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Engineering Services Report

Alterations to Shoreline GA01 Lands at Baldoyle

Stapolin Growth Area 1, Baldoyle, Co. Dublin

Client: The Shoreline Partnership

Job No. R089

May 2021

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ENGINEERING SERVICES REPORT

ALTERATIONS TO SHORELINE GA01 LANDS AT BALDOYLE
STAPOLIN GROWTH AREA 1, BALDOYLE, CO. DUBLIN

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by The Shoreline Partnership to prepare an Engineering Services Report to accompany a planning application for a proposed mixed residential development at Baldoyle, Dublin 13.

In preparing this report, CS Consulting has made reference to the following:

- Fingal County Council Development Plan 2017–2023;
- Baldoyle-Stapolin Local Area Plan
- Greater Dublin regional Code of Practice for Works;
- Local Authority Drainage Records.
- Irish Water Code of Practice for Potable Water;
- Irish Water Code of Practice for Wastewater.

The Engineering Services Report is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with the various additional information submitted by the other members of the design team, which forms part of the planning submission.

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The proposed development site is located at Stapolin Growth Area 1, Baldoyle, Co. Dublin, in the administrative jurisdiction of Fingal County Council. The site has a total site area of c. 9.1ha and a site development area of c. 8.89ha.

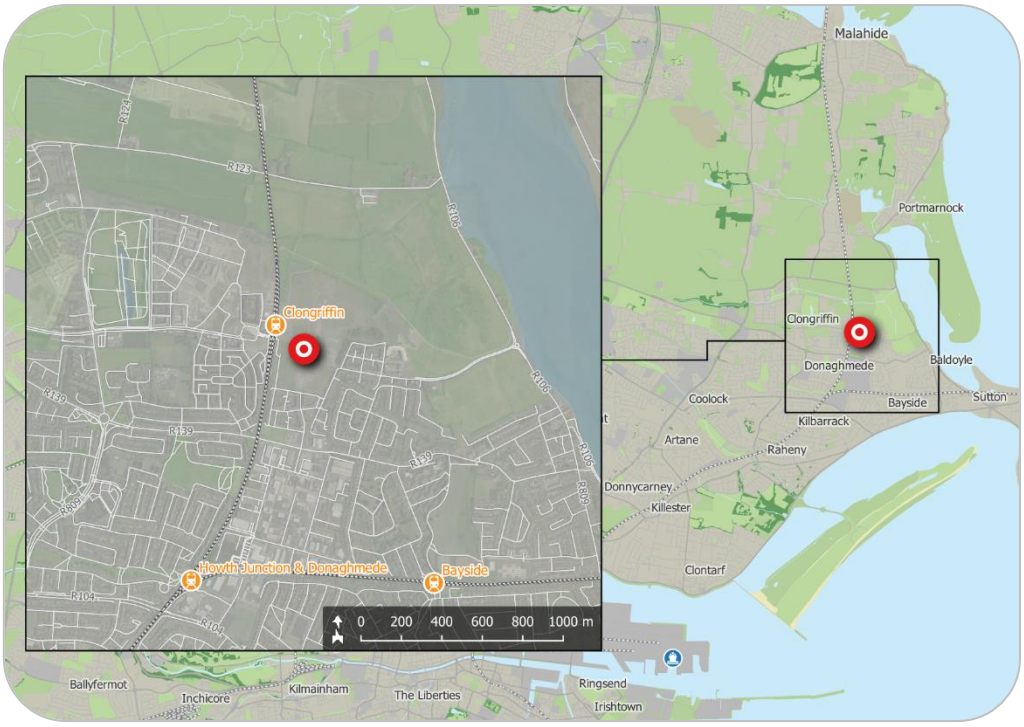

Figure 1 – Location of proposed development site
(*map data & imagery: EPA, OSM Contributors, Google*)

The location of the proposed development site is shown in Figure 1 above; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 2.

The site is bounded to the west by the Dublin-Belfast railway line, with Clongriffin DART Station located just to the north west of the applicant lands, to the east by the Red Arches and Stapolin Lawns residential developments, to south by

the Myrtle residential development. To the north, the applicant site is bounded by future development lands known as Growth Area 3 (GA3).

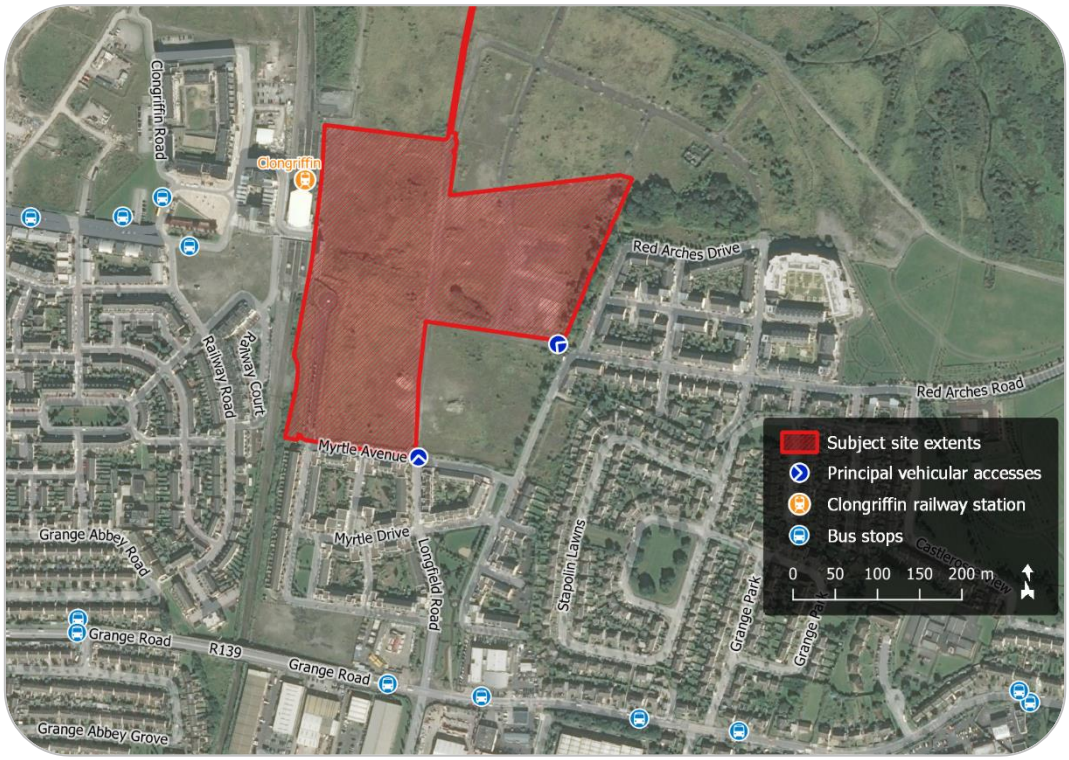

Figure 2 – Site extents and environs
(*map data & imagery: NTA, OSM Contributors, Google*)

2.2 Existing Land Use

The subject lands are currently undeveloped; however, works were carried out previously to install infrastructure. These works included removal of vegetation/topsoil, construction of a road network inter linked with partially prepared site areas and installation of underground services.

The existing infrastructure has been unmaintained for some years.

2.3 Description of Proposed Development

The development will consist of alterations to the permitted development, as permitted under FCC Reg. Ref. 16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046) of 544 no. residential units (385 no. apartments and 159 no. houses), retail and a crèche, to the development of 882 no. new residential dwellings (747 no. apartments, 135 no. houses), residential tenant amenity, retail, crèche, parking, and public realm, over a total site area of c. 9.1 ha, and site development area of c. 8.89 ha. Landscaping will include extensive communal amenity areas, and significant public open space provision.

3.0 STORM WATER INFRASTRUCTURE

3.1 Existing Storm Water Infrastructure

At present there is an existing 1350mm stormwater culvert traversing the subject site along the line of Longfield Road, flowing south to north. This culvert is a diversion of a culvert which previously ran along the western boundary of the development lands.

In addition, there is an existing 1050mm stormwater culvert running from south to north along the line of Stapolin Avenue, which discharges into the Mayne River. Based on the previous planning application for the subject site (Fingal County Council Planning Application F16A/0412), this culvert has been constructed by previous developers at a low level so that it can pass below the North Fringe Sewer located approximately 200m north of the proposed development. The depth of this outfall is approximately 2m below the existing ground level as it passes through to the flood plain further north. The culvert serves the existing developments constructed to date and discharges directly to the Mayne River.

It is noted that there is an existing stormwater drainage network located within the subject site, however due to its poor condition it is not intended to make use of the existing network and therefore it is proposed to be removed and a new network constructed in its place.

3.2 Proposed Storm Water Arrangements

In accordance with *Section 4.3 of Appendix 1 of the Baldoyle-Stapolin Local Area Plan*, the site is located adjacent to the tidal estuary at Baldoyle and as there is no downstream development before outfalling to the Irish Sea, the development site is *not required to provide full attenuation for the 100 year return storm* as per the requirements in Section 6.6, Volume 2, of the GDSDS. In addition the lands discharge into salt wetlands which are the flood estuary of

the Mayne River and extend over approximately 40 hectares (100 year flood plain). Therefore, the principle issue, is the quality of water discharging from the LAP lands and not the quantity of water being discharged to the estuary.

It is the requirement of the LAP that a wetland is installed within the flood plain, just beyond the line of the existing North Fringe foul sewer to provide the required water quality treatment for this and future developments within the LAP. This wetland and its corresponding upstream surface water network were granted under planning reference F16A/0412 and is currently under construction.

All water from the proposed development will discharge to this wetland before discharging to the Mayne River floodplain over a spillway/weir. The wetland will serve as the final water quality treatment for the proposed development of Growth Area 1 (Plus GA2 and GA3). It has been sized to cater for a treatment volume based on 15mm rainfall over 100% of the impermeable site areas and this will be retained in a permanent pool area of the wetland at all times. The wetland will incorporate a sediment forebay to serve as a 'first flush' collector of the majority of silt not removed by SuDS feature upstream. This ensures the remainder of the wetland is not disturbed during maintenance when silt build-up is removed from the fore-bay.

The shape and orientation of the permitted wetland has been designed to maximise the quantity of treatment provided, with a length to width ratio in excess of 3:1, allowing sediments to settle along its length. A varying width has been chosen to encourage diversity of plants and wildlife, while ensuring there are no stagnant areas and that the total volume is available to provide water quality treatment. Details of the planting/landscaping of the wetland are as outlined in the landscape documents from the grant of permission F16A/0412. In summary, the original topsoil with seed-bank of calcareous grassland and wetland species will be replaced to allow self-seeding and natural establishment of the wetland. These works will be carried out under direction

and supervision of ecologist/landscape architect who will identify the source material area and oversee the works.

The permitted wetland will be constructed by excavating the existing ground level to provide the storage volume required. Investigations on site have determined that the material on site is not suitable for lining. It is imperative that the structural stability of the wetland is maintained and as such it will be lined with an impermeable liner. The permanent pool level will be set to approximate the existing ground level. The wetland will be surrounded by a small 300mm high embankment to cater for fluctuations in water level and to ensure flows are directed over the control weir/spillway.

The GDSDS requires that a "treatment volume" (Vt) be provided in order to prevent any pollutants or sediments discharging into river systems, additionally a 'treatment train' stormwater runoff management system is required. According to CIRIA document C753 the following treatment train approach is necessary:

The treatment volume was calculated as 1860m^3 and is based on treatment 15mm of rainfall depth from the runoff from impermeable areas. This will be provided by the constructed wetland. The Wetland has been calculated as follows:

The catchment area served by permitted wetlands comprising of growth areas 1, 2 and 3 = 22.3 hectares approximately.

The treatment volume (vt) required for Growth Area 1 = 5.312 ha (impermeable runoff) x 15mm rainfall = 797m^3 volume.

Treatment ratio for Growth Area 1 = 797/ 11.47 has = 69.5m3/ha.

- Growth Areas 2 and 3 = 4.33 + 6.53 = 10.86 ha (approximately).
- estimated treatment volume for growth areas 2 and 3 =

10.86 ha x 69.5m3 = 755.0m^3 volume.

Therefore, the total treatment volume:

Growth Areas 1, 2 and 3 = 797m^3 + 755m^3 = ***1552m^3***

Wetland volume to be approximately = ***1860m^3***

(as granted under planning permission F16A/0412)

All run-off areas will pass through the required number of treatment stages prior to discharging to the downstream outfall. Treatment methods are listed in the section on SuDS with final treatment provided by the wetland, explained further forward.

As previously mentioned, it is not proposed to connect any surface water generated by the development to the existing culverts referred to earlier as they pass under the existing North Fringe Sewer. It is proposed to connect the proposed development to the new surface water network granted under F16A/0412 that shall cross above the North Fringe Sewer to ensure all surface water generated by the proposed development will pass through the wetland and overspill a weir/spillway into the Mayne River Floodplain.

As informed on the Planning Application F16A/0412, the permitted wetland has been sized to serve Growth Areas 2 and 3 of the Local Area Plan in addition to Growth Area 1 as proposed.

Please refer to CS Consulting drawing Nos. BD-CSC-ZZ-XX-DR-C-0003 and BD-CSC-ZZ-XX-DR-C-0004 for the drainage network layout. The storm drainage network for the development will be in accordance with the requirements and specifications of Fingal County Council. The network has been designed and modelled for the 100 year storm event using Windes Microdrainage programme and the network calculations and modelling results are shown in **Appendix A.**

The proposed new storm water drainage arrangements will be designed and carried out in accordance with:

i) The Greater Dublin Strategic Drainage Study Volume 2,
ii) The Greater Dublin Regional Code of Practice for Drainage Works,
iii) BS EN – 752:2008, Drains & Sewer Systems Outside Buildings,
iv) Part H, Building Drainage of The Building Regulation.

The hardstanding areas within the Windes design have been subject to a co-efficient runoff factor for the various surface types and are as follows:-

- Roof 0.95
- Concrete (Footpath) 0.90
- Asphalt (Road) 0.90

3.3 Proposed SuDS Measures

The second aspect of the storm water drainage network is to improve the quality of the storm water leaving the site. There are a number of water saving systems and SuDS measures that will be put in place to achieve this aim.

The proposed SuDS features shall consist of:

a) Constructed Wetland - Shallow ponds and marshy areas with a high concentration of aquatic vegetation. The wetland will detain flows for an extended period allowing sediments to settle and to remove contaminants by facilitating adhesion to vegetation and aerobic decomposition. Located within existing Mayne River floodplain, prior to discharge to the floodplain

b) Rainwater 'butts'- rain which falls first on to roof areas shall be collected in a water storage unit, to allow for re-use for landscaping purposes to reduce the reliance on the potable water network. Rainwater butts will be provide to all single houses only.

c) Swales: shallow drainage channels covered in grass which can treat, convey and attenuate runoff, at source, and can infiltrate to the ground where the subgrade is suitable. Swales also can promote biodiversity. Swales are located adjacent to the roads of Stapolin Avenue and Stapolin Road.

d) Bio-retention Areas: Shallow landscaped depressions which are under-drained with engineered soils and enhanced vegetation and planting on the surface which manage and treat runoff, at source, and promote biodiversity development. Located generally at suitable low points along roads in lieu of gullies throughout the applicant lands.

e) Green Roofs: Green roofs provide ecological, aesthetic and amenity benefits and intercept and retain rainfall, at source, reducing the volume of runoff and attenuation peak flows. Green roofs absorb most of the rainfall that they receive during ordinary events and they will only contribute to attenuation of flows for larger events. Additionally, green roofs treat surface water through removal of atmospherically deposited urban pollutants. 100mm deep Sedum green roof systems are proposed to the apartment buildings located to the west of Longfield Road in the north west of the applicant lands. Please refer to **Appendix B** for the Bauder Sedum Green Roof System

f) Permeable Paving: These systems are used 'source control' method in managing surface water runoff. Water is managed and dealt with on-site without piping off to storage tanks or surface water treatment systems. Surface water discharge is managed to ensure that risk of contamination or pollution are mitigated. Permeable Paving systems filter contaminants by microbial action. There is no requirement for additional filtering/polishing with Permeable Paving in normal use. It is proposed to construct all parking spaces to the development with permeable paving systems.

The combination of the above noted elements shall allow the proposed development to adhere to the principles of sustainable drainage practices while enhancing overall storm water quality.

3.4 SUDS/Green Infrastructure Selection Checklist

As part of any planning application within the Fingal County Council area a Suds/Green infrastructure checklist is to be submitted. To be in accordance with these requirements the completed checklist is located in **Appendix C**

3.5 Surface Water Items Raised by Fingal County Council

Following the initial submission to An Bord Pleanala, Fingal Co Co issued their Opinion Statement in regards to the proposed development. Outlined below are the main items raised in *Section 8.3.8.2 Surface Water Drainage,* of the Fingal Co Co Opinion together with an appropriate response to the points raised.

3.5.1 Overflow to Rainwater Butts

Fingal Co Co requested in their Opinion Statement, to review the possibility of introducing an overflow from the rainwater butts to private rear gardens to houses that would drain to ground.

Following the receipt of a Site Investigation Report by Messrs Ground Investigations Ireland Ltd, ground conditions were found to be unsuitable for infiltration systems. Please see extracts from the site investigation can be found in **Appendix F**

3.5.2 The Inclusion of Permeable Paving

Please refer to the site wide drainage drawings BD-CSC-ZZ-00-DR-C-0003/0004. These drawings now include Permeable Paving systems to the car parking spaces across the proposed development.

3.5.3 Clarification of Green Roof Areas

Please see drawings BD-CSC-ZZ-00-DR-C-0029/30 that indicates the locations of the green roof systems on the apartment blocks across the development site.

As indicated on the drawings, the total roof area to the apartment blocks is approximately 10,899 sqm. The total green roof area being provided across the apartment blocks is 3,086 sqm, which equates to just under 30% of the total available apartment roof area.

3.5.4 Green Roof Operation

All green roof systems across the development shall be ultimately designed by a specialist post planning. It will be responsibility of the green roof specialist to design the system in accordance with all relevant building regulations including liaising with the architect to provide sufficient gullies, downpipes and overflow pipe systems to the proposed roof of the apartment block.

It is envisaged, that rainwater gullies or outlets shall be provided at roof level at sub-surface level to the green roof system. These gullies/outlets shall channel excess runoff to the drainage network of the apartment block, where it shall eventually discharge to the external surface water network of the development. Overflow pipes and associated downpipes shall be provided along the parapet of the roof to cater for extreme storm

events, when the green roof system is saturated as well as catering for potential blockages to the normal drainage outlets. This is standard practice to any roof design.

3.5.5 Maintenance of Green Roof Areas

Future maintenance of the green roof areas shall be the responsibility of the respective management company to the apartment blocks. It is recommended that the management company engage with the green roof supplier and agree an inspection and maintenance schedule upon commissioning of the green roof system.

Generally, all green roofs require a minimum of two inspections a year to ensure that the system is maintained and in full working order. Maintenance procedures shall include the following tasks:

a. Removal of leaves, debris and litter to the green roof

b. Removal of plants etc encroaching on drainage outlets

c. Weeding and the removal of unwanted species

d. Repairing of any bare/damaged patches etc to the green roof

e. Examination and testing of the drainage system, through irrigation, to ensure the system is in full working order.

In addition, a general maintenance document by Bauder Ltd is provided in **Appendix B.**

3.5.6 SuDS Metrics

Fingal County Council requires that all developments adhere to their policy of implementing sustainable urban drainage systems, SuDs. Suds not only requires that storm water generated on site is restricted for extreme storm events but that the overall quality of the storm water is enhanced, and the water re-used, where feasible on site.

The use of Suds features as part of this development will include swales / bio-rention areas, permeable paving, green roofs, and rainwater butts that will provide infiltration and evaporation as much as physical possible and optimise retention time. Relatively small volumes of rainwater collected on the respective SuDS devices will enter the public sewer network during typical low intensity storms. This is because the proposed SuDS measures will retain rainwater until it is either used via evapotranspiration in the green areas or reused within the development via the rainwater harvesting system. The SuDS processes decrease the impact of the development on the receiving environment by providing amenity and biodiversity in many cases.

The Suds devices and techniques are based on the three key design principles: Water Quantity, Water Quality and Water Amenity. The proposed SuDs devices have considered the following.

- Source Control
- Site Control
- Regional control

The above is based on the GDSDS and in the Suds Manual.

The GDSDS & the local authorities Regional Code of Practice for Drainage Works require that four main criteria to be provided by the developer.

Criterion 1: River Water Quality Protection – satisfied by providing interception storage and treatment of run-off within SUDS features e.g., bio-retention areas. Please see below for further details.

Criterion 2: River Regime Protection - satisfied by attenuating run-off from the site.

We confirm the site is located adjacent to the tidal estuary at Baldoyle and as there is no downstream development before outfalling to the Irish Sea, the *development site is not required to provide full attenuation for the 100-year return storm as stipulated in Section 4.3 of Appendix 1 of the Baldoyle-Stapolin LAP*.

Criterion 3: The GDSDS requires that no flooding should occur on site for storms up to and including the 1 in 30-year event. The pipe network and the attenuation storage volumes should, therefore, be checked for such storms to ensure that no site flooding occurs although partial surcharging of the system is allowed as long as it does not threaten to flood.

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

Refer to **Appendix A** for a copy of the Micro Drainage simulation, which demonstrates a level of service as described above and ensures no surface water flooding to any part of the site for storms up to and

including the 1 in 100 year plus 20% extra for climate change. Therefore, GDSDS Criterion 3 is complied with.

We refer to the Flood Risk Assessment as part of the planning submission for the analysis of flood risk at the subject site.

Criterion 4: River Flood Protection – attenuation and/or long-term storage provided within the Suds features. Criterion 4 is intended to prevent flooding of the receiving system / watercourse by either limiting the volume of runoff to the pre-development greenfield volume using 'long-term storage' (Option 1) or by limiting the rate of runoff for the 1 in 100 year storm to QBAR or 2.0l/s/ha without applying growth factors using 'extended attenuation storage' (Option 2).

We confirm the site is located adjacent to the tidal estuary at Baldoyle and as there is no downstream development before outfalling to the Irish Sea, the development site is not required to provide full attenuation for the 100 year return storm as stipulated in Section 4.3 of Appendix 1 of the Baldoyle-Stapolin LAP.

Criterion 1: Interception and Treatment Storage Calculation

The interception storage volume is calculated based on:

1. Entirety of the paved / roof area (5.68 ha)
2. 5mm rainfall depth
3. 80% runoff factor (5.681x 0.8) = 4.544 ha

The treatment storage volume is calculated based on:

1. Entirety of the paved / roof area (5.68 ha)
2. 15mm rainfall depth
3. 80% runoff factor (5.68 x 0.8) = 4.544 ha

Interception storage is to be provided within the green roofs of the apartment block areas, swales, permeable paving, bio-retention areas, etc (see Section 3.3), and landscape zones at ground level. The volumes to be provided are outlined in the Table 2.0 below, and the required volume for each area is provided in Table 3.0. (for confirmation of areas, please see drawing BD-CSC-ZZ-XX-DR-C-0038)

Required Volume of Interception		
Total Impermeable Area (m^2)	Rainfall Depth (m)	Required Volume of Interception (m^3)
45440	0.005	**227.2**

Table 1: Interception Storage Area Requirement

Required Volume of Interception		
Total Impermeable Area (m^2)	Rainfall Depth (m)	Required Volume of Interception (m^3)
45440	0.015	**681.6**

Table 2: Treatment Storage Area Requirement

Therefore, the total volume required for the development is 909m^3

Volume of Interception and Treatment Provided			
Storage Structure	Area (m^2)	Storage	Volume of Interception Provided (m^3)
Green Roof	3086	10 litres / m^2	30.86
Permeable Pavement	6177	100 mm / m^2	617.7
Swale	710	100 mm / m^2	71
Bio-rendition Areas	106	100 mm / m^2	10.6
Wetlands (GA1 only)			797
		Total Provided	**1527**

Table 3: Interception Storage Provision Calculation

Based on the above calculations and tables, the development is in accordance with Criterion 1, by providing in excess 1500m^3 for both interception and treatment across the GA1 development site.

4.0 FOUL WATER INFRASTRUCTURE

4.1 Existing Foul Infrastructure

There is an existing 375mm diameter foul sewer that runs in a northern direction along the eastern boundary of the site (Stapolin Avenue). This infrastructure was installed by previous developers to serve the entire LAP lands and extends upstream in a southerly direction serving the Myrtle development.

Downstream, this existing 375mm foul sewer discharges to an existing foul pump station located on the north side of Stapolin Haggard. The foul pumping station discharges via a 300mm rising main to the North Fringe Foul Sewer, that runs around the north / north eastern boundary of the site approximately 150m away from the pump station. The pump station currently serves the existing Myrtle and Red Arches Developments.

In addition to the 375mm foul sewer referred to above, there is already an existing foul drainage network located within the development lands, however due to its poor condition it is not intended to make use of the existing network and therefore it is proposed to remove the existing foul sewers within the development site.

4.2 Proposed Foul Drainage Arrangements

The proposed development will require a new separate drainage network to collect and convey the effluent generated by the proposed development. The drainage network for the proposed development has been designed in accordance with:

- The Regional Code of Practice Drainage Works,
- The Greater Dublin Strategic Drainage Study,
- Irish Water Code of Practice for Wastewater Infrastructure.

The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications set out in the Irish Water Code of Practice for Wastewater.

4.3 Proposed Effluent Generation

The proposed development shall comprise 882 no. residential units. Based on Irish Water guidelines, the foul effluent generated shall be:

- For the residential units:
  - ⇒ 446 l/day per residential unit (based on 2.7 persons per unit x 150l/person/day, + a 10% increase factor).
  - ⇒ 446 l/day/unit x 882 units = 333,608 l/day = 393.372 m^3/day;
  - ⇒ 4.55 l/sec Average flow (1 DWF);
  - ⇒ 13.65 l/sec Peak Flow (3 DWF – Population between 1000 and 5000).

A Pre-Connection Enquiry was submitted to Irish Water based on the foul flows for the proposed development and we received a favourable response See **Appendix D**

All foul effluent generated from the proposed development shall be collected in separate foul pipes and flow under gravity, to the existing 375mm diameter foul sewer in the north east corner of the development via a new connection. The foul drainage network has been modelled using Windes Microdrainage and the network calculations can be found in **Appendix E.**

The proposed foul water drainage infrastructure and routing plan is shown on drawings BD-CSC-ZZ-XX-DR-C-0003 and BD-CSC-ZZ-XX-DR-C-0004 included with this submission and the proposed connection to the Irish Water Network can be accommodated.

5.0 POTABLE WATER SUPPLY

5.1 Existing Potable Water Infrastructure

There is an existing 300mm watermain running along the eastern (Stapolin Avenue) and part of the southern (Myrtle Avenue) side of the development. This infrastructure was installed to serve the future developments within the LAP. In addition, there is already existing watermain infrastructure located within the development lands, however due to the condition and system layout it is not intended to make use of the existing network and these shall be removed and replaced to current Irish Water Specifications.

5.2 Proposed Potable Water Infrastructure

The proposed development will require a new network. The network will be designed and installed to the requirements and specifications set out in the Irish Water Code of Practice for Water. The proposed development will connect to the existing 300mm watermains on Myrtle and Stapolin Avenues.

The proposed development shall comprise 882 no. residential units. Based on Irish Water guidelines, the water demand shall be:

- For the residential units:
  - ⇒ 405l/day per residential unit (based on 2.7 persons per unit x 150l/person/day);
  - ⇒ 405l/day/unit x 882 units = 324,810 l/day = 324.81 m^3/day;
  - ⇒ 3.75 l/sec Average water demand;
  - ⇒ 11.25 l/sec Peak water demand (3 times average water demand – Population between 1000 and 5000).

A Pre-Connection Enquiry was submitted to Irish Water based on the water demand for the proposed development and we received a favourable response See **Appendix D.**

The proposed potable water infrastructure and routing plan is shown on drawings BD-CSC-ZZ-XX-DR-C-0005 included with this submission and the proposed connection to the Irish Water Network can be accommodated.

6.0 SURFACE & GROUNDWATER IMPACTS

6.1 Construction Phase

Water pollution will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association provides guidance on the control and management of water pollution from construction sites in their publication Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, which provides information on these issues. Pollutants can commonly include suspended solids, oil, chemicals, cement, cleaning materials and paints. These can enter controlled waters in various ways:

- ⇒ directly into a watercourse
- ⇒ via drains or public sewers
- ⇒ via otherwise dry ditches
- ⇒ in old field drains
- ⇒ by seepage into groundwater systems
- ⇒ through excavations into underlying aquifers
- ⇒ by disturbance of an already contaminated site

The proximity of the site to the River Mayne and the Irish coastline, and the historical uses of the site and nearby areas should be examined early in project planning and design, to ensure that suitable redesign and mitigation measures are undertaken as necessary.

During construction, careful management and planning will help minimise water pollution. This may include adequate bunding of all oil tanks, wheel washers and dust suppression on haul roads (particular care to be taken with the nearby River Mayne and Irish coastline), and regular plant maintenance.

A contingency plan for pollution emergencies should also be developed and regularly updated, which would identify the actions to be taken in the event of a pollution incident.

It is recommended the potential contractor draws up a contingency plan for pollution emergencies that should address the following:

- ⇒ containment measures
- ⇒ emergency discharge routes
- ⇒ list of appropriate equipment and clean-up materials
- ⇒ maintenance schedule for equipment
- ⇒ details of trained staff, location, and provision for 24-hour cover
- ⇒ details of staff responsibilities
- ⇒ notification procedures to inform the relevant environmental protection authority
- ⇒ audit and review schedule
- ⇒ telephone numbers of statutory water undertakers
- ⇒ list of specialist pollution clean-up companies and their contact details

6.2 Operational Phase

The sources of pollution that could potentially have an effect on surface or groundwater during the operational phase of the development will be oil and fuel leaks from parked cars, service vehicles, HGV delivery's etc. Hydrocarbon interceptors such as the wetlands, swales etc will be provided in storm water drainage network and Petrol interceptors will be installed within car parks areas under the apartment buildings to cater for these oil/fuel leaks as required.

It is not anticipated that flooding of the site will occur, due to the fact that there is no historical data which refers to any past flooding on this site and that the site is located in Flood Zone C, please refer to the Flood Risk Assessment under separate cover included with this planning application.

6.3 Mitigation Measures

The construction management of the building project will incorporate protection measures to minimise as far as possible the risk of spillage that could lead to surface and groundwater contamination.

All appropriate methods will be utilised to ensure that surface water arising during the course of construction activities will contain minimum sediment, prior to the ultimate discharge to the wetlands to the north.

Hydrocarbon interceptors will be provided on storm water drainage network and grease traps will be installed on foul sewers where necessary.

Best practice in design and construction will be employed for the installation of surface water and sanitary drainage.

6.4 Pollution Control Preliminary Method Statement

Prior to earthworks commencing, all watercourses and drains will be temporarily culverted to avoid movement of vehicles across watercourses. There will be no tracking of machinery within live channels.

Run-off from the working site or any areas of exposed soil should be channelled and intercepted at regular intervals for discharge to silt traps or lagoons with over-flows directed to land rather than to a watercourse. To avoid siltation of watercourses from crossing point locations, silt traps should be placed beside temporary crossing points with an associated buffer strip. Silt traps should be maintained and cleaned regularly during the course of site works.

A maintenance schedule and operational schedule should be established by the contractor for silt and pollution control measures during the construction period. This should be undertaken in consultation with the relevant statutory authorities.

Pouring of concrete should be carried out in the dry and allowed to cure. Pumped concrete should be monitored carefully to ensure no accidental discharge to a watercourse. Mixer washings and excess concrete should not be discharged to surface water. Implementation of comprehensive and strict site housekeeping measures to isolate concrete from local surface waters is essential.

Oil storage tank(s) and the associated filling area and distribution pipe work should be at least 10m distant from a surface watercourse (rivers, streams, field drains etc.) and 50m from boreholes.

Storage tanks should have secondary containment provided by means of an above ground bund to capture any oil leakage irrespective of whether it rises from leakage of the tank itself or from associated equipment such as filling and off-take points, sighting gauges etc., all of which should be located within the

bund. Bund specification should conform to the current best practice for oil storage.

Oil booms and soakage pads should be maintained on-site to enable a rapid and effective response to any accidental spillage or discharge.

Abstraction of water from watercourses for dust control should be from dedicated watering points. These should preferably be from silt lagoons located on-site or from an excavated site, replenished by ground infiltration and not by stream infiltration. No abstraction should occur on small watercourses.

There can be no direct pumping of contaminated water from the works to a watercourse at any time. Any dewatering must be treated by either infiltration over land, discharge to a Local Authority sewer or to a suitably sized and sited settlement pond.

The short-term storage and removal / disposal of excavated material must be considered and planned such that risk of pollution from these activities is minimised.

Appropriate environmental protection measures are the responsibility of the contractor and all works are subject to the provisions of the Local Government (Water Pollution) Act 1977 (as amended), the Fisheries (Consolidation) Act 1959 (as amended) & Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters 2016.

Appendix A

Storm Drainage Network WinDES Calculations

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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 - England and Wales

Return Period (years)	5	Add Flow / Climate Change (%)	0
M5-60 (mm)	15.900	Minimum Backdrop Height (m)	0.000
Ratio R	0.300	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	0.000
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	80		

Designed with Level Inverts

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)	HYD SECT	DIA (mm)
10.000	66.571	0.333	199.9	0.096	4.00	0.0	0.600	o	225
11.000	32.314	0.207	156.1	0.064	4.00	0.0	0.600	o	225
10.001	59.459	0.197	301.8	0.064	0.00	0.0	0.600	o	300
10.002	33.638	0.113	297.7	0.144	0.00	0.0	0.600	o	375
10.003	78.604	0.262	300.0	0.160	0.00	0.0	0.600	o	375
10.004	10.641	0.036	295.6	0.000	0.00	0.0	0.600	o	450
10.005	19.697	0.028	703.5	0.042	0.00	0.0	0.600	o	1050
12.000	70.076	0.375	186.9	0.000	4.00	0.0	0.600	o	225
12.001	70.774	0.354	199.9	0.120	0.00	0.0	0.600	o	225
12.002	34.303	0.172	199.4	0.125	0.00	0.0	0.600	o	225
12.003	28.176	0.132	213.5	0.102	0.00	0.0	0.600	o	300
10.006	6.090	0.012	507.5	0.000	0.00	0.0	0.600	o	1200
13.000	38.230	0.255	149.9	0.074	4.00	0.0	0.600	o	225

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)
10.000	50.00	5.20	5.181	0.096	0.0	0.0	0.0	0.92	36.6	13.0
11.000	50.00	4.52	5.055	0.064	0.0	0.0	0.0	1.04	41.5	8.7
10.001	50.00	6.31	4.848	0.224	0.0	0.0	0.0	0.90	63.6	30.3
10.002	50.00	6.84	4.651	0.368	0.0	0.0	0.0	1.04	115.4	49.8
10.003	50.00	8.10	4.538	0.528	0.0	0.0	0.0	1.04	115.0	71.5
10.004	50.00	8.25	4.276	0.528	0.0	0.0	0.0	1.18	187.2	71.5
10.005	49.71	8.51	4.240	0.570	0.0	0.0	0.0	1.29	1118.4	76.7
12.000	50.00	5.23	5.245	0.000	0.0	0.0	0.0	0.95	37.9	0.0
12.001	50.00	6.51	4.870	0.120	0.0	0.0	0.0	0.92	36.6	16.2
12.002	50.00	7.13	4.516	0.245	0.0	0.0	0.0	0.92	36.7	33.1
12.003	50.00	7.56	4.344	0.347	0.0	0.0	0.0	1.07	75.8	47.0
10.006	49.54	8.57	4.212	0.917	0.0	0.0	0.0	1.65	1870.4	123.0
13.000	50.00	4.60	7.339	0.074	0.0	0.0	0.0	1.07	42.4	10.0

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)	HYD SECT	DIA (mm)
13.001	46.177	0.307	150.4	0.128	0.00	0.0	0.600	o	225
13.002	14.988	0.076	197.2	0.054	0.00	0.0	0.600	o	300
13.003	62.800	0.314	200.0	0.047	0.00	0.0	0.600	o	375
14.000	88.431	0.590	149.9	0.120	4.00	0.0	0.600	o	225
14.001	6.360	0.042	151.4	0.136	0.00	0.0	0.600	o	225
13.004	17.267	0.086	200.8	0.120	0.00	0.0	0.600	o	375
15.000	47.398	0.316	150.0	0.122	4.00	0.0	0.600	o	225
15.001	47.816	0.239	200.1	0.113	0.00	0.0	0.600	o	300
13.005	67.619	0.151	447.8	0.144	0.00	0.0	0.600	o	525
16.000	55.753	0.587	95.0	0.128	4.00	0.0	0.600	o	225
16.001	44.391	0.654	67.9	0.088	0.00	0.0	0.600	o	225
16.002	45.851	0.116	395.3	0.120	0.00	0.0	0.600	o	375
17.000	34.409	0.227	151.6	0.000	4.00	0.0	0.600	o	225
16.003	48.174	0.107	450.2	0.224	0.00	0.0	0.600	o	525
16.004	48.121	0.107	449.7	0.320	0.00	0.0	0.600	o	525
16.005	10.363	0.022	471.0	0.320	0.00	0.0	0.600	o	525
13.006	27.487	0.062	443.3	0.000	0.00	0.0	0.600	o	600
18.000	54.575	0.270	202.1	0.080	4.00	0.0	0.600	o	225

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)
13.001	50.00	5.32	7.084	0.202	0.0	0.0	0.0	1.06	42.3	27.3
13.002	50.00	5.55	6.777	0.256	0.0	0.0	0.0	1.12	78.9	34.7
13.003	50.00	6.36	6.701	0.303	0.0	0.0	0.0	1.28	141.1	41.1
14.000	50.00	5.38	7.018	0.120	0.0	0.0	0.0	1.07	42.4	16.2
14.001	50.00	5.48	6.428	0.256	0.0	0.0	0.0	1.06	42.2	34.7
13.004	50.00	6.59	6.386	0.679	0.0	0.0	0.0	1.28	140.8	92.0
15.000	50.00	4.74	6.857	0.122	0.0	0.0	0.0	1.07	42.4	16.5
15.001	50.00	5.46	6.541	0.234	0.0	0.0	0.0	1.11	78.3	31.7
13.005	50.00	7.66	5.564	1.058	0.0	0.0	0.0	1.05	227.7	143.2
16.000	50.00	4.69	7.400	0.128	0.0	0.0	0.0	1.34	53.4	17.3
16.001	50.00	5.16	6.813	0.216	0.0	0.0	0.0	1.59	63.2	29.2
16.002	50.00	6.00	5.766	0.336	0.0	0.0	0.0	0.91	100.0	45.5
17.000	50.00	4.54	5.879	0.000	0.0	0.0	0.0	1.06	42.1	0.0
16.003	50.00	6.77	5.650	0.560	0.0	0.0	0.0	1.05	227.1	75.8
16.004	50.00	7.53	5.543	0.880	0.0	0.0	0.0	1.05	227.2	119.2
16.005	50.00	7.70	5.436	1.200	0.0	0.0	0.0	1.03	222.0	162.5
13.006	50.00	8.10	5.413	2.258	0.0	0.0	0.0	1.15	325.2	305.7
18.000	50.00	4.99	6.893	0.080	0.0	0.0	0.0	0.92	36.4	10.8

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)	HYD SECT	DIA (mm)
18.001	35.261	0.190	185.6	0.073	0.00	0.0	0.600	o	225
18.002	79.950	1.176	68.0	0.080	0.00	0.0	0.600	o	225
19.000	83.096	0.602	138.0	0.080	4.00	0.0	0.600	o	300
19.001	30.301	0.152	199.3	0.080	0.00	0.0	0.600	o	375
18.003	20.094	0.058	346.4	0.028	0.00	0.0	0.600	o	375
20.000	50.005	0.420	119.1	0.080	4.00	0.0	0.600	o	225
20.001	30.868	0.155	199.1	0.080	0.00	0.0	0.600	o	375
20.002	16.777	0.084	199.7	0.027	0.00	0.0	0.600	o	375
18.004	68.008	0.135	503.8	0.051	0.00	0.0	0.600	o	600
18.005	65.409	0.131	499.3	0.120	0.00	0.0	0.600	o	750
18.006	65.435	0.130	503.3	0.160	0.00	0.0	0.600	o	750
13.007	7.091	0.009	787.9	0.400	0.00	0.0	0.600	o	825
13.008	19.637	0.026	755.3	0.090	0.00	0.0	0.600	o	1050
13.009	72.854	0.072	1011.9	0.000	0.00	0.0	0.600	o	1050
21.000	58.974	0.295	199.9	0.000	4.00	0.0	0.600	o	300
21.001	6.357	0.032	198.7	0.126	0.00	0.0	0.600	o	300
21.002	73.923	0.370	199.8	0.106	0.00	0.0	0.600	o	375
21.003	92.949	0.299	310.9	0.320	0.00	0.0	0.600	o	450
13.010	22.230	0.061	364.4	0.320	0.00	0.0	0.600	o	1050
13.011	6.976	0.007	996.6	0.062	0.00	0.0	0.600	o	1200

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)
18.001	50.00	5.61	6.623	0.153	0.0	0.0	0.0	0.96	38.0	20.7
18.002	50.00	6.45	6.433	0.233	0.0	0.0	0.0	1.59	63.2	31.5
19.000	50.00	5.04	6.010	0.080	0.0	0.0	0.0	1.34	94.5	10.8
19.001	50.00	5.43	5.408	0.160	0.0	0.0	0.0	1.28	141.3	21.7
18.003	50.00	6.79	4.935	0.421	0.0	0.0	0.0	0.97	106.9	57.0
20.000	50.00	4.70	5.733	0.080	0.0	0.0	0.0	1.20	47.6	10.8
20.001	50.00	5.10	5.313	0.160	0.0	0.0	0.0	1.28	141.4	21.7
20.002	50.00	5.32	5.158	0.187	0.0	0.0	0.0	1.28	141.2	25.3
18.004	50.00	7.84	4.877	0.659	0.0	0.0	0.0	1.08	304.8	89.3
18.005	49.14	8.72	4.742	0.779	0.0	0.0	0.0	1.25	550.3	103.7
18.006	46.95	9.60	4.611	0.939	0.0	0.0	0.0	1.24	548.0	119.4
13.007	46.68	9.71	4.481	3.597	0.0	0.0	0.0	1.05	561.2	454.8
13.008	46.08	9.97	4.472	3.687	0.0	0.0	0.0	1.25	1079.0	460.2
13.009	43.70	11.10	4.446	3.687	0.0	0.0	0.0	1.07	930.7	460.2
21.000	50.00	4.89	5.264	0.000	0.0	0.0	0.0	1.11	78.3	0.0
21.001	50.00	4.98	4.969	0.126	0.0	0.0	0.0	1.11	78.6	17.1
21.002	50.00	5.95	4.937	0.232	0.0	0.0	0.0	1.28	141.2	31.4
21.003	50.00	7.30	4.567	0.552	0.0	0.0	0.0	1.15	182.5	74.7
13.010	43.30	11.31	4.268	4.559	0.0	0.0	0.0	1.80	1558.0	534.7
13.011	43.11	11.41	4.207	4.622	0.0	0.0	0.0	1.18	1330.7	539.6

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)	HYD SECT	DIA (mm)
22.000	63.004	0.210	300.0	0.320	4.00	0.0	0.600	o	375
23.000	85.414	0.323	264.4	0.000	4.00	0.0	0.600	o	300
24.000	61.291	0.199	308.0	0.000	4.00	0.0	0.600	o	375
23.001	44.973	0.450	99.9	0.000	0.00	0.0	0.600	o	450
10.007	68.661	0.088	780.2	0.000	0.00	0.0	0.600	o	1200
25.000	90.280	4.514	20.0	0.201	4.00	0.0	0.600	o	300
25.001	15.517	0.825	18.8	0.128	0.00	0.0	0.600	o	300
25.002	74.749	2.738	27.3	0.176	0.00	0.0	0.600	o	375
25.003	57.836	1.231	47.0	0.161	0.00	0.0	0.600	o	375
10.008	9.460	0.023	411.3	3.200	0.00	0.0	0.600	o	1350
10.009	46.751	0.061	766.4	0.320	0.00	0.0	0.600	o	1350
10.010	72.531	0.094	771.6	0.700	0.00	0.0	0.600	o	1350
26.000	45.048	0.150	300.3	1.500	4.00	0.0	0.600	o	675
26.001	10.138	0.034	298.2	0.000	0.00	0.0	0.600	o	675
26.002	43.971	0.150	293.1	0.600	0.00	0.0	0.600	o	675
27.000	39.958	0.133	300.4	1.500	4.00	0.0	0.600	o	750
27.001	41.283	0.134	308.1	0.000	0.00	0.0	0.600	o	750

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)
22.000	50.00	5.01	5.300	0.320	0.0	0.0	0.0	1.04	115.0	43.3
23.000	50.00	5.48	5.410	0.000	0.0	0.0	0.0	0.96	68.0	0.0
24.000	50.00	4.99	5.595	0.000	0.0	0.0	0.0	1.03	113.4	0.0
23.001	50.00	5.85	5.087	0.000	0.0	0.0	0.0	2.03	323.5	0.0
10.007	41.54	12.27	4.200	5.858	0.0	0.0	0.0	1.33	1505.7	659.1
25.000	50.00	4.43	13.442	0.201	0.0	0.0	0.0	3.53	249.6	27.2
25.001	50.00	4.50	8.928	0.329	0.0	0.0	0.0	3.64	257.4	44.5
25.002	50.00	4.86	8.103	0.505	0.0	0.0	0.0	3.48	384.3	68.4
25.003	50.00	5.22	5.365	0.666	0.0	0.0	0.0	2.65	292.6	90.1
10.008	41.40	12.35	4.112	9.724	0.0	0.0	0.0	1.98	2829.4	1090.4
10.009	40.50	12.89	4.089	10.044	0.0	0.0	0.0	1.44	2067.9	1101.6
10.010	39.18	13.73	4.028	10.744	0.0	0.0	0.0	1.44	2060.9	1140.0
26.000	50.00	4.50	4.283	1.500	0.0	0.0	0.0	1.51	539.3	203.1
26.001	50.00	4.61	4.133	1.500	0.0	0.0	0.0	1.51	541.3	203.1
26.002	50.00	5.09	4.099	2.100	0.0	0.0	0.0	1.53	545.9	284.4
27.000	50.00	4.41	4.216	1.500	0.0	0.0	0.0	1.61	711.0	203.1
27.001	50.00	4.85	4.083	1.500	0.0	0.0	0.0	1.59	702.0	203.1

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)	HYD SECT	DIA (mm)
10.011	61.140	0.079	773.9	0.000	0.00	0.0	0.600	o	1500
10.012	47.459	0.062	765.5	0.495	0.00	0.0	0.600	o	1500
28.000	59.843	0.120	498.7	0.800	4.00	0.0	0.600	o	600
28.001	27.849	0.032	870.3	0.400	0.00	0.0	0.600	o	600
28.002	4.723	0.032	147.6	0.000	0.00	0.0	0.600	o	600
10.013	33.033	0.043	768.2	0.000	0.00	0.0	0.600	[]	-12
10.014	56.194	0.281	200.0	0.000	0.00	0.0	0.600	[]	-12
10.015	19.264	0.096	200.7	0.000	0.00	0.0	0.600	[]	-12

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)
10.011	38.21	14.39	3.934	14.344	0.0	0.0	0.0	1.53	2710.6	1484.3
10.012	37.50	14.90	3.855	14.839	0.0	0.0	0.0	1.54	2725.7	1506.9
28.000	50.00	4.92	4.000	0.800	0.0	0.0	0.0	1.08	306.4	108.3
28.001	50.00	5.49	3.880	1.200	0.0	0.0	0.0	0.82	231.1	162.5
28.002	50.00	5.53	3.848	1.200	0.0	0.0	0.0	2.00	566.2	162.5
10.013	36.97	15.30	3.793	16.039	0.0	0.0	0.0	1.40	2520.4	1606.1
10.014	36.54	15.64	3.750	16.039	0.0	0.0	0.0	2.76	4961.8	1606.1
10.015	36.39	15.75	3.469	16.039	0.0	0.0	0.0	2.75	4953.2	1606.1

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)
S11-5	6.992	1.811	Open Manhole	1200	10.000	5.181	225				
11-4-1	6.919	1.864	Open Manhole	1200	11.000	5.055	225				
S11-4	6.916	2.068	Open Manhole	1200	10.001	4.848	300	10.000	4.848	225	
								11.000	4.848	225	
S11-3	6.378	1.727	Open Manhole	1350	10.002	4.651	375	10.001	4.651	300	
S11-2	6.707	2.169	Open Manhole	1350	10.003	4.538	375	10.002	4.538	375	
S11-1	6.652	2.376	Open Manhole	1350	10.004	4.276	450	10.003	4.276	375	
S11	6.753	2.513	Open Manhole	1800	10.005	4.240	1050	10.004	4.240	450	
S10-4	6.733	1.488	Open Manhole	1050	12.000	5.245	225				
S10-3	7.020	2.150	Open Manhole	1200	12.001	4.870	225	12.000	4.870	225	
S10-2	7.066	2.550	Open Manhole	1200	12.002	4.516	225	12.001	4.516	225	
S10-1	7.007	2.663	Open Manhole	1200	12.003	4.344	300	12.002	4.344	225	
S10	7.011	2.799	Open Manhole	1800	10.006	4.212	1200	10.005	4.212	1050	
								12.003	4.212	300	
S21	9.158	1.819	Open Manhole	1200	13.000	7.339	225				
S20	9.073	1.989	Open Manhole	1200	13.001	7.084	225	13.000	7.084	225	
S19	8.970	2.193	Open Manhole	1200	13.002	6.777	300	13.001	6.777	225	
S18	8.864	2.163	Open Manhole	1350	13.003	6.701	375	13.002	6.701	300	
S17-2	8.730	1.712	Open Manhole	1050	14.000	7.018	225				
S17-1	8.277	1.849	Open Manhole	1200	14.001	6.428	225	14.000	6.428	225	
S17	8.146	1.760	Open Manhole	1350	13.004	6.386	375	13.003	6.387	375	1
								14.001	6.386	225	
S16-2	8.480	1.623	Open Manhole	1050	15.000	6.857	225				
S16-1	8.418	1.877	Open Manhole	1200	15.001	6.541	300	15.000	6.541	225	
S16	7.985	2.421	Open Manhole	1500	13.005	5.564	525	13.004	6.300	375	586
								15.001	6.302	300	513
S15-6	9.170	1.770	Open Manhole	1200	16.000	7.400	225				
S15-5	8.556	1.743	Open Manhole	1200	16.001	6.813	225	16.000	6.813	225	
S15-4	8.068	2.302	Open Manhole	1350	16.002	5.766	375	16.001	6.159	225	243
S15-3-1	7.556	1.677	Open Manhole	1050	17.000	5.879	225				
S15-3	7.934	2.284	Open Manhole	1500	16.003	5.650	525	16.002	5.650	375	
								17.000	5.652	225	
S15-2	7.670	2.127	Open Manhole	1500	16.004	5.543	525	16.003	5.543	525	
S15-1	7.196	1.760	Open Manhole	1500	16.005	5.436	525	16.004	5.436	525	
S15	7.128	1.715	Open Manhole	1500	13.006	5.413	600	13.005	5.413	525	
								16.005	5.414	525	
S18-1	9.177	2.284	Open Manhole	1200	18.000	6.893	225				
S18-2	8.678	2.055	Open Manhole	1200	18.001	6.623	225	18.000	6.623	225	
S14-5	8.081	1.648	Open Manhole	1050	18.002	6.433	225	18.001	6.433	225	
S14-4-2	7.870	1.860	Open Manhole	1200	19.000	6.010	300				
S14-4-1	7.031	1.623	Open Manhole	1350	19.001	5.408	375	19.000	5.408	300	
S14-4	6.735	1.800	Open Manhole	1350	18.003	4.935	375	18.002	5.257	225	172
								19.001	5.256	375	321
S14-3-3	7.488	1.755	Open Manhole	1200	20.000	5.733	225				
S14-3-2	6.800	1.487	Open Manhole	1350	20.001	5.313	375	20.000	5.313	225	
S14-3-1	6.550	1.392	Open Manhole	1350	20.002	5.158	375	20.001	5.158	375	

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)
S14-3	6.540	1.663	Open Manhole	1500	18.004	4.877	600	18.003	4.877	375	

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)
								20.002	5.074	375	
S14-2	6.217	1.475	Open Manhole	1800	18.005	4.742	750	18.004	4.742	600	
S14-1	6.934	2.323	Open Manhole	1800	18.006	4.611	750	18.005	4.611	750	
S14	6.872	2.391	Open Manhole	1800	13.007	4.481	825	13.006	5.351	600	645
								18.006	4.481	750	
S13	6.641	2.169	Open Manhole	1800	13.008	4.472	1050	13.007	4.472	825	
S9C	7.090	2.644	Open Manhole	1800	13.009	4.446	1050	13.008	4.446	1050	
S12-4	6.446	1.182	Open Manhole	1050	21.000	5.264	300				
S12-3	6.886	1.917	Open Manhole	1200	21.001	4.969	300	21.000	4.969	300	
S12-2	6.777	1.840	Open Manhole	1350	21.002	4.937	375	21.001	4.937	300	
S12-1	6.556	1.989	Open Manhole	1350	21.003	4.567	450	21.002	4.567	375	
S9B	6.397	2.129	Open Manhole	1800	13.010	4.268	1050	13.009	4.374	1050	106
								21.003	4.268	450	
S9A	6.951	2.744	Open Manhole	1800	13.011	4.207	1200	13.010	4.207	1050	
S9A-1	6.951	1.651	Open Manhole	1350	22.000	5.300	375				
S9-1-1	6.897	1.487	Open Manhole	1050	23.000	5.410	300				
S9-2	6.811	1.216	Open Manhole	1350	24.000	5.595	375				
S9-1	7.280	2.193	Open Manhole	1350	23.001	5.087	450	23.000	5.087	300	
								24.000	5.396	375	234
S9	6.947	2.747	Open Manhole	1800	10.007	4.200	1200	10.006	4.200	1200	
								13.011	4.200	1200	
								22.000	5.090	375	65
								23.001	4.637	450	
S8-4	15.676	2.234	Open Manhole	1200	25.000	13.442	300				
S8-3	11.261	2.333	Open Manhole	1200	25.001	8.928	300	25.000	8.928	300	
S8-2	10.514	2.411	Open Manhole	1350	25.002	8.103	375	25.001	8.103	300	
S8-1	7.601	2.236	Open Manhole	1350	25.003	5.365	375	25.002	5.365	375	
S8	6.606	2.494	Open Manhole	1800	10.008	4.112	1350	10.007	4.112	1200	
								25.003	4.134	375	
S8A	6.613	2.524	Open Manhole	1800	10.009	4.089	1350	10.008	4.089	1350	
S6	6.862	2.834	Open Manhole	1800	10.010	4.028	1350	10.009	4.028	1350	
S5-3	6.704	2.421	Open Manhole	1500	26.000	4.283	675				
S5-2	6.962	2.829	Open Manhole	1500	26.001	4.133	675	26.000	4.133	675	
S5-1	6.865	2.766	Open Manhole	1500	26.002	4.099	675	26.001	4.099	675	
S4-2	6.861	2.645	Open Manhole	1800	27.000	4.216	750				
S4-1	6.522	2.439	Open Manhole	1800	27.001	4.083	750	27.000	4.083	750	
S4	6.682	2.748	Open Manhole	1800	10.011	3.934	1500	10.010	3.934	1350	
								26.002	3.949	675	
								27.001	3.949	750	
S3	6.280	2.425	Open Manhole	1800	10.012	3.855	1500	10.011	3.855	1500	
S2-2	6.000	2.000	Open Manhole	1500	28.000	4.000	600				
S14	5.630	1.750	Open Manhole	1500	28.001	3.880	600	28.000	3.880	600	
35	6.000	2.152	Open Manhole	1500	28.002	3.848	600	28.001	3.848	600	
S2	6.302	2.509	Open Manhole	3000	10.013	3.793	-12	10.012	3.793	1500	
								28.002	3.816	600	523
S1A	6.000	2.250	Open Manhole	3000	10.014	3.750	-12	10.013	3.750	-12	

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)
S1	6.166	2.697	Open Manhole	3000	10.015	3.469	-12	10.014	3.469	-12	

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)
WETLANDS	6.000	2.627	Open Manhole	0		OUTFALL		10.015	3.373	-12	

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)
10.000	o	225	S11-5	6.992	5.181	1.586	Open Manhole	1200
11.000	o	225	11-4-1	6.919	5.055	1.639	Open Manhole	1200
10.001	o	300	S11-4	6.916	4.848	1.768	Open Manhole	1200
10.002	o	375	S11-3	6.378	4.651	1.352	Open Manhole	1350
10.003	o	375	S11-2	6.707	4.538	1.794	Open Manhole	1350
10.004	o	450	S11-1	6.652	4.276	1.926	Open Manhole	1350
10.005	o	1050	S11	6.753	4.240	1.463	Open Manhole	1800
12.000	o	225	S10-4	6.733	5.245	1.263	Open Manhole	1050
12.001	o	225	S10-3	7.020	4.870	1.925	Open Manhole	1200
12.002	o	225	S10-2	7.066	4.516	2.325	Open Manhole	1200
12.003	o	300	S10-1	7.007	4.344	2.363	Open Manhole	1200
10.006	o	1200	S10	7.011	4.212	1.599	Open Manhole	1800
13.000	o	225	S21	9.158	7.339	1.594	Open Manhole	1200
13.001	o	225	S20	9.073	7.084	1.764	Open Manhole	1200
13.002	o	300	S19	8.970	6.777	1.893	Open Manhole	1200
13.003	o	375	S18	8.864	6.701	1.788	Open Manhole	1350
14.000	o	225	S17-2	8.730	7.018	1.487	Open Manhole	1050
14.001	o	225	S17-1	8.277	6.428	1.624	Open Manhole	1200
13.004	o	375	S17	8.146	6.386	1.385	Open Manhole	1350

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)
10.000	66.571	199.9	S11-4	6.916	4.848	1.843	Open Manhole	1200
11.000	32.314	156.1	S11-4	6.916	4.848	1.843	Open Manhole	1200
10.001	59.459	301.8	S11-3	6.378	4.651	1.427	Open Manhole	1350
10.002	33.638	297.7	S11-2	6.707	4.538	1.794	Open Manhole	1350
10.003	78.604	300.0	S11-1	6.652	4.276	2.001	Open Manhole	1350
10.004	10.641	295.6	S11	6.753	4.240	2.063	Open Manhole	1800
10.005	19.697	703.5	S10	7.011	4.212	1.749	Open Manhole	1800
12.000	70.076	186.9	S10-3	7.020	4.870	1.925	Open Manhole	1200
12.001	70.774	199.9	S10-2	7.066	4.516	2.325	Open Manhole	1200
12.002	34.303	199.4	S10-1	7.007	4.344	2.438	Open Manhole	1200
12.003	28.176	213.5	S10	7.011	4.212	2.499	Open Manhole	1800
10.006	6.090	507.5	S9	6.947	4.200	1.547	Open Manhole	1800
13.000	38.230	149.9	S20	9.073	7.084	1.764	Open Manhole	1200
13.001	46.177	150.4	S19	8.970	6.777	1.968	Open Manhole	1200
13.002	14.988	197.2	S18	8.864	6.701	1.863	Open Manhole	1350
13.003	62.800	200.0	S17	8.146	6.387	1.384	Open Manhole	1350
14.000	88.431	149.9	S17-1	8.277	6.428	1.624	Open Manhole	1200
14.001	6.360	151.4	S17	8.146	6.386	1.535	Open Manhole	1350
13.004	17.267	200.8	S16	7.985	6.300	1.310	Open Manhole	1500

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)
15.000	o	225	S16-2	8.480	6.857	1.398	Open Manhole	1050
15.001	o	300	S16-1	8.418	6.541	1.577	Open Manhole	1200
13.005	o	525	S16	7.985	5.564	1.896	Open Manhole	1500
16.000	o	225	S15-6	9.170	7.400	1.545	Open Manhole	1200
16.001	o	225	S15-5	8.556	6.813	1.518	Open Manhole	1200
16.002	o	375	S15-4	8.068	5.766	1.927	Open Manhole	1350
17.000	o	225	S15-3-1	7.556	5.879	1.452	Open Manhole	1050
16.003	o	525	S15-3	7.934	5.650	1.759	Open Manhole	1500
16.004	o	525	S15-2	7.670	5.543	1.602	Open Manhole	1500
16.005	o	525	S15-1	7.196	5.436	1.235	Open Manhole	1500
13.006	o	600	S15	7.128	5.413	1.115	Open Manhole	1500
18.000	o	225	S18-1	9.177	6.893	2.059	Open Manhole	1200
18.001	o	225	S18-2	8.678	6.623	1.830	Open Manhole	1200
18.002	o	225	S14-5	8.081	6.433	1.423	Open Manhole	1050
19.000	o	300	S14-4-2	7.870	6.010	1.560	Open Manhole	1200
19.001	o	375	S14-4-1	7.031	5.408	1.248	Open Manhole	1350
18.003	o	375	S14-4	6.735	4.935	1.425	Open Manhole	1350

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)
15.000	47.398	150.0	S16-1	8.418	6.541	1.652	Open Manhole	1200
15.001	47.816	200.1	S16	7.985	6.302	1.383	Open Manhole	1500
13.005	67.619	447.8	S15	7.128	5.413	1.190	Open Manhole	1500
16.000	55.753	95.0	S15-5	8.556	6.813	1.518	Open Manhole	1200
16.001	44.391	67.9	S15-4	8.068	6.159	1.684	Open Manhole	1350
16.002	45.851	395.3	S15-3	7.934	5.650	1.909	Open Manhole	1500
17.000	34.409	151.6	S15-3	7.934	5.652	2.057	Open Manhole	1500
16.003	48.174	450.2	S15-2	7.670	5.543	1.602	Open Manhole	1500
16.004	48.121	449.7	S15-1	7.196	5.436	1.235	Open Manhole	1500
16.005	10.363	471.0	S15	7.128	5.414	1.189	Open Manhole	1500
13.006	27.487	443.3	S14	6.872	5.351	0.921	Open Manhole	1800
18.000	54.575	202.1	S18-2	8.678	6.623	1.830	Open Manhole	1200
18.001	35.261	185.6	S14-5	8.081	6.433	1.423	Open Manhole	1050
18.002	79.950	68.0	S14-4	6.735	5.257	1.253	Open Manhole	1350
19.000	83.096	138.0	S14-4-1	7.031	5.408	1.323	Open Manhole	1350
19.001	30.301	199.3	S14-4	6.735	5.256	1.104	Open Manhole	1350
18.003	20.094	346.4	S14-3	6.540	4.877	1.288	Open Manhole	1500

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)
20.000	o	225	S14-3-3	7.488	5.733	1.530	Open Manhole	1200
20.001	o	375	S14-3-2	6.800	5.313	1.112	Open Manhole	1350
20.002	o	375	S14-3-1	6.550	5.158	1.017	Open Manhole	1350
18.004	o	600	S14-3	6.540	4.877	1.063	Open Manhole	1500
18.005	o	750	S14-2	6.217	4.742	0.725	Open Manhole	1800
18.006	o	750	S14-1	6.934	4.611	1.573	Open Manhole	1800
13.007	o	825	S14	6.872	4.481	1.566	Open Manhole	1800
13.008	o	1050	S13	6.641	4.472	1.119	Open Manhole	1800
13.009	o	1050	S9C	7.090	4.446	1.594	Open Manhole	1800
21.000	o	300	S12-4	6.446	5.264	0.882	Open Manhole	1050
21.001	o	300	S12-3	6.886	4.969	1.617	Open Manhole	1200
21.002	o	375	S12-2	6.777	4.937	1.465	Open Manhole	1350
21.003	o	450	S12-1	6.556	4.567	1.539	Open Manhole	1350
13.010	o	1050	S9B	6.397	4.268	1.079	Open Manhole	1800
13.011	o	1200	S9A	6.951	4.207	1.544	Open Manhole	1800
22.000	o	375	S9A-1	6.951	5.300	1.276	Open Manhole	1350
23.000	o	300	S9-1-1	6.897	5.410	1.187	Open Manhole	1050
24.000	o	375	S9-2	6.811	5.595	0.841	Open Manhole	1350

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)
20.000	50.005	119.1	S14-3-2	6.800	5.313	1.262	Open Manhole	1350
20.001	30.868	199.1	S14-3-1	6.550	5.158	1.017	Open Manhole	1350
20.002	16.777	199.7	S14-3	6.540	5.074	1.091	Open Manhole	1500
18.004	68.008	503.8	S14-2	6.217	4.742	0.875	Open Manhole	1800
18.005	65.409	499.3	S14-1	6.934	4.611	1.573	Open Manhole	1800
18.006	65.435	503.3	S14	6.872	4.481	1.641	Open Manhole	1800
13.007	7.091	787.9	S13	6.641	4.472	1.344	Open Manhole	1800
13.008	19.637	755.3	S9C	7.090	4.446	1.594	Open Manhole	1800
13.009	72.854	1011.9	S9B	6.397	4.374	0.973	Open Manhole	1800
21.000	58.974	199.9	S12-3	6.886	4.969	1.617	Open Manhole	1200
21.001	6.357	198.7	S12-2	6.777	4.937	1.540	Open Manhole	1350
21.002	73.923	199.8	S12-1	6.556	4.567	1.614	Open Manhole	1350
21.003	92.949	310.9	S9B	6.397	4.268	1.679	Open Manhole	1800
13.010	22.230	364.4	S9A	6.951	4.207	1.694	Open Manhole	1800
13.011	6.976	996.6	S9	6.947	4.200	1.547	Open Manhole	1800
22.000	63.004	300.0	S9	6.947	5.090	1.482	Open Manhole	1800
23.000	85.414	264.4	S9-1	7.280	5.087	1.893	Open Manhole	1350
24.000	61.291	308.0	S9-1	7.280	5.396	1.509	Open Manhole	1350

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)
23.001	o	450	S9-1	7.280	5.087	1.743	Open Manhole	1350
10.007	o	1200	S9	6.947	4.200	1.547	Open Manhole	1800
25.000	o	300	S8-4	15.676	13.442	1.934	Open Manhole	1200
25.001	o	300	S8-3	11.261	8.928	2.033	Open Manhole	1200
25.002	o	375	S8-2	10.514	8.103	2.036	Open Manhole	1350
25.003	o	375	S8-1	7.601	5.365	1.861	Open Manhole	1350
10.008	o	1350	S8	6.606	4.112	1.144	Open Manhole	1800
10.009	o	1350	S8A	6.613	4.089	1.174	Open Manhole	1800
10.010	o	1350	S6	6.862	4.028	1.484	Open Manhole	1800
26.000	o	675	S5-3	6.704	4.283	1.746	Open Manhole	1500
26.001	o	675	S5-2	6.962	4.133	2.154	Open Manhole	1500
26.002	o	675	S5-1	6.865	4.099	2.091	Open Manhole	1500
27.000	o	750	S4-2	6.861	4.216	1.895	Open Manhole	1800
27.001	o	750	S4-1	6.522	4.083	1.689	Open Manhole	1800
10.011	o	1500	S4	6.682	3.934	1.248	Open Manhole	1800
10.012	o	1500	S3	6.280	3.855	0.925	Open Manhole	1800
28.000	o	600	S2-2	6.000	4.000	1.400	Open Manhole	1500
28.001	o	600	S14	5.630	3.880	1.150	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)
23.001	44.973	99.9	S9	6.947	4.637	1.860	Open Manhole	1800
10.007	68.661	780.2	S8	6.606	4.112	1.294	Open Manhole	1800
25.000	90.280	20.0	S8-3	11.261	8.928	2.033	Open Manhole	1200
25.001	15.517	18.8	S8-2	10.514	8.103	2.111	Open Manhole	1350
25.002	74.749	27.3	S8-1	7.601	5.365	1.861	Open Manhole	1350
25.003	57.836	47.0	S8	6.606	4.134	2.097	Open Manhole	1800
10.008	9.460	411.3	S8A	6.613	4.089	1.174	Open Manhole	1800
10.009	46.751	766.4	S6	6.862	4.028	1.484	Open Manhole	1800
10.010	72.531	771.6	S4	6.682	3.934	1.398	Open Manhole	1800
26.000	45.048	300.3	S5-2	6.962	4.133	2.154	Open Manhole	1500
26.001	10.138	298.2	S5-1	6.865	4.099	2.091	Open Manhole	1500
26.002	43.971	293.1	S4	6.682	3.949	2.058	Open Manhole	1800
27.000	39.958	300.4	S4-1	6.522	4.083	1.689	Open Manhole	1800
27.001	41.283	308.1	S4	6.682	3.949	1.983	Open Manhole	1800
10.011	61.140	773.9	S3	6.280	3.855	0.925	Open Manhole	1800
10.012	47.459	765.5	S2	6.302	3.793	1.009	Open Manhole	3000
28.000	59.843	498.7	S14	5.630	3.880	1.150	Open Manhole	1500
28.001	27.849	870.3	35	6.000	3.848	1.552	Open Manhole	1500

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)
28.002	o	600	35	6.000	3.848	1.552	Open Manhole	1500
10.013	[]	-12	S2	6.302	3.793	2.409	Open Manhole	3000
10.014	[]	-12	S1A	6.000	3.750	2.150	Open Manhole	3000
10.015	[]	-12	S1	6.166	3.469	2.597	Open Manhole	3000

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)
28.002	4.723	147.6	S2	6.302	3.816	1.886	Open Manhole	3000
10.013	33.033	768.2	S1A	6.000	3.750	2.150	Open Manhole	3000
10.014	56.194	200.0	S1	6.166	3.469	2.597	Open Manhole	3000
10.015	19.264	200.7	WETLANDS	6.000	3.373	2.527	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
10.000	-	-	80	0.120	0.096	0.096
11.000	-	-	80	0.080	0.064	0.064
10.001	-	-	80	0.080	0.064	0.064
10.002	-	-	80	0.180	0.144	0.144
10.003	-	-	80	0.200	0.160	0.160
10.004	-	-	80	0.000	0.000	0.000
10.005	-	-	80	0.052	0.042	0.042
12.000	-	-	80	0.000	0.000	0.000
12.001	-	-	80	0.150	0.120	0.120
12.002	-	-	80	0.156	0.125	0.125
12.003	-	-	80	0.128	0.102	0.102
10.006	-	-	80	0.000	0.000	0.000
13.000	-	-	80	0.092	0.074	0.074
13.001	-	-	80	0.160	0.128	0.128
13.002	-	-	80	0.068	0.054	0.054
13.003	-	-	80	0.059	0.047	0.047
14.000	-	-	80	0.150	0.120	0.120
14.001	-	-	80	0.170	0.136	0.136
13.004	-	-	80	0.150	0.120	0.120
15.000	-	-	80	0.152	0.122	0.122
15.001	-	-	80	0.141	0.113	0.113
13.005	-	-	80	0.180	0.144	0.144
16.000	-	-	80	0.160	0.128	0.128
16.001	-	-	80	0.110	0.088	0.088
16.002	-	-	80	0.150	0.120	0.120
17.000	-	-	80	0.000	0.000	0.000
16.003	-	-	80	0.280	0.224	0.224
16.004	-	-	80	0.400	0.320	0.320
16.005	-	-	80	0.400	0.320	0.320
13.006	-	-	80	0.000	0.000	0.000
18.000	-	-	80	0.100	0.080	0.080
18.001	-	-	80	0.091	0.073	0.073
18.002	-	-	80	0.100	0.080	0.080
19.000	-	-	80	0.100	0.080	0.080
19.001	-	-	80	0.100	0.080	0.080
18.003	-	-	80	0.035	0.028	0.028
20.000	-	-	80	0.100	0.080	0.080
20.001	-	-	80	0.100	0.080	0.080
20.002	-	-	80	0.034	0.027	0.027
18.004	-	-	80	0.064	0.051	0.051
18.005	-	-	80	0.150	0.120	0.120
18.006	-	-	80	0.200	0.160	0.160
13.007	-	-	80	0.500	0.400	0.400
13.008	-	-	80	0.113	0.090	0.090
13.009	-	-	80	0.000	0.000	0.000
21.000	-	-	80	0.000	0.000	0.000
21.001	-	-	80	0.158	0.126	0.126
21.002	-	-	80	0.132	0.106	0.106
21.003	-	-	80	0.400	0.320	0.320
13.010	-	-	80	0.400	0.320	0.320
13.011	-	-	80	0.078	0.062	0.062
22.000	-	-	80	0.400	0.320	0.320
23.000	-	-	80	0.000	0.000	0.000
24.000	-	-	80	0.000	0.000	0.000
23.001	-	-	80	0.000	0.000	0.000
10.007	-	-	80	0.000	0.000	0.000
25.000	-	-	80	0.251	0.201	0.201
25.001	-	-	80	0.160	0.128	0.128
25.002	-	-	80	0.220	0.176	0.176
25.003	-	-	80	0.201	0.161	0.161
10.008	-	-	80	4.000	3.200	3.200
10.009	-	-	80	0.400	0.320	0.320

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
10.010	-	-	100	0.700	0.700	0.700
26.000	-	-	100	1.500	1.500	1.500
26.001	-	-	100	0.000	0.000	0.000
26.002	-	-	100	0.600	0.600	0.600
27.000	-	-	100	1.500	1.500	1.500
27.001	-	-	100	0.000	0.000	0.000
10.011	-	-	100	0.000	0.000	0.000
10.012	-	-	100	0.495	0.495	0.495
28.000	-	-	100	0.800	0.800	0.800
28.001	-	-	100	0.400	0.400	0.400
28.002	-	-	100	0.000	0.000	0.000
10.013	-	-	100	0.000	0.000	0.000
10.014	-	-	100	0.000	0.000	0.000
10.015	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				18.550	16.039	16.039

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)
10.015	WETLANDS	6.000	3.373	2.542	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	20.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	1.000
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	5760
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	24

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	15.900	Storm Duration (mins)	2880
Ratio R	0.300		

Summary of Results for 15 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	6.246	0.840	0.000	0.75	0.0	26.6	SURCHARGED
11.000	11-4-1	6.158	0.878	0.000	0.46	0.0	18.1	SURCHARGED
10.001	S11-4	6.122	0.974	0.000	0.84	0.0	51.0	SURCHARGED
10.002	S11-3	6.027	1.001	0.000	0.80	0.0	82.6	SURCHARGED
10.003	S11-2	5.975	1.062	0.000	1.04	0.0	114.1	SURCHARGED
10.004	S11-1	5.795	1.069	0.000	0.84	0.0	110.7	SURCHARGED
10.005	S11	5.769	0.479	0.000	0.21	0.0	110.2	SURCHARGED
12.000	S10-4	6.337	0.867	0.000	-0.13	0.0	-4.8	SURCHARGED
12.001	S10-3	6.342	1.247	0.000	0.71	0.0	25.2	SURCHARGED
12.002	S10-2	6.157	1.416	0.000	1.60	0.0	55.4	SURCHARGED
12.003	S10-1	5.845	1.201	0.000	1.20	0.0	82.0	SURCHARGED
10.006	S10	5.764	0.352	0.000	0.20	0.0	181.8	SURCHARGED
13.000	S21	8.041	0.477	0.000	0.59	0.0	23.5	SURCHARGED
13.001	S20	7.955	0.646	0.000	1.56	0.0	63.1	SURCHARGED
13.002	S19	7.176	0.099	0.000	1.18	0.0	78.0	SURCHARGED
13.003	S18	7.072	-0.004	0.000	0.67	0.0	89.0	OK
14.000	S17-2	7.745	0.502	0.000	0.93	0.0	38.5	SURCHARGED
14.001	S17-1	7.197	0.544	0.000	2.49	0.0	80.8	SURCHARGED
13.004	S17	6.926	0.165	0.000	1.74	0.0	200.9	SURCHARGED
15.000	S16-2	7.294	0.212	0.000	1.09	0.0	44.0	SURCHARGED
15.001	S16-1	6.896	0.055	0.000	1.10	0.0	81.1	SURCHARGED
13.005	S16	6.618	0.529	0.000	1.45	0.0	302.2	SURCHARGED
16.000	S15-6	7.847	0.222	0.000	0.87	0.0	44.7	SURCHARGED
16.001	S15-5	7.500	0.462	0.000	1.07	0.0	64.4	SURCHARGED
16.002	S15-4	6.791	0.650	0.000	1.05	0.0	96.9	SURCHARGED
17.000	S15-3-1	6.658	0.554	0.000	-0.10	0.0	-3.8	SURCHARGED
16.003	S15-3	6.663	0.488	0.000	0.78	0.0	158.0	SURCHARGED
16.004	S15-2	6.593	0.525	0.000	1.23	0.0	248.7	SURCHARGED
16.005	S15-1	6.416	0.455	0.000	2.90	0.0	343.5	SURCHARGED
13.006	S15	6.283	0.270	0.000	2.37	0.0	618.1	SURCHARGED
18.000	S18-1	7.340	0.222	0.000	0.79	0.0	27.5	SURCHARGED
18.001	S18-2	7.258	0.410	0.000	1.22	0.0	43.9	SURCHARGED
18.002	S14-5	7.032	0.374	0.000	1.01	0.0	62.0	SURCHARGED
19.000	S14-4-2	6.135	-0.175	0.000	0.33	0.0	29.7	OK
19.001	S14-4-1	6.119	0.336	0.000	0.47	0.0	58.7	SURCHARGED
18.003	S14-4	6.108	0.798	0.000	1.19	0.0	107.2	SURCHARGED
20.000	S14-3-3	6.116	0.158	0.000	0.68	0.0	31.0	SURCHARGED
20.001	S14-3-2	6.088	0.400	0.000	0.48	0.0	60.5	SURCHARGED
20.002	S14-3-1	6.077	0.544	0.000	0.48	0.0	55.2	SURCHARGED
18.004	S14-3	6.066	0.589	0.000	0.53	0.0	147.0	SURCHARGED
18.005	S14-2	6.036	0.544	0.000	0.26	0.0	125.8	FLOOD RISK
18.006	S14-1	6.018	0.657	0.000	0.30	0.0	146.1	SURCHARGED
13.007	S14	5.996	0.690	0.000	2.05	0.0	770.3	SURCHARGED
13.008	S13	5.935	0.413	0.000	1.61	0.0	784.9	SURCHARGED
13.009	S9C	5.896	0.400	0.000	0.94	0.0	741.9	SURCHARGED
21.000	S12-4	5.905	0.341	0.000	-0.04	0.0	-2.8	SURCHARGED
21.001	S12-3	5.908	0.639	0.000	0.64	0.0	35.3	SURCHARGED
21.002	S12-2	5.899	0.587	0.000	0.47	0.0	63.3	SURCHARGED
21.003	S12-1	5.872	0.855	0.000	0.76	0.0	132.1	SURCHARGED
13.010	S9B	5.828	0.510	0.000	0.84	0.0	853.4	SURCHARGED
13.011	S9A	5.781	0.374	0.000	1.02	0.0	860.1	SURCHARGED
22.000	S9A-1	5.789	0.114	0.000	1.13	0.0	122.1	SURCHARGED
23.000	S9-1-1	5.738	0.028	0.000	-0.02	0.0	-1.5	SURCHARGED
24.000	S9-2	5.738	-0.232	0.000	-0.01	0.0	-1.4	OK
23.001	S9-1	5.738	0.201	0.000	-0.28	0.0	-81.9	SURCHARGED
10.007	S9	5.760	0.360	0.000	0.83	0.0	1018.2	SURCHARGED

Summary of Results for 15 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.561	-0.181	0.000	0.33	0.0	79.6	OK
25.001	S8-3	9.096	-0.132	0.000	0.60	0.0	130.3	OK
25.002	S8-2	8.302	-0.176	0.000	0.54	0.0	198.1	OK
25.003	S8-1	6.268	0.528	0.000	0.86	0.0	236.0	SURCHARGED
10.008	S8	5.697	0.235	0.000	1.61	0.0	1674.6	SURCHARGED
10.009	S8A	5.651	0.212	0.000	1.12	0.0	1680.1	SURCHARGED
10.010	S6	5.572	0.194	0.000	1.07	0.0	1752.4	SURCHARGED
26.000	S5-3	5.695	0.737	0.000	1.10	0.0	502.1	SURCHARGED
26.001	S5-2	5.616	0.808	0.000	1.53	0.0	499.4	SURCHARGED
26.002	S5-1	5.574	0.800	0.000	1.43	0.0	658.7	SURCHARGED
27.000	S4-2	5.506	0.540	0.000	0.91	0.0	529.6	SURCHARGED
27.001	S4-1	5.480	0.647	0.000	0.88	0.0	506.5	SURCHARGED
10.011	S4	5.455	0.021	0.000	1.11	0.0	2262.9	SURCHARGED
10.012	S3	5.355	0.000	0.000	1.17	0.0	2257.8	OK
28.000	S2-2	4.805	0.205	0.000	1.07	0.0	291.7	SURCHARGED
28.001	S14	4.649	0.169	0.000	2.88	0.0	429.4	SURCHARGED
28.002	35	4.464	0.016	0.000	1.56	0.0	427.7	SURCHARGED
10.013	S2	4.406	0.013	0.000	1.51	0.0	2389.0	SURCHARGED
10.014	S1A	4.111	-0.239	0.000	0.62	0.0	2379.8	OK
10.015	S1	3.944	-0.125	0.000	0.85	0.0	2361.2	OK

Summary of Results for 30 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	6.404	0.998	0.000	0.60	0.0	21.2	SURCHARGED
11.000	11-4-1	6.346	1.066	0.000	0.36	0.0	13.9	SURCHARGED
10.001	S11-4	6.315	1.167	0.000	0.76	0.0	45.7	SURCHARGED
10.002	S11-3	6.213	1.187	0.000	0.74	0.0	76.4	FLOOD RISK
10.003	S11-2	6.159	1.246	0.000	0.99	0.0	107.7	SURCHARGED
10.004	S11-1	5.927	1.201	0.000	0.80	0.0	105.8	SURCHARGED
10.005	S11	5.900	0.610	0.000	0.21	0.0	111.6	SURCHARGED
12.000	S10-4	6.485	1.015	0.000	-0.10	0.0	-3.5	FLOOD RISK
12.001	S10-3	6.486	1.391	0.000	0.66	0.0	23.4	SURCHARGED
12.002	S10-2	6.344	1.603	0.000	1.48	0.0	51.2	SURCHARGED
12.003	S10-1	6.022	1.378	0.000	1.09	0.0	74.7	SURCHARGED
10.006	S10	5.894	0.482	0.000	0.20	0.0	178.5	SURCHARGED
13.000	S21	7.749	0.185	0.000	0.51	0.0	20.6	SURCHARGED
13.001	S20	7.682	0.373	0.000	1.39	0.0	56.1	SURCHARGED
13.002	S19	7.084	0.007	0.000	1.06	0.0	70.1	SURCHARGED
13.003	S18	6.995	-0.081	0.000	0.61	0.0	81.0	OK
14.000	S17-2	7.498	0.255	0.000	0.82	0.0	33.8	SURCHARGED
14.001	S17-1	7.078	0.425	0.000	2.21	0.0	71.6	SURCHARGED
13.004	S17	6.873	0.112	0.000	1.58	0.0	182.3	SURCHARGED
15.000	S16-2	7.059	-0.023	0.000	0.93	0.0	37.6	OK
15.001	S16-1	6.779	-0.062	0.000	0.97	0.0	71.6	OK
13.005	S16	6.634	0.545	0.000	1.30	0.0	271.2	SURCHARGED
16.000	S15-6	7.572	-0.053	0.000	0.78	0.0	39.9	OK
16.001	S15-5	7.298	0.260	0.000	0.97	0.0	58.4	SURCHARGED
16.002	S15-4	6.708	0.567	0.000	0.95	0.0	87.7	SURCHARGED
17.000	S15-3-1	6.621	0.517	0.000	-0.06	0.0	-2.4	SURCHARGED
16.003	S15-3	6.622	0.447	0.000	0.73	0.0	146.8	SURCHARGED
16.004	S15-2	6.576	0.508	0.000	1.15	0.0	232.2	SURCHARGED
16.005	S15-1	6.476	0.515	0.000	2.71	0.0	319.9	SURCHARGED
13.006	S15	6.404	0.391	0.000	2.21	0.0	578.1	SURCHARGED
18.000	S18-1	7.194	0.076	0.000	0.69	0.0	24.2	SURCHARGED
18.001	S18-2	7.137	0.289	0.000	1.13	0.0	40.4	SURCHARGED
18.002	S14-5	6.989	0.331	0.000	0.95	0.0	58.2	SURCHARGED
19.000	S14-4-2	6.319	0.009	0.000	0.27	0.0	24.7	SURCHARGED
19.001	S14-4-1	6.292	0.509	0.000	0.35	0.0	43.2	SURCHARGED
18.003	S14-4	6.272	0.962	0.000	0.99	0.0	88.9	SURCHARGED
20.000	S14-3-3	6.308	0.350	0.000	0.54	0.0	24.6	SURCHARGED
20.001	S14-3-2	6.263	0.575	0.000	0.35	0.0	44.4	SURCHARGED
20.002	S14-3-1	6.243	0.710	0.000	0.36	0.0	41.7	SURCHARGED
18.004	S14-3	6.225	0.748	0.000	0.43	0.0	119.3	SURCHARGED
18.005	S14-2	6.191	0.699	0.000	0.28	0.0	135.3	FLOOD RISK
18.006	S14-1	6.170	0.809	0.000	0.32	0.0	154.3	SURCHARGED
13.007	S14	6.145	0.839	0.000	2.10	0.0	789.1	SURCHARGED
13.008	S13	6.076	0.554	0.000	1.63	0.0	793.3	SURCHARGED
13.009	S9C	6.034	0.538	0.000	0.97	0.0	763.8	SURCHARGED
21.000	S12-4	6.118	0.554	0.000	-0.04	0.0	-2.9	SURCHARGED
21.001	S12-3	6.120	0.851	0.000	0.49	0.0	27.3	SURCHARGED
21.002	S12-2	6.110	0.798	0.000	0.36	0.0	48.0	SURCHARGED
21.003	S12-1	6.068	1.051	0.000	0.68	0.0	116.8	SURCHARGED
13.010	S9B	5.963	0.645	0.000	0.91	0.0	921.2	SURCHARGED
13.011	S9A	5.913	0.506	0.000	1.10	0.0	930.2	SURCHARGED
22.000	S9A-1	5.952	0.277	0.000	0.90	0.0	97.0	SURCHARGED
23.000	S9-1-1	5.886	0.176	0.000	-0.03	0.0	-1.9	SURCHARGED
24.000	S9-2	5.886	-0.084	0.000	-0.03	0.0	-2.8	OK
23.001	S9-1	5.886	0.349	0.000	-0.27	0.0	-79.4	SURCHARGED
10.007	S9	5.890	0.490	0.000	0.93	0.0	1135.3	SURCHARGED

Summary of Results for 30 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.547	-0.195	0.000	0.26	0.0	63.0	OK
25.001	S8-3	9.075	-0.153	0.000	0.48	0.0	103.1	OK
25.002	S8-2	8.277	-0.201	0.000	0.44	0.0	158.6	OK
25.003	S8-1	6.215	0.475	0.000	0.70	0.0	191.4	SURCHARGED
10.008	S8	5.812	0.350	0.000	1.83	0.0	1904.6	SURCHARGED
10.009	S8A	5.754	0.315	0.000	1.28	0.0	1935.7	SURCHARGED
10.010	S6	5.650	0.272	0.000	1.24	0.0	2039.3	SURCHARGED
26.000	S5-3	5.804	0.846	0.000	0.93	0.0	426.3	SURCHARGED
26.001	S5-2	5.718	0.910	0.000	1.29	0.0	421.7	SURCHARGED
26.002	S5-1	5.678	0.904	0.000	1.22	0.0	565.2	SURCHARGED
27.000	S4-2	5.587	0.621	0.000	0.75	0.0	434.2	SURCHARGED
27.001	S4-1	5.540	0.707	0.000	0.74	0.0	426.1	SURCHARGED
10.011	S4	5.497	0.063	0.000	1.33	0.0	2704.2	SURCHARGED
10.012	S3	5.355	0.000	0.000	1.42	0.0	2735.4	OK
28.000	S2-2	4.680	0.080	0.000	0.89	0.0	242.9	SURCHARGED
28.001	S14	4.584	0.104	0.000	2.41	0.0	359.3	SURCHARGED
28.002	35	4.479	0.031	0.000	1.31	0.0	359.9	SURCHARGED
10.013	S2	4.458	0.065	0.000	1.86	0.0	2939.0	SURCHARGED
10.014	S1A	4.227	-0.123	0.000	0.75	0.0	2876.8	OK
10.015	S1	4.072	0.003	0.000	1.03	0.0	2847.1	SURCHARGED

Summary of Results for 45 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	6.319	0.913	0.000	0.51	0.0	18.2	SURCHARGED
11.000	11-4-1	6.265	0.985	0.000	0.30	0.0	11.6	SURCHARGED
10.001	S11-4	6.235	1.087	0.000	0.68	0.0	41.1	SURCHARGED
10.002	S11-3	6.144	1.118	0.000	0.65	0.0	67.5	FLOOD RISK
10.003	S11-2	6.094	1.181	0.000	0.90	0.0	98.1	SURCHARGED
10.004	S11-1	5.884	1.158	0.000	0.73	0.0	97.1	SURCHARGED
10.005	S11	5.858	0.568	0.000	0.20	0.0	104.0	SURCHARGED
12.000	S10-4	6.391	0.921	0.000	-0.07	0.0	-2.5	SURCHARGED
12.001	S10-3	6.399	1.304	0.000	0.60	0.0	21.4	SURCHARGED
12.002	S10-2	6.269	1.528	0.000	1.32	0.0	45.6	SURCHARGED
12.003	S10-1	5.967	1.323	0.000	0.96	0.0	65.5	SURCHARGED
10.006	S10	5.853	0.441	0.000	0.18	0.0	167.1	SURCHARGED
13.000	S21	7.510	-0.054	0.000	0.45	0.0	18.1	OK
13.001	S20	7.458	0.149	0.000	1.19	0.0	48.3	SURCHARGED
13.002	S19	7.006	-0.071	0.000	0.92	0.0	60.7	OK
13.003	S18	6.921	-0.155	0.000	0.54	0.0	72.0	OK
14.000	S17-2	7.281	0.038	0.000	0.70	0.0	28.9	SURCHARGED
14.001	S17-1	6.980	0.327	0.000	1.88	0.0	60.9	SURCHARGED
13.004	S17	6.826	0.065	0.000	1.39	0.0	160.2	SURCHARGED
15.000	S16-2	7.007	-0.075	0.000	0.76	0.0	30.8	OK
15.001	S16-1	6.748	-0.093	0.000	0.81	0.0	59.5	OK
13.005	S16	6.482	0.393	0.000	1.17	0.0	243.6	SURCHARGED
16.000	S15-6	7.532	-0.093	0.000	0.63	0.0	32.4	OK
16.001	S15-5	7.021	-0.017	0.000	0.89	0.0	53.4	OK
16.002	S15-4	6.569	0.428	0.000	0.87	0.0	79.8	SURCHARGED
17.000	S15-3-1	6.496	0.392	0.000	-0.03	0.0	-1.3	SURCHARGED
16.003	S15-3	6.498	0.323	0.000	0.65	0.0	130.6	SURCHARGED
16.004	S15-2	6.455	0.387	0.000	1.01	0.0	203.2	SURCHARGED
16.005	S15-1	6.362	0.401	0.000	2.37	0.0	279.9	SURCHARGED
13.006	S15	6.296	0.283	0.000	1.97	0.0	515.3	SURCHARGED
18.000	S18-1	7.017	-0.101	0.000	0.58	0.0	20.2	OK
18.001	S18-2	6.917	0.069	0.000	1.00	0.0	36.0	SURCHARGED
18.002	S14-5	6.803	0.145	0.000	0.85	0.0	52.3	SURCHARGED
19.000	S14-4-2	6.245	-0.065	0.000	0.22	0.0	20.2	OK
19.001	S14-4-1	6.219	0.436	0.000	0.27	0.0	33.5	SURCHARGED
18.003	S14-4	6.199	0.889	0.000	0.90	0.0	80.9	SURCHARGED
20.000	S14-3-3	6.237	0.279	0.000	0.44	0.0	19.9	SURCHARGED
20.001	S14-3-2	6.191	0.503	0.000	0.27	0.0	34.2	SURCHARGED
20.002	S14-3-1	6.172	0.639	0.000	0.28	0.0	32.5	SURCHARGED
18.004	S14-3	6.154	0.677	0.000	0.42	0.0	117.1	SURCHARGED
18.005	S14-2	6.119	0.627	0.000	0.28	0.0	134.4	FLOOD RISK
18.006	S14-1	6.098	0.737	0.000	0.32	0.0	155.4	SURCHARGED
13.007	S14	6.074	0.768	0.000	1.91	0.0	719.3	SURCHARGED
13.008	S13	6.014	0.492	0.000	1.48	0.0	721.3	SURCHARGED
13.009	S9C	5.976	0.480	0.000	0.91	0.0	716.4	SURCHARGED
21.000	S12-4	6.073	0.509	0.000	-0.03	0.0	-2.0	SURCHARGED
21.001	S12-3	6.076	0.807	0.000	0.42	0.0	23.6	SURCHARGED
21.002	S12-2	6.065	0.753	0.000	0.31	0.0	41.1	SURCHARGED
21.003	S12-1	6.021	1.004	0.000	0.60	0.0	103.8	SURCHARGED
13.010	S9B	5.917	0.599	0.000	0.86	0.0	871.6	SURCHARGED
13.011	S9A	5.870	0.463	0.000	1.05	0.0	881.6	SURCHARGED
22.000	S9A-1	5.915	0.240	0.000	0.73	0.0	78.4	SURCHARGED
23.000	S9-1-1	5.847	0.137	0.000	-0.02	0.0	-1.6	SURCHARGED
24.000	S9-2	5.847	-0.123	0.000	-0.01	0.0	-1.5	OK
23.001	S9-1	5.847	0.310	0.000	-0.17	0.0	-50.5	SURCHARGED
10.007	S9	5.849	0.449	0.000	0.89	0.0	1090.3	SURCHARGED

Summary of Results for 45 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.536	-0.206	0.000	0.21	0.0	50.9	OK
25.001	S8-3	9.058	-0.170	0.000	0.38	0.0	83.1	OK
25.002	S8-2	8.258	-0.220	0.000	0.35	0.0	127.7	OK
25.003	S8-1	6.095	0.355	0.000	0.58	0.0	158.9	SURCHARGED
10.008	S8	5.778	0.316	0.000	1.75	0.0	1822.1	SURCHARGED
10.009	S8A	5.725	0.286	0.000	1.24	0.0	1862.3	SURCHARGED
10.010	S6	5.629	0.251	0.000	1.20	0.0	1970.2	SURCHARGED
26.000	S5-3	5.735	0.777	0.000	0.76	0.0	346.2	SURCHARGED
26.001	S5-2	5.663	0.855	0.000	1.06	0.0	345.0	SURCHARGED
26.002	S5-1	5.630	0.856	0.000	1.04	0.0	478.7	SURCHARGED
27.000	S4-2	5.575	0.609	0.000	0.61	0.0	351.8	SURCHARGED
27.001	S4-1	5.531	0.698	0.000	0.60	0.0	346.1	SURCHARGED
10.011	S4	5.487	0.053	0.000	1.27	0.0	2598.5	SURCHARGED
10.012	S3	5.355	0.000	0.000	1.39	0.0	2682.9	OK
28.000	S2-2	4.600	0.000	0.000	0.73	0.0	199.9	OK
28.001	S14	4.531	0.051	0.000	1.99	0.0	296.7	SURCHARGED
28.002	35	4.472	0.024	0.000	1.07	0.0	293.4	SURCHARGED
10.013	S2	4.453	0.060	0.000	1.82	0.0	2885.8	SURCHARGED
10.014	S1A	4.211	-0.139	0.000	0.75	0.0	2840.7	OK
10.015	S1	4.055	-0.014	0.000	1.02	0.0	2825.7	OK

Summary of Results for 60 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	6.171	0.765	0.000	0.47	0.0	16.6	SURCHARGED
11.000	11-4-1	6.130	0.850	0.000	0.28	0.0	11.1	SURCHARGED
10.001	S11-4	6.101	0.953	0.000	0.62	0.0	37.6	SURCHARGED
10.002	S11-3	6.026	1.000	0.000	0.61	0.0	62.9	SURCHARGED
10.003	S11-2	5.980	1.067	0.000	0.82	0.0	89.5	SURCHARGED
10.004	S11-1	5.807	1.081	0.000	0.67	0.0	88.9	SURCHARGED
10.005	S11	5.783	0.493	0.000	0.18	0.0	95.5	SURCHARGED
12.000	S10-4	6.227	0.757	0.000	-0.05	0.0	-1.9	SURCHARGED
12.001	S10-3	6.232	1.137	0.000	0.56	0.0	19.7	SURCHARGED
12.002	S10-2	6.123	1.382	0.000	1.22	0.0	42.0	SURCHARGED
12.003	S10-1	5.872	1.228	0.000	0.89	0.0	60.8	SURCHARGED
10.006	S10	5.778	0.366	0.000	0.17	0.0	153.6	SURCHARGED
13.000	S21	7.438	-0.126	0.000	0.40	0.0	16.0	OK
13.001	S20	7.337	0.028	0.000	1.05	0.0	42.5	SURCHARGED
13.002	S19	6.984	-0.093	0.000	0.81	0.0	53.8	OK
13.003	S18	6.885	-0.191	0.000	0.48	0.0	63.3	OK
14.000	S17-2	7.149	-0.094	0.000	0.62	0.0	25.8	OK
14.001	S17-1	6.906	0.253	0.000	1.67	0.0	54.2	SURCHARGED
13.004	S17	6.788	0.027	0.000	1.22	0.0	141.4	SURCHARGED
15.000	S16-2	6.991	-0.091	0.000	0.65	0.0	26.3	OK
15.001	S16-1	6.727	-0.114	0.000	0.69	0.0	50.9	OK
13.005	S16	6.308	0.219	0.000	1.05	0.0	219.2	SURCHARGED
16.000	S15-6	7.519	-0.106	0.000	0.54	0.0	27.7	OK
16.001	S15-5	6.964	-0.074	0.000	0.77	0.0	46.7	OK
16.002	S15-4	6.388	0.247	0.000	0.77	0.0	71.1	SURCHARGED
17.000	S15-3-1	6.322	0.218	0.000	-0.02	0.0	-0.9	SURCHARGED
16.003	S15-3	6.323	0.148	0.000	0.58	0.0	116.7	SURCHARGED
16.004	S15-2	6.285	0.217	0.000	0.90	0.0	181.9	SURCHARGED
16.005	S15-1	6.209	0.248	0.000	2.10	0.0	248.5	SURCHARGED
13.006	S15	6.155	0.142	0.000	1.77	0.0	463.1	SURCHARGED
18.000	S18-1	7.006	-0.112	0.000	0.49	0.0	17.2	OK
18.001	S18-2	6.794	-0.054	0.000	0.92	0.0	33.1	OK
18.002	S14-5	6.654	-0.004	0.000	0.81	0.0	49.5	OK
19.000	S14-4-2	6.137	-0.173	0.000	0.19	0.0	17.2	OK
19.001	S14-4-1	6.113	0.330	0.000	0.25	0.0	30.8	SURCHARGED
18.003	S14-4	6.094	0.784	0.000	0.84	0.0	75.3	SURCHARGED
20.000	S14-3-3	6.127	0.169	0.000	0.38	0.0	17.3	SURCHARGED
20.001	S14-3-2	6.086	0.398	0.000	0.23	0.0	29.1	SURCHARGED
20.002	S14-3-1	6.067	0.534	0.000	0.26	0.0	30.4	SURCHARGED
18.004	S14-3	6.050	0.573	0.000	0.40	0.0	111.2	SURCHARGED
18.005	S14-2	6.017	0.525	0.000	0.27	0.0	127.9	FLOOD RISK
18.006	S14-1	5.996	0.635	0.000	0.31	0.0	149.5	SURCHARGED
13.007	S14	5.973	0.667	0.000	1.74	0.0	653.9	SURCHARGED
13.008	S13	5.923	0.401	0.000	1.37	0.0	665.0	SURCHARGED
13.009	S9C	5.888	0.392	0.000	0.84	0.0	661.5	SURCHARGED
21.000	S12-4	5.972	0.408	0.000	-0.02	0.0	-1.7	SURCHARGED
21.001	S12-3	5.974	0.705	0.000	0.41	0.0	22.6	SURCHARGED
21.002	S12-2	5.963	0.651	0.000	0.29	0.0	38.7	SURCHARGED
21.003	S12-1	5.923	0.906	0.000	0.54	0.0	94.1	SURCHARGED
13.010	S9B	5.838	0.520	0.000	0.80	0.0	805.3	SURCHARGED
13.011	S9A	5.794	0.387	0.000	0.97	0.0	814.6	SURCHARGED
22.000	S9A-1	5.828	0.153	0.000	0.63	0.0	67.8	SURCHARGED
23.000	S9-1-1	5.772	0.062	0.000	-0.02	0.0	-1.2	SURCHARGED
24.000	S9-2	5.772	-0.198	0.000	-0.01	0.0	-1.0	OK
23.001	S9-1	5.773	0.236	0.000	-0.14	0.0	-39.4	SURCHARGED
10.007	S9	5.775	0.375	0.000	0.83	0.0	1010.9	SURCHARGED

Summary of Results for 60 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.528	-0.214	0.000	0.18	0.0	43.9	OK
25.001	S8-3	9.047	-0.181	0.000	0.33	0.0	71.9	OK
25.002	S8-2	8.244	-0.234	0.000	0.30	0.0	109.9	OK
25.003	S8-1	5.963	0.223	0.000	0.51	0.0	138.9	SURCHARGED
10.008	S8	5.714	0.252	0.000	1.61	0.0	1675.8	SURCHARGED
10.009	S8A	5.669	0.230	0.000	1.14	0.0	1717.4	SURCHARGED
10.010	S6	5.588	0.210	0.000	1.11	0.0	1825.6	SURCHARGED
26.000	S5-3	5.662	0.704	0.000	0.67	0.0	305.0	SURCHARGED
26.001	S5-2	5.606	0.798	0.000	0.92	0.0	301.5	SURCHARGED
26.002	S5-1	5.577	0.803	0.000	0.91	0.0	417.8	SURCHARGED
27.000	S4-2	5.546	0.580	0.000	0.53	0.0	309.2	SURCHARGED
27.001	S4-1	5.507	0.674	0.000	0.53	0.0	302.8	SURCHARGED
10.011	S4	5.468	0.034	0.000	1.18	0.0	2414.8	SURCHARGED
10.012	S3	5.355	0.000	0.000	1.29	0.0	2492.3	OK
28.000	S2-2	4.555	-0.045	0.000	0.63	0.0	172.0	OK
28.001	S14	4.498	0.018	0.000	1.73	0.0	257.8	SURCHARGED
28.002	35	4.444	-0.004	0.000	0.94	0.0	257.9	OK
10.013	S2	4.427	0.034	0.000	1.69	0.0	2682.6	SURCHARGED
10.014	S1A	4.147	-0.203	0.000	0.70	0.0	2666.8	OK
10.015	S1	4.001	-0.068	0.000	0.97	0.0	2665.8	OK

Summary of Results for 90 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.884	0.478	0.000	0.39	0.0	14.0	SURCHARGED
11.000	11-4-1	5.860	0.580	0.000	0.24	0.0	9.2	SURCHARGED
10.001	S11-4	5.838	0.690	0.000	0.54	0.0	32.7	SURCHARGED
10.002	S11-3	5.790	0.764	0.000	0.52	0.0	53.3	SURCHARGED
10.003	S11-2	5.754	0.841	0.000	0.70	0.0	77.0	SURCHARGED
10.004	S11-1	5.641	0.915	0.000	0.58	0.0	76.7	SURCHARGED
10.005	S11	5.622	0.332	0.000	0.16	0.0	81.7	SURCHARGED
12.000	S10-4	5.905	0.435	0.000	-0.03	0.0	-1.1	SURCHARGED
12.001	S10-3	5.908	0.813	0.000	0.49	0.0	17.4	SURCHARGED
12.002	S10-2	5.839	1.098	0.000	1.03	0.0	35.6	SURCHARGED
12.003	S10-1	5.680	1.036	0.000	0.75	0.0	51.0	SURCHARGED
10.006	S10	5.617	0.205	0.000	0.14	0.0	131.1	SURCHARGED
13.000	S21	7.425	-0.139	0.000	0.31	0.0	12.5	OK
13.001	S20	7.244	-0.065	0.000	0.85	0.0	34.2	OK
13.002	S19	6.956	-0.121	0.000	0.65	0.0	43.3	OK
13.003	S18	6.863	-0.213	0.000	0.38	0.0	50.9	OK
14.000	S17-2	7.130	-0.113	0.000	0.49	0.0	20.3	OK
14.001	S17-1	6.761	0.108	0.000	1.32	0.0	42.6	SURCHARGED
13.004	S17	6.685	-0.076	0.000	0.99	0.0	113.8	OK
15.000	S16-2	6.971	-0.111	0.000	0.51	0.0	20.7	OK
15.001	S16-1	6.699	-0.142	0.000	0.54	0.0	39.7	OK
13.005	S16	6.162	0.073	0.000	0.85	0.0	177.0	SURCHARGED
16.000	S15-6	7.502	-0.123	0.000	0.42	0.0	21.8	OK
16.001	S15-5	6.940	-0.098	0.000	0.61	0.0	36.7	OK
16.002	S15-4	6.230	0.089	0.000	0.61	0.0	56.1	SURCHARGED
17.000	S15-3-1	6.183	0.079	0.000	-0.01	0.0	-0.5	SURCHARGED
16.003	S15-3	6.183	0.008	0.000	0.46	0.0	93.0	SURCHARGED
16.004	S15-2	6.149	0.081	0.000	0.72	0.0	145.7	SURCHARGED
16.005	S15-1	6.091	0.130	0.000	1.67	0.0	197.9	SURCHARGED
13.006	S15	6.051	0.038	0.000	1.44	0.0	375.5	SURCHARGED
18.000	S18-1	6.990	-0.128	0.000	0.39	0.0	13.6	OK
18.001	S18-2	6.766	-0.082	0.000	0.72	0.0	25.8	OK
18.002	S14-5	6.565	-0.093	0.000	0.64	0.0	39.1	OK
19.000	S14-4-2	6.087	-0.223	0.000	0.15	0.0	13.6	OK
19.001	S14-4-1	5.875	0.092	0.000	0.20	0.0	25.1	SURCHARGED
18.003	S14-4	5.863	0.553	0.000	0.67	0.0	59.7	SURCHARGED
20.000	S14-3-3	5.891	-0.067	0.000	0.30	0.0	13.6	OK
20.001	S14-3-2	5.858	0.170	0.000	0.19	0.0	23.6	SURCHARGED
20.002	S14-3-1	5.844	0.311	0.000	0.22	0.0	25.8	SURCHARGED
18.004	S14-3	5.832	0.355	0.000	0.34	0.0	94.4	SURCHARGED
18.005	S14-2	5.807	0.315	0.000	0.23	0.0	110.0	SURCHARGED
18.006	S14-1	5.791	0.430	0.000	0.27	0.0	129.4	SURCHARGED
13.007	S14	5.769	0.463	0.000	1.45	0.0	544.1	SURCHARGED
13.008	S13	5.736	0.214	0.000	1.14	0.0	554.3	SURCHARGED
13.009	S9C	5.708	0.212	0.000	0.71	0.0	556.5	SURCHARGED
21.000	S12-4	5.756	0.192	0.000	-0.01	0.0	-0.9	SURCHARGED
21.001	S12-3	5.758	0.489	0.000	0.33	0.0	18.3	SURCHARGED
21.002	S12-2	5.750	0.438	0.000	0.25	0.0	32.9	SURCHARGED
21.003	S12-1	5.720	0.703	0.000	0.46	0.0	80.0	SURCHARGED
13.010	S9B	5.667	0.349	0.000	0.67	0.0	676.1	SURCHARGED
13.011	S9A	5.631	0.224	0.000	0.81	0.0	685.0	SURCHARGED
22.000	S9A-1	5.655	-0.020	0.000	0.50	0.0	54.0	OK
23.000	S9-1-1	5.597	-0.113	0.000	-0.01	0.0	-0.4	OK
24.000	S9-2	5.601	-0.369	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.599	0.062	0.000	-0.05	0.0	-14.4	SURCHARGED
10.007	S9	5.615	0.215	0.000	0.69	0.0	846.0	SURCHARGED

Summary of Results for 90 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.517	-0.225	0.000	0.14	0.0	34.3	OK
25.001	S8-3	9.031	-0.197	0.000	0.26	0.0	56.0	OK
25.002	S8-2	8.226	-0.252	0.000	0.24	0.0	86.0	OK
25.003	S8-1	5.709	-0.031	0.000	0.41	0.0	111.3	OK
10.008	S8	5.570	0.108	0.000	1.35	0.0	1405.1	SURCHARGED
10.009	S8A	5.540	0.101	0.000	0.97	0.0	1455.2	SURCHARGED
10.010	S6	5.485	0.107	0.000	0.93	0.0	1532.8	SURCHARGED
26.000	S5-3	5.523	0.565	0.000	0.54	0.0	245.3	SURCHARGED
26.001	S5-2	5.484	0.676	0.000	0.74	0.0	243.3	SURCHARGED
26.002	S5-1	5.463	0.689	0.000	0.73	0.0	338.2	SURCHARGED
27.000	S4-2	5.462	0.496	0.000	0.43	0.0	246.6	SURCHARGED
27.001	S4-1	5.433	0.600	0.000	0.42	0.0	244.0	SURCHARGED
10.011	S4	5.405	-0.029	0.000	0.97	0.0	1982.9	OK
10.012	S3	5.232	-0.123	0.000	1.06	0.0	2038.1	OK
28.000	S2-2	4.519	-0.081	0.000	0.50	0.0	135.9	OK
28.001	S14	4.480	0.000	0.000	1.37	0.0	203.3	OK
28.002	35	4.411	-0.037	0.000	0.73	0.0	199.3	OK
10.013	S2	4.393	0.000	0.000	1.39	0.0	2193.9	OK
10.014	S1A	4.086	-0.264	0.000	0.57	0.0	2188.5	OK
10.015	S1	3.912	-0.157	0.000	0.79	0.0	2185.3	OK

Summary of Results for 120 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.700	0.294	0.000	0.34	0.0	12.2	SURCHARGED
11.000	11-4-1	5.677	0.397	0.000	0.20	0.0	8.0	SURCHARGED
10.001	S11-4	5.657	0.509	0.000	0.47	0.0	28.2	SURCHARGED
10.002	S11-3	5.612	0.586	0.000	0.45	0.0	46.4	SURCHARGED
10.003	S11-2	5.579	0.666	0.000	0.61	0.0	67.0	SURCHARGED
10.004	S11-1	5.486	0.760	0.000	0.50	0.0	66.7	SURCHARGED
10.005	S11	5.468	0.178	0.000	0.14	0.0	71.4	SURCHARGED
12.000	S10-4	5.706	0.236	0.000	-0.02	0.0	-0.7	SURCHARGED
12.001	S10-3	5.709	0.614	0.000	0.42	0.0	15.0	SURCHARGED
12.002	S10-2	5.649	0.908	0.000	0.90	0.0	31.0	SURCHARGED
12.003	S10-1	5.517	0.873	0.000	0.64	0.0	44.0	SURCHARGED
10.006	S10	5.465	0.053	0.000	0.13	0.0	114.2	SURCHARGED
13.000	S21	7.417	-0.147	0.000	0.26	0.0	10.5	OK
13.001	S20	7.224	-0.085	0.000	0.71	0.0	28.7	OK
13.002	S19	6.936	-0.141	0.000	0.55	0.0	36.4	OK
13.003	S18	6.848	-0.228	0.000	0.33	0.0	43.1	OK
14.000	S17-2	7.118	-0.125	0.000	0.41	0.0	17.0	OK
14.001	S17-1	6.702	0.049	0.000	1.12	0.0	36.3	SURCHARGED
13.004	S17	6.649	-0.112	0.000	0.83	0.0	96.1	OK
15.000	S16-2	6.959	-0.123	0.000	0.43	0.0	17.3	OK
15.001	S16-1	6.682	-0.159	0.000	0.45	0.0	33.3	OK
13.005	S16	6.092	0.003	0.000	0.71	0.0	148.8	SURCHARGED
16.000	S15-6	7.492	-0.133	0.000	0.35	0.0	18.2	OK
16.001	S15-5	6.927	-0.111	0.000	0.51	0.0	30.7	OK
16.002	S15-4	6.159	0.018	0.000	0.52	0.0	47.5	SURCHARGED
17.000	S15-3-1	6.120	0.016	0.000	-0.01	0.0	-0.4	SURCHARGED
16.003	S15-3	6.120	-0.055	0.000	0.39	0.0	78.6	OK
16.004	S15-2	6.091	0.023	0.000	0.60	0.0	121.9	SURCHARGED
16.005	S15-1	6.046	0.085	0.000	1.41	0.0	166.9	SURCHARGED
13.006	S15	6.014	0.001	0.000	1.20	0.0	312.9	SURCHARGED
18.000	S18-1	6.981	-0.137	0.000	0.32	0.0	11.4	OK
18.001	S18-2	6.749	-0.099	0.000	0.61	0.0	21.7	OK
18.002	S14-5	6.551	-0.107	0.000	0.54	0.0	33.1	OK
19.000	S14-4-2	6.080	-0.230	0.000	0.12	0.0	11.4	OK
19.001	S14-4-1	5.692	-0.091	0.000	0.18	0.0	22.0	OK
18.003	S14-4	5.680	0.370	0.000	0.59	0.0	52.8	SURCHARGED
20.000	S14-3-3	5.809	-0.149	0.000	0.25	0.0	11.4	OK
20.001	S14-3-2	5.676	-0.012	0.000	0.17	0.0	21.2	OK
20.002	S14-3-1	5.663	0.130	0.000	0.21	0.0	24.0	SURCHARGED
18.004	S14-3	5.651	0.174	0.000	0.29	0.0	81.2	SURCHARGED
18.005	S14-2	5.629	0.137	0.000	0.20	0.0	95.1	SURCHARGED
18.006	S14-1	5.613	0.252	0.000	0.24	0.0	114.6	SURCHARGED
13.007	S14	5.594	0.288	0.000	1.24	0.0	468.3	SURCHARGED
13.008	S13	5.569	0.047	0.000	0.99	0.0	480.4	SURCHARGED
13.009	S9C	5.543	0.047	0.000	0.60	0.0	474.9	SURCHARGED
21.000	S12-4	5.590	0.026	0.000	-0.01	0.0	-0.5	SURCHARGED
21.001	S12-3	5.591	0.322	0.000	0.27	0.0	15.2	SURCHARGED
21.002	S12-2	5.583	0.271	0.000	0.21	0.0	28.1	SURCHARGED
21.003	S12-1	5.555	0.538	0.000	0.40	0.0	68.4	SURCHARGED
13.010	S9B	5.507	0.189	0.000	0.57	0.0	575.1	SURCHARGED
13.011	S9A	5.476	0.069	0.000	0.69	0.0	583.0	SURCHARGED
22.000	S9A-1	5.503	-0.172	0.000	0.42	0.0	45.5	OK
23.000	S9-1-1	5.437	-0.273	0.000	0.00	0.0	0.1	OK
24.000	S9-2	5.595	-0.375	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.453	-0.084	0.000	-0.03	0.0	-8.3	OK
10.007	S9	5.462	0.062	0.000	0.60	0.0	736.5	SURCHARGED

Summary of Results for 120 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.510	-0.232	0.000	0.12	0.0	28.6	OK
25.001	S8-3	9.022	-0.206	0.000	0.22	0.0	46.8	OK
25.002	S8-2	8.216	-0.262	0.000	0.20	0.0	71.8	OK
25.003	S8-1	5.543	-0.197	0.000	0.35	0.0	94.6	OK
10.008	S8	5.423	-0.039	0.000	1.16	0.0	1208.2	OK
10.009	S8A	5.370	-0.069	0.000	0.83	0.0	1249.1	OK
10.010	S6	5.267	-0.111	0.000	0.81	0.0	1334.8	OK
26.000	S5-3	5.247	0.289	0.000	0.45	0.0	207.6	SURCHARGED
26.001	S5-2	5.211	0.403	0.000	0.63	0.0	207.0	SURCHARGED
26.002	S5-1	5.191	0.417	0.000	0.63	0.0	289.2	SURCHARGED
27.000	S4-2	5.193	0.227	0.000	0.36	0.0	208.1	SURCHARGED
27.001	S4-1	5.166	0.333	0.000	0.36	0.0	207.0	SURCHARGED
10.011	S4	5.139	-0.295	0.000	0.87	0.0	1768.8	OK
10.012	S3	5.002	-0.353	0.000	0.94	0.0	1823.1	OK
28.000	S2-2	4.512	-0.088	0.000	0.41	0.0	112.2	OK
28.001	S14	4.480	0.000	0.000	1.11	0.0	165.4	OK
28.002	35	4.407	-0.041	0.000	0.59	0.0	162.1	OK
10.013	S2	4.393	0.000	0.000	1.24	0.0	1967.1	OK
10.014	S1A	4.057	-0.293	0.000	0.52	0.0	1964.1	OK
10.015	S1	3.869	-0.200	0.000	0.71	0.0	1958.6	OK

Summary of Results for 180 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.392	-0.014	0.000	0.28	0.0	10.0	OK
11.000	11-4-1	5.374	0.094	0.000	0.17	0.0	6.6	SURCHARGED
10.001	S11-4	5.357	0.209	0.000	0.38	0.0	22.7	SURCHARGED
10.002	S11-3	5.319	0.293	0.000	0.36	0.0	37.4	SURCHARGED
10.003	S11-2	5.292	0.379	0.000	0.49	0.0	53.9	SURCHARGED
10.004	S11-1	5.229	0.503	0.000	0.41	0.0	53.8	SURCHARGED
10.005	S11	5.214	-0.076	0.000	0.11	0.0	57.9	OK
12.000	S10-4	5.385	-0.085	0.000	-0.01	0.0	-0.3	OK
12.001	S10-3	5.385	0.290	0.000	0.34	0.0	11.9	SURCHARGED
12.002	S10-2	5.340	0.599	0.000	0.71	0.0	24.5	SURCHARGED
12.003	S10-1	5.253	0.609	0.000	0.51	0.0	35.0	SURCHARGED
10.006	S10	5.211	-0.201	0.000	0.10	0.0	92.0	OK
13.000	S21	7.407	-0.157	0.000	0.20	0.0	8.1	OK
13.001	S20	7.203	-0.106	0.000	0.55	0.0	22.1	OK
13.002	S19	6.913	-0.164	0.000	0.42	0.0	28.1	OK
13.003	S18	6.828	-0.248	0.000	0.25	0.0	33.1	OK
14.000	S17-2	7.105	-0.138	0.000	0.32	0.0	13.1	OK
14.001	S17-1	6.637	-0.016	0.000	0.86	0.0	27.9	OK
13.004	S17	6.605	-0.156	0.000	0.64	0.0	74.2	OK
15.000	S16-2	6.946	-0.136	0.000	0.33	0.0	13.4	OK
15.001	S16-1	6.663	-0.178	0.000	0.35	0.0	25.7	OK
13.005	S16	5.923	-0.166	0.000	0.55	0.0	115.5	OK
16.000	S15-6	7.480	-0.145	0.000	0.27	0.0	14.1	OK
16.001	S15-5	6.911	-0.127	0.000	0.39	0.0	23.7	OK
16.002	S15-4	6.014	-0.127	0.000	0.40	0.0	36.6	OK
17.000	S15-3-1	5.984	-0.120	0.000	0.00	0.0	0.1	OK
16.003	S15-3	5.984	-0.191	0.000	0.29	0.0	59.2	OK
16.004	S15-2	5.963	-0.105	0.000	0.46	0.0	92.1	OK
16.005	S15-1	5.930	-0.031	0.000	1.06	0.0	125.3	OK
13.006	S15	5.864	-0.149	0.000	0.92	0.0	239.6	OK
18.000	S18-1	6.969	-0.149	0.000	0.25	0.0	8.8	OK
18.001	S18-2	6.731	-0.117	0.000	0.47	0.0	16.7	OK
18.002	S14-5	6.534	-0.124	0.000	0.41	0.0	25.4	OK
19.000	S14-4-2	6.072	-0.238	0.000	0.10	0.0	8.8	OK
19.001	S14-4-1	5.501	-0.282	0.000	0.14	0.0	17.6	OK
18.003	S14-4	5.410	0.100	0.000	0.50	0.0	44.7	SURCHARGED
20.000	S14-3-3	5.800	-0.158	0.000	0.19	0.0	8.8	OK
20.001	S14-3-2	5.427	-0.261	0.000	0.14	0.0	17.5	OK
20.002	S14-3-1	5.395	-0.138	0.000	0.16	0.0	18.9	OK
18.004	S14-3	5.385	-0.092	0.000	0.24	0.0	67.0	OK
18.005	S14-2	5.365	-0.127	0.000	0.16	0.0	78.4	OK
18.006	S14-1	5.352	-0.009	0.000	0.20	0.0	97.2	OK
13.007	S14	5.330	0.024	0.000	0.98	0.0	369.0	SURCHARGED
13.008	S13	5.310	-0.212	0.000	0.78	0.0	377.7	OK
13.009	S9C	5.285	-0.211	0.000	0.48	0.0	377.1	OK
21.000	S12-4	5.313	-0.251	0.000	0.00	0.0	-0.1	OK
21.001	S12-3	5.313	0.044	0.000	0.23	0.0	12.8	SURCHARGED
21.002	S12-2	5.307	-0.005	0.000	0.17	0.0	22.7	OK
21.003	S12-1	5.284	0.267	0.000	0.32	0.0	54.9	SURCHARGED
13.010	S9B	5.246	-0.072	0.000	0.46	0.0	463.5	OK
13.011	S9A	5.221	-0.186	0.000	0.56	0.0	470.4	OK
22.000	S9A-1	5.447	-0.228	0.000	0.33	0.0	35.1	OK
23.000	S9-1-1	5.410	-0.300	0.000	0.00	0.0	0.0	OK
24.000	S9-2	5.595	-0.375	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.209	-0.328	0.000	0.00	0.0	-1.1	OK
10.007	S9	5.209	-0.191	0.000	0.49	0.0	594.1	OK

Summary of Results for 180 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.503	-0.239	0.000	0.09	0.0	22.1	OK
25.001	S8-3	9.010	-0.218	0.000	0.17	0.0	36.1	OK
25.002	S8-2	8.200	-0.278	0.000	0.15	0.0	55.4	OK
25.003	S8-1	5.496	-0.244	0.000	0.27	0.0	73.1	OK
10.008	S8	5.166	-0.296	0.000	0.94	0.0	977.4	OK
10.009	S8A	5.144	-0.295	0.000	0.67	0.0	1009.0	OK
10.010	S6	5.069	-0.309	0.000	0.66	0.0	1077.9	OK
26.000	S5-3	5.063	0.105	0.000	0.35	0.0	161.3	SURCHARGED
26.001	S5-2	5.033	0.225	0.000	0.49	0.0	160.8	SURCHARGED
26.002	S5-1	5.017	0.243	0.000	0.49	0.0	224.6	SURCHARGED
27.000	S4-2	5.020	0.054	0.000	0.28	0.0	161.6	SURCHARGED
27.001	S4-1	4.998	0.165	0.000	0.28	0.0	160.1	SURCHARGED
10.011	S4	4.976	-0.458	0.000	0.71	0.0	1439.8	OK
10.012	S3	4.846	-0.509	0.000	0.77	0.0	1486.3	OK
28.000	S2-2	4.406	-0.194	0.000	0.32	0.0	86.7	OK
28.001	S14	4.383	-0.097	0.000	0.85	0.0	126.2	OK
28.002	35	4.322	-0.126	0.000	0.45	0.0	124.6	OK
10.013	S2	4.312	-0.081	0.000	1.01	0.0	1604.1	OK
10.014	S1A	4.011	-0.339	0.000	0.42	0.0	1605.6	OK
10.015	S1	3.802	-0.267	0.000	0.58	0.0	1606.7	OK

Summary of Results for 240 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.260	-0.146	0.000	0.24	0.0	8.7	OK
11.000	11-4-1	5.224	-0.056	0.000	0.14	0.0	5.5	OK
10.001	S11-4	5.210	0.062	0.000	0.31	0.0	19.0	SURCHARGED
10.002	S11-3	5.178	0.152	0.000	0.30	0.0	31.4	SURCHARGED
10.003	S11-2	5.155	0.242	0.000	0.41	0.0	45.2	SURCHARGED
10.004	S11-1	5.109	0.383	0.000	0.34	0.0	45.2	SURCHARGED
10.005	S11	5.097	-0.193	0.000	0.09	0.0	48.6	OK
12.000	S10-4	5.245	-0.225	0.000	0.00	0.0	0.0	OK
12.001	S10-3	5.229	0.134	0.000	0.29	0.0	10.1	SURCHARGED
12.002	S10-2	5.191	0.450	0.000	0.60	0.0	20.7	SURCHARGED
12.003	S10-1	5.129	0.485	0.000	0.43	0.0	29.6	SURCHARGED
10.006	S10	5.094	-0.318	0.000	0.09	0.0	77.8	OK
13.000	S21	7.400	-0.164	0.000	0.17	0.0	6.6	OK
13.001	S20	7.190	-0.119	0.000	0.45	0.0	18.2	OK
13.002	S19	6.899	-0.178	0.000	0.35	0.0	23.1	OK
13.003	S18	6.816	-0.260	0.000	0.21	0.0	27.4	OK
14.000	S17-2	7.096	-0.147	0.000	0.26	0.0	10.8	OK
14.001	S17-1	6.602	-0.051	0.000	0.71	0.0	23.1	OK
13.004	S17	6.580	-0.181	0.000	0.53	0.0	61.2	OK
15.000	S16-2	6.936	-0.146	0.000	0.27	0.0	11.0	OK
15.001	S16-1	6.650	-0.191	0.000	0.29	0.0	21.2	OK
13.005	S16	5.874	-0.215	0.000	0.46	0.0	95.2	OK
16.000	S15-6	7.472	-0.153	0.000	0.22	0.0	11.6	OK
16.001	S15-5	6.901	-0.137	0.000	0.32	0.0	19.5	OK
16.002	S15-4	5.948	-0.193	0.000	0.33	0.0	30.3	OK
17.000	S15-3-1	5.907	-0.197	0.000	0.00	0.0	0.0	OK
16.003	S15-3	5.907	-0.268	0.000	0.25	0.0	50.0	OK
16.004	S15-2	5.876	-0.192	0.000	0.39	0.0	78.4	OK
16.005	S15-1	5.842	-0.119	0.000	0.90	0.0	106.7	OK
13.006	S15	5.811	-0.202	0.000	0.77	0.0	201.8	OK
18.000	S18-1	6.962	-0.156	0.000	0.21	0.0	7.2	OK
18.001	S18-2	6.719	-0.129	0.000	0.38	0.0	13.8	OK
18.002	S14-5	6.524	-0.134	0.000	0.34	0.0	21.0	OK
19.000	S14-4-2	6.066	-0.244	0.000	0.08	0.0	7.2	OK
19.001	S14-4-1	5.492	-0.291	0.000	0.12	0.0	14.4	OK
18.003	S14-4	5.276	-0.034	0.000	0.42	0.0	37.7	OK
20.000	S14-3-3	5.792	-0.166	0.000	0.16	0.0	7.2	OK
20.001	S14-3-2	5.397	-0.291	0.000	0.12	0.0	14.4	OK
20.002	S14-3-1	5.277	-0.256	0.000	0.14	0.0	16.6	OK
18.004	S14-3	5.254	-0.223	0.000	0.21	0.0	57.6	OK
18.005	S14-2	5.238	-0.254	0.000	0.14	0.0	66.7	OK
18.006	S14-1	5.226	-0.135	0.000	0.17	0.0	81.3	OK
13.007	S14	5.213	-0.093	0.000	0.83	0.0	312.0	OK
13.008	S13	5.196	-0.326	0.000	0.66	0.0	319.8	OK
13.009	S9C	5.166	-0.330	0.000	0.41	0.0	319.6	OK
21.000	S12-4	5.264	-0.300	0.000	0.00	0.0	0.0	OK
21.001	S12-3	5.181	-0.088	0.000	0.19	0.0	10.6	OK
21.002	S12-2	5.176	-0.136	0.000	0.15	0.0	19.5	OK
21.003	S12-1	5.156	0.139	0.000	0.27	0.0	46.6	SURCHARGED
13.010	S9B	5.123	-0.195	0.000	0.39	0.0	392.5	OK
13.011	S9A	5.102	-0.305	0.000	0.47	0.0	398.1	OK
22.000	S9A-1	5.431	-0.244	0.000	0.27	0.0	28.9	OK
23.000	S9-1-1	5.410	-0.300	0.000	0.00	0.0	0.0	OK
24.000	S9-2	5.595	-0.375	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.090	-0.447	0.000	0.00	0.0	0.0	OK
10.007	S9	5.092	-0.308	0.000	0.41	0.0	503.1	OK

Summary of Results for 240 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.496	-0.246	0.000	0.08	0.0	18.1	OK
25.001	S8-3	9.001	-0.227	0.000	0.14	0.0	29.7	OK
25.002	S8-2	8.191	-0.287	0.000	0.13	0.0	45.6	OK
25.003	S8-1	5.484	-0.256	0.000	0.22	0.0	60.1	OK
10.008	S8	5.054	-0.408	0.000	0.80	0.0	830.9	OK
10.009	S8A	5.032	-0.407	0.000	0.57	0.0	857.6	OK
10.010	S6	4.959	-0.419	0.000	0.56	0.0	916.2	OK
26.000	S5-3	4.940	-0.018	0.000	0.29	0.0	133.7	OK
26.001	S5-2	4.916	0.108	0.000	0.41	0.0	132.9	SURCHARGED
26.002	S5-1	4.902	0.128	0.000	0.40	0.0	186.1	SURCHARGED
27.000	S4-2	4.905	-0.061	0.000	0.23	0.0	133.8	OK
27.001	S4-1	4.887	0.054	0.000	0.23	0.0	132.0	SURCHARGED
10.011	S4	4.869	-0.565	0.000	0.60	0.0	1222.3	OK
10.012	S3	4.740	-0.615	0.000	0.65	0.0	1262.0	OK
28.000	S2-2	4.335	-0.265	0.000	0.26	0.0	71.7	OK
28.001	S14	4.310	-0.170	0.000	0.71	0.0	105.7	OK
28.002	35	4.250	-0.198	0.000	0.38	0.0	104.6	OK
10.013	S2	4.242	-0.151	0.000	0.86	0.0	1363.2	OK
10.014	S1A	3.980	-0.370	0.000	0.36	0.0	1363.6	OK
10.015	S1	3.758	-0.311	0.000	0.49	0.0	1364.3	OK

Summary of Results for 360 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.246	-0.160	0.000	0.18	0.0	6.5	OK
11.000	11-4-1	5.105	-0.175	0.000	0.11	0.0	4.3	OK
10.001	S11-4	5.035	-0.113	0.000	0.24	0.0	14.7	OK
10.002	S11-3	5.011	-0.015	0.000	0.23	0.0	24.0	OK
10.003	S11-2	4.993	0.080	0.000	0.32	0.0	34.5	SURCHARGED
10.004	S11-1	4.957	0.231	0.000	0.26	0.0	34.4	SURCHARGED
10.005	S11	4.948	-0.342	0.000	0.07	0.0	37.1	OK
12.000	S10-4	5.245	-0.225	0.000	0.00	0.0	0.0	OK
12.001	S10-3	5.045	-0.050	0.000	0.22	0.0	7.8	OK
12.002	S10-2	5.016	0.275	0.000	0.46	0.0	16.0	SURCHARGED
12.003	S10-1	4.973	0.329	0.000	0.33	0.0	22.7	SURCHARGED
10.006	S10	4.946	-0.466	0.000	0.07	0.0	59.6	OK
13.000	S21	7.391	-0.173	0.000	0.12	0.0	5.0	OK
13.001	S20	7.174	-0.135	0.000	0.34	0.0	13.6	OK
13.002	S19	6.881	-0.196	0.000	0.26	0.0	17.3	OK
13.003	S18	6.799	-0.277	0.000	0.15	0.0	20.5	OK
14.000	S17-2	7.085	-0.158	0.000	0.20	0.0	8.1	OK
14.001	S17-1	6.566	-0.087	0.000	0.53	0.0	17.3	OK
13.004	S17	6.550	-0.211	0.000	0.40	0.0	45.9	OK
15.000	S16-2	6.925	-0.157	0.000	0.20	0.0	8.2	OK
15.001	S16-1	6.635	-0.206	0.000	0.22	0.0	15.8	OK
13.005	S16	5.813	-0.276	0.000	0.34	0.0	71.4	OK
16.000	S15-6	7.462	-0.163	0.000	0.17	0.0	8.6	OK
16.001	S15-5	6.888	-0.150	0.000	0.24	0.0	14.6	OK
16.002	S15-4	5.907	-0.234	0.000	0.25	0.0	22.7	OK
17.000	S15-3-1	5.879	-0.225	0.000	0.00	0.0	0.0	OK
16.003	S15-3	5.851	-0.324	0.000	0.19	0.0	37.7	OK
16.004	S15-2	5.810	-0.258	0.000	0.29	0.0	59.2	OK
16.005	S15-1	5.772	-0.189	0.000	0.68	0.0	80.6	OK
13.006	S15	5.742	-0.271	0.000	0.58	0.0	151.7	OK
18.000	S18-1	6.952	-0.166	0.000	0.15	0.0	5.4	OK
18.001	S18-2	6.705	-0.143	0.000	0.29	0.0	10.3	OK
18.002	S14-5	6.510	-0.148	0.000	0.26	0.0	15.7	OK
19.000	S14-4-2	6.057	-0.253	0.000	0.06	0.0	5.4	OK
19.001	S14-4-1	5.482	-0.301	0.000	0.09	0.0	10.8	OK
18.003	S14-4	5.140	-0.170	0.000	0.32	0.0	28.4	OK
20.000	S14-3-3	5.784	-0.174	0.000	0.12	0.0	5.4	OK
20.001	S14-3-2	5.387	-0.301	0.000	0.09	0.0	10.8	OK
20.002	S14-3-1	5.240	-0.293	0.000	0.11	0.0	12.6	OK
18.004	S14-3	5.121	-0.356	0.000	0.16	0.0	44.2	OK
18.005	S14-2	5.091	-0.401	0.000	0.11	0.0	51.4	OK
18.006	S14-1	5.082	-0.279	0.000	0.13	0.0	61.9	OK
13.007	S14	5.071	-0.235	0.000	0.63	0.0	238.5	OK
13.008	S13	5.059	-0.463	0.000	0.50	0.0	244.4	OK
13.009	S9C	5.018	-0.478	0.000	0.31	0.0	243.9	OK
21.000	S12-4	5.264	-0.300	0.000	0.00	0.0	0.0	OK
21.001	S12-3	5.055	-0.214	0.000	0.15	0.0	8.5	OK
21.002	S12-2	5.040	-0.272	0.000	0.12	0.0	15.6	OK
21.003	S12-1	4.994	-0.023	0.000	0.21	0.0	36.1	OK
13.010	S9B	4.968	-0.350	0.000	0.30	0.0	300.1	OK
13.011	S9A	4.952	-0.455	0.000	0.36	0.0	304.6	OK
22.000	S9A-1	5.413	-0.262	0.000	0.20	0.0	21.6	OK
23.000	S9-1-1	5.410	-0.300	0.000	0.00	0.0	0.0	OK
24.000	S9-2	5.595	-0.375	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.087	-0.450	0.000	0.00	0.0	0.0	OK
10.007	S9	4.945	-0.455	0.000	0.32	0.0	385.4	OK

Summary of Results for 360 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.488	-0.254	0.000	0.06	0.0	13.6	OK
25.001	S8-3	8.992	-0.236	0.000	0.10	0.0	22.2	OK
25.002	S8-2	8.180	-0.298	0.000	0.09	0.0	34.1	OK
25.003	S8-1	5.466	-0.274	0.000	0.16	0.0	44.9	OK
10.008	S8	4.907	-0.555	0.000	0.61	0.0	636.9	OK
10.009	S8A	4.887	-0.552	0.000	0.44	0.0	657.0	OK
10.010	S6	4.817	-0.561	0.000	0.43	0.0	701.4	OK
26.000	S5-3	4.786	-0.172	0.000	0.22	0.0	100.6	OK
26.001	S5-2	4.767	-0.041	0.000	0.31	0.0	99.7	OK
26.002	S5-1	4.757	-0.017	0.000	0.30	0.0	139.7	OK
27.000	S4-2	4.759	-0.207	0.000	0.17	0.0	100.6	OK
27.001	S4-1	4.745	-0.088	0.000	0.17	0.0	99.6	OK
10.011	S4	4.731	-0.703	0.000	0.46	0.0	936.0	OK
10.012	S3	4.607	-0.748	0.000	0.50	0.0	967.7	OK
28.000	S2-2	4.258	-0.342	0.000	0.20	0.0	53.9	OK
28.001	S14	4.223	-0.257	0.000	0.54	0.0	80.1	OK
28.002	35	4.156	-0.292	0.000	0.29	0.0	79.7	OK
10.013	S2	4.149	-0.244	0.000	0.66	0.0	1046.4	OK
10.014	S1A	3.937	-0.413	0.000	0.27	0.0	1046.6	OK
10.015	S1	3.698	-0.371	0.000	0.38	0.0	1047.4	OK

Summary of Results for 720 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.231	-0.175	0.000	0.11	0.0	3.9	OK
11.000	11-4-1	5.093	-0.187	0.000	0.07	0.0	2.6	OK
10.001	S11-4	4.925	-0.223	0.000	0.15	0.0	9.1	OK
10.002	S11-3	4.799	-0.227	0.000	0.14	0.0	14.9	OK
10.003	S11-2	4.784	-0.129	0.000	0.20	0.0	21.5	OK
10.004	S11-1	4.761	0.035	0.000	0.17	0.0	22.1	SURCHARGED
10.005	S11	4.755	-0.535	0.000	0.04	0.0	23.1	OK
12.000	S10-4	5.245	-0.225	0.000	0.00	0.0	0.0	OK
12.001	S10-3	4.925	-0.170	0.000	0.14	0.0	4.9	OK
12.002	S10-2	4.798	0.057	0.000	0.29	0.0	10.0	SURCHARGED
12.003	S10-1	4.771	0.127	0.000	0.21	0.0	14.3	SURCHARGED
10.006	S10	4.754	-0.658	0.000	0.04	0.0	38.7	OK
13.000	S21	7.379	-0.185	0.000	0.07	0.0	3.0	OK
13.001	S20	7.153	-0.156	0.000	0.20	0.0	8.2	OK
13.002	S19	6.856	-0.221	0.000	0.16	0.0	10.4	OK
13.003	S18	6.778	-0.298	0.000	0.09	0.0	12.4	OK
14.000	S17-2	7.069	-0.174	0.000	0.12	0.0	4.9	OK
14.001	S17-1	6.525	-0.128	0.000	0.32	0.0	10.4	OK
13.004	S17	6.510	-0.251	0.000	0.24	0.0	27.7	OK
15.000	S16-2	6.909	-0.173	0.000	0.12	0.0	5.0	OK
15.001	S16-1	6.612	-0.229	0.000	0.13	0.0	9.6	OK
13.005	S16	5.743	-0.346	0.000	0.21	0.0	43.1	OK
16.000	S15-6	7.448	-0.177	0.000	0.10	0.0	5.2	OK
16.001	S15-5	6.870	-0.168	0.000	0.15	0.0	8.8	OK
16.002	S15-4	5.865	-0.276	0.000	0.15	0.0	13.7	OK
17.000	S15-3-1	5.879	-0.225	0.000	0.00	0.0	0.0	OK
16.003	S15-3	5.790	-0.385	0.000	0.11	0.0	22.8	OK
16.004	S15-2	5.732	-0.336	0.000	0.18	0.0	35.9	OK
16.005	S15-1	5.686	-0.275	0.000	0.41	0.0	48.9	OK
13.006	S15	5.658	-0.355	0.000	0.35	0.0	92.0	OK
18.000	S18-1	6.939	-0.179	0.000	0.09	0.0	3.3	OK
18.001	S18-2	6.686	-0.162	0.000	0.17	0.0	6.2	OK
18.002	S14-5	6.492	-0.166	0.000	0.15	0.0	9.5	OK
19.000	S14-4-2	6.047	-0.263	0.000	0.04	0.0	3.3	OK
19.001	S14-4-1	5.463	-0.320	0.000	0.05	0.0	6.5	OK
18.003	S14-4	5.061	-0.249	0.000	0.19	0.0	17.2	OK
20.000	S14-3-3	5.772	-0.186	0.000	0.07	0.0	3.3	OK
20.001	S14-3-2	5.368	-0.320	0.000	0.05	0.0	6.5	OK
20.002	S14-3-1	5.221	-0.312	0.000	0.07	0.0	7.6	OK
18.004	S14-3	5.021	-0.456	0.000	0.10	0.0	26.9	OK
18.005	S14-2	4.943	-0.549	0.000	0.07	0.0	31.6	OK
18.006	S14-1	4.915	-0.446	0.000	0.08	0.0	38.2	OK
13.007	S14	4.906	-0.400	0.000	0.39	0.0	147.5	OK
13.008	S13	4.893	-0.629	0.000	0.31	0.0	148.8	OK
13.009	S9C	4.839	-0.657	0.000	0.19	0.0	149.5	OK
21.000	S12-4	5.264	-0.300	0.000	0.00	0.0	0.0	OK
21.001	S12-3	5.030	-0.239	0.000	0.09	0.0	5.2	OK
21.002	S12-2	5.002	-0.310	0.000	0.07	0.0	9.5	OK
21.003	S12-1	4.786	-0.231	0.000	0.13	0.0	22.5	OK
13.010	S9B	4.770	-0.548	0.000	0.18	0.0	185.6	OK
13.011	S9A	4.759	-0.648	0.000	0.22	0.0	187.8	OK
22.000	S9A-1	5.386	-0.289	0.000	0.12	0.0	13.0	OK
23.000	S9-1-1	5.410	-0.300	0.000	0.00	0.0	0.0	OK
24.000	S9-2	5.595	-0.375	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.087	-0.450	0.000	0.00	0.0	0.0	OK
10.007	S9	4.753	-0.647	0.000	0.20	0.0	239.8	OK

Summary of Results for 720 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.478	-0.264	0.000	0.03	0.0	8.2	OK
25.001	S8-3	8.976	-0.252	0.000	0.06	0.0	13.4	OK
25.002	S8-2	8.160	-0.318	0.000	0.06	0.0	20.6	OK
25.003	S8-1	5.444	-0.296	0.000	0.10	0.0	27.1	OK
10.008	S8	4.715	-0.747	0.000	0.38	0.0	398.0	OK
10.009	S8A	4.695	-0.744	0.000	0.27	0.0	410.3	OK
10.010	S6	4.628	-0.750	0.000	0.27	0.0	437.3	OK
26.000	S5-3	4.584	-0.374	0.000	0.13	0.0	61.0	OK
26.001	S5-2	4.569	-0.239	0.000	0.19	0.0	60.7	OK
26.002	S5-1	4.563	-0.211	0.000	0.18	0.0	85.0	OK
27.000	S4-2	4.564	-0.402	0.000	0.11	0.0	61.0	OK
27.001	S4-1	4.555	-0.278	0.000	0.11	0.0	60.7	OK
10.011	S4	4.547	-0.887	0.000	0.29	0.0	581.1	OK
10.012	S3	4.428	-0.927	0.000	0.31	0.0	600.5	OK
28.000	S2-2	4.177	-0.423	0.000	0.12	0.0	32.6	OK
28.001	S14	4.124	-0.356	0.000	0.33	0.0	48.8	OK
28.002	35	4.042	-0.406	0.000	0.18	0.0	48.8	OK
10.013	S2	4.032	-0.361	0.000	0.41	0.0	649.1	OK
10.014	S1A	3.882	-0.468	0.000	0.17	0.0	649.2	OK
10.015	S1	3.623	-0.446	0.000	0.24	0.0	649.7	OK

Summary of Results for 1440 minute 100 year Winter (Storm)

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.219	-0.187	0.000	0.07	0.0	2.3	OK
11.000	11-4-1	5.084	-0.196	0.000	0.04	0.0	1.6	OK
10.001	S11-4	4.909	-0.239	0.000	0.09	0.0	5.5	OK
10.002	S11-3	4.727	-0.299	0.000	0.09	0.0	9.0	OK
10.003	S11-2	4.652	-0.261	0.000	0.12	0.0	12.9	OK
10.004	S11-1	4.616	-0.110	0.000	0.10	0.0	13.9	OK
10.005	S11	4.613	-0.677	0.000	0.03	0.0	13.6	OK
12.000	S10-4	5.245	-0.225	0.000	0.00	0.0	0.0	OK
12.001	S10-3	4.913	-0.182	0.000	0.08	0.0	2.9	OK
12.002	S10-2	4.637	-0.104	0.000	0.17	0.0	6.0	OK
12.003	S10-1	4.622	-0.022	0.000	0.12	0.0	8.5	OK
10.006	S10	4.612	-0.800	0.000	0.03	0.0	24.0	OK
13.000	S21	7.369	-0.195	0.000	0.04	0.0	1.8	OK
13.001	S20	7.136	-0.173	0.000	0.12	0.0	4.9	OK
13.002	S19	6.839	-0.238	0.000	0.09	0.0	6.3	OK
13.003	S18	6.758	-0.318	0.000	0.06	0.0	7.4	OK
14.000	S17-2	7.057	-0.186	0.000	0.07	0.0	2.9	OK
14.001	S17-1	6.498	-0.155	0.000	0.19	0.0	6.3	OK
13.004	S17	6.480	-0.281	0.000	0.14	0.0	16.6	OK
15.000	S16-2	6.897	-0.185	0.000	0.07	0.0	3.0	OK
15.001	S16-1	6.596	-0.245	0.000	0.08	0.0	5.7	OK
13.005	S16	5.695	-0.394	0.000	0.12	0.0	25.9	OK
16.000	S15-6	7.436	-0.189	0.000	0.06	0.0	3.1	OK
16.001	S15-5	6.858	-0.180	0.000	0.09	0.0	5.3	OK
16.002	S15-4	5.841	-0.300	0.000	0.09	0.0	8.2	OK
17.000	S15-3-1	5.879	-0.225	0.000	0.00	0.0	0.0	OK
16.003	S15-3	5.753	-0.422	0.000	0.07	0.0	13.7	OK
16.004	S15-2	5.680	-0.388	0.000	0.11	0.0	21.5	OK
16.005	S15-1	5.626	-0.335	0.000	0.25	0.0	29.4	OK
13.006	S15	5.599	-0.414	0.000	0.21	0.0	55.2	OK
18.000	S18-1	6.927	-0.191	0.000	0.06	0.0	2.0	OK
18.001	S18-2	6.671	-0.177	0.000	0.10	0.0	3.7	OK
18.002	S14-5	6.479	-0.179	0.000	0.09	0.0	5.7	OK
19.000	S14-4-2	6.040	-0.270	0.000	0.02	0.0	2.0	OK
19.001	S14-4-1	5.451	-0.332	0.000	0.03	0.0	3.9	OK
18.003	S14-4	5.026	-0.284	0.000	0.11	0.0	10.3	OK
20.000	S14-3-3	5.763	-0.195	0.000	0.04	0.0	2.0	OK
20.001	S14-3-2	5.356	-0.332	0.000	0.03	0.0	3.9	OK
20.002	S14-3-1	5.206	-0.327	0.000	0.04	0.0	4.6	OK
18.004	S14-3	4.978	-0.499	0.000	0.06	0.0	16.1	OK
18.005	S14-2	4.869	-0.623	0.000	0.04	0.0	19.1	OK
18.006	S14-1	4.812	-0.549	0.000	0.05	0.0	22.9	OK
13.007	S14	4.797	-0.509	0.000	0.23	0.0	87.9	OK
13.008	S13	4.783	-0.739	0.000	0.18	0.0	90.1	OK
13.009	S9C	4.725	-0.771	0.000	0.11	0.0	90.1	OK
21.000	S12-4	5.264	-0.300	0.000	0.00	0.0	0.0	OK
21.001	S12-3	5.014	-0.255	0.000	0.06	0.0	3.1	OK
21.002	S12-2	4.986	-0.326	0.000	0.04	0.0	5.7	OK
21.003	S12-1	4.678	-0.339	0.000	0.08	0.0	13.5	OK
13.010	S9B	4.635	-0.683	0.000	0.11	0.0	113.6	OK
13.011	S9A	4.625	-0.782	0.000	0.13	0.0	110.9	OK
22.000	S9A-1	5.366	-0.309	0.000	0.07	0.0	7.8	OK
23.000	S9-1-1	5.410	-0.300	0.000	0.00	0.0	0.0	OK
24.000	S9-2	5.595	-0.375	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.087	-0.450	0.000	0.00	0.0	0.0	OK
10.007	S9	4.625	-0.775	0.000	0.13	0.0	156.7	OK

Summary of Results for 1440 minute 100 year Winter (Storm)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.471	-0.271	0.000	0.02	0.0	4.9	OK
25.001	S8-3	8.965	-0.263	0.000	0.04	0.0	8.0	OK
25.002	S8-2	8.148	-0.330	0.000	0.03	0.0	12.3	OK
25.003	S8-1	5.424	-0.316	0.000	0.06	0.0	16.3	OK
10.008	S8	4.573	-0.889	0.000	0.24	0.0	247.9	OK
10.009	S8A	4.547	-0.892	0.000	0.17	0.0	253.6	OK
10.010	S6	4.484	-0.894	0.000	0.16	0.0	270.8	OK
26.000	S5-3	4.458	-0.500	0.000	0.08	0.0	36.7	OK
26.001	S5-2	4.419	-0.389	0.000	0.11	0.0	36.7	OK
26.002	S5-1	4.415	-0.359	0.000	0.11	0.0	51.3	OK
27.000	S4-2	4.427	-0.539	0.000	0.06	0.0	36.7	OK
27.001	S4-1	4.410	-0.423	0.000	0.06	0.0	36.6	OK
10.011	S4	4.405	-1.029	0.000	0.18	0.0	357.0	OK
10.012	S3	4.292	-1.063	0.000	0.19	0.0	369.0	OK
28.000	S2-2	4.129	-0.471	0.000	0.07	0.0	19.6	OK
28.001	S14	4.064	-0.416	0.000	0.20	0.0	29.4	OK
28.002	35	3.978	-0.470	0.000	0.11	0.0	29.4	OK
10.013	S2	3.952	-0.441	0.000	0.25	0.0	397.7	OK
10.014	S1A	3.842	-0.508	0.000	0.10	0.0	397.8	OK
10.015	S1	3.572	-0.497	0.000	0.14	0.0	397.9	OK

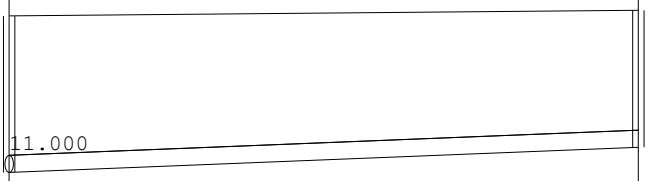
Summary of Results for 2880 minute 100 year Winter (Storm)

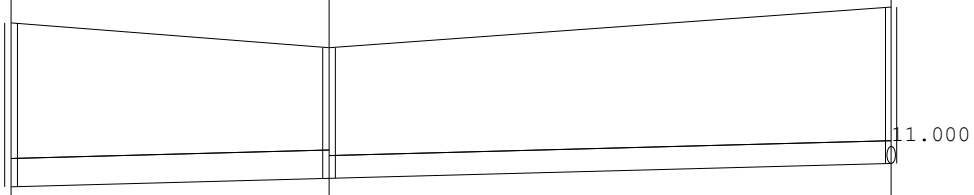
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

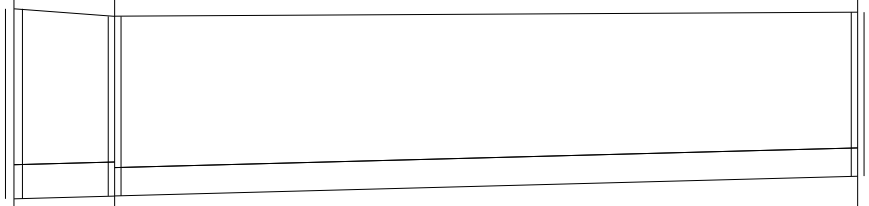
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
10.000	S11-5	5.210	-0.196	0.000	0.04	0.0	1.4	OK
11.000	11-4-1	5.078	-0.202	0.000	0.02	0.0	0.9	OK
10.001	S11-4	4.893	-0.255	0.000	0.05	0.0	3.3	OK
10.002	S11-3	4.706	-0.320	0.000	0.05	0.0	5.4	OK
10.003	S11-2	4.605	-0.308	0.000	0.07	0.0	7.7	OK
10.004	S11-1	4.509	-0.217	0.000	0.06	0.0	8.0	OK
10.005	S11	4.507	-0.783	0.000	0.02	0.0	8.7	OK
12.000	S10-4	5.245	-0.225	0.000	0.00	0.0	0.0	OK
12.001	S10-3	4.902	-0.193	0.000	0.05	0.0	1.8	OK
12.002	S10-2	4.564	-0.177	0.000	0.10	0.0	3.6	OK
12.003	S10-1	4.512	-0.132	0.000	0.08	0.0	5.2	OK
10.006	S10	4.506	-0.906	0.000	0.02	0.0	14.5	OK
13.000	S21	7.363	-0.201	0.000	0.03	0.0	1.1	OK
13.001	S20	7.124	-0.185	0.000	0.07	0.0	3.0	OK
13.002	S19	6.823	-0.254	0.000	0.06	0.0	3.7	OK
13.003	S18	6.745	-0.331	0.000	0.03	0.0	4.4	OK
14.000	S17-2	7.048	-0.195	0.000	0.04	0.0	1.8	OK
14.001	S17-1	6.479	-0.174	0.000	0.12	0.0	3.7	OK
13.004	S17	6.460	-0.301	0.000	0.09	0.0	9.9	OK
15.000	S16-2	6.887	-0.195	0.000	0.04	0.0	1.8	OK
15.001	S16-1	6.582	-0.259	0.000	0.05	0.0	3.4	OK
13.005	S16	5.663	-0.426	0.000	0.07	0.0	15.5	OK
16.000	S15-6	7.428	-0.197	0.000	0.04	0.0	1.9	OK
16.001	S15-5	6.846	-0.192	0.000	0.05	0.0	3.2	OK
16.002	S15-4	5.822	-0.319	0.000	0.05	0.0	4.9	OK
17.000	S15-3-1	5.879	-0.225	0.000	0.00	0.0	0.0	OK
16.003	S15-3	5.725	-0.450	0.000	0.04	0.0	8.2	OK
16.004	S15-2	5.646	-0.422	0.000	0.06	0.0	12.9	OK
16.005	S15-1	5.580	-0.381	0.000	0.15	0.0	17.6	OK
13.006	S15	5.554	-0.459	0.000	0.13	0.0	33.1	OK
18.000	S18-1	6.920	-0.198	0.000	0.03	0.0	1.2	OK
18.001	S18-2	6.659	-0.189	0.000	0.06	0.0	2.2	OK
18.002	S14-5	6.467	-0.191	0.000	0.06	0.0	3.4	OK
19.000	S14-4-2	6.028	-0.282	0.000	0.01	0.0	1.2	OK
19.001	S14-4-1	5.441	-0.342	0.000	0.02	0.0	2.3	OK
18.003	S14-4	5.004	-0.306	0.000	0.07	0.0	6.2	OK
20.000	S14-3-3	5.757	-0.201	0.000	0.03	0.0	1.2	OK
20.001	S14-3-2	5.346	-0.342	0.000	0.02	0.0	2.3	OK
20.002	S14-3-1	5.197	-0.336	0.000	0.02	0.0	2.7	OK
18.004	S14-3	4.952	-0.525	0.000	0.04	0.0	9.7	OK
18.005	S14-2	4.831	-0.661	0.000	0.02	0.0	11.4	OK
18.006	S14-1	4.746	-0.615	0.000	0.03	0.0	13.8	OK
13.007	S14	4.721	-0.585	0.000	0.14	0.0	52.7	OK
13.008	S13	4.708	-0.814	0.000	0.11	0.0	54.0	OK
13.009	S9C	4.648	-0.848	0.000	0.07	0.0	54.0	OK
21.000	S12-4	5.264	-0.300	0.000	0.00	0.0	0.0	OK
21.001	S12-3	5.004	-0.265	0.000	0.03	0.0	1.9	OK
21.002	S12-2	4.977	-0.335	0.000	0.03	0.0	3.4	OK
21.003	S12-1	4.633	-0.384	0.000	0.05	0.0	8.1	OK
13.010	S9B	4.531	-0.787	0.000	0.07	0.0	67.5	OK
13.011	S9A	4.513	-0.894	0.000	0.08	0.0	68.3	OK
22.000	S9A-1	5.350	-0.325	0.000	0.04	0.0	4.7	OK
23.000	S9-1-1	5.410	-0.300	0.000	0.00	0.0	0.0	OK
24.000	S9-2	5.595	-0.375	0.000	0.00	0.0	0.0	OK
23.001	S9-1	5.087	-0.450	0.000	0.00	0.0	0.0	OK
10.007	S9	4.509	-0.891	0.000	0.07	0.0	89.3	OK

Summary of Results for 2880 minute 100 year Winter (Storm)

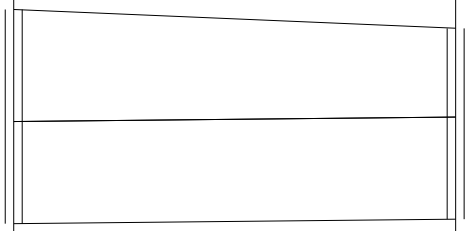
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
25.000	S8-4	13.459	-0.283	0.000	0.01	0.0	2.9	OK
25.001	S8-3	8.958	-0.270	0.000	0.02	0.0	4.8	OK
25.002	S8-2	8.139	-0.339	0.000	0.02	0.0	7.4	OK
25.003	S8-1	5.411	-0.329	0.000	0.04	0.0	9.7	OK
10.008	S8	4.464	-0.998	0.000	0.14	0.0	145.1	OK
10.009	S8A	4.439	-1.000	0.000	0.10	0.0	148.9	OK
10.010	S6	4.375	-1.003	0.000	0.10	0.0	159.1	OK
26.000	S5-3	4.395	-0.563	0.000	0.05	0.0	22.0	OK
26.001	S5-2	4.316	-0.492	0.000	0.07	0.0	22.0	OK
26.002	S5-1	4.310	-0.464	0.000	0.07	0.0	30.8	OK
27.000	S4-2	4.343	-0.623	0.000	0.04	0.0	22.0	OK
27.001	S4-1	4.302	-0.531	0.000	0.04	0.0	22.0	OK
10.011	S4	4.296	-1.138	0.000	0.10	0.0	211.3	OK
10.012	S3	4.189	-1.166	0.000	0.11	0.0	218.3	OK
28.000	S2-2	4.094	-0.506	0.000	0.04	0.0	11.7	OK
28.001	S14	4.023	-0.457	0.000	0.12	0.0	17.6	OK
28.002	35	3.946	-0.502	0.000	0.06	0.0	17.6	OK
10.013	S2	3.908	-0.485	0.000	0.15	0.0	235.8	OK
10.014	S1A	3.815	-0.535	0.000	0.06	0.0	235.6	OK
10.015	S1	3.539	-0.530	0.000	0.09	0.0	235.5	OK

MH Name	S11-4	S11-5	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		10.000	
Dia (mm)		225	
Slope (1:X)		199.9	
Cover Level (m)	6.916	6.992	
Invert Level (m)	4.848	5.181	
Length (m)		66.571	

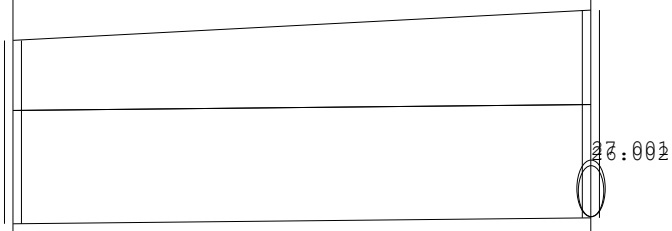
MH Name	S11-2	S11-3	S11-4	
Hor Scale 800 Ver Scale 100 Datum (m)2.000				
PN		10.002	10.001	
Dia (mm)		375	300	
Slope (1:X)		297.7	301.8	
Cover Level (m)	6.707	6.378	6.916	
Invert Level (m)	4.538	4.651	4.651 4.848	
Length (m)		33.638	59.459	

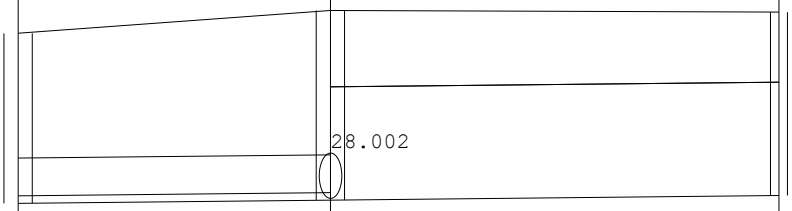
MH Name	S11	S11-1		S11-2	
Hor Scale 800 Ver Scale 100 Datum (m)2.000					
PN		10.004		10.003	
Dia (mm)		450		375	
Slope (1:X)		295.6		300.0	
Cover Level (m)	6.753	6.652		6.707	
Invert Level (m)		4.240	4.276	4.276	4.538
Length (m)		10.641		78.604	

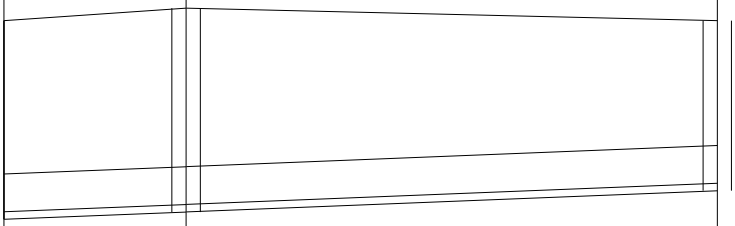
MH Name	S8A		S9		S11	
Hor Scale 800 Ver Scale 100 Datum (m)2.000						
PN			10.007		10.005	
Dia (mm)			1200		1050	
Slope (1:X)			780.2		703.5	
Cover Level (m)	6.613	6.606	6.947	7.011	6.753	
Invert Level (m)		4.089	4.112	4.200	4.200	4.212	4.212	4.240
Length (m)			68.661		19.697	

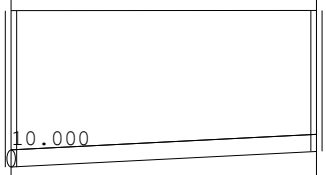
MH Name	S6	S8A	
Hor Scale 800 Ver Scale 100 Datum (m)2.000			
PN		10.009	
Dia (mm)		1350	
Slope (1:X)		766.4	
Cover Level (m)	6.862	6.613	
Invert Level (m)	4.028	4.089	
Length (m)		46.751	

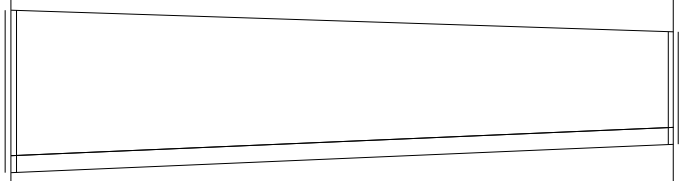
MH Name	S4	S6	
Hor Scale 800 Ver Scale 100 Datum (m)2.000			
PN		10.010	
Dia (mm)		1350	
Slope (1:X)		771.6	
Cover Level (m)	6.682	6.862	
Invert Level (m)	3.934	4.028	
Length (m)		72.531	

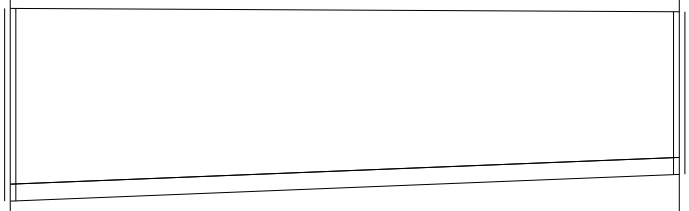
MH Name	S3	S4	
Hor Scale 800 Ver Scale 100 Datum (m)2.000			
PN		10.011	
Dia (mm)		1500	
Slope (1:X)		773.9	
Cover Level (m)	6.280	6.682	
Invert Level (m)	3.855	3.934	
Length (m)		61.140	

MH Name	S1A	S2	S3	
Hor Scale 800 Ver Scale 100 Datum (m)2.000				
PN		10.013	10.012	
Dia (mm)		-12	1500	
Slope (1:X)		768.2	765.5	
Cover Level (m)	6.000	6.302	6.280	
Invert Level (m)	3.750	3.793	3.793	3.855
Length (m)		33.033	47.459	

MH Name	WETLANDS	S1	S1A	
Hor Scale 800 Ver Scale 100 Datum (m)2.000				
PN		10.015	10.014	
Dia (mm)		-12	-12	
Slope (1:X)		200.7	200.0	
Cover Level (m)	6.000	6.166	6.000	
Invert Level (m)		3.373 / 3.469	3.469 / 3.750	
Length (m)		19.264	56.194	

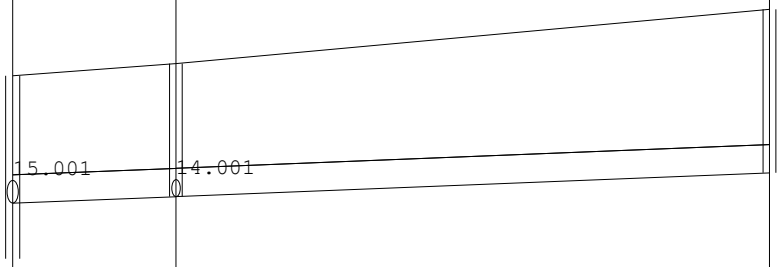
MH Name	S11-4	11-4-1	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		11.000	
Dia (mm)		225	
Slope (1:X)		156.1	
Cover Level (m)	6.916	6.919	
Invert Level (m)		4.848 / 5.055	
Length (m)		32.314	

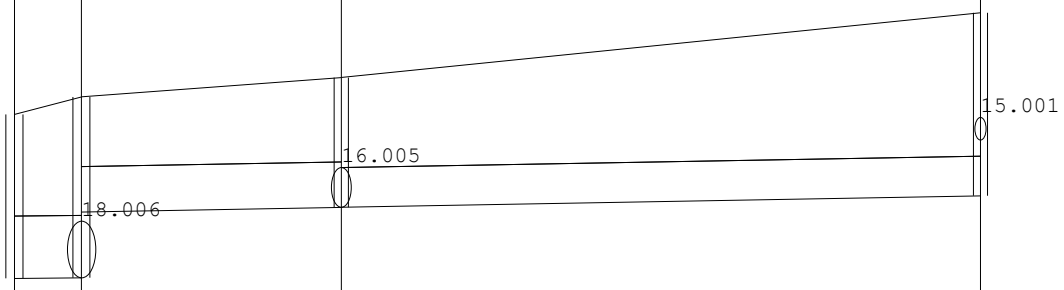
MH Name	S10-3	S10-4	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		12.000	
Dia (mm)		225	
Slope (1:X)		186.9	
Cover Level (m)	7.020	6.733	
Invert Level (m)	4.870	5.245	
Length (m)		70.076	

MH Name	S10-2	S10-3	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		12.001	
Dia (mm)		225	
Slope (1:X)		199.9	
Cover Level (m)	7.066	7.020	
Invert Level (m)	4.516	4.870	
Length (m)		70.774	

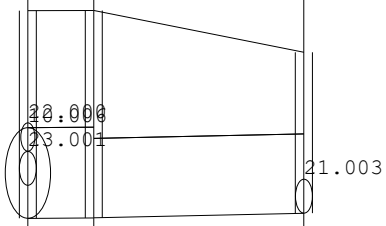
MH Name	S10	S10-1	S10-2	
Hor Scale 800 Ver Scale 100 Datum (m)2.000		10.005		
PN		12.003	12.002	
Dia (mm)		300	225	
Slope (1:X)		213.5	199.4	
Cover Level (m)	7.011	7.007	7.066	
Invert Level (m)		4.212 / 4.344	4.344 / 4.516	
Length (m)		28.176	34.303	

MH Name	S18	S19	S20	S21	
Hor Scale 800 Ver Scale 100 Datum (m)5.000					
PN		13.002	13.001	13.000	
Dia (mm)		300	225	225	
Slope (1:X)		197.2	150.4	149.9	
Cover Level (m)	8.864	8.970	9.073	9.158	
Invert Level (m)		6.701 / 6.777	6.777 / 7.084	7.084 / 7.339	
Length (m)		14.988	46.177	38.230	

MH Name	S16	S17	S18	
Hor Scale 800 Ver Scale 100 Datum (m) 4.000				
PN		13.004	13.003	
Dia (mm)		375	375	
Slope (1:X)		200.8	200.0	
Cover Level (m)	7.985	8.146	8.864	
Invert Level (m)		6.300 6.386	6.387 6.701	
Length (m)		17.267	62.800	

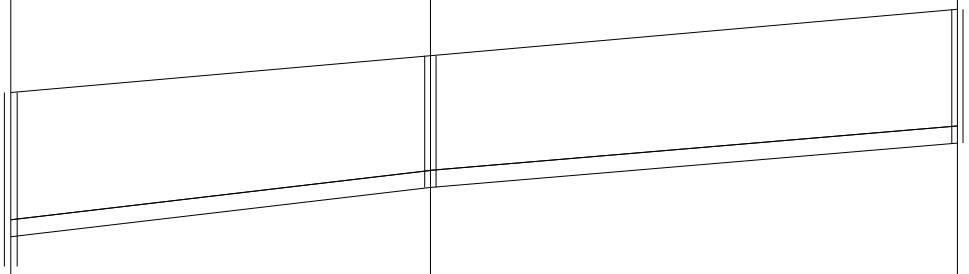
MH Name	S13		S15	S16	
Hor Scale 800 Ver Scale 100 Datum (m) 3.000					
PN			13.006	13.005	
Dia (mm)			600	525	
Slope (1:X)			443.3	447.8	
Cover Level (m)	6.641	6.872	7.128	7.985	
Invert Level (m)		4.472 4.481	5.351 5.413	5.413 5.564	
Length (m)			27.487	67.619	

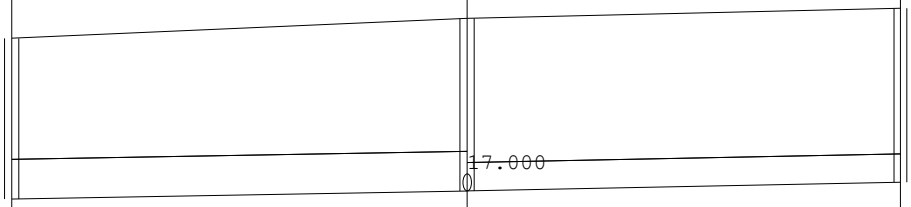
MH Name	S9B		S9C	S13	
Hor Scale 800 Ver Scale 100 Datum (m)2.000					
PN		13.009		13.008	
Dia (mm)		1050		1050	
Slope (1:X)		1011.9		755.3	
Cover Level (m)	6.397		7.090	6.641	
Invert Level (m)		4.374	4.446	4.446	4.472
Length (m)		72.854		19.637	

MH Name	S9		S9B	
Hor Scale 800 Ver Scale 100 Datum (m)2.000				
PN			13.010	
Dia (mm)			1050	
Slope (1:X)			364.4	
Cover Level (m)	6.947	6.951	6.397	
Invert Level (m)		4.200	4.207	4.207	4.268
Length (m)			22.230	

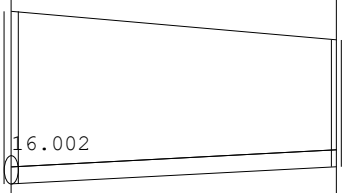
MH Name	S17		S17-2	
Hor Scale 800 Ver Scale 100 Datum (m) 4.000		13.003		
PN			14.000	
Dia (mm)			225	
Slope (1:X)			149.9	
Cover Level (m)	8.146	8.277	8.730	
Invert Level (m)		6.386 6.428	6.428 7.018	
Length (m)			88.431	

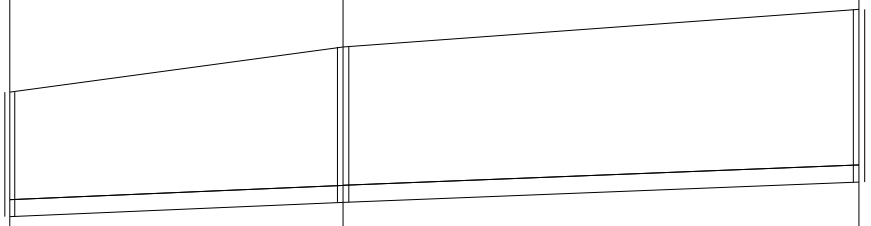
MH Name	S16	S16-1	S16-2	
Hor Scale 800 Ver Scale 100 Datum (m) 4.000		13.004		
PN		15.001	15.000	
Dia (mm)		300	225	
Slope (1:X)		200.1	150.0	
Cover Level (m)	7.985	8.418	8.480	
Invert Level (m)		6.302 6.541	6.541 6.857	
Length (m)		47.816	47.398	

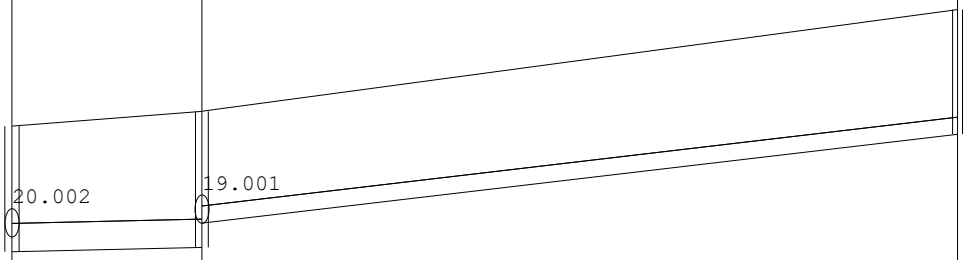
MH Name	S15-4	S15-5	S15-6	
Hor Scale 800 Ver Scale 100 Datum (m) 4.000				
PN		16.001	16.000	
Dia (mm)		225	225	
Slope (1:X)		67.9	95.0	
Cover Level (m)	8.068	8.556	9.170	
Invert Level (m)	6.159	6.813	6.813 7.400	
Length (m)		44.391	55.753	

MH Name	S15-2	S15-3	S15-4	
Hor Scale 800 Ver Scale 100 Datum (m) 4.000				
PN		16.003	16.002	
Dia (mm)		525	375	
Slope (1:X)		450.2	395.3	
Cover Level (m)	7.670	7.934	8.068	
Invert Level (m)	5.543	5.650	5.650 5.766	
Length (m)		48.174	45.851	

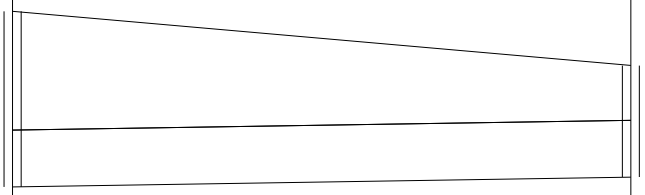
MH Name	S15	S15-1	S15-2	
Hor Scale 800 Ver Scale 100 Datum (m) 3.000				
PN		16.005	16.004	
Dia (mm)		525	525	
Slope (1:X)		471.0	449.7	
Cover Level (m)	7.128	7.196	7.670	
Invert Level (m)		5.414	5.436 5.436	5.543
Length (m)		10.363	48.121	

MH Name	S15-3	S15-3-1	
Hor Scale 800 Ver Scale 100 Datum (m) 4.000			
PN		17.000	
Dia (mm)		225	
Slope (1:X)		151.6	
Cover Level (m)	7.934	7.556	
Invert Level (m)		5.652	5.879
Length (m)		34.409	

MH Name	S14-5	S18-2	S18-1	
Hor Scale 800 Ver Scale 100 Datum (m)5.000				
PN		18.001	18.000	
Dia (mm)		225	225	
Slope (1:X)		185.6	202.1	
Cover Level (m)	8.081	8.678	9.177	
Invert Level (m)	6.433	6.623	6.623	6.893
Length (m)		35.261	54.575	

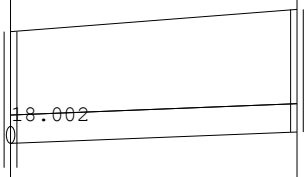
MH Name	S14-3	S14-4	S14-5	
Hor Scale 800 Ver Scale 100 Datum (m)3.000				
PN		18.003	18.002	
Dia (mm)		375	225	
Slope (1:X)		346.4	68.0	
Cover Level (m)	6.540	6.735	8.081	
Invert Level (m)	4.877	4.935	5.257	6.433
Length (m)		20.094	79.950	

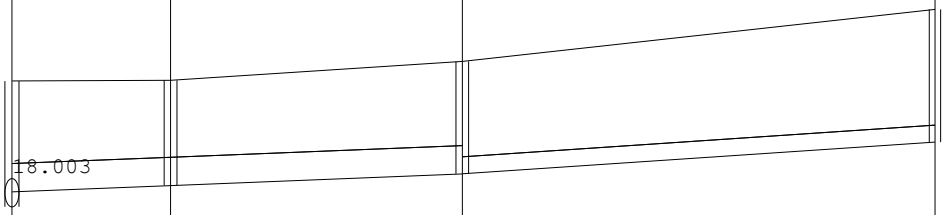
MH Name	S14-2	S14-3	
Hor Scale 800 Ver Scale 100 Datum (m)2.000			
PN		18.004	
Dia (mm)		600	
Slope (1:X)		503.8	
Cover Level (m)	6.217	6.540	
Invert Level (m)	4.742	4.877	
Length (m)		68.008	

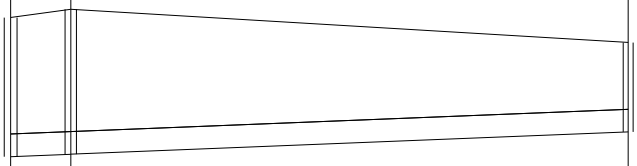
MH Name	S14-1	S14-2	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		18.005	
Dia (mm)		750	
Slope (1:X)		499.3	
Cover Level (m)	6.934	6.217	
Invert Level (m)	4.611	4.742	
Length (m)		65.409	

MH Name	S14	S14-1	
Hor Scale 800 Ver Scale 100 Datum (m)2.000		13.006	
PN		18.006	
Dia (mm)		750	
Slope (1:X)		503.3	
Cover Level (m)	6.872	6.934	
Invert Level (m)	4.481	4.611	
Length (m)		65.435	

MH Name	S14-4-1	S14-4-2	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		19.000	
Dia (mm)		300	
Slope (1:X)		138.0	
Cover Level (m)	7.031	7.870	
Invert Level (m)	5.408	6.010	
Length (m)		83.096	

MH Name	S14-4	S14-4-1	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		19.001	
Dia (mm)		375	
Slope (1:X)		199.3	
Cover Level (m)	6.735	7.031	
Invert Level (m)		5.256	5.408
Length (m)		30.301	

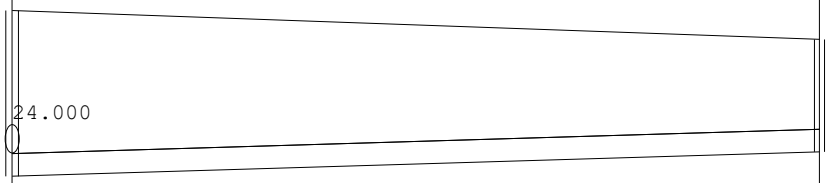
MH Name	S14-3	S14-3-1	S14-3-2	S14-3-3	
Hor Scale 800 Ver Scale 100 Datum (m)3.000					
PN		20.002	20.001	20.000	
Dia (mm)		375	375	225	
Slope (1:X)		199.7	199.1	119.1	
Cover Level (m)	6.540	6.550	6.800	7.488	
Invert Level (m)		5.074	5.158	5.313	5.733
		5.158	5.158	5.313	
Length (m)		16.777	30.868	50.005	

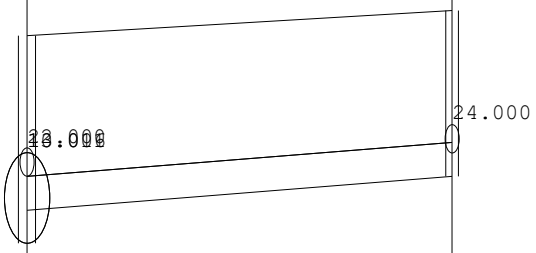
MH Name	S12-2		S12-4	
Hor Scale 800 Ver Scale 100 Datum (m)3.000				
PN			21.000	
Dia (mm)			300	
Slope (1:X)			199.9	
Cover Level (m)	6.777	6.886	6.446	
Invert Level (m)		4.937 4.969	4.969 5.264	
Length (m)			58.974	

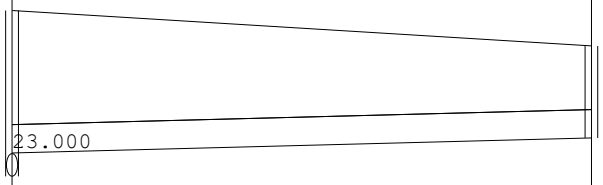
MH Name	S12-1	S12-2	
Hor Scale 800 Ver Scale 100 Datum (m)2.000			
PN		21.002	
Dia (mm)		375	
Slope (1:X)		199.8	
Cover Level (m)	6.556	6.777	
Invert Level (m)	4.567	4.937	
Length (m)		73.923	

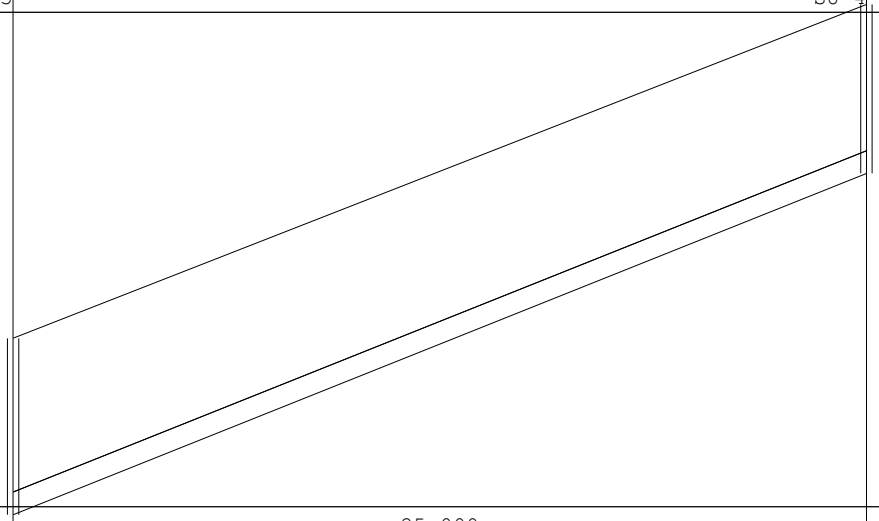
MH Name	S9B		S12-1	
		13.009		
Hor Scale 800 Ver Scale 100 Datum (m)2.000				
PN		21.003		
Dia (mm)		450		
Slope (1:X)		310.9		
Cover Level (m)	6.397		6.556	
Invert Level (m)		4.268	4.567	
Length (m)		92.949		

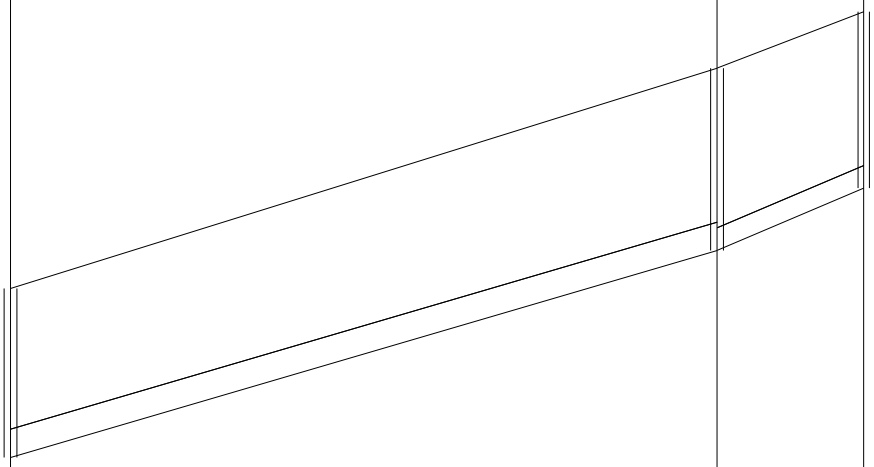
MH Name	S9		S9A-1	
		18.006 23.001		
Hor Scale 800 Ver Scale 100 Datum (m)2.000				
PN		22.000		
Dia (mm)		375		
Slope (1:X)		300.0		
Cover Level (m)	6.947		6.951	
Invert Level (m)		5.090	5.300	
Length (m)		63.004		

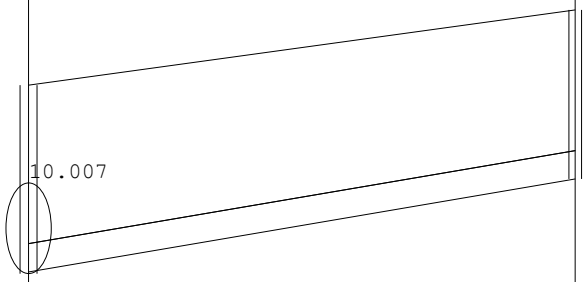
MH Name	S9-1	S9-1-1	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		23.000	
Dia (mm)		300	
Slope (1:X)		264.4	
Cover Level (m)	7.280	6.897	
Invert Level (m)	5.087	5.410	
Length (m)		85.414	

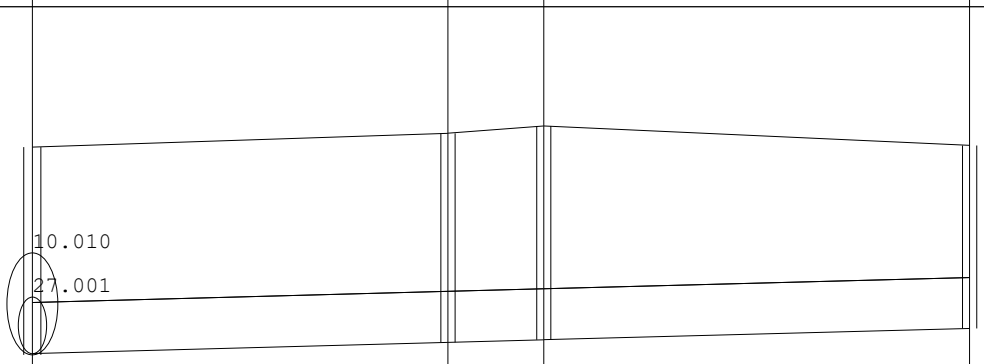
MH Name	S9	S9-1	
Hor Scale 800 Ver Scale 100 Datum (m)2.000			
PN		23.001	
Dia (mm)		450	
Slope (1:X)		99.9	
Cover Level (m)	6.947	7.280	
Invert Level (m)	4.637	5.087	
Length (m)		44.973	

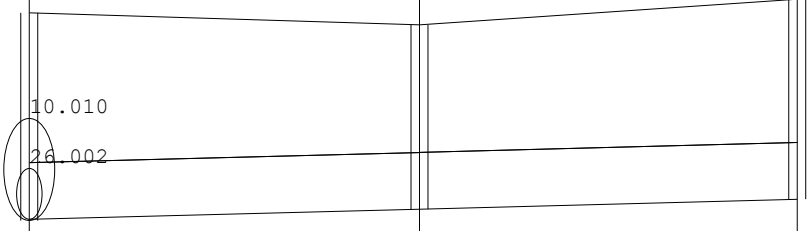
MH Name	S9-1		S9-2	
Hor Scale 800 Ver Scale 100 Datum (m) 3.000				
PN		24.000		
Dia (mm)		375		
Slope (1:X)		308.0		
Cover Level (m)	7.280		6.811	
Invert Level (m)		5.396		5.595
Length (m)		61.291		

MH Name	S8-3		S8-4	
Hor Scale 800 Ver Scale 100 Datum (m) 9.033				
PN		25.000		
Dia (mm)		300		
Slope (1:X)		20.0		
Cover Level (m)	11.261		15.676	
Invert Level (m)		8.928		13.442
Length (m)		90.280		

MH Name	S8-1	S8-2	S8-3
Hor Scale 800 Ver Scale 100 Datum (m)5.000			
PN		25.002	25.001
Dia (mm)		375	300
Slope (1:X)		27.3	18.8
Cover Level (m)	7.601	10.514	11.261
Invert Level (m)	5.365	8.103	8.103 / 8.928
Length (m)		74.749	15.517

MH Name	S8	S8-1	
Hor Scale 800 Ver Scale 100 Datum (m)3.000			
PN		25.003	
Dia (mm)		375	
Slope (1:X)		47.0	
Cover Level (m)	6.606	7.601	
Invert Level (m)	4.134	5.365	
Length (m)		57.836	

MH Name	S4	S5-1	S5-2	S5-3	
					
Hor Scale 800 Ver Scale 100 Datum (m)2.000					
PN		26.002	26.001	26.000	
Dia (mm)		675	675	675	
Slope (1:X)		293.1	298.2	300.3	
Cover Level (m)	6.682	6.865	6.962	6.704	
Invert Level (m)		3.949 / 4.099	4.099 / 4.133	4.133 / 4.283	
Length (m)		43.971	10.138	45.048	

MH Name	S4	S4-1	S4-2	
				
Hor Scale 800 Ver Scale 100 Datum (m)2.000				
PN		27.001	27.000	
Dia (mm)		750	750	
Slope (1:X)		308.1	300.4	
Cover Level (m)	6.682	6.522	6.861	
Invert Level (m)		3.949 / 4.083	4.083 / 4.216	
Length (m)		41.283	39.958	

MH Name	S2		S14	S2-2	
Hor Scale 800 Ver Scale 100 Datum (m)2.000		10.012			
PN			28.001	28.000	
Dia (mm)			600	600	
Slope (1:X)			870.3	498.7	
Cover Level (m)	6.302	6.000	5.630	6.000	
Invert Level (m)		3.848	3.848 3.880	3.880 4.000	
Length (m)			27.849	59.843	

Appendix B

Bauder Ltd Green Roof Information

CS CONSULTING
GROUP

Revision: January 2018

PRODUCT DATASHEET

Bauder XF301 Sedum System

Single layer, light weight, Sedum System.

Intended Use

Bauder XF301 Single Layer Sedum System is an ultra-light weight sedum system. The product can be laid directly onto the waterproofing without the need for a growing medium. XF301 also contains a moisture mat which retains up to 5 Ltr of water/m2. The vegetation is a mix of in excess of 14 sedum varieties.

PRODUCT INFORMATION AND TECHNICAL PERFORMANCE		
Characteristic	**Unit**	**XF300 Sedum Blanket**
Maximum Saturated Weight	Kg/m²	≤44
Thickness	mm	34 - 44
Sedum and Saxifrage Species	Nos	14 - 17 species
pH Value		6.5 - 7
Typical Supply Size	m	1 x 2
Sedum Species	14+	The species mix is adjusted from time to time. Please contact Bauder Technical for further information
Long Rolls (for use with crane attachment)	m	5 to 10m
Material		Substrate and sedum plants, embedded in a nylon mesh, with a moisture retention fleece

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CERTIFICATION AND ENVIRONMENTAL INFORMATION	
International Standards Organisation (ISO)	ISO 9001:2015 Quality Management Certificates EN1271 (UK) and 70499/03-15_e (Germany). ISO 14001:2015 Environmental Management Certificates A10552 (UK) and 70499/03-15_d (Germany). ISO 50001: 2011 Energy Management Certificate 70499/03-15_c
BS 476 Part 3: 2004	Ext. F. AA Ext. S. AA
Recycled content	≥ 80% recycled material

INSTALLATION GUIDANCE
Normally installed directly onto the waterproofing or on flat roofs onto SDF mat. Care should be taken not to traffic the sedum. XF301 should be layed by skilled operative. See Bauder's Green Roof Installation Guide for full details.

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BAUDER

GENERAL MAINTENANCE

Green Roof Extensive System

Lightweight sedum system XF301.

BAUDER EXTENSIVE GREEN ROOF SYSTEMS

XF301 and SB & WB vegetation blankets and other substrate based planting schemes.

What to Expect From a Bauder Extensive Green Roof System

There is a common misconception that extensive green roofs, and sedum plants in particular, are always green and that from ground level they resemble grass. This is misleading, as they consist mainly of low growing, drought tolerant plants including sedums, saxifrage, wild flowers, grasses, moss and herbs.

The appearance of the vegetation within an extensive green roof will change year on year, dependent upon fluctuations in the seasonal weather throughout the period. It should also be expected that more grass and moss will be present during the wetter months, because the conditions will be ideal for these species to exist, they will tend to die off during the dry summer months, as free-draining extensive substrates will not hold sufficient moisture for them to survive.
The growth and flowering of the individual species within the vegetation mix through the late spring and summer will be dependent upon the weather prevailing at the time, which will also determine which species will be most prominent in any given year.
In the winter, sedum will become smaller and turn red/brown in colour as they prepare themselves to withstand the coming winter frosts. This gives the vegetation a red/brown hue in the late autumn and winter months, which is sometimes mistaken for the plants being distressed, when in fact they are in optimum condition for the time of year.

It is another misconception that extensive green roofs are maintenance free> Green roofs are 'low maintenance' rather than 'no maintenance'. Bauder recommend that all green roofs have a way of watering during prolonged periods without rain. All green roofs will benefit from water during droughts (See Bauder's Watering Guide).
All green roofs will require feeding from time to time e.g. Bauder's lightweight Xero Flor Sedum Blanket contains little in the way of natural nutrient, so fertiliser must be applied annually to ensure that the plants become resistant to extremes of weather and temperature.

The Bauder XF301 Sedum Blanket contains approximately 14-17 different plant species, some very similar in appearance to others but being more drought tolerant. Not every species incorporated will survive and the more dominant will be expected to prevail over time because they will adapt better to a particular location. Regardless of this, we would anticipate that at least 50% of the species will flourish.

Extensive green roofs that have a deeper substrate growing medium, where the vegetation is provided either by selected plug plant species or seeds, will generally support a broader species mix, which can include wild flowers, grasses and herbs. An increased amount of dead vegetation will arise from this type of species mix following flowering, which will need to be cut back and removed, both to reduce the bio-mass on the roof and to encourage seed drop from the dead flower heads.

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Watering and Irrigation: all green roofs will require water during prolonged periods of dry weather, generally sedums are much more drought tolerant than native wildflowers but both will benefit from a prolonged soaking (not little and often) to prevent them from fully drying out (Details are in the Bauder Watering Guide).

General Maintenance

General maintenance is normally carried out annually during springtime. However, certain tasks which will be dependent upon the location of the roof, such as the removal of weeds, seedlings and accumulated leaf litter from overhanging trees may also need to be done during the autumn.

The following procedures should be carried out as indicated below, in order to ensure that the roof is maintained in good condition and to protect the validity of the guarantee.

Preliminary Maintenance Procedures

- Ensure safe access can be gained to the roof and that relevant Health and Safety procedures are followed when working at roof level. It is advised that the contractor should always seek proof of current maintenance for any man-safe roof access systems prior to proceeding with the work on site.
- Remove all dead vegetation and debris from the roof surface, taking particular care to ensure that all chute outlets, gutters and downpipes are clear. Where the species mix incorporates wild flowers and grasses it is recommended that all dead vegetation is strimmed off and the waste lowered to the ground and carted away.
  Please note: Roofs in the vicinity of taller trees will need more frequent maintenance. We recommend removing dead leaves during the spring and again in the autumn, to ensure that they do not damage the roof vegetation.
- Remove the lids of all Inspection chambers, ensure that all rainwater outlets and downpipes are free from blockages and that water can flow freely away.
- Ensure that any protective metal flashings and termination bars remain securely fixed in place. Advice the client of the need to repair or renew as necessary.
- Examine all mastic sealant and mortar pointing for signs of degradation. Advice the client of the need to repair or renew as necessary.
- Check that all promenade tiles and paving slabs remain in position, secure and in good condition.
- Ensure that any new items of plant/equipment that may have been introduced to the roof are mounted on suitable isolated slabs and that any fixings used to secure the plant/equipment in place do not penetrate the waterproofing. If in doubt, please contact Bauder for further advice.
- The Building owner should keep a record of all inspections and maintenance carried out on the roof. Any signs of damage, contamination or degradation to the waterproofing should be reported to Bauder immediately, in order that arrangements can be made for remedial work to be carried out if necessary. Damage to the landscaping should be reported to the building owner. If this damage includes Bauder components, then Bauder may be contacted for remedial advice.

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- When carrying out maintenance to adjoining areas, care must be taken not to damage either the landscaping or the waterproofing system. If it is considered that either has been affected, the Bauder should be contacted for advice. Any waterproofing damage caused after completion of the original installation may invalidate the guarantee.
- Any unauthorised alterations to the waterproofing system will invalidate the guarantee. If such a situation should arise, then Bauder should be contacted so that we may advise on the alteration and how it should be incorporated without affecting the guarantee.

Vegetation Maintenance Tasks

The following tasks should be carried out annually: -

Application of Fertiliser to the vegetation: As a general rule all sedum based green roofs require feeding annually to promote strong growth in the sedum and make them more drought tolerant. Biodiverse and Wildflowers system often do not need annual fertiliser as this may allow weed species to out compete them.

1. Plant encroachment

Any vegetation which has encroached into drainage outlets, walkways and the vegetation barriers (pebbles) should be removed. The vegetation removed may be set aside and used to repair any bare patches if required (see below). If movement/settlement of the pebble vegetation barrier has occurred, additional washed stone pebbles similar to the existing are to be added.

2. Monitor the colour and rate of growth

The colour and rate of growth of the vegetation should be reviewed to establish the health of the plants. It should be noted that many factors can affect the growth and colour of the vegetation and that plants tend to be greener in wetter, mild conditions (springtime) and where the roof pitch is shallow.

Notes

- During May, June and July, sedum plants flower and you will see a mixture of colours – predominantly whites, pinks and yellows with some purple. The foliage of some species of sedum, such as Sedum Album “Coral Carpet”, is blush red naturally during the summer and autumn, and so the vegetation can take on a more ‘red/brown appearance. This becomes more noticeable once plants have flowered, leaving remnants of dry brown seed heads. The best visible indication of the health of a plant is if the leaves are fleshy and contain plenty of water.
- When exposed to extreme conditions, sedum plants have a tendency to turn a deep red colour. This is a natural phenomenon and is important to help the plant to acclimatize, ready to survive a cold winter or hot summer. This will usually occur during extreme cold weather as well as periods of prolonged drought, in very exposed locations or when the plants are in distress through lack of nutrient (fertiliser).
- If an irrigation system is fitted, it is best to run it only during prolonged dry weather and for limited periods – see ‘Irrigation’ information below.

- If sedums are showing signs of distress, but have received regular rainfall, then the most likely problem is a lack of nutrient and a fertiliser should be applied.
- Only a relatively few species of sedum and other plants suitable for an extensive green roof installation will persist in partial and full shade, and they will generally be greener in colour and grow "leggier" in these locations. There will be a significant variance in the growth and colour between the plants growing in full or partial shade and those in full sun and this should be recognised as a feature of the living nature of each individual roof.
- If problems with the vegetation are suspected, Bauder may be contacted for advice and, if necessary, a suggested course of action.

3. Weeding

With the exception of saplings, which should always be removed, weeds in an extensive green roof should be considered as a problem only of aesthetics. If considered excessive, they can be removed either manually or by using a 'spot weed wipe', ensuring that care is taken to follow specific instructions regarding the use of any proprietary products. After the removal of weeds and saplings, treat the affected area as if it were a bare patch (see below). All extensive green roof installations will at times include some moss and grass.

4 Repairing Bare Patches.

Bare patches can be easily repaired and this is best done during the main growing seasons of March/April or from late August until the end of September. Take vegetation cuttings from surrounding areas of abundant growth and place on bare patches, pressing gently into the soil. A light sprinkling of sand mixed with compost should then be dressed over the affected area to improve the uptake of the cuttings. The best results will be achieved if this work is carried out during spring maintenance and the affected area is kept moist for a short period afterwards. Please contact Bauder for further project-specific advice.

Please note: In areas of extreme exposure or where localised wind-swirl is caused by adjacent structures, it is possible that both the vegetation and substrate will be disturbed by periods of high wind. Should this occur, consideration should be given to how best to secure the installation against similar conditions in the future prior to re-instatement. If a problem of this type is suspected, Bauder may be contacted for advice and, if necessary, a suggested course of action.

5 Fertiliser for Bauder XF301 sedum blankets

Bauder Sedum Blankets are grown in a shallow growing medium which contains very little nutrient, so the annual application of fertiliser is crucial to ensure that the plants remain healthy. Fertiliser should ideally be applied during March/April, as it helps the plants to prepare for extreme weather conditions and flowering whilst also allowing the different species to gain sufficient nutrients without competing against each other.

Organic fertiliser can be obtained direct from Bauder in 25kg bags, which is sufficient for an area of 312.5m2 when applied at the recommended rate of 80gm/m². Areas of up to 30m² may be applied using either a hand held spreader or strewn by hand from a bucket. Larger roofs should always be done using a trolley applicator, which can be purchased direct from Bauder. Always apply the fertiliser at the given rate written on bag.

It is recommended that the fertiliser is lightly 'watered in' immediately after application, to avoid "burning" of the foliage, which may occur if fertiliser pellets settle on the leaves. Dung-based organic fertilisers should be avoided.

6 Irrigation

Bauder SB sedum blanket and XF301 systems

When Bauder sedum systems are installed we recommend installed we recommend the provision of either a sprinkler or drip line irrigation system where the following conditions apply: -

- All south-facing roof without shade.
- All roof slopes exceeding a 2° pitch.
- Windy or exposed site locations, where the wind can dry out the blanket.
- Sites up to 50 miles inland of the east coast of the UK mainland.

Irrigation should only be activated during periods of dry weather, or if the sedum plants are showing signs of distress. The irrigation system is best activated for 2-3 hours, preferably at dawn or dusk to minimize unnecessary evaporation. Then once every 4-6 days for the duration of the hot weather conditions. This can be easily managed by using an inexpensive battery-powered, programmable timer.

Native Wildflower/Biodiverse Roofs

Extensive substrate green roof systems vary greatly in the amount of water they require. Sedum is very drought tolerant, wildflowers much less so. The watering requirements will depend on the following factors:

- The Pitch of the roof
- The amount of rainfall it receives.
- The exposure of the roof.
- The vegetation growing on the roof.
- The depth of the substrate and drainage board.

Bauder always advise that there should be a way to water the roof during times of dry weather. This might be a water supply point adjacent to the green roof, or a fully automatic irrigation system.

Some Biodiverse roofs are designed not to be watered. Whilst this will remove the water demands from the roof, it will reduce the flowering period of the plants and over time reduce the number of species as plants struggle with the harsh environment.

In these cases Bauder would strongly recommend that increasing the depth of substrate in some areas (15-2000mm+) to help prevent the substrate drying out completely (See Bauder Water Guidelines).

Please note - continuous daily watering is neither recommended nor necessary and will only promote weeds and other unwanted plant species.

Advice and Supply of Irrigation Equipment

Access Irrigation Ltd is one of the country's longest established irrigation specialists and has considerable experience in green roofs. They are happy to provide irrigation advice on any Bauder project and can supply a wide range of irrigation products.

Please contact:-
Access Irrigation Ltd
Crick Northampton NN6 7XS
T: 01788 823811 F: 01788 824256
E: sales@access-irrigation.co.uk
www.access-irrigation.co.uk

Support

Extensive roofs should require only minimal maintenance. Bauder is happy to offer advice on any issues concerning your green roof and any such query should be forwarded to the Bauder Green Roof Technical Department at the address below in the first instance. We believe our products and systems are of the highest standard and we are always prepared to discuss any queries or concerns that may arise. It is always of great help if you can provide photographs of the affected area(s) to accompany any such queries.

Please note: In the event of any query arising which it is thought may affect the condition of the system, then Bauder should be contacted at the address below. We cannot accept responsibility for any problem or failure due to use outside those parameters for which the system was designed or 'acts of god' beyond our control e.g. extreme weather conditions or damage through pests.

BAUDER GREEN ROOF MAINTENANCE SERVICE

With over 30 years' experience in the design and supply of green roofs throughout the UK and Ireland Bauder can offer unparalleled experience and expertise in green roof maintenance including sedum, plug planted and wildflower.

Having established the largest UK facility cultivating green roof vegetation blanket we have unique knowledge and horticultural expertise for roofscape vegetation. With national coverage by over 50 field personnel, you can be assured of a prompt reliable service to fully meet your requirements.

Our Service

Bauder's experienced team will provide you with a tailor-made maintenance programme for your green roof. A typical Bauder maintenance programme Includes:

- Full inspection and evaluation of your green roof
- Application of organic slow release granular fertiliser
- Removal of leaves and debris
- Removal of unwanted vegetation
- Inspection and clearance of outlets
- Examination and testing of irrigation

This work is undertaken by Bauder's experienced maintenance technicians who will carry out the necessary risk assessments and comply with all current health and safety legislation throughout the duration of the work. Finally, you will be provided with a bespoke report with photographic verification outlining the condition of the planting and any areas requiring on going treatment.

To discuss your specific requirements, please call our Green Roof Maintenance Team for a no obligation quote.

T: 0845 271 8801 **E:** greenmaintenance@bauder.co.uk

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Appendix C

SuDS/Green Infrastructure Checklist

CS CONSULTING
GROUP

SUDS/Green Infrastructure selection checklist –To be submitted in planning submission - Rev 1

Suds Measures	Measures to be used on this site	Rationale for selecting/not selecting measure	Checklist submitted? See no. 8 below
Source Control			
Swales	Yes.	Where possible where green spaces reside against road infrastructure then swales are introduced.	Yes
Tree Pits	No	None provided due to congestion of services and cross over of services and IW code of practice in relation to separation distances.	
Rainwater Butts	Yes	In single house units only.	Yes
Rainwater harvesting	No	None proposed	
Soakaways	No	Poor permeability. BRE digest 365 test failed.	
Infiltration trenches	No	Poor permeability.	
Permeable pavement (Grasscrete, Block paving, Portous Asphalt etc.)	No	Poor permeability. Asphalt parking proposed.	
Green Roofs	Yes	Low level roofs in apartment development will have green roofs. High level roofs will not have green roofs. Percentage of green roof area to be confirmed upon final design. Podium slabs to apartment blocks to incorporate limited green roof systems.	
Filter strips	No		
Bio-retention systems/Raingardens	Yes	Some Bio retention areas proposed in green areas adjacent to road network.	
Blue Roofs	No	None proposed.	
Filter Drain	Yes	Filter drains under swale areas to be included.	
Site Control			
Detention Basins	No	Refer to regional control below	
Retentions basins	No	Refer to regional control below	
Regional Control			
Ponds	Yes	Forebay to be constructed prior to attenuation discharge to the wetlands.	
Wetlands	Yes	Wetlands to be constructed to serve the GA1, 2 and 3 of the development as approved under the 2016 permission on the site and currently under construction.	
Other			

Petrol/Oil interceptor	yes	Petrol inceptors to be placed on the parking under the apartment development and in addition Forebay control prior to entering the wetlands.	
Attenuation tank – only as a last resort where other measures are not feasible	No	None proposed	
Oversized pipes– only as a last resort where other measures are not feasible	No	None proposed.	

Note:

1. Fingal has a preference for above ground Green Infrastructure rather than tanks or over sized pipes . Above ground flows through swales, basins etc are encouraged.
2. Demonstrate SUDS system will have sufficient Pollutant removal efficiency in accordance with Ciria Suds Manual C753
3. Basins sides should be no steeper than 1:4 and no deeper than 1.2m in the 1%AEP
4. Culverting shall be avoided where possible
5. De-culverting is encouraged.
6. Please submit evidence of infiltration rates
7. To account for climate change in the design of the drainage system rainfall intensities should be factored up by 20%
8. The Applicant must provide Suds checklists in accordance with the Appendix B of the Ciria Suds manual C753

Appendix	**Name**
B3	Full planning
B4	Scheme design
B5	Health and safety
B6	Infiltration assessment
B7	Proprietary treatment
B9	filter strip
B11	filter drain
B13	swale
B15	bioretention
B16	pervious pavement
B17	attenuation tank
B19	basin
B21	pond wetland

Flood risk to be assessed

Flood risk	Applicable to subject site	Measures to reduce risk	Residual risk
Fluvial	No		
Pluvial	No		
Coastal	No		
Groundwater	No		
Dam/Embankment/Canal bank breach	No		
Network drainage	Yes	Network modelled for 100 year event plus climate change, and no flooding occurs. In the event of blockage failure, the road network is designed to direct floodwater to green areas	No
Snow melt	No		
Watermain burst	Yes	the road network is designed to direct floodwater to green areas	No

Note:

Models should consider the risk when outlets are surcharged

Climate Change scenarios to be considered both MRFS and HEFS

Appendix D

Irish Water Pre-Connection Enquiry Response

CS CONSULTING
GROUP

Sean McCallion
Embassy House
Ballsbridge,
Dublin 4
D04H6Y0

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

25 November 2020

Dear Sean McCallion,

Re: Connection Reference No CDS19008452 pre-connection enquiry -
Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 1032 units at The Coast, Balboyle, Dublin 13, Co. Dublin.

Irish Water has reviewed your pre-connection enquiry in relation to a water connection at The Coast, Balboyle, Dublin 13, Co. Dublin.

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

Water:

New connection to the existing network is feasible without upgrade.

The site has to connect to the existing 200mm MOPVC on the south side (with a 200mm connection main). Bulk meter to be installed on the connection main which will be connected to online telemetry. A secondary connection main of 200mm ID with a valve installed will be required from the 450mm DI to the north (valve will be closed during normal operation).

Wastewater:

New connection to the existing network (1600mm sewer) is feasible without upgrade.

Internal pipework has to be sized for the full development. Connection detail to the 1600mm sewer has to be submitted at Connection application stage. The 1600 sewer becomes surcharged at this location and the connection detail will need to withstand any surcharging affect to the internal network.

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

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

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

If you have any further questions, please contact Marko Komso from the design team on 022 54611 or email mkomso@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Appendix E

Foul Water Drainage WinDES Calculations

CS CONSULTING
GROUP

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	150.00	Maximum Backdrop Height (m)	0.000
Persons per House	2.70	Min Design Depth for Optimisation (m)	0.000
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.000	44.225	0.737	60.0	0.000	0	0.0	1.500	o	150
F1.001	46.749	0.467	100.0	0.000	0	0.0	1.500	o	150
F1.002	16.800	0.171	98.0	0.000	0	0.0	1.500	o	150
F2.000	43.511	0.725	60.0	0.000	0	0.0	1.500	o	150
F2.001	43.513	0.435	100.0	0.000	0	0.0	1.500	o	150
F2.002	10.824	0.108	100.2	0.000	0	0.0	1.500	o	150
F3.000	45.449	0.757	60.0	0.000	0	0.0	1.500	o	150
F3.001	45.326	0.453	100.1	0.000	0	0.0	1.500	o	150
F3.002	19.957	0.200	99.8	0.000	0	0.0	1.500	o	150
F4.000	39.353	0.656	60.0	0.000	0	0.0	1.500	o	150
F4.001	39.318	0.655	60.0	0.000	0	0.0	1.500	o	150
F4.002	35.546	0.178	200.0	0.000	0	0.0	1.500	o	225
F4.003	37.250	0.186	200.0	0.000	0	0.0	1.500	o	225
F5.000	61.795	0.542	114.0	0.000	0	0.0	1.500	o	225
F5.001	35.119	0.308	114.0	0.000	0	0.0	1.500	o	225

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	7.369	0.000	0.0	0	0.0	0	0.00	1.13	20.0	0.0
F1.001	6.632	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0
F1.002	6.164	0.000	0.0	0	0.0	0	0.00	0.88	15.6	0.0
F2.000	7.300	0.000	0.0	0	0.0	0	0.00	1.13	20.0	0.0
F2.001	6.575	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0
F2.002	6.140	0.000	0.0	0	0.0	0	0.00	0.87	15.5	0.0
F3.000	7.080	0.000	0.0	0	0.0	0	0.00	1.13	20.0	0.0
F3.001	6.323	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0
F3.002	5.870	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0
F4.000	7.929	0.000	0.0	0	0.0	0	0.00	1.13	20.0	0.0
F4.001	7.273	0.000	0.0	0	0.0	0	0.00	1.13	20.0	0.0
F4.002	6.618	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F4.003	6.440	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F5.000	7.370	0.000	0.0	0	0.0	0	0.00	1.07	42.7	0.0
F5.001	6.828	0.000	0.0	0	0.0	0	0.00	1.07	42.7	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F5.002	29.556	0.259	114.0	0.000	0	0.0	1.500	o	225
F4.004	16.668	0.083	200.8	0.000	0	0.0	1.500	o	225
F4.005	32.543	0.163	199.7	0.000	0	0.0	1.500	o	225
F4.006	51.277	0.256	200.3	0.000	0	0.0	1.500	o	225
F4.007	8.669	0.043	200.0	0.000	0	0.0	1.500	o	225
F4.008	5.995	0.030	200.0	0.000	0	0.0	1.500	o	225
F6.000	61.024	0.305	200.0	0.000	0	0.0	1.500	o	225
F7.000	48.652	0.243	200.0	0.000	0	0.0	1.500	o	225
F6.001	52.120	0.261	200.0	0.000	0	0.0	1.500	o	225
F8.000	46.089	0.230	200.4	0.000	0	0.0	1.500	o	225
F8.001	25.305	0.127	200.0	0.000	0	0.0	1.500	o	225
F8.002	36.993	0.185	200.0	0.000	0	0.0	1.500	o	225
F6.002	20.617	0.103	200.2	0.000	0	0.0	1.500	o	225
F6.003	30.364	0.152	200.0	0.000	0	0.0	1.500	o	225
F6.004	33.282	0.166	200.0	0.000	0	0.0	1.500	o	225
F6.005	71.492	0.357	200.0	0.000	0	0.0	1.500	o	225
F6.006	66.964	0.335	200.0	0.000	0	0.0	1.500	o	225
F6.007	12.715	0.064	198.7	0.000	0	0.0	1.500	o	225
F6.008	9.963	0.050	200.0	0.000	0	0.0	1.500	o	225
F9.000	67.484	0.675	100.0	0.000	0	0.0	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F5.002	6.520	0.000	0.0	0	0.0	0	0.00	1.07	42.7	0.0
F4.004	6.254	0.000	0.0	0	0.0	0	0.00	0.81	32.1	0.0
F4.005	6.171	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F4.006	6.008	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F4.007	5.752	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F4.008	5.708	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.000	5.155	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F7.000	5.165	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.001	4.850	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.000	5.510	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.001	5.280	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F8.002	5.153	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.002	2.831	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.003	2.728	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.004	2.576	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.005	2.410	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.006	2.052	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F6.007	1.717	0.000	0.0	0	0.0	0	0.00	0.81	32.3	0.0
F6.008	1.653	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F9.000	5.170	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F9.001	67.518	0.675	100.0	0.000	0	0.0	1.500	o	150
F10.000	38.894	0.499	77.9	0.000	0	0.0	1.500	o	225
F10.001	9.807	0.049	200.0	0.000	0	0.0	1.500	o	225
F10.002	83.996	0.420	200.0	0.000	0	0.0	1.500	o	225
F10.003	28.315	0.142	200.0	0.000	0	0.0	1.500	o	225
F10.004	59.805	0.299	200.0	0.000	0	0.0	1.500	o	225

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F9.001	4.495	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0
F10.000	5.114	0.000	0.0	0	0.0	0	0.00	1.30	51.7	0.0
F10.001	4.615	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F10.002	4.566	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F10.003	4.146	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0
F10.004	4.004	0.000	0.0	0	0.0	0	0.00	0.81	32.2	0.0

Manhole Schedules for Foul - Main

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)
FFA14	9.174	1.805	Open Manhole	1200	F1.000	7.369	150				
FFA13	9.075	2.443	Open Manhole	1200	F1.001	6.632	150	F1.000	6.632	150	
FFA12	8.972	2.808	Open Manhole	1200	F1.002	6.164	150	F1.001	6.164	150	
FEX.F11	8.864	2.871	Open Manhole	0		OUTFALL		F1.002	5.993	150	
FFA10-3	8.756	1.456	Open Manhole	1050	F2.000	7.300	150				
FFA10-2	8.742	2.167	Open Manhole	1200	F2.001	6.575	150	F2.000	6.575	150	
FFA10-1	8.278	2.138	Open Manhole	1200	F2.002	6.140	150	F2.001	6.140	150	
FEX.F10	8.105	2.073	Open Manhole	0		OUTFALL		F2.002	6.032	150	
FFA9-3	8.469	1.389	Open Manhole	1050	F3.000	7.080	150				
FFA9-2	8.440	2.117	Open Manhole	1200	F3.001	6.323	150	F3.000	6.323	150	
FFA9-1	7.988	2.118	Open Manhole	1200	F3.002	5.870	150	F3.001	5.870	150	
FEX.F9	8.023	2.353	Open Manhole	0		OUTFALL		F3.002	5.670	150	
FFA3-12	9.195	1.266	Open Manhole	1050	F4.000	7.929	150				
FFA3-11	8.762	1.489	Open Manhole	1050	F4.001	7.273	150	F4.000	7.273	150	
FFA3-10	8.329	1.711	Open Manhole	1050	F4.002	6.618	225	F4.001	6.618	150	
FFA3-9	7.938	1.498	Open Manhole	1050	F4.003	6.440	225	F4.002	6.440	225	
FFA3-8-3	8.000	0.630	Open Manhole	1050	F5.000	7.370	225				
FFA3-8-2	7.404	0.576	Open Manhole	1050	F5.001	6.828	225	F5.000	6.828	225	
FFA3-8-1	7.573	1.053	Open Manhole	1050	F5.002	6.520	225	F5.001	6.520	225	
FFA3-8	7.670	1.416	Open Manhole	1050	F4.004	6.254	225	F4.003	6.254	225	
								F5.002	6.261	225	7
FFA3-7	7.500	1.329	Open Manhole	1050	F4.005	6.171	225	F4.004	6.171	225	
FFA3-6	7.680	1.672	Open Manhole	1050	F4.006	6.008	225	F4.005	6.008	225	
FFA3-5	7.167	1.415	Open Manhole	1050	F4.007	5.752	225	F4.006	5.752	225	
FFA3-4	7.128	1.420	Open Manhole	1050	F4.008	5.708	225	F4.007	5.708	225	
FEXF3-3	7.100	1.422	Open Manhole	0		OUTFALL		F4.008	5.678	225	
FFB6-1A	6.800	1.645	Open Manhole	1050	F6.000	5.155	225				
FFB-2	6.782	1.617	Open Manhole	1050	F7.000	5.165	225				
FFB6-1	7.141	2.291	Open Manhole	1200	F6.001	4.850	225	F6.000	4.850	225	
								F7.000	4.922	225	72
FFB9	7.750	2.240	Open Manhole	1200	F8.000	5.510	225				
FFB8	6.802	1.522	Open Manhole	1050	F8.001	5.280	225	F8.000	5.280	225	
FFB7	6.679	1.526	Open Manhole	1050	F8.002	5.153	225	F8.001	5.153	225	
FFB6	6.907	4.076	Open Manhole	1200	F6.002	2.831	225	F6.001	4.589	225	1758
								F8.002	4.969	225	2138
FFB5	7.020	4.292	Open Manhole	1200	F6.003	2.728	225	F6.002	2.728	225	
FFB4A	6.953	4.377	Open Manhole	1200	F6.004	2.576	225	F6.003	2.576	225	
FFB4	7.101	4.691	Open Manhole	1200	F6.005	2.410	225	F6.004	2.410	225	
FFB3	7.070	5.018	Open Manhole	1200	F6.006	2.052	225	F6.005	2.052	225	
FFB2	6.840	5.123	Open Manhole	1200	F6.007	1.717	225	F6.006	1.717	225	
FFB1	6.940	5.287	Open Manhole	1200	F6.008	1.653	225	F6.007	1.653	225	
FFB0	6.873	5.269	Open Manhole	0		OUTFALL		F6.008	1.604	225	
FFA2-2	6.652	1.482	Open Manhole	1050	F9.000	5.170	150				
FFA2-1	6.665	2.170	Open Manhole	1200	F9.001	4.495	150	F9.000	4.495	150	
FEX.F2	6.924	3.104	Open Manhole	0		OUTFALL		F9.001	3.820	150	
FFA1-1-4A	6.550	1.436	Open Manhole	1050	F10.000	5.114	225				

Manhole Schedules for Foul - Main

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)
FFA1-1-4	6.786	2.171	Open Manhole	1200	F10.001	4.615	225	F10.000	4.615	225	
FFA1-1-3	6.658	2.092	Open Manhole	1200	F10.002	4.566	225	F10.001	4.566	225	
FFA1-1-2	6.649	2.503	Open Manhole	1200	F10.003	4.146	225	F10.002	4.146	225	
FFA1-1-1	6.420	2.416	Open Manhole	1200	F10.004	4.004	225	F10.003	4.004	225	
FEX.F1	6.724	3.019	Open Manhole	0		OUTFALL		F10.004	3.705	225	

PIPELINE SCHEDULES for Foul - Main

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)
F1.000	o	150	FFA14	9.174	7.369	1.655	Open Manhole	1200
F1.001	o	150	FFA13	9.075	6.632	2.293	Open Manhole	1200
F1.002	o	150	FFA12	8.972	6.164	2.658	Open Manhole	1200
F2.000	o	150	FFA10-3	8.756	7.300	1.306	Open Manhole	1050
F2.001	o	150	FFA10-2	8.742	6.575	2.017	Open Manhole	1200
F2.002	o	150	FFA10-1	8.278	6.140	1.988	Open Manhole	1200
F3.000	o	150	FFA9-3	8.469	7.080	1.239	Open Manhole	1050
F3.001	o	150	FFA9-2	8.440	6.323	1.967	Open Manhole	1200
F3.002	o	150	FFA9-1	7.988	5.870	1.968	Open Manhole	1200
F4.000	o	150	FFA3-12	9.195	7.929	1.116	Open Manhole	1050
F4.001	o	150	FFA3-11	8.762	7.273	1.339	Open Manhole	1050
F4.002	o	225	FFA3-10	8.329	6.618	1.486	Open Manhole	1050
F4.003	o	225	FFA3-9	7.938	6.440	1.273	Open Manhole	1050
F5.000	o	225	FFA3-8-3	8.000	7.370	0.405	Open Manhole	1050
F5.001	o	225	FFA3-8-2	7.404	6.828	0.351	Open Manhole	1050
F5.002	o	225	FFA3-8-1	7.573	6.520	0.828	Open Manhole	1050
F4.004	o	225	FFA3-8	7.670	6.254	1.191	Open Manhole	1050
F4.005	o	225	FFA3-7	7.500	6.171	1.104	Open Manhole	1050
F4.006	o	225	FFA3-6	7.680	6.008	1.447	Open Manhole	1050
F4.007	o	225	FFA3-5	7.167	5.752	1.190	Open Manhole	1050
F4.008	o	225	FFA3-4	7.128	5.708	1.195	Open Manhole	1050

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)
F1.000	44.225	60.0	FFA13	9.075	6.632	2.293	Open Manhole	1200
F1.001	46.749	100.0	FFA12	8.972	6.164	2.658	Open Manhole	1200
F1.002	16.800	98.0	FEX.F11	8.864	5.993	2.721	Open Manhole	0
F2.000	43.511	60.0	FFA10-2	8.742	6.575	2.017	Open Manhole	1200
F2.001	43.513	100.0	FFA10-1	8.278	6.140	1.988	Open Manhole	1200
F2.002	10.824	100.2	FEX.F10	8.105	6.032	1.923	Open Manhole	0
F3.000	45.449	60.0	FFA9-2	8.440	6.323	1.967	Open Manhole	1200
F3.001	45.326	100.1	FFA9-1	7.988	5.870	1.968	Open Manhole	1200
F3.002	19.957	99.8	FEX.F9	8.023	5.670	2.203	Open Manhole	0
F4.000	39.353	60.0	FFA3-11	8.762	7.273	1.339	Open Manhole	1050
F4.001	39.318	60.0	FFA3-10	8.329	6.618	1.561	Open Manhole	1050
F4.002	35.546	200.0	FFA3-9	7.938	6.440	1.273	Open Manhole	1050
F4.003	37.250	200.0	FFA3-8	7.670	6.254	1.191	Open Manhole	1050
F5.000	61.795	114.0	FFA3-8-2	7.404	6.828	0.351	Open Manhole	1050
F5.001	35.119	114.0	FFA3-8-1	7.573	6.520	0.828	Open Manhole	1050
F5.002	29.556	114.0	FFA3-8	7.670	6.261	1.184	Open Manhole	1050
F4.004	16.668	200.8	FFA3-7	7.500	6.171	1.104	Open Manhole	1050
F4.005	32.543	199.7	FFA3-6	7.680	6.008	1.447	Open Manhole	1050
F4.006	51.277	200.3	FFA3-5	7.167	5.752	1.190	Open Manhole	1050
F4.007	8.669	200.0	FFA3-4	7.128	5.708	1.195	Open Manhole	1050
F4.008	5.995	200.0	FEXF3-3	7.100	5.678	1.197	Open Manhole	0

PIPELINE SCHEDULES for Foul - Main

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)
F6.000	o	225	FFB6-1A	6.800	5.155	1.420	Open Manhole	1050
F7.000	o	225	FFB-2	6.782	5.165	1.392	Open Manhole	1050
F6.001	o	225	FFB6-1	7.141	4.850	2.066	Open Manhole	1200
F8.000	o	225	FFB9	7.750	5.510	2.015	Open Manhole	1200
F8.001	o	225	FFB8	6.802	5.280	1.297	Open Manhole	1050
F8.002	o	225	FFB7	6.679	5.153	1.301	Open Manhole	1050
F6.002	o	225	FFB6	6.907	2.831	3.851	Open Manhole	1200
F6.003	o	225	FFB5	7.020	2.728	4.067	Open Manhole	1200
F6.004	o	225	FFB4A	6.953	2.576	4.152	Open Manhole	1200
F6.005	o	225	FFB4	7.101	2.410	4.466	Open Manhole	1200
F6.006	o	225	FFB3	7.070	2.052	4.793	Open Manhole	1200
F6.007	o	225	FFB2	6.840	1.717	4.898	Open Manhole	1200
F6.008	o	225	FFB1	6.940	1.653	5.062	Open Manhole	1200
F9.000	o	150	FFA2-2	6.652	5.170	1.332	Open Manhole	1050
F9.001	o	150	FFA2-1	6.665	4.495	2.020	Open Manhole	1200
F10.000	o	225	FFA1-1-4A	6.550	5.114	1.211	Open Manhole	1050
F10.001	o	225	FFA1-1-4	6.786	4.615	1.946	Open Manhole	1200
F10.002	o	225	FFA1-1-3	6.658	4.566	1.867	Open Manhole	1200
F10.003	o	225	FFA1-1-2	6.649	4.146	2.278	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)
F6.000	61.024	200.0	FFB6-1	7.141	4.850	2.066	Open Manhole	1200
F7.000	48.652	200.0	FFB6-1	7.141	4.922	1.994	Open Manhole	1200
F6.001	52.120	200.0	FFB6	6.907	4.589	2.093	Open Manhole	1200
F8.000	46.089	200.4	FFB8	6.802	5.280	1.297	Open Manhole	1050
F8.001	25.305	200.0	FFB7	6.679	5.153	1.301	Open Manhole	1050
F8.002	36.993	200.0	FFB6	6.907	4.969	1.713	Open Manhole	1200
F6.002	20.617	200.2	FFB5	7.020	2.728	4.067	Open Manhole	1200
F6.003	30.364	200.0	FFB4A	6.953	2.576	4.152	Open Manhole	1200
F6.004	33.282	200.0	FFB4	7.101	2.410	4.466	Open Manhole	1200
F6.005	71.492	200.0	FFB3	7.070	2.052	4.793	Open Manhole	1200
F6.006	66.964	200.0	FFB2	6.840	1.717	4.898	Open Manhole	1200
F6.007	12.715	198.7	FFB1	6.940	1.653	5.062	Open Manhole	1200
F6.008	9.963	200.0	FFB0	6.873	1.604	5.044	Open Manhole	0
F9.000	67.484	100.0	FFA2-1	6.665	4.495	2.020	Open Manhole	1200
F9.001	67.518	100.0	FEX.F2	6.924	3.820	2.954	Open Manhole	0
F10.000	38.894	77.9	FFA1-1-4	6.786	4.615	1.946	Open Manhole	1200
F10.001	9.807	200.0	FFA1-1-3	6.658	4.566	1.867	Open Manhole	1200
F10.002	83.996	200.0	FFA1-1-2	6.649	4.146	2.278	Open Manhole	1200
F10.003	28.315	200.0	FFA1-1-1	6.420	4.004	2.191	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F10.004	o	225	FFA1-1-1	6.420	4.004	2.191	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)
F10.004	59.805	200.0	FEX.F1	6.724	3.705	2.794	Open Manhole	0

Surcharged Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.002	FEX.F11	8.864	5.993	5.687	0	0

Input Hydrograph Type: User Defined

No Input Hydrograph data used for analysis due to offset specified.

Surcharged Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F2.002	FEX.F10	8.105	6.032	5.374	0	0

Input Hydrograph Type: User Defined

No Input Hydrograph data used for analysis due to offset specified.

Surcharged Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F3.002	FEX.F9	8.023	5.670	5.345	0	0

Input Hydrograph Type: User Defined

No Input Hydrograph data used for analysis due to offset specified.

Surcharged Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F4.008	FEXF3-3	7.100	5.678	5.678	0	0

Input Hydrograph Type: User Defined

No Input Hydrograph data used for analysis due to offset specified.

Surcharged Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F6.008	FFB0	6.873	1.604	3.812	0	0

Input Hydrograph Type: User Defined

No Input Hydrograph data used for analysis due to offset specified.

Surcharged Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F9.001	FEX.F2	6.924	3.820	3.812	0	0

Input Hydrograph Type: User Defined

No Input Hydrograph data used for analysis due to offset specified.

Surcharged Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F10.004	FEX.F1	6.724	3.705	1.604	0	0

Input Hydrograph Type: User Defined

No Input Hydrograph data used for analysis due to offset specified.

Appendix F

Soakaway Information from Site Investigation

CS CONSULTING
GROUP

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Ground Investigations Ireland

Baldoyle GA1

Interim Ground Investigation Report

DOCUMENT CONTROL SHEET

Project Title	Baldoyle GA1
Engineer	CS Consulting Group
Client	Richmond Homes
Project No	9161-10-19
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Interim	D MagLochlainn	C Finnerty	C Finnerty	Dublin	18 December 2019

APPENDIX 3 – Soakaway Records

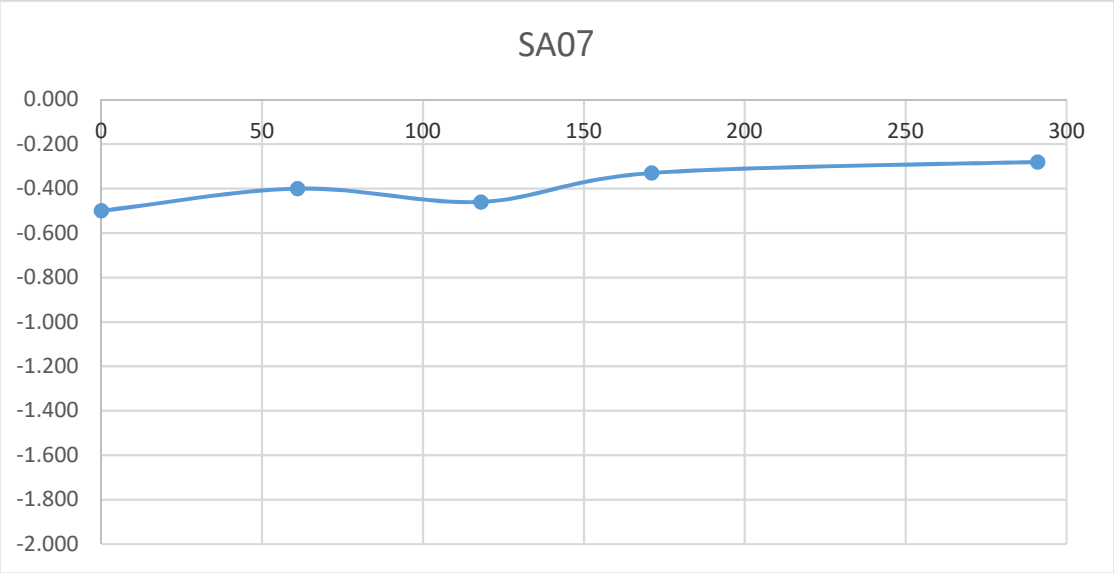
SA07

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.60m x 0.50m x 1.60m (L x W x D)

Date	Time	Water level (m bgl)
30/10/2019	0	-0.500
30/10/2019	61	-0.400
30/10/2019	118	-0.460
30/10/2019	171	-0.330
30/10/2019	291	-0.280

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.50	1.600	1.100	0.775	1.325



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