5.9	1.00	70.7	35.5
S27.007	41.43	9.90	31.116	0.315	0.0	0.0	7.1	0.70	49.2	42.4
S28.000	50.00	5.32	31.225	0.004	0.0	0.0	0.1	1.00	39.8	0.6
S28.001	50.00	5.46	31.110	0.036	0.0	0.0	1.0	1.00	39.8	5.9

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
28.002	50.497	0.297	170.0	0.060	0.00	0.0	0.600	o	225	Pipe/Conduit	
28.003	8.993	0.053	170.0	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
28.004	31.917	0.188	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
28.005	45.406	0.267	170.1	0.018	0.00	0.0	0.600	o	225	Pipe/Conduit	
28.006	3.987	0.023	170.0	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
29.000	35.384	0.208	170.0	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
29.001	7.101	0.042	170.0	0.035	0.00	0.0	0.600	o	225	Pipe/Conduit	
29.002	31.247	0.184	170.0	0.067	0.00	0.0	0.600	o	225	Pipe/Conduit	
29.003	31.542	0.186	170.0	0.133	0.00	0.0	0.600	o	225	Pipe/Conduit	
29.004	18.997	0.112	170.0	0.011	0.00	0.0	0.600	o	300	Pipe/Conduit	

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S28.002	50.00	6.31	31.061	0.096	0.0	0.0	2.6	1.00	39.8	15.7
S28.003	49.96	6.46	30.764	0.137	0.0	0.0	3.7	1.00	39.8	22.2
S28.004	48.36	6.99	30.711	0.137	0.0	0.0	3.7	1.00	39.8	22.2
S28.005	46.29	7.74	30.524	0.155	0.0	0.0	3.9	1.00	39.7	23.3
S28.006	46.12	7.81	30.257	0.178	0.0	0.0	4.4	1.00	39.8	26.7
S29.000	50.00	5.59	31.335	0.010	0.0	0.0	0.3	1.00	39.8	1.7
S29.001	50.00	5.71	31.127	0.045	0.0	0.0	1.2	1.00	39.8	7.4
S29.002	50.00	6.23	31.085	0.112	0.0	0.0	3.0	1.00	39.8	18.3
S29.003	49.04	6.75	30.901	0.246	0.0	0.0	6.5	1.00	39.8	39.2
S29.004	48.27	7.02	30.641	0.257	0.0	0.0	6.7	1.20	85.0	40.3



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PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section	Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow (l/s)	(mm)	SECT	(mm)			Design

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S29.005	47.93	7.14	30.529	0.298	0.0	0.0	7.7	1.00	70.7	46.4
S29.006	46.78	7.55	30.500	0.298	0.0	0.0	7.7	1.00	70.7	46.4
S29.007	44.14	8.63	30.397	0.298	0.0	0.0	7.7	1.00	70.7	46.4
S29.008	43.87	8.75	30.135	0.298	0.0	0.0	7.7	1.00	70.7	46.4
S28.007	43.54	8.89	31.160	0.476	0.0	0.0	11.2	1.00	70.6	67.4
S27.008	40.82	10.22	30.888	0.906	0.0	0.0	20.0	1.00	158.7	120.2
S30.000	50.00	6.00	32.228	0.039	0.0	0.0	1.1	0.58	23.0	6.4

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
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Micro Drainage

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
S31.000	34.500	0.203	170.0	0.005	5.00	0.0	0.600	o	225	Pipe/Conduit		
S31.001	17.999	0.106	170.0	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit		
S30.001	48.000	0.096	500.0	0.052	0.00	0.0	0.600	o	225	Pipe/Conduit		
S30.002	8.249	0.016	500.0	0.035	0.00	0.0	0.600	o	225	Pipe/Conduit		
S30.003	16.500	0.033	500.0	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit		
S30.004	28.797	0.063	454.7	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit		
S32.000	39.193	0.078	500.0	0.027	5.00	0.0	0.600	o	225	Pipe/Conduit		
S32.001	32.301	0.065	500.0	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit		
S32.002	11.514	0.023	500.0	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit		

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S31.000	50.00	5.58	32.716	0.005	0.0	0.0	0.1	1.00	39.8	0.9
S31.001	50.00	5.88	32.513	0.008	0.0	0.0	0.2	1.00	39.8	1.2
S30.001	47.26	7.38	32.159	0.099	0.0	0.0	2.5	0.58	23.0	15.2
S30.002	46.62	7.62	32.063	0.134	0.0	0.0	3.4	0.58	23.0	20.3
S30.003	45.41	8.09	32.046	0.148	0.0	0.0	3.6	0.58	23.0	21.8
S30.004	43.56	8.88	32.013	0.167	0.0	0.0	3.9	0.61	24.1	23.6
S32.000	50.00	6.13	31.939	0.027	0.0	0.0	0.7	0.58	23.0	4.4
S32.001	48.14	7.06	31.861	0.067	0.0	0.0	1.8	0.58	23.0	10.6
S32.002	47.22	7.39	31.796	0.083	0.0	0.0	2.1	0.58	23.0	12.8

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
33.000	39.083	0.078	501.1	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit		
33.001	33.401	0.067	500.0	0.041	0.00	0.0	0.600	o	225	Pipe/Conduit		
33.002	12.087	0.024	500.0	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit		
32.003	8.985	0.018	500.0	0.012	0.00	0.0	0.600	o	300	Pipe/Conduit		
32.004	13.067	0.037	354.4	0.010	0.00	0.0	0.600	o	300	Pipe/Conduit		
34.000	33.015	0.066	500.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit		
34.001	41.347	0.083	500.0	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit		
34.002	9.962	0.020	500.0	0.024	0.00	0.0	0.600	o	225	Pipe/Conduit		

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
83.000	50.00	6.13	31.364	0.010	0.0	0.0	0.3	0.58	23.0	1.7
83.001	48.06	7.09	31.286	0.051	0.0	0.0	1.3	0.58	23.0	8.0
83.002	47.09	7.44	31.219	0.064	0.0	0.0	1.6	0.58	23.0	9.8
82.003	46.52	7.65	31.120	0.160	0.0	0.0	4.0	0.70	49.2	24.2
82.004	45.84	7.92	31.102	0.170	0.0	0.0	4.2	0.83	58.6	25.4
84.000	50.00	5.95	31.636	0.013	0.0	0.0	0.4	0.58	23.0	2.2
84.001	47.91	7.14	31.570	0.032	0.0	0.0	0.8	0.58	23.0	5.0
84.002	47.12	7.43	31.487	0.055	0.0	0.0	1.4	0.58	23.0	8.5



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<u>Storm</u>		
k (mm)	HYD SECT	DIA (mm)
Section Type		Auto Design
600	o 300	Pipe/Conduit

P.N	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S32.005	44.98	8.27	31.065	0.240	0.0	0.0	5.8	0.78	55.3	35.1
S30.005	43.29	9.00	30.949	0.434	0.0	0.0	10.2	0.82	91.0	61.1
S30.006	42.23	9.50	30.936	0.457	0.0	0.0	10.5	0.80	88.7	62.8
S30.007	41.99	9.62	30.888	0.479	0.0	0.0	10.9	0.80	88.7	65.4
S30.008	40.76	10.25	30.877	0.493	0.0	0.0	10.9	0.80	88.7	65.4
S30.009	38.87	11.32	30.816	0.542	0.0	0.0	11.4	0.85	93.6	68.4
S27.009	34.44	14.41	30.696	1.503	0.0	0.0	28.0	0.18	183.4	168.2
S27.010	50.00	5.29	30.695	0.000	7.2	0.0	1.2	0.44	7.8	7.2

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<u>Storm</u>		
k (mm)	HYD SECT	DIA (mm)
Section Type		Auto Design
600	o 300	Pipe/Conduit

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S32.005	44.98	8.27	31.065	0.240	0.0	0.0	5.8	0.78	55.3	35.1
S30.005	43.29	9.00	30.949	0.434	0.0	0.0	10.2	0.82	91.0	61.1
S30.006	42.23	9.50	30.936	0.457	0.0	0.0	10.5	0.80	88.7	62.8
S30.007	41.99	9.62	30.888	0.479	0.0	0.0	10.9	0.80	88.7	65.4
S30.008	40.76	10.25	30.877	0.493	0.0	0.0	10.9	0.80	88.7	65.4
S30.009	38.87	11.32	30.816	0.542	0.0	0.0	11.4	0.85	93.6	68.4
S27.009	34.44	14.41	30.696	1.503	0.0	0.0	28.0	0.18	183.4	168.2
S27.010	50.00	5.29	30.695	0.000	7.2	0.0	1.2	0.44	7.8	7.2

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
27.011	26.882	0.054	497.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
27.012	19.799	0.196	100.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
27.013	26.874	0.260	103.4	0.039	0.00	0.0	0.600	o	150	Pipe/Conduit		
27.014	74.954	1.440	52.1	0.027	0.00	0.0	0.600	o	150	Pipe/Conduit		
27.015	33.785	1.030	32.8	0.095	0.00	0.0	0.600	o	150	Pipe/Conduit		
35.000	31.893	0.470	67.9	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit		
35.001	71.008	1.250	56.8	0.082	0.00	0.0	0.600	o	150	Pipe/Conduit		
35.002	35.083	0.960	36.5	0.049	0.00	0.0	0.600	o	150	Pipe/Conduit		
35.003	8.080	0.290	27.9	0.061	0.00	0.0	0.600	o	300	Pipe/Conduit		

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S27.011	50.00	6.30	30.680	0.000	7.2	0.0	1.4	0.44	7.8«	8.6
S27.012	49.43	6.63	30.626	0.000	7.2	0.0	1.4	1.00	17.7	8.6
S27.013	48.09	7.08	30.140	0.039	7.2	0.0	2.5	0.99	17.5	14.7
S27.014	45.70	7.97	29.880	0.066	7.2	0.0	3.1	1.40	24.7	18.4
S27.015	44.92	8.29	28.440	0.160	7.2	0.0	5.3	1.76	31.2«	32.1
S35.000	50.00	5.43	30.380	0.032	0.0	0.0	0.9	1.22	21.6	5.2
S35.001	50.00	6.32	29.910	0.114	0.0	0.0	3.1	1.34	23.6	18.6
S35.002	49.30	6.67	28.660	0.164	0.0	0.0	4.4	1.67	29.5	26.2
S35.003	49.16	6.71	27.700	0.225	0.0	0.0	6.0	2.99	211.4	35.9



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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
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S27.016	48.559	1.500	32.4	0.057	0.00	0.0	0.600	o	300	Pipe/Conduit	
S27.017	42.610	0.561	76.0	0.155	0.00	0.0	0.600	o	300	Pipe/Conduit	
S27.018	49.974	2.049	24.4	0.018	0.00	0.0	0.600	o	300	Pipe/Conduit	
S36.000	53.925	2.050	26.3	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S27.019	4.550	0.190	23.9	0.102	0.00	0.0	0.600	o	300	Pipe/Conduit	

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
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S27.016	44.23	8.59	27.410	0.442	7.2	0.0	12.0	2.77	196.0	72.2
S27.017	43.35	8.98	25.910	0.597	7.2	0.0	15.4	1.81	127.6	92.7
S27.018	42.78	9.24	25.349	0.615	7.2	0.0	15.7	3.20	226.0	94.2
S36.000	50.00	5.46	25.350	0.000	0.0	0.0	0.0	1.97	34.8	0.0
S27.019	42.73	9.26	23.300	0.717	7.2	0.0	18.0	3.23	228.1	108.2

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Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
27.000	Classification	Road	75	0.025	0.019	0.019
	Classification	Grass (Lawn)	15	0.007	0.001	0.020
	Classification	Grass (Lawn)	15	0.002	0.000	0.020
	Classification	Road	75	0.068	0.051	0.071
	Classification	Grass (Lawn)	15	0.002	0.000	0.072
27.001	-	-	100	0.000	0.000	0.000
27.002	Classification	Grass (Lawn)	15	0.009	0.001	0.001
27.003	Classification	Grass (Lawn)	15	0.000	0.000	0.000
	Classification	Grass (Lawn)	15	0.009	0.001	0.001
	Classification	Road	75	0.009	0.007	0.008
27.004	Classification	Grass (Lawn)	15	0.015	0.002	0.002
	Classification	Road	75	0.021	0.016	0.018
	Classification	Grass (Lawn)	15	0.057	0.009	0.026
27.005	User	-	100	0.051	0.051	0.051
27.006	Classification	Grass (Lawn)	15	0.035	0.005	0.005
	Classification	Grass (Lawn)	15	0.001	0.000	0.005
	Classification	Road	75	0.064	0.048	0.054
	User	-	100	0.040	0.040	0.094
27.007	Classification	Grass (Lawn)	15	0.003	0.000	0.000
	Classification	Grass (Lawn)	15	0.000	0.000	0.001
	Classification	Grass (Lawn)	15	0.026	0.004	0.004
	Classification	Grass (Lawn)	15	0.003	0.000	0.005
	Classification	Grass (Lawn)	15	0.004	0.001	0.006
	Classification	Road	75	0.077	0.058	0.063
28.000	Classification	Roof (Std)	95	0.004	0.004	0.004
28.001	Classification	Roof (Std)	95	0.034	0.032	0.032
28.002	Classification	Roof (Std)	95	0.063	0.060	0.060
28.003	Classification	Roof (Std)	95	0.042	0.040	0.040



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Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
28.004	-	-	100	0.000	0.000	0.000
28.005	Classification	Roof (Std)	95	0.019	0.018	0.018
28.006	Classification	Roof (Std)	95	0.024	0.023	0.023
29.000	Classification	Roof (Std)	95	0.011	0.010	0.010
29.001	Classification	Roof (Std)	95	0.037	0.035	0.035
29.002	Classification	Roof (Std)	95	0.050	0.048	0.048
	User	-	100	0.019	0.019	0.067
29.003	Classification	Roof (Std)	95	0.085	0.081	0.081
	Classification	Roof (Std)	95	0.056	0.053	0.133
29.004	Classification	Roof (Std)	95	0.012	0.011	0.011
29.005	Classification	Roof (Std)	95	0.043	0.041	0.041
29.006	-	-	100	0.000	0.000	0.000
29.007	-	-	100	0.000	0.000	0.000
29.008	-	-	100	0.000	0.000	0.000
28.007	-	-	100	0.000	0.000	0.000
27.008	Classification	Road	75	0.093	0.070	0.070
	Classification	Road	75	0.046	0.035	0.105
	Classification	Road	75	0.014	0.010	0.115
30.000	Classification	Road	75	0.051	0.039	0.039
	Classification	Grass (Lawn)	15	0.004	0.001	0.039
31.000	Classification	Grass (Lawn)	15	0.035	0.005	0.005
31.001	Classification	Grass (Lawn)	15	0.016	0.002	0.002
30.001	Classification	Road	75	0.063	0.047	0.047
	Classification	Grass (Lawn)	15	0.002	0.000	0.048
	Classification	Grass (Lawn)	15	0.003	0.000	0.048
	Classification	Grass (Lawn)	15	0.003	0.001	0.048
	Classification	Default	90	0.004	0.004	0.052
30.002	Classification	Grass (Lawn)	15	0.002	0.000	0.000

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Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	Classification	Road	75	0.046	0.035	0.035
30.003	Classification	Road	75	0.018	0.014	0.014
30.004	Classification	Road	75	0.025	0.019	0.019
32.000	Classification	Grass (Lawn)	15	0.003	0.000	0.000
	Classification	Road	75	0.036	0.027	0.027
32.001	Classification	Grass (Lawn)	15	0.001	0.000	0.000
	Classification	Grass (Lawn)	15	0.001	0.000	0.000
	Classification	Grass (Lawn)	15	0.001	0.000	0.001
	Classification	Grass (Lawn)	15	0.001	0.000	0.001
	Classification	Road	75	0.053	0.040	0.040
32.002	Classification	Grass (Lawn)	15	0.006	0.001	0.001
	Classification	Default	90	0.002	0.002	0.003
	Classification	Road	75	0.017	0.013	0.016
33.000	Classification	Grass (Lawn)	15	0.004	0.001	0.001
	Classification	Grass (Lawn)	15	0.003	0.000	0.001
	Classification	Bioretention / Planted	30	0.031	0.009	0.010
33.001	Classification	Grass (Lawn)	15	0.002	0.000	0.000
	Classification	Grass (Lawn)	15	0.003	0.000	0.001
	Classification	Road	75	0.053	0.040	0.041
33.002	Classification	Grass (Lawn)	15	0.004	0.001	0.001
	Classification	Grass (Lawn)	15	0.008	0.001	0.002
	Classification	Road	75	0.015	0.011	0.013
32.003	Classification	Grass (Lawn)	15	0.000	0.000	0.000
	Classification	Road	75	0.016	0.012	0.012
32.004	Classification	Road	75	0.014	0.010	0.010
34.000	Classification	Road	75	0.018	0.013	0.013
34.001	Classification	Grass (Lawn)	15	0.002	0.000	0.000
	Classification	Road	75	0.025	0.018	0.019

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Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
34.002	Classification	Grass (Lawn)	15	0.003	0.000	0.000
	Classification	Grass (Lawn)	15	0.003	0.000	0.001
	Classification	Default	90	0.001	0.001	0.002
	Classification	Grass (Lawn)	15	0.004	0.001	0.003
	Classification	Grass (Lawn)	15	0.003	0.000	0.003
	Classification	Road	75	0.027	0.021	0.024
32.005	Classification	Grass (Lawn)	15	0.002	0.000	0.000
	Classification	Road	75	0.018	0.014	0.014
30.005	Classification	Road	75	0.037	0.028	0.028
30.006	Classification	Grass (Lawn)	15	0.007	0.001	0.001
	Classification	Grass (Lawn)	15	0.001	0.000	0.001
	Classification	Road	75	0.029	0.022	0.023
30.007	Classification	Road	75	0.029	0.022	0.022
30.008	Classification	Grass (Lawn)	15	0.016	0.002	0.002
	Classification	Grass (Lawn)	15	0.000	0.000	0.002
	Classification	Grass (Lawn)	15	0.002	0.000	0.003
	Classification	Grass (Lawn)	15	0.000	0.000	0.003
	Classification	Road	75	0.015	0.011	0.014
30.009	Classification	Grass (Lawn)	15	0.003	0.000	0.000
	Classification	Grass (Lawn)	15	0.010	0.001	0.002
	Classification	Grass (Lawn)	15	0.010	0.001	0.003
	Classification	Grass (Lawn)	15	0.002	0.000	0.004
	Classification	Grass (Lawn)	15	0.001	0.000	0.004
	Classification	Grass (Lawn)	15	0.002	0.000	0.004
	Classification	Grass (Lawn)	15	0.008	0.001	0.005
	Classification	Grass (Lawn)	15	0.005	0.001	0.006
	Classification	Grass (Lawn)	15	0.018	0.003	0.009
	Classification	Grass (Lawn)	15	0.015	0.002	0.011



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Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	Classification	Grass (Lawn)	15	0.008	0.001	0.012
	Classification	Road	75	0.004	0.003	0.015
	Classification	Road	75	0.002	0.001	0.016
	Classification	Road	75	0.000	0.000	0.016
	Classification	Road	75	0.013	0.010	0.026
	Classification	Road	75	0.029	0.022	0.048
	Classification	Grass (Lawn)	15	0.003	0.000	0.048
27.009	Classification	Grass (Lawn)	15	0.001	0.000	0.000
	Classification	Grass (Lawn)	15	0.002	0.000	0.000
	Classification	Grass (Lawn)	15	0.002	0.000	0.001
	Classification	Grass (Lawn)	15	0.001	0.000	0.001
	Classification	Grass (Lawn)	15	0.000	0.000	0.001
	Classification	Grass (Lawn)	15	0.002	0.000	0.001
	Classification	Grass (Lawn)	15	0.001	0.000	0.001
	Classification	Grass (Lawn)	15	0.015	0.002	0.004
	Classification	Grass (Lawn)	15	0.001	0.000	0.004
	Classification	Grass (Lawn)	15	0.001	0.000	0.004
	Classification	Grass (Lawn)	15	0.009	0.001	0.005
	Classification	Road	75	0.024	0.018	0.023
	Classification	Road	75	0.039	0.030	0.053
	Classification	Road	75	0.003	0.003	0.055
27.010	-	-	100	0.000	0.000	0.000
27.011	-	-	100	0.000	0.000	0.000
27.012	-	-	100	0.000	0.000	0.000
27.013	Classification	Riverview Estate	60	0.065	0.039	0.039
27.014	Classification	Riverview Estate	60	0.045	0.027	0.027
27.015	Classification	Riverview Estate	60	0.158	0.095	0.095
35.000	Classification	Riverview Estate	60	0.053	0.032	0.032

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
35.001	Classification	Riverview Estate	60	0.137	0.082	0.082
35.002	Classification	Riverview Estate	60	0.082	0.049	0.049
35.003	Classification	Road	75	0.081	0.061	0.061
27.016	Classification	Road	75	0.076	0.057	0.057
27.017	Classification	Road	75	0.206	0.155	0.155
27.018	Classification	Grass (Lawn)	15	0.123	0.018	0.018
36.000	-	-	100	0.000	0.000	0.000
27.019	User	-	100	0.102	0.102	0.102
				Total	Total	Total
				3.336	2.220	2.220

These areas include the existing network in the Riverview Estate

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S27.019	SW	24.710	23.110	0.000	0	0

Proposed Development
Total Area =2.18ha
Hardstand Area=1.5ha

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Online Controls for Storm

Orifice Manhole: SW30, DS/PN: S30.002, Volume (m³): 4.3

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 32.063

Orifice Manhole: SW39, DS/PN: S32.003, Volume (m³): 2.9

Diameter (m) 0.054 Discharge Coefficient 0.600 Invert Level (m) 31.195

Orifice Manhole: SW46, DS/PN: S30.006, Volume (m³): 2.7

Diameter (m) 0.055 Discharge Coefficient 0.600 Invert Level (m) 30.936

Hydro-Brake® Optimum Manhole: SW51, DS/PN: S27.010, Volume (m³): 37.7

Unit Reference MD-SHE-0124-8400-1700-8400	Sump Available	Yes
Design Head (m) 1.700	Diameter (mm)	124
Design Flow (l/s) 8.4	Invert Level (m)	30.695
Flush-Flo™ Calculated Minimum Outlet Pipe Diameter (mm)		150
Objective Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	8.4	Kick-Flo®	1.036	6.6
Flush-Flo™	0.505	8.3	Mean Flow over Head Range	-	7.3

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

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Storage Structures for Storm

Porous Car Park Manhole: SW2, DS/PN: S27.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	32.5
Max Percolation (l/s)	45.1	Slope (1:X)	126.4
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	33.061	Membrane Depth (mm)	1125

Tank or Pond Manhole: SW24, DS/PN: S28.007

Invert Level (m) 31.160

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	20.0	1.000	20.0	1.001	0.0

Porous Car Park Manhole: SW28, DS/PN: S31.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	65.0
Max Percolation (l/s)	90.3	Slope (1:X)	166.7
Safety Factor	2.0	Depression Storage (mm)	1
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	32.513	Membrane Depth (mm)	1838

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<u>Porous Car Park Manhole: SW29, DS/PN: S30.001</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Width (m)</td> <td>5.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>67.8</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>94.2</td> <td>Slope (1:X)</td> <td>103.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>31.725</td> <td>Membrane Depth (mm)</td> <td>2490</td> </tr> </table> <u>Porous Car Park Manhole: SW30, DS/PN: S30.002</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Width (m)</td> <td>5.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>78.4</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>108.9</td> <td>Slope (1:X)</td> <td>166.7</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>31.443</td> <td>Membrane Depth (mm)</td> <td>2513</td> </tr> </table> <u>Porous Car Park Manhole: SW31, DS/PN: S30.003</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Width (m)</td> <td>5.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>12.5</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>17.4</td> <td>Slope (1:X)</td> <td>166.7</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>31.394</td> <td>Membrane Depth (mm)</td> <td>1956</td> </tr> </table> <u>Porous Car Park Manhole: SW32, DS/PN: S30.004</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Max Percolation (l/s)</td> <td>24.3</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Safety Factor</td> <td>2.0</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0	Membrane Percolation (mm/hr)	1000	Length (m)	67.8	Max Percolation (l/s)	94.2	Slope (1:X)	103.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	31.725	Membrane Depth (mm)	2490	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0	Membrane Percolation (mm/hr)	1000	Length (m)	78.4	Max Percolation (l/s)	108.9	Slope (1:X)	166.7	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	31.443	Membrane Depth (mm)	2513	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0	Membrane Percolation (mm/hr)	1000	Length (m)	12.5	Max Percolation (l/s)	17.4	Slope (1:X)	166.7	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	31.394	Membrane Depth (mm)	1956	Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	24.3	Membrane Percolation (mm/hr)	1000	Safety Factor	2.0
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<u>Porous Car Park Manhole: SW32, DS/PN: S30.004</u> Porosity 0.30 Slope (1:X) 166.7 Invert Level (m) 31.297 Depression Storage (mm) 5 Width (m) 5.0 Evaporation (mm/day) 3 Length (m) 17.5 Membrane Depth (mm) 1450 <u>Porous Car Park Manhole: SW34, DS/PN: S32.001</u> Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 3.6 Membrane Percolation (mm/hr) 1000 Length (m) 72.1 Max Percolation (l/s) 72.1 Slope (1:X) 166.6 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 31.408 Membrane Depth (mm) 1566 <u>Porous Car Park Manhole: SW35, DS/PN: S32.002</u> Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 3.6 Membrane Percolation (mm/hr) 1000 Length (m) 40.5 Max Percolation (l/s) 40.5 Slope (1:X) 166.6 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 31.218 Membrane Depth (mm) 1546 <u>Porous Car Park Manhole: SW37, DS/PN: S33.001</u> Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30 Membrane Percolation (mm/hr) 1000 Invert Level (m) 30.834 Max Percolation (l/s) 75.4 Width (m) 5.0 Safety Factor 2.0 Length (m) 54.3		
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<u>Porous Car Park Manhole: SW37, DS/PN: S33.001</u> Slope (1:X) 166.7 Evaporation (mm/day) 3 Depression Storage (mm) 5 Membrane Depth (mm) 1346 <u>Porous Car Park Manhole: SW38, DS/PN: S33.002</u> Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.0 Membrane Percolation (mm/hr) 1000 Length (m) 31.4 Max Percolation (l/s) 43.6 Slope (1:X) 166.7 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 30.638 Membrane Depth (mm) 1542 <u>Porous Car Park Manhole: SW44, DS/PN: S32.005</u> Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.0 Membrane Percolation (mm/hr) 1000 Length (m) 32.5 Max Percolation (l/s) 45.1 Slope (1:X) 166.7 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 30.437 Membrane Depth (mm) 1843 <u>Porous Car Park Manhole: SW45, DS/PN: S30.005</u> Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.0 Membrane Percolation (mm/hr) 1000 Length (m) 55.0 Max Percolation (l/s) 76.4 Slope (1:X) 166.7 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 30.340 Membrane Depth (mm) 1900		
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<u>Porous Car Park Manhole: SW46, DS/PN: S30.006</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Width (m)</td> <td>5.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>19.2</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>26.7</td> <td>Slope (1:X)</td> <td>166.7</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>30.240</td> <td>Membrane Depth (mm)</td> <td>1920</td> </tr> </table> <u>Cellular Storage Manhole: SW51, DS/PN: S27.010</u> <table> <tr> <td>Invert Level (m)</td> <td>30.695</td> <td>Safety Factor</td> <td>2.0</td> </tr> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Porosity</td> <td>0.65</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.00000</td> <td></td> <td></td> </tr> </table> <table> <thead> <tr> <th>Depth (m)</th> <th>Area (m²)</th> <th>Inf. Area (m²)</th> <th>Depth (m)</th> <th>Area (m²)</th> <th>Inf. Area (m²)</th> </tr> </thead> <tbody> <tr> <td>0.000</td> <td>900.0</td> <td>0.0</td> <td>1.290</td> <td>0.0</td> <td>0.0</td> </tr> <tr> <td>1.280</td> <td>900.0</td> <td>0.0</td> <td>1.755</td> <td>0.0</td> <td>0.0</td> </tr> </tbody> </table>			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0	Membrane Percolation (mm/hr)	1000	Length (m)	19.2	Max Percolation (l/s)	26.7	Slope (1:X)	166.7	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	30.240	Membrane Depth (mm)	1920	Invert Level (m)	30.695	Safety Factor	2.0	Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.65	Infiltration Coefficient Side (m/hr)	0.00000			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	900.0	0.0	1.290	0.0	0.0	1.280	900.0	0.0	1.755	0.0	0.0
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Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Storage Structure Volume (m³)	Total Volume (m³)
S27.000	SW1	0.000	0.000
S27.001	SW2	14.625	14.625
S27.002	SW3	0.000	0.000
S27.003	SW4	0.000	0.000
S27.004	SW5	0.000	0.000
S27.005	SW6	0.000	0.000
S27.006	SW6A	0.000	0.000
S27.007	SW7	0.000	0.000
S28.000	SW8	0.000	0.000
S28.001	SW9	0.000	0.000
S28.002	SW10	0.000	0.000
S28.003	SW11	0.000	0.000
S28.004	SW12	0.000	0.000
S28.005	SW13	0.000	0.000
S28.006	SW14	0.000	0.000
S29.000	SW15	0.000	0.000
S29.001	SW16	0.000	0.000
S29.002	SW17	0.000	0.000
S29.003	SW18	0.000	0.000
S29.004	SW19	0.000	0.000
S29.005	SW20	0.000	0.000
S29.006	SW21	0.000	0.000
S29.007	SW22	0.000	0.000
S29.008	SW23	0.000	0.000
S28.007	SW24	20.007	20.007

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XP Solutions	Network 2020.1.3	

Volume Summary (Static)

Pipe Number	USMH Name	Storage Structure Volume (m³)	Total Volume (m³)
S27.011	SW52	0.000	0.000
S27.012	SWSW53	0.000	0.000
S27.013	SWSCO7758901	0.000	0.000
S27.014	SWSCO7758802	0.000	0.000
S27.015	SWSCO7758804	0.000	0.000
S35.000	SWSCO7757901	0.000	0.000
S35.001	SWSCO7758801	0.000	0.000
S35.002	SWSCO7758803	0.000	0.000
S35.003	SWSCO77587011	0.000	0.000
S27.016	SWSCO7758702	0.000	0.000
S27.017	SWSCO7758703	0.000	0.000
S27.018	SWSCO7758610	0.000	0.000
S36.000	SWSCO7758704	0.000	0.000
S27.019	SWSCO7758602	0.000	0.000
Total		1033.919	1033.919

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 14.800 Cv (Summer) 0.750
Region Scotland and Ireland Ratio R 0.272 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status ON
Analysis Timestep Fine DVD Status ON

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Pipe Flow / Cap.	Pipe Flow (l/s)	Status
S27.000	SW1	15 minute 100 year Winter I+20%	35.975	34.932	-0.143	0.28	24.3	OK
S27.001	SW2	15 minute 100 year Winter I+20%	34.486	33.148	-0.138	0.32	24.1	OK
S27.002	SW3	15 minute 100 year Winter I+20%	33.464	32.841	-0.134	0.34	24.2	OK

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH	Event	US/CL	Water		Flow /	Pipe		Status		
	Name			(m)	Level		Depth	Cap.		Flow	
			(m)	(m)	(m)		(l/s)				
S27.003	SW4	15 minute	100 year	Winter	I+20%	33.064	32.416	-0.148	0.25	26.6	OK
S27.004	SW5	15 minute	100 year	Winter	I+20%	32.500	32.162	0.169	0.92	30.7	SURCHARGED
S27.005	SW6	15 minute	100 year	Winter	I+20%	32.250	31.958	0.209	1.57	38.9	FLOOD RISK
S27.006	SW6A	30 minute	100 year	Winter	I+20%	32.250	31.650	0.022	0.82	54.5	SURCHARGED
S27.007	SW7	30 minute	100 year	Winter	I+20%	32.300	31.505	0.089	1.43	65.5	SURCHARGED
S28.000	SW8	30 minute	100 year	Winter	I+20%	32.650	31.923	0.473	0.04	1.6	SURCHARGED
S28.001	SW9	30 minute	100 year	Winter	I+20%	32.650	31.923	0.587	0.22	7.0	SURCHARGED
S28.002	SW10	30 minute	100 year	Winter	I+20%	32.650	31.916	0.630	0.47	18.0	SURCHARGED
S28.003	SW11	30 minute	100 year	Winter	I+20%	32.250	31.860	0.871	0.79	25.6	SURCHARGED
S28.004	SW12	30 minute	100 year	Winter	I+20%	32.640	31.795	0.859	0.65	24.3	SURCHARGED
S28.005	SW13	30 minute	100 year	Winter	I+20%	32.640	31.718	0.970	0.71	26.9	SURCHARGED
S28.006	SW14	30 minute	100 year	Winter	I+20%	32.500	31.589	1.107	1.11	30.5	SURCHARGED
S29.000	SW15	30 minute	100 year	Winter	I+20%	32.760	32.370	0.810	0.08	3.0	SURCHARGED
S29.001	SW16	30 minute	100 year	Winter	I+20%	32.640	32.365	1.013	0.30	9.1	FLOOD RISK
S29.002	SW17	30 minute	100 year	Winter	I+20%	32.640	32.358	1.048	0.57	21.1	FLOOD RISK
S29.003	SW18	30 minute	100 year	Winter	I+20%	32.640	32.297	1.170	1.32	49.1	SURCHARGED
S29.004	SW19	30 minute	100 year	Winter	I+20%	32.460	32.019	1.078	0.68	50.2	SURCHARGED
S29.005	SW20	30 minute	100 year	Winter	I+20%	32.500	31.920	1.091	1.12	57.8	SURCHARGED
S29.006	SW21	30 minute	100 year	Winter	I+20%	32.270	31.851	1.051	0.89	56.3	SURCHARGED
S29.007	SW22	30 minute	100 year	Winter	I+20%	32.040	31.766	1.068	0.81	54.6	FLOOD RISK
S29.008	SW23	30 minute	100 year	Winter	I+20%	32.450	31.593	1.158	1.06	54.5	SURCHARGED
S28.007	SW24	30 minute	100 year	Winter	I+20%	32.360	31.523	0.063	1.57	84.1	SURCHARGED
S27.008	SW25	1440 minute	100 year	Winter	I+20%	32.450	31.429	0.091	0.17	20.7	SURCHARGED
S30.000	SW26	2880 minute	100 year	Winter	I+20%	33.353	33.005	0.552	0.04	0.8	SURCHARGED
S31.000	SW27	2880 minute	100 year	Winter	I+20%	34.141	32.770	-0.171	0.00	0.1	OK
S31.001	SW28	2880 minute	100 year	Winter	I+20%	34.561	32.771	0.033	0.03	1.2	SURCHARGED

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH	Event							Water		Surcharged		Pipe		Status
	Name								US/CL	Level	Depth	Flow /	Flow		
								(m)	(m)	(m)	Cap.	(l/s)			
S30.001	SW29	2880	minute	100	year	Winter	I+20%	34.515	33.090	0.707	0.07	1.5	SURCHARGED		
S30.002	SW30	2880	minute	100	year	Winter	I+20%	34.256	33.195	0.907	0.05	0.9	SURCHARGED		
S30.003	SW31	4320	minute	100	year	Winter	I+20%	33.650	32.087	-0.185	0.06	1.0	OK		
S30.004	SW32	960	minute	100	year	Winter	I+20%	33.047	32.050	-0.189	0.05	1.2	OK		
S32.000	SW33	15	minute	100	year	Winter	I+20%	33.064	32.043	-0.121	0.43	9.4	OK		
S32.001	SW34	240	minute	100	year	Winter	I+20%	33.274	31.921	-0.164	0.16	3.6	OK		
S32.002	SW35	480	minute	100	year	Winter	I+20%	33.064	31.863	-0.158	0.19	2.9	OK		
S33.000	SW36	2160	minute	100	year	Winter	I+20%	32.489	31.835	0.246	0.01	0.2	SURCHARGED		
S33.001	SW37	2160	minute	100	year	Winter	I+20%	32.680	31.836	0.325	0.06	1.2	SURCHARGED		
S33.002	SW38	4320	minute	100	year	Winter	I+20%	32.680	31.859	0.415	0.08	1.3	SURCHARGED		
S32.003	SW39	2880	minute	100	year	Summer	I+20%	32.915	31.891	0.471	0.03	1.1	SURCHARGED		
S32.004	SW40	2160	minute	100	year	Winter	I+20%	32.915	31.815	0.413	0.04	1.6	SURCHARGED		
S34.000	SW41	1440	minute	100	year	Winter	I+20%	32.760	31.739	-0.122	0.01	0.3	OK		
S34.001	SW42	1440	minute	100	year	Winter	I+20%	32.760	31.732	-0.063	0.03	0.7	OK		
S34.002	SW43	2160	minute	100	year	Winter	I+20%	32.460	31.806	0.094	0.07	1.0	SURCHARGED		
S32.005	SW44	2160	minute	100	year	Winter	I+20%	32.580	31.813	0.448	0.06	2.8	SURCHARGED		
S30.005	SW45	2160	minute	100	year	Winter	I+20%	32.540	31.849	0.525	0.05	3.7	SURCHARGED		
S30.006	SW46	2160	minute	100	year	Winter	I+20%	32.460	31.852	0.541	0.05	3.6	SURCHARGED		
S30.007	SW47	1440	minute	100	year	Winter	I+20%	32.400	31.434	0.170	0.05	3.6	SURCHARGED		
S30.008	SW48	1440	minute	100	year	Winter	I+20%	32.500	31.433	0.181	0.05	3.7	SURCHARGED		
S30.009	SW49	1440	minute	100	year	Winter	I+20%	32.400	31.431	0.240	0.05	4.1	SURCHARGED		
S27.009	SW50	1440	minute	100	year	Winter	I+20%	32.450	31.428	-0.393	0.04	24.9	OK		
S27.010	SW51	1440	minute	100	year	Winter	I+20%	32.450	31.425	0.580	1.21	8.3	SURCHARGED		
S27.011	SW52	2880	minute	100	year	Winter	I+20%	31.800	30.835	0.005	1.11	8.3	SURCHARGED		
S27.012	SWSW53	2880	minute	100	year	Winter	I+20%	31.800	30.701	-0.075	0.50	8.3	OK		
S27.013	SWSCO7758901	15	minute	100	year	Winter	I+20%	31.260	30.274	-0.016	0.85	14.1	OK		

Micro Drainage

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Checked by

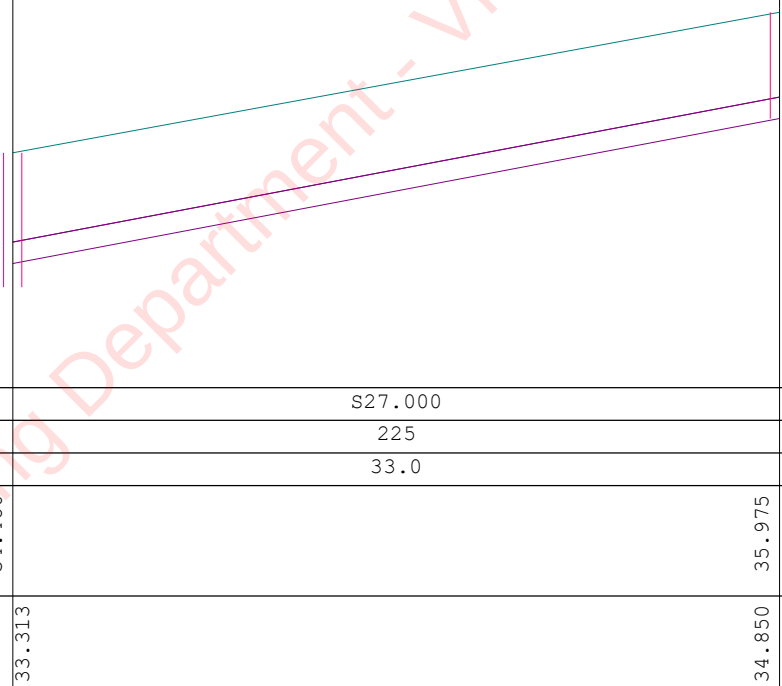
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water		Flow / Cap.	Pipe Flow (1/s)	Status
				Level (m)	Depth (m)			
S27.014	SWSCO7758802	15 minute 100 year Winter I+20%	30.940	30.161	0.131	0.80	19.4	SURCHARGED
S27.015	SWSCO7758804	15 minute 100 year Winter I+20%	29.590	29.418	0.828	1.33	40.1	FLOOD RISK
S35.000	SWSCO7757901	15 minute 100 year Winter I+20%	31.290	30.816	0.286	0.45	9.4	SURCHARGED
S35.001	SWSCO7758801	15 minute 100 year Winter I+20%	30.850	30.749	0.689	1.06	24.7	FLOOD RISK
S35.002	SWSCO7758803	15 minute 100 year Winter I+20%	29.570	29.323	0.513	1.24	35.2	FLOOD RISK
S35.003	SWSCO77587011	15 minute 100 year Winter I+20%	28.880	27.834	-0.166	0.40	54.6	OK
S27.016	SWSCO7758702	15 minute 100 year Winter I+20%	28.820	27.581	-0.129	0.60	111.3	OK
S27.017	SWSCO7758703	15 minute 100 year Winter I+20%	27.440	26.640	0.430	1.32	157.6	SURCHARGED
S27.018	SWSCO7758610	15 minute 100 year Winter I+20%	28.000	25.548	-0.101	0.77	163.0	OK
S36.000	SWSCO7758704	15 minute 100 year Summer I+20%	27.390	25.350	-0.150	0.00	0.0	OK
S27.019	SWSCO7758602	15 minute 100 year Winter I+20%	24.710	23.997	0.397	1.75	191.3	SURCHARGED

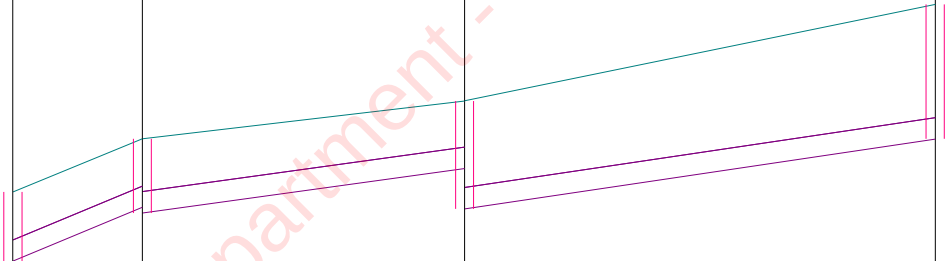
SURFACEWATER LONG SECTIONS

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MH Name	SW2	SW1
MH Invert Level (m)	33.061	34.850
		
Hor Scale 500		
Ver Scale 80		
Datum (m) 32.000		
PN	S27.000	
Dia (mm)	225	
Slope (1:X)	33.0	
Cover Level (m)	34.486	35.975
Invert Level (m)	33.313	34.850
Length (m)	50.713	

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MH Name	SW5	SW4	SW3	SW2
MH Invert Level (m)	31.768	32.276	32.320	33.061
Hor Scale 500 Ver Scale 80 Datum (m) 31.000				
PN		S27.003	S27.002	S27.001
Dia (mm)		225	225	225
Slope (1:X)		15.0	45.0	42.0
Cover Level (m)	32.500	33.064	33.464	34.486
Invert Level (m)	31.768	32.339	32.750	33.061
Length (m)		8.565	21.318	31.129

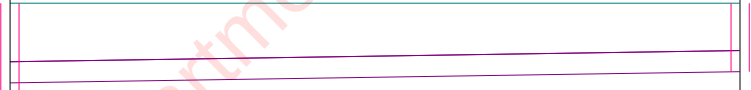
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MH Name	SW6	SW5
MH Invert Level (m)	31.524	31.768
		
Hor Scale 500		
Ver Scale 80		
Datum (m) 30.000		
PN	S27.004	
Dia (mm)	225	
Slope (1:X)	220.0	
Cover Level (m)	32.250	32.500
Invert Level (m)	31.524	31.768
Length (m)	53.587	

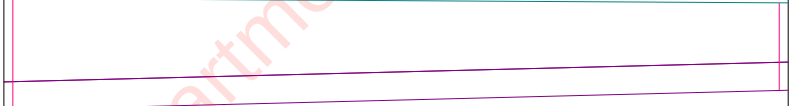
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MH Name	SW6A	SW6
MH Invert Level (m)	31.328	31.524
Hor Scale 500 Ver Scale 80 Datum (m) 30.000 		
PN	S27.005	
Dia (mm)	225	
Slope (1:X)	399.1	
Cover Level (m)	32.250	32.250
Invert Level (m)	31.403	31.524
Length (m)	48.295	

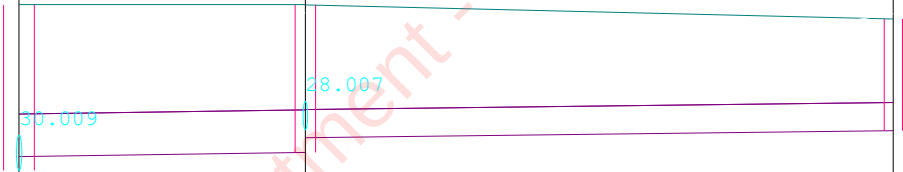
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MH Name	SW7	SW6A
MH Invert Level (m)	31.116	31.328
		
Hor Scale 500		
Ver Scale 80		
Datum (m) 30.000		
PN	S27.006	
Dia (mm)	300	
Slope (1:X)	245.0	
Cover Level (m)	32.300	32.250
Invert Level (m)	31.116	31.328
Length (m)	51.894	

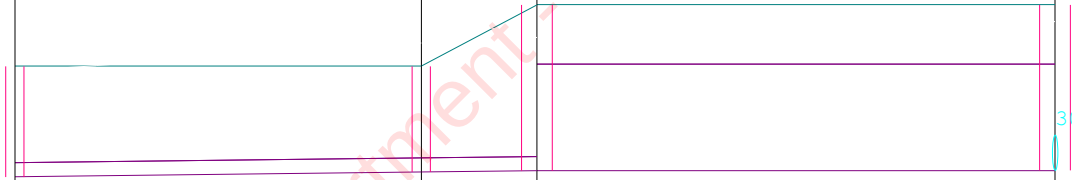
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MH Name	SW50	SW25	SW7
MH Invert Level (m)	30.696	30.888	31.116
			
Hor Scale 500			
Ver Scale 80			
Datum (m) 29.000			
PN	S27.008	S27.007	
Dia (mm)	450	300	
Slope (1:X)	410.0	500.0	
Cover Level (m)	32.450	32.450	32.300
Invert Level (m)	30.842	30.888 31.038	31.116
Length (m)	18.932	38.898	

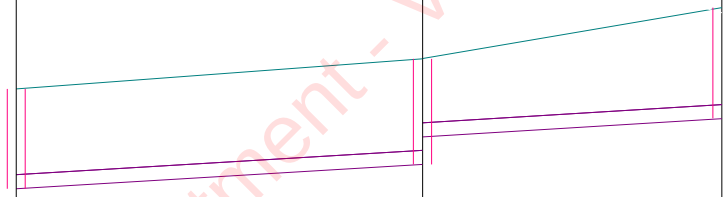
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MH Name	SWSW53	SW52	SW51	SW50
MH Invert Level (m)	30.626	30.680	30.695	30.696
Hor Scale 500 Ver Scale 80 Datum (m) 29.000				
PN	S27.011		S27.010	S27.009
Dia (mm)	150		150	1125
Slope (1:X)	497.8		500.0	34269.9
Cover Level (m)	31.800	31.800	32.450	32.450
Invert Level (m)	30.626	30.680	30.695	30.696
Length (m)	26.882		7.648	34.270

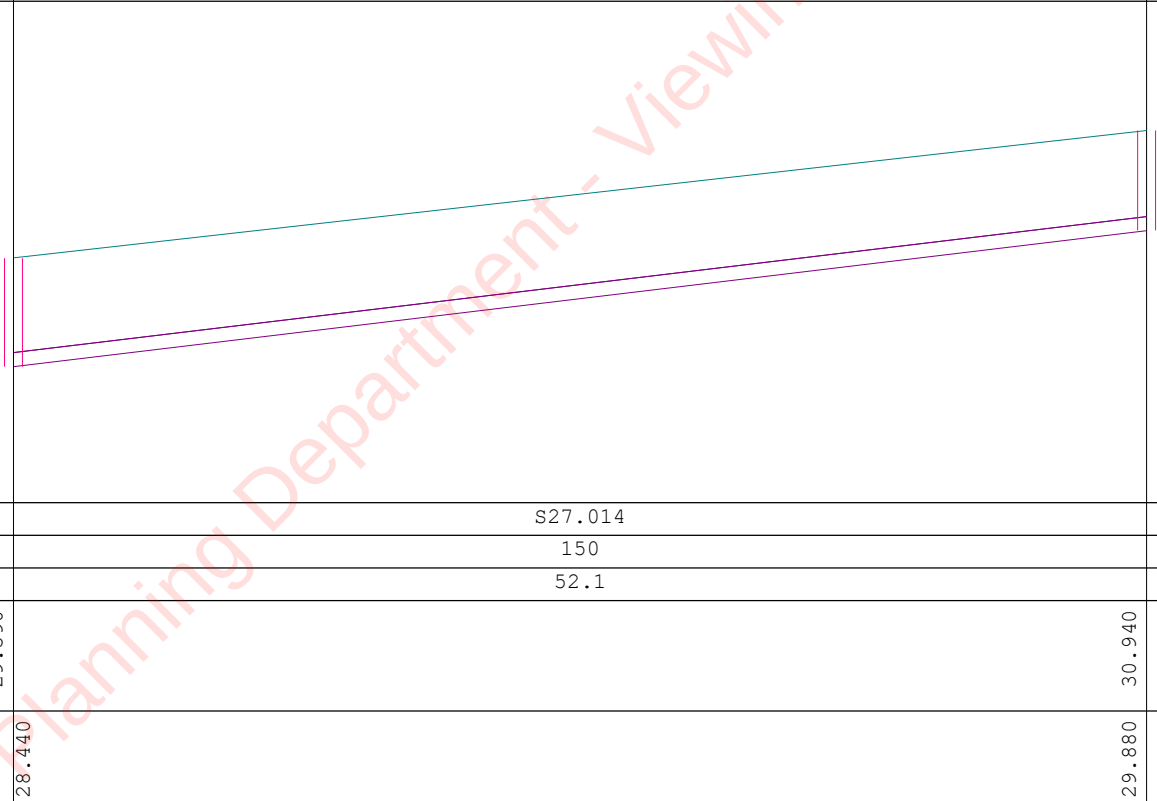
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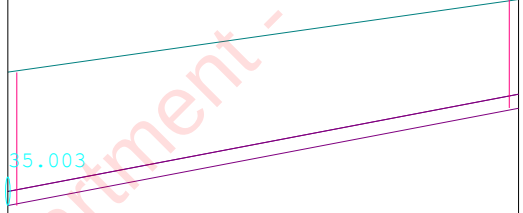
MH Name	SWSC07758802	SWSC07758901	SWSW53
MH Invert Level (m)	29.880	30.140	30.626
Hor Scale 500 Ver Scale 80 Datum (m) 28.000			
PN	S27.013		S27.012
Dia (mm)	150		150
Slope (1:X)	103.4		100.9
Cover Level (m)	30.940	31.260	31.800
Invert Level (m)	29.880	30.140 30.430	30.626
Length (m)	26.874		19.799

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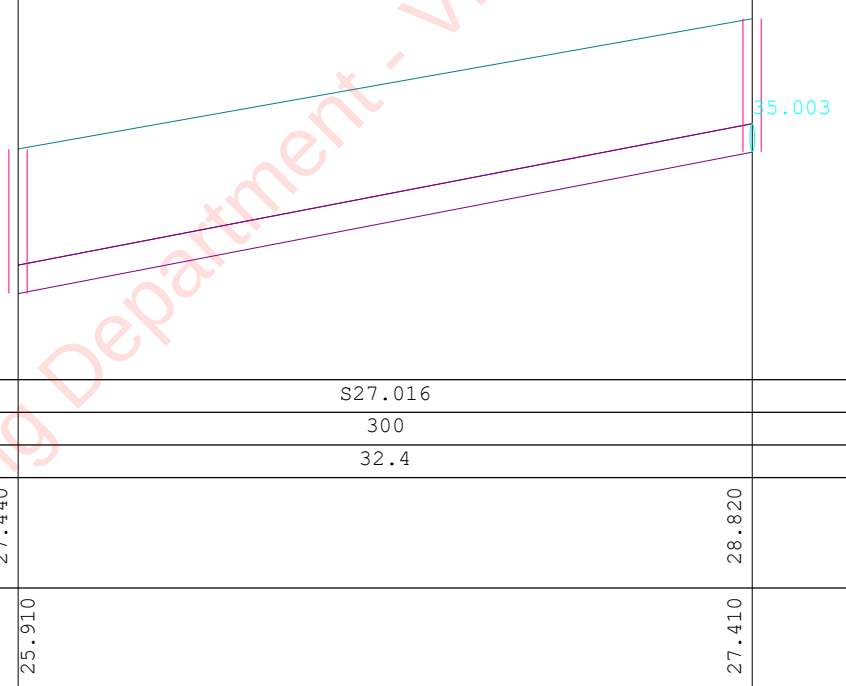
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MH Name	SWSC07758804	SWSC07758802
MH Invert Level (m)	28.440	29.880
		
Hor Scale 500		
Ver Scale 80		
Datum (m) 27.000		
PN	S27.014	
Dia (mm)	150	
Slope (1:X)	52.1	
Cover Level (m)	29.590	30.940
Invert Level (m)	28.440	29.880
Length (m)	74.954	

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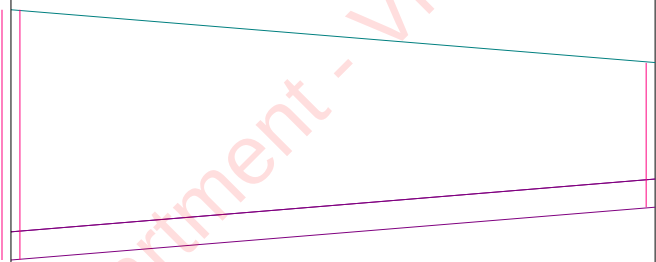
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XP Solutions		Network 2020.1.3	
MH Name	SWSCO7758702	SWSCO7758804	
MH Invert Level (m)	27.410	28.440	
Hor Scale 500 Ver Scale 80 Datum (m) 26.000			
PN		S27.015	
Dia (mm)		150	
Slope (1:X)		32.8	
Cover Level (m)	28.820	29.590	
Invert Level (m)	27.410	28.440	
Length (m)		33.785	
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MH Name	SWSCO7758703	SWSCO7758702
MH Invert Level (m)	25.910	27.410
Hor Scale 500 Ver Scale 80 Datum (m) 25.000		
PN	S27.016	
Dia (mm)	300	
Slope (1:X)	32.4	
Cover Level (m)	27.440	28.820
Invert Level (m)	25.910	27.410
Length (m)	48.559	

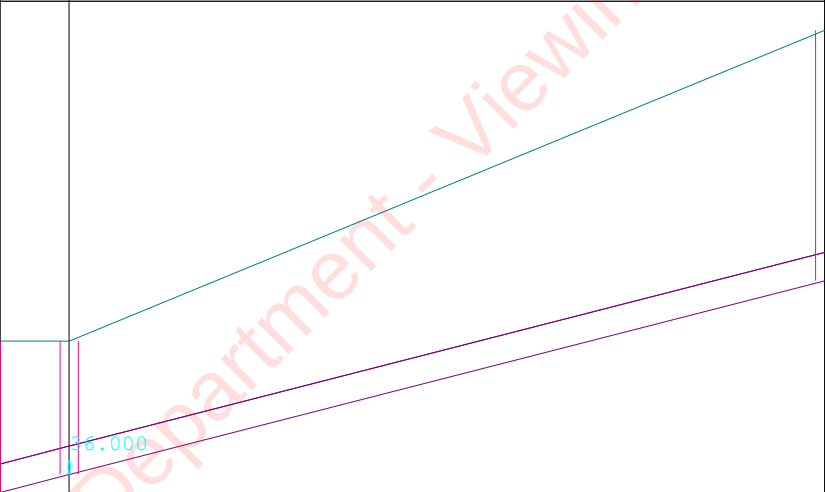
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MH Name	SWSC07758610	SWSC07758703
MH Invert Level (m)	25.349	25.910
		
Datum (m) 24.000		
PN	S27.017	
Dia (mm)	300	
Slope (1:X)	76.0	
Cover Level (m)	28.000	27.440
Invert Level (m)	25.349	25.910
Length (m)	42.610	

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MH Name	SW	SWSC07758610
MH Invert Level (m)	23.110	25.349
Hor Scale 500 Ver Scale 80 Datum (m) 23.000 		
PN	S27.018	
Dia (mm)	300	
Slope (1:X)	24.4	
Cover Level (m)	24.710 24.710	28.000
Invert Level (m)	23.110 23.300 23.300	25.349
Length (m)	49.974	

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APPENDIX E. WASTEWATER DESIGN CALCULATIONS

Appendix E

WASTEWATER DESIGN CALCULATIONS

JOB NAME: Drogheda Twin Schools	JOB NO: A612	DATE: 08/04/2023
TITLE: Wastewater Design Calculations	CALCS BY: DP	CHECK'D: MK



Zone	Occupancy	Flow:As Per Appendix C IW-CDS-5030-03 (l/p/day) (1 School Day =10 hr)	Infiltration (% of flow)	Average Daily Demand (l/day)	Average Daily Demand (l/s)	Peak Daily Demand (l/s) (Peak Factor=4.5)
St. Ita School (90 Staff and 160 Students)	250	50	10%	13750.00	0.38	1.72
St. Mary School (65 Staff and 100 Students)	165	50	10%	9075.00	0.25	1.13
DEVELOPMENT TOTAL	415.000			22825.0	0.63	2.85

Flow rates from Appendix C of IW Code of Practice for Wastewater Infrastructure, December 2017 (IW-CDS-5030-03)

Infiltration rates from Appendix B of IW Code of Practice for Wastewater Infrastructure, December 2017 (IW-CDS-5030-03)

Peaking Factor from Appendix B of IW Code of Practice for Wastewater Infrastructure, December 2017 (IW-CDS-5030-03)

Micro Drainage

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Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
F1.000	55.604	0.927	60.0	0.000	0	0.0	1.500	o	375	Pipe/Conduit		
F2.000	17.718	0.118	150.0	0.000	62	0.0	1.500	o	150	Pipe/Conduit		
F2.001	7.161	0.048	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
F2.002	43.002	0.287	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
F2.003	51.102	0.341	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit		
F1.001	17.382	0.087	200.0	0.000	0	0.0	1.500	o	375	Pipe/Conduit		
F1.002	56.259	0.281	200.0	0.000	0	0.0	1.500	o	375	Pipe/Conduit		

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	32.060	0.000	0.0	0	0.0	0	0.00	2.07	228.8	0.0
F2.000	31.629	0.000	0.0	62	0.0	49	0.58	0.71	12.6	2.9
F2.001	31.511	0.000	0.0	62	0.0	49	0.58	0.71	12.6	2.9
F2.002	31.463	0.000	0.0	62	0.0	49	0.58	0.71	12.6	2.9
F2.003	31.176	0.000	0.0	62	0.0	49	0.58	0.71	12.6	2.9
F1.001	30.611	0.000	0.0	62	0.0	39	0.47	1.13	125.1	2.9
F1.002	30.524	0.000	0.0	62	0.0	39	0.47	1.13	125.1	2.9

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FOUL SEWERAGE DESIGN

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F3.000	31.784	0.212	150.0	0.000	95	0.0	1.500	o	150	Pipe/Conduit	
F3.001	20.185	0.135	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.002	8.060	0.054	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.003	26.228	0.175	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.004	69.853	0.466	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.005	42.182	0.281	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.006	2.928	0.020	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.003	54.971	0.275	200.0	0.000	0	0.0	1.500	o	375	Pipe/Conduit	
F1.004	6.568	0.109	60.0	0.000	0	0.0	1.500	o	375	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F3.000	31.670	0.000	0.0	95	0.0	61	0.65	0.71	12.6	4.4
F3.001	31.458	0.000	0.0	95	0.0	61	0.65	0.71	12.6	4.4
F3.002	31.324	0.000	0.0	95	0.0	61	0.65	0.71	12.6	4.4
F3.003	31.270	0.000	0.0	95	0.0	61	0.65	0.71	12.6	4.4
F3.004	31.095	0.000	0.0	95	0.0	61	0.65	0.71	12.6	4.4
F3.005	30.629	0.000	0.0	95	0.0	61	0.65	0.71	12.6	4.4
F3.006	30.348	0.000	0.0	95	0.0	61	0.65	0.71	12.6	4.4
F1.003	30.104	0.000	0.0	157	0.0	61	0.62	1.13	125.1	7.3
F1.004	29.829	0.000	0.0	157	0.0	46	0.94	2.07	228.8	7.3

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FOUL SEWERAGE DESIGN

Network Design Table for Foul - Main

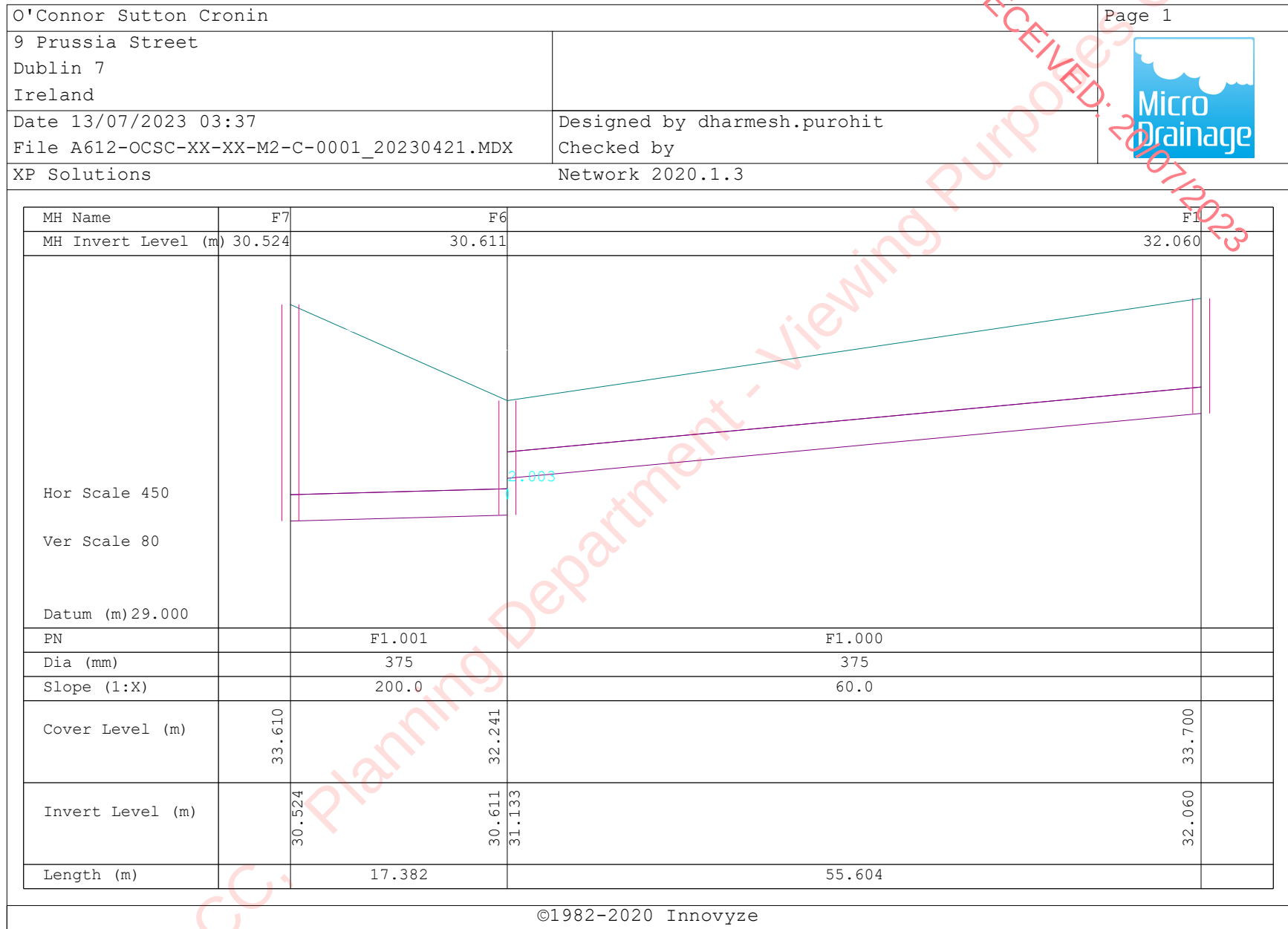
PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.005	70.575	1.176	60.0	0.000	0	0.0	1.500	o	375	Pipe/Conduit	

Network Results Table

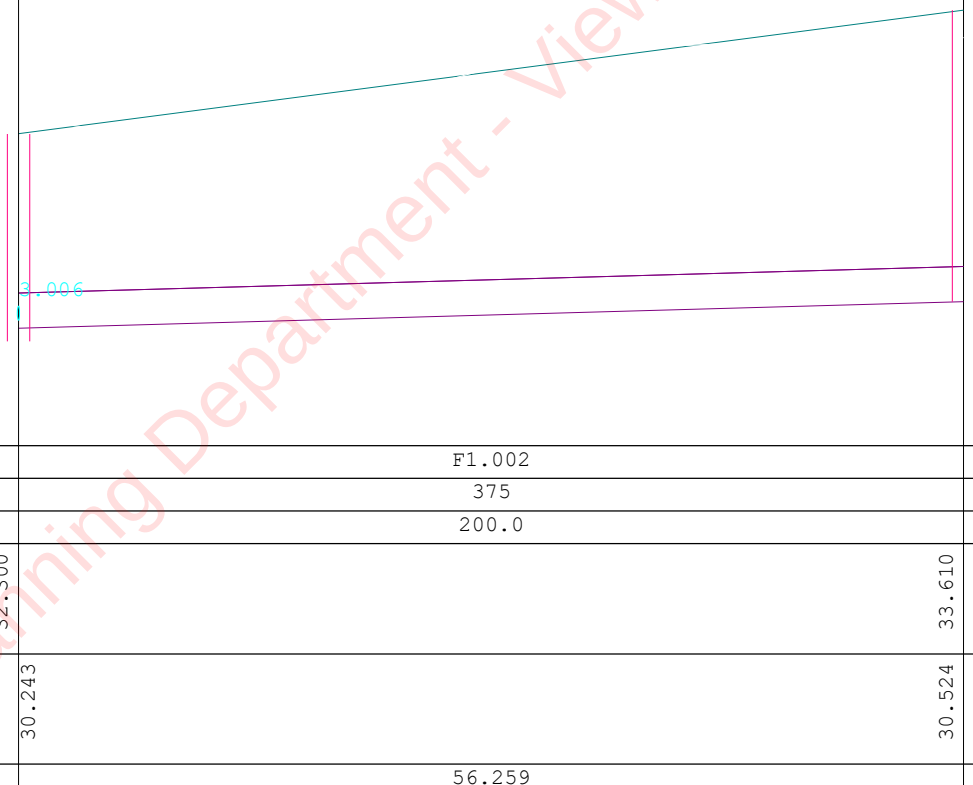
PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.005	29.298	0.000	0.0	157	0.0	46	0.94	2.07	228.8

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FOUL SEWER LONGSECTIONS



O'Connor Sutton Cronin		Page 2	
9 Prussia Street Dublin 7 Ireland			
Date 13/07/2023 03:37 File A612-OCSC-XX-XX-M2-C-0001_20230421.MDX		Designed by dharmesh.purohit Checked by	
XP Solutions		Network 2020.1.3	

MH Name	F15	F7
MH Invert Level (m)	30.104	30.524
		
Hor Scale 450		
Ver Scale 80		
Datum (m) 29.000		
PN	F1.002	
Dia (mm)	375	
Slope (1:X)	200.0	
Cover Level (m)	32.300	33.610
Invert Level (m)	30.104	30.524
Length (m)	56.259	

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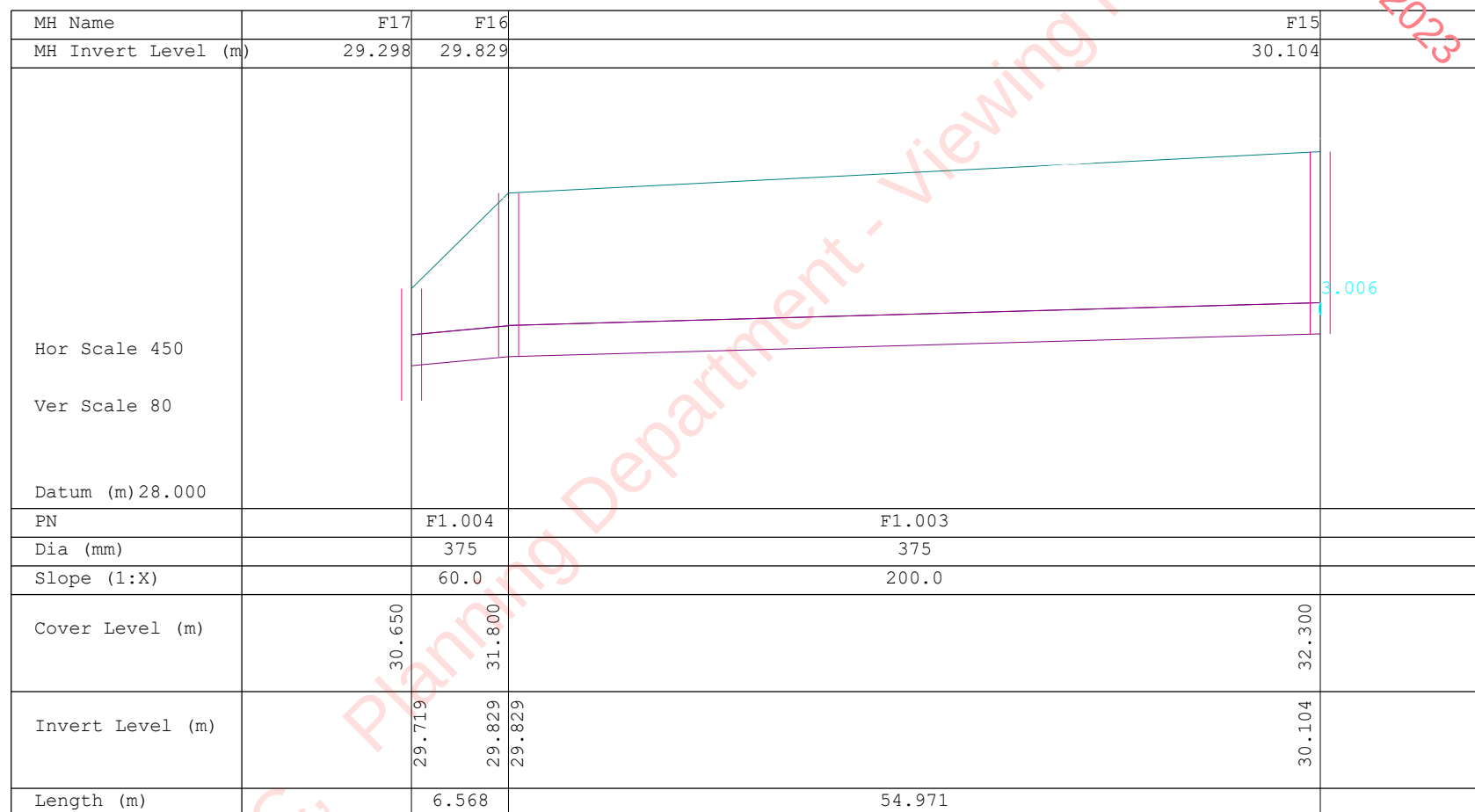


Micro Drainage

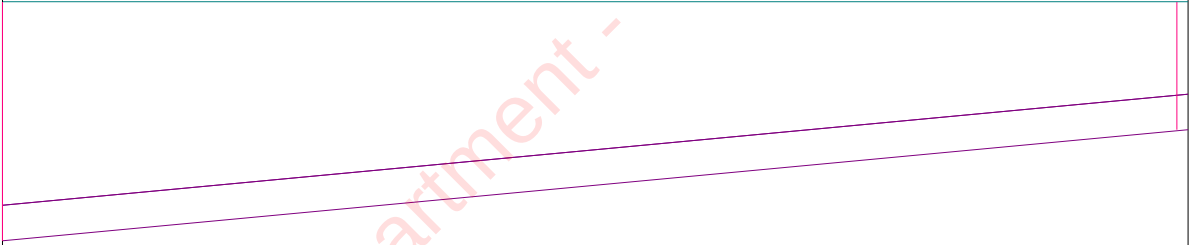
Designed by dharmesh.purohit

Checked by

Network 2020.1.3



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XP Solutions		Network 2020.1.3	

MH Name	F	F17
MH Invert Level (m)	28.122	29.298
Hor Scale 450 Ver Scale 80 Datum (m) 27.000 		
PN		F1.005
Dia (mm)		375
Slope (1:X)		60.0
Cover Level (m)	30.650	30.650
Invert Level (m)	28.122	29.298
Length (m)		70.575

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APPENDIX F. IRISHWATER CONFIRMATION OF FEASIBILITY

Appendix F

IRISH WATER CONFIRMATION OF FEASIBILITY



Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí
Irish Water
PO Box 448,
South City
Delivery Office,
Cork City,
www.water.ie

RECEIVED: 20/07/2020
Planning Department - Viewing Purposes Only

Daire O Mahoney
9 Prussia Street
Dublin 7
D07KT57
Co. Dublin
Ireland

12 June 2020

Dear Daire O Mahoney,

**Re: Connection Reference No CDS20003516 pre-connection enquiry -
Subject to contract | Contract denied**

**Connection for Business Connection of 2 unit(s) at St. Ita's & St.Mary's School, Cement Road,
Louth.**

Irish Water has reviewed your pre-connection enquiry in relation to a water connection at St. Ita's & St.Mary's School, Cement Road, Louth.

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.

Wastewater

The connection to the proposed development can be facilitated. Our records indicate the presence of existing wastewater infrastructure traversing the subject site. It will be necessary to comply with Irish Water's Wayleave requirements in relation to this infrastructure.

Water

The connection to the proposed development can be facilitated.

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 Jonathon Edgeworth from the design team on 01-8925808 or email joedgeworth@water.ie. For further information, visit www.water.ie/connections.

Yours sincerely,



Maria O'Dwyer

Connections and Developer Services

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