PROJECT MOORETOWN 220 kV SUBSTATION

Drainage and Water Services Report

PROJECT NUMBER 60641561

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Distribution List

# Hard Copies	PDF Required	Association / Company Name
0	1	Huntstown Power Company

PROJECT CIRRUS

Drainage and Water Services Report

Contents

1. Introduction

This document provides a brief description of the proposed drainage and water services works adopted in the design and general requirements.

It is provided to assist understanding of the development proposals and the clients design requirements only and does not supersede in any way the requirements of the contract, drawings specifications and other documents formally issued for the works.

1.1 Site

The site is located approximately 500m north of the N2 / M50 junction in Huntstown, Co. Dublin. The land is currently in agricultural use and has an area of circa 12.95 hectares (32.15 Acres) Field boundaries are fenced with hedges and trees on all sides. A small existing watercourse runs roughly south to north through the site and will be diverted as part of the design as noted below. The land is generally flat, there are slight slopes to the watercourse and to the north with low points along the watercourse.

1.2 Development Description

The development by Huntstown Power Company located at Huntstown, Co. Dublin involves the construction of a new electrical substation and associated grid connection (known as the Customer Compound), which will serve the site including a proposed Data Centre development which will be located immediately to the east of the development, as well as any future development on the wider landholding. The details contained in this strategy and application include information relating to elements of the concurrent planning application for the Data Centre under application Ref FW21A/0151.

A separate Drainage and Water Services report has been produced by Clifton Scannell Emerson Associates (CSEA) for the Data Centre which is included in Appendix A of this report which takes into account surface and foul drainage discharges from the substation and Customer Compound identified in this report.

Whilst it is the intention that in the permanent condition the substation and the Customer Compound drainage systems will be connected into the Data Centre drainage network, the drainage design has been planned to accommodate any possible delay to the construction of the Data Centre to allow both areas to operate as standalone drainage systems prior to the Data Centre being constructed however this will necessitate incorporating part of the works previously intended to form part of the Data Centre scheme as noted below:

- Forming a road access to the south of the site off of the existing campus road including associated drainage works.
- Installation of a 900 diameter ditch diversion. Refer Section 5 of CSEA's Drainage and Water Services report in Appendix A
- Construction of an attenuation basin to the north of the site. Refer Clifton Scannell Emerson Associates (CSEA) drawing 20_099-CSE-00-XX-DR-C-2116 in Appendix B.

2. Drainage

2.1 Surface Water

The proposed development will be connected to a SUDS facility to provide attenuation in compliance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS) The following section outlines the surface water drainage proposals for the development for each area. All SUDS elements have been designed as per the recommendation of the SuDS Manual 2015. All surface water works including connections will be carried out in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.
The sites for the EirGrid substation and Customer Compound will provide a first level of SUDs treatment described below and a final treatment together with attenuation will be provided in the attenuation basin to the north of the site. This basin will, in the temporary condition, provide attenuation for the substation and Customer Compound and in the permanent condition, will also form part of the attenuation system for the Data Centre.

2.1.1 EirGrid Compound

A surface water drainage network separate from the adjacent Customer Compound will be formed via. a solid walled pipe systems pipes will be used, connected to a Class 1 full retention interceptor prior to discharge to the attenuation basin which will provide the final treatment and attenuation from the compound.

It is proposed that the interceptor, installed downstream of the compound surface water network and upstream of the attenuation basin, will be a Class 1 full retention interceptor designed to accept and treat the full design flow delivered in the surface water drainage system.

A system of road gullies and linear drainage channels will direct the surface water run-off from the impermeable areas into the surface water system with manholes and catch pits located on all drains to minimise silt transfer and intercept contamination.

During oiling of transformers surface water drainage from the road area can be closed off after the interceptor to prevent a catastrophic large volume leak of oil reaching the SUDS treatment.

2.1.2 Customer Compound

The proposed surface water drainage will be similar to that proposed for the EirGrid compound above with a series of gullies and linear drainage channels collecting surface water run-off from the compound access road and yard connecting into a solid walled pipe system.
Drainage will discharge into a full retention Class 1 interceptor prior to discharge into the attenuation basin for final treatment and attenuation.
Transformer bases will provide for a leak retention of a minimum of 110% of the stored oil in the transformer. Surface water from each will be pumped from the sump via an Aquasentry pump and monitoring system which will shut down and alarm in the event of oil contamination.
Surface water from the normal delivery of the pumps will discharge to the surface water pipes and Class1 interceptor system to prevent contamination

A surface water ditch diversion pipe as noted in Item 1.2 above is shown within the Customer Compound. This diversion will require to be installed to provide a temporary surface water connection for the southern access road drainage system and to allow the construction of the Customer Compound. For details of the proposed ditch diversion refer to Section 5 in CSEA’s Drainage and Water Services in Appendix A.

2.2 Foul Drainage

2.2.1 EirGrid Compound

The pipe network is designed in accordance with the requirement of Table 6.4 of the Greater Dublin Strategic Drainage Study

The proposed foul water network collects foul water flows from the toilet, shower and mess facilities within the GIS building.
The substation building is an unmanned facility with visiting maintenance crews. This is generally a two man crew visiting site for two days per month.

As a result, this development is not covered by the types of activities listed in Appendix D of the Irish Water Code of Practice for Wastewater Infrastructure. Accordingly, proposed wastewater flows have been based on the assumed usage rates of the appliances in the building.
The proposed foul water flows from the development are estimated to be a maximum of 400l/day during occupation, with a peak discharge of 1.6l/sec during an 8hr shift period.

Drainage from the GIS building will be gathered to a centrally located manhole where, in the permanent condition, it will then be pumped offsite to the adjacent Data Centre private sewer (refer to CSEA drawing 20_099-CSE-00-XX-DR-C-2210 in Appendix B and Section 3 of CSEA's Drainage and Water Services report in Appendix A). The route, flows and general levels of the rising main has been agreed with the Data Centre designers and allows for local flow buffering at the pump station before discharge. In this condition the foul drainage from the GIS building will be drained to a cesspool and tankered off-site for disposal.

The proposed network will adhere to the minimum pipe gradients set out in Table 6 of the "Building Regulations Technical Guidance Document H". It is proposed to take all foul drainage from the buildings by means of 100mmø pipes with minimum gradients of 1:60 which connect to 150mmø pipes laid at minimum gradients of 1:100. The key design parameters are summarised as follows:-

- Minimum Self-Cleansing Velocity for Gravity Sewer = 1.0 m/s;
- Minimum gradient of gravity sewer = 1:60
- Roughness Co-efficient for Gravity Sewer (ks) = 0.6mm

2.2.2 Customer Compound

There is no proposed foul water network for the Customer Compound area.

3. Water Supply

A water supply will be provided from the Huntstown Power Station private water supply.
A peak water demand of 400 litres/day during an 8 hour occupied shift has been allowed.
Due to the gaps in use from the supply, potable water will be imported bottled water.

4. Firefighting Water

No provision is required within the EirGrid substation or Customer Compounds.

5. Schedule of Aecom Drawings

Drawing No. 60641561-DWG-713 Outline Drainage Layout

6. Framework of Specifications (EIRGRID)

Not applicable.

Appendix A - CSEA Engineering Planning Report – Drainage and Water Services for Huntstown Data Centre Facility (produced by Clifton Scannell Emerson Associates)

20_099-CSE-00-XX-RP-C-005 Engineering Planning Report - Drainage and Water Services

Clifton Scannell Emerson Associates

Engineering Planning Report - Drainage and Water Services

Huntstown Data Centre Facility

Client: Huntstown Power Company Ltd.

Date: 9th April 2021

Job Number: 20_099

Civil Engineering | Structural Engineering | Transport Engineering | Environmental Engineering | Project Management | Health and Safety

CONSULTING ENGINEERS

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Document Control Sheet

Project Name:	Huntstown Data Centre Facility
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Issue No.	Issue Status	Date	Prepared by	Checked by
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1.2	DRAFT	07/05/2021	CD	PM
1.3	PLANNING	04/08/2021	CD	PM

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1 Introduction

This report is being submitted as part of the planning application for Energia Group for the proposed data storage facility and energy centre development on site at Huntstown, Dublin 11. The report outlines the proposals for drainage services, water supply and flood risk assessment for the development. The proposed development site is approximately 13.30 Hectares in size.

1.1 Development Description

The proposed development of a greenfield site of approximately 13.30 Hectares. It is located approximately 500m north of the N2 / M50 junction in Huntstown, Co. Dublin. The development will consist of the construction of two separate data centre buildings to be constructed over a 10 year period.

Huntstown Power Company Limited, intends to seek permission for the development of 2 no. data hall buildings and ancillary structures on this site. The extent of the site layout is highlighted in Figure 1.1 below:-

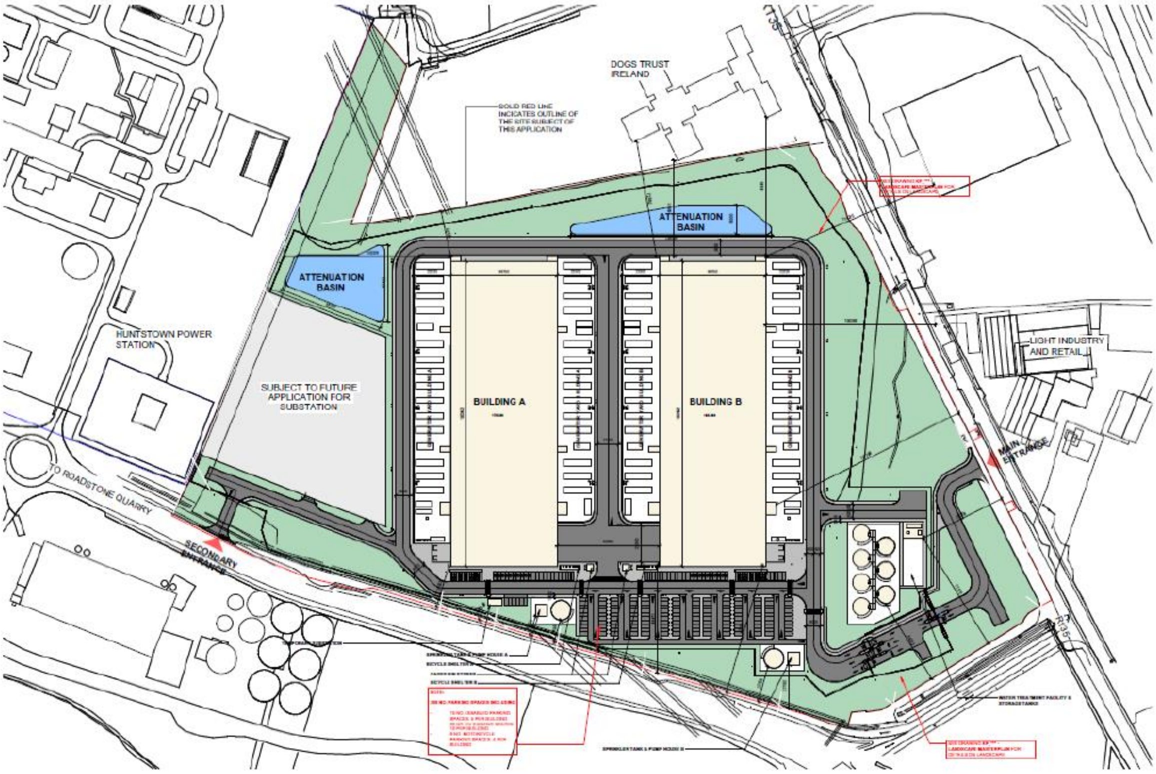

Figure 1.1 – Proposed Site Masterplan

The proposed development is described as follows:

- Demolition of 2 no. existing residential dwellings to the east of the site (c. 344 sqm in area);
- Construction of 2 no. data hall buildings (Buildings A and B) comprising data hall rooms, mechanical and electrical galleries, ancillary offices including meeting rooms, workshop spaces, staff areas including break rooms, toilets, shower/changing facilities, storage areas, lobbies, loading bays and docks, associated plant throughout, photovoltaic panels and screened plant areas at roof levels, circulation areas and stair and lift cores throughout;

- External plant and 58 no. generators located within a generator yard to the east and west of Buildings A and B at ground level. The area is enclosed by a c.6.5m high louvred screen wall;
- The proposed data halls (Buildings A and B) are arranged over 3 storeys with a gross floor area of c.37,647sqm each;
- The overall height of the data hall buildings is c.28m to roof parapet level and c.32m including roof plant, roof vents and flues. The total height of Buildings A and B does not exceed 112m OD (above sea level);
- The proposed development includes the provision of a temporary substation (c.32sqm), water treatment building (c. 369sqm and c.7.5m high), 7 no. water storage tanks (8,200m^3 c.6.35m high), 2 no. sprinkler tanks (c.670m^3 each and c.7.2m high) with 2 no. pump houses each (c.40sqm c.6m high);
- The total gross floor area of the data halls and ancillary structures is c.75,775sqm;
- All associated site development works, services provision, drainage upgrade works, 2 no. attenuation basins, landscaping and berming (c.6m high), boundary treatment works and security fencing c.2.4m high, new vehicular entrance from the North Road, secondary access to the south west of the site from the existing private road, all internal access roads, security gates, pedestrian/cyclist routes, lighting, 2 no. bin stores, 2 no. bicycle stores serving 48 no bicycle spaces, 200 no. car parking spaces and 8 no. motorcycle parking spaces;
- A proposed 220kv substation located to the south west of this site will be subject of a separate Strategic Infrastructure Development application to An Bord Pleanála under section 182A of the Planning and Development Act 2000 (as amended);
- An Environmental Impact Assessment Report (EIAR) is submitted with this application.

1.2 Existing Land Use

The existing site is a greenfield site which is currently used as agricultural land.

2 Surface Water Drainage

2.1 General

The proposed development will provide attenuation in compliance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS) The following section outlines the surface water drainage proposals for the development. All SUDS elements have been designed as per the recommendation of the SuDS Manual 2015.

All surface water works including connections will be carried out in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

2.2 Drawings

The following drawings are provided in support of the planning application to surface water drainage

- Drawing No. 20_099-CSE-00-XX-DR-C-2110 Proposed Overall Surface Water Drainage Layout
- Drawing No. 20_099-CSE-00-XX-DR-C-2111- Proposed Surface Water Drainage Sheet 1
- Drawing No. 20_099-CSE-00-XX-DR-C-2112- Proposed Surface Water Drainage Sheet 2
- Drawing No. 20_099-CSE-00-XX-DR-C-2115 Surface Water Attenuation Basin 1 Plan and Sections
- Drawing No. 20_099-CSE-00-XX-DR-C-2116 Surface Water Attenuation Basin 2 Plan and Sections
- Drawing No. 20_099-CSE-00-XX-DR-C-2910 Standard Trench Details
- Drawing No. 20_099-CSE-00-XX-DR-C-2911 Proposed Drainage Details Sheet 1
- Drawing No. 20_099-CSE-00-XX-DR-C-2911 Proposed Drainage Details Sheet 2
- Drawing No. 20_099-CSE-00-XX-DR-C-2911 Proposed Drainage Details Sheet 3

2.3 Existing Surface Water Network

There is no drainage system currently serving the site. The lands fall to the north west of the site and are bordered by a drainage ditch which flows to the Huntstown Stream which is a tributary of the Ward River. The ditch in question joins the Ward approximately 5 km north east of the site.

2.4 Proposed Surface Water Network

2.4.1 Overview

The proposed surface water networks for the development collect runoff from roofs, roads and other hard standing areas in a sealed system of pipes and gullies. There are two separate surface water drainage networks in the proposed development which flow to separate surface water attenuation basins (Refer to Drawing No s 20_099-CSE-00-XX-DR-C-2115 and 20_099-CSE-00-XX-DR-C-2116) from which attenuated flows are discharged, via carrier drains, to the adjacent ditch, described in Section 2.3, adjacent to the north west corner of the site.

2.4.2 Surface Water Network Design

The pipe network is designed in accordance with the requirement of Table 6.4 of the Greater Dublin Strategic Drainage Study (GDSDS) See Fig 2.1 below.

Parameter	Surface Water Sewers
Minimum depth	1.2m cover under highways 0.9m elsewhere
Maximum depth	Normally 5m
Minimum sewer size	225mm
Runoff factors for pipe sizing	100% paved and roof surfaces 0% off pervious surfaces
Rainfall for initial pipe sizing	50mm/hr rainfall intensity
Minimum velocity (pipe full)	1.0m/s
Flooding	Checks made for adequate protection * No flooding for return period less than 30 years except where explicitly planned Simulation modelling is required for sites greater than 24ha**
Roughness – ks	0.6mm

Fig 2.1 – GDSDS Pipe Design Criteria

In addition to the criteria outlined in Fig 2.1 no flooding of buildings will occur for return periods less than 100 years. Car parks and roadways may flood between 30-100 years. Simulation, drainage design and site levels should take account of this criteria.

Manholes shall be provided at junctions in the network, at changes of direction and gradient and at no more than 90m centres.

The surface water pipe network has been modelled using WinDes™ software and detailed calculations are provided in Appendix A.

2.4.3 Pollution Control Measures

It is proposed to provide a number of full retention hydrocarbon interceptors in the surface water drainage scheme.

Due to generator refuelling activities taking place on roads throughout the development it is proposed to provide a Class 1 full retention separators downstream of all roads and upstream of the proposed surface water attenuation basins in accordance with Section 20 of the Greater Dublin Regional Code of Practice. The full retention separator is designed to treat the full design flow that can be delivered in the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 50mm/hour.

There is potential for surface water and condensate to accumulate in the exhaust stacks which serve the generators. Gullies which serve the exhaust stacks will discharge to a dedicated surface water drainage pipe which will be connected to a Class 1 full retention separator. Two full retention interceptors will be required per building to serve the exhaust stacks.

Details of the full retention separator proposed are provided in Appendix B to this report and are outlined in Table 2.1 below.

Ref	Type	Class	Model Specification (by Klargestor or equivalent)	Design Flow Rate (l/s)	Oil Capacity (l)
PI-1	Full Retention	1	NSFP003	3	30
PI-2	Full Retention	1	NSFA200	200	2000
PI-3	Full Retention	1	NSFP003	3	30
PI-4	Full Retention	1	NSFA200	200	2000
PI-5	Full Retention	1	NSFP003	3	30
PI-6	Full Retention	1	NSFP003	3	30
PI-7	Bypass	1	NSBE020	20	300

Table 2.1 – Petrol Interceptor Details

In addition to the full retention separators two hydrodynamic solid separators will also be provided within the drainage network to screen rubbish, debris and sediment from the surface water runoff before it enters the attenuation pond.

Details of the hydrodynamic solid separator proposed are provided in Appendix C to this report.

2.4.4 Proposed Permeable Paving

It is proposed to provide permeable paving in the car parking areas to the south of the development in order to reduce the hard standing areas discharging to the surface water drainage network insofar as possible. Locations where permeable paving is being proposed is indicated on Drawing No. s 20_099-CSE-00-XX-DR-C-2021 and 20_099-CSE-00-XX-DR-C-2022 and details of the permeable paving system is indicated on Drawing No. s 20_099-CSE-00-XX-DR-C-2900.

2.4.5 Surface Water Attenuation

The surface water network has been designed to provide sufficient capacity to contain and convey all surface water runoff associated with the 1 in 100 year event to the attenuation basins without any overland flooding. This complies with Criterion 3 of Table 6.3 of Volume 2 of the GDSDS.

All calculations have allowed for an additional allowance of 10% in rainfall intensities to allow for climate change as per Table 6.1 of Volume 2 of the GDSDS.

The allowable discharge rate from the site (QBAR) has been calculated in accordance with the following equation as per Section 6.3.1.2.2 of the GDSDS. Calculations are provided D to this report.

The proposed development will have two attenuation basins, one located to the north of the site and a second basin located to the west of the site. The total allowable discharge from the site has been calculated as 28.26 l/s which has been spilt between the attenuation basins with 12.0 l/s discharging from the north basin and 16.26 l/s discharging from the west basin. Discharge from both basins will be controlled by hydrobrake vortex control units as outlined below and details are provided in Appendix E:-

- Attenuation Basin 1 (North) SHE-0143-1200-2000-1200
- Attenuation Basin 2 (West) - SHE-0174-1650-1600-1650

Analysis of the Windes^{TM} results for the data storage facility s drainage network identified the 240 minute winter storm during the 1 in 100 year return period as the critical storm in terms of attenuation storage volume. The design information for both attenuation basins is outlined below. See Appendix A for details of the Windes^{TM} calculations.

Attenuation Basin 1 (North)

- Basin Invert Level = 76.704m OD
- Proposed Ground Level at Basin = 79.00m approx.
- Discharge Rate = 12 l/s
- Design Head = 2.0m
- Critical Storm Event = 240 Minute Winter
- High Water Level during 1 in 100 year event = 78.704m

- Storage Volume required for proposed development = 1,233m^3

Attenuation Basin 2 (West)

- Basin Invert Level = 75.800m OD
- Proposed Ground Level at Basin = 77.60m approx.
- Discharge Rate = 16.26 l/s
- Design Head = 1.6m
- Critical Storm Event = 240 Minute Winter
- High Water Level during 1 in 100 year event = 77.390m
- Storage Volume required for proposed development = 2,439m^3

Attenuation Basin 2 has additional capacity to facilitate the development of the proposed GIS substation which is being carried out by others.

2.5 Rainwater Harvesting

It is proposed to provide 6000 litre rainwater harvesting tanks to serve grey water usage in the Administration Area of both buildings. The roof downpipes serving the Administration Area will be connected upstream of the rainwater harvesting tanks and rainwater will be pumped into the building plumbing system to serve grey water usage purposes. An overflow will be provided to the main surface water drainage system.

It is possible that rainwater harvesting from the data hall roof of Building B could be used to augment the cooling water supply. This will be subject to a full cost benefit analysis and detailed design.

2.6 Surface Water Drainage Design Summary

The proposed surface water drainage network has been designed in accordance with GDSDS and Greater Dublin Regional Code of Practice. The proposed surface water network flows in a north westly direction and is attenuated before discharging to the Huntstown Stream. The allowable discharge from the site is 28.26 l/s and the total attenuation storage volume provided is 3,672 m^3 in two attenuation basins. A number of petrol interceptors are provided thoughout the network to manage water quality and permeable paving has been provided in car parking areas in order to minimise surface water runoff.

3 Foul Water Drainage

3.1 General

A pre-connection enquiry (PCE) form was submitted to Irish Water on 26th July 2020 which addressed water and wastewater demand for the development. The reference number for the Pre-Connection Enquiry is CDS 200004468. Irish Water subsequently provided a Confirmation of Feasibility (CoF) on 31st March 2021 (Refer to Appendix F for details) which indicated that it is feasible to connect foul water flows from the proposed development without any infrastructure upgrades by Irish Water. It is proposed to outfall the foul drainage from the site to the existing 225mm foul sewer in the R135 to the east of the development site.

3.2 Drawings

The following drawings are provided in support of the planning application to foul water drainage:-

- Drawing No. 20_099-CSE-00-XX-DR-C-2210 Proposed Overall Foul Water Drainage Layout
- Drawing No. 20_099-CSE-00-XX-DR-C-2211 - Proposed Foul Water Drainage Sheet 1
- Drawing No. 20_099-CSE-00-XX-DR-C-2212 - Proposed Foul Water Drainage Sheet 2
- Drawing No. 20_099-CSE-00-XX-DR-C-2910 Standard Trench Details
- Drawing No. 20_099-CSE-00-XX-DR-C-2911 Proposed Drainage Details Sheet 1
- Drawing No. 20_099-CSE-00-XX-DR-C-2911 Proposed Drainage Details Sheet 2
- Drawing No. 20_099-CSE-00-XX-DR-C-2911 Proposed Drainage Details Sheet 3

3.3 Existing Infrastructure

An existing 225mm foul sewer located in the R135 Regional Road to the east of the site which has capacity to serve the development as noted in the Irish Water CoF referenced in Section 3.1 above.

3.4 Proposed Foul Water Drainage Network

3.4.1 Overview

The proposed foul water drainage network collects domestic foul water flows from the administration block of the proposed Data Storage Facilities and the adjacent GIS substation. A gravity sewer will flow in an easterly direction where it will discharge to a proposed pumping station. It will be necessary to pump foul flows to a discharge manhole at the site boundary which will outfall by gravity to the existing 225mm sewer in the R135.

3.4.2 Foul Water Demand

Foul demand for the proposed development is a combination of domestic demand (admin area etc.) and industrial demand has been estimated as follows.

Domestic Demand

- Population (max) (P_E) = 256
- Consumption (G_E) = 50 litres per head per day (office/ Factory with Canteen) as per Appendix C of the Irish Water Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03).
- Daily Demand (P_EG_E) = 12,800 litres or 12.8m^3
- Infiltration (I) = 10% of P_EG_E = 1.28m^3

Industrial Demand

We estimate that the peak discharge from the process systems will be approximately 19l/s with the site at full load. The process discharge will only occur during the extreme warm ambient days and as an estimate based on historical weather data for Dublin, the annual discharge will be approximately 24 hours per annum. However, this maybe more if re-entrainment of warm air occurs on the site, which could necessitate the requirement for additional evaporative cooling during the extreme warm ambient days. We are currently evaluating this through Computational Fluid Dynamic (CFD) simulations.

As part of the design intent, the peak discharge of circa 19l/s will be collected underground and retreated for re-use in the cooling process. We estimate that approximately 25-30% of this peak discharge (i.e. 19 l/s) will be of no use for the cooling process and will be discharged to waste drain. This flow corresponds to 4.75 l/s -5.70 l/s.

Dry Weather Flow

Dry Weather Flow (PG+I+E) from the proposed development is calculated as follows:-

- Typical working day = 8.00-17.00 (9 hours)
- Dry Weather Flow (Domestic) = (12.8+1.28)*1000) / 9*60*60 = 0.43 litres/sec
- Dry Weather Flow (Industrial) = 35.5*1000) / 24*60*60 = 0.41 litres/sec

3.4.3 Foul Water Pipe Design

The network has been designed to ensure that the foul discharge maintains a self-cleansing velocity. The proposed network adheres to the minimum pipe gradients set out in Table 6 of the "Building Regulations Technical Guidance Document H". It is proposed to take all foul drainage from the buildings by means of 100mm pipes with minimum gradients of 1:60 which connect to 150mm pipes laid at minimum gradients of 1:100. The key design parameters are summarised as follows:-

- Minimum Self-Cleansing Velocity for Gravity Sewer = 0.75 m/s;

- Minimum gradient of gravity sewer = 1:100
- Roughness Co-efficient for Gravity Sewer (k_s) = 1.5mm
- Design Flow = as per Appendix B of the Irish Water Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03).

Calculation of Design Flow

Design Flow has been calculated based on the requirements of Appendix B of the Irish Water Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03). The parameters are outlined as follows:-

- Design Flow = Design Foul Flow + Surface Water Allowance (Commercial/Industrial) (SW_E) where
- Design Foul Flow = $P_E G_E$ x $Pf_{dom\ ind}$ + I + E x Pf_{trade} where
  - $P_E G_E$ = 12.8m^3 or 0.4 litres/sec (9 hour day)
  - I = 10% of $P_E G_E$ = 1.28m^3 or 0.04 litres/sec
  - E= 35.5 m^3 or 0.41 litres/sec (24 hour day)
  - $Pf_{dom\ ind}$ = 4.5
  - Pf_{trade} =3.0
- SW_E = Surface Water Allowance = Q = 2.78CiA (as per Appendix B of the Irish Water Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03) Section 2.2.10.2.2) where
  - Runoff Co-Efficieint (C) =1.0
  - Rainfall Intensity (I) = 50mm/hour
  - Area (A) = 0.025 hectares (Estimate Misconnection of surface water is envisaged to be low as this is a new development).

Based on the above the design flow from the proposed development is as follows

Design Flow => (0.4 x 4.5) + 0.04 + (0.41 x 3.0) + 2.78 (1.0 x 50 x 0.025) => **6.5 litres/sec.**

Foul sewer network calculations are outlined in Appendix G.

3.4.4 Foul Water Pumping Station

As noted in Section 3.3 and 3.4.1 a foul water pumping station will be required to serve the development due to site topography and the level of the existing 225mm foul sewer. The design will comply with the requirements of Part 5 of the Irish Water Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03). The key design parameters are outlined below:-

- Storage Volume (24 hours) = 20m^3 provided (12.8 m^3 required)
- Flow Rate (Q) = 3.76 litres/sec (Flow required to achieve velocity of 0.75 m/s in 80mm - This is a higher flow than 6 x DWF (Domestic) (6 x 0.43 litres/sec = 2.58 litres/sec).
- Rising Main Diameter = 80mm
- Rising Main Length = 186m
- Rising Main Volume = 0.93m^3
- No. of times Rising Main empties per day = 1
- Mean Rising Main Velocity = 0.75 m/sec
- Roughness Value (Ks) = 0.15mm
- Static Head = 3.891m
- Friction Head Loss (FHL) (Estimate based on Colebrook-White) = 1.77m
- Fitting (Estimate) = 0.177m (10% of FHL)
- Total Estimated Design Head = 5.838m approx. (Subject to Detailed Design).

3.4.5 Proposed Substation

It is proposed to provide a sleeve to facilitate a rising main connection from the proposed sub-station development (subject to a separate planning application).

3.4.6 Internal Cooling Water Drainage (CWD)

In addition to the domestic foul sewer an additional Cooling Water Drainage (CWD) drainage network is required. This sewer will collect discharge from the AHU units and flows in a northerly direction towards a site pumping station which will pump CWD flows to the Water Treatment Plant where it will be treated and re-used. Typically discharge to the CWD drainage will be approximately 17 litres/sec. CWD Network calculations are provided in Appendix G. The CWD pumping station has been designed based on the following criteria.

- Storage Volume = 20 m^3
- Flow Rate (Q) = 5.89 litres/sec (Flow required to achieve velocity of 0.75 m/s in 100mm)
- Rising Main Diameter = 100mm
- Rising Main Length = 255m
- Rising Main Volume = 2.0m^3
- No. of times Rising Main empties per day = 1
- Mean Rising Main Velocity = 0.75 m/sec
- Roughness Value (Ks) = 0.15mm
- Static Head = 6m
- Friction Head Loss (FHL) (Estimate based on Colebrook-White) = 1.78m
- Fitting (Estimate) = 0.178m (10% of FHL)
- Total Estimated Design Head = 7.96m approx. (Subject to Detailed Design).

3.5 Foul Drainage Design Summary

The proposed foul water drainage network has been designed in accordance with the requirements of Appendix B of the Irish Water Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03). The domestic foul sewer flows in a easterly direction towards a proposed pumping station which pumps to a discharge manhole adjacent to the existing Irish Water 225mm foul sewer in the R135 road to the east of the site. The proposed CWD drainage drains by gravity to a pumping station located to the northeast of Building B where it will be pumped to the Water Treatment Plant. Foul discharge from the Water Treatment Plant Building will discharge by gravity to the Irish Water Network. Irish Water have provided a Confirmation of Feasibility for the proposed water supply connection (Ref CDS 200004468).

4 Water Supply

4.1 General

A pre-connection enquiry (PCE) form was submitted to Irish Water on 26th July 2020 which addressed water and wastewater demand for the development. The reference number for the Pre-Connection Enquiry is CDS 200004468. Irish Water subsequently provided a Confirmation of Feasibility (CoF) on 31st March 2021 (refer to Appendix F for details) which indicated that it is feasible to provide supply to the site subject to upgrades. The upgrade works involve the replacement of approx. 1500m of new 450mm pipe main to replace the existing 6" uPVC main in the R135 and the upgrade of pumps at Ballycoolen Highlands Tower. The CoF notes that the developer is to fund a portion of the upgrade works.

4.2 Drawings

The following drawings are provided in support of the planning application to water supply:-

- Drawing No. 20_099-CSE-00-XX-DR-C-2310 Proposed Overall Water Supply Layout Plan
- Drawing No. 20_099-CSE-00-XX-DR-C-2311- Proposed Water Supply Layout Plan Sheet 1
- Drawing No. 20_099-CSE-00-XX-DR-C-2312- Proposed Water Supply Layout Plan Sheet 2
- Drawing No. 20_099-CSE-00-XX-DR-C-2910 Standard Trench Details

4.3 Existing Infrastructure

There is an existing 150mm water main located in the R1135. Irish Water are proposing updates to the network which will serve the development. As noted in Section 4.1 this watermain is to be upgraded with a new 450mm watermain.

4.4 Proposed Water Supply

It is proposed to connect a 200mm watermain to this upgraded 450mm pipe in the R135.

It is proposed to provide connections from the 200mm incoming water supply main to the admin area of the data centre buildings, the water treatment plant room, the two no sprinkler storage tanks and to the adjacent GIS Substation (being designed by others).

4.4.1 Domestic Water Demand

Domestic water supply demand for the proposed development has been estimated as follows (As per Section 3.7.2 of the Irish Water Code of Practice (IW-CDS-5020-03) .

- Population = 256
- Consumption = 45 litres per person per day
- Daily Demand = 11,520 litres per day
- Average Flow = 0.13 litres/sec
- Average Day/Peak Week Demand = 1.25 x 0.13 = 0.17 litres/sec
- Peak Demand = 5.0 x 0.17 litres/sec = 0.85 litres/sec

4.4.2 Process Water Demand

We estimate that the peak process water demand will be approximately 56l/s with the site at full load. This estimate excludes periodic flushing and washdown. The peak process water demand will only occur during the extreme warm ambient days and as an estimate based on historical weather data for Dublin, this should be approximately 24 hours per annum. However, this maybe more if re-entrainment of warm air occurs on the site, which could necessitate the requirement for additional evaporative cooling during the extreme warm ambient days. We are currently evaluating this through Computational Fluid Dynamic (CFD) simulations.

On-site storage will be provided as part of the development. Water storage (2590m^3) will be provided for the evaporative cooling hours required in the worst case summer 48 hour period. The water fill from the Irish Water main can be adjusted to fill the system over this time period.

Process water supply demand for the proposed development has been estimated in the Table below.

DUB DC	Water Requirement (m^3/year)	Cumulative (m^3/year)	Projected Timeframe
COLO 1	346	-	July 2023
COLO 2	346	691.2	October 2023
COLO 3	346	1037.2	December 2023
COLO 4	346	1383.3	February 2024
COLO 5	346	1729.2	April 2024
COLO 6	346	2075.2	July 2024
COLO 7	346	2421.2	September 2024
Building A	2,421.2		December 2024
Building B	2,421.2		January 2025
Total		**4,842.4**	

Table 4.1 – Proposed Water Demand Estimate

4.5 Fire Hydrant Main

The proposed development will be served by a 250mm fire hydrant main which is connected to two proposed sprinkler tanks (Each tank has a capacity of 670m^3) and associated pump houses. The fire hydrants will be provided at appropriate locations in accordance with the specialist fire protection contractors design and Fingal County Council requirements.

4.6 Water Supply Summary

The proposed Water Supply Network will comprise of a 200mm which will be connected to the Irish Water supply network in the R135 which is to be upgraded to 400mm . The water main will serve the proposed buildings, water treatment plant, sprinkler tanks and proposed substation. A separate fire hydrant main will be provided to serve the fire hydrants which will be feed from the sprinkler tanks. Irish Water have provided a Confirmation of Feasibility for the proposed water supply connection (Ref CDS 200004468).

5 Ditch Diversion

5.1 Catchment Study

As noted in section the proposed development site is traversed by an existing ditch which forms the Huntstown Stream. In order to facilitate the development of the site it is necessary to remove a section of the ditch and replace with a new 900mm pipe (minimum size required by OPW Guidelines for the Construction, Replacement or Alteration of Bridges and Culverts (OPW Guidelines)) which will traverse the western section of the site. The catchment area draining to the ditch is estimated using contour mapping to be 0.4 km^2 (see Fig 5.1 below catchment highlighted in green).

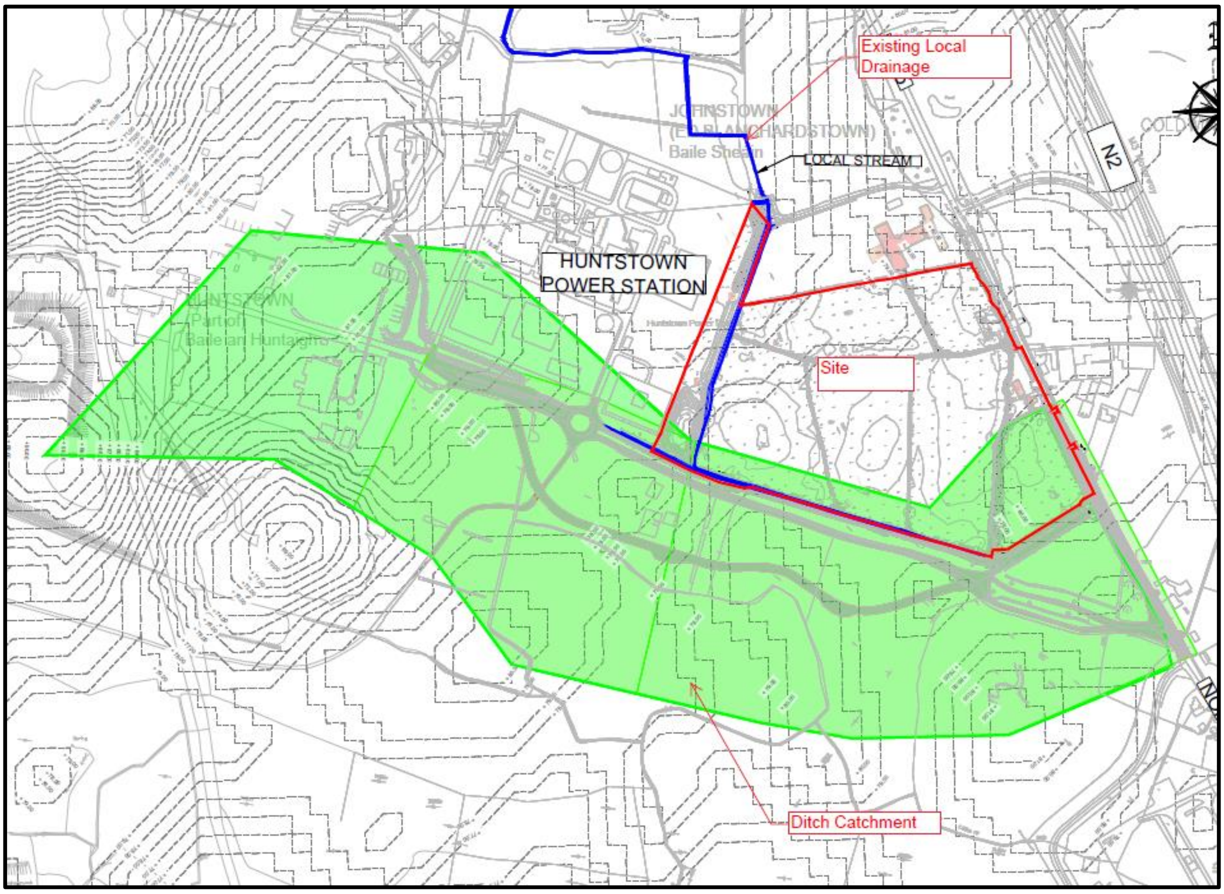

Table 5.1 – Catchment Mapping

The catchment area is determined to be 30.77 Hectares (highlighted in green) and the percentage impermeable area (highlighted grey on attached map is estimated to be 10%.

The catchment map is included in Appendix H of this report.

5.2 Ditch Diversion Design Parameters

The proposed ditch diversion is required to take account of the requirements of OPW Guidelines for the Construction, Replacement or Alteration of Bridges and Culverts (OPW Guidelines)) which are outline below:-

- Diversion pipe to be capable of passing a fluvial flood flow with a 1% annual exceedance probability (AEP) or 1 in 100 year flow without significantly chaging the hydraulic characteristics of the watercourse;
- Diversion pipe to maintain a freeboard of 300mm;
- Diversion pipe capable of operating under the above design conditions without causing a hydraulic loss of no more than 300mm;
- Diameter must not be less than 900mm;
- All calculations have allowed for an additional allowance of 10% in rainfall intensities to allow for climate change as per Table 6.1 of Volume 2 of the GDSDS.

5.3 Calculations

The proposed ditch diversion has been simulated using Civil 3D and WinDes™ software. Calculations are provided in Appendix I of this report.

5.4 Drawings

The following drawings are provided in support of the planning application for the ditch diversion.

- Drawing No. 20_099-CSE-00-XX-DR-C-2117 Ditch Diversion Layout Plan and Longitudinal Sections.

5.5 Design Summary

The proposed ditch diversion has been designed as a 900mm at gradient of 1:479. The pre-development water level upstream of the ditch diversion has been assessed at the start of the proposed diversion works at Nodes ST 1 and ST2 indicated on Drawing No. 20_099-CSE-00-XX-DR-C-2117. The water Levels are outlined in Table 5.1 overleaf:-

Node	Pre-Development Water Level (mOD)	Post-Development Water Level (mOD)	Difference (m)
ST 1	76.794	76.888	+0.094
ST 2	77.277	77.154	-0.123

Table 5.1 – Pre and Post Development Water Levels

As noted above there is an increase in water level of 0.094m or 94mm at ST 1 to the west of the diversion and a decrease 0.123m or 123mm at ST 2 to the east of the diversion. The minimum freeboard is 307mm. The above information is outlined in the Windes calculations included in Appendix I.

The proposed ditch diversion complies with the OPW Guidelines in terms of capable to pass the required return period of the 1 in 100 year event. A minimum freeboard of 307mm has been provided, in excess of the 300mm required by the OPW Guidelines and hydraulic loss across the diversion route are calculated to be below the 300mm allowed by the OPW Guidelines.

5.6 Environmental Summary

The existing onsite drainage ditches have been assessed by the project ecologist and hydrologist in respect of the applicability of the Objective WQ05 within the Fingal County Development Plan 2017-2023. Objective WQ05 requires the establishment of a riparian corridors free from new development along all significant watercourses and streams in the County. Chapter 7 (Hydrology) of the EIAR notes that these are existing manmade ditches with intermittent or ephemeral characteristics are not considered to be a significant watercourse or stream, therefore Objective WQ05 is not considered to apply to any of the local drainage ditches on the site. Furthermore, Chapter 8 (Biodiversity) of the EIAR has assessed these onsite ditches for ecological value and concluded that due to their ephemeral nature have and they have no fisheries value and are also unfavourable for amphibians.

Appendix A – Surface Water Drainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	25	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	0
Ratio R	0.300	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)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Network 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.010	4-8	1.163	8-12	1.588	12-16	0.255	16-20	0.003

Total Area Contributing (ha) = 3.019

Total Pipe Volume (m³) = 147.103

Network Design Table for Network 1

« - Indicates pipe capacity < flow

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
1.000	16.964	0.085	199.6	0.017	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	13.677	0.068	201.1	0.024	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	46.642	0.155	300.9	0.017	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	12.681	0.042	301.9	0.100	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	40.946	0.136	301.1	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.31	78.624	0.017	0.0	0.0	0.0	0.92	36.7	2.3
1.001	50.00	5.55	78.539	0.041	0.0	0.0	0.0	0.92	36.5	5.6
1.002	50.00	6.42	78.396	0.058	0.0	0.0	0.0	0.90	63.7	7.8
1.003	50.00	6.65	78.241	0.158	0.0	0.0	0.0	0.90	63.6	21.4
1.004	50.00	7.41	78.199	0.181	0.0	0.0	0.0	0.90	63.7	24.6

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Network Design Table for Network 1

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
2.000	21.396	0.107	200.0	0.030	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	40.880	0.102	400.8	0.047	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	20.017	0.050	400.3	0.101	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	33.574	0.084	399.7	0.071	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	52.436	0.131	400.3	0.222	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.000	37.955	0.190	199.8	0.147	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.009	64.358	0.161	399.7	0.240	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	40.080	0.100	400.8	0.130	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.011	24.280	0.049	495.5	0.257	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.012	29.641	0.059	502.4	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.013	65.828	0.132	498.7	0.157	0.00	0.0	0.600	o	600	Pipe/Conduit	
4.000	60.127	0.200	300.6	0.057	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.014	13.518	0.027	500.7	0.099	0.00	0.0	0.600	o	600	Pipe/Conduit	
5.000	40.474	0.135	299.8	0.115	5.00	0.0	0.600	o	300	Pipe/Conduit	
5.001	43.937	0.146	300.9	0.131	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	50.00	5.39	78.248	0.030	0.0	0.0	0.0	0.92	36.6	4.1
1.005	50.00	8.09	77.913	0.259	0.0	0.0	0.0	1.01	160.5	35.1
1.006	50.00	8.42	77.811	0.360	0.0	0.0	0.0	1.01	160.6	48.7
1.007	50.00	8.97	77.761	0.431	0.0	0.0	0.0	1.01	160.7	58.4
1.008	50.00	9.83	77.677	0.653	0.0	0.0	0.0	1.01	160.6	88.4
3.000	50.00	5.69	77.959	0.147	0.0	0.0	0.0	0.92	36.6	19.9
1.009	50.00	10.90	77.544	1.040	0.0	0.0	0.0	1.01	160.7	140.8
1.010	50.00	11.56	77.383	1.170	0.0	0.0	0.0	1.01	160.5	158.4
1.011	50.00	11.93	77.133	1.427	0.0	0.0	0.0	1.09	307.4	193.2
1.012	50.00	12.39	77.084	1.427	0.0	0.0	0.0	1.08	305.2	193.2
1.013	50.00	13.40	77.025	1.584	0.0	0.0	0.0	1.08	306.4	214.5
4.000	50.00	6.11	77.381	0.057	0.0	0.0	0.0	0.90	63.7	7.8
1.014	50.00	13.61	76.781	1.741	0.0	0.0	0.0	1.08	305.8	235.7
5.000	50.00	5.75	78.366	0.115	0.0	0.0	0.0	0.90	63.8	15.5
5.001	50.00	6.56	78.231	0.246	0.0	0.0	0.0	0.90	63.7	33.3

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Network Design Table for Network 1

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
5.002	50.000	0.167	299.4	0.145	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.003	33.783	0.113	299.0	0.169	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.000	40.474	0.135	299.8	0.115	5.00	0.0	0.600	o	300	Pipe/Conduit	
6.001	43.937	0.146	300.9	0.131	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.002	50.000	0.167	299.4	0.145	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.003	33.783	0.113	299.0	0.169	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.004	70.309	0.234	300.5	0.080	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.004	36.054	0.120	300.5	0.080	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.015	93.160	0.466	199.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.016	63.465	0.317	200.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.017	69.205	0.384	180.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.018	5.054	0.033	153.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.002	50.00	7.48	78.085	0.390	0.0	0.0	0.0	0.90	63.9	52.8
5.003	50.00	8.02	77.843	0.559	0.0	0.0	0.0	1.04	115.2	75.7
6.000	50.00	5.75	78.268	0.115	0.0	0.0	0.0	0.90	63.8	15.5
6.001	50.00	6.56	78.133	0.245	0.0	0.0	0.0	0.90	63.7	33.2
6.002	50.00	7.48	77.987	0.390	0.0	0.0	0.0	0.90	63.9	52.9
6.003	50.00	8.02	77.745	0.559	0.0	0.0	0.0	1.04	115.2	75.7
6.004	50.00	9.15	77.632	0.639	0.0	0.0	0.0	1.04	114.9	86.5
5.004	50.00	9.73	77.398	1.278	0.0	0.0	0.0	1.04	114.9«	173.0
1.015	50.00	15.01	76.750	3.019	0.0	0.0	0.0	1.11	78.3«	408.8
1.016	50.00	15.96	76.284	3.019	0.0	0.0	0.0	1.11	78.3«	408.8
1.017	50.00	16.95	75.967	3.019	0.0	0.0	0.0	1.17	82.6«	408.8
1.018	50.00	17.02	75.583	3.019	0.0	0.0	0.0	1.27	89.6«	408.8

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Manhole Schedules for Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S 1.0	80.043	1.419	Open Manhole	1200	1.000	78.624	225				
S 1.1	79.974	1.435	Open Manhole	1200	1.001	78.539	225	1.000	78.539	225	
S 1.2	79.910	1.514	Open Manhole	1350	1.002	78.396	300	1.001	78.471	225	
S 1.3	79.712	1.471	Open Manhole	1350	1.003	78.241	300	1.002	78.241	300	
S 1.4	79.672	1.473	Open Manhole	1350	1.004	78.199	300	1.003	78.199	300	
S 2.0	79.663	1.415	Open Manhole	1200	2.000	78.248	225				
S 1.5	79.433	1.520	Open Manhole	1200	1.005	77.913	450	1.004	78.063	300	
								2.000	78.141	225	3
S 1.6	79.108	1.297	Open Manhole	1500	1.006	77.811	450	1.005	77.811	450	
S 1.7	79.068	1.307	Open Manhole	1500	1.007	77.761	450	1.006	77.761	450	
S 1.8	79.138	1.461	Open Manhole	1500	1.008	77.677	450	1.007	77.677	450	
S 3.0	79.452	1.493	Open Manhole	1200	3.000	77.959	225				
S 1.9	79.128	1.584	Open Manhole	1350	1.009	77.544	450	1.008	77.546	450	2
								3.000	77.769	225	
S 1.10	79.207	1.824	Open Manhole	1650	1.010	77.383	450	1.009	77.383	450	
S 1.11	79.207	2.074	Open Manhole	1650	1.011	77.133	600	1.010	77.283	450	
S 1.12	79.330	2.246	Open Manhole	1500	1.012	77.084	600	1.011	77.084	600	
S 1.13	79.330	2.305	Open Manhole	1650	1.013	77.025	600	1.012	77.025	600	
S 4.0	79.000	1.619	Open Manhole	1200	4.000	77.381	300				
S 1.14	79.818	3.037	Open Manhole	1950	1.014	76.781	600	1.013	76.893	600	112
								4.000	77.181	300	100
S 5.0	79.867	1.501	Open Manhole	1200	5.000	78.366	300				
S 5.1	79.857	1.626	Open Manhole	1200	5.001	78.231	300	5.000	78.231	300	
S 5.2	79.845	1.760	Open Manhole	1350	5.002	78.085	300	5.001	78.085	300	
S 5.3	79.831	1.988	Open Manhole	1350	5.003	77.843	375	5.002	77.918	300	
S 6.0	79.823	1.555	Open Manhole	1200	6.000	78.268	300				
S 6.1	79.824	1.691	Open Manhole	1200	6.001	78.133	300	6.000	78.133	300	
S 6.2	79.824	1.837	Open Manhole	1350	6.002	77.987	300	6.001	77.987	300	
S 6.3	79.823	2.078	Open Manhole	1350	6.003	77.745	375	6.002	77.820	300	
S 6.4	79.569	1.937	Open Manhole	1350	6.004	77.632	375	6.003	77.632	375	
S 5.4	79.573	2.175	Open Manhole	1500	5.004	77.398	375	5.003	77.730	375	332
								6.004	77.398	375	
S 1.15	79.000	2.250	Open Manhole	2100	1.015	76.750	300	1.014	76.754	600	304
								5.004	77.278	375	603
S 1.16	78.963	2.679	Open Manhole	2100	1.016	76.284	300	1.015	76.284	300	
S 1.17	77.991	2.024	Open Manhole	2100	1.017	75.967	300	1.016	75.967	300	
S 1.18	77.551	1.968	Open Manhole	2250	1.018	75.583	300	1.017	75.583	300	
MH80	77.451	1.901	Open Manhole	1500		OUTFALL		1.018	75.550	300	

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Manhole Schedules for Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S 1.0	711876.988	741371.323	711876.988	741371.323	Required	
S 1.1	711862.418	741362.634	711862.531	741362.548	Required	
S 1.2	711858.853	741349.430	711858.957	741349.439	Required	
S 1.3	711879.102	741307.413	711878.998	741307.401	Required	
S 1.4	711876.368	741295.030	711876.286	741295.095	Required	
S 2.0	711849.858	741258.554	711849.858	741258.554	Required	
S 1.5	711839.478	741277.263	711839.478	741277.263	Required	
S 1.6	711802.647	741259.524	711802.628	741259.628	Required	
S 1.7	711782.708	741261.287	711782.785	741261.358	Required	
S 1.8	711782.708	741294.861	711782.813	741294.861	Required	
S 3.0	711820.658	741347.297	711820.658	741347.297	Required	
S 1.9	711782.702	741347.297	711782.702	741347.297	Required	
S 1.10	711782.700	741411.655	711782.670	741411.655	Required	
S 1.11	711782.701	741451.735	711782.596	741451.735	Required	
S 1.12	711782.702	741476.015	711782.522	741476.016	Required	

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Manhole Schedules for Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S 1.13	711782.702	741505.657	711782.628	741505.583	Required	
S 4.0	711656.747	741505.657	711656.747	741505.657	Required	
S 1.14	711716.874	741505.657	711716.874	741505.657	Required	
S 5.0	711682.023	741339.449	711682.023	741339.449	Required	
S 5.1	711682.023	741379.923	711682.203	741379.923	Required	
S 5.2	711682.023	741423.860	711682.128	741423.860	Required	
S 5.3	711682.023	741473.860	711682.166	741473.860	Required	
S 6.0	711752.332	741339.449	711752.332	741339.449	Required	
S 6.1	711752.332	741379.923	711752.512	741379.923	Required	
S 6.2	711752.332	741423.860	711752.437	741423.860	Required	
S 6.3	711752.332	741473.860	711752.474	741473.860	Required	
S 6.4	711752.332	741507.644	711752.231	741507.543	Required	
S 5.4	711682.023	741507.644	711682.023	741507.644	Required	
S 1.15	711716.189	741519.157	711716.189	741519.157	Required	
S 1.16	711623.037	741520.297	711623.037	741520.297	Required	

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Manhole Schedules for Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S 1.17	711559.632	741517.531	711559.632	741517.531	Required	
S 1.18	711490.437	741516.384	711490.437	741516.384	Required	
MH80	711487.406	741520.429			No Entry	

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PIPELINE SCHEDULES for Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	S 1.0	80.043	78.624	1.194	Open Manhole	1200
1.001	o	225	S 1.1	79.974	78.539	1.210	Open Manhole	1200
1.002	o	300	S 1.2	79.910	78.396	1.214	Open Manhole	1350
1.003	o	300	S 1.3	79.712	78.241	1.171	Open Manhole	1350
1.004	o	300	S 1.4	79.672	78.199	1.173	Open Manhole	1350
2.000	o	225	S 2.0	79.663	78.248	1.190	Open Manhole	1200
1.005	o	450	S 1.5	79.433	77.913	1.070	Open Manhole	1200
1.006	o	450	S 1.6	79.108	77.811	0.847	Open Manhole	1500
1.007	o	450	S 1.7	79.068	77.761	0.857	Open Manhole	1500
1.008	o	450	S 1.8	79.138	77.677	1.011	Open Manhole	1500
3.000	o	225	S 3.0	79.452	77.959	1.268	Open Manhole	1200
1.009	o	450	S 1.9	79.128	77.544	1.134	Open Manhole	1350
1.010	o	450	S 1.10	79.207	77.383	1.374	Open Manhole	1650
1.011	o	600	S 1.11	79.207	77.133	1.474	Open Manhole	1650
1.012	o	600	S 1.12	79.330	77.084	1.646	Open Manhole	1500
1.013	o	600	S 1.13	79.330	77.025	1.705	Open Manhole	1650

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	16.964	199.6	S 1.1	79.974	78.539	1.210	Open Manhole	1200
1.001	13.677	201.1	S 1.2	79.910	78.471	1.214	Open Manhole	1350
1.002	46.642	300.9	S 1.3	79.712	78.241	1.171	Open Manhole	1350
1.003	12.681	301.9	S 1.4	79.672	78.199	1.173	Open Manhole	1350
1.004	40.946	301.1	S 1.5	79.433	78.063	1.070	Open Manhole	1200
2.000	21.396	200.0	S 1.5	79.433	78.141	1.067	Open Manhole	1200
1.005	40.880	400.8	S 1.6	79.108	77.811	0.847	Open Manhole	1500
1.006	20.017	400.3	S 1.7	79.068	77.761	0.857	Open Manhole	1500
1.007	33.574	399.7	S 1.8	79.138	77.677	1.011	Open Manhole	1500
1.008	52.436	400.3	S 1.9	79.128	77.546	1.132	Open Manhole	1350
3.000	37.955	199.8	S 1.9	79.128	77.769	1.134	Open Manhole	1350
1.009	64.358	399.7	S 1.10	79.207	77.383	1.374	Open Manhole	1650
1.010	40.080	400.8	S 1.11	79.207	77.283	1.474	Open Manhole	1650
1.011	24.280	495.5	S 1.12	79.330	77.084	1.646	Open Manhole	1500
1.012	29.641	502.4	S 1.13	79.330	77.025	1.705	Open Manhole	1650
1.013	65.828	498.7	S 1.14	79.818	76.893	2.325	Open Manhole	1950

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PIPELINE SCHEDULES for Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.000	o	300	S 4.0	79.000	77.381	1.319	Open Manhole	1200
1.014	o	600	S 1.14	79.818	76.781	2.437	Open Manhole	1950
5.000	o	300	S 5.0	79.867	78.366	1.201	Open Manhole	1200
5.001	o	300	S 5.1	79.857	78.231	1.326	Open Manhole	1200
5.002	o	300	S 5.2	79.845	78.085	1.460	Open Manhole	1350
5.003	o	375	S 5.3	79.831	77.843	1.613	Open Manhole	1350
6.000	o	300	S 6.0	79.823	78.268	1.255	Open Manhole	1200
6.001	o	300	S 6.1	79.824	78.133	1.391	Open Manhole	1200
6.002	o	300	S 6.2	79.824	77.987	1.537	Open Manhole	1350
6.003	o	375	S 6.3	79.823	77.745	1.703	Open Manhole	1350
6.004	o	375	S 6.4	79.569	77.632	1.562	Open Manhole	1350
5.004	o	375	S 5.4	79.573	77.398	1.800	Open Manhole	1500
1.015	o	300	S 1.15	79.000	76.750	1.950	Open Manhole	2100
1.016	o	300	S 1.16	78.963	76.284	2.379	Open Manhole	2100
1.017	o	300	S 1.17	77.991	75.967	1.724	Open Manhole	2100
1.018	o	300	S 1.18	77.551	75.583	1.668	Open Manhole	2250

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.000	60.127	300.6	S 1.14	79.818	77.181	2.337	Open Manhole	1950
1.014	13.518	500.7	S 1.15	79.000	76.754	1.646	Open Manhole	2100
5.000	40.474	299.8	S 5.1	79.857	78.231	1.326	Open Manhole	1200
5.001	43.937	300.9	S 5.2	79.845	78.085	1.460	Open Manhole	1350
5.002	50.000	299.4	S 5.3	79.831	77.918	1.613	Open Manhole	1350
5.003	33.783	299.0	S 5.4	79.573	77.730	1.468	Open Manhole	1500
6.000	40.474	299.8	S 6.1	79.824	78.133	1.391	Open Manhole	1200
6.001	43.937	300.9	S 6.2	79.824	77.987	1.537	Open Manhole	1350
6.002	50.000	299.4	S 6.3	79.823	77.820	1.703	Open Manhole	1350
6.003	33.783	299.0	S 6.4	79.569	77.632	1.562	Open Manhole	1350
6.004	70.309	300.5	S 5.4	79.573	77.398	1.800	Open Manhole	1500
5.004	36.054	300.5	S 1.15	79.000	77.278	1.347	Open Manhole	2100
1.015	93.160	199.9	S 1.16	78.963	76.284	2.379	Open Manhole	2100
1.016	63.465	200.2	S 1.17	77.991	75.967	1.724	Open Manhole	2100
1.017	69.205	180.2	S 1.18	77.551	75.583	1.668	Open Manhole	2250
1.018	5.054	153.2	MH80	77.451	75.550	1.601	Open Manhole	1500

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Area Summary for Network 1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Roads	100	0.017	0.017	0.017
1.001	Classification	Roads	100	0.013	0.013	0.013
	Classification	Grass	30	0.039	0.012	0.024
1.002	Classification	Roads	100	0.017	0.017	0.017
1.003	Classification	Roads	100	0.100	0.100	0.100
1.004	Classification	Roads	100	0.024	0.024	0.024
2.000	Classification	Roads	100	0.030	0.030	0.030
1.005	Classification	Roads	100	0.047	0.047	0.047
1.006	Classification	Roads	100	0.101	0.101	0.101
1.007	Classification	Roads	100	0.025	0.025	0.025
	Classification	Roof	100	0.041	0.041	0.066
	Classification	Grass	30	0.017	0.005	0.071
1.008	Classification	Roads	100	0.111	0.111	0.111
	Classification	Grass	30	0.020	0.006	0.117
	Classification	Roads	100	0.105	0.105	0.222
3.000	Classification	Roads	100	0.034	0.034	0.034
	Classification	Roads	100	0.105	0.105	0.138
	Classification	Grass	30	0.028	0.008	0.147
1.009	Classification	Roads	100	0.233	0.233	0.233
	Classification	Grass	30	0.024	0.007	0.240
1.010	Classification	Roads	100	0.120	0.120	0.120
	Classification	Grass	30	0.035	0.011	0.130
1.011	Classification	Roads	100	0.242	0.242	0.242
	Classification	Grass	30	0.050	0.015	0.257
1.012	-	-	100	0.000	0.000	0.000
1.013	Classification	Roads	100	0.125	0.125	0.125
	Classification	Grass	30	0.037	0.011	0.136
	Classification	Grass	30	0.070	0.021	0.157
4.000	Classification	Roads	100	0.057	0.057	0.057
1.014	Classification	Roads	100	0.099	0.099	0.099
5.000	Classification	Roof	100	0.115	0.115	0.115
5.001	Classification	Roof	100	0.131	0.131	0.131
5.002	Classification	Roof	100	0.145	0.145	0.145
5.003	Classification	Roof	100	0.169	0.169	0.169
6.000	Classification	Roof	100	0.115	0.115	0.115
6.001	Classification	Roof	100	0.131	0.131	0.131
6.002	Classification	Roof	100	0.145	0.145	0.145
6.003	Classification	Roof	100	0.169	0.169	0.169
6.004	Classification	Roof	100	0.080	0.080	0.080
5.004	Classification	Roof	100	0.080	0.080	0.080
1.015	-	-	100	0.000	0.000	0.000
1.016	-	-	100	0.000	0.000	0.000
1.017	-	-	100	0.000	0.000	0.000
1.018	-	-	100	0.000	0.000	0.000
				Total 3.243	Total 3.019	Total 3.019

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Network Classifications for Network 1

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	S 1.0	225	1.194	1.210	Unclassified	1200	0	1.194	Unclassified
1.001	S 1.1	225	1.210	1.214	Unclassified	1200	0	1.210	Unclassified
1.002	S 1.2	300	1.171	1.214	Unclassified	1350	0	1.214	Unclassified
1.003	S 1.3	300	1.171	1.173	Unclassified	1350	0	1.171	Unclassified
1.004	S 1.4	300	1.070	1.173	Unclassified	1350	0	1.173	Unclassified
2.000	S 2.0	225	1.067	1.190	Unclassified	1200	0	1.190	Unclassified
1.005	S 1.5	450	0.847	1.070	Unclassified	1200	0	1.070	Unclassified
1.006	S 1.6	450	0.847	0.857	Unclassified	1500	0	0.847	Unclassified
1.007	S 1.7	450	0.857	1.011	Unclassified	1500	0	0.857	Unclassified
1.008	S 1.8	450	1.011	1.132	Unclassified	1500	0	1.011	Unclassified
3.000	S 3.0	225	1.134	1.268	Unclassified	1200	0	1.268	Unclassified
1.009	S 1.9	450	1.134	1.374	Unclassified	1350	0	1.134	Unclassified
1.010	S 1.10	450	1.374	1.474	Unclassified	1650	0	1.374	Unclassified
1.011	S 1.11	600	1.474	1.646	Unclassified	1650	0	1.474	Unclassified
1.012	S 1.12	600	1.646	1.705	Unclassified	1500	0	1.646	Unclassified
1.013	S 1.13	600	1.705	2.325	Unclassified	1650	0	1.705	Unclassified
4.000	S 4.0	300	1.319	2.337	Unclassified	1200	0	1.319	Unclassified
1.014	S 1.14	600	1.646	2.437	Unclassified	1950	0	2.437	Unclassified
5.000	S 5.0	300	1.201	1.326	Unclassified	1200	0	1.201	Unclassified
5.001	S 5.1	300	1.326	1.460	Unclassified	1200	0	1.326	Unclassified
5.002	S 5.2	300	1.460	1.613	Unclassified	1350	0	1.460	Unclassified
5.003	S 5.3	375	1.468	1.613	Unclassified	1350	0	1.613	Unclassified
6.000	S 6.0	300	1.255	1.391	Unclassified	1200	0	1.255	Unclassified
6.001	S 6.1	300	1.391	1.537	Unclassified	1200	0	1.391	Unclassified
6.002	S 6.2	300	1.537	1.703	Unclassified	1350	0	1.537	Unclassified
6.003	S 6.3	375	1.562	1.703	Unclassified	1350	0	1.703	Unclassified
6.004	S 6.4	375	1.562	1.800	Unclassified	1350	0	1.562	Unclassified
5.004	S 5.4	375	1.347	1.800	Unclassified	1500	0	1.800	Unclassified
1.015	S 1.15	300	1.950	2.379	Unclassified	2100	0	1.950	Unclassified
1.016	S 1.16	300	1.724	2.379	Unclassified	2100	0	2.379	Unclassified
1.017	S 1.17	300	1.668	1.724	Unclassified	2100	0	1.724	Unclassified
1.018	S 1.18	300	1.601	1.668	Unclassified	2250	0	1.668	Unclassified

Free Flowing Outfall Details for Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.018	MH80	77.451	75.550	0.000	1500	0

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Simulation Criteria for Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	25	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.300		

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Online Controls for Network 1

Hydro-Brake® Optimum Manhole: S 1.15, DS/PN: 1.015, Volume (m^3): 14.8

Unit Reference	MD-SHE-0144-1200-1950-1200
Design Head (m)	1.950
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	144
Invert Level (m)	76.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.950	12.0
Flush-Flo™	0.566	12.0
Kick-Flo®	1.177	9.5
Mean Flow over Head Range	-	10.5

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

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	5.2	1.200	9.5	3.000	14.7	7.000	22.1
0.200	10.1	1.400	10.3	3.500	15.8	7.500	22.8
0.300	11.2	1.600	10.9	4.000	16.9	8.000	23.5
0.400	11.7	1.800	11.6	4.500	17.9	8.500	24.2
0.500	11.9	2.000	12.1	5.000	18.8	9.000	24.9
0.600	12.0	2.200	12.7	5.500	19.7	9.500	25.6
0.800	11.7	2.400	13.2	6.000	20.5		
1.000	11.0	2.600	13.7	6.500	21.3		

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Storage Structures for Network 1

Tank or Pond Manhole: S 1.15, DS/PN: 1.015

Invert Level (m) 76.750

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	329.0	2.250	1292.0

Manhole Headloss for Network 1

PN	US/MH Name	US/MH Headloss
1.000	S 1.0	0.500
1.001	S 1.1	0.500
1.002	S 1.2	0.500
1.003	S 1.3	0.500
1.004	S 1.4	0.500
2.000	S 2.0	0.500
1.005	S 1.5	0.500
1.006	S 1.6	0.500
1.007	S 1.7	0.500
1.008	S 1.8	0.500
3.000	S 3.0	0.500
1.009	S 1.9	0.500
1.010	S 1.10	0.500
1.011	S 1.11	0.500
1.012	S 1.12	0.500
1.013	S 1.13	0.500
4.000	S 4.0	0.500
1.014	S 1.14	0.500
5.000	S 5.0	0.500
5.001	S 5.1	0.500
5.002	S 5.2	0.500
5.003	S 5.3	0.500
6.000	S 6.0	0.500
6.001	S 6.1	0.500
6.002	S 6.2	0.500
6.003	S 6.3	0.500
6.004	S 6.4	0.500
5.004	S 5.4	0.500
1.015	S 1.15	0.500
1.016	S 1.16	0.500
1.017	S 1.17	0.500
1.018	S 1.18	0.500

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.300
Region Scotland and Ireland Cv (Summer) 0.750
M5-60 (mm) 16.500 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S 1.0	15 Winter	1	+10%					78.662
1.001	S 1.1	15 Winter	1	+10%					78.597
1.002	S 1.2	15 Winter	1	+10%	100/15 Winter				78.462
1.003	S 1.3	15 Winter	1	+10%	100/15 Summer				78.357
1.004	S 1.4	15 Winter	1	+10%	100/15 Summer				78.314
2.000	S 2.0	15 Winter	1	+10%	100/15 Summer				78.299
1.005	S 1.5	15 Winter	1	+10%	100/15 Summer				78.054
1.006	S 1.6	15 Winter	1	+10%	30/15 Winter				77.986
1.007	S 1.7	15 Winter	1	+10%	30/15 Winter				77.943
1.008	S 1.8	15 Winter	1	+10%	30/15 Summer				77.880
3.000	S 3.0	15 Winter	1	+10%	30/15 Summer				78.077
1.009	S 1.9	15 Winter	1	+10%	30/15 Summer				77.792
1.010	S 1.10	15 Winter	1	+10%	30/15 Summer				77.648
1.011	S 1.11	480 Winter	1	+10%	30/60 Summer				77.571
1.012	S 1.12	480 Winter	1	+10%	30/30 Winter				77.570
1.013	S 1.13	480 Winter	1	+10%	30/30 Winter				77.569
4.000	S 4.0	480 Winter	1	+10%	30/60 Summer				77.567
1.014	S 1.14	480 Winter	1	+10%	1/120 Summer				77.567
5.000	S 5.0	15 Winter	1	+10%	30/15 Summer				78.467
5.001	S 5.1	15 Winter	1	+10%	30/15 Summer				78.375
5.002	S 5.2	15 Winter	1	+10%	30/15 Summer				78.266

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S 1.0	-0.187	0.000	0.06			2.1	OK	
1.001	S 1.1	-0.167	0.000	0.15			4.7	OK	
1.002	S 1.2	-0.234	0.000	0.11			6.3	OK	
1.003	S 1.3	-0.184	0.000	0.31			16.2	OK	
1.004	S 1.4	-0.185	0.000	0.31			18.5	OK	
2.000	S 2.0	-0.174	0.000	0.11			3.8	OK	
1.005	S 1.5	-0.309	0.000	0.18			25.6	OK	
1.006	S 1.6	-0.275	0.000	0.26			33.6	OK	
1.007	S 1.7	-0.268	0.000	0.28			39.1	OK	
1.008	S 1.8	-0.247	0.000	0.38			55.3	OK	
3.000	S 3.0	-0.107	0.000	0.54			18.7	OK	
1.009	S 1.9	-0.202	0.000	0.57			84.8	OK	
1.010	S 1.10	-0.185	0.000	0.64			91.4	OK	
1.011	S 1.11	-0.162	0.000	0.11			27.3	OK	
1.012	S 1.12	-0.114	0.000	0.11			26.5	OK	
1.013	S 1.13	-0.056	0.000	0.10			28.3	OK	
4.000	S 4.0	-0.114	0.000	0.02			1.1	OK	
1.014	S 1.14	0.186	0.000	0.17			27.6	SURCHARGED	
5.000	S 5.0	-0.199	0.000	0.24			14.2	OK	
5.001	S 5.1	-0.156	0.000	0.45			26.9	OK	
5.002	S 5.2	-0.119	0.000	0.65			39.4	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.003	S 5.3	15 Winter	1	+10%	30/15 Summer				78.037
6.000	S 6.0	15 Winter	1	+10%	30/15 Summer				78.369
6.001	S 6.1	15 Winter	1	+10%	30/15 Summer				78.277
6.002	S 6.2	15 Winter	1	+10%	30/15 Summer				78.168
6.003	S 6.3	15 Winter	1	+10%	30/15 Summer				77.939
6.004	S 6.4	15 Winter	1	+10%	30/15 Summer				77.840
5.004	S 5.4	15 Winter	1	+10%	30/15 Summer				77.773
1.015	S 1.15	480 Winter	1	+10%	1/15 Summer				77.566
1.016	S 1.16	480 Winter	1	+10%					76.364
1.017	S 1.17	480 Winter	1	+10%					76.044
1.018	S 1.18	360 Summer	1	+10%					75.674

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.003	S 5.3	-0.181	0.000	0.52			54.0	OK	
6.000	S 6.0	-0.199	0.000	0.24			14.2	OK	
6.001	S 6.1	-0.156	0.000	0.45			26.9	OK	
6.002	S 6.2	-0.119	0.000	0.66			39.5	OK	
6.003	S 6.3	-0.181	0.000	0.52			53.7	OK	
6.004	S 6.4	-0.167	0.000	0.53			57.6	OK	
5.004	S 5.4	0.000	0.000	1.02			105.0	OK	
1.015	S 1.15	0.516	0.000	0.16			11.9	SURCHARGED	
1.016	S 1.16	-0.220	0.000	0.16			11.9	OK	
1.017	S 1.17	-0.223	0.000	0.15			11.9	OK	
1.018	S 1.18	-0.209	0.000	0.20			11.9	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.300
Region Scotland and Ireland Cv (Summer) 0.750
M5-60 (mm) 16.500 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S 1.0	15 Winter	30	+10%					78.681
1.001	S 1.1	15 Winter	30	+10%					78.635
1.002	S 1.2	15 Winter	30	+10%	100/15 Winter				78.511
1.003	S 1.3	15 Winter	30	+10%	100/15 Summer				78.453
1.004	S 1.4	15 Winter	30	+10%	100/15 Summer				78.408
2.000	S 2.0	15 Winter	30	+10%	100/15 Summer				78.325
1.005	S 1.5	960 Winter	30	+10%	100/15 Summer				78.311
1.006	S 1.6	960 Winter	30	+10%	30/15 Winter				78.312
1.007	S 1.7	960 Winter	30	+10%	30/15 Winter				78.311
1.008	S 1.8	960 Winter	30	+10%	30/15 Summer				78.310
3.000	S 3.0	15 Winter	30	+10%	30/15 Summer				78.317
1.009	S 1.9	960 Winter	30	+10%	30/15 Summer				78.309
1.010	S 1.10	960 Winter	30	+10%	30/15 Summer				78.307
1.011	S 1.11	960 Winter	30	+10%	30/60 Summer				78.305
1.012	S 1.12	960 Winter	30	+10%	30/30 Winter				78.304
1.013	S 1.13	960 Winter	30	+10%	30/30 Winter				78.303
4.000	S 4.0	960 Winter	30	+10%	30/60 Summer				78.301
1.014	S 1.14	960 Winter	30	+10%	1/120 Summer				78.301
5.000	S 5.0	15 Winter	30	+10%	30/15 Summer				78.766
5.001	S 5.1	15 Winter	30	+10%	30/15 Summer				78.728
5.002	S 5.2	15 Winter	30	+10%	30/15 Summer				78.593

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S 1.0	-0.168	0.000	0.14			4.7	OK	
1.001	S 1.1	-0.129	0.000	0.37			11.8	OK	
1.002	S 1.2	-0.185	0.000	0.27			16.0	OK	
1.003	S 1.3	-0.088	0.000	0.83			43.0	OK	
1.004	S 1.4	-0.091	0.000	0.80			47.5	OK	
2.000	S 2.0	-0.148	0.000	0.25			8.3	OK	
1.005	S 1.5	-0.052	0.000	0.04			6.1	OK	
1.006	S 1.6	0.051	0.000	0.06			8.4	SURCHARGED	
1.007	S 1.7	0.100	0.000	0.07			10.0	SURCHARGED	
1.008	S 1.8	0.183	0.000	0.10			14.9	SURCHARGED	
3.000	S 3.0	0.133	0.000	1.07			37.2	SURCHARGED	
1.009	S 1.9	0.315	0.000	0.15			22.7	SURCHARGED	
1.010	S 1.10	0.474	0.000	0.17			23.6	SURCHARGED	
1.011	S 1.11	0.572	0.000	0.12			28.4	SURCHARGED	
1.012	S 1.12	0.620	0.000	0.11			27.8	SURCHARGED	
1.013	S 1.13	0.678	0.000	0.11			31.2	SURCHARGED	
4.000	S 4.0	0.620	0.000	0.02			1.2	SURCHARGED	
1.014	S 1.14	0.920	0.000	0.21			34.5	SURCHARGED	
5.000	S 5.0	0.100	0.000	0.47			27.8	SURCHARGED	
5.001	S 5.1	0.197	0.000	0.92			55.0	SURCHARGED	
5.002	S 5.2	0.208	0.000	1.37			82.6	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.003	S 5.3	960 Winter	30	+10%	30/15 Summer				78.305
6.000	S 6.0	15 Winter	30	+10%	30/15 Summer				78.877
6.001	S 6.1	15 Winter	30	+10%	30/15 Summer				78.845
6.002	S 6.2	15 Winter	30	+10%	30/15 Summer				78.764
6.003	S 6.3	15 Winter	30	+10%	30/15 Summer				78.540
6.004	S 6.4	15 Winter	30	+10%	30/15 Summer				78.433
5.004	S 5.4	960 Winter	30	+10%	30/15 Summer				78.304
1.015	S 1.15	960 Winter	30	+10%	1/15 Summer				78.300
1.016	S 1.16	960 Winter	30	+10%					76.364
1.017	S 1.17	960 Winter	30	+10%					76.044
1.018	S 1.18	1440 Summer	30	+10%					75.674

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.003	S 5.3	0.087	0.000	0.13			13.2	SURCHARGED	
6.000	S 6.0	0.309	0.000	0.44			26.0	SURCHARGED	
6.001	S 6.1	0.412	0.000	0.78			46.3	SURCHARGED	
6.002	S 6.2	0.477	0.000	1.19			71.8	SURCHARGED	
6.003	S 6.3	0.420	0.000	0.97			100.2	SURCHARGED	
6.004	S 6.4	0.426	0.000	0.99			107.0	SURCHARGED	
5.004	S 5.4	0.531	0.000	0.27			27.7	SURCHARGED	
1.015	S 1.15	1.250	0.000	0.16			11.9	SURCHARGED	
1.016	S 1.16	-0.220	0.000	0.16			11.9	OK	
1.017	S 1.17	-0.223	0.000	0.15			11.9	OK	
1.018	S 1.18	-0.209	0.000	0.20			11.9	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.300
Region Scotland and Ireland Cv (Summer) 0.750
M5-60 (mm) 16.500 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S 1.0	15 Winter	100	+10%					78.754
1.001	S 1.1	15 Winter	100	+10%					78.746
1.002	S 1.2	15 Winter	100	+10%	100/15 Winter				78.733
1.003	S 1.3	15 Winter	100	+10%	100/15 Summer				78.718
1.004	S 1.4	15 Winter	100	+10%	100/15 Summer				78.693
2.000	S 2.0	15 Winter	100	+10%	100/15 Summer				78.656
1.005	S 1.5	15 Winter	100	+10%	100/15 Summer				78.642
1.006	S 1.6	960 Winter	100	+10%	30/15 Winter				78.638
1.007	S 1.7	960 Winter	100	+10%	30/15 Winter				78.638
1.008	S 1.8	960 Winter	100	+10%	30/15 Summer				78.637
3.000	S 3.0	15 Winter	100	+10%	30/15 Summer				78.721
1.009	S 1.9	960 Winter	100	+10%	30/15 Summer				78.635
1.010	S 1.10	960 Winter	100	+10%	30/15 Summer				78.632
1.011	S 1.11	960 Winter	100	+10%	30/60 Summer				78.630
1.012	S 1.12	960 Winter	100	+10%	30/30 Winter				78.629
1.013	S 1.13	960 Winter	100	+10%	30/30 Winter				78.628
4.000	S 4.0	960 Winter	100	+10%	30/60 Summer				78.626
1.014	S 1.14	960 Winter	100	+10%	1/120 Summer				78.626
5.000	S 5.0	15 Winter	100	+10%	30/15 Summer				79.352
5.001	S 5.1	15 Winter	100	+10%	30/15 Summer				79.308
5.002	S 5.2	15 Winter	100	+10%	30/15 Summer				79.151

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S 1.0	-0.095	0.000	0.19			6.1	OK	
1.001	S 1.1	-0.018	0.000	0.48			15.2	OK	
1.002	S 1.2	0.037	0.000	0.32			18.8	SURCHARGED	
1.003	S 1.3	0.177	0.000	0.93			48.3	SURCHARGED	
1.004	S 1.4	0.194	0.000	0.85			50.7	SURCHARGED	
2.000	S 2.0	0.183	0.000	0.29			9.6	SURCHARGED	
1.005	S 1.5	0.279	0.000	0.50			72.0	SURCHARGED	
1.006	S 1.6	0.377	0.000	0.08			9.8	SURCHARGED	
1.007	S 1.7	0.427	0.000	0.08			11.5	SURCHARGED	
1.008	S 1.8	0.510	0.000	0.11			16.8	SURCHARGED	
3.000	S 3.0	0.537	0.000	1.25			43.4	SURCHARGED	
1.009	S 1.9	0.641	0.000	0.17			25.2	SURCHARGED	
1.010	S 1.10	0.799	0.000	0.20			28.0	SURCHARGED	
1.011	S 1.11	0.897	0.000	0.15			35.0	SURCHARGED	
1.012	S 1.12	0.945	0.000	0.14			34.8	SURCHARGED	
1.013	S 1.13	1.003	0.000	0.14			39.0	SURCHARGED	
4.000	S 4.0	0.945	0.000	0.02			1.5	SURCHARGED	
1.014	S 1.14	1.245	0.000	0.27			43.0	SURCHARGED	
5.000	S 5.0	0.686	0.000	0.53			31.7	SURCHARGED	
5.001	S 5.1	0.777	0.000	1.04			62.0	SURCHARGED	
5.002	S 5.2	0.766	0.000	1.59			95.7	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.003	S 5.3	15 Winter	100	+10%	30/15 Summer				78.736
6.000	S 6.0	15 Winter	100	+10%	30/15 Summer				79.603
6.001	S 6.1	15 Winter	100	+10%	30/15 Summer				79.562
6.002	S 6.2	15 Winter	100	+10%	30/15 Summer				79.431
6.003	S 6.3	15 Winter	100	+10%	30/15 Summer				79.091
6.004	S 6.4	15 Winter	100	+10%	30/15 Summer				78.931
5.004	S 5.4	960 Winter	100	+10%	30/15 Summer				78.628
1.015	S 1.15	960 Winter	100	+10%	1/15 Summer				78.625
1.016	S 1.16	960 Summer	100	+10%					76.364
1.017	S 1.17	960 Winter	100	+10%					76.044
1.018	S 1.18	960 Winter	100	+10%					75.674

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.003	S 5.3	0.518	0.000	1.32			135.7	SURCHARGED	
6.000	S 6.0	1.035	0.000	0.49			29.2	FLOOD RISK	
6.001	S 6.1	1.129	0.000	0.93			55.3	FLOOD RISK	
6.002	S 6.2	1.144	0.000	1.41			84.9	SURCHARGED	
6.003	S 6.3	0.971	0.000	1.18			122.1	SURCHARGED	
6.004	S 6.4	0.924	0.000	1.24			134.1	SURCHARGED	
5.004	S 5.4	0.855	0.000	0.32			33.3	SURCHARGED	
1.015	S 1.15	1.575	0.000	0.16			11.9	SURCHARGED	
1.016	S 1.16	-0.220	0.000	0.16			11.9	OK	
1.017	S 1.17	-0.223	0.000	0.15			11.9	OK	
1.018	S 1.18	-0.209	0.000	0.20			11.9	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network 2

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	25	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	0
Ratio R	0.300	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)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Network 2

Time (mins)	**Area (ha)**	**Time (mins)**	**Area (ha)**	**Time (mins)**	**Area (ha)**	**Time (mins)**	**Area (ha)**
0-4	1.175	4-8	3.082	8-12	0.741	12-16	0.008

Total Area Contributing (ha) = 5.006

Total Pipe Volume (m³) = 199.417

Network Design Table for Network 2

« - Indicates pipe capacity < flow

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**
7.000	41.093	0.137	299.9	0.120	5.00	0.0	0.600	o	300	Pipe/Conduit	
7.001	43.607	0.145	300.7	0.186	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	49.818	0.142	350.8	0.155	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.003	31.126	0.089	349.7	0.103	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.004	69.850	0.200	349.3	0.071	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	**Rain (mm/hr)**	**T.C. (mins)**	**US/IL (m)**	**Σ I.Area (ha)**	**Σ Base Flow (l/s)**	**Foul (l/s)**	**Add Flow (l/s)**	**Vel (m/s)**	**Cap (l/s)**	**Flow (l/s)**
7.000	50.00	5.76	77.889	0.120	0.0	0.0	0.0	0.90	63.8	16.3
7.001	50.00	6.57	77.752	0.307	0.0	0.0	0.0	0.90	63.7	41.5
7.002	50.00	7.43	77.532	0.462	0.0	0.0	0.0	0.96	106.2	62.6
7.003	50.00	7.97	77.390	0.565	0.0	0.0	0.0	0.96	106.4	76.5
7.004	50.00	9.18	77.301	0.636	0.0	0.0	0.0	0.96	106.4	86.1

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Network Design Table for Network 2

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
8.000	40.587	0.135	300.6	0.120	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.001	44.112	0.147	300.1	0.186	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.002	49.149	0.140	351.1	0.155	0.00	0.0	0.600	o	375	Pipe/Conduit	
8.003	31.795	0.091	349.4	0.102	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.005	29.103	0.058	501.8	0.071	0.00	0.0	0.600	o	600	Pipe/Conduit	
7.006	14.203	0.028	507.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
7.007	14.976	0.030	499.2	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
9.000	36.000	0.120	300.0	0.220	5.00	0.0	0.600	o	300	Pipe/Conduit	
9.001	36.000	0.120	300.0	0.229	0.00	0.0	0.600	o	300	Pipe/Conduit	
9.002	26.554	0.076	349.4	0.198	0.00	0.0	0.600	o	375	Pipe/Conduit	
9.003	45.446	0.114	398.6	0.225	0.00	0.0	0.600	o	450	Pipe/Conduit	
9.004	31.125	0.078	399.0	0.229	0.00	0.0	0.600	o	450	Pipe/Conduit	
9.005	18.750	0.038	493.4	0.120	0.00	0.0	0.600	o	600	Pipe/Conduit	
9.006	45.587	0.091	501.0	0.053	0.00	0.0	0.600	o	600	Pipe/Conduit	
9.007	65.811	0.132	498.6	0.086	0.00	0.0	0.600	o	600	Pipe/Conduit	
9.008	20.815	0.042	495.6	0.081	0.00	0.0	0.600	o	600	Pipe/Conduit	
10.000	29.283	0.098	298.8	0.034	5.00	0.0	0.600	o	300	Pipe/Conduit	
10.001	39.204	0.131	299.3	0.052	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
8.000	50.00	5.75	77.690	0.120	0.0	0.0	0.0	0.90	63.7	16.3
8.001	50.00	6.57	77.555	0.307	0.0	0.0	0.0	0.90	63.8	41.5
8.002	50.00	7.42	77.333	0.462	0.0	0.0	0.0	0.96	106.2	62.6
8.003	50.00	7.97	77.193	0.564	0.0	0.0	0.0	0.96	106.4	76.4
7.005	50.00	9.62	76.876	1.271	0.0	0.0	0.0	1.08	305.4	172.1
7.006	50.00	9.84	76.818	1.271	0.0	0.0	0.0	1.07	303.8	172.1
7.007	50.00	10.07	76.790	1.271	0.0	0.0	0.0	1.08	306.2	172.1
9.000	50.00	5.66	77.034	0.220	0.0	0.0	0.0	0.90	63.8	29.8
9.001	50.00	6.33	76.914	0.449	0.0	0.0	0.0	0.90	63.8	60.8
9.002	50.00	6.79	76.719	0.648	0.0	0.0	0.0	0.96	106.4	87.7
9.003	50.00	7.54	76.568	0.872	0.0	0.0	0.0	1.01	161.0	118.1
9.004	50.00	8.05	76.454	1.101	0.0	0.0	0.0	1.01	160.9	149.1
9.005	50.00	8.34	76.226	1.221	0.0	0.0	0.0	1.09	308.0	165.4
9.006	50.00	9.04	76.188	1.274	0.0	0.0	0.0	1.08	305.7	172.5
9.007	50.00	10.05	76.097	1.360	0.0	0.0	0.0	1.08	306.4	184.2
9.008	50.00	10.37	75.965	1.441	0.0	0.0	0.0	1.09	307.4	195.1
10.000	50.00	5.54	77.291	0.034	0.0	0.0	0.0	0.90	63.9	4.6
10.001	50.00	6.26	77.193	0.087	0.0	0.0	0.0	0.90	63.9	11.7

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Network Design Table for Network 2

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
10.002	39.682	0.099	400.8	0.081	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.003	59.279	0.148	400.5	0.132	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.004	50.432	0.126	400.3	0.109	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.005	30.298	0.076	398.7	0.073	0.00	0.0	0.600	o	375	Pipe/Conduit	
10.006	16.896	0.042	402.3	0.072	0.00	0.0	0.600	o	450	Pipe/Conduit	
11.000	16.777	0.056	299.6	0.011	5.00	0.0	0.600	o	300	Pipe/Conduit	
12.000	17.025	0.085	200.3	0.038	5.00	0.0	0.600	o	225	Pipe/Conduit	
11.001	68.443	0.228	300.2	0.042	0.00	0.0	0.600	o	300	Pipe/Conduit	
11.002	18.602	0.062	300.0	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
11.003	18.450	0.062	297.6	0.021	0.00	0.0	0.600	o	300	Pipe/Conduit	
10.007	38.835	0.097	400.4	0.104	0.00	0.0	0.600	o	450	Pipe/Conduit	
10.008	38.104	0.095	401.1	0.125	0.00	0.0	0.600	o	450	Pipe/Conduit	
10.009	37.063	0.074	500.9	0.146	0.00	0.0	0.600	o	600	Pipe/Conduit	
10.010	39.876	0.080	498.5	0.088	0.00	0.0	0.600	o	600	Pipe/Conduit	
9.009	12.624	0.025	505.0	0.132	0.00	0.0	0.600	o	600	Pipe/Conduit	
13.000	34.249	0.086	398.2	0.998	5.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
10.002	50.00	7.00	76.987	0.167	0.0	0.0	0.0	0.90	99.3	22.6
10.003	50.00	8.10	76.888	0.300	0.0	0.0	0.0	0.90	99.3	40.6
10.004	50.00	9.03	76.740	0.408	0.0	0.0	0.0	0.90	99.3	55.3
10.005	50.00	9.59	76.614	0.481	0.0	0.0	0.0	0.90	99.5	65.2
10.006	50.00	9.87	76.463	0.553	0.0	0.0	0.0	1.01	160.2	74.9
11.000	50.00	5.31	77.203	0.011	0.0	0.0	0.0	0.90	63.8	1.6
12.000	50.00	5.31	77.307	0.038	0.0	0.0	0.0	0.92	36.6	5.2
11.001	50.00	6.57	77.147	0.092	0.0	0.0	0.0	0.90	63.8	12.5
11.002	50.00	6.92	76.919	0.128	0.0	0.0	0.0	0.90	63.8	17.3
11.003	50.00	7.26	76.857	0.149	0.0	0.0	0.0	0.91	64.1	20.1
10.007	50.00	10.51	76.421	0.805	0.0	0.0	0.0	1.01	160.6	109.1
10.008	50.00	11.14	76.324	0.931	0.0	0.0	0.0	1.01	160.5	126.0
10.009	50.00	11.71	76.079	1.076	0.0	0.0	0.0	1.08	305.7	145.8
10.010	50.00	12.33	76.005	1.165	0.0	0.0	0.0	1.08	306.5	157.7
9.009	50.00	12.52	75.925	2.737	0.0	0.0	0.0	1.08	304.5«	370.7
13.000	50.00	5.56	75.986	0.998	0.0	0.0	0.0	1.01	161.0	135.2

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Network Design Table for Network 2

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
7.008	39.382	0.150	262.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.008	50.00	13.20	75.800	5.006	0.0	0.0	0.0	0.97	68.3«	677.9

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Manhole Schedules for Network 2

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S 7.0	79.389	1.500	Open Manhole	1200	7.000	77.889	300				
S 7.1	79.374	1.622	Open Manhole	1200	7.001	77.752	300	7.000	77.752	300	
S 7.2	79.362	1.830	Open Manhole	1200	7.002	77.532	375	7.001	77.607	300	
S 7.3	79.349	1.959	Open Manhole	1200	7.003	77.390	375	7.002	77.390	375	
S 7.4	79.146	1.845	Open Manhole	1200	7.004	77.301	375	7.003	77.301	375	
S 8.0	79.333	1.643	Open Manhole	1200	8.000	77.690	300				
S 8.1	79.331	1.776	Open Manhole	1200	8.001	77.555	300	8.000	77.555	300	
S 8.2	79.331	1.998	Open Manhole	1200	8.002	77.333	375	8.001	77.408	300	
S 8.3	79.332	2.139	Open Manhole	1200	8.003	77.193	375	8.002	77.193	375	
S 7.5	79.142	2.266	Open Manhole	1200	7.005	76.876	600	7.004	77.101	375	
								8.003	77.102	375	1
S 7.6	78.684	1.866	Open Manhole	1200	7.006	76.818	600	7.005	76.818	600	
S 7.7	78.757	1.967	Open Manhole	1200	7.007	76.790	600	7.006	76.790	600	
S 9.0	79.116	2.082	Open Manhole	1200	9.000	77.034	300				
S 9.1	79.192	2.278	Open Manhole	1200	9.001	76.914	300	9.000	76.914	300	
S 9.2	79.154	2.435	Open Manhole	1350	9.002	76.719	375	9.001	76.794	300	
S 9.3	79.127	2.559	Open Manhole	1350	9.003	76.568	450	9.002	76.643	375	
S 9.4	79.080	2.626	Open Manhole	1350	9.004	76.454	450	9.003	76.454	450	
S 9.5	79.001	2.775	Open Manhole	1500	9.005	76.226	600	9.004	76.376	450	
S 9.6	78.955	2.767	Open Manhole	1200	9.006	76.188	600	9.005	76.188	600	
S 9.7	78.842	2.745	Open Manhole	1350	9.007	76.097	600	9.006	76.097	600	
S 9.8	78.406	2.441	Open Manhole	1500	9.008	75.965	600	9.007	75.965	600	
S 10.0	79.326	2.035	Open Manhole	1200	10.000	77.291	300				
S 10.1	79.230	2.037	Open Manhole	1200	10.001	77.193	300	10.000	77.193	300	
S 10.2	79.228	2.241	Open Manhole	1200	10.002	76.987	375	10.001	77.062	300	
S 10.3	79.162	2.274	Open Manhole	1200	10.003	76.888	375	10.002	76.888	375	
S 10.4	78.778	2.038	Open Manhole	1200	10.004	76.740	375	10.003	76.740	375	
S 10.5	78.977	2.363	Open Manhole	1200	10.005	76.614	375	10.004	76.614	375	
S 10.6	78.610	2.147	Open Manhole	1200	10.006	76.463	450	10.005	76.538	375	
S 11.0	79.073	1.870	Open Manhole	1200	11.000	77.203	300				
S 12.0	78.732	1.425	Open Manhole	1200	12.000	77.307	225				
S 11.1	78.976	1.829	Open Manhole	1200	11.001	77.147	300	11.000	77.147	300	
								12.000	77.222	225	
S 11.2	78.643	1.724	Open Manhole	1200	11.002	76.919	300	11.001	76.919	300	
S 11.3	78.553	1.696	Open Manhole	1200	11.003	76.857	300	11.002	76.857	300	
S 10.7	78.671	2.250	Open Manhole	1200	10.007	76.421	450	10.006	76.421	450	
								11.003	76.795	300	224
S 10.8	78.697	2.373	Open Manhole	1200	10.008	76.324	450	10.007	76.324	450	

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Manhole Schedules for Network 2

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S 10.9	78.705	2.626	Open Manhole	1200	10.009	76.079	600	10.008	76.229	450	
S 10.10	78.672	2.667	Open Manhole	1200	10.010	76.005	600	10.009	76.005	600	
S 9.9	78.721	2.798	Open Manhole	1200	9.009	75.925	600	9.008	75.923	600	
								10.010	75.925	600	
S 13.0	79.000	3.014	Open Manhole	2550	13.000	75.986	450				
S 7.8	77.600	1.800	Open Manhole	1200	7.008	75.800	300	7.007	76.760	600	1260
								9.009	75.900	600	400
								13.000	75.900	450	250
MH145	77.000	1.350	Open Manhole	1800		OUTFALL		7.008	75.650	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S 7.0	711621.162	741339.449	711621.162	741339.449	Required	
S 7.1	711621.162	741380.541	711621.162	741380.541	Required	
S 7.2	711621.162	741424.149	711621.162	741424.149	Required	
S 7.3	711621.162	741473.966	711621.162	741473.966	Required	
S 7.4	711621.189	741505.093	711621.189	741505.093	Required	
S 8.0	711551.339	741339.449	711551.339	741339.449	Required	
S 8.1	711551.339	741380.036	711551.339	741380.036	Required	
S 8.2	711551.339	741424.149	711551.339	741424.149	Required	
S 8.3	711551.339	741473.298	711551.339	741473.298	Required	

Manhole Schedules for Network 2

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S 7.5	711551.339	741505.093	711551.339	741505.093	Required	
S 7.6	711522.236	741505.093	711522.236	741505.093	Required	
S 7.7	711522.236	741490.889	711522.236	741490.889	Required	
S 9.0	711648.669	741325.241	711648.669	741325.241	Required	
S 9.1	711648.669	741361.241	711648.669	741361.241	Required	
S 9.2	711648.669	741397.241	711648.669	741397.241	Required	
S 9.3	711648.669	741423.795	711648.669	741423.795	Required	
S 9.4	711648.669	741469.241	711648.669	741469.241	Required	
S 9.5	711648.669	741500.366	711648.669	741500.366	Required	
S 9.6	711631.390	741507.644	711631.390	741507.644	Required	
S 9.7	711585.803	741507.644	711585.803	741507.644	Required	
S 9.8	711519.992	741507.644	711519.992	741507.644	Required	
S 10.0	711758.694	741294.046	711758.694	741294.046	Required	
S 10.1	711729.411	741294.046	711729.411	741294.046	Required	
S 10.2	711690.208	741294.046	711690.208	741294.046	Required	

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Manhole Schedules for Network 2

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S 10.3	711650.525	741294.046	711650.525	741294.046	Required	
S 10.4	711591.247	741294.046	711591.247	741294.046	Required	
S 10.5	711540.815	741294.046	711540.815	741294.046	Required	
S 10.6	711519.992	741316.055	711519.992	741316.055	Required	
S 11.0	711407.140	741364.493	711407.140	741364.493	Required	
S 12.0	711414.847	741343.041	711414.847	741343.041	Required	
S 11.1	711422.675	741358.159	711422.675	741358.159	Required	
S 11.2	711486.026	741332.252	711486.026	741332.252	Required	
S 11.3	711503.244	741325.211	711503.244	741325.211	Required	
S 10.7	711519.992	741332.951	711519.992	741332.951	Required	
S 10.8	711519.992	741371.786	711519.992	741371.786	Required	
S 10.9	711519.992	741409.889	711519.992	741409.889	Required	
S 10.10	711519.992	741446.953	711519.992	741446.953	Required	
S 9.9	711519.992	741486.828	711519.992	741486.828	Required	
S 13.0	711481.160	741466.479	711481.160	741466.479	Required	

Manhole Schedules for Network 2

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S 7.8	711507.467	741488.408	711507.467	741488.408	Required	
MH145	711483.271	741519.480			No Entry	

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PIPELINE SCHEDULES for Network 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.000	o	300	S 7.0	79.389	77.889	1.200	Open Manhole	1200
7.001	o	300	S 7.1	79.374	77.752	1.322	Open Manhole	1200
7.002	o	375	S 7.2	79.362	77.532	1.455	Open Manhole	1200
7.003	o	375	S 7.3	79.349	77.390	1.584	Open Manhole	1200
7.004	o	375	S 7.4	79.146	77.301	1.470	Open Manhole	1200
8.000	o	300	S 8.0	79.333	77.690	1.343	Open Manhole	1200
8.001	o	300	S 8.1	79.331	77.555	1.476	Open Manhole	1200
8.002	o	375	S 8.2	79.331	77.333	1.623	Open Manhole	1200
8.003	o	375	S 8.3	79.332	77.193	1.764	Open Manhole	1200
7.005	o	600	S 7.5	79.142	76.876	1.666	Open Manhole	1200
7.006	o	600	S 7.6	78.684	76.818	1.266	Open Manhole	1200
7.007	o	600	S 7.7	78.757	76.790	1.367	Open Manhole	1200
9.000	o	300	S 9.0	79.116	77.034	1.782	Open Manhole	1200
9.001	o	300	S 9.1	79.192	76.914	1.978	Open Manhole	1200
9.002	o	375	S 9.2	79.154	76.719	2.060	Open Manhole	1350
9.003	o	450	S 9.3	79.127	76.568	2.109	Open Manhole	1350
9.004	o	450	S 9.4	79.080	76.454	2.176	Open Manhole	1350
9.005	o	600	S 9.5	79.001	76.226	2.175	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.000	41.093	299.9	S 7.1	79.374	77.752	1.322	Open Manhole	1200
7.001	43.607	300.7	S 7.2	79.362	77.607	1.455	Open Manhole	1200
7.002	49.818	350.8	S 7.3	79.349	77.390	1.584	Open Manhole	1200
7.003	31.126	349.7	S 7.4	79.146	77.301	1.470	Open Manhole	1200
7.004	69.850	349.3	S 7.5	79.142	77.101	1.666	Open Manhole	1200
8.000	40.587	300.6	S 8.1	79.331	77.555	1.476	Open Manhole	1200
8.001	44.112	300.1	S 8.2	79.331	77.408	1.623	Open Manhole	1200
8.002	49.149	351.1	S 8.3	79.332	77.193	1.764	Open Manhole	1200
8.003	31.795	349.4	S 7.5	79.142	77.102	1.665	Open Manhole	1200
7.005	29.103	501.8	S 7.6	78.684	76.818	1.266	Open Manhole	1200
7.006	14.203	507.3	S 7.7	78.757	76.790	1.367	Open Manhole	1200
7.007	14.976	499.2	S 7.8	77.600	76.760	0.240	Open Manhole	1200
9.000	36.000	300.0	S 9.1	79.192	76.914	1.978	Open Manhole	1200
9.001	36.000	300.0	S 9.2	79.154	76.794	2.060	Open Manhole	1350
9.002	26.554	349.4	S 9.3	79.127	76.643	2.109	Open Manhole	1350
9.003	45.446	398.6	S 9.4	79.080	76.454	2.176	Open Manhole	1350
9.004	31.125	399.0	S 9.5	79.001	76.376	2.175	Open Manhole	1500
9.005	18.750	493.4	S 9.6	78.955	76.188	2.167	Open Manhole	1200

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PIPELINE SCHEDULES for Network 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.006	o	600	S 9.6	78.955	76.188	2.167	Open Manhole	1200
9.007	o	600	S 9.7	78.842	76.097	2.145	Open Manhole	1350
9.008	o	600	S 9.8	78.406	75.965	1.841	Open Manhole	1500
10.000	o	300	S 10.0	79.326	77.291	1.735	Open Manhole	1200
10.001	o	300	S 10.1	79.230	77.193	1.737	Open Manhole	1200
10.002	o	375	S 10.2	79.228	76.987	1.866	Open Manhole	1200
10.003	o	375	S 10.3	79.162	76.888	1.899	Open Manhole	1200
10.004	o	375	S 10.4	78.778	76.740	1.663	Open Manhole	1200
10.005	o	375	S 10.5	78.977	76.614	1.988	Open Manhole	1200
10.006	o	450	S 10.6	78.610	76.463	1.697	Open Manhole	1200
11.000	o	300	S 11.0	79.073	77.203	1.570	Open Manhole	1200
12.000	o	225	S 12.0	78.732	77.307	1.200	Open Manhole	1200
11.001	o	300	S 11.1	78.976	77.147	1.529	Open Manhole	1200
11.002	o	300	S 11.2	78.643	76.919	1.424	Open Manhole	1200
11.003	o	300	S 11.3	78.553	76.857	1.396	Open Manhole	1200
10.007	o	450	S 10.7	78.671	76.421	1.800	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.006	45.587	501.0	S 9.7	78.842	76.097	2.145	Open Manhole	1350
9.007	65.811	498.6	S 9.8	78.406	75.965	1.841	Open Manhole	1500
9.008	20.815	495.6	S 9.9	78.721	75.923	2.198	Open Manhole	1200
10.000	29.283	298.8	S 10.1	79.230	77.193	1.737	Open Manhole	1200
10.001	39.204	299.3	S 10.2	79.228	77.062	1.866	Open Manhole	1200
10.002	39.682	400.8	S 10.3	79.162	76.888	1.899	Open Manhole	1200
10.003	59.279	400.5	S 10.4	78.778	76.740	1.663	Open Manhole	1200
10.004	50.432	400.3	S 10.5	78.977	76.614	1.988	Open Manhole	1200
10.005	30.298	398.7	S 10.6	78.610	76.538	1.697	Open Manhole	1200
10.006	16.896	402.3	S 10.7	78.671	76.421	1.800	Open Manhole	1200
11.000	16.777	299.6	S 11.1	78.976	77.147	1.529	Open Manhole	1200
12.000	17.025	200.3	S 11.1	78.976	77.222	1.529	Open Manhole	1200
11.001	68.443	300.2	S 11.2	78.643	76.919	1.424	Open Manhole	1200
11.002	18.602	300.0	S 11.3	78.553	76.857	1.396	Open Manhole	1200
11.003	18.450	297.6	S 10.7	78.671	76.795	1.576	Open Manhole	1200
10.007	38.835	400.4	S 10.8	78.697	76.324	1.923	Open Manhole	1200

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PIPELINE SCHEDULES for Network 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.008	o	450	S 10.8	78.697	76.324	1.923	Open Manhole	1200
10.009	o	600	S 10.9	78.705	76.079	2.026	Open Manhole	1200
10.010	o	600	S 10.10	78.672	76.005	2.067	Open Manhole	1200
9.009	o	600	S 9.9	78.721	75.925	2.196	Open Manhole	1200
13.000	o	450	S 13.0	79.000	75.986	2.564	Open Manhole	2550
7.008	o	300	S 7.8	77.600	75.800	1.500	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.008	38.104	401.1	S 10.9	78.705	76.229	2.026	Open Manhole	1200
10.009	37.063	500.9	S 10.10	78.672	76.005	2.067	Open Manhole	1200
10.010	39.876	498.5	S 9.9	78.721	75.925	2.196	Open Manhole	1200
9.009	12.624	505.0	S 7.8	77.600	75.900	1.100	Open Manhole	1200
13.000	34.249	398.2	S 7.8	77.600	75.900	1.250	Open Manhole	1200
7.008	39.382	262.5	MH145	77.000	75.650	1.050	Open Manhole	1800

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Area Summary for Network 2

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
7.000	Classification	Roof	100	0.120	0.120	0.120
7.001	Classification	Roof	100	0.186	0.186	0.186
7.002	Classification	Roof	100	0.155	0.155	0.155
7.003	Classification	Roof	100	0.103	0.103	0.103
7.004	Classification	Roof	100	0.071	0.071	0.071
8.000	Classification	Roof	100	0.120	0.120	0.120
8.001	Classification	Roof	100	0.186	0.186	0.186
8.002	Classification	Roof	100	0.155	0.155	0.155
8.003	Classification	Roof	100	0.102	0.102	0.102
7.005	Classification	Roof	100	0.071	0.071	0.071
7.006	-	-	100	0.000	0.000	0.000
7.007	-	-	100	0.000	0.000	0.000
9.000	Classification	Roads	100	0.220	0.220	0.220
9.001	Classification	Roads	100	0.229	0.229	0.229
9.002	Classification	Roads	100	0.198	0.198	0.198
9.003	Classification	Roads	100	0.225	0.225	0.225
9.004	Classification	Roads	100	0.229	0.229	0.229
9.005	Classification	Roads	100	0.120	0.120	0.120
9.006	Classification	Roads	100	0.053	0.053	0.053
9.007	Classification	Roads	100	0.086	0.086	0.086
9.008	Classification	Roads	100	0.081	0.081	0.081
10.000	Classification	Roads	100	0.034	0.034	0.034
10.001	Classification	Roads	100	0.052	0.052	0.052
10.002	Classification	Roads	100	0.081	0.081	0.081
10.003	Classification	Roads	100	0.086	0.086	0.086
	Classification	Roof	100	0.046	0.046	0.132
10.004	Classification	Roads	100	0.109	0.109	0.109
10.005	Classification	Roads	100	0.073	0.073	0.073
10.006	Classification	Roads	100	0.072	0.072	0.072
11.000	Classification	Roads	100	0.011	0.011	0.011
12.000	Classification	Roads	100	0.038	0.038	0.038
11.001	Classification	Roads	100	0.042	0.042	0.042
11.002	Classification	Roads	100	0.035	0.035	0.035
11.003	Classification	Roads	100	0.021	0.021	0.021
10.007	Classification	Roads	100	0.104	0.104	0.104
10.008	Classification	Roads	100	0.125	0.125	0.125
10.009	Classification	Roads	100	0.146	0.146	0.146
10.010	Classification	Roads	100	0.088	0.088	0.088
9.009	Classification	Roads	100	0.132	0.132	0.132
13.000	Classification	Roof	100	0.113	0.113	0.113
	Classification	Roof	100	0.205	0.205	0.318
	Classification	Roads	100	0.229	0.229	0.546
	Classification	Roads	100	0.068	0.068	0.615
	Classification	Grass	30	0.191	0.057	0.672
	Classification	Gravel	75	0.104	0.078	0.750
	Classification	Roof	100	0.037	0.037	0.788
	Classification	Gravel	75	0.076	0.057	0.844
	Classification	Gravel	75	0.205	0.154	0.998
7.008	-	-	100	0.000	0.000	0.000
				Total 5.236	Total 5.006	Total 5.006

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Network Classifications for Network 2

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
7.000	S 7.0	300	1.200	1.322	Unclassified	1200	0	1.200	Unclassified
7.001	S 7.1	300	1.322	1.455	Unclassified	1200	0	1.322	Unclassified
7.002	S 7.2	375	1.455	1.584	Unclassified	1200	0	1.455	Unclassified
7.003	S 7.3	375	1.470	1.584	Unclassified	1200	0	1.584	Unclassified
7.004	S 7.4	375	1.470	1.666	Unclassified	1200	0	1.470	Unclassified
8.000	S 8.0	300	1.343	1.476	Unclassified	1200	0	1.343	Unclassified
8.001	S 8.1	300	1.476	1.623	Unclassified	1200	0	1.476	Unclassified
8.002	S 8.2	375	1.623	1.764	Unclassified	1200	0	1.623	Unclassified
8.003	S 8.3	375	1.665	1.764	Unclassified	1200	0	1.764	Unclassified
7.005	S 7.5	600	1.266	1.666	Unclassified	1200	0	1.666	Unclassified
7.006	S 7.6	600	1.266	1.367	Unclassified	1200	0	1.266	Unclassified
7.007	S 7.7	600	0.240	1.367	Unclassified	1200	0	1.367	Unclassified
9.000	S 9.0	300	1.782	1.978	Unclassified	1200	0	1.782	Unclassified
9.001	S 9.1	300	1.978	2.060	Unclassified	1200	0	1.978	Unclassified
9.002	S 9.2	375	2.060	2.109	Unclassified	1350	0	2.060	Unclassified
9.003	S 9.3	450	2.109	2.176	Unclassified	1350	0	2.109	Unclassified
9.004	S 9.4	450	2.175	2.176	Unclassified	1350	0	2.176	Unclassified
9.005	S 9.5	600	2.167	2.175	Unclassified	1500	0	2.175	Unclassified
9.006	S 9.6	600	2.145	2.167	Unclassified	1200	0	2.167	Unclassified
9.007	S 9.7	600	1.841	2.145	Unclassified	1350	0	2.145	Unclassified
9.008	S 9.8	600	1.841	2.198	Unclassified	1500	0	1.841	Unclassified
10.000	S 10.0	300	1.735	1.737	Unclassified	1200	0	1.735	Unclassified
10.001	S 10.1	300	1.737	1.866	Unclassified	1200	0	1.737	Unclassified
10.002	S 10.2	375	1.866	1.899	Unclassified	1200	0	1.866	Unclassified
10.003	S 10.3	375	1.663	1.899	Unclassified	1200	0	1.899	Unclassified
10.004	S 10.4	375	1.663	1.988	Unclassified	1200	0	1.663	Unclassified
10.005	S 10.5	375	1.697	1.988	Unclassified	1200	0	1.988	Unclassified
10.006	S 10.6	450	1.697	1.800	Unclassified	1200	0	1.697	Unclassified
11.000	S 11.0	300	1.529	1.570	Unclassified	1200	0	1.570	Unclassified
12.000	S 12.0	225	1.200	1.529	Unclassified	1200	0	1.200	Unclassified
11.001	S 11.1	300	1.424	1.529	Unclassified	1200	0	1.529	Unclassified
11.002	S 11.2	300	1.396	1.424	Unclassified	1200	0	1.424	Unclassified
11.003	S 11.3	300	1.396	1.576	Unclassified	1200	0	1.396	Unclassified
10.007	S 10.7	450	1.800	1.923	Unclassified	1200	0	1.800	Unclassified
10.008	S 10.8	450	1.923	2.026	Unclassified	1200	0	1.923	Unclassified
10.009	S 10.9	600	2.026	2.067	Unclassified	1200	0	2.026	Unclassified
10.010	S 10.10	600	2.067	2.196	Unclassified	1200	0	2.067	Unclassified
9.009	S 9.9	600	1.100	2.196	Unclassified	1200	0	2.196	Unclassified
13.000	S 13.0	450	1.250	2.564	Unclassified	2550	0	2.564	Unclassified
7.008	S 7.8	300	1.050	1.500	Unclassified	1200	0	1.500	Unclassified

Free Flowing Outfall Details for Network 2

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
7.008	MH145	77.000	75.650	0.000	1800	0

Simulation Criteria for Network 2

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	25	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.300		

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Online Controls for Network 2

Hydro-Brake® Optimum Manhole: S 7.8, DS/PN: 7.008, Volume (m³): 14.3

Unit Reference	MD-SHE-0173-1600-1500-1600
Design Head (m)	1.500
Design Flow (l/s)	16.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	173
Invert Level (m)	75.800
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.500	16.0
Flush-Flo™	0.442	16.0
Kick-Flo®	0.961	13.0
Mean Flow over Head Range	-	13.9

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

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	6.1	1.200	14.4	3.000	22.3	7.000	33.5
0.200	14.4	1.400	15.5	3.500	24.0	7.500	34.6
0.300	15.6	1.600	16.5	4.000	25.6	8.000	35.7
0.400	16.0	1.800	17.4	4.500	27.0	8.500	36.7
0.500	15.9	2.000	18.3	5.000	28.4	9.000	37.8
0.600	15.7	2.200	19.2	5.500	29.8	9.500	38.8
0.800	14.9	2.400	20.0	6.000	31.1		
1.000	13.2	2.600	20.8	6.500	32.3		

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Storage Structures for Network 2

Tank or Pond Manhole: S 7.8, DS/PN: 7.008

Invert Level (m) 75.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1264.0	1.800	1873.0

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Manhole Headloss for Network 2

PN	US/MH Name	US/MH Headloss
7.000	S 7.0	0.500
7.001	S 7.1	0.500
7.002	S 7.2	0.500
7.003	S 7.3	0.500
7.004	S 7.4	0.500
8.000	S 8.0	0.500
8.001	S 8.1	0.500
8.002	S 8.2	0.500
8.003	S 8.3	0.500
7.005	S 7.5	0.500
7.006	S 7.6	0.500
7.007	S 7.7	0.500
9.000	S 9.0	0.500
9.001	S 9.1	0.500
9.002	S 9.2	0.500
9.003	S 9.3	0.500
9.004	S 9.4	0.500
9.005	S 9.5	0.500
9.006	S 9.6	0.500
9.007	S 9.7	0.500
9.008	S 9.8	0.500
10.000	S 10.0	0.500
10.001	S 10.1	0.500
10.002	S 10.2	0.500
10.003	S 10.3	0.500
10.004	S 10.4	0.500
10.005	S 10.5	0.500
10.006	S 10.6	0.500
11.000	S 11.0	0.500
12.000	S 12.0	0.500
11.001	S 11.1	0.500
11.002	S 11.2	0.500
11.003	S 11.3	0.500
10.007	S 10.7	0.500
10.008	S 10.8	0.500
10.009	S 10.9	0.500
10.010	S 10.10	0.500
9.009	S 9.9	0.500
13.000	S 13.0	0.500
7.008	S 7.8	0.500

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

Simulation Criteria

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

Number of Input Hydrographs 0   Number of Storage Structures 1
Number of Online Controls 1   Number of Time/Area Diagrams 0
Number of Offline Controls 0   Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR   Ratio R 0.300
Region Scotland and Ireland   Cv (Summer) 0.750
M5-60 (mm) 16.500   Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
7.000	S 7.0	15 Winter	1	+10%	30/15 Summer				77.993
7.001	S 7.1	15 Winter	1	+10%	30/15 Summer				77.915
7.002	S 7.2	15 Winter	1	+10%	30/15 Summer				77.719
7.003	S 7.3	15 Winter	1	+10%	30/15 Summer				77.597
7.004	S 7.4	15 Winter	1	+10%	30/15 Summer				77.511
8.000	S 8.0	15 Winter	1	+10%	30/15 Summer				77.794
8.001	S 8.1	15 Winter	1	+10%	30/15 Summer				77.718
8.002	S 8.2	15 Winter	1	+10%	30/15 Summer				77.520
8.003	S 8.3	15 Winter	1	+10%	30/15 Summer				77.400
7.005	S 7.5	15 Winter	1	+10%	30/15 Winter				77.234
7.006	S 7.6	15 Winter	1	+10%	30/15 Summer				77.190
7.007	S 7.7	15 Winter	1	+10%	100/15 Winter				77.146
9.000	S 9.0	15 Winter	1	+10%	30/15 Summer				77.185
9.001	S 9.1	15 Winter	1	+10%	30/15 Summer				77.130
9.002	S 9.2	15 Winter	1	+10%	30/15 Summer				76.960
9.003	S 9.3	15 Winter	1	+10%	30/15 Summer				76.832
9.004	S 9.4	15 Winter	1	+10%	30/15 Summer				76.747
9.005	S 9.5	30 Winter	1	+10%	30/15 Winter				76.562
9.006	S 9.6	30 Winter	1	+10%	30/15 Winter				76.528
9.007	S 9.7	30 Winter	1	+10%	30/15 Summer				76.497
9.008	S 9.8	30 Winter	1	+10%	30/15 Summer				76.472

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
7.000	S 7.0	-0.196	0.000	0.25			14.8	OK	
7.001	S 7.1	-0.137	0.000	0.56			33.3	OK	
7.002	S 7.2	-0.188	0.000	0.48			47.0	OK	
7.003	S 7.3	-0.168	0.000	0.58			54.9	OK	
7.004	S 7.4	-0.165	0.000	0.58			58.4	OK	
8.000	S 8.0	-0.196	0.000	0.25			14.9	OK	
8.001	S 8.1	-0.137	0.000	0.56			33.3	OK	
8.002	S 8.2	-0.188	0.000	0.48			47.1	OK	
8.003	S 8.3	-0.168	0.000	0.58			55.0	OK	
7.005	S 7.5	-0.242	0.000	0.45			112.6	OK	
7.006	S 7.6	-0.228	0.000	0.68			110.5	OK	
7.007	S 7.7	-0.244	0.000	0.66			109.9	OK	
9.000	S 9.0	-0.149	0.000	0.46			27.0	OK	
9.001	S 9.1	-0.084	0.000	0.84			49.7	OK	
9.002	S 9.2	-0.134	0.000	0.73			67.6	OK	
9.003	S 9.3	-0.186	0.000	0.60			86.3	OK	
9.004	S 9.4	-0.157	0.000	0.75			104.0	OK	
9.005	S 9.5	-0.264	0.000	0.52			104.4	OK	
9.006	S 9.6	-0.260	0.000	0.40			104.8	OK	
9.007	S 9.7	-0.200	0.000	0.36			100.6	OK	
9.008	S 9.8	-0.093	0.000	0.43			92.0	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
10.000	S 10.0	15 Winter	1	+10%				
10.001	S 10.1	15 Winter	1	+10%				
10.002	S 10.2	15 Winter	1	+10%	100/15 Winter			
10.003	S 10.3	15 Winter	1	+10%	100/15 Summer			
10.004	S 10.4	15 Winter	1	+10%	100/15 Summer			
10.005	S 10.5	15 Winter	1	+10%	30/15 Winter			
10.006	S 10.6	15 Winter	1	+10%	30/15 Winter			
11.000	S 11.0	15 Winter	1	+10%				
12.000	S 12.0	15 Winter	1	+10%				
11.001	S 11.1	15 Winter	1	+10%				
11.002	S 11.2	15 Winter	1	+10%	100/30 Winter			
11.003	S 11.3	15 Winter	1	+10%	100/15 Winter			
10.007	S 10.7	15 Winter	1	+10%	30/15 Winter			
10.008	S 10.8	30 Winter	1	+10%	30/15 Winter			
10.009	S 10.9	30 Winter	1	+10%	30/15 Winter			
10.010	S 10.10	30 Winter	1	+10%	30/15 Summer			
9.009	S 9.9	30 Winter	1	+10%	30/15 Summer			
13.000	S 13.0	960 Winter	1	+10%	30/15 Summer			
7.008	S 7.8	960 Winter	1	+10%	1/60 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
10.000	S 10.0	77.346	-0.245	0.000	0.07			4.3	OK
10.001	S 10.1	77.275	-0.218	0.000	0.16			9.6	OK
10.002	S 10.2	77.105	-0.257	0.000	0.19			17.6	OK
10.003	S 10.3	77.035	-0.228	0.000	0.31			29.2	OK
10.004	S 10.4	76.908	-0.207	0.000	0.41			37.3	OK
10.005	S 10.5	76.797	-0.192	0.000	0.47			41.8	OK
10.006	S 10.6	76.682	-0.231	0.000	0.40			46.1	OK
11.000	S 11.0	77.247	-0.256	0.000	0.03			1.4	OK
12.000	S 12.0	77.365	-0.167	0.000	0.15			4.8	OK
11.001	S 11.1	77.232	-0.215	0.000	0.17			10.2	OK
11.002	S 11.2	77.021	-0.198	0.000	0.24			13.5	OK
11.003	S 11.3	76.965	-0.192	0.000	0.28			15.4	OK
10.007	S 10.7	76.643	-0.228	0.000	0.46			65.7	OK
10.008	S 10.8	76.554	-0.220	0.000	0.51			73.0	OK
10.009	S 10.9	76.485	-0.194	0.000	0.30			76.2	OK
10.010	S 10.10	76.471	-0.134	0.000	0.28			73.0	OK
9.009	S 9.9	76.455	-0.070	0.000	1.03			162.6	OK
13.000	S 13.0	76.382	-0.054	0.000	0.08			11.9	OK
7.008	S 7.8	76.380	0.280	0.000	0.25			15.9	SURCHARGED

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Level Exceeded
10.000	S 10.0	
10.001	S 10.1	
10.002	S 10.2	
10.003	S 10.3	
10.004	S 10.4	
10.005	S 10.5	
10.006	S 10.6	
11.000	S 11.0	
12.000	S 12.0	
11.001	S 11.1	
11.002	S 11.2	
11.003	S 11.3	
10.007	S 10.7	
10.008	S 10.8	
10.009	S 10.9	
10.010	S 10.10	
9.009	S 9.9	
13.000	S 13.0	
7.008	S 7.8	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.300
Region Scotland and Ireland Cv (Summer) 0.750
M5-60 (mm) 16.500 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
7.000	S 7.0	15 Winter	30	+10%	30/15 Summer				78.257
7.001	S 7.1	15 Winter	30	+10%	30/15 Summer				78.218
7.002	S 7.2	15 Winter	30	+10%	30/15 Summer				78.030
7.003	S 7.3	15 Winter	30	+10%	30/15 Summer				77.896
7.004	S 7.4	15 Winter	30	+10%	30/15 Summer				77.770
8.000	S 8.0	15 Winter	30	+10%	30/15 Summer				78.055
8.001	S 8.1	15 Winter	30	+10%	30/15 Summer				78.014
8.002	S 8.2	15 Winter	30	+10%	30/15 Summer				77.782
8.003	S 8.3	15 Winter	30	+10%	30/15 Summer				77.615
7.005	S 7.5	15 Winter	30	+10%	30/15 Winter				77.481
7.006	S 7.6	15 Winter	30	+10%	30/15 Summer				77.430
7.007	S 7.7	30 Summer	30	+10%	100/15 Winter				77.390
9.000	S 9.0	15 Winter	30	+10%	30/15 Summer				77.999
9.001	S 9.1	15 Winter	30	+10%	30/15 Summer				77.900
9.002	S 9.2	15 Winter	30	+10%	30/15 Summer				77.510
9.003	S 9.3	15 Winter	30	+10%	30/15 Summer				77.308
9.004	S 9.4	15 Winter	30	+10%	30/15 Summer				77.083
9.005	S 9.5	960 Winter	30	+10%	30/15 Winter				77.067
9.006	S 9.6	960 Winter	30	+10%	30/15 Winter				77.066
9.007	S 9.7	960 Winter	30	+10%	30/15 Summer				77.065
9.008	S 9.8	1440 Winter	30	+10%	30/15 Summer				77.064

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
7.000	S 7.0	0.068	0.000	0.50			30.0	SURCHARGED	
7.001	S 7.1	0.166	0.000	1.22			72.9	SURCHARGED	
7.002	S 7.2	0.123	0.000	0.99			97.4	SURCHARGED	
7.003	S 7.3	0.131	0.000	1.18			111.6	SURCHARGED	
7.004	S 7.4	0.094	0.000	1.16			116.9	SURCHARGED	
8.000	S 8.0	0.065	0.000	0.51			30.4	SURCHARGED	
8.001	S 8.1	0.159	0.000	1.23			73.5	SURCHARGED	
8.002	S 8.2	0.074	0.000	1.05			102.8	SURCHARGED	
8.003	S 8.3	0.047	0.000	1.25			117.9	SURCHARGED	
7.005	S 7.5	0.005	0.000	0.94			232.2	SURCHARGED	
7.006	S 7.6	0.012	0.000	1.42			231.0	SURCHARGED	
7.007	S 7.7	0.000	0.000	1.30			216.6	OK	
9.000	S 9.0	0.665	0.000	0.92			54.4	SURCHARGED	
9.001	S 9.1	0.686	0.000	1.77			104.1	SURCHARGED	
9.002	S 9.2	0.416	0.000	1.59			147.8	SURCHARGED	
9.003	S 9.3	0.290	0.000	1.35			195.4	SURCHARGED	
9.004	S 9.4	0.179	0.000	1.74			241.7	SURCHARGED	
9.005	S 9.5	0.241	0.000	0.14			27.8	SURCHARGED	
9.006	S 9.6	0.278	0.000	0.11			28.3	SURCHARGED	
9.007	S 9.7	0.368	0.000	0.10			28.6	SURCHARGED	
9.008	S 9.8	0.499	0.000	0.10			21.5	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
10.000	S 10.0	15 Winter	30	+10%				
10.001	S 10.1	15 Winter	30	+10%				
10.002	S 10.2	15 Winter	30	+10%	100/15 Winter			
10.003	S 10.3	15 Winter	30	+10%	100/15 Summer			
10.004	S 10.4	15 Winter	30	+10%	100/15 Summer			
10.005	S 10.5	960 Winter	30	+10%	30/15 Winter			
10.006	S 10.6	960 Winter	30	+10%	30/15 Winter			
11.000	S 11.0	15 Winter	30	+10%				
12.000	S 12.0	15 Winter	30	+10%				
11.001	S 11.1	15 Winter	30	+10%				
11.002	S 11.2	15 Winter	30	+10%	100/30 Winter			
11.003	S 11.3	1440 Winter	30	+10%	100/15 Winter			
10.007	S 10.7	1440 Winter	30	+10%	30/15 Winter			
10.008	S 10.8	1440 Winter	30	+10%	30/15 Winter			
10.009	S 10.9	1440 Winter	30	+10%	30/15 Winter			
10.010	S 10.10	1440 Winter	30	+10%	30/15 Summer			
9.009	S 9.9	1440 Winter	30	+10%	30/15 Summer			
13.000	S 13.0	1440 Winter	30	+10%	30/15 Summer			
7.008	S 7.8	1440 Winter	30	+10%	1/60 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
10.000	S 10.0	77.379	-0.212	0.000	0.16			9.5	OK
10.001	S 10.1	77.329	-0.164	0.000	0.40			23.9	OK
10.002	S 10.2	77.205	-0.157	0.000	0.48			43.7	OK
10.003	S 10.3	77.153	-0.110	0.000	0.78			72.6	OK
10.004	S 10.4	77.087	-0.028	0.000	0.91			83.4	OK
10.005	S 10.5	77.069	0.080	0.000	0.13			11.3	SURCHARGED
10.006	S 10.6	77.068	0.155	0.000	0.11			12.9	SURCHARGED
11.000	S 11.0	77.291	-0.212	0.000	0.06			3.2	OK
12.000	S 12.0	77.397	-0.135	0.000	0.33			10.7	OK
11.001	S 11.1	77.285	-0.162	0.000	0.39			24.0	OK
11.002	S 11.2	77.091	-0.128	0.000	0.58			31.9	OK
11.003	S 11.3	77.068	-0.089	0.000	0.05			2.6	OK
10.007	S 10.7	77.067	0.196	0.000	0.10			14.0	SURCHARGED
10.008	S 10.8	77.066	0.292	0.000	0.11			15.6	SURCHARGED
10.009	S 10.9	77.065	0.386	0.000	0.07			17.3	SURCHARGED
10.010	S 10.10	77.064	0.459	0.000	0.07			18.0	SURCHARGED
9.009	S 9.9	77.063	0.538	0.000	0.26			40.8	SURCHARGED
13.000	S 13.0	77.064	0.628	0.000	0.12			17.1	SURCHARGED
7.008	S 7.8	77.062	0.962	0.000	0.25			15.9	SURCHARGED

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Level Exceeded
10.000	S 10.0	
10.001	S 10.1	
10.002	S 10.2	
10.003	S 10.3	
10.004	S 10.4	
10.005	S 10.5	
10.006	S 10.6	
11.000	S 11.0	
12.000	S 12.0	
11.001	S 11.1	
11.002	S 11.2	
11.003	S 11.3	
10.007	S 10.7	
10.008	S 10.8	
10.009	S 10.9	
10.010	S 10.10	
9.009	S 9.9	
13.000	S 13.0	
7.008	S 7.8	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.300
Region Scotland and Ireland Cv (Summer) 0.750
M5-60 (mm) 16.500 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
7.000	S 7.0	15 Winter	100	+10%	30/15 Summer				78.801
7.001	S 7.1	15 Winter	100	+10%	30/15 Summer				78.755
7.002	S 7.2	15 Winter	100	+10%	30/15 Summer				78.476
7.003	S 7.3	15 Winter	100	+10%	30/15 Summer				78.268
7.004	S 7.4	15 Winter	100	+10%	30/15 Summer				78.058
8.000	S 8.0	15 Winter	100	+10%	30/15 Summer				78.467
8.001	S 8.1	15 Winter	100	+10%	30/15 Summer				78.414
8.002	S 8.2	15 Winter	100	+10%	30/15 Summer				78.057
8.003	S 8.3	15 Winter	100	+10%	30/15 Summer				77.788
7.005	S 7.5	15 Winter	100	+10%	30/15 Winter				77.545
7.006	S 7.6	15 Winter	100	+10%	30/15 Summer				77.453
7.007	S 7.7	15 Winter	100	+10%	100/15 Winter				77.392
9.000	S 9.0	15 Winter	100	+10%	30/15 Summer				78.720
9.001	S 9.1	15 Winter	100	+10%	30/15 Summer				78.570
9.002	S 9.2	15 Winter	100	+10%	30/15 Summer				78.026
9.003	S 9.3	15 Winter	100	+10%	30/15 Summer				77.776
9.004	S 9.4	15 Winter	100	+10%	30/15 Summer				77.511
9.005	S 9.5	1440 Winter	100	+10%	30/15 Winter				77.396
9.006	S 9.6	1440 Winter	100	+10%	30/15 Winter				77.395
9.007	S 9.7	1440 Winter	100	+10%	30/15 Summer				77.394
9.008	S 9.8	1440 Winter	100	+10%	30/15 Summer				77.392

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
7.000	S 7.0	0.612	0.000	0.59			35.0	SURCHARGED	
7.001	S 7.1	0.703	0.000	1.38			82.4	SURCHARGED	
7.002	S 7.2	0.569	0.000	1.24			121.7	SURCHARGED	
7.003	S 7.3	0.503	0.000	1.54			145.2	SURCHARGED	
7.004	S 7.4	0.382	0.000	1.51			152.0	SURCHARGED	
8.000	S 8.0	0.477	0.000	0.65			38.4	SURCHARGED	
8.001	S 8.1	0.559	0.000	1.53			91.5	SURCHARGED	
8.002	S 8.2	0.349	0.000	1.36			133.1	SURCHARGED	
8.003	S 8.3	0.220	0.000	1.66			157.2	SURCHARGED	
7.005	S 7.5	0.069	0.000	1.25			309.1	SURCHARGED	
7.006	S 7.6	0.035	0.000	1.91			310.1	SURCHARGED	
7.007	S 7.7	0.002	0.000	1.85			310.0	SURCHARGED	
9.000	S 9.0	1.386	0.000	1.12			65.9	SURCHARGED	
9.001	S 9.1	1.356	0.000	2.14			126.0	SURCHARGED	
9.002	S 9.2	0.932	0.000	1.92			178.0	SURCHARGED	
9.003	S 9.3	0.758	0.000	1.63			236.3	SURCHARGED	
9.004	S 9.4	0.607	0.000	2.13			295.5	SURCHARGED	
9.005	S 9.5	0.570	0.000	0.12			24.2	SURCHARGED	
9.006	S 9.6	0.607	0.000	0.09			24.8	SURCHARGED	
9.007	S 9.7	0.697	0.000	0.10			26.3	SURCHARGED	
9.008	S 9.8	0.827	0.000	0.13			27.9	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
10.000	S 10.0	15 Winter	100	+10%				
10.001	S 10.1	15 Winter	100	+10%				
10.002	S 10.2	15 Winter	100	+10%	100/15 Winter			
10.003	S 10.3	15 Winter	100	+10%	100/15 Summer			
10.004	S 10.4	15 Winter	100	+10%	100/15 Summer			
10.005	S 10.5	1440 Winter	100	+10%	30/15 Winter			
10.006	S 10.6	1440 Winter	100	+10%	30/15 Winter			
11.000	S 11.0	1440 Winter	100	+10%				
12.000	S 12.0	15 Winter	100	+10%				
11.001	S 11.1	1440 Winter	100	+10%				
11.002	S 11.2	1440 Winter	100	+10%	100/30 Winter			
11.003	S 11.3	1440 Winter	100	+10%	100/15 Winter			
10.007	S 10.7	1440 Winter	100	+10%	30/15 Winter			
10.008	S 10.8	1440 Winter	100	+10%	30/15 Winter			
10.009	S 10.9	1440 Winter	100	+10%	30/15 Winter			
10.010	S 10.10	1440 Winter	100	+10%	30/15 Summer			
9.009	S 9.9	1440 Winter	100	+10%	30/15 Summer			
13.000	S 13.0	1440 Winter	100	+10%	30/15 Summer			
7.008	S 7.8	1440 Winter	100	+10%	1/60 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
10.000	S 10.0	77.500	-0.091	0.000	0.21			12.2	OK
10.001	S 10.1	77.491	-0.002	0.000	0.49			28.9	OK
10.002	S 10.2	77.481	0.119	0.000	0.54			48.7	SURCHARGED
10.003	S 10.3	77.461	0.198	0.000	0.83			77.1	SURCHARGED
10.004	S 10.4	77.403	0.288	0.000	0.99			91.5	SURCHARGED
10.005	S 10.5	77.398	0.409	0.000	0.12			10.1	SURCHARGED
10.006	S 10.6	77.397	0.484	0.000	0.10			11.3	SURCHARGED
11.000	S 11.0	77.397	-0.106	0.000	0.00			0.3	OK
12.000	S 12.0	77.411	-0.121	0.000	0.43			13.9	OK
11.001	S 11.1	77.397	-0.050	0.000	0.03			2.0	OK
11.002	S 11.2	77.397	0.178	0.000	0.05			2.8	SURCHARGED
11.003	S 11.3	77.397	0.240	0.000	0.06			3.3	SURCHARGED
10.007	S 10.7	77.396	0.525	0.000	0.11			16.2	SURCHARGED
10.008	S 10.8	77.395	0.621	0.000	0.13			17.9	SURCHARGED
10.009	S 10.9	77.393	0.714	0.000	0.08			20.5	SURCHARGED
10.010	S 10.10	77.392	0.787	0.000	0.09			22.3	SURCHARGED
9.009	S 9.9	77.392	0.867	0.000	0.33			52.6	SURCHARGED
13.000	S 13.0	77.392	0.956	0.000	0.15			21.1	SURCHARGED
7.008	S 7.8	77.390	1.290	0.000	0.26			16.4	FLOOD RISK

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network 2

PN	US/MH Name	Level Exceeded
10.000	S 10.0	
10.001	S 10.1	
10.002	S 10.2	
10.003	S 10.3	
10.004	S 10.4	
10.005	S 10.5	
10.006	S 10.6	
11.000	S 11.0	
12.000	S 12.0	
11.001	S 11.1	
11.002	S 11.2	
11.003	S 11.3	
10.007	S 10.7	
10.008	S 10.8	
10.009	S 10.9	
10.010	S 10.10	
9.009	S 9.9	
13.000	S 13.0	
7.008	S 7.8	

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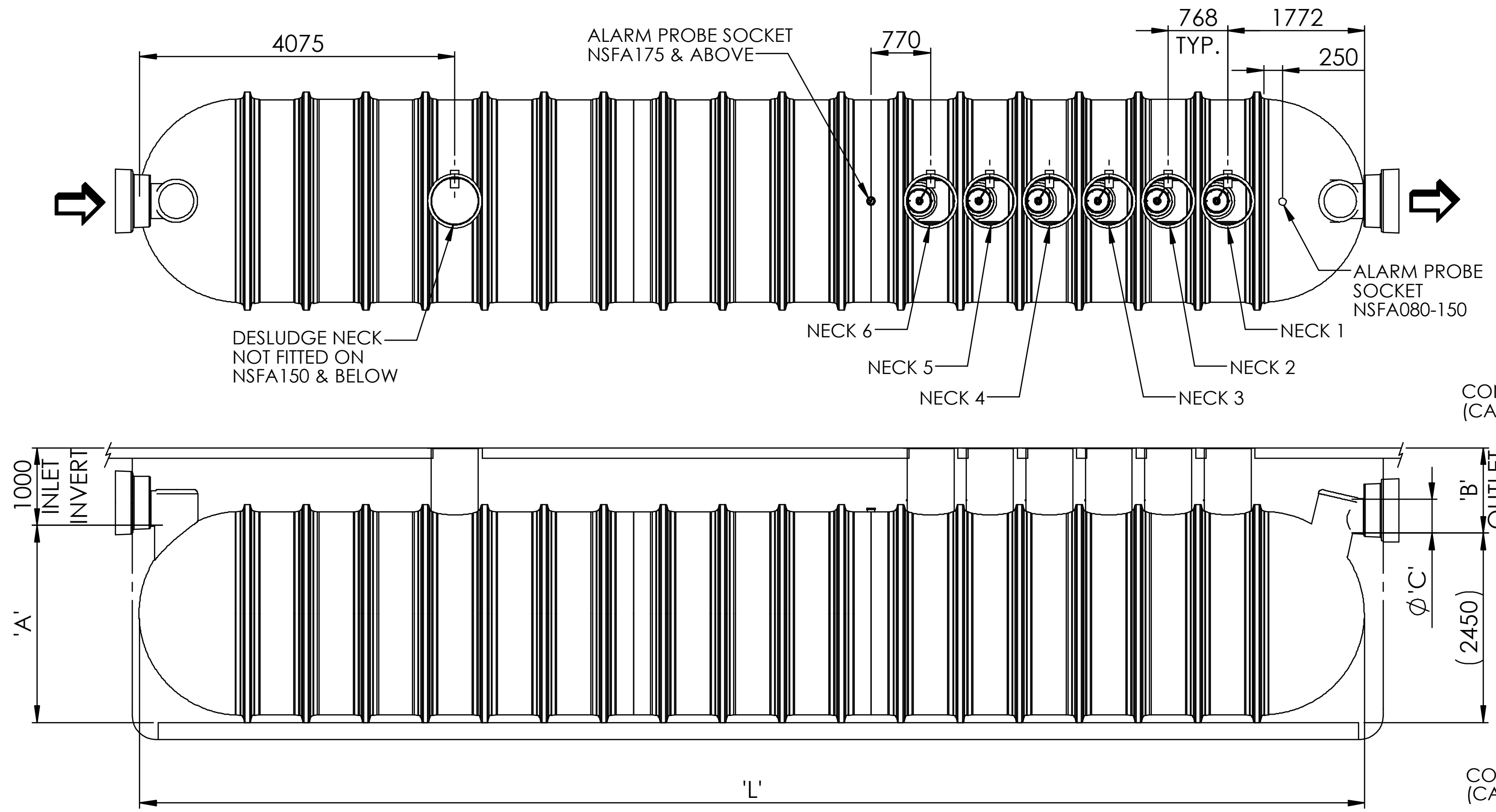
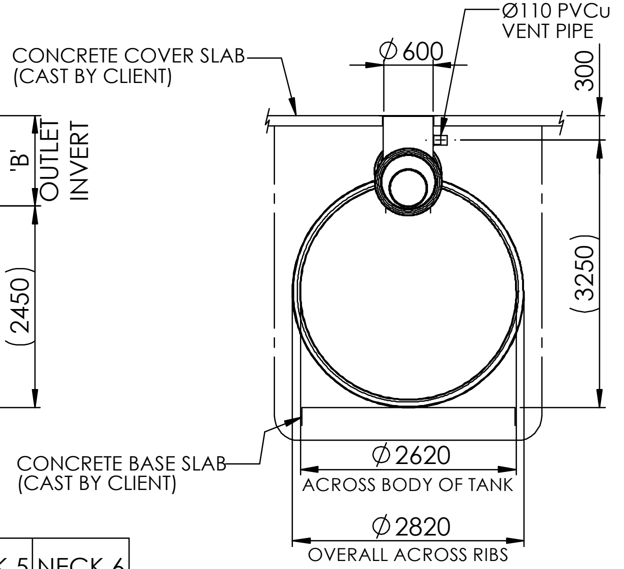
Appendix B – Hydrocarbon Interceptor Details



NOTES

1. BS EN 858 STATES MINIMUM CONNECTION SIZES, UNITS ORDERED WITH DIFFERENT SIZE CONNECTIONS ARE NOT FULLY COMPLIANT WITH THE STANDARD. ALTERNATIVE CONNECTORS MAY BE ORDERED.
2. EXTENSION NECKS FOR DEEPER INVERTS CAN BE PROVIDED IN 0.5m INCREMENTS FOR ON SITE ASSEMBLY. MAX 2.0m INVERT RECOMMENDED.
3. ALL UNITS REQUIRE APPROPRIATE COVER & FRAME TO SUIT APPLIED LOADINGS.
4. THIS DRAWING SHOULD BE USED FOR DIMENSIONAL INFORMATION ONLY. IT IS ESSENTIAL THAT THIS DRAWING IS READ IN CONJUNCTION WITH INSTALLATION GUIDELINES SUPPLIED WITH THE UNIT (COPIES ARE AVAILABLE FROM OUR SALES DEPT.).
5. STANDARD PIPE ORIENTATION SHOWN. FOR OTHER AVAILABLE OPTIONS SEE TDS0033.
6. THIS DRAWING IS ALSO AVAILABLE ON OUR WEBSITE www.kingspanenv.com



UNIT REF.	UNIT CLASS	NOMINAL FLOW RATE (L/s)	APPROX. EMPTY WEIGHT (kg)	'L' OVERALL LENGTH	'A' BASE TO INLET INVERT	'B' OUTLET INVERT	'C' STD. PIPE DIA. (GRP)	NECK 1 FITTED	NECK 2 FITTED	NECK 3 FITTED	NECK 4 FITTED	NECK 5 FITTED	NECK 6 FITTED
NSFA080	1	80	1250	5744	2500	1050	300	✓	✓				
NSFA100	1	100	1350	6200	2500	1050	375/400	✓	✓				
NSFA125	1	125	1700	7365	2500	1050	450	✓	✓	✓			
NSFA150	1	150	2000	8675	2550	1100	500/525	✓	✓	✓			
NSFA175	1	175	2400	9975	2550	1100	500/525	✓	✓	✓	✓		
NSFA200	1	200	2700	11280	2550	1100	600	✓	✓	✓	✓		
NSFA210	1	210	2900	11994	2550	1100	600	✓	✓	✓	✓	✓	
NSFA225	1	225	3100	12766	2550	1100	600	✓	✓	✓	✓	✓	
NSFA240	1	240	3300	13582	2550	1100	600	✓	✓	✓	✓	✓	
NSFA255	1	255	3450	14300	2550	1100	600	✓	✓	✓	✓	✓	✓
NSFA270	1	270	3600	15071	2550	1100	600	✓	✓	✓	✓	✓	✓
NSFA285	1	285	3800	15833	2550	1100	600	✓	✓	✓	✓	✓	✓

Please check with Kingspan Environmental For The Latest Issue Of This Drawing

Issue	Date	Drawn by	Description
04	11.03.19	T.Kelly	CC1444 - Units now built to 1.0m Invert First Fix
03	03.04.18	T.Kelly	CC1425 - Units 210 to 285 Added : Class 2 Reference Deleted

Material : n/a
Finish : n/a
Weight : n/a
Tolerance : n/a
Thickness : n/a
Surface Area : n/a

Drawing : DS0896P

NSFA080 - NSFA285 Full Retention Separators

All dimensions in mm

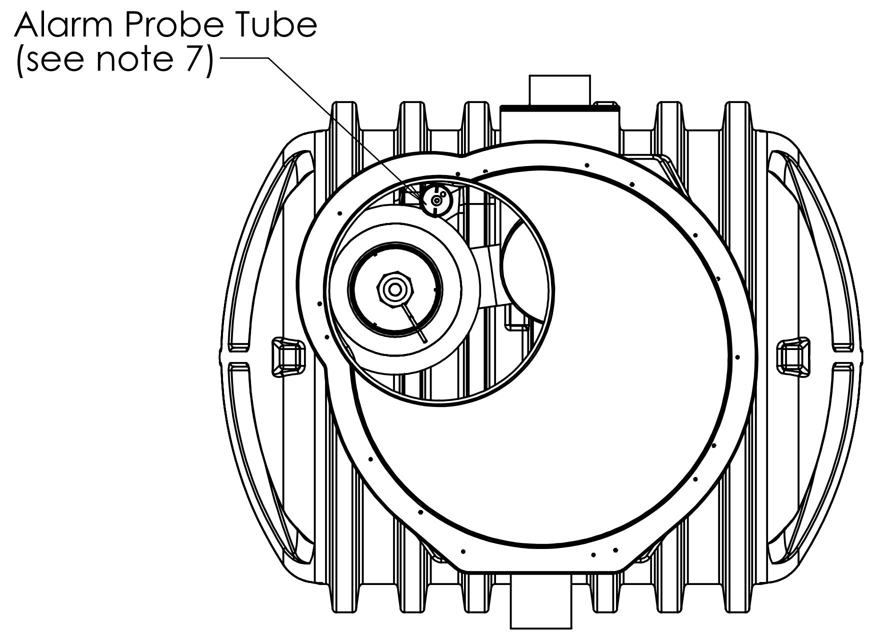
Scale: Not to scale

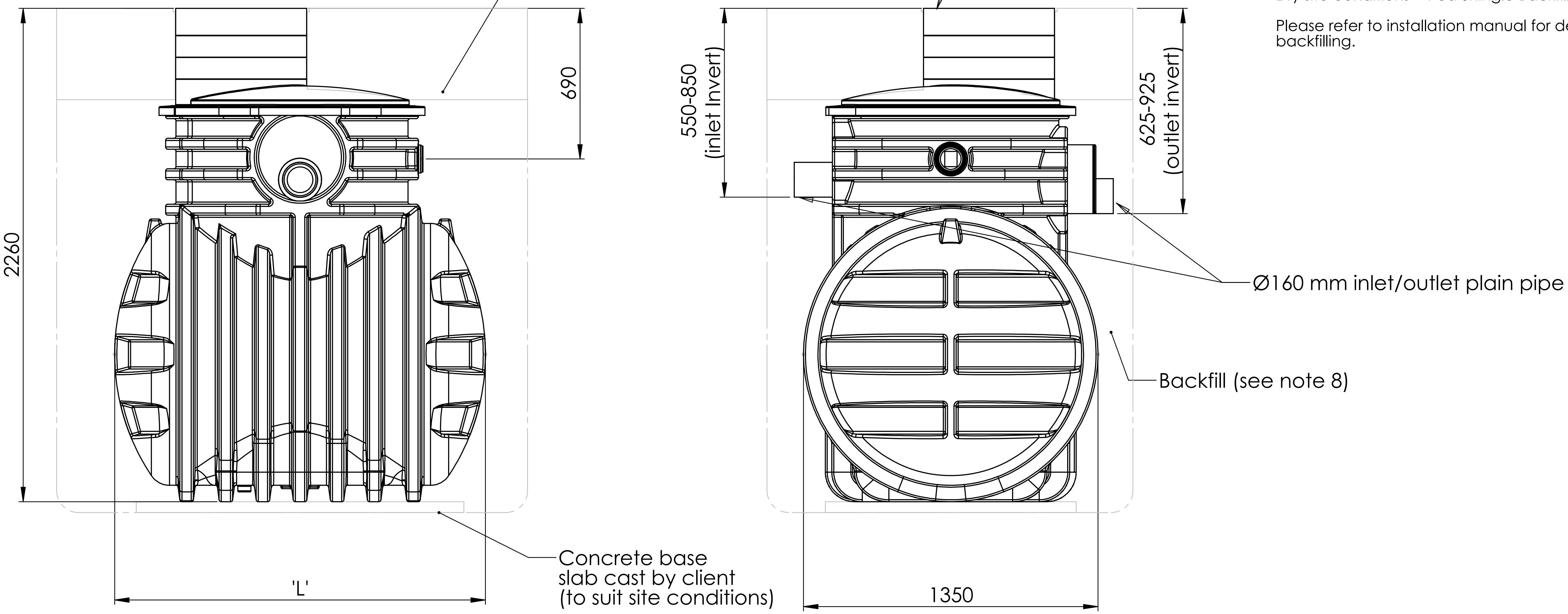
Kingspan reserve the right to alter the details of this drawing without prior notice. This drawing is copyright and may not be reproduced or used without the written permission of Kingspan.

Kingspan Environmental

R:\Drawing Data\02 - Sales Drawings\DS\DS - 08\DS0896P NSFA080-285 Full Retention Separators

Unit Ref No	Nominal Flow	Dim L (mm)	Approx Empty Weight (kgs)	Fall across unit
NSFP003	3 L/s	1700	180	75
NSFP006	6 L/s	1700	180	75





Notes:-

1. Inlet/Outlet pipes are plain pipe ∅160 mm PVCu. The standard EN 858 states minimum connection sizes, units ordered with different sized connections are not fully compliant with the standard.

2. Extension necks for deeper inverts can be provided. These can be cut in 200 mm sections. Max 2.0m Invert recommended. Please ask our sales department for further details.

3. All units require appropriate cover and frame to suit applied loadings.

4. This drawing should be used for dimensional information only.It is essential that this drawing is read in conjunction with the installation guidelines supplied with the unit.(Copies are available from our sales dept.).

5. This drawing is also available on our website www.kingspanenv.com.

6. A ∅76 mm tube (internal) is supplied to house an oil alarm probe.

7. Wet site conditions - Concrete Backfill
Dry site conditions - Pea Shingle Backfill

Please refer to installation manual for details of correct backfilling.

Please check with Kingspan Environmental that this drawing is the latest issue

Issue	Date	Drawn by	Approved by	Description
04	15/12/10	S.Gill		CC934
03	24/02/10	S. Gill		CC794
02	23/09/09	S.Gill		Drawing Description Changed/Table Corrected
01	19/03/09	S.Gill		Initial Release

All dimensions in mm

Scale: Not to scale

Material : n/a
Finish : n/a
Weight : Kgs n/a

Tolerance : n/a
Thickness : n/a
Surface Area : n/a

Drawing : NSFP 003-006 Sales Drawing

Page 1 of 1

Drg No - DSO992

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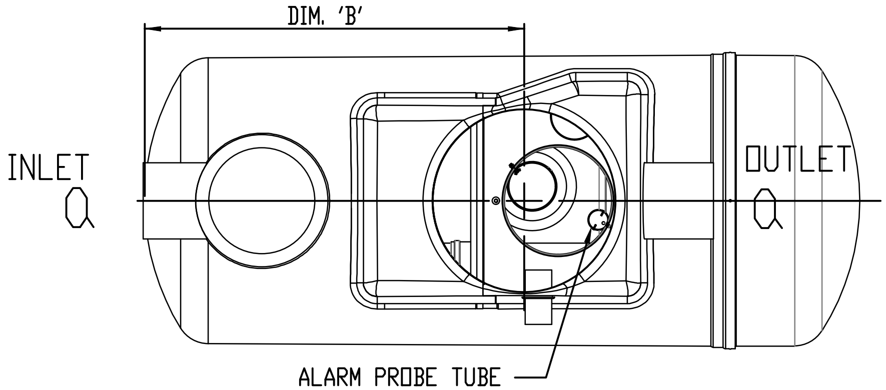
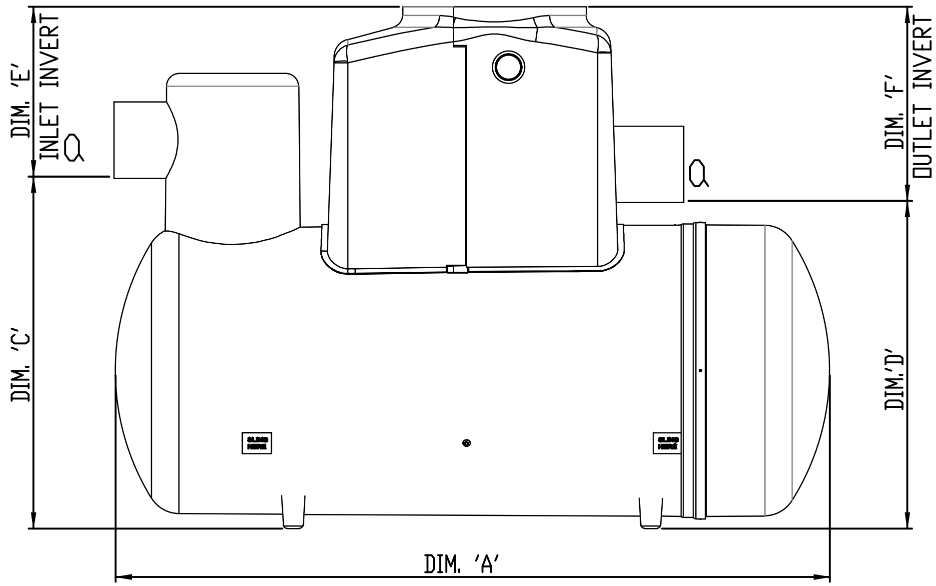
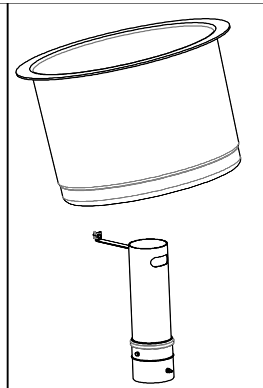
Kingspan Environmental

Y:\engineering\Drawing Data\02 - Sales Drawings\DS\DS - 09\DS0992 NSFP003-NSFP006 Full retention Seperators Sales Drawing

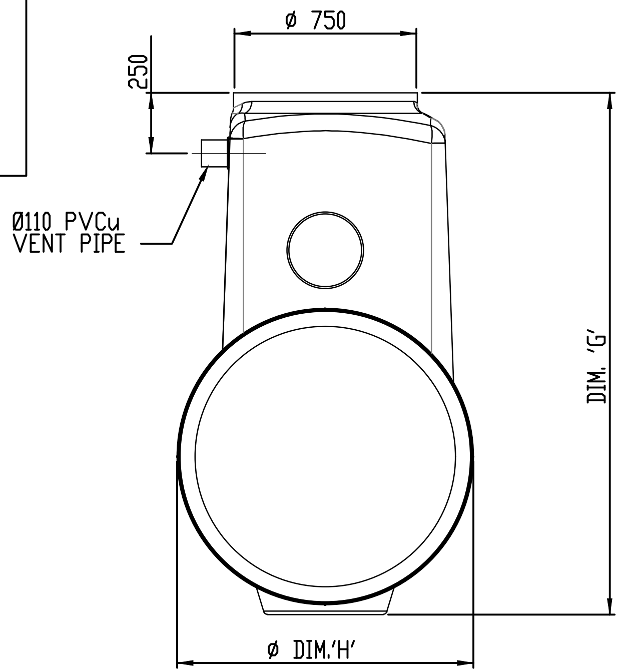






EXTENSION PARTS (IF REQUIRED) INCLUDED IN PRODUCT CODE

NOTES
1. UNITS ARE SUPPLIED WITH THE STANDARD (MINIMUM) PIPEWORK SIZE, AND ORIENTATION SHOWN ON THE DRAWING. THE STANDARD EN858-1 STATES MINIMUM CONNECTION SIZES, UNITS ORDERED WITH DIFFERENT SIZE CONNECTIONS MAY NOT BE FULLY COMPLIANT WITH THE STANDARD. PLEASE CONSULT OUR SALES DEPARTMENT FOR DETAILS OF AVAILABLE OPTIONS, BUT PLEASE NOTE WE DO NOT ALTER INTERNAL PIPEWORK.
2. ALL UNITS SUPPLIED ARE CLASS 1 AND INCLUDE A COALESCER.
3. EXTENSION PARTS FOR DEEPER INVERTS CAN BE PROVIDED FOR ON SITE ASSEMBLY.
4. ALL UNITS REQUIRE APPROPRIATE CONCRETE BASE, COVER AND FRAME TO SUIT APPLIED LOADINGS.
5. THIS DRAWING SHOULD BE USED FOR DIMENSIONAL INFORMATION ONLY.
6. A Ø76mm TUBE IS SUPPLIED TO HOUSE AN OIL ALARM PROBE.



UNIT	NOMINAL FLOW (l/sec.)	DIM.'A'	DIM.'B'	DIM.'C'	DIM.'D'	DIM.'E'	DIM.'F'	DIM.'G'	DIM.'H'	STD. PIPE Ø	APPROX. EMPTY WEIGHT (kg)	FALL ACROSS UNIT
NSBE010	10.0	2069	1096	1450	1350	700	800	2150	1220	315	160	100
NSBE015	15.0	2947	1560	1450	1350	700	800	2150	1220	315	200	100
NSBE020	20.0	3893	2016	1450	1350	700	800	2150	1220	375	220	100

Please check with Kingspan Environmental that this drawing is the latest issue

Issue	Date	Drawn by	Approved by	Description
03	14.09.12	T.Kelly		CC1081 - Inlet neck added & Std pipe for NSBE020 375 was 315
02	20.08.12	CS		CC981 - Pipe work up date from 160 & 200 to 315dia.
01	27.07.11	T.Kelly		CC981 - Initial Release

Material : Various
Finish :
Weight :

Tolerance :
Thickness : n/a
Surface Area :

Drawing : DS1155

NSBE010 - NSBE020 Bypass Separators

All dimensions in mm

Scale: Not to scale

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X:\engineering\Drawing Data\02 - Sales Drawings\DS\DS - 11\DS1155 NSBE010-020 Bypass Separators

Appendix C – Solid Separator Details

CDS Dimensions (mm)

	CDS10404	CDS0604	CDS0606	CDS0804	CDS0806	CDS0808	CDS1010	CDS1012	CDS1015
A	370	370	370	370	370	370	500	500	500
B	444	815	615	810	830	810	800	800	830
C	1250	1985	1985	2080	2300	2480	2800	3000	3330
D	800	1200	200	1500	1500	1500	2000	2000	2000
E	1112	1665	1665	1966	1966	1966	2475	2475	2475
F	400	700	700	700	700	800	1000	1000	1000
G (dia)	400	600	600	800	800	800	1000	1000	1000
H	400	400	600	400	600	800	1000	1200	1500

Selection Table — CDS Polypropylene Manhole Units

Model Reference	Hydraulic Peak Flow Rate l/s	Treatment Flow Rate l/s	Drainage Area — Impermeable m²	Chamber Diameter (mm)	Internal Pipe Diameter (mm)
CDS 0404	30	12.5	2,000	900	150/225
CDS 0604	70	23	5,000	1200	225
CDS 0606/01	140	38	10,000	1200	225-375
CDS 0606/02	200	38	15,000	1200	225-375
CDS 0806	350	49	25,000	1500	450
CDS 0808	400	72	30,000	1500	450
CDS 1010	480	116	35,000	2000	450
CDS 1012	550	157	40,000	2000	450/750
CDS 1015	700	211	50,000	2000	450/750
CDS 0804	275	31	20,000	1500	300

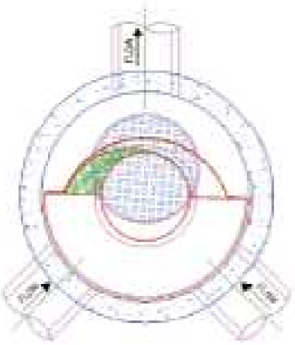
Proposed Peak Flow Rate for each model calculated using Rational Lloyd Davis with a rainfall intensity of 50mm/hr. For greater flows — special design/ construction required.

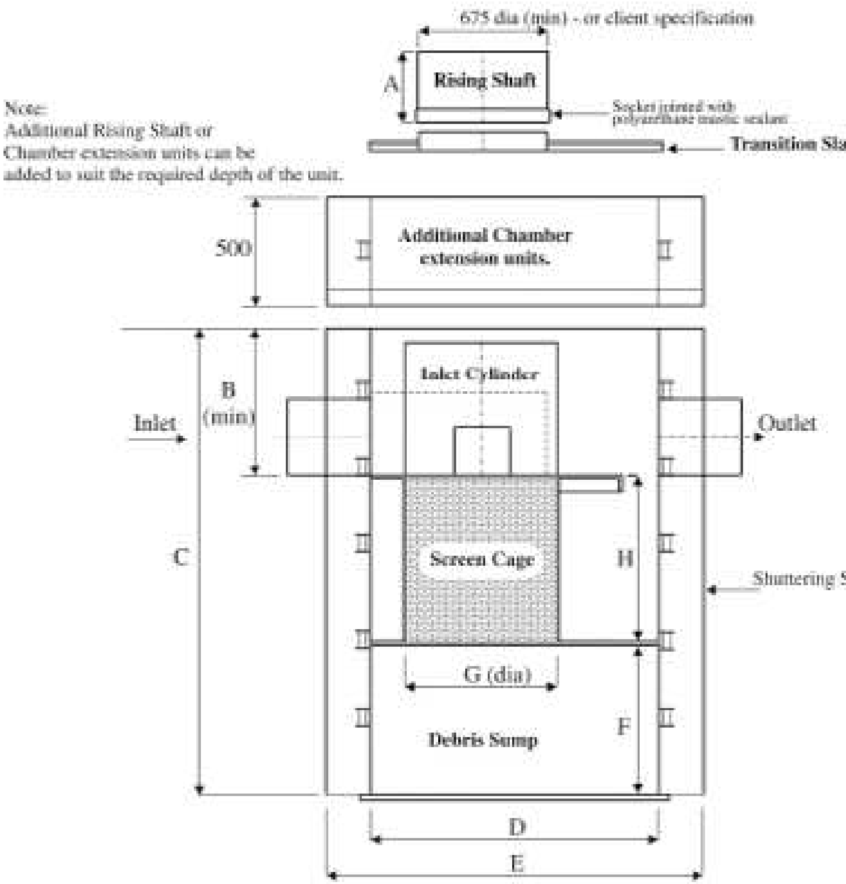
In-Line CDS

For small catchment, these units are used within the drainage system in-line and are supplied as BBA Approved* complete manhole polypropylene units from the selection table above.

Off-Line CDS

Larger catchment areas and retrofit projects designed with larger surface runoff conveyance capacity can receive treatment using a CDS unit placed adjacent to the storm pipeline. Water is channeled to these offline CDS configurations using a diversion structure. The diversion structure and its weir send the water quality flow to the offline CDS unit and also ensure larger flow events from less frequent storm events properly bypass the offline unit without cause flooding upstream of the unit.





Model Designation

A four digit number representing the screen diameter and screen height then follows to give the standard model designation for a CDS screen for installation into standard commercially available pre-fabricated manhole chambers. Example: CDS 0806 designates a separation screen dia. 0.8 m and screen height of 0.6m.

Support

- Drawings and specifications are available at contechstormwater.com.
- Site-specific design support is available from our engineers.

800.338.1122
contechstormwater.com

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Nothing in this catalog should be construed as an expressed warranty or an implied warranty of merchantability or fitness for any particular purpose. See the CONTECH standard quotation or acknowledgement for applicable warranties and other terms and conditions of sale.

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266 related foreign patents or other patents pending.

CDS is a trademark of CONTECH Construction Products Inc.

Appendix D – QBAR Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

HR Wallingford
Working with water

Calculated by:	Conor Doherty
Site name:	DUB 40
Site location:	Huntstown

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.41135° N
Longitude:	6.32112° W
Reference:	1307439049
Date:	Feb 23 2021 14:37

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	12.85

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	935	822
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.13	2.13
Growth curve factor 100 years:	2.61	2.61
Growth curve factor 200 years:	2.86	2.86

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	32.86	28.26
1 in 1 year (l/s):	27.93	24.02
1 in 30 years (l/s):	69.99	60.2
1 in 100 year (l/s):	85.76	73.76
1 in 200 years (l/s):	93.97	80.83

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix E – Flow Control Devise Details

Technical Specification

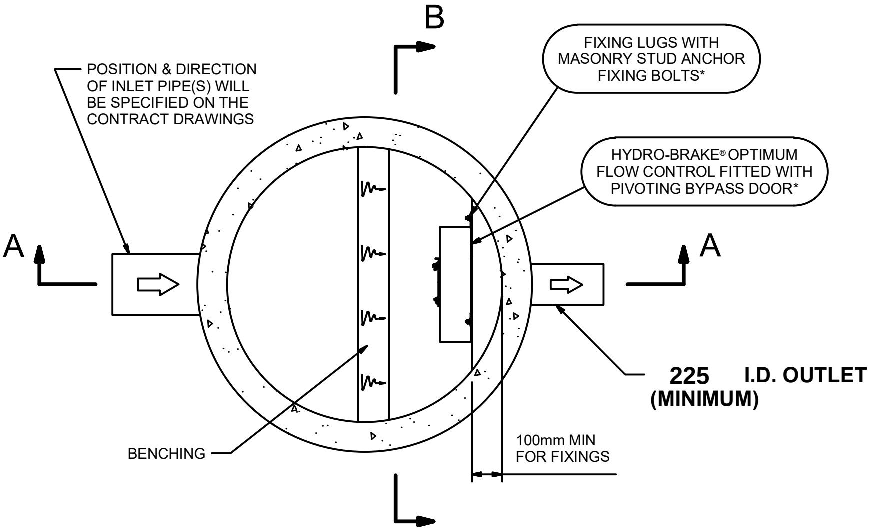
Control Point	Head (m)	Flow (l/s)
Primary Design	2.000	11.988
Flush-Flo™	0.583	11.986
Kick-Flo®	1.209	9.456
Mean Flow		10.499

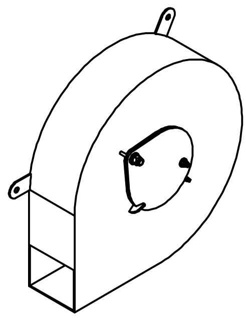
Hydro-Brake® Optimum Flow Control including:

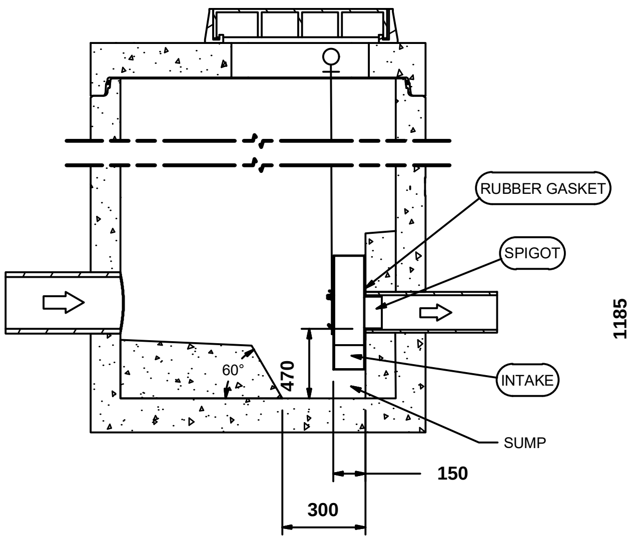
- 5 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet

CERTIFICATE 08/4596

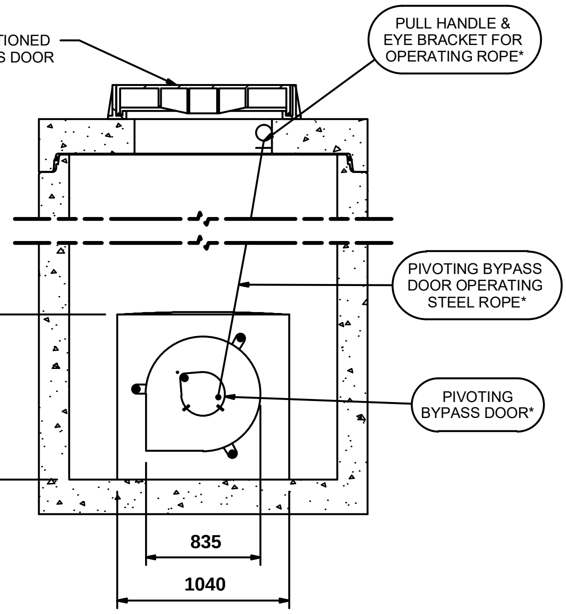
PT/329/0412







SECTION A-A



SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE !

The head/flow characteristics of this SHE-0143-1200-2000-1200 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

DATE	04/03/2021 09:26:45
SITE	
DESIGNER	Debbie Henry
REF	Hydrobrake 1

SHE-0143-1200-2000-1200

Hydro-Brake® Optimum

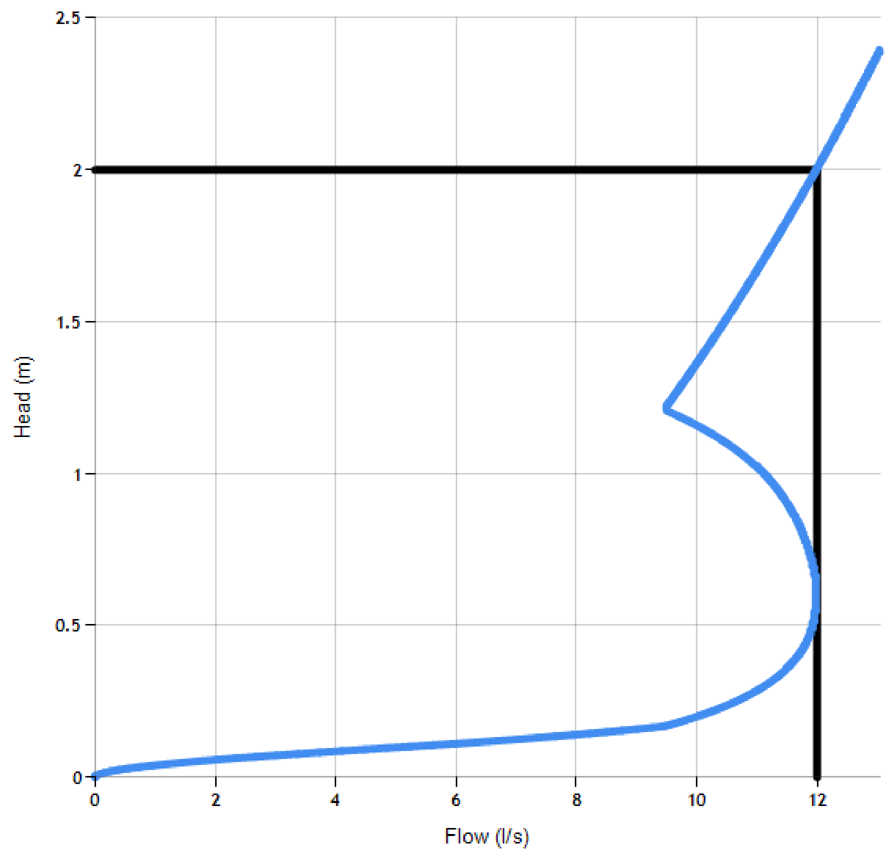
© 2021 Hydro International Ltd, Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD. Tel; 01275 878371 Fax; 01275 874979 Web; www.hydro-int.com Email; enquiries@hydro-int.com

dhenry@hydro-int.com

Technical Specification		
Control Point	Head (m)	Flow (l/s)
Primary Design	2.000	11.988
Flush-Flo™	0.583	11.986
Kick-Flo®	1.209	9.456
Mean Flow		10.499

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

WRc APPROVED
PT/329/0412



Head (m)	Flow (l/s)
0.000	0.000
0.069	2.789
0.138	7.861
0.207	10.108
0.276	10.912
0.345	11.425
0.414	11.738
0.483	11.909
0.552	11.979
0.621	11.978
0.690	11.924
0.759	11.829
0.828	11.693
0.897	11.509
0.966	11.259
1.034	10.921
1.103	10.466
1.172	9.864
1.241	9.575
1.310	9.821
1.379	10.061
1.448	10.294
1.517	10.522
1.586	10.745
1.655	10.963
1.724	11.176
1.793	11.385
1.862	11.589
1.931	11.790
2.000	11.988

DESIGN ADVICE !

The head/flow characteristics of this SHE-0143-1200-2000-1200 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	04/03/2021 09:26:45
SITE	
DESIGNER	Debbie Henry
REF	Hydrobrake 1

SHE-0143-1200-2000-1200

Hydro-Brake Optimum®

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Hydro International, Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD. Tel 01275 878371 Fax 01275 874979 Web www.hydro-int.com Email enquiries@hydro-int.com

dhenry@hydro-int.com

Technical Specification

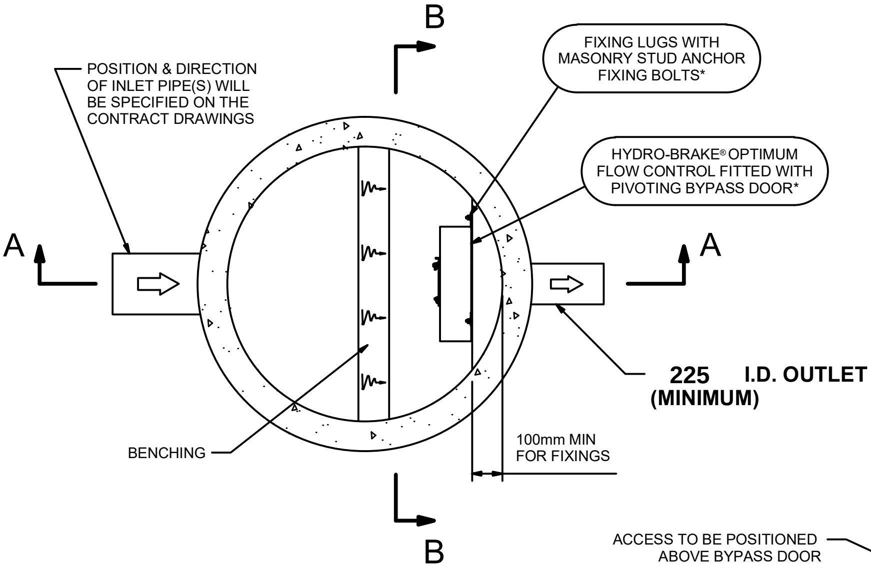
Control Point	Head (m)	Flow (l/s)
Primary Design	1.600	16.456
Flush-Flo™	0.474	16.466
Kick-Flo®	1.020	13.299
Mean Flow		14.303

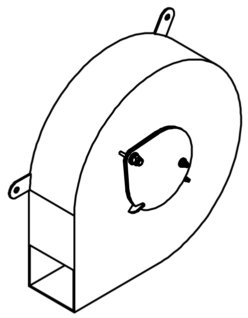
Hydro-Brake® Optimum Flow Control including:

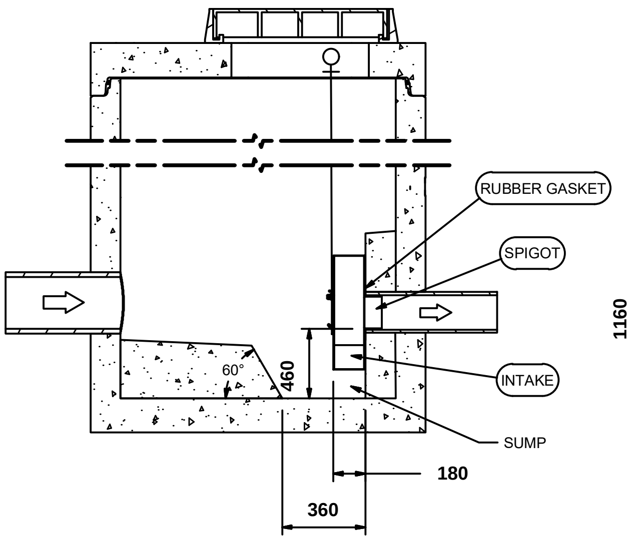
- 5 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

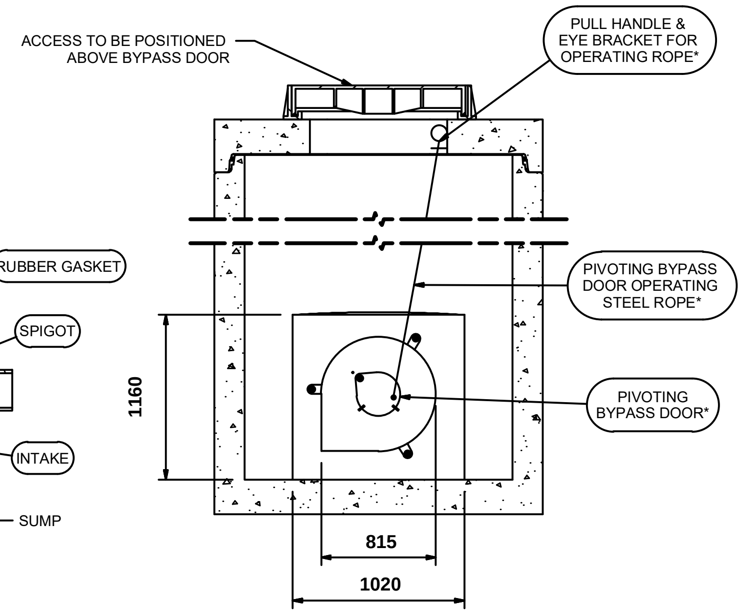
WRc Approved PT/329/0412







SECTION A-A



SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
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FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE !

The head/flow characteristics of this SHE-0174-1650-1600-1650 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	04/03/2021 09:28:21
SITE	
DESIGNER	Debbie Henry
REF	Hydrobrake 2

SHE-0174-1650-1600-1650

Hydro-Brake® Optimum

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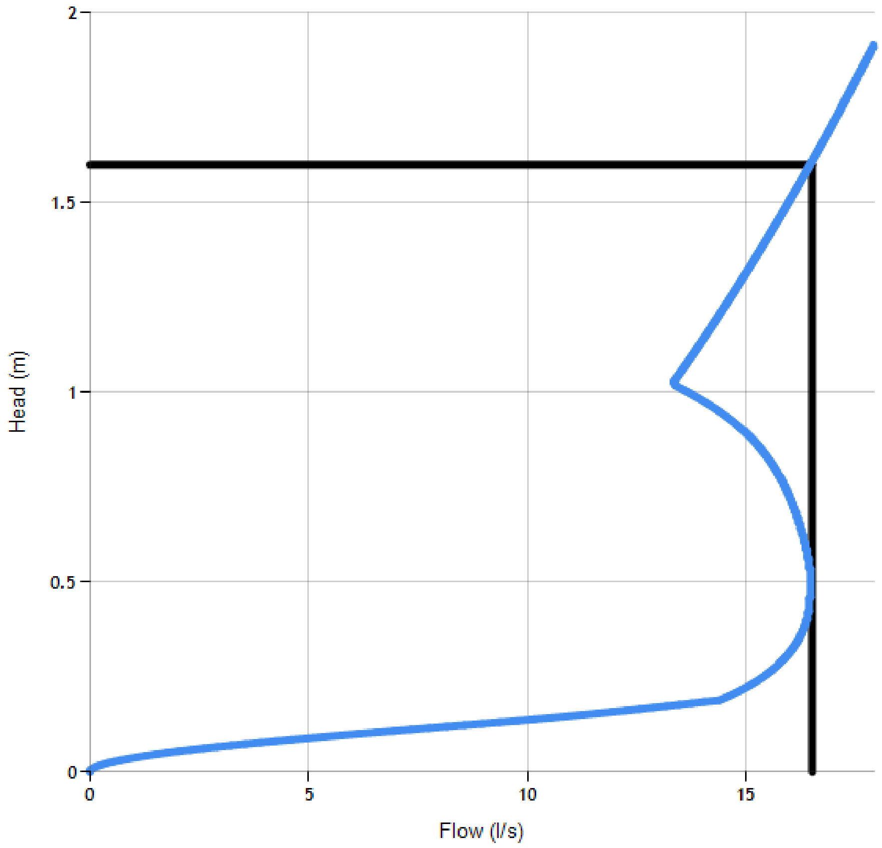
dhenry@hydro-int.com

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.600	16.456
Flush-Flo™	0.474	16.466
Kick-Flo®	1.020	13.299
Mean Flow		14.303

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

WRc APPROVED
PT/329/0412



Head (m)	Flow (l/s)
0.000	0.000
0.055	2.122
0.110	7.230
0.166	12.589
0.221	14.961
0.276	15.666
0.331	16.101
0.386	16.344
0.441	16.450
0.497	16.460
0.552	16.404
0.607	16.303
0.662	16.165
0.717	15.990
0.772	15.766
0.828	15.468
0.883	15.065
0.938	14.514
0.993	13.774
1.048	13.471
1.103	13.801
1.159	14.123
1.214	14.437
1.269	14.743
1.324	15.043
1.379	15.337
1.434	15.625
1.490	15.907
1.545	16.184
1.600	16.456

DESIGN ADVICE !

The head/flow characteristics of this SHE-0174-1650-1600-1650 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International ®

DATE	04/03/2021 09:28:21
SITE	
DESIGNER	Debbie Henry
REF	Hydrobrake 2

SHE-0174-1650-1600-1650

Hydro-Brake Optimum®

© 2021 Hydro International, Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD. Tel 01275 878371 Fax 01275 874979 Web www.hydro-int.com Email enquiries@hydro-int.com

dhenry@hydro-int.com

Appendix F – Irish Water Confirmation of Feasibility

Philip Corr

Seafort Lodge
Castledawson Avenue
Blackrock
Co. Dublin
A94P768

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

31 March 2021

Re: CDS20004468 pre-connection enquiry - Subject to contract   Contract denied

Connection for Business Connection of 3 units at Huntstown, Dublin, Co. Dublin

Dear Sir/Madam,

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

SER ICE	**OUTCOME OF PRE-CONNECTION ENQUIR** **THIS IS NOT A CONNECTION OFFER. OU MUST APPL FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF OU WISH TO PROCEED.**
Water Connection	Feasible Subject to upgrades
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
Water Connection	Approx. 1500m of new 450mm ID pipe main to replace the existing 6” uPVC main as shown below (red dashed line) will be required. This new 450mm will be connected to the existing 450mm DI main.

Stiúrthóirí / Directors: Cathal Marley (Chairman), Niall Gleeson, Eamon Gallen, Yvonne Harris, Brendan Murphy, Maria O'Dwyer
Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, D01 NP86
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.
Uimhir Chláraithe in Éirinn / Registered in Ireland No.: 530363

IW-HP-BUS

REV012

Upgrade of pumps at Balleycoolen Highlands Tower will be required.

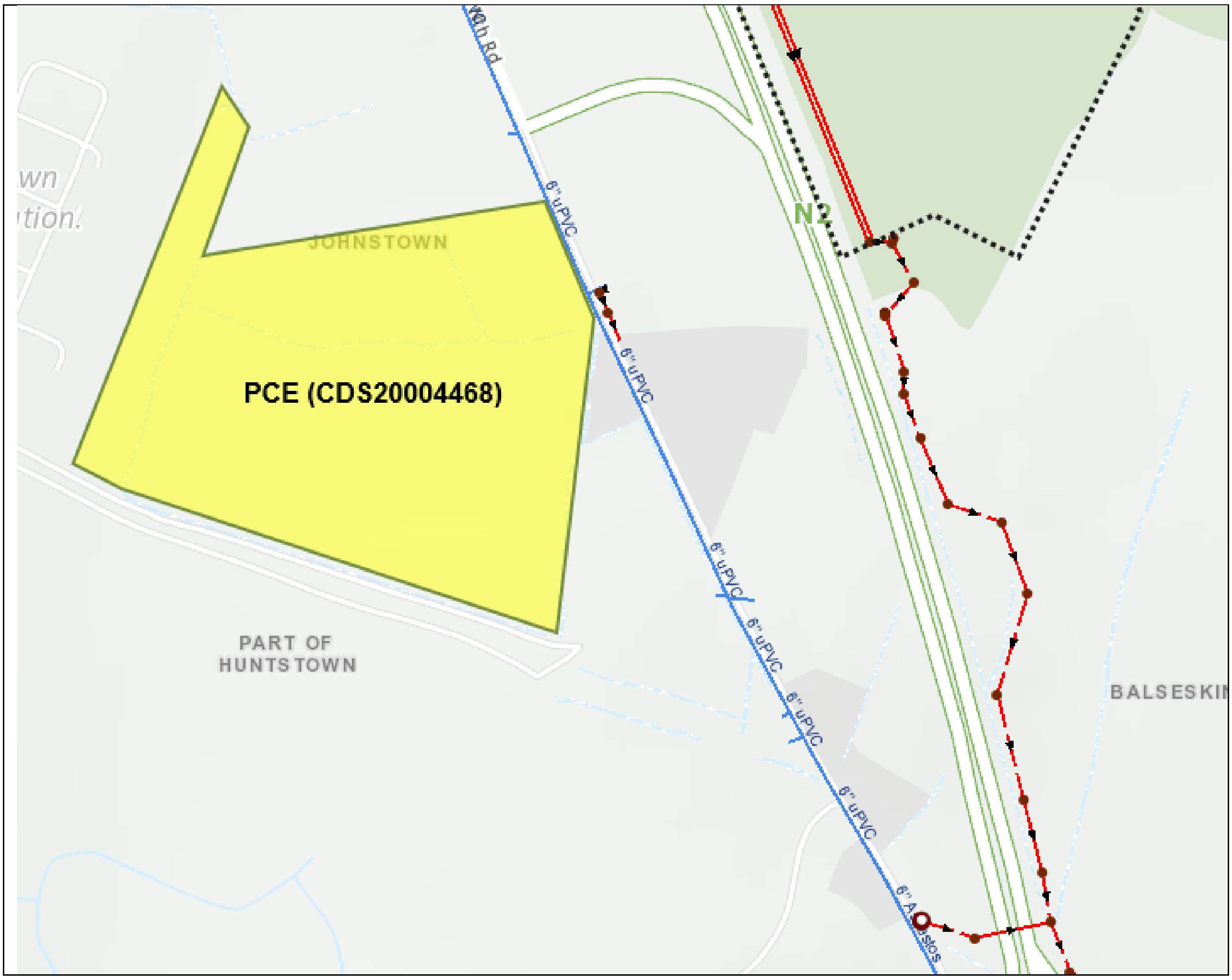
The Developer has to fund a portion of the upgrade works. That will be determined at a connection application stage, based on the peak flow and other connection applications in Hunstown SDZ at that time.

On-site water storage will be required for the average day peak week demand rate of the commercial section for 24-hour period with a re-fill time of 12 hours.

New bulk meter and associated telemetry system will be required to be installed along this connection main.

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

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



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

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

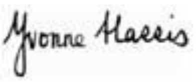
General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.

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

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

Yours sincerely,



vonne Harris

Head of Customer Operations

Appendix G – Foul Drainage Calculations

TITLE							Project Number				Revision	Date
Project	Data Centre at Huntstown						20_099				Planning	07/05/2021
SUBJECT												
Public Gravity Sewer Capacity Check												
Irish Water Code of Practice for Wastewater Infrasturcture (IW_CDS-5030-03)												
Note:												
k_s =	0.0015	m										

CLIFTON SCANNELL EMERSON ASSOCIATES
Consulting Engineers
E-mail: info@csea.ie Web: www.csea.ie

Pipe Section	Dist (m)	Slope (1/X)	Piezo Gradient	Pipe Dia (mm)	Pipe Dia (m)	Flow (l/s)	Full Cap (l/s)	Adequate Capacity?	Full Vel (m/s)	Prop Discharge <0.8	Prop Vel (m/s)	Actual Vel (m/s)	Self Cleansing >0.75m/s	Notes
Domestic Foul														
F1.1-F1.3	135.0	80.0	0.013	150.0	0.150	3.70	17.309	✓	0.98	0.21	0.77	0.76	✓	
F1.3-F1.4	76.0	100.0	0.010	150.0	0.150	5.32	15.470	✓	0.88	0.34	0.90	0.79	✓	
F2.0-F2.5	50.0	80.0	0.013	100.0	0.100	4.75	5.839	✓	0.74	0.81	1.10	0.82	✓	**
CWD Drainage														
CWD	76.0	200.0	0.005	225.0	0.225	19.00	32.193	✓	0.81	0.59	1.04	0.84	✓	

Notes:

Proportional Discharge = Actual Discharge/Full Bore Discharge

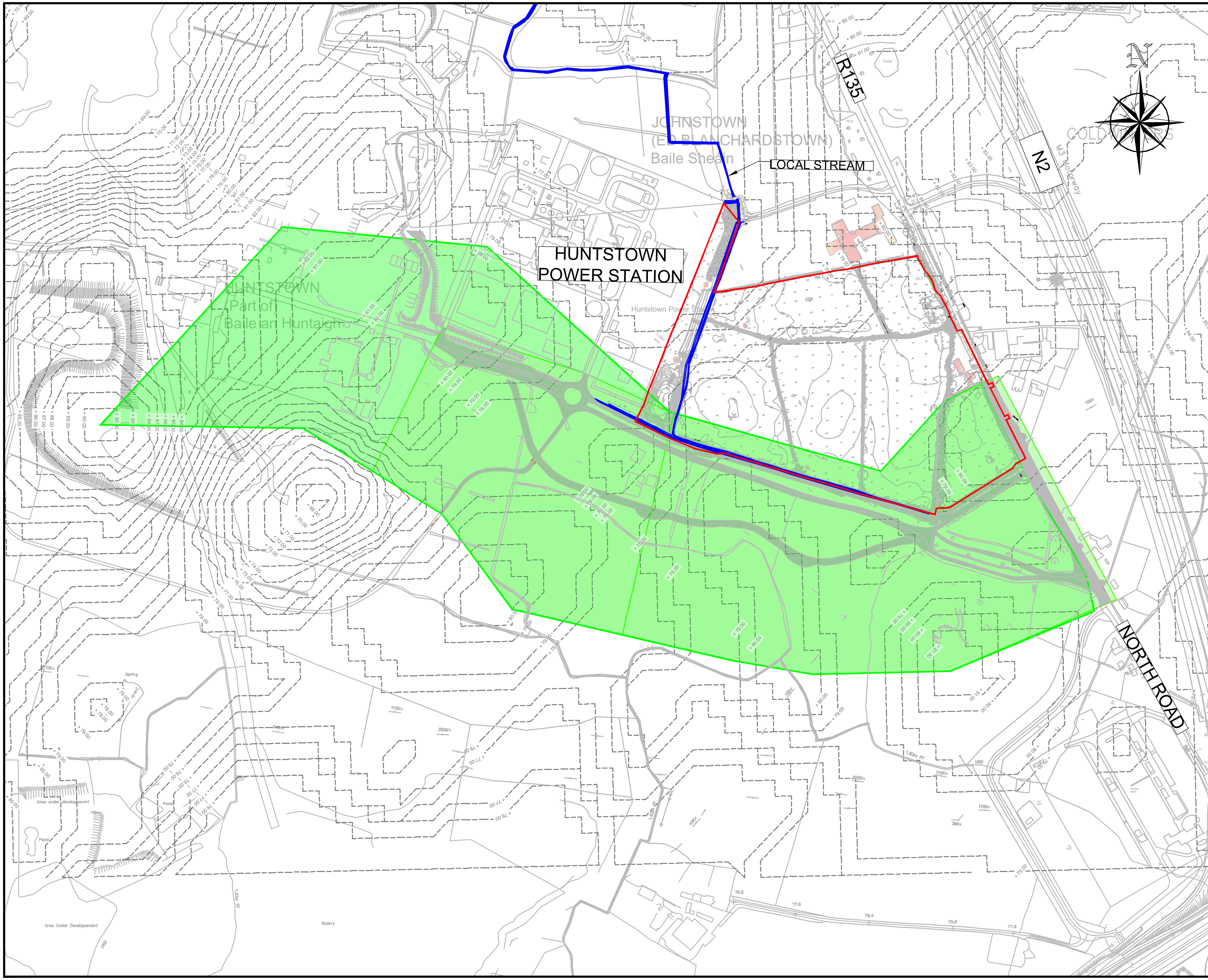
Proportional Velocity = Actual Velocity/Full Bore Velocity

k_s = Pipe Roughness Factor

Design Flow based on Equation 2 of Sectio 2.2 of Appendix B to IW-CDS-5030-03

** As per Section 3.6.6 of IW-CDS-5030-03)

Appendix H – Ditch Diversion Catchment Map



A3

LEGEND:

- OUTLINE OF SITE SUBJECT TO THIS APPLICATION
- EXISTING CONTOURS
- EXISTING LEVELS
- CATCHMENT AREA
- ROAD AREA
- EXISTING DRAINS

Rev	Description	Drawn	Checked	Date
P02	ISSUED FOR PLANNING	DM	CD	04-08-2021
P01	FOR INFORMATION	PH	CD	08-04-2021

Clifton Scannell Emerson Associates

Clifton Scannell Emerson Associates Limited
Consulting Engineers,
Seafort Lodge,
Castledawson Avenue,
Blackrock, Co. Dublin,
Ireland, A94 P768

T: +353 1 288 5006
F: +353 1 283 3466
E: info@csea.ie
W: www.csea.ie

Client: HUNSTOWN POWER COMPANY LTD

Project: HUNTSTOWN DATA CENTRE FACILITY

Dwg. Title: PROPOSED DITCH DIVERSION CATCHMENT AREA

Drawn By: PH | Date: 08-04-2021 | CSEA Job No.: 20_099

Checked By: CD | Scale: 1:500@ A3

Project Code - Originator - Zone/Phase - Level - Type - Role - Dwg. No.

20_099 - CSE - 00 - XX - DR - C - 1011

Status Code: S2 | Suitability Description: FOR INFORMATION

Revision: P02 | Project Status: PLANNING

Appendix I – Ditch Diversion Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	10
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	0
Ratio R	0.300	Minimum Backdrop Height (m)	0.175
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.480	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.653	8-12	2.042	16-20	5.595	24-28	3.921	32-36	1.984
4-8	2.042	12-16	5.387	20-24	5.595	28-32	3.553		

Total Area Contributing (ha) = 30.770

Total Pipe Volume (m³) = 3252.257

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	233.000	0.110	2118.2	1.954	22.00	0.0	0.030	\/	-1	Pipe/Conduit	
1.001	136.000	0.059	2305.1	0.000	0.00	0.0	0.030	\/	-1	Pipe/Conduit	
2.000	99.000	0.560	176.8	1.123	22.00	0.0	0.030	\/	-3	Pipe/Conduit	
1.002	224.000	0.910	246.2	0.000	0.00	0.0	0.030	\/	-2	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	17.99	28.48	77.110	1.954	0.0	0.0	0.0	0.60	2367.2	60.9
1.001	17.44	30.00	77.000	1.954	0.0	0.0	0.0	0.57	2269.2	60.9
2.000	20.40	22.91	77.120	1.123	0.0	0.0	0.0	1.81	4855.2	39.7
1.002	17.44	30.00	76.560	3.077	0.0	0.0	0.0	2.06	14083.3	93.0

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Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	**Conduit Type**	**Major Dimn. (mm)**	**Minor Dimn. (mm)**	**Side Slope (Deg)**	**Corner Splay (mm)**	**4*Hyd Radius (m)**	**XSect Area (m²)**
-1	\/	3368	1626			3.012	3.949
-2	\/	3800	2572			3.825	6.829
-3	\/	2681	1456			2.457	2.680

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	78.950	1.840	Junction		1.000	77.110	-1				
ST2	78.575	1.575	Junction		1.001	77.000	-1	1.000	77.000	-1	
2	78.650	1.530	Junction		2.000	77.120	-3				
ST1	78.200	1.640	Junction		1.002	76.560	-2	1.001	76.941	-1	1907
								2.000	76.560	-3	
	77.300	1.650	Open Manhole	0		OUTFALL		1.002	75.650	-2	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	-363.296	185.463			No Entry	
ST2	-586.420	118.347			No Entry	
2	-814.011	60.037			No Entry	
ST1	-717.705	82.977			No Entry	
	-778.113	298.678			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	\/	-1	1	78.950	77.110	1.740	Junction	
1.001	\/	-1	ST2	78.575	77.000	-0.051	Junction	
2.000	\/	-3	2	78.650	77.120	1.430	Junction	
1.002	\/	-2	ST1	78.200	76.560	1.540	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	233.000	2118.2	ST2	78.575	77.000	1.475	Junction	
1.001	136.000	2305.1	ST1	78.200	76.941	-0.367	Junction	
2.000	99.000	176.8	ST1	78.200	76.560	1.540	Junction	
1.002	224.000	246.2		77.300	75.650	1.550	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	10	19.540	1.954	1.954
1.001	-	-	10	0.000	0.000	0.000
2.000	-	-	10	11.230	1.123	1.123
1.002	-	-	10	0.000	0.000	0.000
				Total	Total	Total
				30.770	3.077	3.077

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	1	-1	1.475	1.740	Unclassified				Junction
1.001	ST2	-1	-0.051	-0.051	Unclassified				Junction
2.000	2	-3	1.430	1.540	Unclassified				Junction
1.002	ST1	-2	1.540	1.550	Unclassified				Junction

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)
1.002		77.300	75.650	75.650	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.300		

Manhole Headloss for Storm

PN	US/MH Name	US/MH Headloss
1.000	1	0.000
1.001	ST2	0.000
2.000	2	0.000
1.002	ST1	0.000

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

Simulation Criteria

Areal Reduction Factor 1.000 | Additional Flow - % of Total Flow 10.000
Hot Start (mins) 0 | MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 | Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 | Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR | Ratio R 0.300
Region Scotland and Ireland | Cv (Summer) 0.480
M5-60 (mm) 16.500 | Cv (Winter) 0.480

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	1	+10%					77.289
1.001	ST2	60 Summer	1	+10%					77.148
2.000	2	60 Summer	1	+10%					77.182
1.002	ST1	60 Summer	1	+10%					76.644

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-1.447	0.000	0.02			70.0	OK	
1.001	ST2	-1.478	0.000	0.02			65.8	OK	
2.000	2	-1.394	0.000	0.01			40.5	OK	
1.002	ST1	-2.488	0.000	0.01			98.7	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	Scotland and Ireland	Cv (Summer)	0.480
M5-60 (mm)	16.500	Cv (Winter)	0.480

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	30	+10%					77.388
1.001	ST2	60 Summer	30	+10%					77.238
2.000	2	60 Summer	30	+10%					77.255
1.002	ST1	60 Summer	30	+10%					76.742

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-1.348	0.000	0.04			148.4	OK	
1.001	ST2	-1.388	0.000	0.04			140.8	OK	
2.000	2	-1.321	0.000	0.02			88.4	OK	
1.002	ST1	-2.390	0.000	0.02			215.0	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 | Additional Flow - % of Total Flow 10.000
Hot Start (mins) 0 | MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 | Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 | Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR | Ratio R 0.300
Region Scotland and Ireland | Cv (Summer) 0.480
M5-60 (mm) 16.500 | Cv (Winter) 0.480

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	100	+10%					77.433
1.001	ST2	60 Summer	100	+10%					77.277
2.000	2	60 Summer	100	+10%					77.281
1.002	ST1	60 Summer	100	+10%					76.794

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-1.303	0.000	0.06			191.7	OK	
1.001	ST2	-1.349	0.000	0.05			182.1	OK	
2.000	2	-1.295	0.000	0.02			114.8	OK	
1.002	ST1	-2.338	0.000	0.02			275.7	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	10
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	0
Ratio R	0.300	Minimum Backdrop Height (m)	0.175
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.480	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.000	8-12	4.246	16-20	4.358	24-28	4.358	32-36	0.915
4-8	4.561	12-16	4.358	20-24	4.358	28-32	3.615		

Total Area Contributing (ha) = 30.770

Total Pipe Volume (m³) = 1768.069

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	233.000	0.110	2118.2	1.954	22.00	0.0		0.030	\/	-1	Pipe/Conduit	
1.001	65.000	0.540	120.4	0.000	0.00	0.0		0.030	\/	-1	Pipe/Conduit	
2.000	67.000	0.339	197.6	0.443	22.00	0.0		0.030	\/	-3	Pipe/Conduit	
2.001	25.000	0.126	198.4	0.165	0.00	0.0	0.600		o	-4	Pipe/Conduit	
2.002	7.000	0.095	73.7	0.515	0.00	0.0		0.030	\/	-3	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	17.99	28.48	77.110	1.954	0.0	0.0	0.0	0.60	2367.2	60.9
1.001	17.83	28.91	77.000	1.954	0.0	0.0	0.0	2.51	9930.3	60.9
2.000	20.53	22.65	77.120	0.443	0.0	0.0	0.0	1.71	4591.9	15.8
2.001	20.43	22.84	76.781	0.608	0.0	0.0	0.0	2.22	1412.9	21.5
2.002	20.41	22.88	76.655	1.123	0.0	0.0	0.0	2.81	7520.5	39.7

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
2.003	71.000	0.100	710.0	0.000	0.00	0.0		0.030	\/	-3	Pipe/Conduit	
1.002	6.000	0.010	600.0	0.000	0.00	0.0	0.600		o	-4	Pipe/Conduit	
1.003	155.200	0.324	479.0	0.000	0.00	0.0	0.600		o	-4	Pipe/Conduit	
1.004	60.300	0.126	479.0	0.000	0.00	0.0	0.600		o	-4	Pipe/Conduit	
1.005	34.000	0.071	479.0	0.000	0.00	0.0	0.600		o	-4	Pipe/Conduit	
1.006	38.000	0.079	479.0	0.000	0.00	0.0		0.030	o	-4	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.003	19.77	24.19	76.560	1.123	0.0	0.0	0.0	0.90	2422.7	39.7
1.002	17.80	28.99	76.460	3.077	0.0	0.0	0.0	1.27	809.1	94.9
1.003	17.44	30.00	76.250	3.077	0.0	0.0	0.0	1.42	906.5	94.9
1.004	17.44	30.00	75.926	3.077	0.0	0.0	0.0	1.42	906.5	94.9
1.005	17.44	30.00	75.800	3.077	0.0	0.0	0.0	1.42	906.5	94.9
1.006	17.44	30.00	75.729	3.077	0.0	0.0	0.0	0.56	358.4	94.9

Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m²)
-1	\/	3368	1626			3.012	3.949
-3	\/	2681	1456			2.457	2.680
-4	o	900	900			0.900	0.636

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	78.950	1.840	Junction		1.000	77.110	-1				
ST2	78.725	1.725	Junction		1.001	77.000	-1	1.000	77.000	-1	
2	78.650	1.530	Junction		2.000	77.120	-3				
HW-10	78.610	1.829	Junction		2.001	76.781	-4	2.000	76.781	-3	
HW-11	78.520	1.865	Junction		2.002	76.655	-3	2.001	76.655	-4	
ST1	78.510	1.950	Junction		2.003	76.560	-3	2.002	76.560	-3	
HW-8	78.500	2.040	Junction		1.002	76.460	-4	1.001	76.460	-1	
								2.003	76.460	-3	
DIV-01	78.441	2.191	Open Manhole	3000	1.003	76.250	-4	1.002	76.450	-4	200
DIV-02	77.550	1.624	Open Manhole	3000	1.004	75.926	-4	1.003	75.926	-4	
DIV-03	77.702	1.902	Open Manhole	3000	1.005	75.800	-4	1.004	75.800	-4	
DIV-04	77.629	1.900	Open Manhole	3000	1.006	75.729	-4	1.005	75.729	-4	
	77.300	1.650	Open Manhole	0		OUTFALL		1.006	75.650	-4	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	-437.033	133.145			No Entry	
ST2	-669.625	146.923			No Entry	
2	-903.933	150.334			No Entry	
HW-10	-836.933	150.204			No Entry	
HW-11	-811.937	149.812			No Entry	
ST1	-804.937	149.846			No Entry	
HW-8	-734.123	154.987			No Entry	
DIV-01	-735.111	160.905	-735.111	160.905	Required	

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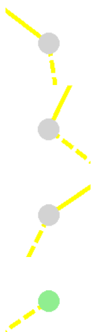
Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
DIV-02	-758.780	314.290	-758.780	314.290	Required	
DIV-03	-806.723	350.863	-806.723	350.863	Required	
DIV-04	-791.871	381.447	-791.871	381.447	Required	
	-760.405	402.752			No Entry	



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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	10	19.540	1.954	1.954
1.001	-	-	10	0.000	0.000	0.000
2.000	-	-	10	4.430	0.443	0.443
2.001	-	-	10	1.650	0.165	0.165
2.002	-	-	10	5.150	0.515	0.515
2.003	-	-	10	0.000	0.000	0.000
1.002	-	-	10	0.000	0.000	0.000
1.003	-	-	10	0.000	0.000	0.000
1.004	-	-	10	0.000	0.000	0.000
1.005	-	-	10	0.000	0.000	0.000
1.006	-	-	10	0.000	0.000	0.000
				Total	Total	Total
				30.770	3.077	3.077

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	1	-1	1.625	1.740	Unclassified				Junction
1.001	ST2	-1	1.625	1.940	Unclassified				Junction
2.000	2	-3	1.430	1.729	Unclassified				Junction
2.001	HW-10	-4	1.729	1.765	Unclassified				Junction
2.002	HW-11	-3	1.765	1.850	Unclassified				Junction
2.003	ST1	-3	1.850	1.940	Unclassified				Junction
1.002	HW-8	-4	1.891	1.940	Unclassified				Junction
1.003	DIV-01	-4	1.524	2.091	Unclassified	3000	0	2.091	Unclassified
1.004	DIV-02	-4	1.524	1.802	Unclassified	3000	0	1.524	Unclassified
1.005	DIV-03	-4	1.800	1.802	Unclassified	3000	0	1.802	Unclassified
1.006	DIV-04	-4	1.550	1.800	Unclassified	3000	0	1.800	Unclassified

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)
1.006		77.300	75.650	75.650	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.300		

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Manhole Headloss for Storm

PN	US/MH Name	US/MH Headloss
1.000	1	0.000
1.001	ST2	0.000
2.000	2	0.000
2.001	HW-10	0.000
2.002	HW-11	0.000
2.003	ST1	0.000
1.002	HW-8	0.000
1.003	DIV-01	0.500
1.004	DIV-02	0.500
1.005	DIV-03	0.500
1.006	DIV-04	0.500

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	Scotland and Ireland	Cv (Summer)	0.480
M5-60 (mm)	16.500	Cv (Winter)	0.480

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	1	+10%					77.272
1.001	ST2	60 Summer	1	+10%					77.055
2.000	2	60 Summer	1	+10%					77.146
2.001	HW-10	30 Summer	1	+10%					76.851
2.002	HW-11	30 Summer	1	+10%					76.753
2.003	ST1	30 Summer	1	+10%					76.746
1.002	HW-8	60 Summer	1	+10%					76.662
1.003	DIV-01	60 Summer	1	+10%					76.444
1.004	DIV-02	60 Summer	1	+10%					76.176
1.005	DIV-03	60 Summer	1	+10%					76.088
1.006	DIV-04	60 Summer	1	+10%					76.051

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-1.464	0.000	0.02			70.2	OK	
1.001	ST2	-1.571	0.000	0.01			70.1	OK	
2.000	2	-1.430	0.000	0.00			16.0	OK	
2.001	HW-10	-0.830	0.000	0.03			23.9	OK*	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.002	HW-11	-1.358	0.000	0.01			56.8	OK	
2.003	ST1	-1.270	0.000	0.02			55.7	OK	
1.002	HW-8	-0.698	0.000	0.11			102.1	OK*	
1.003	DIV-01	-0.706	0.000	0.12			100.6	OK	
1.004	DIV-02	-0.650	0.000	0.13			97.1	OK	
1.005	DIV-03	-0.612	0.000	0.14			96.1	OK	
1.006	DIV-04	-0.578	0.000	0.28			95.9	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 10.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.300
Region Scotland and Ireland Cv (Summer) 0.480
M5-60 (mm) 16.500 Cv (Winter) 0.480

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	30	+10%					77.360
1.001	ST2	60 Summer	30	+10%					77.119
2.000	2	60 Summer	30	+10%					77.176
2.001	HW-10	30 Summer	30	+10%					76.904
2.002	HW-11	30 Summer	30	+10%					76.850
2.003	ST1	30 Summer	30	+10%					76.844
1.002	HW-8	60 Summer	30	+10%					76.747
1.003	DIV-01	60 Summer	30	+10%					76.556
1.004	DIV-02	60 Summer	30	+10%					76.339
1.005	DIV-03	60 Summer	30	+10%					76.266
1.006	DIV-04	60 Summer	30	+10%					76.231

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-1.376	0.000	0.04			153.8	OK	
1.001	ST2	-1.507	0.000	0.02			152.5	OK	
2.000	2	-1.400	0.000	0.01			34.9	OK	
2.001	HW-10	-0.777	0.000	0.06			54.2	OK*	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.002	HW-11	-1.261	0.000	0.02			130.1	OK	
2.003	ST1	-1.172	0.000	0.05			124.5	OK	
1.002	HW-8	-0.613	0.000	0.23			217.8	OK*	
1.003	DIV-01	-0.594	0.000	0.26			214.7	OK	
1.004	DIV-02	-0.487	0.000	0.27			204.0	OK	
1.005	DIV-03	-0.434	0.000	0.29			202.5	OK	
1.006	DIV-04	-0.398	0.000	0.59			202.2	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	Scotland and Ireland	Cv (Summer)	0.480
M5-60 (mm)	16.500	Cv (Winter)	0.480

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	100	+10%					77.404
1.001	ST2	60 Summer	100	+10%					77.154
2.000	2	60 Summer	100	+10%					77.193
2.001	HW-10	30 Summer	100	+10%					76.931
2.002	HW-11	30 Summer	100	+10%					76.893
2.003	ST1	30 Summer	100	+10%					76.888
1.002	HW-8	60 Summer	100	+10%					76.776
1.003	DIV-01	60 Summer	100	+10%					76.600
1.004	DIV-02	60 Summer	100	+10%					76.425
1.005	DIV-03	60 Summer	100	+10%					76.358
1.006	DIV-04	60 Summer	100	+10%					76.322

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-1.332	0.000	0.06			199.9	OK	
1.001	ST2	-1.472	0.000	0.02			197.6	OK	
2.000	2	-1.383	0.000	0.01			45.3	OK	
2.001	HW-10	-0.750	0.000	0.07			70.1	OK*	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.002	HW-11	-1.218	0.000	0.03			168.1	OK	
2.003	ST1	-1.128	0.000	0.07			160.5	OK	
1.002	HW-8	-0.584	0.000	0.29			275.5	OK*	
1.003	DIV-01	-0.550	0.000	0.33			273.4	OK	
1.004	DIV-02	-0.401	0.000	0.34			261.3	OK	
1.005	DIV-03	-0.343	0.000	0.38			259.3	OK	
1.006	DIV-04	-0.307	0.000	0.76			259.0	OK	

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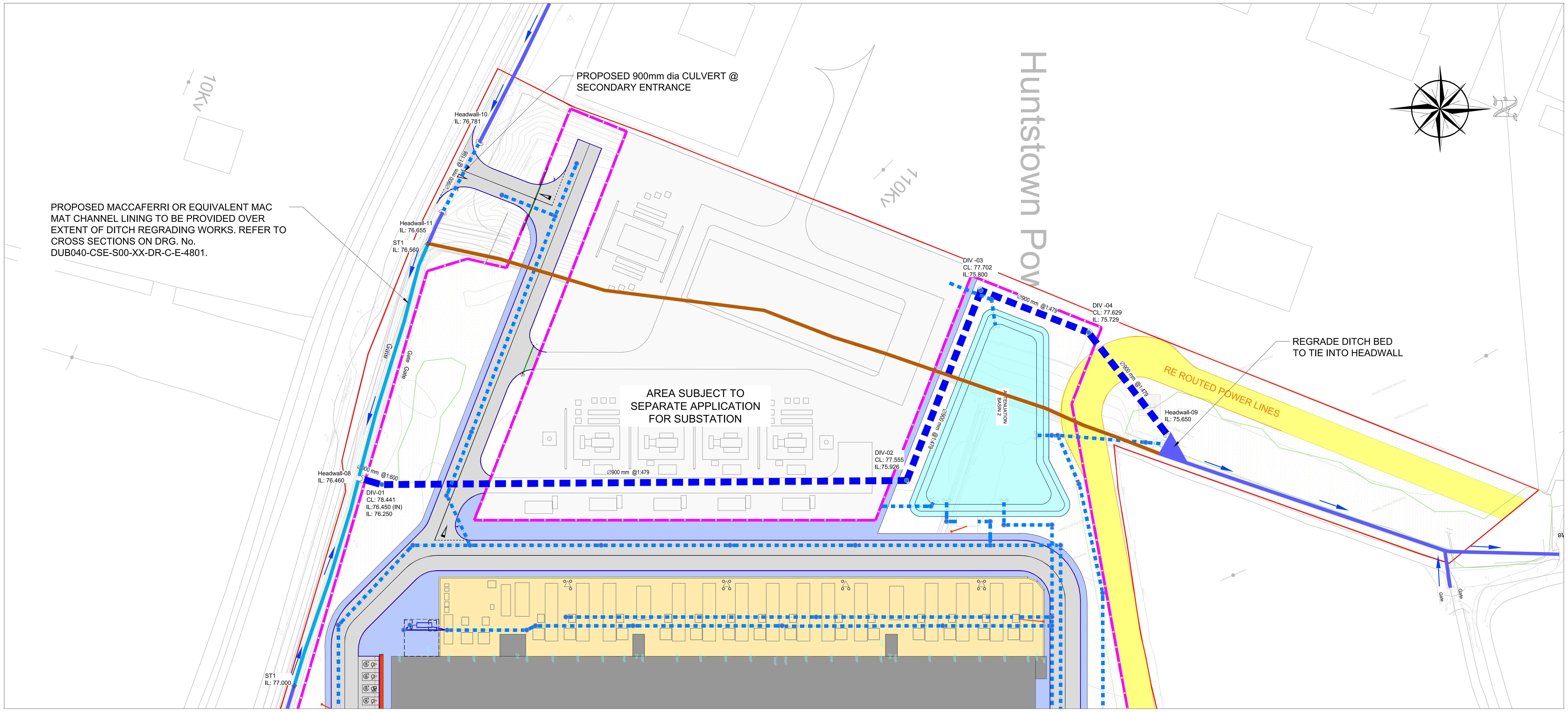
Appendix B - Huntstown Data Centre Facility Drawings

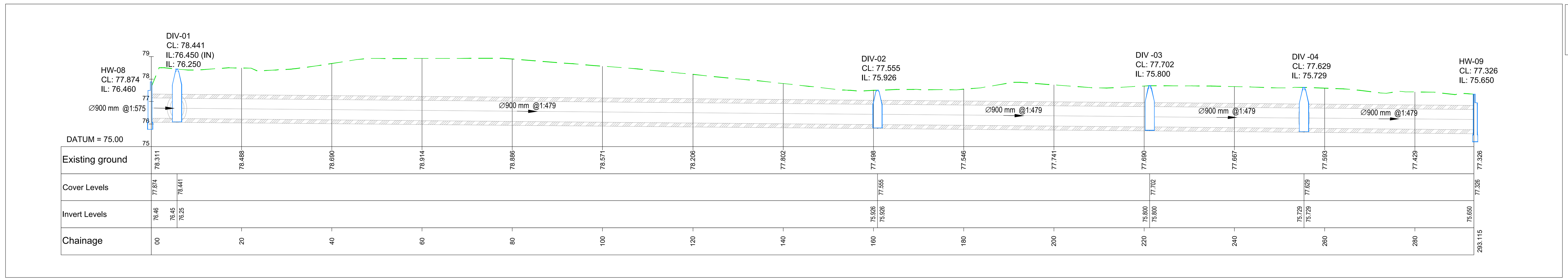
20_099-CSE-00-XX-DR-C-2117	Proposed Ditch Diversion Layout Plan
20_099-CSE-00-XX-DR-C-2116	Proposed Surface Water Attenuation Basin 2 Layout Plans
20_099-CSE-00-XX-DR-C-2210	Proposed Overall Foul Water Drainage Layout Plan

DRAWING IS PRODUCED USING THE IRISH TRANSVERSE MERCATOR (ITM) GEOGRAPHIC COORDINATE SYSTEM

A0



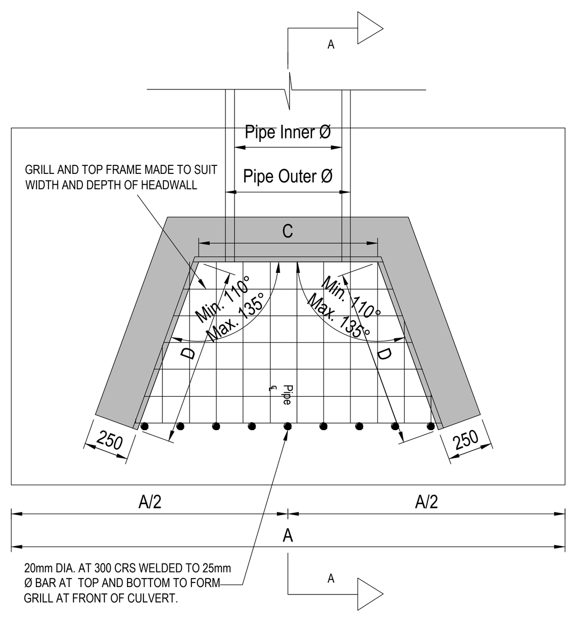
PROPOSED DITCH DIVERSION - LAYOUT PLAN
Scale: 1:500



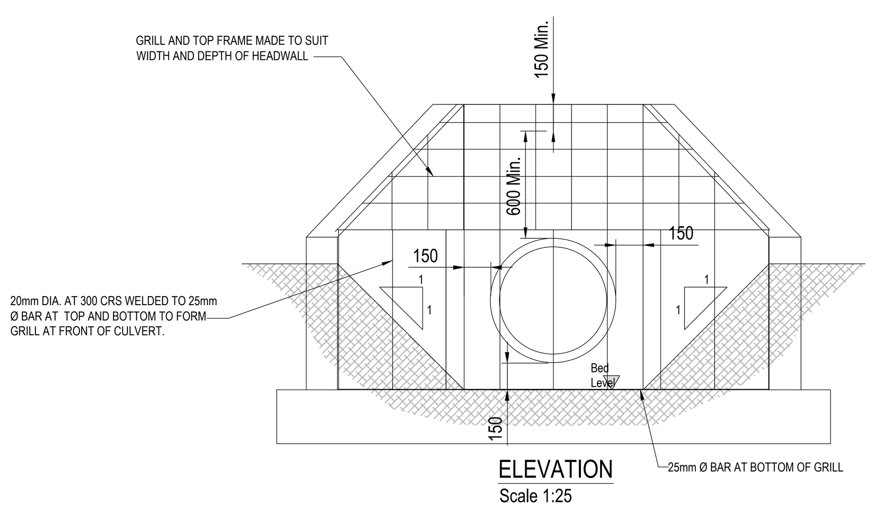
PROPOSED DITCH DIVERSION - PROFILE
Scale: H 1:500, V 1:100

NOTE:

ALL CHAMBERS TO HAVE LOCKABLE LIDS.

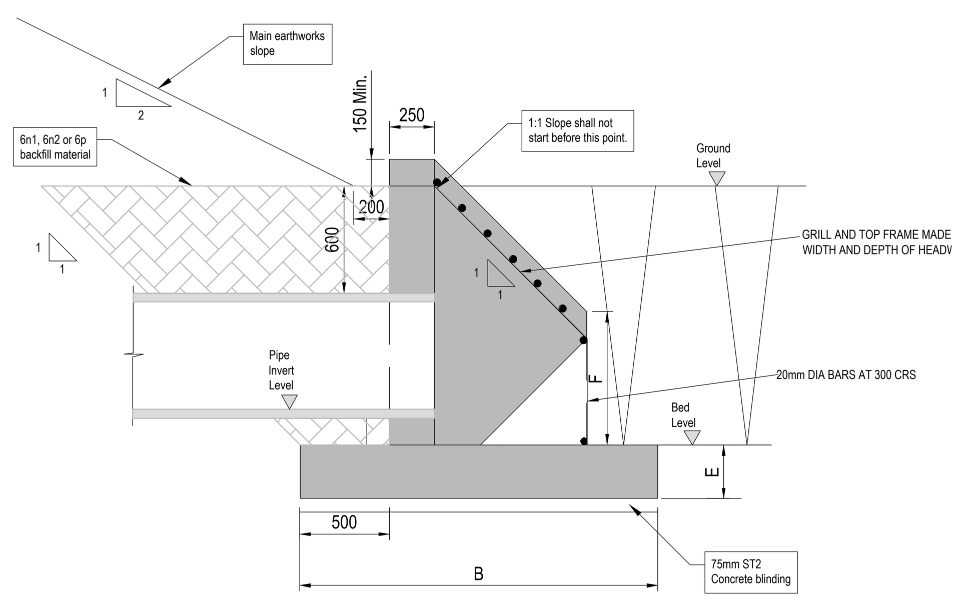


PLAN VIEW
Scale 1:25



ELEVATION
Scale 1:25

PROPOSED HEADWALL DETAILS



SECTION A - A
Scale 1:25

Schedule of Minimum Dimensions						
Pipe Inner Ø	A	B	C	D	E	F
<= 300	2000	2000	Pipe Outer Ø + 300	1000	400	500
301 - 600	2500	2500	Pipe Outer Ø + 300	1250	400	600
601 - 900	3200	3200	Pipe Outer Ø + 300	1550	500	700
901 -1200	3900	3900	Pipe Outer Ø + 300	1850	500	800
1201 - 1500	4700	4700	Pipe Outer Ø + 300	2150	500	900
1501 - 1800	5200	5200	Pipe Outer Ø + 300	2350	500	1000

The dimensions contained in the table above are minimums only and the designer shall conform details for specific site conditions. The dimensions contained in the table above are based on the following constraints:

- Angle between headwall and wingwall is 100°.
- Backfill material is free draining.
- There no live load effects on the headwall.
- Characteristic value of internal friction (ϕ) of the backfill material =37.5°
- 600mm cover to the pipe at the rear of the headwall, with a 200mm wide flat area before the commencement of the main slope.
- Slope of fill measured from the rear face of the wingwalls downwards from bed level upwards are both to be 1:1.

Headwall Notes:

1. All dimensions are in Millimetres.
2. This drawing is only to be used in association with a unique structural design. This design is to be carried out in accordance with the NRA Requirements for the use of Eurocodes for the design of road structures.
3. Reinforced concrete shall ne a minimum grade of C37/40. All structural concrete shall be specified in accordance with Series 1700 of the NRA MCDRW.
4. All blinding concrete shall be ST2 in accordance with IS EN 206.
5. The Minimum cover to reinforced concrete for durability shall be in accordance with NRA BD 57. Minimum exposure class to be XC4.
6. Any exposed concrete surfces from 100mm below ground level to be class U4/F4. All other surfaces to be class U1/F1 finish unless otherwise specified.
7. Headwall wingwalls to be sloped and shall maintain a minimum height of 150mm above adjacent backfill level.
8. Rendered concrete blockwork may be used as an alternative to in-situ or precast concrete for pipes up to 300mm inner diameter.
9. All headwalls shall be backfilled with class 6N1, 6N2 or 6P backfill material. headwalls shall be founded on a minimum 75mm layer of ST2 blinding concrete. Details of the sub-base layer to be confirmed based on site conditions.
10. Rock armour and/or gabion headwalls and wingwalls are prohibited.

LEGEND:

- Proposed Soft Landscape Refer to Landscape Architect Details.
- Proposed Concrete Pavement
- Proposed Concrete Footpath
- Proposed Roads
- Proposed Building
- Proposed Permeable Parking
- Proposed Attenuation Basins Refer to Drawings No. 2115 & 2116 for Details.
- Proposed ESB Wayleave for Diverted Overhead Lines
- Outline of the Site Subject to this application
- Proposed Security Fence Type 1 to Architects Details
- Proposed Security Gates/Barriers to Architects Details
- Proposed Surface Water Network
- Proposed SW Manhole

LEGEND WATERCOURES:

- EXISTING DITCH TO BE REGRATED AND RETAINED
- EXISTING DITCH TO BE REMOVED AND BACKFILLED
- EXISTING DITCH TO BE RETAINED
- DIVERSION OF DITCH
- FLOW DIRECTION
- ST1 IL:76.560 / ST2 IL:77.000 — EXISTING BED LEVEL OF DITCH

Rev	Description	Drawn	Checked	Date
P04	ISSUED FOR PLANNING	DM	CD	04.08.2021
P03	DRAFT ISSUE FOR PLANNING	PH	CD	07.05.2021
P02	DRAFT ISSUE FOR PLANNING	PH	CD	09.04.2021
P01	DRAFT ISSUED FOR PLANNING	DM	CD	02.03.2021

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Client: HUNSTOWN POWER COMPANY LTD

Project: HUNTSTOWN DATA CENTRE FACILITY

Dwg. Title: PROPOSED WATERCOURSE DIVERSION LAYOUT & SECTIONS - SHEET 1

Drawn By: DM | Date: MARCH 2021 | CSEA Job No.: 20_099

Checked By: CD | Scale: AS INDICATED @ A0

Project Code - Originator - Zone/Phase - Level - Type - Role - Dwg. No.

20_099 - CSE - 00 - XX - DR - C - 2117

Status Code: S2 | Suitability Description: SUITABLE FOR INFORMATION

Revision: P04 | Project Status: PLANNING

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DRAWING IS PRODUCED USING THE IRISH TRANSVERSE MERCATOR (ITM) GEOGRAPHIC COORDINATE SYSTEM

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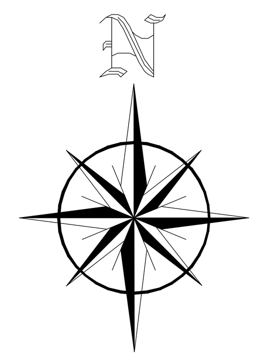
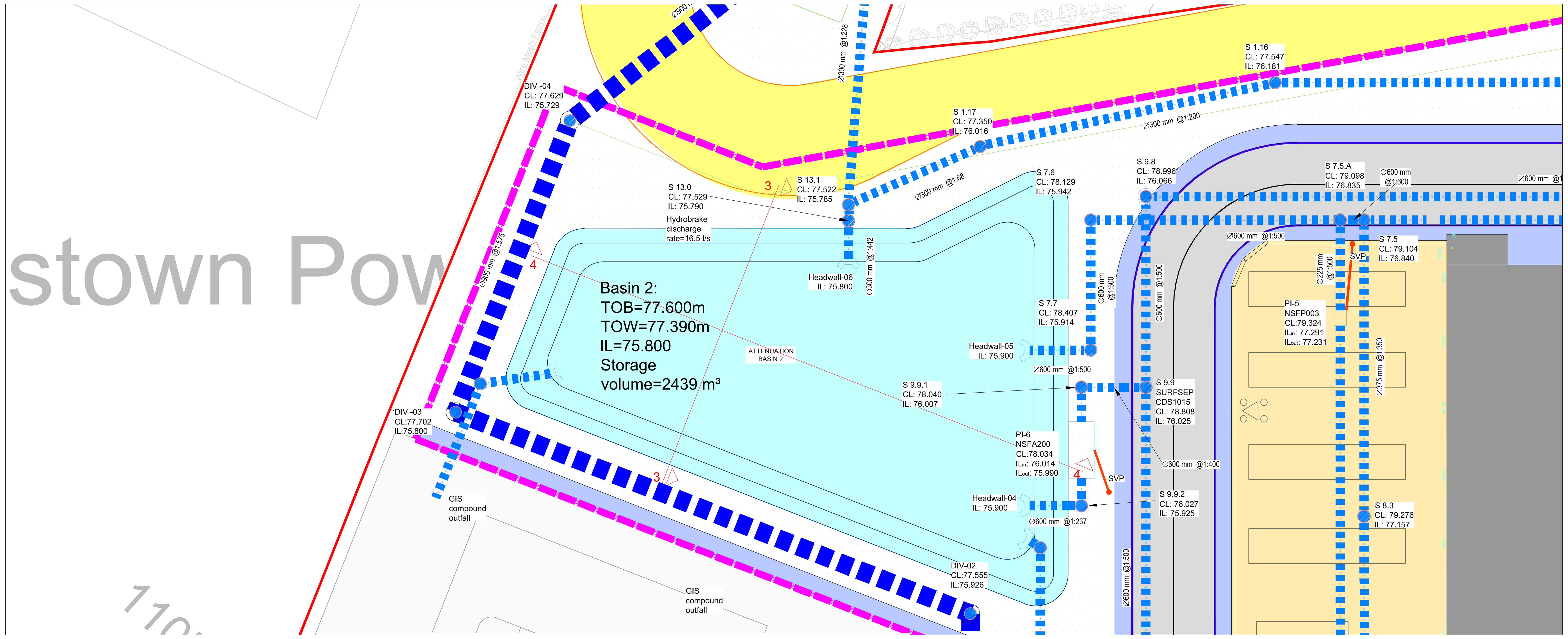




ATTENUATION BASIN 2 LAYOUT PLAN

SCALE 1:250

PETROL INTERCEPTOR DESIGN INFORMATION

Ref	Type	Class	Model Specification (by Klargestor)	Design Flow Rate (l\s)	Oil Capacity (l)
PI-1	Full Retention	1	NSFP003	3	30
PI-2	Full Retention	1	NSFA200	200	200
PI-3	Full Retention	1	NSFP003	3	30
PI-4	Full Retention	1	NSFA200	200	2000
PI-5	Full Retention	1	NSFP003	3	30
PI-6	Full Retention	1	NSFP003	3	30
PI-7	Bypass	1	NSBE020	20	300

GENERAL NOTES :

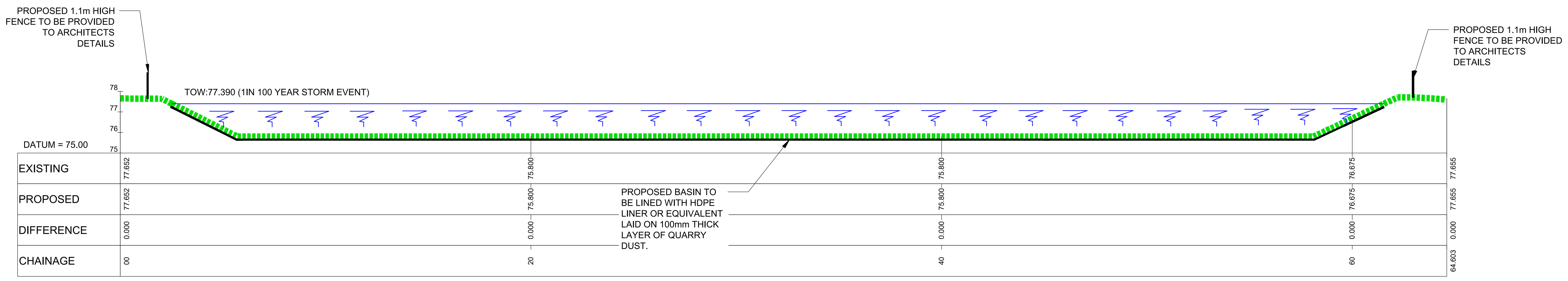
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIFICATIONS
2. DO NOT SCALE DIMENSIONS
3. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS PRIOR TO CONSTRUCTION, ANY DISCREPANCIES TO BE NOTIFIED TO CSEA
4. TEMPORARY SUPPORTS TO THE SIDES OF THE EXCAVATION MAY BE REQUIRED DEPENDENT ON SUBSOIL, METHOD OF WORK AND SITE CONSTRAINTS, AND ARE TO BE AGREED WITH ER PRIOR TO COMMENCEMENT OF EXCAVATION. SIDE SLOPES OF AN UNSUPPORTED EXCAVATION DEPENDANT UPON SUBSOIL AND SHALL BE AGREED WITH THE ENGINEER
5. MAIN CONTRACTOR TO PROVIDE A METHOD STATEMENT AND RISK ASSESSMENT FOR THE EXCAVATION WORKS FOR THE ER TO REVIEW
6. THE CONSTRUCTION, AS SHOWN, IS APPLICABLE ONLY WHERE SUBSOIL AT FORMATION LEVEL EXCEEDS 100kN/m² BEARING CAPACITY
7. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE CIVIL WORKS SPECIFICATION

SURFACE WATER NOTES:

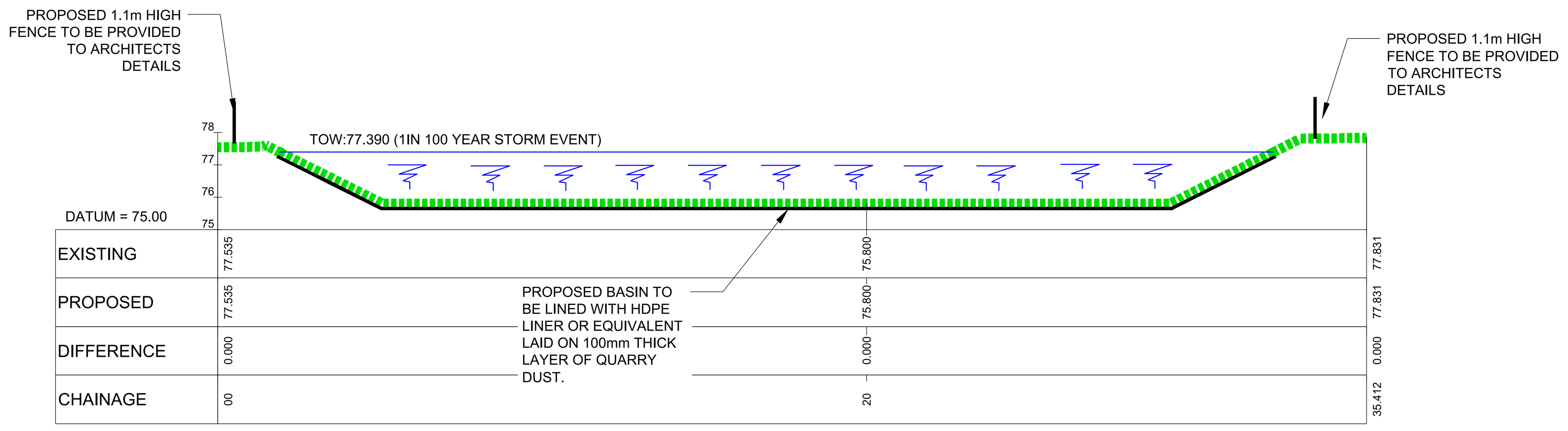
1. STORM SEWER PIPES TO BE ADS HDPE TWINWALL IN ACCORDANCE WITH EN13476. FOR ALL STORMWATER DRAINAGE FOR PIPES < 450mm IN DIAMETER.
2. CONCRETE PIPES TO BE SPECIFIED ON PIPE DIAMETERS OF 450mm AND ABOVE.
3. ALL RWP's CONNECTIONS ARE 150mm WELDED HDPE WITH 90° SLOW RADII BENDS SADDLED INTO MAIN SURFACE WATER DRAINAGE.
4. FOR ALL MANHOLE DETAILS, PIPE BEDDING, SURROUND AND HAUNCHING DETAILS AS PER DWG DUB40-CSE-S00-XX-DR-C-F-4806. MANHOLE COVERS & FRAMES, ROAD GULLIES, TESTING & CLEANING OF DRAINS AND SEWER DIVERSIONS, REFER TO THE CIVIL WORKS SPECIFICATION AND GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0 WHICH IS PROVIDED IN THE INFORMATION PACK.
5. GULLY CONNECTIONS SHALL COMPLY WITHTHE CIVIL WORKS SPECIFICATION, SECTION 11 AND SECTION 14.7 OF GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0.
6. ALL MANHOLES SHALL BE IN ACCORDANCE WITH THE FOLLOWING DETAILS OUTLINED IN APPENDIX 1 GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0 OF THE FOLLOWING:-
   - MANHOLES WHERE LESS THAN 1m COVER TO TOP OF PIPE SHALL BE TYPE A;
   - MANHOLES WITH BETWEEN 1m AND 3m COVER TO TOP OF PIPE SHALL BE TYPE J;
   - MANHOLES WITH GREATER THAN 3m COVER TO TOP OF PIPE SHALL BE TYPE K;
7. ALL MANHOLES ON DRAINS OF 450mm DIAMETER AND OVER SHALL BE PROVIDED WITH SAFETY CHAINS FOR PLACING ACROSS THE MOUTH OF THE DRAIN ON THE DOWNSTREAM SIDE OF THE MANHOLE. MILD STEEL SAFETY CHAIN SHALL BE 12MM NOMINAL SIZE GRADE M (4) NON-CALIBRATED CHAIN, TYPE 1, COMPLYING WITH BS EN 818: PART 3. CHAINS SHALL BE HOT DIP GALVANISED TO BS EN ISO 1461. CHAINS SHALL BE SECURED ONLY BY A SAFETY EYEBOLT TO BS 7883: 2005 WITH A STANDARD SCREW GATE KARABINER TO BS EN 362.
8. VERTICAL BACKDROP IN MANHOLES SHALL BE IN ACCORDANCE WITH TYPE G MANHOLE DETAIL IN APPENDIX 1 TO THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0.
9. ALL COVERS AND GRATINGS SHALL COMPLY BE CLASS D400 TO EN 124.
10. ATTENUATION BASIN ABBREVIATIONS
    TOB = TOP OF BANK
    TOW = TOP OF WATER LEVEL FOR 1 IN 100 YEAR EVENT

LEGEND:

- Proposed Soft Landscape Refer to Landscape Architect Details.
- Proposed Concrete Pavement
- Proposed Concrete Footpath
- Proposed Roads
- Proposed Building
- Proposed Permeable Parking
- Proposed Attenuation Basins
- Proposed ESB Wayleave for Diverted Overhead Lines
- Outline of the Site Subject to this application
- Proposed Security Fence Type 1 to Architects Details
- Proposed Security Gates/Barriers to Architects Details
- Proposed Kerb
- Proposed Drainage Kerb
- Proposed Retaining Wall
- Proposed Aco Drain
- Proposed Surface Water Network
- Proposed SW Manhole
- Proposed Ditch to be Retained/Regraded
- Proposed Ditch Flow Direction
- Proposed Diverted Ditch Route. Refer to Drawing No. 2117 for Details
- Proposed Vent Pipe to Terminate 2.5m above Ground Level.
- Proposed Headwall. Refer to Drawing No. 2117 for Details



BASIN 2(3-3) - PROFILE
SCALE: H 1:125,V 1:125



BASIN 2(4-4) - PROFILE
SCALE: H 1:125,V 1:125

Rev	Description	Drawn	Checked	Date
P04	ISSUED FOR PLANNING	DM	CD	04.08.2021
P03	DRAFT ISSUE FOR PLANNING	PH	CD	07.05.2021
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P01	DRAFT ISSUED FOR PLANNING	DM	CD	02.03.2021

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Project: HUNTSTOWN DATA CENTRE FACILITY

Dwg. Title: PROPOSED ATTENUATION BASIN LAYOUT & SECTIONS - SHEET 2

Drawn By: DM
Date: MARCH 2021
Checked By: CD
Scale: AS INDICATED @ A0
CSEA Job No.: 20_099

Project Code - Originator - Zone/Phase - Level - Type - Role - Dwg. No.

20_099 - CSE - 00 - XX - DR - C - 2116

Status Code: S2
Suitability Description: SUITABLE FOR INFORMATION

Revision: P04
Project Status: PLANNING

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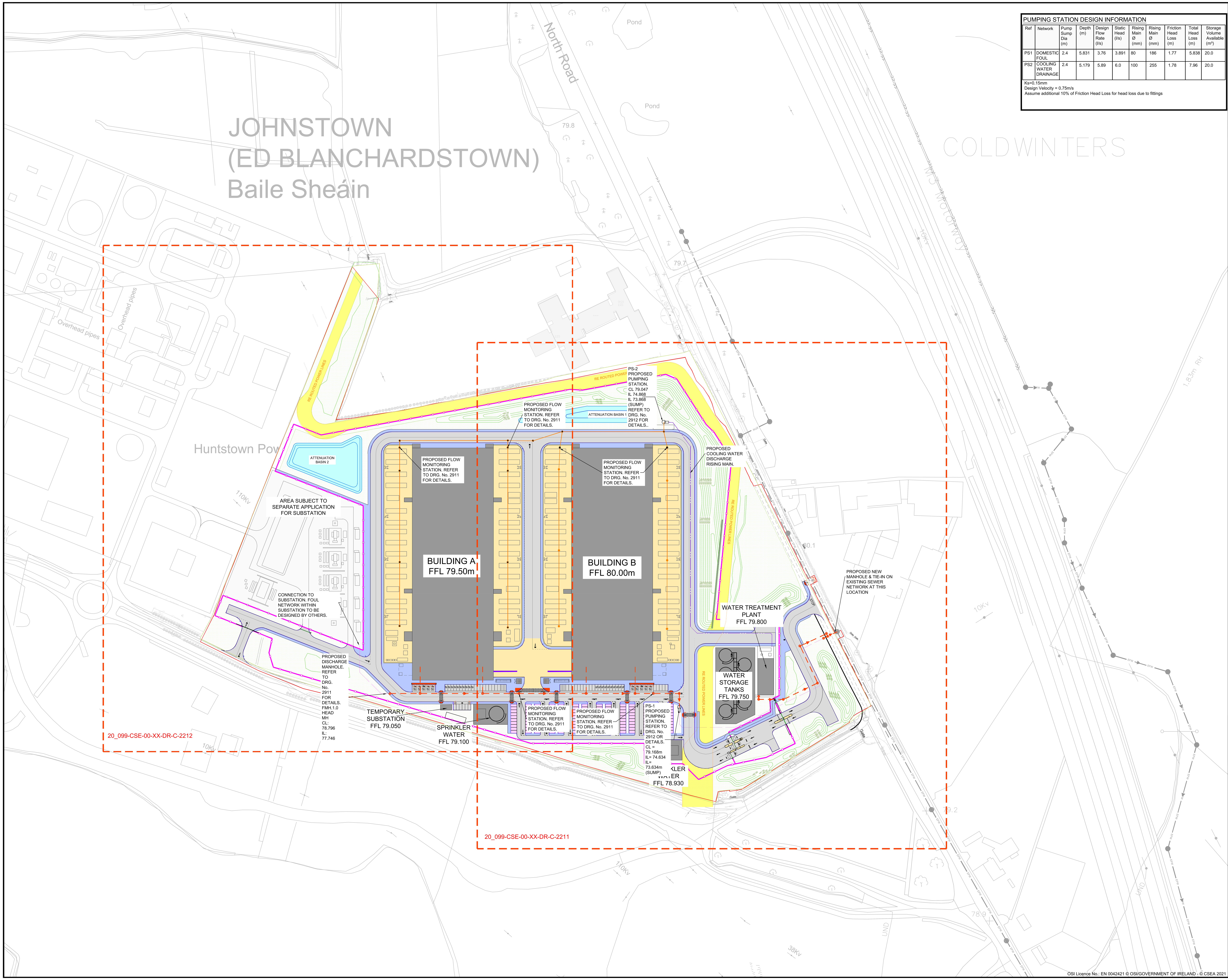

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PUMPING STATION DESIGN INFORMATION

Ref	Network	Pump Sump Dia (m)	Depth (m)	Design Flow Rate (l/s)	Static Head (l/s)	Rising Main Ø (mm)	Rising Main Ø (mm)	Friction Head Loss (m)	Total Head Loss (m)	Storage Volume Available (m^3)
PS1	DOMESTIC FOUL	2.4	5.831	3.76	3.891	80	186	1.77	5.838	20.0
PS2	COOLING WATER DRAINAGE	2.4	5.179	5.89	6.0	100	255	1.78	7.96	20.0

Ks=0.15mm
Design Velocity = 0.75m/s
Assume additional 10% of Friction Head Loss for head loss due to fittings

LEGEND:

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- Proposed Building
- Proposed Permeable Parking
- Proposed Attenuation Basins Refer to Drawings No. 2115 & 2116 for Details.
- Proposed ESB Wayleave for Diverted Overhead Lines
- Outline of the Site Subject to this application
- Proposed Security Fence Type 1 to Architects Details
- Proposed Security Gates/Barriers to Architects Details
- Proposed Kerb
- Proposed Drainage Kerb
- Proposed Retaining Wall
- Proposed Tactile Paving & Drop Kerb. Refer to Drawing No. 2900 for Details.
- Proposed Foul Water Network Sewer
- Proposed FW Manhole
- Proposed 80mm DIA Foul Water Raising Main
- Proposed Cooling Water Discharge Sewer
- Proposed Cooling Water Discharge Manhole
- Proposed 100mm DIA Cooling Rising WM Main
- Existing Foul Sewer
- Existing FW Manhole

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Client: HUNSTOWN POWER COMPANY LTD
Project: HUNTSTOWN DATA CENTRE FACILITY

Dwg. Title: PROPOSED OVERALL FOUL WATER LAYOUT PLAN

Drawn By: DM | Date: MARCH 2021 | CSEA Job No.: 20_099
Checked By: CD | Scale: 1:1000 @ A0

Project Code - Originator - Zone/Phase - Level - Type - Role - Dwg. No.
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Revision: P04 | Project Status: PLANNING