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Engineering Services Report

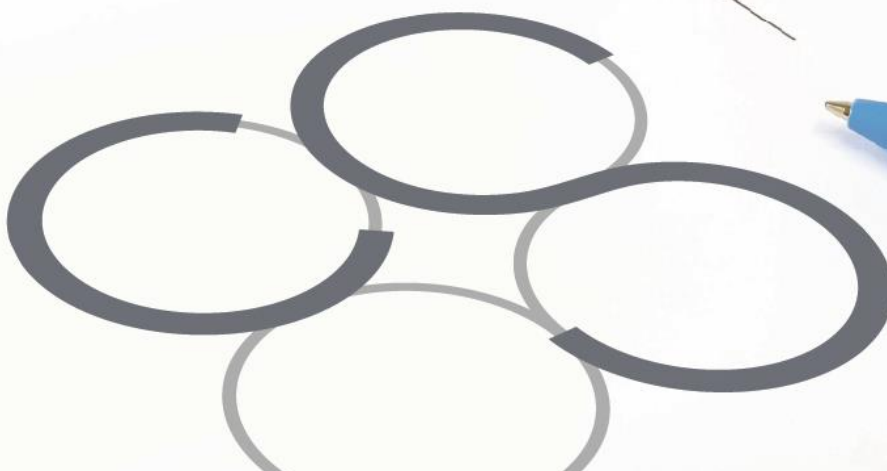
Proposed Residential Development

Devoy Barracks, Naas, Co. Kildare

Client: Land Development Agency

Job No. L086

March 2022



ENGINEERING SERVICES REPORT

PROPOSED RESIDENTIAL DEVELOPMENT

DEVOY BARRACKS, NAAS, CO. KILDARE

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by the Land Development Agency to prepare an Engineering Services Report to accompany a planning application for a residential development at Devoy Barracks, John Devoy Road, Naas, County Kildare.

This report assesses the proposed development under the following headings:

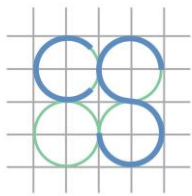
- Foul Drainage Infrastructure
- Stormwater Drainage Infrastructure
- Potable Water Infrastructure

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

- Kildare County Development Plan 2017–2023
- Naas Local Area Plan (LAP) 2021 – 2027
- Regional Code of Practice For development works, Version 6
- Irish Waters Code of Practice for Water Infrastructure
- Irish Waters Code of Practice for Wastewater Infrastructure
- Greater Dublin Strategic Development Study
- Local Authority Drainage Records

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.

CS Consulting met via MS Teams with Mr David Hall, Senior Executive Engineer of Kildare Co. Co. Water Services Planning Department, on the



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16th of February 2022 (Via Microsoft Teams) and the items raised in that meeting are highlighted within this document.

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The proposed development site is located at Devoy Barracks, John Devoy Road, Naas, County Kildare. The site is located in the administrative jurisdiction of Kildare County Council and has a total gross area of approximately 4.1 ha.

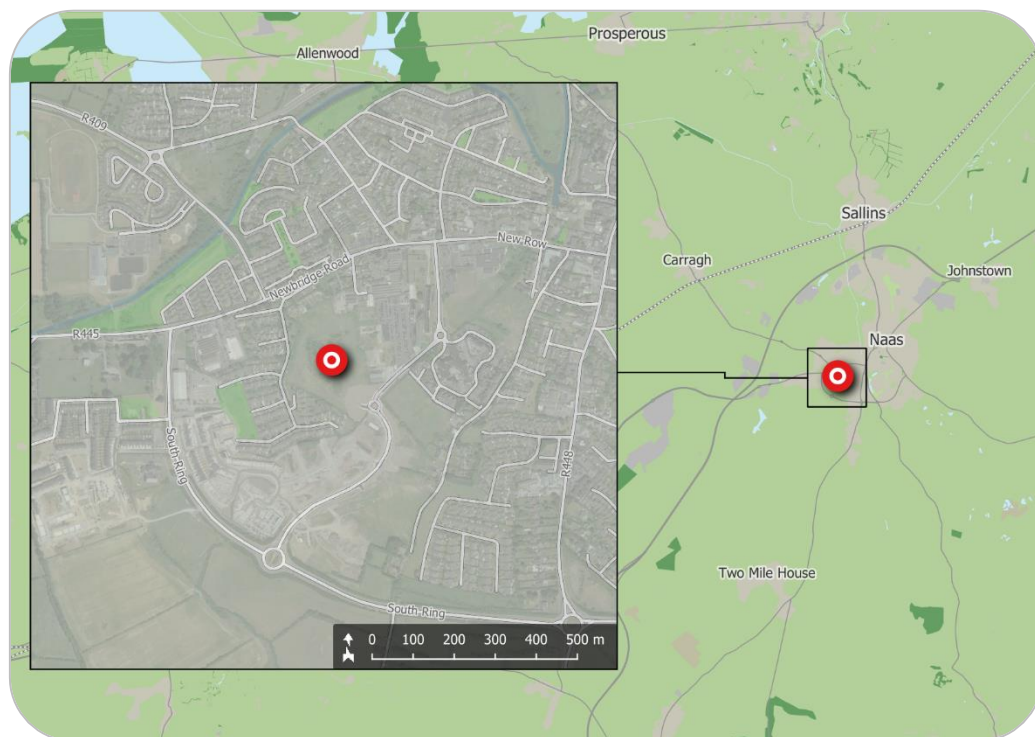


Figure 1 – Location of proposed development site
(map data & imagery: EPA, OSM Contributors, Google)

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 north by existing residential properties on Devoy Terrace and industrial units; to the east by Kildare County Council Offices

and car park facility; to the southeast by the John Devoy Road; and to the west and south west by the existing Arconagh and Elsmore residential estates.

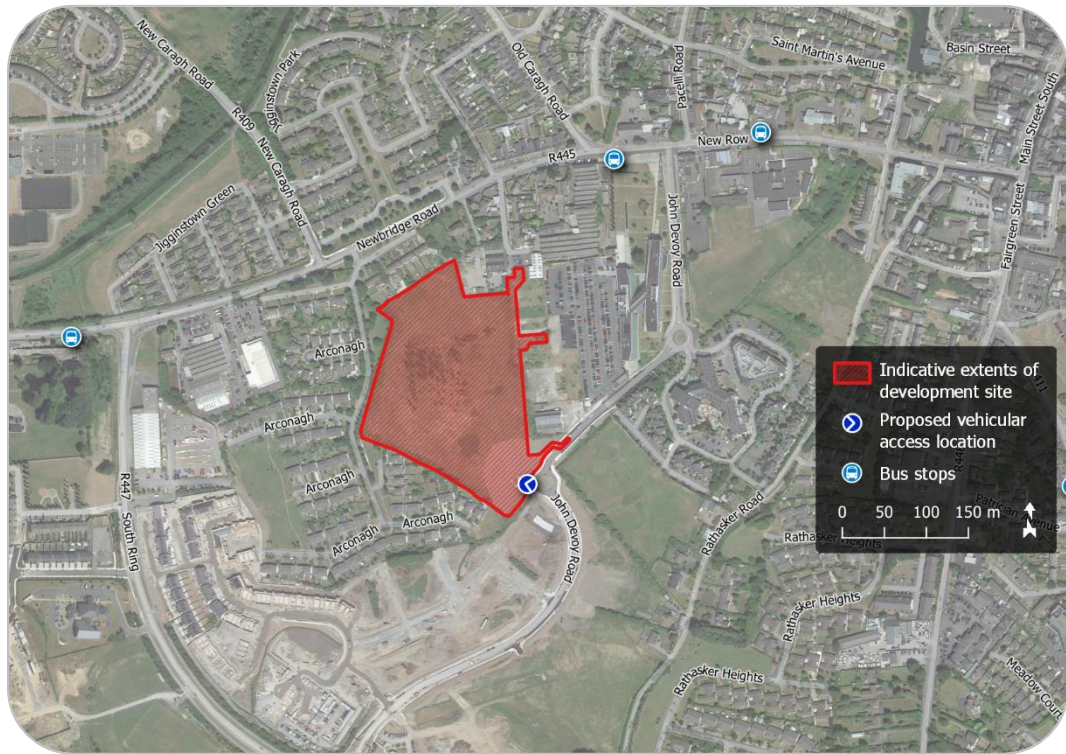


Figure 2 – Site extents and environs
(map data & imagery: NTA, GoCar, OSM Contributors, Google)

2.2 Existing Land Use

The subject site is currently greenfield.

2.3 Proposed Development

The development site is located on John Devoy Road, Naas, Co Kildare, known locally as Devoy Barracks. The nett site area is 3.97 hectares in area, the area of the application is 4.1 hectares.

The site is located to the south-west of the town, close to the town centre, and zoned residential in the current Naas Local Area Plan 2021-2027.

Access is proposed via an existing access point on the John Devoy Road along the southern boundary with additional pedestrian access provided to the east, and future pedestrian and cycle connection opportunities provided to the north, west and east.

The revised development is for the construction of 219 no. residential units, comprising of a mix of terraced houses (42 no. 3 bed units), and duplex / apartment units (177 no. in total; 64 no. 1 bed units; 105 no. 2 bed units and 8 no. 3 bed units) ranging in height from 2 to 5 storeys, a 59-place childcare facility, public and communal open spaces and all associated site works and infrastructure.

The proposed scheme has been developed having regard to the following policy documents:

- Quality Housing for Sustainable Communities 2007
- Urban Design Manual - A Best Practice Guide 2009
- Sustainable Residential Development in Urban areas (Cities, Towns & Villages) 2009 - Guidelines for Planning Authorities
- Sustainable Urban Housing - Design Standards for New Apartments 2020
- Guidelines for Planning Authorities
- Design Manual for Urban Roads and Streets (DMURS)
- Naas Local Area Plan 2021–2027
- Kildare County Development Plan 2017-2023

3.0 STORMWATER DRAINAGE

3.1 Existing Storm Water Arrangements

CS Consulting has obtained the Drainage Layout of the constructed John Devoy link road, located at the southern boundary of the subject site. Following a review, this Drainage Layout indicates a 225mm diameter stormwater sewer running west to east towards the existing 1050mm diameter stormwater sewer on John Devoy Road.

In addition, a 225mm diameter spur was provided as part of the construction of the John Devoy Link Road into the development lands to serve as a future stormwater connection for the subject site.

At a meeting on the 16th of February 2022, Mr David Hall (Senior Executive Engineer of Kildare Co. Co. Water Services Planning Department) raised the issue of the status of newly constructed drains in John Devoy Road. CS Consulting had previously made contact with DBFL Consulting Engineers, who were responsible for the design of the John Devoy Road. They confirmed all works to the John Devoy Road were built in accordance with TII and Kildare Co. Co. Specifications and were regularly inspected by representatives of both DBFL and Kildare Co. Co. during the construction period ensuring the newly constructed drains in John Devoy Road are fit for purpose and future 'taking in charge'.

Please refer to **Appendix A** for a copy of the Drainage Layout for the John Devoy Link Road.

3.2 Proposed Storm Water Arrangements

In accordance with Kildare County Council requirements, storm water shall be managed in two phases.

The **first** requirement is to restrict storm water runoff from the proposed development to greenfield runoff rates. The **second** requirement for new applications is to incorporate Sustainable Drainage Systems (SuDS) proposals into the scheme. The SuDS concept requires that storm water quality be improved before disposal and, where applicable, storm water is discharged into the ground on site.

The proposed new storm water drainage arrangements shall 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 GDSDS & the Local Authority's Regional Code of Practice for Drainage Works require that four main criteria be provided by the applicant:

- Criterion 1: River Water Quality Protection – satisfied by providing interception storage and treatment of run-off within SuDS features (e.g. wetlands or bio-retention areas).
- Criterion 2: River Regime Protection – satisfied by attenuating run-off from the site.
- Criterion 3: Level of Service (flooding) for the site – satisfied by the site being outside the 1-in-1000-year coastal and fluvial flood levels. Pluvial flood risk addressed by development designed to accommodate a 1-in-100-year extreme storm as noted in GDSDS. Planned flood routing for storms greater than 100-year level considered in design and development run-off contained on site.
- Criterion 4: River Flood Protection – attenuation and/or long-term storage provided within the SuDS features.

3.3 Proposed Attenuation Arrangements

In accordance with the requirements of Kildare County Council, all new developments are to incorporate Sustainable Drainage Systems (SuDS). The SuDS principles require a two-fold approach to address storm water management on new developments.

The **first** requirement is to reduce any post development run-off to pre-development discharge rates. The development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1-in-100-year storm event, increased by 20% for predicted climate change factors.

To ensure an accurate calculation of the required attenuation for the site, Met Eireann was contacted to provide:

- a) The SAAR (Standard Annual Average Rainfall) for the area: 731mm/year.
- b) The sliding duration table for the site indicating the 1:100 year rainwater intensities to be used.

It is also worth noting that the soil type value was obtained from the Flood Studies Report and for the subject lands this has been established as soil type 3).

These parameters allow the Q-Bar value (greenfield runoff rate) to be calculated. The proposed development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1-in-100-year storm event, increased by 20% for predicted climate change factors, and each site shall have individual attenuation systems.

Based on the QBAR calculation of: $0.00108 \times \text{AREA}^{0.89} \times \text{SAAR}^{1.17} \times \text{SOIL}^{2.17}$

The proposed development has a greenfield runoff rate of 3.02 l/s/ha. The gross site area is 4.1 ha and therefore the allowable discharge rate shall be 12.4 l/sec. This discharge rate shall be used for the final discharges from the development post construction to the existing network on the John Devoy Road.

In line with observations made by Mr David Hall of Kildare County Council, regarding attenuation tank accessibility and future maintenance, the development's stormwater drainage system includes 3no. separate attenuation systems, rather than a single large attenuation tank. These comprise of:

- a northern attenuation tank (Tank 1) with a storage volume of 200m³;
- a central attenuation tank (Tank 2) with a storage volume of 240m³;
- and
- a southern constructed wetland with a storage volume of 340m³.

The surface water network discharge to the existing public stormwater sewer in John Devoy Road, at an attenuated discharge rate of 12.4 l/sec. Tank 1 is positioned upstream of Tank 2, within the internal drainage network and shall have an attenuated outflow rate of 5.0 l/s.

Both attenuation tanks shall be constructed using the Stormtech attenuation system or similar and, due to favourable soakaway test results, shall be designed to allow infiltration of attenuated stormwater to ground.

Please refer to CS Consulting Drawing **DEV-CSC-00-XX-DR-C-0109** for stormwater details.

3.4 Proposed Sustainable Drainage System (SuDS) Measures

The **second** aspect is the policy of the Local Authority is to include Sustainable Drainage Systems (SuDS) in all new applications. The aim is to provide an effective system to mitigate the adverse effects of storm water

runoff on the environment, through enhanced quality systems and on local infrastructure to aid in preventing downstream flooding. The features proposed shall reduce run-off volumes, pollution concentrations and enhance groundwater recharge and biodiversity.

The proposed SuDS features shall comprise:

- a) 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 shall be provided to the rear of all houses in the development.
- b) Low water usage sanitary appliances to reduce the reliance on potable water supplies;
- c) Permeable paving – all on-street parking spaces, external courtyard parking spaces and on-curtilage parking shall be constructed of permeable paving to allow for local infiltration; permeable paving to house driveways shall cater for runoff to the front pitched roof of each house; All non 'taking in charge' areas shall be constructed of permeable paving systems or similar approved infiltration systems. All non-taking in charge hard stand areas across development such as courtyards and private terraces shall be constructed using elements permeable paving systems and other SuDS devices.
- d) Porous Asphalt – Home zone areas shall have the carriageways constructed of porous asphalt. Similarly to the permeable paving systems, the porous asphalt shall allow for local infiltration of SW runoff. All non-taking in charge hard stand areas across development such as courtyards and private terraces shall be constructed using elements porous asphalt and other SuDS devices.
- e) Tree pit drainage systems - hardstanding areas shall be directed into tree pits or landscaped areas to allow for local infiltration;

- f) Bio-Swales – Roads and footpaths draining to gullies shall be directed to bio-swales (a Nature Based Solution SuDS device) located adjacent to them prior to discharging to the main drainage network. The bio-swales shall allow for local infiltration to ground;
- g) Soakaways – Following favourable Site investigations and in particular soakaways tests, all houses shall have the rear half of the runoff generated from their roofs drain to soakaways in their back gardens. This item was discussed and agreed with Mr David Hall of Kildare Co. Co. and a copy of the soakaway results extracted from the site investigation report can be found in **Appendix B**. (we note groundwater monitoring took place over a 3 month summer and 3 month winter period respectively as requested by the Kildare Co. Co. Water Service Planning Department and confirmed the ground water level is circa 3.0m below existing ground levels of the site).
- h) Constructed Wetlands – As part of the 100 year attenuation strategy, excess flood water shall pond in the proposed constructed wetlands (a Nature Based Solution SuDS device) adjacent to the roundabout. The favourable soakaway tests show this excess floodwater shall drain to ground as well as drain to the external SW network via the above mentioned flow control of 12.4l/s;
- i) Green Roofs – Green Roof systems (a Nature Based Solution SuDS device) shall be provided to the newly proposed podium to the undercroft car park. Green Roofs shall retain a small volume of runoff and slow the flow of rainfall to the main drainage network;
- j) Road gullies – shall be trapped to allow for the removal of grit and other potentially harmful material entering the storm network;
- k) Oil Separator – at the end of the storm water network a suitable oil separator is to be fitted to allow any hydrocarbons which may have built up from on-site traffic to be removed from storm water prior to disposal.

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.

There are several benefits from the promotion of these SuDS elements within the development, below is a list of such benefits:

- **Biodiversity and Ecology:** Habitats are maintained, created & linked to support existing & new wildlife. This increases biodiversity & improves the quality of ecosystems in urban environments.
- **Amenity and Economy:** Access to open, green spaces allows for activities such as walking, cycling & organised sports. This improves the physical & mental health & wellbeing of communities.
- **Water Quality:** SuDS filter sediment & contaminants from runoff which improves quality. They intercept rainfall & reduce the volume entering sewers & drains, reducing combined sewer overflow and the amount that needs treating.
- **Flood Risk Management:** SuDS mimic natural drainage patterns & reduce the volume of runoff reaching drains & watercourses. They provide areas to store water & slow the flow of water to reduce flood risk in urban areas.
- **Climate Resilience:** Vegetation and plants used, e.g. in green roofs, can capture & store carbon and greenhouse gases to improve air quality. They can also regulate building temperatures and reduce air & water pollution.
- **Rainwater Demand:** Water is collected all year round in water butts (rainwater harvesting) and can be used for landscape maintenance. This reduces demand on mains supplies & is useful in drought conditions.

Alternative approaches to SuDS were considered during the design development. Green roofs to the apartments over the crèche building at

the southeast corner of the development were also considered. It was however felt that due to the provision of PV Panels to this roof area there would be a high fire risk with the two systems overlapping and as such the green roof system to the apartment block was removed.

Rain gardens were also reviewed as a SuDS system to cater for runoff to the proposed houses. However, the design currently allows for permeable paving to house driveways that shall cater for runoff to the front pitched roof of each house. With this design in place the requirement for rain gardens were not required.

3.5 Proposed Interception and Treatment Measures

Interception and treatment storage shall be provided via the use of infiltration trenches within the rear gardens of all, as well as via tree pit drainage systems, soft landscaping areas, and permeable paving.

The Greater Dublin Strategic Study recommends calculating 80% runoff from hard paved areas and 5mm rainfall for first flush interception. The net total hardstanding area for the development site is 20,800m² approximately. Therefore, the interception volume is as follows:

$$20,800\text{m}^2 \times 0.8 \times 0.005\text{m} = 83\text{m}^3$$

Treatment volume is:

$$20,800\text{m}^2 \times 0.8 \times 0.015\text{m} = 250\text{m}^3$$

The total volume is: $= 383\text{m}^3$

It is proposed to treat interception storage volumes across the development via bio-swales, soft landscape areas, permeable paving, infiltration trenches, tree pit drainage systems and soakaways. In addition, the Stormtech attenuation tanks shall provide 97 cubic metres of interception and treatment storage in the build-up of their stone bases. The

circa 3,050m² of permeable paving within the development shall provide another 457 cubic metres of interception and treatment storage, meaning the development is well in excess of the interception and treatment volumes requirements. The inclusion of a constructed wetlands shall provide an additional 25m³ meaning a total of 579m³ of interception and treatment volume is provided across the development site well in excess of the requirement.

3.6 WinDES Microdrainage Calculations

Following discussions with Mr David Hall of Kildare Co. Co., surface water drainage calculations are provided for both the 1-in-30-year and 1-in-100-year storm events for the scheme, with both including a climate change factor of 20%.

Please see **Appendix C** for the WinDES Microdrainage Calculations.

3.7 Flood Exceedance Route

As part of any new development scheme, a flood exceedance route is required across the development site in order to facilitate for storm events above that of the 1-in-100-year storm event, or if a blockage occurs in the surface water system that causes excess flood water to spill out onto the road network of the development.

Drawing **DEV-CSC-ZZ-XX-DR-C-0121** indicates the overland flood route across the development site. Excess flood water shall flow away from proposed structures and flow towards the existing stream to the south of the development as agreed with KCC Water Services.

4.0 FOUL DRAINAGE

4.1 Existing Foul Arrangements

CS Consulting has obtained the Drainage Layout of the constructed John Devoy link road, located at the southern boundary of the subject site. Following a review, the drawing indicates a 225mm diameter foul sewer running west to east towards the existing foul sewer on John Devoy Road.

In addition, 2no. 225mm diameter spurs are provided as part of the construction of the John Devoy Link Road for future foul connection at the subject site.

Please refer to **Appendix A** for a copy of the Drainage Layout for John Devoy link Road.

4.2 Proposed Foul Drainage Arrangements

The proposed development shall 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 shall 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 is to comprise 219 no. residential units. Based on Irish Water guidelines, the foul effluent generated shall be:

- ⇒ 446 l/day per unit (based on 2.7 persons per unit x 150 l/person/day, + a 10% increase factor)
- ⇒ 446 l/day/apt x 219 units = 97,674 l/day = 97.7 m³/day
- ⇒ 1.13 l/sec Average Flow (DWF)
- ⇒ 6.78 l/sec Peak Flow (= 6 x DWF for population between 0 and 1000)

4.4 Proposed Foul Drainage Arrangements

The drainage network for the development shall be in accordance with Part H of the Building Regulations and to the requirements and specifications of Irish Water.

All foul effluent generated from the proposed development shall be collected in separate foul pipes and flow under gravity to the existing 225mm diameter foul sewer at John Devoy Road, via an existing connection.

The proposed foul drainage infrastructure and routing plan is shown on drawing **DEV-CSC-00-XX-DR-C-0109** included with this submission.

4.5 Irish Water Confirmation of Feasibility (COF)

Irish Water (IW), who since 2014 are in control of foul drainage services, requires that a pre-connection enquiry (PCE) be submitted for all SHD applications to ensure that current existing infrastructure is capable of accommodating a new development.

The PCE was submitted to IW based on the foul flows for a proposed number of 250 no. residential units in March 2020. In response to this application, Irish

Water issued a Confirmation of Feasibility (CoF) letter stating that a new connection to the existing network is feasible without upgrade.

We note that during previous engagement with Kildare Co. Co., a query was raised in regard to the condition and capacity of the Naas Town Wastewater Network to which we propose connecting (as outlined in the PCE made to Irish Water and the CoF issued in response). Kildare Co. Co. queried whether a foul pumping station on the proposed development site was a more appropriate proposal, with discharge to the foul network on the Naas Southern Ring Road.

Following further correspondence with IW on the matter, it was confirmed that the CoF issued previously should be used. A copy of that correspondence is appended for reference. Please note, we reverted to IW in July 2021 requesting an up-to-date CoF and IW reverted with a COF dated 24th August 2021.

CS Consulting contacted IW again in February 2022 and IW confirmed the CoF dated 24th August is still valid to use in this planning submission.

Please refer to **Appendix D** for a copy of the latest confirmation of feasibility letters and additional correspondence from IW, as mentioned previously.

5.0 POTABLE WATER

5.1 Existing Potable Water System

Kildare County Council's drainage records indicate that there is a 100mm diameter uPVC watermain at the west of the subject site, on Arconagh; a 5" diameter cast-iron watermain on Newbridge Road; a 250mm diameter asbestos watermain and a 315mm diameter HPPE on South Ring.

CS Consulting have obtained the watermain layout of the constructed John Devoy Link Road. Following a review, the drawing indicates a 150mm diameter watermain running along the John Devoy Road, and a connection spur left at the development entrance adjacent to the roundabout.

Please refer to **Appendix A** for a copy of the Watermain Layout for John Devoy link Road.

5.2 Proposed Potable Water System

It is proposed to make a new connection off the existing 180mm diameter watermain on John Devoy Road to the development site and supply a 150mm internal diameter watermain to the proposed development site.

The proposed development is to consist of 219no. residential units and based on Irish Water guidelines, the water demand shall be:

- ⇒ 405l/day per residential unit (based on 2.7 persons per unit x 150l/person/day)
- ⇒ 405l/day /unit x 219 units = 88,695 l/day = 88.7 m³/day
- ⇒ 1.027 l/sec Average water demand
- ⇒ 5.14 l/sec Peak water demand (5 times average water demand)

The proposed watermain infrastructure and routing plan is shown on drawing **DEV-CSC-00-XX-DR-C-0113** included with this submission.

5.3 Irish Water Confirmation of Feasibility

A Pre-Connection Enquiry (PCE) has been submitted to Irish Water based on the water demand for 250no. residential units and we have received a Confirmation of Feasibility (CoF) in response.

Irish Water has stated in this CoF letter that a new connection to the existing network is feasible without upgrade. In addition, Irish Water noted that the connection to the water network shall be via a new 150 mm ID watermain at the site development boundary to the existing 180 mm watermain and should include for a bulk meter to be installed on the connection main inside the development site.

Please note, we reverted to IW requesting an up-to-date CoF in July 2021 and IW reverted with a revised COF dated 24th August 2021. Please refer to **Appendix D** for a copy of the latest confirmation of feasibility letter. CS Consulting contacted IW again in February 2022 and IW confirmed the CoF dated 24th August is still valid to use in this planning submission.

1.0 SUDS OPERATION AND MAINTENANCE PLAN

1.1 SuDS Maintenance

For the SuDS strategy to work as designed, it is important that the entire drainage system is well maintained. It shall be the responsibility of the site management team to ensure the drainage system is maintained. Maintenance and clearing of gullies drain manholes (including catch pits) and attenuation tanks shall ensure adequate performance. The recommended programme is outlined in Tables 1-5 below.

1.2 Stormtech Attenuation Tanks by Cubic M3

The Isolator Row of the Stormtech attenuation system was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow the applicable rules and regulations for a confined space entry. Maintenance is accomplished by jetting the Isolator Row. The jetting process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/jetting combination vehicles. Selection of an appropriate jetting nozzle shall improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45° are best. Most jetting reels have 120 meters of hose allowing maintenance of an Isolator Row up to 50 chambers long. The jetting process shall only be performed on StormTech Isolator Rows that

have the correct woven geotextile (as specified by StormTech) over their angular base stone.

1.3 Permeable Paving and Porous Asphalt

Permeable paving and porous asphalt are only proposed to areas that shall not be taken in charge by the Local Authority on completion of the development. Areas to be taken in charge by the local authority do not include these surface finishes as they shall be constructed to Kildare Co Co specifications.

Regular inspection and maintenance is important for the effective operation of pervious pavements. Permeable pavements need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Sweeping twice per year should be sufficient to maintain an acceptable infiltration rate on most sites. However, in some instances, more may be required, and the frequency should be adjusted to suit site-specific circumstances and should be informed by inspection reports.

A brush and suction cleaner (which can be a lorry-mounted device or a similar precinct sweeper) should be used for regular sweeping. Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material in permeable paving. Any lost material should be replaced. It is also possible to clean the surface using lightweight rotating brush cleaners combined with power spraying using hot water.

If the surface has clogged then a more specialist sweeper with water and oscillating and rotating brushes may be required, especially for porous asphalt surfaces, to restore the surface infiltration rate to an acceptable level. The specialist should be adjusted so that it does not strip binder from the aggregate in the asphalt.

Post completion, road openings in the porous asphalt should be kept to an absolute minimum and they are likely to lower performance of the porous asphalt as it shall be difficult to replace like with like.

1.4 Bio-Swales and Wetlands

Bio-Swales and wetlands (Nature Based Solution SuDS devices) shall require regular maintenance to ensure continuing operation to design performance standards. The treatment of these devices is dependent on maintenance. The major maintenance requirement for the wetland is mowing during the spring/summer seasons. Mowing should ideally retain grass lengths of 75-150mm across the main "treatment" surface, to assist in filtering pollutants and retaining sediments and to reduce the risk of flattening during runoff events. However, longer vegetation lengths, where appropriate, are not considered to pose a significant risk to functionality. Similarly for the Bio-swales, planting shall be maintained over the growth seasons and in Autumn bio-swales shall be cleared of all excess material.

1.5 Tree Pits

Maintenance requirements of trees shall be greatest during the first few years, when the tree is becoming established. Early maintenance should involve regular inspection, removal of invasive vegetation and possibly irrigation during long dry periods, particularly in soils with high void ratios. The expertise of an arboriculturist/landscape architect with local knowledge should be sought regarding appropriate irrigation schedules. Maintenance responsibility for a tree pit or planter should always be placed with an appropriate organisation.

1.6 Green Roofs

Green roofs (a Nature Based Solution SuDS device) require a minimum of two inspections a year to ensure they are fit for purpose. A typical maintenance programme includes:

Roof Evaluation - One of the team experts shall perform a comprehensive review of your green roof to determine what remedial work, if any, needs to be done.

Removal of Unwanted Items - Over time a green roof can become congested with leaves, debris and other unwanted vegetation, which can be removed as part of the service.

Inspection - of roof outlets and removal of any encroaching vegetation to enable water to flow freely through rainwater pipes.

Application of fertiliser - To help restore your green roof to its best, an organic slow release granular fertiliser shall encourage growth.

Testing - After all above work has been performed the system shall be irrigated and examined, ensuring it is working as expected.

2.0 RESPONSE TO KILDARE COUNTY COUNCIL OPINION

Kildare County Council's Water Services Section (KCCWSS) issued their opinion in relation to the Stage 2 planning submission in November 2021. We have reviewed the document and below summarise additional items raised in their opinion report not previously mentioned in this report and we describe the measures taken by the design team in response to these opinion matters.

1. Irish Water Matters

- a. Statement of Design Acceptance (SoDA): KCCWSS requested a SoDA from IW be included in the final planning application. We confirm a SODA was received from IW and is included with this submission under separate cover.
- b. Fire Fighting Water Pressure: KCCWSS stated that the standard fire fighting supply flow is 1,000 litres per minute. Pressure and flow tests carried out by Messrs Larsen Water Management on the existing hydrant on the John Devoy Road gives a flow of 1820 l/min, well in excess of the minimum requirement.
- c. Allow for future connections for lands to the east of the development: We confirm spurs for future development for both foul and potable water can be accommodated into the scheme at detailed design stage.

2. Bluebell-Yeomanstown Stream

- a. We confirm, the Bluebell-Yeomanstown Stream along part of the southern boundary shall be retained as an open channel as it currently is. At a meeting with David Hall it was confirmed the stream is outside the ownership of the Land Development Agency and shall be maintained by the adjacent landowner.

However, it was discussed and agreed at the meeting with Mr David Hall, that maintenance access to stream from the Land Development Agency lands shall be provided.

- b. Section 50 Consents: We confirm a Section 50 Consent from the OPW is not required to be obtained for this application.

3. Sustainable Drainage Systems

- a. Nature Based Solutions (NBS): KCCWSS recommended that additional NBS for SuDS devices be designed into the development. We have incorporated the following NBS systems into the design:

- Constructed Wetlands
- Bio-Swales
- Proposed Tree Pit Drainage Systems
- Green Roof Systems

More detail is provided in *Section 3.4* of this report on these NBS systems

- b. All private/management company hard surface areas to be constructed of permeable systems: KCCWSS recommended all hard surface areas that shall not be offered to Kildare County Council for "Taking in Charge" shall be constructed of permeable paving or similar infiltration systems. We confirm all private hard surfaces shall now be constructed in permeable paving, porous asphalt or similar approved SuDS devices.
- c. SuDS Maintenance: A management company shall be engaged by the Land Development Agency on completion of

the development. They shall be responsible for the inspecting and maintaining all SuDS devices in private areas. See Section 6.0 for additional maintenance information.

- d. Geotechnical Matters: KCCWSS commented on the ground water monitoring, the results of the soakaway tests and the design of the SuDS devices and requested we review 'subject to expert geotechnical advice'. We confirm that a specialist geotechnical expert shall be engaged post a grant of planning and shall review and advise on the SuDS proposals and details of their assessment and recommendations shall form part of the detailed design and compliance submission to the Local Authority.

4. Existing External Drainage Networks on John Devoy Road

- a. Drainage Ownership: KCCWSS raised concerns on the ownership of the foul and storm water drainage networks constructed as part of the John Devoy Road. We confirm both networks are in the ownership of the Housing Agency, a stakeholder in this application and included under separate cover are relevant letters of consent to connect to these networks on their lands.
- b. Status of Existing Drainage: KCCWSS enquired on the current status of the external networks and being fit for purpose, as neither the foul or storm pipelines are taken in charge by the Local Authority or IW. Prior to connection to the existing networks, both networks shall be surveyed, and any defects found shall be rectified at the expense of the developer. It is envisaged that the foul network to John Devoy Road shall be vested to IW on connection of the development and the surface water network on completion of all developments fronting onto John Devoy Road. Until such time as the surface water network is taken in

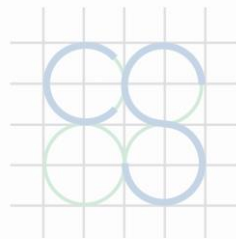
charge, the management company appointed to the development shall inspect and maintain this network.

5. Miscellaneous Items

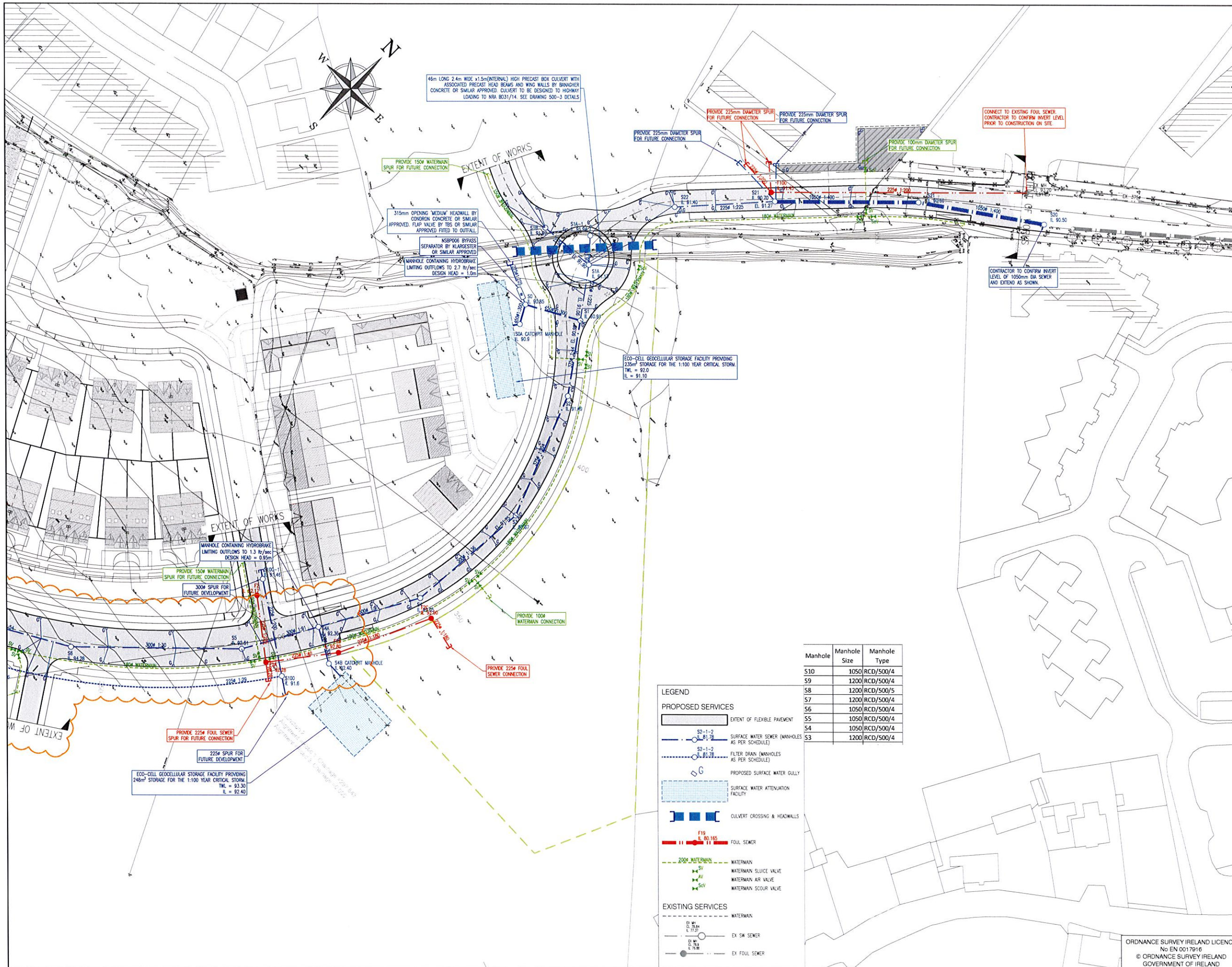
- a. Undercroft Car Park: the undercroft car park shall have two drainage networks, a surface water network that caters for the runoff from the podium that shall discharge to the main surface water network of the development. Runoff from the car park level shall be collected in a separate network that shall pass through a petrol interceptor and discharge to the external foul network.
- b. Attenuation Tank within the undercroft car park: KCCWSS requested the proposed tank shown in previous submissions be removed. This tank has now been removed and replaced by the constructed wetlands, a Nature Based Solution SuDS device.
- c. Oversized pipes: KCCWSS queried the use of oversized pipes within the surface water network. Following the modelling analysis for a 100 year event plus climate change factors of the network, oversized pipes have to be used to prevent the network from surcharging and flooding the site.

Appendix A

Drainage Layout for John Devoy Link Road



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ON ORIGINAL

0 5 10 20 30 40 50mm

NOTES:

GENERAL NOTES:

1. ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE NRA SPECIFICATION FOR ROAD WORKS EXCEPT WHERE NOTED OTHERWISE.
2. ALL DIMENSIONS IN METRES UNLESS SPECIFIED OTHERWISE.
3. ALL CO-ORDINATES ARE TO IRISH NATIONAL GRID.
4. ALL LEVELS ARE TO ORDNANCE DATUM AND ARE IN METRES.
5. ALL TEMPORARY TRAFFIC & OPERATIONS MANAGEMENT SHALL COMPLY FULLY WITH THE NRA SPECIFICATION FOR ROAD WORKS.
6. THE CONTRACTOR MUST Liaise DIRECTLY WITH KILDARE COUNTY COUNCIL AS REQUIRED.
7. ALL VEHICULAR & OPERATIONAL ROUTES WITHIN AND SURROUNDING THE WORKS EXTENTS MUST BE MAINTAINED THROUGHOUT THE WORKS IN ACCORDANCE WITH THE CONTRACTORS APPROVED TEMPORARY TRAFFIC & OPERATIONS MANAGEMENT PLAN AND SHALL COMPLY FULLY WITH THE PROVISIONS OF CH.8 OF THE TRAFFIC SIGNS MANUAL.
8. CONTRACTOR SHALL EMPLOY THE SERVICES OF AN APPROVED SURVEY COMPANY TO ESTABLISH THE GRID IDENTIFIED.
9. ALL AGGREGATES PROPOSED FOR USE ON THIS SCHEME SHALL MEET FULLY THE REQUIREMENTS OF THE NRA SPECIFICATION FOR ROAD WORKS AND IN ADDITION THE REQUIREMENTS STATED IN STANDARD RECOMMENDATION S.R. 21:2014 GUIDANCE ON THE USE OF I.S. EN 12422:2002 +A1:2007 - AGGREGATES FOR UNBOUND AND HYDRAULICALLY BOUND MATERIALS FOR USE IN CIVIL ENGINEERING WORK AND ROAD CONSTRUCTION.
10. ALL WATERMAIN SHALL BE HDPE, PE100, SDR17 TO IS EN 12201 PART 2:2011 AND IS EN 12201-3:2011.
11. COVER TO WATERMAIN SHALL BE 500mm MAXIMUM. 750mm MINIMUM. MINIMUM CLEARANCE OF 300mm SHALL BE PROVIDED TO ALL OTHER UTILITIES. NO SERVICES SHALL BE Laid OVER WATERMAIN EXCEPT FOR CROSSINGS WHICH SHALL HAVE A MINIMUM CLEARANCE OF 100mm.

KEY PLAN

WARNING

1. IF UNCERTAIN OF A DETAIL OR NOTE, DO NOT PROCEED UNTIL CLARIFICATION IS SOUGHT FROM THE ENGINEER AND SUITABLE INFORMATION PROVIDED.
2. ALL ANOMALIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY TO ALLOW TIME FOR REMEDIAL ACTION.

G	21-03-18	ACCESS TO PHASE 2 ADDED	PVC	NGC
F	23-11-17	SERVICES UPDATED	PGC	NGC
E	03-10-17	REVISED JUNCTION	PGC	NGC
D	17-06-17	REVISED DRAINAGE	NGC	SGR
C	03-03-17	REVISED TENDER	PVC	NGC
B	21/12/16	ATTENTION NOTES AMENDED	NGC	NGC
A	07/12/16	KCC COMMENTS AND RSA	PVC	NGC
REV.	DATE	DESCRIPTION	BY	CHKD

CONSTRUCTION

DESIGNED	PGC	PREPARED	PGC
DATE	APR 2016	CHECKED	WBA

Manhole	Manhole Size	Manhole Type
S10	1050	RCD/500/4
S9	1200	RCD/500/4
S8	1200	RCD/500/5
S7	1200	RCD/500/4
S6	1050	RCD/500/4
S5	1050	RCD/500/4
S4	1050	RCD/500/4
S3	1200	RCD/500/4

LEGEND

PROPOSED SERVICES

- EXTENT OF FLEXIBLE PAVEMENT
- S2-1-2 SURFACE WATER SEWER (MANHOLES AS PER SCHEDULE)
- S2-1-2 FILTER DRAIN (MANHOLES AS PER SCHEDULE)
- PROPOSED SURFACE WATER GULLY
- SURFACE WATER ATTENUATION FACILITY
- CULVERT CROSSING & HEADWALLS
- F18 IL 80.165 FOUL SEWER
- 200mm WATERMAIN
- WATERMAIN SLUICE VALVE
- WATERMAIN AIR VALVE
- WATERMAIN SCOUR VALVE

EXISTING SERVICES

- WATERMAIN
- EX SW SEWER
- EX FOUL SEWER

ORDNANCE SURVEY IRELAND LICENCE No EN 0017916
© ORDNANCE SURVEY IRELAND GOVERNMENT OF IRELAND

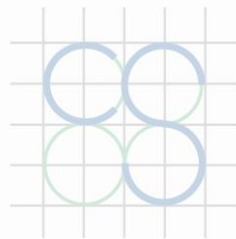
DBFL Consulting Engineers
DUBLIN OFFICE: 10, The Chantry, 1-2 O'Connell Street, Westford, Ireland
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FAX: +353 51 844 913
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DBFL

PROJECT
DEVLOY LINK ROAD

DRG TITLE
**DRAINAGE LAYOUT
GENERAL ARRANGEMENT
SHEET 2**

ARCHITECT
CAIRN HOMES PLC

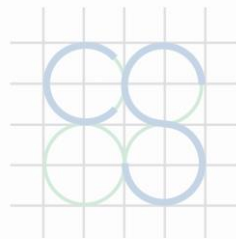
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DRG NO: 064011-500-2



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Appendix B

Soakaway Test Information

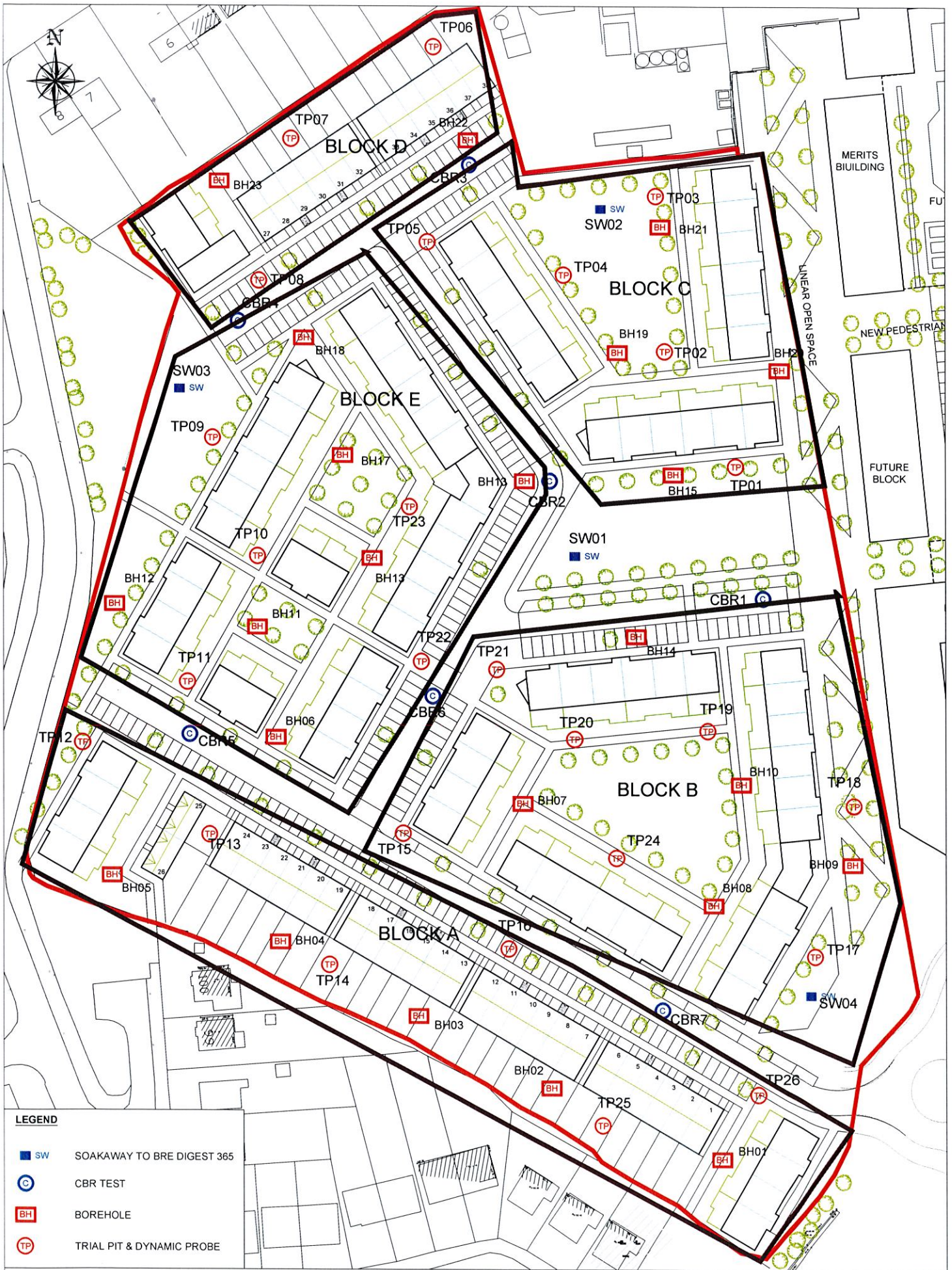


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APPENDIX 3 – Soakaway Records



www.gil.ie



NOTES

- For setting out refer to Architect's drawings
- This drawing to be read in conjunction with all other Architectural and Engineering drawings and all other relevant drawings and Specifications
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Rev No	Date	REVISION NOTE	Rev By	Check By

Architect	COADY ARCHITECTS
Project	DEVELOPMENT AT DEVROY BARRACKS, NAAS
Title	SITE INVESTIGATION SCOPING PLAN
On by	DO
Check by	GL
Approved by	OS
Date	15/01/2020
Scale	NOT TO SCALE
Ref	L086-SK001

CS Consulting Group	DUBLIN LONDON LIMERICK
Head Office	1st Floor, 100-102, Dublin 2
Tel	+353 (0)1 5480633 F +353 (0)1 5011355
Email	info@csconsulting.ie
Website	www.csconsulting.ie
Quality	ISO 9001:2008
Environment	ISO 14001:2004
Health & Safety	ISO 45001:2011
CEAS	CEAS 1801:2007



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

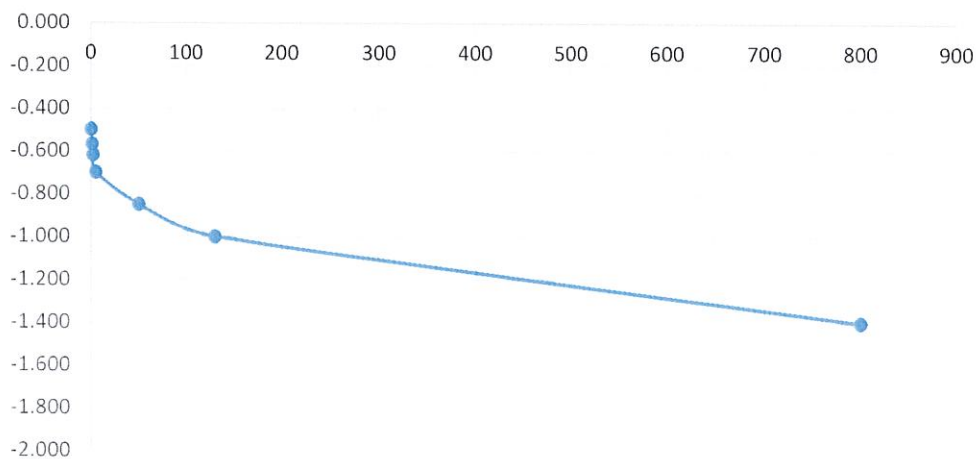
Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin,
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SW01**Soakaway Test to BRE Digest 365****Trial Pit Dimensions: 1.60m x 0.50m 1.50m (L x W x D)**

Date	Time	Water level (m bgl)
20/05/2020	0	-0.500
20/05/2020	1	-0.570
20/05/2020	2	-0.620
20/05/2020	5	-0.700
20/05/2020	50	-0.850
20/05/2020	130	-1.000
20/05/2020	800	-1.400

Start depth 0.50	Depth of Pit 1.500	Diff 1.000	75% full 0.75	25%full 1.25
Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
1.600	0.500		0.500	0.40
Tp75-25 (from graph) (s)		33180	50% Eff Depth 0.500	ap50 (m2) 2.9
f =	9.195E-05	m/s		

SW01



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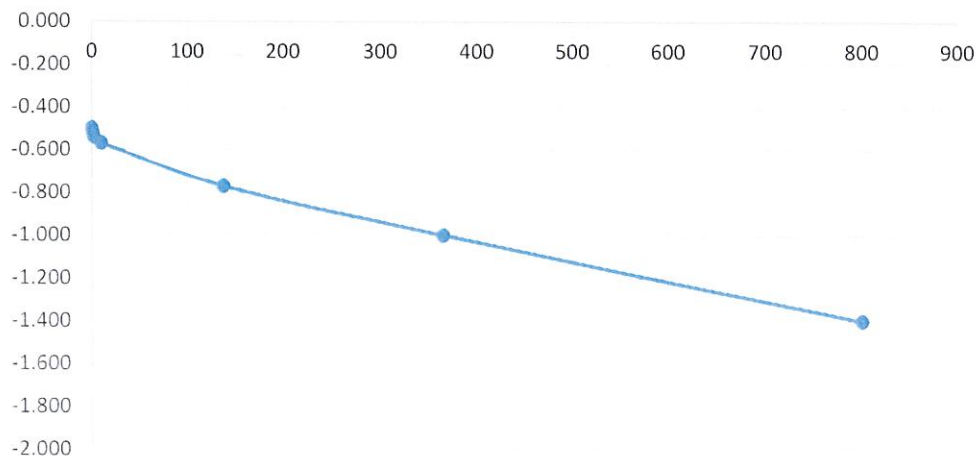
Tel: 01 601 5175 / 5176
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Web: www.gii.ie

SW02**Soakaway Test to BRE Digest 365**

Trial Pit Dimensions: 1.80m x 0.50m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
20/05/2020	0	-0.500
20/05/2020	1	-0.520
20/05/2020	2	-0.540
20/05/2020	10	-0.570
20/05/2020	138	-0.770
20/05/2020	365	-1.000
20/05/2020	800	-1.400

Start depth 0.50	Depth of Pit 1.500	Diff 1.000	75% full 0.75	25%full 1.25
Length of pit (m) 1.800	Width of pit (m) 0.500		75-25Ht (m) 0.500	Vp75-25 (m3) 0.45
Tp75-25 (from graph) (s)		34920	50% Eff Depth 0.500	ap50 (m2) 3.2
f =		4.027E-06	m/s	

SW02



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

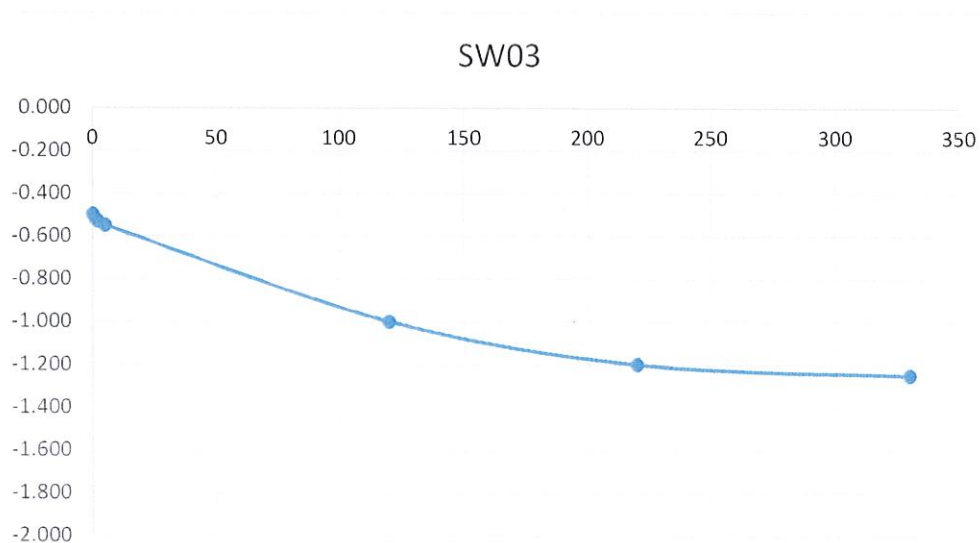
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SW03**Soakaway Test to BRE Digest 365****Trial Pit Dimensions: 1.80m x 0.50m 1.50m (L x W x D)**

Date	Time	Water level (m bgl)
20/05/2020	0	-0.500
20/05/2020	1	-0.520
20/05/2020	2	-0.530
20/05/2020	5	-0.550
20/05/2020	120	-1.000
20/05/2020	220	-1.200
20/05/2020	330	-1.250

Start depth 0.50	Depth of Pit 1.500	Diff 1.000	75% full 0.75	25%full 1.25
Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
1.800	0.500		0.500	0.45
Tp75-25 (from graph) (s)	16800		50% Eff Depth	ap50 (m2)
			0.500	3.2
f =	8.371E-06	m/s		





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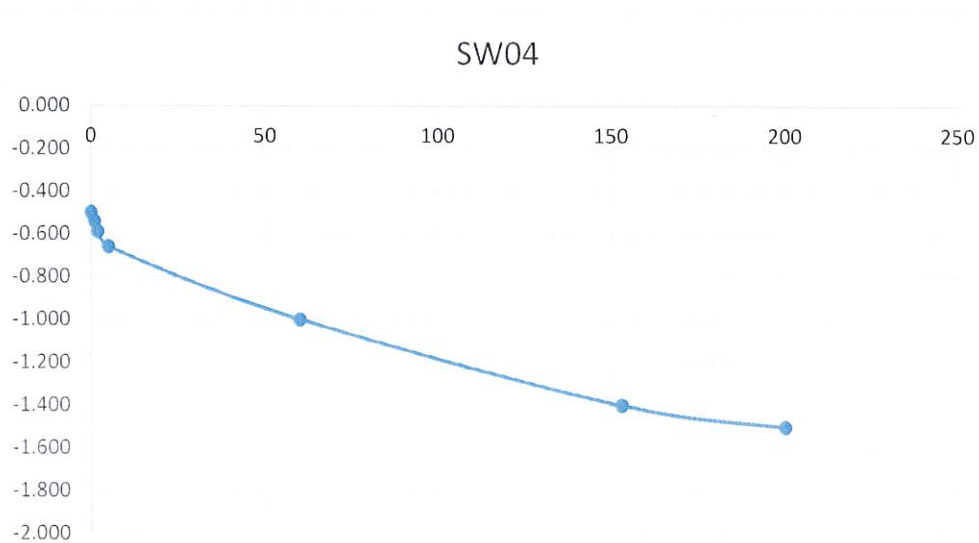
SW04

Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 1.90m x 0.50m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
20/05/2020	0	-0.500
20/05/2020	1	-0.540
20/05/2020	2	-0.590
20/05/2020	5	-0.660
20/05/2020	60	-1.000
20/05/2020	153	-1.400
20/05/2020	200	-1.500

Start depth 0.50	Depth of Pit 1.500	Diff 1.000	75% full 0.75	25%full 1.25
Length of pit (m) 1.900	Width of pit (m) 0.500		75-25Ht (m) 0.500	Vp75-25 (m3) 0.48
Tp75-25 (from graph) (s)	5280		50% Eff Depth 0.500	ap50 (m2) 3.35
f =	2.685E-05	m/s		





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(V1 August 2018)

Project Number	9476-02-20	Sample Date	11-08-20
Client	CS Consulting	Well I.D.	BH01
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.07
Stick Up (mm)	Flush	Water Level (mBTOC)	1.71
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Number	9476-02-20	Sample Date	11-08-20
Client	CS Consulting	Well I.D.	BH05
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.0
Stick Up (mm)	Flush	Water Level (mBTOC)	3.20
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Number	9476-02-20	Sample Date	11-08-20
Client	CS Consulting	Well I.D.	BH013
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	4.50
Stick Up (mm)	Flush	Water Level (mBTOC)	3.44
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Information

Project Information			
Project Number	9476-02-20	Sample Date	11-08-20
Client	CS Consulting	Well I.D.	BH20
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	5.50PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.50
Stick Up (mm)	Flush	Water Level (mBTC)	3.08
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

Gas Data

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Information			
Project Number	9476-02-20	Sample Date	11-08-20
Client	CS Consulting	Well I.D.	BH23
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data			
Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.24
Stick Up (mm)	Flush	Water Level (mBTC)	Dry
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Information

Project Information			
Project Number	9476-02-20	Sample Date	09-10-20
Client	CS Consulting	Well I.D.	BH05
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data

Well Data			
Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.0
Stick Up (mm)	Flush	Water Level (mBTOC)	2.62
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

Gas Data

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Number	9476-02-20	Sample Date	09-10-20
Client	CS Consulting	Well I.D.	BH013
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	4.50
Stick Up (mm)	Flush	Water Level (mBTC)	3.50
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Number	9476-02-20	Sample Date	09-10-20
Client	CS Consulting	Well I.D.	BH20
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	5.50PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.50
Stick Up (mm)	Flush	Water Level (mBTOC)	3.17
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Number	9476-02-20	Sample Date	09-10-20
Client	CS Consulting	Well I.D.	BH23
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.24
Stick Up (mm)	Flush	Water Level (mBTC)	Dry
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Information

Project Number	9476-02-20	Sample Date	16-10-20
Client	CS Consulting	Well I.D.	BH01
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.07
Stick Up (mm)	Flush	Water Level (mBTC)	1.60
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

Gas Data

[illegible]

Additional Comments/Observations:



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Web: www.gil.ie

(V1 August 2018)

Project Information

Project Number	9476-02-20	Sample Date	16-10-20
Client	CS Consulting	Well I.D.	BH05
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.0
Stick Up (mm)	Flush	Water Level (mBTC)	2.97
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

Gas Data

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Number	9476-02-20	Sample Date	16-10-20
Client	CS Consulting	Well I.D.	BH20
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data			
Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	5.50PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.50
Stick Up (mm)	Flush	Water Level (mBTOC)	3.60
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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(V1 August 2018)

Project Information			
Project Number	9476-02-20	Sample Date	16-10-20
Client	CS Consulting	Well I.D.	BH23
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data			
Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.24
Stick Up (mm)	Flush	Water Level (mBTC)	Dry
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



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Web: www.gil.ie

(V1 August 2018)

Project Information

Project Number	9476-02-20	Sample Date	23-10-20
Client	CS Consulting	Well I.D.	BH01
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.07
Stick Up (mm)	Flush	Water Level (mBTC)	1.68
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

Gas Data

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gli.ie
Web: www.gli.ie

(V1 August 2018)

Project Number	9476-02-20	Sample Date	23-10-20
Client	CS Consulting	Well I.D.	BH013
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	4.50
Stick Up (mm)	Flush	Water Level (mBTOC)	3.57
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gil.ie
Web: www.gil.ie

(V1 August 2018)

Project Information			
Project Number	9476-02-20	Sample Date	16-10-20
Client	CS Consulting	Well I.D.	BH23
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data			
Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.24
Stick Up (mm)	Flush	Water Level (mBTC)	Dry
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gil.ie
Web: www.gil.ie

(V1 August 2018)

Project Information			
Project Number	9476-02-20	Sample Date	18-12-20
Client	CS Consulting	Well I.D.	BH05
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.0
Stick Up (mm)	Flush	Water Level (mBTC)	2.36
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gilje
Web: www.gilje

(V1 August 2018)

Project Information			
Project Number	9476-02-20	Sample Date	18-12-20
Client	CS Consulting	Well I.D.	BH013
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	4.50
Stick Up (mm)	Flush	Water Level (mBTC)	3.30
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
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Web: www.gii.ie

(V1 August 2018)

Project Information

Project Number	9476-02-20	Sample Date	18-12-20
Client	CS Consulting	Well I.D.	BH20
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	5.50PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.50
Stick Up (mm)	Flush	Water Level (mBTC)	3.03
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

Gas Data

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gli.ie
Web: www.gli.ie

(V1 August 2018)

Project Information			
Project Number	9476-02-20	Sample Date	18-12-20
Client	CS Consulting	Well I.D.	BH23
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.24
Stick Up (mm)	Flush	Water Level (mBTC)	Dry
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gli.ie
Web: www.gli.ie

(V1 August 2018)

Project Number	9476-02-20	Sample Date	22-01-21
Client	CS Consulting	Well I.D.	BH01
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	SK	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.07
Stick Up (mm)	Flush	Water Level (mBTC)	1.60
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gil.ie
Web: www.gil.ie

(V1 August 2018)

Project Number	9476-02-20	Sample Date	21-01-21
Client	CS Consulting	Well I.D.	BH013
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	SK	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	4.50
Stick Up (mm)	Flush	Water Level (mBTOC)	3.30
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gli.ie
Web: www.gli.ie

(V1 August 2018)

Project Number	9476-02-20	Sample Date	21-01-21
Client	CS Consulting	Well I.D.	BH23
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data			
Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.24
Stick Up (mm)	Flush	Water Level (mBTOC)	Dry
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gil.ie
Web: www.gil.ie

(V1 August 2018)

Project Number	9476-02-20	Sample Date	26-02-21
Client	CS Consulting	Well I.D.	BH05
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	SK	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	6.0
Stick Up (mm)	Flush	Water Level (mBTOC)	2.54
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gil.ie
Web: www.gil.ie

(V1 August 2018)

Project Number	9476-02-20	Sample Date	26-02-21
Client	CS Consulting	Well I.D.	BH013
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	SK	Weather Previous 24 hours	Dry

Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	4.50
Stick Up (mm)	Flush	Water Level (mBTC)	3.36
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

[illegible]

Additional Comments/Observations:



Tel: 01 601 5175 / 5176
Email: info@gil.ie
Web: www.gil.ie

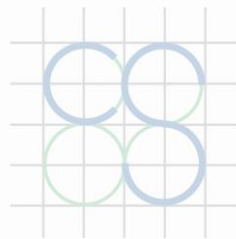
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Client	CS Consulting	Well I.D.	BH23
Site Name	Devoy Barracks	Weather	Dry
Sampler I.D.	PM	Weather Previous 24 hours	Dry

Well Data			
Casing Diameter (mm)	100mm	Standpipe Type uPVC etc.	PVC
Standpipe Diameter (mm)	50mm	Total Well Depth (m)	5.24
Stick Up (mm)	Flush	Water Level (mBTC)	Dry
Weather	Dry	Odour	None
Gas Meter Model	Geotech GA 5000	Gas Valve/Cap Condition	Good

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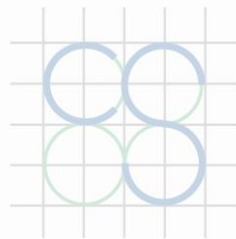
Additional Comments/Observations:




CS CONSULTING
GROUP

Appendix C

Storm Drainage Network WinDES Calculations



CS CONSULTING
GROUP

Cronin & Sutton Consulting		Page 1
1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
Date 29/03/2022 16:38	Designed by JF	
File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm













Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	PIMP (%)	70
M5-60 (mm)	17.900	Add Flow / Climate Change (%)	20
Ratio R	0.330	Minimum Backdrop Height (m)	0.300
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	15.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

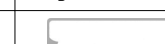
Designed with Level Inverts

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)	Section Type	Auto Design
S1.000	76.171	2.240	34.0	0.056	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	10.708	0.054	198.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	26.561	0.200	132.8	0.068	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	28.717	0.144	199.4	0.172	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	8.411	0.042	200.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	12.762	0.064	199.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	5.216	0.206	25.3	0.007	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	40.520	0.500	81.0	0.051	4.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	21.661	0.130	166.7	0.038	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.002	2.800	0.070	39.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	30.918	0.500	61.8	0.049	4.00	0.0	0.600	o	225	Pipe/Conduit	
S3.003	25.955	0.925	28.1	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.56	94.550	0.056	0.0	0.0	1.5	2.25	89.5	9.1
S1.001	50.00	4.76	92.310	0.056	0.0	0.0	1.5	0.92	36.8	9.1
S2.000	50.00	4.39	93.100	0.068	0.0	0.0	1.8	1.13	45.0	11.1
S1.002	50.00	5.19	92.256	0.296	0.0	0.0	8.0	1.11	78.4	48.1
S1.003	50.00	5.31	92.112	0.296	0.0	0.0	8.0	1.11	78.3	48.1
S1.004	50.00	5.51	92.070	0.296	0.0	0.0	8.0	1.11	78.4	48.1
S1.005	50.00	5.53	92.006	0.303	0.0	0.0	8.2	3.14	221.8	49.3
S3.000	50.00	4.46	94.075	0.051	0.0	0.0	1.4	1.45	57.8	8.3
S3.001	50.00	4.82	93.575	0.089	0.0	0.0	2.4	1.01	40.1	14.5
S3.002	50.00	4.84	93.445	0.089	0.0	0.0	2.4	2.08	82.5	14.5
S4.000	50.00	4.31	93.875	0.049	0.0	0.0	1.3	1.67	66.2	7.9
S3.003	50.00	5.02	93.375	0.161	0.0	0.0	4.4	2.48	98.6	26.1

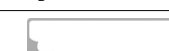
Cronin & Sutton Consulting		Page 2
1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
Date 29/03/2022 16:38 File L086 - COMBINED DRAINAGE (JF 20...	Designed by JF Checked by GL	
Innovyze	Network 2020.1.3	

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)	Section Type	Auto Design
S5.000	37.338	0.719	51.9	0.112	4.00	0.0	0.600	o	225	Pipe/Conduit	
S3.004	30.171	0.650	46.4	0.067	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	33.177	0.336	98.7	0.111	0.00	0.0	0.600	o	375	Pipe/Conduit	
S6.000	37.754	0.226	167.1	0.176	4.00	0.0	0.600	o	300	Pipe/Conduit	
S6.001	45.027	0.185	243.4	0.192	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.007	49.543	0.140	353.9	0.164	0.00	0.0	0.600	o	525	Pipe/Conduit	
S7.000	10.541	0.251	42.0	0.035	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	36.362	0.021	1736.0	0.104	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.009	14.759	0.195	75.7	0.046	0.00	0.0	0.600	o	750	Pipe/Conduit	
S8.000	26.623	0.261	102.0	0.113	4.00	0.0	0.600	o	225	Pipe/Conduit	
S9.000	47.090	0.896	52.6	0.153	4.00	0.0	0.600	o	225	Pipe/Conduit	
S8.001	42.084	0.637	66.1	0.188	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.002	31.048	0.526	59.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.003	5.137	0.233	22.0	0.069	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.004	5.698	0.139	41.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.005	11.376	0.543	21.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.000	14.726	0.600	24.5	0.020	4.00	0.0	0.600	o	225	Pipe/Conduit	
S10.001	28.183	0.900	31.3	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S5.000	50.00	4.34	93.169	0.112	0.0	0.0	3.0	1.82	72.3	18.1
S3.004	50.00	5.28	92.450	0.339	0.0	0.0	9.2	1.92	76.5	55.1
S1.006	50.00	5.84	91.800	0.753	0.0	0.0	20.4	1.82	201.4	122.4
S6.000	50.00	4.52	92.800	0.176	0.0	0.0	4.8	1.21	85.8	28.7
S6.001	50.00	5.27	92.574	0.369	0.0	0.0	10.0	1.00	70.9	59.9
S1.007	50.00	6.53	91.464	1.285	0.0	0.0	34.8	1.18	256.5	208.8
S7.000	50.00	4.09	91.575	0.035	0.0	0.0	1.0	2.02	80.5	5.7
S1.008	50.00	7.45	91.324	1.424	0.0	0.0	38.6	0.66	292.7	231.4
S1.009	50.00	7.53	91.303	1.471	0.0	0.0	39.8	3.22	1422.1	239.0
S8.000	50.00	4.34	95.555	0.113	0.0	0.0	3.1	1.29	51.5	18.4
S9.000	50.00	4.43	95.700	0.153	0.0	0.0	4.2	1.81	71.9	24.9
S8.001	50.00	4.80	94.804	0.455	0.0	0.0	12.3	1.94	136.9	74.0
S8.002	50.00	5.05	94.168	0.455	0.0	0.0	12.3	2.05	144.9	74.0
S8.003	50.00	5.07	93.642	0.524	0.0	0.0	14.2	3.36	237.7	85.1
S8.004	50.00	5.11	93.409	0.524	0.0	0.0	14.2	2.46	174.1	85.1
S8.005	50.00	5.17	93.270	0.524	0.0	0.0	14.2	3.45	243.9	85.1
S10.000	50.00	4.09	95.375	0.020	0.0	0.0	0.5	2.65	105.4	3.2
S10.001	50.00	4.29	94.775	0.070	0.0	0.0	1.9	2.35	93.3	11.4

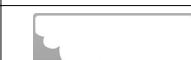
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Date 29/03/2022 16:38	Designed by JF	
File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

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)	Section Type	Auto Design
S10.002	8.536	0.427	20.0	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.003	26.440	0.721	36.7	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.006	30.459	0.891	34.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.007	49.190	0.401	122.7	0.055	0.00	0.0	0.600	o	375	Pipe/Conduit	
S11.000	53.092	1.327	40.0	0.123	4.00	0.0	0.600	o	225	Pipe/Conduit	
S12.000	8.981	0.184	48.7	0.013	4.00	0.0	0.600	o	225	Pipe/Conduit	
S11.001	8.349	0.186	44.9	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S13.000	54.234	0.470	115.4	0.077	4.00	0.0	0.600	o	225	Pipe/Conduit	
S11.002	25.643	0.200	128.2	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.000	72.028	1.570	45.9	0.047	4.00	0.0	0.600	o	225	Pipe/Conduit	
S11.003	45.027	1.170	38.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.008	63.039	0.630	100.1	0.052	0.00	0.0	0.600	o	375	Pipe/Conduit	
S8.009	19.414	0.103	188.5	0.031	0.00	0.0	0.600	o	375	Pipe/Conduit	
S8.010	21.918	0.063	347.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.010	10.843	0.031	350.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S15.000	20.740	0.041	505.8	0.000	4.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S10.002	50.00	4.34	93.875	0.084	0.0	0.0	2.3	2.94	116.9	13.6
S10.003	50.00	4.54	93.448	0.097	0.0	0.0	2.6	2.17	86.2	15.7
S8.006	50.00	5.36	92.727	0.621	0.0	0.0	16.8	2.70	190.7	100.8
S8.007	50.00	5.86	91.836	0.675	0.0	0.0	18.3	1.63	180.6	109.7
S11.000	50.00	4.43	94.318	0.123	0.0	0.0	3.3	2.07	82.5	20.1
S12.000	50.00	4.08	93.175	0.013	0.0	0.0	0.4	1.88	74.7	2.2
S11.001	50.00	4.50	92.991	0.150	0.0	0.0	4.1	1.96	77.8	24.4
S13.000	50.00	4.74	93.275	0.077	0.0	0.0	2.1	1.22	48.4	12.5
S11.002	50.00	5.11	92.805	0.267	0.0	0.0	7.2	1.15	45.9	43.3
S14.000	50.00	4.62	94.175	0.047	0.0	0.0	1.3	1.94	77.0	7.6
S11.003	50.00	5.47	92.605	0.314	0.0	0.0	8.5	2.12	84.1	51.0
S8.008	50.00	4.58	91.435	0.000	6.0	0.0	1.0	1.81	200.1	6.0
S8.009	50.00	4.83	90.805	0.031	6.0	0.0	2.0	1.32	145.4	12.3
S8.010	50.00	5.20	90.702	0.031	6.0	0.0	2.0	0.97	106.7	12.3
S1.010	50.00	7.65	90.639	1.502	6.0	0.0	41.9	1.49	658.3	251.3
S15.000	50.00	4.60	91.050	0.000	0.0	0.0	0.0	0.57	22.8	0.0

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.011	22.654	0.242	93.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.012	19.334	0.097	199.3	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.013	4.708	0.024	200.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.014	13.614	0.068	200.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.011	50.00	7.78	90.608	1.502	6.0	0.0	41.9	2.89	1278.1	251.3
S1.012	50.00	4.16	90.366	0.000	12.5	0.0	2.1	1.98	874.1	12.5
S1.013	50.00	4.20	90.269	0.000	12.5	0.0	2.5	1.98	872.7	15.0
S1.014	50.00	4.32	90.245	0.000	12.5	0.0	2.5	1.98	872.6	15.0

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)
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S1.014	SMHEX. SWMH	92.700	90.177	90.300	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha	Storage 2.000
Hot Start (mins)	0	Inlet Coefficient	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	2	Number of Storage Structures	12	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	17.900	Storm Duration (mins)	2880
Ratio R	0.330		

Online Controls for Storm

Hydro-Brake® Manhole: SMH45, DS/PN: S8.008, Volume (m³): 10.3


Design Head (m) 1.200 Hydro-Brake® Type Md4 Invert Level (m) 91.435
Design Flow (l/s) 3.0 Diameter (mm) 59

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	0.800	2.4	2.000	3.8	4.000	5.4	7.000	7.2
0.200	1.4	1.000	2.7	2.200	4.0	4.500	5.8	7.500	7.4
0.300	1.5	1.200	3.0	2.400	4.2	5.000	6.1	8.000	7.7
0.400	1.7	1.400	3.2	2.600	4.4	5.500	6.4	8.500	7.9
0.500	1.9	1.600	3.4	3.000	4.7	6.000	6.6	9.000	8.1
0.600	2.1	1.800	3.6	3.500	5.1	6.500	6.9	9.500	8.4

Hydro-Brake® Manhole: SMH50, DS/PN: S1.012, Volume (m³): 15.3

Design Head (m) 1.600 Hydro-Brake® Type Md4 Invert Level (m) 90.366
Design Flow (l/s) 12.5 Diameter (mm) 112

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	0.800	8.7	2.000	13.8	4.000	19.6	7.000	25.9
0.200	8.0	1.000	9.8	2.200	14.5	4.500	20.7	7.500	26.8
0.300	7.8	1.200	10.7	2.400	15.1	5.000	21.9	8.000	27.6
0.400	6.9	1.400	11.6	2.600	15.8	5.500	22.9	8.500	28.5
0.500	7.1	1.600	12.4	3.000	16.9	6.000	23.9	9.000	29.3
0.600	7.6	1.800	13.1	3.500	18.3	6.500	24.9	9.500	30.1

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Storage Structures for Storm

Porous Car Park Manhole: SMH5, DS/PN: S1.002

Infiltration Coefficient Base (m/hr)	0.03014	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	678.0
Max Percolation (l/s)	1883.3	Slope (1:X)	87.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	92.900	Membrane Depth (mm)	0

Porous Car Park Manhole: SMH5, DS/PN: S1.003

Infiltration Coefficient Base (m/hr)	0.03014	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	57.0
Max Percolation (l/s)	158.3	Slope (1:X)	87.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	92.757	Membrane Depth (mm)	0

Porous Car Park Manhole: SMH10, DS/PN: S3.003

Infiltration Coefficient Base (m/hr)	0.03014	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	90.0
Max Percolation (l/s)	250.0	Slope (1:X)	76.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	93.375	Membrane Depth (mm)	0

Porous Car Park Manhole: SMH14, DS/PN: S3.004

Infiltration Coefficient Base (m/hr)	0.01533	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	60.0
Max Percolation (l/s)	166.7	Slope (1:X)	200.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	92.450	Membrane Depth (mm)	0

Porous Car Park Manhole: SMH22, DS/PN: S1.008


Infiltration Coefficient Base (m/hr)	0.03014	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	85.0
Max Percolation (l/s)	236.1	Slope (1:X)	78.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	91.324	Membrane Depth (mm)	0

Porous Car Park Manhole: SMH29, DS/PN: S8.001

Infiltration Coefficient Base (m/hr)	0.03472	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	44.0
Max Percolation (l/s)	122.2	Slope (1:X)	75.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	94.804	Membrane Depth (mm)	0

Porous Car Park Manhole: SMH31, DS/PN: S8.003

Infiltration Coefficient Base (m/hr)	0.03472	Porosity	0.30
Membrane Percolation (mm/hr)	100	Invert Level (m)	93.642
Max Percolation (l/s)	40.0	Width (m)	10.0
Safety Factor	3.0	Length (m)	144.0

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Porous Car Park Manhole: SMH31, DS/PN: S8.003

Slope (1:X) 60.0 Evaporation (mm/day) 3
Depression Storage (mm) 0 Membrane Depth (mm) 0

Porous Car Park Manhole: SMH35, DS/PN: S10.003

Infiltration Coefficient Base (m/hr)	0.03014	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	36.0
Max Percolation (l/s)	100.0	Slope (1:X)	70.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	93.448	Membrane Depth (mm)	0

Porous Car Park Manhole: SMH42, DS/PN: S11.002

Infiltration Coefficient Base (m/hr)	0.01611	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	122.0
Max Percolation (l/s)	338.9	Slope (1:X)	30.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	92.805	Membrane Depth (mm)	0

Tank or Pond Manhole: SMH45, DS/PN: S8.008

Invert Level (m) 91.435

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	300.0	0.500	300.0

Infiltration Basin Manhole: SMH46, DS/PN: S15.000

Invert Level (m) 91.050 Safety Factor 3.0
Infiltration Coefficient Base (m/hr) 0.09950 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.09950

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	105.0	1.450	420.0

Tank or Pond Manhole: SMH50, DS/PN: S1.012

Invert Level (m) 90.366

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	150.0	1.600	150.0

Summary Wizard of 15 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840


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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow		Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S1.000	SMH1	5	94.624	-0.151	0.000	0.23		20.4		OK
S1.001	SMH3	6	92.957	0.422	0.000	0.67		20.6		SURCHARGED
S2.000	SMH4	5	93.226	-0.099	0.000	0.61		25.3		OK
S1.002	SMH5	6	92.933	0.377	0.000	1.32		93.8		SURCHARGED
S1.003	SMH5	6	92.715	0.303	0.000	1.52		89.7		SURCHARGED
S1.004	SMH6	6	92.622	0.252	0.000	1.38		88.6		SURCHARGED
S1.005	SMH6	6	92.502	0.196	0.000	0.64		91.1		SURCHARGED
S3.000	SMH7	5	94.166	-0.134	0.000	0.34		18.7		OK
S3.001	SMH8	5	93.741	-0.059	0.000	0.87		31.8		OK
S3.002	SMH9	5	93.584	-0.086	0.000	0.69		32.2		OK
S4.000	SMH9	5	93.958	-0.142	0.000	0.29		18.1		OK
S3.003	SMH10	6	93.502	-0.098	0.000	0.61		55.4		OK
S5.000	SMH13	5	93.295	-0.099	0.000	0.60		41.3		OK
S3.004	SMH14	7	92.700	0.025	0.000	0.95		67.6		SURCHARGED
S1.006	SMH15	7	92.421	0.246	0.000	0.91		163.7		SURCHARGED
S6.000	SMH17	6	93.382	0.282	0.000	0.70		55.9		SURCHARGED
S6.001	SMH18	6	93.265	0.391	0.000	1.75		115.9		SURCHARGED
S1.007	SMH20	18	92.134	0.145	0.000	1.38		314.5		SURCHARGED
S7.000	SMH21	29	91.917	0.117	0.000	0.17		11.4		SURCHARGED
S1.008	SMH22	29	91.913	-0.161	0.000	0.96		255.5		OK
S1.009	SMH24	38	91.583	-0.470	0.000	0.30		258.6		OK
S8.000	SMH26	5	95.719	-0.061	0.000	0.88		42.1		OK
S9.000	SMH28	5	95.857	-0.068	0.000	0.82		56.4		OK
S8.001	SMH29	6	95.105	0.001	0.000	1.00		127.8		SURCHARGED
S8.002	SMH29	7	94.402	-0.066	0.000	0.97		127.8		OK
S8.003	SMH31	7	93.911	-0.031	0.000	0.87		131.8		OK
S8.004	SMH31	7	93.733	0.024	0.000	1.13		131.9		SURCHARGED
S8.005	SMH29	7	93.451	-0.119	0.000	0.68		132.0		OK
S10.000	SMH32	5	95.417	-0.183	0.000	0.08		7.3		OK
S10.001	SMH33	5	94.859	-0.141	0.000	0.30		26.0		OK
S10.002	SMH34	4	93.964	-0.136	0.000	0.33		31.1		OK
S10.003	SMH35	5	93.553	-0.120	0.000	0.43		34.5		OK
S8.006	SMH36	17	92.961	-0.066	0.000	0.92		159.0		OK
S8.007	SMH37	46	92.224	0.013	0.000	1.01		169.0		SURCHARGED

Summary Wizard of 15 minute 30 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water			Surcharged		Flow / Cap.	Overflow (l/s)	Half Drain		Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)	Flow	Volume			Time (mins)	Flow		
S11.000	SMH38	5	94.441	-0.102	0.000	0.57					45.4	OK	
S12.000	SMH39	8	93.300	-0.100	0.000	0.08					4.7	OK	
S11.001	SMH40	8	93.296	0.080	0.000	0.78					49.2	SURCHARGED	
S13.000	SMH41	6	93.402	-0.098	0.000	0.58					27.1	OK	
S11.002	SMH42	9	93.216	0.186	0.000	1.40					59.4	SURCHARGED	
S14.000	SMH43	5	94.248	-0.152	0.000	0.23					17.0	OK	
S11.003	SMH44	26	92.771	-0.059	0.000	0.89					71.6	OK	
S8.008	SMH45	60	91.908	0.098	0.000	0.02					2.9	SURCHARGED	
S8.009	SMH46	40	91.409	0.230	0.000	0.09					10.6	SURCHARGED	
S8.010	SMH47	40	91.408	0.331	0.000	0.05					4.8	SURCHARGED	
S1.010	SMH48	40	91.406	0.017	0.000	0.72					261.1	SURCHARGED	
S15.000	SMH46	40	91.384	0.109	0.000	0.00					0.0	SURCHARGED	
S1.011	SMH49	40	91.403	0.046	0.000	0.27					253.2	SURCHARGED	
S1.012	SMH50	40	91.402	0.287	0.000	0.02					12.4	SURCHARGED	
S1.013	SMH51	41	90.357	-0.662	0.000	0.03					12.4	OK	
S1.014	SMH52	48	90.322	-0.674	0.000	0.02					12.4	OK	

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Summary Wizard of 30 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded			Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	
S1.000	SMH1	7	94.620	-0.155	0.000	0.20			17.8	OK
S1.001	SMH3	8	92.830	0.295	0.000	0.57			17.7	SURCHARGED
S2.000	SMH4	7	93.217	-0.108	0.000	0.52			21.7	OK
S1.002	SMH5	8	92.811	0.255	0.000	1.21			85.7	SURCHARGED
S1.003	SMH5	8	92.621	0.209	0.000	1.39			82.1	SURCHARGED
S1.004	SMH6	8	92.545	0.175	0.000	1.28			81.9	SURCHARGED
S1.005	SMH6	8	92.446	0.140	0.000	0.58			83.1	SURCHARGED
S3.000	SMH7	7	94.160	-0.140	0.000	0.29			16.2	OK
S3.001	SMH8	7	93.726	-0.074	0.000	0.78			28.4	OK
S3.002	SMH9	7	93.572	-0.099	0.000	0.61			28.3	OK
S4.000	SMH9	7	93.952	-0.148	0.000	0.25			15.7	OK
S3.003	SMH10	7	93.494	-0.106	0.000	0.54			49.2	OK
S5.000	SMH13	7	93.286	-0.108	0.000	0.52			35.7	OK
S3.004	SMH14	10	92.694	0.019	0.000	0.95			68.1	SURCHARGED
S1.006	SMH15	8	92.378	0.203	0.000	0.88			158.3	SURCHARGED
S6.000	SMH17	7	93.263	0.163	0.000	0.64			51.2	SURCHARGED
S6.001	SMH18	7	93.166	0.292	0.000	1.61			106.8	SURCHARGED
S1.007	SMH20	20	92.120	0.131	0.000	1.30			296.4	SURCHARGED
S7.000	SMH21	26	91.926	0.126	0.000	0.15			10.2	SURCHARGED
S1.008	SMH22	26	91.922	-0.152	0.000	0.99			261.9	OK
S1.009	SMH24	35	91.622	-0.431	0.000	0.31			265.0	OK
S8.000	SMH26	7	95.705	-0.075	0.000	0.76			36.3	OK
S9.000	SMH28	7	95.844	-0.081	0.000	0.71			48.8	OK
S8.001	SMH29	7	95.065	-0.040	0.000	1.00			127.5	OK
S8.002	SMH29	8	94.402	-0.066	0.000	0.97			127.5	OK
S8.003	SMH31	8	93.910	-0.032	0.000	0.87			131.8	OK
S8.004	SMH31	8	93.732	0.023	0.000	1.13			131.8	SURCHARGED
S8.005	SMH29	8	93.451	-0.119	0.000	0.67			131.7	OK
S10.000	SMH32	7	95.414	-0.186	0.000	0.07			6.3	OK
S10.001	SMH33	7	94.853	-0.147	0.000	0.26			22.7	OK
S10.002	SMH34	7	93.957	-0.143	0.000	0.28			26.9	OK
S10.003	SMH35	7	93.545	-0.128	0.000	0.38			30.7	OK
S8.006	SMH36	20	92.948	-0.079	0.000	0.89			155.0	OK
S8.007	SMH37	48	92.172	-0.039	0.000	1.00			166.5	OK

Summary Wizard of 30 minute 30 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water			Surcharged		Flow / Cap.	Overflow (l/s)	Half Drain		Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)	Flow	Volume			Time (mins)	Flow		
S11.000	SMH38	7	94.432	-0.111	0.000	0.50					39.2	OK	
S12.000	SMH39	11	93.260	-0.140	0.000	0.07					4.2	OK	
S11.001	SMH40	11	93.256	0.040	0.000	0.71					44.4	SURCHARGED	
S13.000	SMH41	7	93.393	-0.107	0.000	0.52					24.2	OK	
S11.002	SMH42	11	93.194	0.164	0.000	1.36					57.8	SURCHARGED	
S14.000	SMH43	7	94.244	-0.156	0.000	0.20					14.9	OK	
S11.003	SMH44	28	92.766	-0.063	0.000	0.86					69.0	OK	
S8.008	SMH45	47	92.057	0.247	0.000	0.02					2.9	SURCHARGED	
S8.009	SMH46	35	91.622	0.442	0.000	0.08					9.3	SURCHARGED	
S8.010	SMH47	35	91.620	0.544	0.000	0.05					4.6	SURCHARGED	
S1.010	SMH48	35	91.619	0.230	0.000	0.74					267.2	SURCHARGED	
S15.000	SMH46	35	91.588	0.313	0.000	0.00					0.0	SURCHARGED	
S1.011	SMH49	35	91.616	0.258	0.000	0.27					251.4	SURCHARGED	
S1.012	SMH50	35	91.615	0.499	0.000	0.02					12.4	SURCHARGED	
S1.013	SMH51	53	90.357	-0.662	0.000	0.03					12.4	OK	
S1.014	SMH52	55	90.322	-0.674	0.000	0.02					12.4	OK	

Summary Wizard of 60 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 2	Number of Storage Structures 12	Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
Region Scotland and Ireland	Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	20, 20, 20

			Water	Surcharged	Flooded			Half Drain	Pipe		
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow		
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	
S1.000	SMH1	11	94.609	-0.166	0.000	0.15			12.8	OK	
S1.001	SMH3	11	92.563	0.028	0.000	0.41			12.7	SURCHARGED	
S2.000	SMH4	11	93.197	-0.128	0.000	0.38			15.7		OK
S1.002	SMH5	11	92.545	-0.011	0.000	0.91			64.6		OK
S1.003	SMH5	11	92.412	0.000	0.000	1.10			65.0	OK	
S1.004	SMH6	13	92.354	-0.016	0.000	0.99			63.7	OK	
S1.005	SMH6	16	92.277	-0.029	0.000	0.45			63.7	OK	
S3.000	SMH7	11	94.146	-0.154	0.000	0.21			11.7	OK	
S3.001	SMH8	11	93.698	-0.102	0.000	0.54			19.9	OK	
S3.002	SMH9	11	93.551	-0.119	0.000	0.43			20.1	OK	
S4.000	SMH9	11	93.941	-0.159	0.000	0.18			11.3	OK	
S3.003	SMH10	11	93.474	-0.126	0.000	0.40			36.2	OK	
S5.000	SMH13	11	93.266	-0.128	0.000	0.38			25.9	OK	
S3.004	SMH14	11	92.637	-0.038	0.000	0.82			58.8	OK	
S1.006	SMH15	16	92.238	0.063	0.000	0.78			139.5	SURCHARGED	
S6.000	SMH17	11	93.009	-0.091	0.000	0.48			38.5	OK	
S6.001	SMH18	11	92.951	0.077	0.000	1.21			80.3	SURCHARGED	
S1.007	SMH20	26	92.029	0.040	0.000	1.07			245.6	SURCHARGED	
S7.000	SMH21	31	91.891	0.091	0.000	0.11			7.4	SURCHARGED	
S1.008	SMH22	31	91.883	-0.191	0.000	0.91			240.2	OK	
S1.009	SMH24	32	91.763	-0.290	0.000	0.28			244.3	OK	
S8.000	SMH26	11	95.676	-0.104	0.000	0.55			26.2	OK	
S9.000	SMH28	11	95.817	-0.108	0.000	0.51			35.4	OK	
S8.001	SMH29	11	95.010	-0.094	0.000	0.79			101.3	OK	
S8.002	SMH29	11	94.366	-0.102	0.000	0.77			101.6	OK	
S8.003	SMH31	11	93.838	-0.104	0.000	0.75			113.7	OK	
S8.004	SMH31	11	93.646	-0.062	0.000	0.97			113.0	OK	
S8.005	SMH29	11	93.436	-0.134	0.000	0.57			112.1	OK	
S10.000	SMH32	11	95.407	-0.193	0.000	0.05			4.6	OK	
S10.001	SMH33	11	94.842	-0.158	0.000	0.19			16.3	OK	
S10.002	SMH34	11	93.945	-0.155	0.000	0.20			19.3	OK	
S10.003	SMH35	11	93.530	-0.143	0.000	0.27			21.6	OK	
S8.006	SMH36	23	92.928	-0.099	0.000	0.77			132.7	OK	
S8.007	SMH37	47	92.217	0.006	0.000	0.84			140.9	SURCHARGED	

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1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
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File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

Summary Wizard of 60 minute 30 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water Surcharged Flooded			Flow / Cap.	Overflow (l/s)	Half Drain Pipe		Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S11.000	SMH38	11	94.413	-0.130	0.000	0.36			28.5	OK
S12.000	SMH39	14	93.208	-0.192	0.000	0.05			3.1	OK
S11.001	SMH40	15	93.150	-0.066	0.000	0.53			33.5	OK
S13.000	SMH41	11	93.373	-0.127	0.000	0.37			17.3	OK
S11.002	SMH42	17	93.106	0.076	0.000	1.19			50.5	SURCHARGED
S14.000	SMH43	11	94.233	-0.167	0.000	0.14			10.7	OK
S11.003	SMH44	30	92.751	-0.079	0.000	0.74			59.3	OK
S8.008	SMH45	42	92.212	0.403	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	32	91.765	0.585	0.000	0.06			7.1	SURCHARGED
S8.010	SMH47	32	91.763	0.687	0.000	0.05			4.1	SURCHARGED
S1.010	SMH48	32	91.762	0.373	0.000	0.64			228.9	SURCHARGED
S15.000	SMH46	32	91.740	0.465	0.000	0.00			0.0	SURCHARGED
S1.011	SMH49	32	91.760	0.402	0.000	0.23			211.2	SURCHARGED
S1.012	SMH50	32	91.758	0.643	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	58	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	59	90.322	-0.674	0.000	0.02			12.4	OK

Summary Wizard of 180 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

			Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	SMH1	22	94.591	-0.184	0.000	0.08			6.6	OK
S1.001	SMH3	22	92.414	-0.121	0.000	0.21			6.5	OK
S2.000	SMH4	22	93.167	-0.158	0.000	0.19			8.0	OK
S1.002	SMH5	22	92.404	-0.152	0.000	0.49			34.6	OK
S1.003	SMH5	26	92.278	-0.134	0.000	0.58			34.3	OK
S1.004	SMH6	26	92.228	-0.142	0.000	0.53			34.1	OK
S1.005	SMH6	29	92.107	-0.199	0.000	0.25			34.9	OK
S3.000	SMH7	22	94.124	-0.176	0.000	0.11			6.0	OK
S3.001	SMH8	22	93.657	-0.143	0.000	0.28			10.4	OK
S3.002	SMH9	22	93.517	-0.153	0.000	0.22			10.4	OK
S4.000	SMH9	22	93.921	-0.179	0.000	0.09			5.7	OK
S3.003	SMH10	22	93.444	-0.156	0.000	0.20			18.4	OK
S5.000	SMH13	22	93.236	-0.158	0.000	0.19			13.1	OK
S3.004	SMH14	22	92.567	-0.108	0.000	0.53			37.9	OK
S1.006	SMH15	34	91.983	-0.192	0.000	0.47			85.1	OK
S6.000	SMH17	22	92.904	-0.196	0.000	0.26			20.7	OK
S6.001	SMH18	22	92.751	-0.123	0.000	0.64			42.7	OK
S1.007	SMH20	32	91.912	-0.077	0.000	0.63			145.1	OK
S7.000	SMH21	30	91.908	0.108	0.000	0.06			3.9	SURCHARGED
S1.008	SMH22	30	91.907	-0.167	0.000	0.58			152.9	OK
S1.009	SMH24	23	91.905	-0.148	0.000	0.18			153.2	OK
S8.000	SMH26	22	95.636	-0.144	0.000	0.28			13.3	OK
S9.000	SMH28	22	95.778	-0.147	0.000	0.26			18.0	OK
S8.001	SMH29	22	94.939	-0.165	0.000	0.41			52.4	OK
S8.002	SMH29	22	94.300	-0.168	0.000	0.40			52.2	OK
S8.003	SMH31	22	93.774	-0.168	0.000	0.39			59.5	OK
S8.004	SMH31	22	93.562	-0.147	0.000	0.51			59.9	OK
S8.005	SMH29	22	93.384	-0.186	0.000	0.31			60.1	OK
S10.000	SMH32	22	95.399	-0.201	0.000	0.02			2.3	OK
S10.001	SMH33	22	94.821	-0.179	0.000	0.09			8.2	OK
S10.002	SMH34	21	93.923	-0.177	0.000	0.10			9.8	OK
S10.003	SMH35	21	93.504	-0.169	0.000	0.14			11.1	OK
S8.006	SMH36	35	92.860	-0.167	0.000	0.41			71.1	OK
S8.007	SMH37	34	92.473	0.262	0.000	0.45			75.8	SURCHARGED

Summary Wizard of 180 minute 30 year Summer I+20% for Storm										
			Water	Surcharged	Flooded				Half Drain	Pipe
PN	US/MH Name	Storm Rank	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status
S11.000	SMH38	22	94.383	-0.160	0.000	0.18			14.5	OK
S12.000	SMH39	25	93.199	-0.201	0.000	0.03			1.6	OK
S11.001	SMH40	28	93.072	-0.144	0.000	0.28			17.5	OK
S13.000	SMH41	23	93.342	-0.158	0.000	0.19			9.0	OK
S11.002	SMH42	33	92.949	-0.081	0.000	0.72			30.6	OK
S14.000	SMH43	22	94.215	-0.185	0.000	0.07			5.5	OK
S11.003	SMH44	40	92.711	-0.118	0.000	0.45			35.8	OK
S8.008	SMH45	33	92.471	0.661	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	23	91.908	0.728	0.000	0.04			4.3	SURCHARGED
S8.010	SMH47	23	91.906	0.829	0.000	0.04			3.7	SURCHARGED
S1.010	SMH48	23	91.904	0.515	0.000	0.40			144.9	SURCHARGED
S15.000	SMH46	23	91.885	0.610	0.000	0.00			0.0	SURCHARGED
S1.011	SMH49	23	91.902	0.545	0.000	0.12			116.1	SURCHARGED
S1.012	SMH50	23	91.901	0.785	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	33	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	34	90.322	-0.674	0.000	0.02			12.4	OK

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1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
Date 29/03/2022 16:38	Designed by JF	
File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

Summary Wizard of 360 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow	Half Drain Time	Pipe Flow	Status
			(m)	(m)	(m³)	Cap. (l/s)	(mins)	(l/s)	
S1.000	SMH1	31	94.581	-0.194	0.000	0.05		4.0	OK
S1.001	SMH3	31	92.380	-0.155	0.000	0.13		4.0	OK
S2.000	SMH4	31	93.151	-0.174	0.000	0.12		4.9	OK
S1.002	SMH5	32	92.368	-0.188	0.000	0.30		21.2	OK
S1.003	SMH5	33	92.236	-0.176	0.000	0.36		21.2	OK
S1.004	SMH6	33	92.188	-0.182	0.000	0.33		21.2	OK
S1.005	SMH6	35	92.084	-0.222	0.000	0.15		21.7	OK
S3.000	SMH7	31	94.113	-0.187	0.000	0.07		3.6	OK
S3.001	SMH8	31	93.638	-0.162	0.000	0.17		6.4	OK
S3.002	SMH9	31	93.500	-0.170	0.000	0.14		6.4	OK
S4.000	SMH9	31	93.909	-0.191	0.000	0.06		3.5	OK
S3.003	SMH10	31	93.428	-0.172	0.000	0.12		11.4	OK
S5.000	SMH13	31	93.220	-0.174	0.000	0.12		8.0	OK
S3.004	SMH14	31	92.539	-0.136	0.000	0.33		23.8	OK
S1.006	SMH15	39	91.939	-0.236	0.000	0.30		53.4	OK
S6.000	SMH17	31	92.879	-0.221	0.000	0.16		12.6	OK
S6.001	SMH18	31	92.705	-0.169	0.000	0.40		26.4	OK
S1.007	SMH20	30	91.925	-0.064	0.000	0.40		91.2	OK
S7.000	SMH21	27	91.921	0.121	0.000	0.04		2.5	SURCHARGED
S1.008	SMH22	27	91.920	-0.154	0.000	0.37		96.9	OK
S1.009	SMH24	21	91.919	-0.134	0.000	0.11		98.0	OK
S8.000	SMH26	31	95.617	-0.163	0.000	0.17		8.1	OK
S9.000	SMH28	31	95.760	-0.165	0.000	0.16		11.0	OK
S8.001	SMH29	31	94.906	-0.198	0.000	0.25		32.3	OK
S8.002	SMH29	31	94.268	-0.200	0.000	0.24		32.3	OK
S8.003	SMH31	31	93.742	-0.200	0.000	0.25		37.0	OK
S8.004	SMH31	31	93.525	-0.184	0.000	0.32		37.0	OK
S8.005	SMH29	32	93.358	-0.212	0.000	0.19		37.0	OK
S10.000	SMH32	31	95.391	-0.209	0.000	0.02		1.4	OK
S10.001	SMH33	31	94.810	-0.190	0.000	0.06		5.0	OK
S10.002	SMH34	31	93.912	-0.188	0.000	0.06		6.0	OK
S10.003	SMH35	31	93.492	-0.181	0.000	0.09		6.8	OK
S8.006	SMH36	42	92.829	-0.198	0.000	0.25		43.9	OK
S8.007	SMH37	25	92.630	0.419	0.000	0.28		46.9	SURCHARGED

Summary Wizard of 360 minute 30 year Summer I+20% for Storm										
			Water	Surcharged	Flooded				Half Drain	Pipe
PN	US/MH Name	Storm Rank	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status
S11.000	SMH38	31	94.368	-0.175	0.000	0.11			8.8	OK
S12.000	SMH39	34	93.192	-0.208	0.000	0.02			1.0	OK
S11.001	SMH40	37	93.053	-0.163	0.000	0.17			10.7	OK
S13.000	SMH41	33	93.326	-0.174	0.000	0.12			5.5	OK
S11.002	SMH42	40	92.910	-0.120	0.000	0.45			19.0	OK
S14.000	SMH43	31	94.205	-0.195	0.000	0.04			3.4	OK
S11.003	SMH44	47	92.685	-0.144	0.000	0.28			22.4	OK
S8.008	SMH45	25	92.629	0.819	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	21	91.921	0.741	0.000	0.03			3.8	SURCHARGED
S8.010	SMH47	21	91.919	0.842	0.000	0.04			3.7	SURCHARGED
S1.010	SMH48	21	91.917	0.529	0.000	0.26			94.5	SURCHARGED
S15.000	SMH46	20	91.899	0.624	0.000	0.02			0.4	SURCHARGED
S1.011	SMH49	21	91.916	0.558	0.000	0.07			68.9	SURCHARGED
S1.012	SMH50	21	91.914	0.799	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	26	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	29	90.322	-0.674	0.000	0.02			12.4	OK

Cronin & Sutton Consulting		Page 18
1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
Date 29/03/2022 16:38	Designed by JF	
File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

Summary Wizard of 720 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

			Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	SMH1	40	94.575	-0.200	0.000	0.03			2.4	OK
S1.001	SMH3	40	92.359	-0.176	0.000	0.08			2.4	OK
S2.000	SMH4	40	93.139	-0.186	0.000	0.07			2.9	OK
S1.002	SMH5	40	92.341	-0.215	0.000	0.18			12.8	OK
S1.003	SMH5	41	92.206	-0.206	0.000	0.22			12.8	OK
S1.004	SMH6	41	92.160	-0.210	0.000	0.20			12.8	OK
S1.005	SMH6	42	92.067	-0.239	0.000	0.09			13.1	OK
S3.000	SMH7	40	94.104	-0.196	0.000	0.04			2.2	OK
S3.001	SMH8	40	93.623	-0.177	0.000	0.10			3.8	OK
S3.002	SMH9	40	93.488	-0.182	0.000	0.08			3.8	OK
S4.000	SMH9	40	93.902	-0.198	0.000	0.03			2.1	OK
S3.003	SMH10	40	93.416	-0.184	0.000	0.08			6.9	OK
S5.000	SMH13	40	93.208	-0.186	0.000	0.07			4.8	OK
S3.004	SMH14	40	92.518	-0.157	0.000	0.20			14.4	OK
S1.006	SMH15	44	91.906	-0.269	0.000	0.18			32.2	OK
S6.000	SMH17	40	92.862	-0.238	0.000	0.10			7.6	OK
S6.001	SMH18	40	92.673	-0.201	0.000	0.24			15.9	OK
S1.007	SMH20	33	91.885	-0.104	0.000	0.24			55.1	OK
S7.000	SMH21	32	91.880	0.080	0.000	0.02			1.5	SURCHARGED
S1.008	SMH22	32	91.880	-0.194	0.000	0.21			57.0	
S1.009	SMH24	24	91.878	-0.175	0.000	0.07			58.1	OK
S8.000	SMH26	40	95.603	-0.177	0.000	0.10			4.9	OK
S9.000	SMH28	40	95.747	-0.178	0.000	0.10			6.6	OK
S8.001	SMH29	40	94.882	-0.222	0.000	0.15			19.5	OK
S8.002	SMH29	40	94.244	-0.224	0.000	0.15			19.5	OK
S8.003	SMH31	40	93.718	-0.224	0.000	0.15			22.3	OK
S8.004	SMH31	40	93.497	-0.212	0.000	0.19			22.3	OK
S8.005	SMH29	41	93.337	-0.233	0.000	0.11			22.3	OK
S10.000	SMH32	40	95.385	-0.215	0.000	0.01			0.8	OK
S10.001	SMH33	40	94.802	-0.198	0.000	0.03			3.0	OK
S10.002	SMH34	40	93.903	-0.197	0.000	0.04			3.6	OK
S10.003	SMH35	40	93.481	-0.192	0.000	0.05			4.1	OK
S8.006	SMH36	49	92.805	-0.222	0.000	0.15			26.4	OK
S8.007	SMH37	21	92.742	0.531	0.000	0.17			28.2	SURCHARGED

Summary Wizard of 720 minute 30 year Summer I+20% for Storm										
			Water	Surcharged	Flooded				Half Drain	Pipe
PN	US/MH Name	Storm Rank	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status
S11.000	SMH38	40	94.356	-0.187	0.000	0.07			5.3	OK
S12.000	SMH39	43	93.185	-0.215	0.000	0.01			0.6	OK
S11.001	SMH40	45	93.039	-0.177	0.000	0.10			6.5	OK
S13.000	SMH41	42	93.314	-0.186	0.000	0.07			3.3	OK
S11.002	SMH42	47	92.884	-0.146	0.000	0.27			11.5	OK
S14.000	SMH43	40	94.199	-0.201	0.000	0.03			2.0	OK
S11.003	SMH44	33	92.743	-0.087	0.000	0.17			13.5	OK
S8.008	SMH45	21	92.740	0.930	0.000	0.02			3.0	SURCHARGED
S8.009	SMH46	24	91.880	0.700	0.000	0.03			3.5	SURCHARGED
S8.010	SMH47	24	91.878	0.802	0.000	0.04			3.6	SURCHARGED
S1.010	SMH48	24	91.877	0.488	0.000	0.16			57.1	SURCHARGED
S15.000	SMH46	24	91.859	0.584	0.000	0.02			0.4	SURCHARGED
S1.011	SMH49	24	91.875	0.518	0.000	0.05			44.5	SURCHARGED
S1.012	SMH50	24	91.874	0.758	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	32	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	39	90.322	-0.674	0.000	0.02			12.4	OK

Cronin & Sutton Consulting

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Dublin

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Date 29/03/2022 16:38

File L086 - COMBINED DRAINAGE (JF 20...

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L086-DEVOY BARRACKS


STORM NETWORK

Designed by JF

Checked by GL

Network 2020.1.3

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Summary Wizard of 1440 minute 30 year Summer I+20% for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coeffiecient 1.000

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 2

Number of Storage Structures 12

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model

FSR M5-60 (mm) 17.900

Cv (Summer) 0.750

Region Scotland and Ireland

Ratio R 0.330

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

DVD Status OFF

Analysis Timestep

Fine Inertia Status OFF

DTS Status

ON

Profile(s)

Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080

Return Period(s) (years) 1, 30, 100

Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	SMH1	48	94.568	-0.207	0.000	0.02			1.5	OK
S1.001	SMH3	48	92.345	-0.190	0.000	0.05			1.5	OK
S2.000	SMH4	48	93.130	-0.195	0.000	0.04			1.8	OK
S1.002	SMH5	48	92.321	-0.235	0.000	0.11			7.7	OK
S1.003	SMH5	48	92.184	-0.228	0.000	0.13			7.7	OK
S1.004	SMH6	48	92.139	-0.231	0.000	0.12			7.7	OK
S1.005	SMH6	49	92.051	-0.255	0.000	0.06			7.9	OK
S3.000	SMH7	48	94.098	-0.202	0.000	0.02			1.3	OK
S3.001	SMH8	48	93.612	-0.188	0.000	0.06			2.3	OK
S3.002	SMH9	48	93.477	-0.193	0.000	0.05			2.3	OK
S4.000	SMH9	48	93.897	-0.203	0.000	0.02			1.3	OK
S3.003	SMH10	48	93.406	-0.194	0.000	0.05			4.1	OK
S5.000	SMH13	48	93.199	-0.195	0.000	0.04			2.9	OK
S3.004	SMH14	48	92.502	-0.173	0.000	0.12			8.6	OK
S1.006	SMH15	49	91.882	-0.293	0.000	0.11			19.4	OK
S6.000	SMH17	48	92.846	-0.254	0.000	0.06			4.6	OK
S6.001	SMH18	48	92.649	-0.225	0.000	0.14			9.6	OK
S1.007	SMH20	42	91.775	-0.214	0.000	0.14			33.1	OK
S7.000	SMH21	38	91.771	-0.029	0.000	0.01			0.9	OK
S1.008	SMH22	38	91.771	-0.303	0.000	0.13			35.1	OK
S1.009	SMH24	31	91.769	-0.284	0.000	0.04			36.1	OK
S8.000	SMH26	48	95.591	-0.189	0.000	0.06			2.9	OK
S9.000	SMH28	48	95.735	-0.190	0.000	0.06			4.0	OK
S8.001	SMH29	48	94.865	-0.239	0.000	0.09			11.7	OK
S8.002	SMH29	48	94.228	-0.240	0.000	0.09			11.7	OK
S8.003	SMH31	48	93.702	-0.240	0.000	0.09			13.3	OK
S8.004	SMH31	48	93.476	-0.233	0.000	0.11			13.3	OK
S8.005	SMH29	49	93.321	-0.249	0.000	0.07			13.3	OK
S10.000	SMH32	48	95.381	-0.219	0.000	0.01			0.5	OK
S10.001	SMH33	48	94.797	-0.203	0.000	0.02			1.8	OK
S10.002	SMH34	48	93.898	-0.202	0.000	0.02			2.2	OK
S10.003	SMH35	48	93.474	-0.199	0.000	0.03			2.5	OK
S8.006	SMH36	54	92.788	-0.239	0.000	0.09			15.8	OK
S8.007	SMH37	20	92.743	0.532	0.000	0.10			16.9	SURCHARGED

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Summary Wizard of 1440 minute 30 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded			Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	
S11.000	SMH38	48	94.347	-0.196	0.000	0.04			3.2	OK
S12.000	SMH39	50	93.181	-0.219	0.000	0.01			0.3	OK
S11.001	SMH40	51	93.027	-0.189	0.000	0.06			3.9	OK
S13.000	SMH41	49	93.305	-0.195	0.000	0.04			2.0	OK
S11.002	SMH42	53	92.865	-0.165	0.000	0.16			6.9	OK
S14.000	SMH43	48	94.192	-0.208	0.000	0.02			1.2	OK
S11.003	SMH44	31	92.744	-0.085	0.000	0.10			8.1	OK
S8.008	SMH45	20	92.742	0.932	0.000	0.02			3.1	SURCHARGED
S8.009	SMH46	31	91.771	0.592	0.000	0.03			3.5	SURCHARGED
S8.010	SMH47	31	91.769	0.693	0.000	0.04			3.7	SURCHARGED
S1.010	SMH48	31	91.768	0.379	0.000	0.10			37.2	SURCHARGED
S15.000	SMH46	31	91.751	0.476	0.000	0.02			0.3	SURCHARGED
S1.011	SMH49	31	91.766	0.408	0.000	0.03			30.6	SURCHARGED
S1.012	SMH50	31	91.765	0.649	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	51	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	50	90.322	-0.674	0.000	0.02			12.4	OK

Summary Wizard of 2880 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm) 17.900 Cv (Summer) 0.750	
Region Scotland and Ireland	Ratio R 0.330 Cv (Winter) 0.840	

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow		Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S1.000	SMH1	54	94.561	-0.214	0.000	0.01			0.9	OK
S1.001	SMH3	54	92.336	-0.199	0.000	0.03			0.9	OK
S2.000	SMH4	54	93.124	-0.201	0.000	0.03			1.1	OK
S1.002	SMH5	54	92.307	-0.249	0.000	0.07			4.8	OK
S1.003	SMH5	54	92.169	-0.243	0.000	0.08			4.8	OK
S1.004	SMH6	54	92.124	-0.246	0.000	0.07			4.8	OK
S1.005	SMH6	54	92.042	-0.264	0.000	0.03			4.9	OK
S3.000	SMH7	54	94.091	-0.209	0.000	0.01			0.8	OK
S3.001	SMH8	54	93.604	-0.196	0.000	0.04			1.4	OK
S3.002	SMH9	54	93.471	-0.199	0.000	0.03			1.4	OK
S4.000	SMH9	54	93.889	-0.211	0.000	0.01			0.8	OK
S3.003	SMH10	54	93.400	-0.200	0.000	0.03			2.6	OK
S5.000	SMH13	54	93.193	-0.201	0.000	0.03			1.8	OK
S3.004	SMH14	54	92.490	-0.185	0.000	0.08			5.4	OK
S1.006	SMH15	54	91.863	-0.312	0.000	0.07			12.1	OK
S6.000	SMH17	54	92.837	-0.263	0.000	0.04			2.9	OK
S6.001	SMH18	54	92.634	-0.240	0.000	0.09			6.0	OK
S1.007	SMH20	54	91.585	-0.404	0.000	0.09			20.7	OK
S7.000	SMH21	55	91.584	-0.216	0.000	0.01			0.6	OK
S1.008	SMH22	49	91.568	-0.506	0.000	0.09			22.6	OK
S1.009	SMH24	39	91.565	-0.488	0.000	0.03			23.3	OK
S8.000	SMH26	54	95.583	-0.197	0.000	0.04			1.8	OK
S9.000	SMH28	54	95.727	-0.198	0.000	0.04			2.5	OK
S8.001	SMH29	54	94.850	-0.254	0.000	0.06			7.3	OK
S8.002	SMH29	54	94.213	-0.255	0.000	0.05			7.3	OK
S8.003	SMH31	54	93.687	-0.255	0.000	0.05			8.3	OK
S8.004	SMH31	54	93.461	-0.248	0.000	0.07			8.3	OK
S8.005	SMH29	54	93.309	-0.260	0.000	0.04			8.3	OK
S10.000	SMH32	54	95.379	-0.221	0.000	0.00			0.3	OK
S10.001	SMH33	54	94.789	-0.211	0.000	0.01			1.1	OK
S10.002	SMH34	54	93.890	-0.210	0.000	0.01			1.4	OK
S10.003	SMH35	54	93.469	-0.204	0.000	0.02			1.5	OK
S8.006	SMH36	57	92.773	-0.254	0.000	0.06			9.8	OK
S8.007	SMH37	23	92.668	0.457	0.000	0.06			10.5	SURCHARGED

Summary Wizard of 2880 minute 30 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded			Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	
S11.000	SMH38	54	94.342	-0.201	0.000	0.03			2.0	OK
S12.000	SMH39	55	93.179	-0.221	0.000	0.00			0.2	OK
S11.001	SMH40	55	93.019	-0.197	0.000	0.04			2.4	OK
S13.000	SMH41	54	93.299	-0.201	0.000	0.03			1.2	OK
S11.002	SMH42	57	92.852	-0.177	0.000	0.10			4.3	OK
S14.000	SMH43	54	94.186	-0.214	0.000	0.01			0.8	OK
S11.003	SMH44	52	92.669	-0.161	0.000	0.06			5.1	OK
S8.008	SMH45	23	92.666	0.856	0.000	0.02			3.0	SURCHARGED
S8.009	SMH46	37	91.568	0.388	0.000	0.03			3.4	SURCHARGED
S8.010	SMH47	37	91.566	0.489	0.000	0.04			3.5	SURCHARGED
S1.010	SMH48	37	91.564	0.175	0.000	0.07			25.2	SURCHARGED
S15.000	SMH46	37	91.551	0.276	0.000	0.01			0.1	SURCHARGED
S1.011	SMH49	37	91.563	0.205	0.000	0.02			23.0	SURCHARGED
S1.012	SMH50	37	91.561	0.446	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	36	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	32	90.322	-0.674	0.000	0.02			12.4	OK

Summary Wizard of 10080 minute 30 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

			Water	Surcharged	Flooded	Half Drain			Pipe	
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	SMH1	65	94.554	-0.221	0.000	0.00			0.4	OK
S1.001	SMH3	65	92.323	-0.212	0.000	0.01			0.4	OK
S2.000	SMH4	65	93.111	-0.214	0.000	0.01			0.4	OK
S1.002	SMH5	65	92.288	-0.268	0.000	0.03			1.9	OK
S1.003	SMH5	65	92.147	-0.265	0.000	0.03			1.9	OK
S1.004	SMH6	65	92.104	-0.266	0.000	0.03			1.9	OK
S1.005	SMH6	65	92.025	-0.281	0.000	0.01			1.9	OK
S3.000	SMH7	65	94.081	-0.219	0.000	0.01			0.3	OK
S3.001	SMH8	65	93.592	-0.208	0.000	0.02			0.6	OK
S3.002	SMH9	65	93.458	-0.212	0.000	0.01			0.6	OK
S4.000	SMH9	65	93.880	-0.220	0.000	0.01			0.3	OK
S3.003	SMH10	65	93.387	-0.213	0.000	0.01			1.0	OK
S5.000	SMH13	65	93.180	-0.214	0.000	0.01			0.7	OK
S3.004	SMH14	65	92.475	-0.200	0.000	0.03			2.1	OK
S1.006	SMH15	64	91.841	-0.334	0.000	0.03			4.8	OK
S6.000	SMH17	65	92.820	-0.280	0.000	0.01			1.1	OK
S6.001	SMH18	65	92.610	-0.264	0.000	0.04			2.4	OK
S1.007	SMH20	65	91.529	-0.460	0.000	0.04			8.2	OK
S7.000	SMH21	65	91.579	-0.221	0.000	0.00			0.2	OK
S1.008	SMH22	65	91.421	-0.653	0.000	0.03			8.9	OK
S1.009	SMH24	65	91.341	-0.712	0.000	0.01			9.2	OK
S8.000	SMH26	65	95.571	-0.209	0.000	0.02			0.7	OK
S9.000	SMH28	65	95.715	-0.210	0.000	0.01			1.0	OK
S8.001	SMH29	65	94.835	-0.269	0.000	0.02			2.9	OK
S8.002	SMH29	64	94.198	-0.270	0.000	0.02			2.9	OK
S8.003	SMH31	64	93.672	-0.270	0.000	0.02			3.3	OK
S8.004	SMH31	65	93.442	-0.267	0.000	0.03			3.3	OK
S8.005	SMH29	65	93.294	-0.276	0.000	0.02			3.3	OK
S10.000	SMH32	64	95.376	-0.224	0.000	0.00			0.1	OK
S10.001	SMH33	65	94.781	-0.219	0.000	0.01			0.4	OK
S10.002	SMH34	64	93.881	-0.219	0.000	0.01			0.5	OK
S10.003	SMH35	65	93.456	-0.217	0.000	0.01			0.6	OK
S8.006	SMH36	64	92.758	-0.269	0.000	0.02			3.9	OK
S8.007	SMH37	42	92.285	0.074	0.000	0.03			4.2	SURCHARGED

Summary Wizard of 10080 minute 30 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded			Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	
S11.000	SMH38	65	94.329	-0.214	0.000	0.01			0.8	OK
S12.000	SMH39	65	93.176	-0.224	0.000	0.00			0.1	OK
S11.001	SMH40	65	93.007	-0.209	0.000	0.02			1.0	OK
S13.000	SMH41	65	93.286	-0.214	0.000	0.01			0.5	OK
S11.002	SMH42	65	92.834	-0.196	0.000	0.04			1.7	OK
S14.000	SMH43	65	94.179	-0.221	0.000	0.00			0.3	OK
S11.003	SMH44	66	92.628	-0.201	0.000	0.02			2.0	OK
S8.008	SMH45	39	92.283	0.474	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	64	90.845	-0.335	0.000	0.03			3.1	OK
S8.010	SMH47	64	90.757	-0.319	0.000	0.03			3.1	OK
S1.010	SMH48	64	90.728	-0.661	0.000	0.03			12.3	OK
S15.000	SMH46	64	91.050	-0.225	0.000	0.00			0.0	OK
S1.011	SMH49	64	90.664	-0.693	0.000	0.01			12.3	OK
S1.012	SMH50	64	90.617	-0.499	0.000	0.02			11.7	OK
S1.013	SMH51	64	90.355	-0.664	0.000	0.03			11.7	OK
S1.014	SMH52	64	90.320	-0.675	0.000	0.02			11.7	OK

Summary Wizard of 15 minute 100 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water Surcharged			Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)					
S11.000	SMH38	2	94.464	-0.079	0.000	0.75			59.1	OK
S12.000	SMH39	2	93.470	0.070	0.000	0.08			4.8	SURCHARGED
S11.001	SMH40	2	93.464	0.249	0.000	1.02			64.0	SURCHARGED
S13.000	SMH41	2	93.495	-0.005	0.000	0.74			34.3	OK
S11.002	SMH42	3	93.330	0.300	0.000	1.57			66.6	SURCHARGED
S14.000	SMH43	2	94.259	-0.141	0.000	0.30			22.2	OK
S11.003	SMH44	21	92.835	0.005	0.000	0.99			79.4	SURCHARGED
S8.008	SMH45	48	92.050	0.240	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	36	91.618	0.438	0.000	0.10			12.1	SURCHARGED
S8.010	SMH47	36	91.616	0.540	0.000	0.06			5.0	SURCHARGED
S1.010	SMH48	36	91.615	0.226	0.000	0.76			273.6	SURCHARGED
S15.000	SMH46	36	91.579	0.304	0.000	0.00			0.0	SURCHARGED
S1.011	SMH49	36	91.611	0.254	0.000	0.29			269.0	SURCHARGED
S1.012	SMH50	36	91.610	0.494	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	49	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	47	90.322	-0.674	0.000	0.02			12.4	OK

Summary Wizard of 30 minute 100 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow	Half Drain Time	Pipe Flow	Status
			(m)	(m)	(m³)	Cap. (l/s)	(mins)	(l/s)	
S1.000	SMH1	3	94.630	-0.145	0.000	0.27		23.2	OK
S1.001	SMH3	3	93.079	0.544	0.000	0.68		21.0	SURCHARGED
S2.000	SMH4	3	93.239	-0.086	0.000	0.68		28.4	OK
S1.002	SMH5	3	93.052	0.496	0.000	1.33		94.6	SURCHARGED
S1.003	SMH5	3	92.826	0.414	0.000	1.52		89.9	SURCHARGED
S1.004	SMH6	3	92.736	0.366	0.000	1.40		89.5	SURCHARGED
S1.005	SMH6	4	92.627	0.321	0.000	0.64		91.3	SURCHARGED
S3.000	SMH7	3	94.173	-0.127	0.000	0.38		21.1	OK
S3.001	SMH8	3	93.765	-0.035	0.000	1.00		36.5	OK
S3.002	SMH9	3	93.596	-0.074	0.000	0.78		36.4	OK
S4.000	SMH9	3	93.965	-0.135	0.000	0.33		20.4	OK
S3.003	SMH10	3	93.515	-0.085	0.000	0.70		63.7	OK
S5.000	SMH13	3	93.308	-0.086	0.000	0.68		46.5	OK
S3.004	SMH14	3	92.781	0.106	0.000	1.00		71.8	SURCHARGED
S1.006	SMH15	4	92.551	0.376	0.000	0.93		167.5	SURCHARGED
S6.000	SMH17	3	93.635	0.535	0.000	0.83		65.6	SURCHARGED
S6.001	SMH18	3	93.478	0.604	0.000	2.06		136.5	SURCHARGED
S1.007	SMH20	8	92.285	0.296	0.000	1.53		350.5	SURCHARGED
S7.000	SMH21	15	92.056	0.256	0.000	0.20		13.4	SURCHARGED
S1.008	SMH22	17	92.052	-0.022	0.000	1.00		265.4	OK
S1.009	SMH24	27	91.840	-0.213	0.000	0.31		271.7	OK
S8.000	SMH26	3	95.748	-0.032	0.000	1.00		47.5	OK
S9.000	SMH28	3	95.895	-0.030	0.000	0.92		63.2	OK
S8.001	SMH29	3	95.180	0.076	0.000	1.05		134.6	SURCHARGED
S8.002	SMH29	3	94.484	0.016	0.000	1.01		132.9	SURCHARGED
S8.003	SMH31	3	93.954	0.012	0.000	0.93		139.9	SURCHARGED
S8.004	SMH31	3	93.754	0.046	0.000	1.20		139.9	SURCHARGED
S8.005	SMH29	4	93.458	-0.111	0.000	0.72		139.8	OK
S10.000	SMH32	3	95.420	-0.180	0.000	0.09		8.3	OK
S10.001	SMH33	3	94.866	-0.134	0.000	0.34		29.6	OK
S10.002	SMH34	3	93.971	-0.129	0.000	0.37		35.1	OK
S10.003	SMH35	3	93.561	-0.113	0.000	0.50		39.8	OK
S8.006	SMH36	8	93.151	0.124	0.000	0.98		170.1	SURCHARGED
S8.007	SMH37	37	92.381	0.170	0.000	1.10		183.3	SURCHARGED

Summary Wizard of 30 minute 100 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S11.000	SMH38	3	94.453	-0.090	0.000	0.65			51.2	OK
S12.000	SMH39	3	93.418	0.018	0.000	0.07			4.5	SURCHARGED
S11.001	SMH40	3	93.413	0.197	0.000	0.91			57.5	SURCHARGED
S13.000	SMH41	3	93.445	-0.055	0.000	0.67			31.0	OK
S11.002	SMH42	6	93.317	0.288	0.000	1.51			64.1	SURCHARGED
S14.000	SMH43	3	94.254	-0.146	0.000	0.26			19.4	OK
S11.003	SMH44	17	92.863	0.033	0.000	0.95			76.2	SURCHARGED
S8.008	SMH45	40	92.251	0.442	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	27	91.839	0.659	0.000	0.09			11.0	SURCHARGED
S8.010	SMH47	27	91.837	0.761	0.000	0.08			7.3	SURCHARGED
S1.010	SMH48	27	91.835	0.447	0.000	0.77			278.5	SURCHARGED
S15.000	SMH46	28	91.793	0.518	0.000	0.00			0.0	SURCHARGED
S1.011	SMH49	27	91.832	0.474	0.000	0.28			264.7	SURCHARGED
S1.012	SMH50	27	91.831	0.715	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	43	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	49	90.322	-0.674	0.000	0.02			12.4	OK

L086-DEVOY BARRACKS
STORM NETWORK

Designed by JF

Checked by GL

Network 2020.1.3



Simulation Criteria

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	12	Number of Real Time Controls	0


Rainfall Model	FSR M5-60 (mm)	17.900	Cv (Summer)	0.750
Region Scotland and Ireland	Ratio R	0.330	Cv (Winter)	0.840

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080

Return Period(s) (years)	1, 30, 100
Climate Change (%)	20, 20, 20

			Water	Surcharged	Flooded	Half Drain			Pipe	
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	SMH1	8	94.618	-0.157	0.000	0.19			16.6	OK
S1.001	SMH3	7	92.853	0.318	0.000	0.51			15.8	SURCHARGED
S2.000	SMH4	8	93.213	-0.112	0.000	0.49			20.3	OK
S1.002	SMH5	7	92.833	0.277	0.000	1.13			79.9	SURCHARGED
S1.003	SMH5	7	92.658	0.246	0.000	1.34			79.2	SURCHARGED
S1.004	SMH6	7	92.585	0.215	0.000	1.23			78.6	SURCHARGED
S1.005	SMH6	7	92.490	0.184	0.000	0.56			79.7	SURCHARGED
S3.000	SMH7	8	94.157	-0.143	0.000	0.28			15.1	OK
S3.001	SMH8	8	93.721	-0.079	0.000	0.71			25.8	OK
S3.002	SMH9	8	93.569	-0.101	0.000	0.56			26.1	OK
S4.000	SMH9	8	93.950	-0.150	0.000	0.24			14.7	OK
S3.003	SMH10	8	93.490	-0.110	0.000	0.51			46.8	OK
S5.000	SMH13	8	93.282	-0.112	0.000	0.49			33.6	OK
S3.004	SMH14	5	92.725	0.050	0.000	0.96			68.3	SURCHARGED
S1.006	SMH15	6	92.426	0.251	0.000	0.86			154.6	SURCHARGED
S6.000	SMH17	8	93.235	0.135	0.000	0.63			49.6	SURCHARGED
S6.001	SMH18	8	93.142	0.268	0.000	1.56			103.6	SURCHARGED
S1.007	SMH20	13	92.178	0.189	0.000	1.30			296.4	SURCHARGED
S7.000	SMH21	21	92.007	0.207	0.000	0.14			9.8	SURCHARGED
S1.008	SMH22	21	92.006	-0.068	0.000	1.00			265.4	OK
S1.009	SMH24	17	92.004	-0.049	0.000	0.32			272.3	OK
S8.000	SMH26	8	95.699	-0.081	0.000	0.71			34.0	OK
S9.000	SMH28	8	95.838	-0.087	0.000	0.67			45.8	OK
S8.001	SMH29	8	95.053	-0.051	0.000	1.00			127.5	OK
S8.002	SMH29	6	94.403	-0.065	0.000	0.97			127.4	OK
S8.003	SMH31	6	93.919	-0.023	0.000	0.89			134.0	OK
S8.004	SMH31	6	93.738	0.029	0.000	1.15			133.8	SURCHARGED
S8.005	SMH29	6	93.453	-0.117	0.000	0.68			133.6	OK
S10.000	SMH32	8	95.412	-0.188	0.000	0.06			5.9	OK
S10.001	SMH33	8	94.851	-0.149	0.000	0.24			21.2	OK
S10.002	SMH34	8	93.955	-0.145	0.000	0.26			25.1	OK
S10.003	SMH35	8	93.543	-0.131	0.000	0.35			28.0	OK
S8.006	SMH36	11	93.099	0.072	0.000	0.89			154.7	SURCHARGED
S8.007	SMH37	35	92.458	0.247	0.000	0.98			163.4	SURCHARGED

Summary Wizard of 60 minute 100 year Summer I+20% for Storm										
			Water	Surcharged	Flooded				Half Drain	Pipe
PN	US/MH Name	Storm Rank	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status
S11.000	SMH38	8	94.428	-0.115	0.000	0.47			37.0	OK
S12.000	SMH39	9	93.286	-0.114	0.000	0.06			3.6	OK
S11.001	SMH40	9	93.282	0.066	0.000	0.65			41.1	SURCHARGED
S13.000	SMH41	8	93.389	-0.111	0.000	0.48			22.4	OK
S11.002	SMH42	10	93.211	0.182	0.000	1.40			59.3	SURCHARGED
S14.000	SMH43	8	94.242	-0.158	0.000	0.18			13.8	OK
S11.003	SMH44	20	92.836	0.006	0.000	0.86			69.1	SURCHARGED
S8.008	SMH45	34	92.453	0.643	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	17	92.005	0.826	0.000	0.07			7.9	SURCHARGED
S8.010	SMH47	17	92.004	0.927	0.000	0.05			4.4	SURCHARGED
S1.010	SMH48	17	92.002	0.613	0.000	0.70			253.7	SURCHARGED
S15.000	SMH46	17	91.971	0.696	0.000	0.00			0.0	SURCHARGED
S1.011	SMH49	17	92.000	0.642	0.000	0.25			233.9	SURCHARGED
S1.012	SMH50	17	91.998	0.883	0.000	0.02			12.6	SURCHARGED
S1.013	SMH51	17	90.357	-0.661	0.000	0.03			12.6	OK
S1.014	SMH52	17	90.322	-0.673	0.000	0.02			12.6	OK

Cronin & Sutton Consulting		Page 32
1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
Date 29/03/2022 16:38	Designed by JF	
File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

Summary Wizard of 180 minute 100 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840


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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

			Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	SMH1	16	94.597	-0.178	0.000	0.10			8.4	OK
S1.001	SMH3	14	92.441	-0.094	0.000	0.27			8.3	OK
S2.000	SMH4	16	93.175	-0.150	0.000	0.24			10.2	OK
S1.002	SMH5	14	92.429	-0.127	0.000	0.62			44.2	OK
S1.003	SMH5	17	92.308	-0.104	0.000	0.74			43.8	OK
S1.004	SMH6	19	92.255	-0.115	0.000	0.68			43.6	OK
S1.005	SMH6	20	92.193	-0.113	0.000	0.31			44.7	OK
S3.000	SMH7	16	94.131	-0.169	0.000	0.14			7.6	OK
S3.001	SMH8	15	93.669	-0.131	0.000	0.36			13.3	OK
S3.002	SMH9	15	93.527	-0.143	0.000	0.28			13.3	OK
S4.000	SMH9	16	93.926	-0.174	0.000	0.12			7.3	OK
S3.003	SMH10	14	93.453	-0.147	0.000	0.26			23.6	OK
S5.000	SMH13	16	93.244	-0.150	0.000	0.25			16.8	OK
S3.004	SMH14	15	92.586	-0.089	0.000	0.68			48.3	OK
S1.006	SMH15	20	92.192	0.017	0.000	0.60			108.7	SURCHARGED
S6.000	SMH17	16	92.919	-0.181	0.000	0.33			26.4	OK
S6.001	SMH18	14	92.785	-0.089	0.000	0.82			54.6	OK
S1.007	SMH20	12	92.185	0.196	0.000	0.81			185.0	SURCHARGED
S7.000	SMH21	8	92.179	0.379	0.000	0.07			5.0	SURCHARGED
S1.008	SMH22	8	92.179	0.105	0.000	0.71			188.4	SURCHARGED
S1.009	SMH24	8	92.176	0.123	0.000	0.20			175.4	SURCHARGED
S8.000	SMH26	16	95.648	-0.132	0.000	0.36			17.0	OK
S9.000	SMH28	16	95.790	-0.135	0.000	0.33			23.0	OK
S8.001	SMH29	14	94.960	-0.144	0.000	0.53			67.0	OK
S8.002	SMH29	14	94.321	-0.147	0.000	0.50			66.6	OK
S8.003	SMH31	14	93.794	-0.148	0.000	0.50			76.2	OK
S8.004	SMH31	14	93.588	-0.121	0.000	0.66			76.6	OK
S8.005	SMH29	15	93.400	-0.170	0.000	0.39			76.9	OK
S10.000	SMH32	16	95.401	-0.199	0.000	0.03			2.9	OK
S10.001	SMH33	14	94.827	-0.173	0.000	0.12			10.5	OK
S10.002	SMH34	14	93.929	-0.171	0.000	0.13			12.5	OK
S10.003	SMH35	14	93.512	-0.161	0.000	0.18			14.2	OK
S8.006	SMH36	27	92.881	-0.146	0.000	0.52			90.9	OK
S8.007	SMH37	18	92.785	0.574	0.000	0.58			96.5	SURCHARGED

Summary Wizard of 180 minute 100 year Summer I+20% for Storm

			Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S11.000	SMH38	16	94.392	-0.151	0.000	0.23			18.5	OK
S12.000	SMH39	19	93.201	-0.199	0.000	0.03			2.0	OK
S11.001	SMH40	22	93.084	-0.132	0.000	0.36			22.4	OK
S13.000	SMH41	17	93.351	-0.149	0.000	0.25			11.5	OK
S11.002	SMH42	23	92.977	-0.053	0.000	0.92			39.0	OK
S14.000	SMH43	16	94.221	-0.179	0.000	0.09			7.0	OK
S11.003	SMH44	24	92.786	-0.044	0.000	0.57			45.8	OK
S8.008	SMH45	18	92.782	0.972	0.000	0.02			2.9	SURCHARGED
S8.009	SMH46	8	92.179	0.999	0.000	0.04			5.3	SURCHARGED
S8.010	SMH47	8	92.177	1.100	0.000	0.05			4.8	SURCHARGED
S1.010	SMH48	8	92.175	0.786	0.000	0.46			165.9	SURCHARGED
S15.000	SMH46	8	92.150	0.875	0.000	0.00			0.0	SURCHARGED
S1.011	SMH49	8	92.173	0.815	0.000	0.13			123.2	SURCHARGED
S1.012	SMH50	8	92.171	1.056	0.000	0.02			13.2	SURCHARGED
S1.013	SMH51	8	90.359	-0.660	0.000	0.03			13.2	OK
S1.014	SMH52	8	90.323	-0.672	0.000	0.02			13.2	OK

Cronin & Sutton Consulting		Page 34
1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
Date 29/03/2022 16:38	Designed by JF	
File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

Summary Wizard of 360 minute 100 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow		Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S1.000	SMH1	28	94.585	-0.190	0.000	0.06			5.1	OK
S1.001	SMH3	28	92.394	-0.141	0.000	0.16			5.1	OK
S2.000	SMH4	28	93.157	-0.168	0.000	0.15			6.2	OK
S1.002	SMH5	28	92.383	-0.173	0.000	0.38			26.8	OK
S1.003	SMH5	30	92.253	-0.159	0.000	0.45			26.8	OK
S1.004	SMH6	28	92.212	-0.158	0.000	0.42			26.8	OK
S1.005	SMH6	18	92.209	-0.097	0.000	0.19			27.5	OK
S3.000	SMH7	28	94.118	-0.182	0.000	0.08			4.6	OK
S3.001	SMH8	28	93.646	-0.154	0.000	0.22			8.1	OK
S3.002	SMH9	28	93.508	-0.162	0.000	0.17			8.1	OK
S4.000	SMH9	28	93.914	-0.186	0.000	0.07			4.4	OK
S3.003	SMH10	28	93.434	-0.166	0.000	0.16			14.4	OK
S5.000	SMH13	28	93.226	-0.168	0.000	0.15			10.1	OK
S3.004	SMH14	28	92.552	-0.123	0.000	0.42			30.2	OK
S1.006	SMH15	17	92.207	0.032	0.000	0.38			67.7	SURCHARGED
S6.000	SMH17	28	92.891	-0.209	0.000	0.20			16.0	OK
S6.001	SMH18	28	92.724	-0.150	0.000	0.50			33.4	OK
S1.007	SMH20	10	92.200	0.211	0.000	0.50			113.9	SURCHARGED
S7.000	SMH21	6	92.195	0.395	0.000	0.04			3.0	SURCHARGED
S1.008	SMH22	6	92.195	0.121	0.000	0.40			105.8	SURCHARGED
S1.009	SMH24	6	92.192	0.139	0.000	0.12			101.4	SURCHARGED
S8.000	SMH26	28	95.625	-0.155	0.000	0.22			10.3	OK
S9.000	SMH28	28	95.768	-0.157	0.000	0.20			13.9	OK
S8.001	SMH29	28	94.921	-0.184	0.000	0.32			41.0	OK
S8.002	SMH29	28	94.282	-0.186	0.000	0.31			41.0	OK
S8.003	SMH31	28	93.756	-0.186	0.000	0.31			47.0	OK
S8.004	SMH31	28	93.541	-0.168	0.000	0.40			47.0	OK
S8.005	SMH29	29	93.369	-0.201	0.000	0.24			47.0	OK
S10.000	SMH32	28	95.395	-0.205	0.000	0.02			1.8	OK
S10.001	SMH33	28	94.815	-0.185	0.000	0.07			6.3	OK
S10.002	SMH34	28	93.917	-0.183	0.000	0.08			7.6	OK
S10.003	SMH35	28	93.497	-0.176	0.000	0.11			8.7	OK
S8.006	SMH36	16	92.984	-0.043	0.000	0.32			55.6	OK
S8.007	SMH37	9	92.979	0.768	0.000	0.36			59.3	SURCHARGED

Summary Wizard of 360 minute 100 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water			Surcharged		Flow / Cap.	Overflow (l/s)	Half Drain		Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)	Flow	Volume			Time (mins)	Flow		
S11.000	SMH38	28	94.374	-0.169	0.000	0.14						11.2	OK
S12.000	SMH39	31	93.196	-0.204	0.000	0.02						1.2	OK
S11.001	SMH40	34	93.061	-0.155	0.000	0.22						13.6	OK
S13.000	SMH41	29	93.333	-0.167	0.000	0.15						6.9	OK
S11.002	SMH42	22	92.983	-0.046	0.000	0.57						24.1	OK
S14.000	SMH43	28	94.209	-0.191	0.000	0.06						4.3	OK
S11.003	SMH44	9	92.980	0.150	0.000	0.35						28.4	SURCHARGED
S8.008	SMH45	9	92.977	1.167	0.000	0.02						3.1	SURCHARGED
S8.009	SMH46	6	92.194	1.015	0.000	0.04						4.7	SURCHARGED
S8.010	SMH47	6	92.193	1.116	0.000	0.05						4.4	SURCHARGED
S1.010	SMH48	6	92.191	0.802	0.000	0.27						97.6	SURCHARGED
S15.000	SMH46	6	92.167	0.892	0.000	0.00						0.0	SURCHARGED
S1.011	SMH49	6	92.189	0.831	0.000	0.08						73.7	SURCHARGED
S1.012	SMH50	6	92.188	1.072	0.000	0.02						13.3	SURCHARGED
S1.013	SMH51	6	90.359	-0.659	0.000	0.04						13.3	OK
S1.014	SMH52	6	90.323	-0.672	0.000	0.02						13.3	OK

Summary Wizard of 720 minute 100 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow	Half Drain Time	Pipe Flow	Status
			(m)	(m)	(m³)	Cap. (l/s)	(mins)	(l/s)	
S1.000	SMH1	37	94.577	-0.198	0.000	0.03		3.0	OK
S1.001	SMH3	37	92.368	-0.167	0.000	0.10		3.0	OK
S2.000	SMH4	37	93.145	-0.180	0.000	0.09		3.7	OK
S1.002	SMH5	37	92.352	-0.204	0.000	0.23		16.0	OK
S1.003	SMH5	38	92.218	-0.194	0.000	0.27		16.0	OK
S1.004	SMH6	38	92.171	-0.199	0.000	0.25		16.0	OK
S1.005	SMH6	22	92.163	-0.143	0.000	0.12		16.4	OK
S3.000	SMH7	37	94.107	-0.193	0.000	0.05		2.8	OK
S3.001	SMH8	37	93.629	-0.171	0.000	0.13		4.8	OK
S3.002	SMH9	37	93.493	-0.177	0.000	0.10		4.8	OK
S4.000	SMH9	37	93.905	-0.195	0.000	0.04		2.6	OK
S3.003	SMH10	37	93.421	-0.179	0.000	0.09		8.6	OK
S5.000	SMH13	37	93.214	-0.180	0.000	0.09		6.0	OK
S3.004	SMH14	37	92.526	-0.149	0.000	0.25		18.0	OK
S1.006	SMH15	22	92.161	-0.014	0.000	0.22		40.4	OK
S6.000	SMH17	37	92.869	-0.231	0.000	0.12		9.5	OK
S6.001	SMH18	37	92.686	-0.188	0.000	0.30		19.9	OK
S1.007	SMH20	15	92.155	0.166	0.000	0.30		67.7	SURCHARGED
S7.000	SMH21	9	92.149	0.349	0.000	0.03		1.8	SURCHARGED
S1.008	SMH22	9	92.149	0.075	0.000	0.23		60.9	SURCHARGED
S1.009	SMH24	9	92.147	0.094	0.000	0.07		61.1	SURCHARGED
S8.000	SMH26	37	95.608	-0.172	0.000	0.13		6.1	OK
S9.000	SMH28	37	95.752	-0.173	0.000	0.12		8.3	OK
S8.001	SMH29	37	94.893	-0.212	0.000	0.19		24.4	OK
S8.002	SMH29	37	94.255	-0.213	0.000	0.18		24.4	OK
S8.003	SMH31	37	93.729	-0.213	0.000	0.18		27.9	OK
S8.004	SMH31	37	93.508	-0.201	0.000	0.24		27.9	OK
S8.005	SMH29	38	93.345	-0.225	0.000	0.14		27.9	OK
S10.000	SMH32	37	95.387	-0.213	0.000	0.01		1.1	OK
S10.001	SMH33	37	94.805	-0.195	0.000	0.04		3.8	OK
S10.002	SMH34	37	93.906	-0.194	0.000	0.05		4.5	OK
S10.003	SMH35	37	93.485	-0.188	0.000	0.06		5.2	OK
S8.006	SMH36	10	93.118	0.091	0.000	0.19		33.1	SURCHARGED
S8.007	SMH37	6	93.114	0.903	0.000	0.21		35.4	SURCHARGED

Summary Wizard of 720 minute 100 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded			Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	
S11.000	SMH38	37	94.362	-0.181	0.000	0.08			6.7	OK
S12.000	SMH39	40	93.188	-0.212	0.000	0.01			0.7	OK
S11.001	SMH40	17	93.118	-0.098	0.000	0.13			8.1	OK
S13.000	SMH41	39	93.320	-0.180	0.000	0.09			4.1	OK
S11.002	SMH42	16	93.117	0.088	0.000	0.34			14.4	SURCHARGED
S14.000	SMH43	37	94.202	-0.198	0.000	0.03			2.5	OK
S11.003	SMH44	6	93.115	0.285	0.000	0.21			16.9	SURCHARGED
S8.008	SMH45	6	93.112	1.302	0.000	0.02			3.3	SURCHARGED
S8.009	SMH46	9	92.149	0.969	0.000	0.03			4.0	SURCHARGED
S8.010	SMH47	9	92.147	1.070	0.000	0.04			3.9	SURCHARGED
S1.010	SMH48	9	92.145	0.756	0.000	0.17			59.9	SURCHARGED
S15.000	SMH46	9	92.122	0.847	0.000	0.02			0.3	SURCHARGED
S1.011	SMH49	9	92.143	0.786	0.000	0.05			43.5	SURCHARGED
S1.012	SMH50	9	92.142	1.026	0.000	0.02			13.1	SURCHARGED
S1.013	SMH51	9	90.359	-0.660	0.000	0.03			13.1	OK
S1.014	SMH52	9	90.323	-0.672	0.000	0.02			13.1	OK

Summary Wizard of 1440 minute 100 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm) 17.900 Cv (Summer) 0.750	
Region Scotland and Ireland	Ratio R 0.330 Cv (Winter) 0.840	


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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded			Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	
S1.000	SMH1	45	94.572	-0.203	0.000	0.02			1.8	OK
S1.001	SMH3	45	92.350	-0.185	0.000	0.06			1.8	OK
S2.000	SMH4	45	93.133	-0.192	0.000	0.05			2.2	OK
S1.002	SMH5	45	92.329	-0.227	0.000	0.13			9.5	OK
S1.003	SMH5	45	92.192	-0.220	0.000	0.16			9.5	OK
S1.004	SMH6	45	92.147	-0.223	0.000	0.15			9.5	OK
S1.005	SMH6	46	92.057	-0.249	0.000	0.07			9.8	OK
S3.000	SMH7	45	94.100	-0.200	0.000	0.03			1.6	OK
S3.001	SMH8	45	93.617	-0.183	0.000	0.08			2.9	OK
S3.002	SMH9	45	93.481	-0.189	0.000	0.06			2.9	OK
S4.000	SMH9	45	93.899	-0.201	0.000	0.03			1.6	OK
S3.003	SMH10	45	93.409	-0.191	0.000	0.06			5.1	OK
S5.000	SMH13	45	93.202	-0.192	0.000	0.05			3.6	OK
S3.004	SMH14	45	92.508	-0.167	0.000	0.15			10.7	OK
S1.006	SMH15	27	92.039	-0.136	0.000	0.13			24.0	OK
S6.000	SMH17	45	92.852	-0.248	0.000	0.07			5.7	OK
S6.001	SMH18	45	92.659	-0.215	0.000	0.18			11.9	OK
S1.007	SMH20	25	92.032	0.043	0.000	0.18			40.5	SURCHARGED
S7.000	SMH21	19	92.027	0.227	0.000	0.02			1.1	SURCHARGED
S1.008	SMH22	19	92.026	-0.048	0.000	0.15			39.1	OK
S1.009	SMH24	16	92.024	-0.029	0.000	0.04			38.6	OK
S8.000	SMH26	45	95.596	-0.184	0.000	0.08			3.6	OK
S9.000	SMH28	45	95.739	-0.186	0.000	0.07			4.9	OK
S8.001	SMH29	45	94.871	-0.233	0.000	0.11			14.5	OK
S8.002	SMH29	45	94.234	-0.234	0.000	0.11			14.5	OK
S8.003	SMH31	45	93.708	-0.234	0.000	0.11			16.6	OK
S8.004	SMH31	45	93.484	-0.225	0.000	0.14			16.6	OK
S8.005	SMH29	46	93.328	-0.242	0.000	0.08			16.6	OK
S10.000	SMH32	45	95.382	-0.218	0.000	0.01			0.6	OK
S10.001	SMH33	45	94.799	-0.201	0.000	0.03			2.3	OK
S10.002	SMH34	45	93.900	-0.200	0.000	0.03			2.7	OK
S10.003	SMH35	45	93.477	-0.197	0.000	0.04			3.1	OK
S8.006	SMH36	9	93.131	0.104	0.000	0.11			19.6	SURCHARGED
S8.007	SMH37	5	93.128	0.917	0.000	0.13			21.0	SURCHARGED

Summary Wizard of 1440 minute 100 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water			Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
S11.000	SMH38	45	94.350	-0.193	0.000	0.05			4.0	OK
S12.000	SMH39	47	93.182	-0.218	0.000	0.01			0.4	OK
S11.001	SMH40	16	93.131	-0.084	0.000	0.08			4.8	OK
S13.000	SMH41	46	93.308	-0.192	0.000	0.05			2.5	OK
S11.002	SMH42	15	93.131	0.101	0.000	0.20			8.6	SURCHARGED
S14.000	SMH43	45	94.197	-0.203	0.000	0.02			1.5	OK
S11.003	SMH44	5	93.129	0.299	0.000	0.13			10.1	SURCHARGED
S8.008	SMH45	5	93.126	1.317	0.000	0.02			3.5	SURCHARGED
S8.009	SMH46	16	92.027	0.847	0.000	0.03			3.9	SURCHARGED
S8.010	SMH47	16	92.025	0.948	0.000	0.04			4.0	SURCHARGED
S1.010	SMH48	16	92.023	0.634	0.000	0.11			39.2	SURCHARGED
S15.000	SMH46	16	92.003	0.728	0.000	0.02			0.3	SURCHARGED
S1.011	SMH49	16	92.021	0.663	0.000	0.03			31.3	SURCHARGED
S1.012	SMH50	16	92.020	0.904	0.000	0.02			12.7	SURCHARGED
S1.013	SMH51	16	90.357	-0.661	0.000	0.03			12.7	OK
S1.014	SMH52	16	90.322	-0.673	0.000	0.02			12.7	OK

Cronin & Sutton Consulting		Page 40
1st Floor, 19-22 Dame Street Dublin D02 N500, Ireland	L086-DEVOY BARRACKS STORM NETWORK	
Date 29/03/2022 16:38	Designed by JF	
File L086 - COMBINED DRAINAGE (JF 20...	Checked by GL	
Innovyze	Network 2020.1.3	

Summary Wizard of 2880 minute 100 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.330 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S1.000	SMH1	51	94.564	-0.211	0.000	0.01			1.1	OK
S1.001	SMH3	51	92.339	-0.196	0.000	0.04			1.1	OK
S2.000	SMH4	51	93.126	-0.199	0.000	0.03			1.3	OK
S1.002	SMH5	51	92.313	-0.243	0.000	0.08			5.9	OK
S1.003	SMH5	51	92.175	-0.237	0.000	0.10			5.9	OK
S1.004	SMH6	51	92.131	-0.239	0.000	0.09			5.9	OK
S1.005	SMH6	51	92.045	-0.261	0.000	0.04			6.0	OK
S3.000	SMH7	51	94.095	-0.205	0.000	0.02			1.0	OK
S3.001	SMH8	51	93.607	-0.193	0.000	0.05			1.8	OK
S3.002	SMH9	51	93.473	-0.197	0.000	0.04			1.8	OK
S4.000	SMH9	51	93.892	-0.208	0.000	0.02			1.0	OK
S3.003	SMH10	51	93.402	-0.198	0.000	0.03			3.2	OK
S5.000	SMH13	51	93.195	-0.199	0.000	0.03			2.2	OK
S3.004	SMH14	51	92.496	-0.179	0.000	0.09			6.6	OK
S1.006	SMH15	51	91.871	-0.304	0.000	0.08			14.8	OK
S6.000	SMH17	51	92.840	-0.260	0.000	0.04			3.5	OK
S6.001	SMH18	51	92.640	-0.234	0.000	0.11			7.3	OK
S1.007	SMH20	36	91.815	-0.174	0.000	0.11			25.2	OK
S7.000	SMH21	36	91.811	0.011	0.000	0.01			0.7	SURCHARGED
S1.008	SMH22	36	91.811	-0.263	0.000	0.10			26.7	OK
S1.009	SMH24	29	91.809	-0.244	0.000	0.03			27.2	OK
S8.000	SMH26	51	95.586	-0.194	0.000	0.05			2.2	OK
S9.000	SMH28	51	95.730	-0.195	0.000	0.04			3.0	OK
S8.001	SMH29	51	94.856	-0.248	0.000	0.07			8.9	OK
S8.002	SMH29	51	94.218	-0.249	0.000	0.07			8.9	OK
S8.003	SMH31	51	93.692	-0.249	0.000	0.07			10.2	OK
S8.004	SMH31	51	93.468	-0.241	0.000	0.09			10.2	OK
S8.005	SMH29	51	93.314	-0.256	0.000	0.05			10.2	OK
S10.000	SMH32	51	95.379	-0.221	0.000	0.00			0.4	OK
S10.001	SMH33	51	94.792	-0.208	0.000	0.02			1.4	OK
S10.002	SMH34	51	93.894	-0.206	0.000	0.02			1.7	OK
S10.003	SMH35	51	93.472	-0.202	0.000	0.02			1.9	OK
S8.006	SMH36	12	93.047	0.020	0.000	0.07			12.1	SURCHARGED
S8.007	SMH37	7	93.045	0.834	0.000	0.08			12.9	SURCHARGED

Summary Wizard of 2880 minute 100 year Summer I+20% for Storm

PN	US/MH Name	Storm Rank	Water Surcharged			Flow / Cap.	Overflow (l/s)	Half Drain Pipe		Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S11.000	SMH38	51	94.344	-0.199	0.000	0.03			2.4	OK
S12.000	SMH39	52	93.180	-0.220	0.000	0.00			0.3	OK
S11.001	SMH40	40	93.048	-0.168	0.000	0.05			3.0	OK
S13.000	SMH41	51	93.301	-0.199	0.000	0.03			1.5	OK
S11.002	SMH42	20	93.048	0.018	0.000	0.12			5.3	SURCHARGED
S14.000	SMH43	51	94.188	-0.212	0.000	0.01			0.9	OK
S11.003	SMH44	7	93.046	0.216	0.000	0.08			6.2	SURCHARGED
S8.008	SMH45	7	93.043	1.233	0.000	0.02			3.4	SURCHARGED
S8.009	SMH46	29	91.812	0.632	0.000	0.03			3.8	SURCHARGED
S8.010	SMH47	29	91.810	0.733	0.000	0.04			3.9	SURCHARGED
S1.010	SMH48	29	91.808	0.419	0.000	0.08			28.5	SURCHARGED
S15.000	SMH46	29	91.791	0.516	0.000	0.01			0.1	SURCHARGED
S1.011	SMH49	29	91.806	0.449	0.000	0.03			23.5	SURCHARGED
S1.012	SMH50	29	91.805	0.689	0.000	0.02			12.4	SURCHARGED
S1.013	SMH51	48	90.357	-0.662	0.000	0.03			12.4	OK
S1.014	SMH52	44	90.322	-0.674	0.000	0.02			12.4	OK

Summary Wizard of 10080 minute 100 year Summer I+20% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 2	Number of Storage Structures 12	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm) 17.900 Cv (Summer) 0.750
Region Scotland and Ireland	Ratio R 0.330 Cv (Winter) 0.840

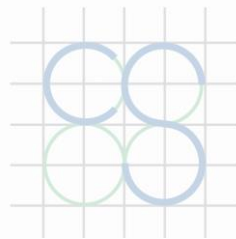
Margin for Flood Risk Warning (mm) 300.0	DVD Status OFF
Analysis Timestep	Fine Inertia Status OFF
DTS Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	20, 20, 20

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Flow	
					Flow / Cap.	Overflow (l/s)	Time (mins)	(l/s)	
S1.000	SMH1	62	94.555	-0.220	0.000	0.00		0.4	OK
S1.001	SMH3	62	92.325	-0.210	0.000	0.01		0.4	OK
S2.000	SMH4	62	93.113	-0.212	0.000	0.01		0.5	OK
S1.002	SMH5	62	92.291	-0.265	0.000	0.03		2.3	OK
S1.003	SMH5	62	92.150	-0.262	0.000	0.04		2.3	OK
S1.004	SMH6	62	92.106	-0.264	0.000	0.04		2.3	OK
S1.005	SMH6	62	92.029	-0.277	0.000	0.02		2.3	OK
S3.000	SMH7	62	94.083	-0.217	0.000	0.01		0.4	OK
S3.001	SMH8	62	93.595	-0.205	0.000	0.02		0.7	OK
S3.002	SMH9	62	93.461	-0.209	0.000	0.01		0.7	OK
S4.000	SMH9	62	93.881	-0.219	0.000	0.01		0.4	OK
S3.003	SMH10	62	93.389	-0.211	0.000	0.01		1.2	OK
S5.000	SMH13	62	93.182	-0.212	0.000	0.01		0.9	OK
S3.004	SMH14	62	92.477	-0.198	0.000	0.04		2.6	OK
S1.006	SMH15	62	91.843	-0.332	0.000	0.03		5.7	OK
S6.000	SMH17	62	92.824	-0.276	0.000	0.02		1.4	OK
S6.001	SMH18	62	92.614	-0.260	0.000	0.04		2.8	OK
S1.007	SMH20	62	91.535	-0.454	0.000	0.04		9.8	OK
S7.000	SMH21	62	91.579	-0.221	0.000	0.00		0.3	OK
S1.008	SMH22	62	91.430	-0.644	0.000	0.04		10.7	OK
S1.009	SMH24	62	91.348	-0.705	0.000	0.01		11.0	OK
S8.000	SMH26	62	95.574	-0.206	0.000	0.02		0.9	OK
S9.000	SMH28	62	95.718	-0.207	0.000	0.02		1.2	OK
S8.001	SMH29	62	94.837	-0.267	0.000	0.03		3.4	OK
S8.002	SMH29	62	94.200	-0.268	0.000	0.03		3.4	OK
S8.003	SMH31	62	93.674	-0.268	0.000	0.03		3.9	OK
S8.004	SMH31	62	93.444	-0.264	0.000	0.03		3.9	OK
S8.005	SMH29	62	93.298	-0.271	0.000	0.02		3.9	OK
S10.000	SMH32	62	95.377	-0.223	0.000	0.00		0.1	OK
S10.001	SMH33	62	94.782	-0.218	0.000	0.01		0.5	OK
S10.002	SMH34	62	93.882	-0.218	0.000	0.01		0.6	OK
S10.003	SMH35	62	93.458	-0.215	0.000	0.01		0.7	OK
S8.006	SMH36	63	92.760	-0.267	0.000	0.03		4.7	OK
S8.007	SMH37	28	92.604	0.393	0.000	0.03		5.0	SURCHARGED

Summary Wizard of 10080 minute 100 year Summer I+20% for Storm

			Water	Surcharged	Flooded	Half Drain			Pipe		
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow		
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	
S11.000	SMH38	62	94.331	-0.212	0.000	0.01			0.9	OK	
S12.000	SMH39	62	93.177	-0.223	0.000	0.00			0.1	OK	
S11.001	SMH40	62	93.010	-0.206	0.000	0.02			1.2	OK	
S13.000	SMH41	62	93.288	-0.212	0.000	0.01			0.6	OK	
S11.002	SMH42	63	92.836	-0.193	0.000	0.05			2.0	OK	
S14.000	SMH43	62	94.180	-0.220	0.000	0.00			0.4	OK	
S11.003	SMH44	64	92.630	-0.200	0.000	0.03			2.4	OK	
S8.008	SMH45	28	92.603	0.793	0.000	0.02			3.0	SURCHARGED	
S8.009	SMH46	63	90.845	-0.335	0.000	0.03			3.1		OK
S8.010	SMH47	61	90.780	-0.296	0.000	0.03			3.1		OK
S1.010	SMH48	61	90.773	-0.615	0.000	0.04			14.0	OK	
S15.000	SMH46	58	91.050	-0.225	0.000	0.00			0.0	OK	
S1.011	SMH49	61	90.766	-0.592	0.000	0.02			14.0	OK	
S1.012	SMH50	61	90.764	-0.351	0.000	0.02			12.4	OK	
S1.013	SMH51	61	90.357	-0.662	0.000	0.03			12.4	OK	
S1.014	SMH52	61	90.322	-0.674	0.000	0.02			12.4	OK	



CS CONSULTING
GROUP

Appendix D

Irish Water Confirmation of Feasibility Letter

Gary Lindsay
CS Consulting Group
19 - 22 Dame Street
Dublin 2
D02E267

24 August 2021

Dear Gary Lindsay,

**Re: Connection Reference No CDS20001770 pre-connection enquiry -
Subject to contract | Contract denied**

Connection for Multi/Mixed Use Development of 250 unit(s) at Devoy Barracks, John Devoy Road, Naas, Co. Kildare

Irish Water has reviewed your pre-connection enquiry in relation to a water and wastewater connection at Devoy Barracks, John Devoy Road, Naas, Co. Kildare.

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.

The proposed water and wastewater connections for this development connect to the Irish Water network via infrastructure that has not been taken in charge by Irish Water (Third Party Infrastructure). Please be advised that at connection application stage and prior to the commencement of any Self-Lay Works, you have to:

- identify and procure transfer to Irish Water of the arterial water and wastewater Infrastructure within the Third Party Infrastructure
- demonstrate that the arterial infrastructure are in compliance with requirements of Irish Water Code of Practice and Standard Details and in adequate condition and capacity to cater for additional load from the Development

Water:

New connection to the existing network is feasible without upgrade.

Connection to the water network shall be via a new 150 mm ID pipe to be laid to connect the site development to the existing 180 mm and should include a bulk meter to be installed on the connection main.

Wastewater:

New connection to the existing network is feasible without upgrade.

Strategic Housing Development:

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

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

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

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

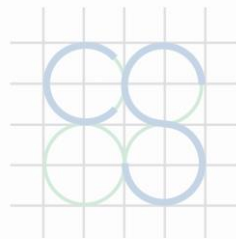
If you have any further questions, please contact Fionán Ginty from the design team on 01 8925734 or email fginty@water.ie. For further information, visit www.water.ie/connections.

Yours sincerely,



Maria O'Dwyer

Connections and Developer Services



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