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ALBER
DEVELOPMENTS

Residential Development, Rosshill, Galway

Civil Works Design Report
Planning Stage

Residential Development, Rosshill, Galway

Report on Civil Works Planning Stage - Preliminary

Document Control Sheet	
Document Reference	10690/TR02
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Client:	Alber Developments Ltd
Client Address:	1st Floor, Fairgreen House, Fairgreen Rd, Galway, H91 AXK8
Project Number	10690

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P1	Issued for Planning	SH	19/05/2021	RD	19/05/20201	BH	19/05/2021

TOBIN Consulting Engineers

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1 INTRODUCTION

TOBIN Consulting Engineers were appointed to provide engineering consultancy services for the proposed residential development at Rosshill, in Galway City (Figure 1.1 & Figure 1.2).

This report has been prepared to detail the Civil Works elements of the proposed residential development at Rosshill, Co. Galway and should be read in conjunction with the corresponding foul and storm design drawings as outlined and noted herein. This report details the foul and storm drainage design and the water main details for the development.

Planning permission is sought by **Alber Developments Ltd** for development on a site extending to 4.704 hectares on lands to the south of Rosshill Road, west of Rosshill Stud Farm Road.

The proposed development will consist of:

1. Construction of 102no. residential units comprising of 35 apartments and 67 houses:

    - 4no. Apartment Type '1A' - 1 bed 2 person (1 Storey)
    - 4no. Apartment Type '1B' - 1 bed 2 person (1 Storey)
    - 3no. Apartment Type '1C' - 1 bed 2 person (1 Storey)
    - 11no. Apartment Type '2A' - 2 bed 4 person (1 Storey)
    - 4no. Apartment Type '2B' - 2 bed 4 person (1 Storey)
    - 3no. Apartment Type '2C' - 2 bed 4 person (1 Storey)
    - 3no. Apartment Type '2D' - 2 bed 4 person (1 Storey)
    - 3no. Apartment Type '2E' - 2 bed 3 person (1 Storey)
    - 2no. House Type 'A/A1' - 4 Bed Semi Detached
    - 8no. House Type 'B/B1' - 3 Bed Semi detached
    - 4no. House Type 'C/C1' - 3 Bed End of Terrace
    - 2no. House Type 'C2' - 3 Bed Mid Terrace
    - 2no. House Type 'D' - 2 storey town house - end of terrace - 3 bed
    - 4no. House Type 'D1' - 2 storey town house - mid terrace - 3 bed
    - 2no. House Type 'D2' - 3 storey town house - end of terrace - 4 bed
    - 2no. House Type 'E' - 3 bed Long Semi-Detached
    - 2no. House Type 'F' - 4 bed Long Semi-Detached
    - 3no. House Type 'G' - 2 storey town house - end of terrace - 3 bed
    - 6no. House Type 'G1' - 2 storey town house - mid terrace - 3 bed
    - 3no. House Type 'G2' - 2 storey town house - mid terrace - 3 bed
    - 1no. House Type 'H' - 3 Bed semi detached
    - 1no. House Type 'H1' - 3 Bed semi detached - Double front
    - 8no. House Type 'J/J1' - 3 Bed semi detached
    - 4no. House Type 'K' - 3 bed Long Semi-Detached
    - 4no. House Type 'L' - 4 bed Long Semi-Detached
    - 3no. House Type 'M' - 3 Bed End of Terrace
    - 3no. House Type 'M1' - 3 Bed End of Terrace
    - 3no. House Type 'M2' - 3 Bed Mid Terrace

2. Demolition of the existing silage concrete apron (40 sqm)
3. Childcare facility (399sqm over 2-storeys) associated outdoor play areas and parking
4. Retail/ Commercial space (188.5sqm) including loading bay
5. Provision of shared communal and private open space, including play and fitness equipment
6. Car and cycle parking, including electric vehicle charging points
7. Provision of all associated surface water and foul drainage services and connections including pumping station

8. Landscaping, access routes and public art
9. Lighting and associated works
10. Access and junction improvements at Rosshill Road and Rosshill Stud Farm Road
11. Provision of a footpath connectivity link along Rosshill Road and Rosshill Stud Farm Road
12. All associated works and services

Figure 1.1 – Site Location

Figure 1.2 - Proposed Site Layout

1.1 Wastewater Drainage System Overview

The proposed wastewater drainage system for the development will consist of a network of gravity sewers laid under roads and open spaces which will discharge to a wastewater pumping station to be located in the north west of the site. From here, the wastewater will be pumped via a 150mm ø rising main to discharge to the existing Irish Water (IW) pumping station located at Merlin Park. Irish Water have confirmed that the development as proposed (102 dwellings, creche & retail/commercial space) can be accommodated on their network without any upgrade works to the existing Merlin Park pumping station, subject to a night-time pumping regime being employed.

The onsite pumping station will provide 24-hours storage for the total number of units associated with the ownership boundary (equivalent to 342 dwelling, creche and retail/commercial space) and will comply with the requirements of the IW Code of Practice for Wastewater Infrastructure. Following discussions with Irish Water, the proposed onsite pumping station will be capable of accommodating future development of other residential zoned lands to the south of the proposed site, should these lands be developed. This will be achieved by the installation of additional modular storage connected to the existing storage tank as required by the future development. In addition to this, a night-time wastewater pumping regime will be employed by the onsite pumping station as agreed with Irish Water.

The gravity sewer network has been sized to cater for the proposed development, for future phases of the proposed development within the current ownership boundary and also for potential future development of lands to the far south of the site.

It is proposed that all gravity sewers within the wastewater drainage network will be of thermoplastic construction in compliance with the IW Code of Practice for Wastewater Infrastructure. The maximum pipe diameter is to be 225mm, with a maximum and minimum gradient of 1/27 and 1/200.

The proposed gravity sewer network has been designed using Innovyse Microdrainage modelling software. The models confirm that all flow velocities within the network will fall within the limits as set out in the IW Code of Practice for Wastewater Infrastructure and IW Standard Details.

Irish Water have reviewed the proposed wastewater drainage system and have confirmed its suitability. A statement of design acceptance received from Irish Water is included in Appendix A of this report.

1.2 Storm Drainage System Overview

The proposed stormwater drainage system has been designed to cater for all surface water runoff from all impermeable area within in the development for 1 in 100 year return period storm event of durations ranging from 15 minutes to 7 days. An additional allowance of 20% has been included to account for the effects of climate change in the design of the storm water drainage system. The maximum diameter of storm water sewer pipes is proposed to be 300mm, with maximum and minimum gradients of 1/22 and 1/250 respectively.

All stormwater collected in the proposed stormwater sewer networks will discharge via Oil/Petrol Interceptors to underground soakaway structures which will be strategically situated throughout the site. In these soakaway structures, the stormwater will soak away through the underlying fractured rock/boulders. The soakaways shall be constructed of a cellular storage unit providing 95% porosity or stone filled soakaway providing 40% void ratio. These will also attenuate storm water during and post storm events prior to infiltrating through the underlying fractured rock/boulders. All soakaways throughout the site have also been sized to accommodate 1 in 100 year storm events with an additional +20% Climate Change allowance.

Landscaped bioswales are proposed as a Sustainable Urban Drainage System (SuDS) measure and a primary tool for the management of storm water runoff from car parking areas around the proposed apartment block. This is in direct response to the request for same by Galway City Council.

1.3 Watermain Overview

The proposed watermain layout has been designed in accordance with Irish Water Code of Practice for Water Infrastructure. Following consultation with Irish Water, a 200mm ø spine watermain is proposed to supply this development and the surrounding potential development lands. Through agreement with Irish Water and the developer of the Ross Alta site on Rosshill Road, a 200mm ø watermain connection will be facilitated on Rosshill Road. The Ross Alta development is currently under construction and the 200mm ø watermain proposed to service the lands pertaining this application has been constructed as part of the Ross Alta connection agreement with Irish Water.

Irish Water have reviewed the proposed watermain layout and have confirmed its suitability. A statement of design acceptance received from Irish Water is included in Appendix A of this report.

1.4 Roads Layout

All internal roads have been designed in accordance with the Design Manual for Urban Roads and Streets (DMURS), May 2019 and the Recommendations for Site Development Works for Housing Areas, 1998. A separate statement of compliance with ministerial guidance in relation to DMURS accompanies this application.

An independent Road Safety Audit (RSA) has been carried out on the site by CST Group Chartered Engineers in February 2021 and the Auditors report has been included in the planning submission for this proposed development. The recommendations from the RSA have been addressed in the proposed site layout.

2 WASTEWATER DRAINAGE DESIGN

2.1 Introduction

The pipework for the wastewater drainage system has been designed to provide for six times the dry weather flow in accordance with the Recommendations for Site Development Works as published by the Department of the Environment and Local Government and to Irish Water Code of Practice and Standard Details. The layout of the proposed wastewater drainage system is presented on drawings 10690-2103, 2104 & 2105.

2.2 Loading rates

An average occupancy rate of 2.7 P.E. per dwelling has been taken for the development to account for the varying unit occupancies. The occupancy per dwelling figures have been obtained from the Irish Water Codes of Practice as per Wastewater Code of Practice, Appendix B – Gravity Sewer Design Requirements, section 1.2.1 Housing Density & Occupancy.

150 ltr per head per day +10% unit consumption contribution has been taken into account for the sewer design as per Irish Water Code of Practice for Wastewater Infrastructure - section 3.6 Hydraulic Design for Gravity Sewers. The foul sewer pipe network has been designed using Microdrainage modelling software. The outputs from the foul water models are presented in Appendix C.

A peak flow rate of 6 time the dry weather flow was obtained from as per Wastewater Code of Practice, Appendix C – Gravity Sewer Design Requirements, section 2.2.5. Domestic Wastewater Peaking Factors.

The above factors and a 10% unit consumption allowance equate to a wastewater generation of 450 litres per dwelling per day. The loading rate for the development is calculated as follows:

= 450 litres x 112 units (102 dwellings + 10 dwelling allowance for Creche and retail/commercial)
= 50,400 litres = 50.4m^3

2.3 Wastewater Discharge

It is proposed to discharge via gravity to a pumping station located in the North-West of the site and then discharge via rising main to the existing Merlin Park pumping station. Irish Water have confirmed that the development as proposed (102 dwellings, creche & retail/commercial space) can be accommodated on their network without any upgrade works to the existing Merlin Park pumping station, subject to a night-time pumping regime being employed.

A rising main was laid along Rosshill Road during construction of a nearby development with the specific intention of serving the development lands pertaining to this application and the surrounding development lands. The proposed rising main associated with this development will be laid to under the internal site roads to connect to the existing rising main on Rosshill Road. A collaborative approach has been taken and an agreement has been made with the developer of the development on Rosshill Road (Pl Ref: 16/228), and in consultation with Irish Water that the developer will construct a rising main and watermain along Rosshill Road to facilitate the connection of this proposed development. These works will negate the need for an additional trench to be excavated along Rosshill Road for the proposed development.

Irish Water have confirmed that sufficient capacity is available in the IW foul sewer network currently to cater for the proposed development consisting of 102 no. units plus 1 no. creche and retail/commercial space. As requested by Irish Water, a night time pumping arrangement will be employed by the proposed pumping station. Based on a pumping flow rate of 7l/s through the 24-hour storage volume for the proposed development (102 dwellings + Creche + Retail/Commercial) could be pumped in 2 hours as shown below:

= 112 Units x 450 litres/day = 50,400 litres
= Pumping rate = 7 litres/second
= Time to pump 24-hour storge volume = 50,400/(7 x 3600) = 2 hours

2.4 Pumping Station

The pumping station will be designed in accordance with the requirements set out in the Irish Water specification for wastewater systems IW-CDS-5030-03. The pumping station will be a minimum of 15.0m from boundary of the nearest dwelling in line with Irish Water guidance.

The pumping station will be designed to cater for 24 hr storage for the total number of dwellings, creche and retail/commercial space associated with the site masterplan (equivalent to 342 dwellings, creche and retail/commercial space) in accordance with Irish Water requirements. A typical pumping station detail is presented in Appendix D.

As noted on the Irish Water Confirmation of Feasibility (refer to Appendix A), the pumping station will be required cater for any future development to the south of the proposed lands. This will be

achieved by the future installation of additional underground modular storage connected to the existing storage tank as required and per discussions with Irish Water.

The pumping station layout is illustrated on the site layout drawing and includes a 4.0m wide pull in area to allow for an occasional tanker or service vehicles to be parked outside the pumping station. It is estimated that tanker movements to the site would be minimal and subject to the operational efficiencies of the pumping station. However, it would be anticipated that no more than 2 - 4 tanker visits would be required per annum.

The proposed pumping station has been relocated within the site following discussions with Galway City Council and An Bord Pleanala. The proposed location avoids existing trees and areas of environmental sensitivity. Further information on this can be found in the accompanying Design Statement and response to the Board's planning opinion.

3 STORMWATER DRAINAGE DESIGN

3.1 Introduction

The proposed stormwater drainage system for the site will consist of a network of sewers conveying surface water runoff from hard surfaces such as roads, roofs etc., to soakaway tanks located in open spaces throughout the development. The soakaway structures will attenuate stormwater and allow it to infiltrate to groundwater. The soakaways and stormwater sewer network have been designed using Innovyse Microdrainage modelling software. The outputs and results of the analyses are presented in Appendix B.

The proposed stormwater drainage system has been designed to cater for all surface water runoff from all impermeable area within in the development for 1 in 100 year return period storm event of durations ranging from 15 minutes to 7 days. An additional allowance of 20% has been included to account for the effects of climate change in the design of the storm water drainage system.

Prior to discharge to the soakaways, it is proposed to install oil separators/silt traps at the inlet, thus reducing the amount of debris etc. entering the soakaways. Surface water from hard surfaces in the proposed development including roadways and roofs, as shown on Drawing No. 10690-2102, will flow by gravity to the soakaways.

It is proposed to use a number of Bioswales as a primary tool for the management of storm water for the car parking area around the apartment block. The bioswales will primarily allow for infiltration directly to the ground while also allowing for a limited storage volume of runoff water. The Bioswales will include a high-level overflow connecting back to the main storm drainage for the development. Refer to section 7.0 for further details.

4 WATERMAIN

The Watermain has been designed in accordance with Irish Water Code of Practice and standard details.

The water supply required for the proposed development shall be via a 200mm ø watermain as per Irish Water requirements. Similar to the arrangement for the foul rising main, agreements were made with the developer constructing the adjacent residential development and in consultation with Irish Water to install the 200mm watermain within the Rosshill road to the extent of their development (i.e. 200mm watermain was previously constructed during construction of the adjacent development). This will allow the proposed development to be able to connect to the 200mm watermain on the north side of the railway bridge instead of needing to excavate a new trench up to the R338 (old Dublin Road). Refer to Irish Water Confirmation of Feasibility letter in

Appendix A noting the proposed connection location to the 200mm ø watermain just north of the railway bridge.

The watermain arrangement is shown on drawing No. 10690-2101 and 10690-2102. It is proposed to serve to site using a 200mm ø 'spine' watermain down to the main junction in the proposed development. All other branch mains from the 200mm ø will be 100mm ø PE. In accordance with Local authority standards, a water meter and Logging Device (Larson Type) are proposed at the connection into the proposed site. A sluice valve, strainer and 200mm ø by-pass arrangement is also proposed to allow for possible disconnection of water meters by the Local Authority.

5 FIRE FIGHTING FLOWS

In order to meet required fire flow requirements, it is proposed to install a static water storage tank within the site. This is being provided as Irish Water will not guarantee available fire flow within the proposed hydrants to be located on site. It is proposed to provide an underground storage tank capable of holding the same capacity as would flow through a hydrant at 20 l/s for a 1 hour period. This equates to a minimum volume required for the site of 72,000 litres.

The requirement for a flow of 20 l/s is derived from the 'National Guidance Document on the provisions of water for Firefighting – Water UK 3rd Edition'. The tank will be located within open space and easily accessible by fire tenders and tankers should they need to access it. A watermin connection from the 150mm ø watermain will be provided to top-up the tank periodically and a high-level overflow will connect back to the main storm drainage for the site.

It is noted that in addition to the static storage tank, a significant volume of water will still be available from hydrants located throughout the development. Any specific requirements as requested by the local fire authority when applying for the Fire Certification will be incorporated at the detail design stage.

6 ROADS LAYOUT

All internal roads have been designed in accordance with the Design Manual for Urban Roads and Streets (DMURS), May 2019 and the Recommendations for Site Development Works for Housing Areas, 1998. A separate statement of compliance with ministerial guidance in relation to DMURS accompanies this application.

Autotrack vehicle swept path analysis has been completed for the proposed site layout for a Large Car, a Refuse Truck and a Fire Tender to ensure the vehicles can safely manoeuvre around the site.

In general, roads within the proposed development will fall with existing site topography from South to North. Road makeup shall be in accordance with Galway City Council Taking In-Charge requirements. Refer to Drawing 10690- 2115. The use of raised junctions and pedestrian crossing points along with strategically positioned drop kerbs and tactile paving will allow for full linkage for visually impaired and less-able pedestrians. Refer to the DMURS 2019 Statement of Consistency for further details on the roads layout.

An independent Road Safety Audit has been carried out on the site and the Auditors report has been included in the planning submission for this proposed development.

7 SUSTAINABLE URBAN DRAIANGE SYSTEM (SUDS)

It is proposed to install three bioretention swales (bioswales) within the North East area of the site. Bioswales are an effective way of providing drainage for roads, paths or car parks while incorporating the natural landscape of the area. The proposed bioswales will be designed in accordance with the CIRIA Sustainable Drainage System (SuDS) Manual, 2015.

The flow velocity and vegetation are designed to provide effective filtration, attenuation and infiltration to groundwater while also ensuring the banks of the swales are not eroded by flows through the bioswales. A series of flat areas that are terraced down the length of the bioswale are constructed to achieve effective biofiltration. Native plant species will also be used in providing a dense and durable cover of vegetation that creates appropriate habitat for indigenous species.

The bioswales will include a high-level overflow that will connect back into the proposed underground storm network should the bioswale capacity be reached. Further storage can be provided beneath the swale base using gravel or other filter/drainage systems.

8 CONCLUSION

In conjunction with the associated drawings, this report details the foul and storm drainage and watermain works proposed for the residential development at Rosshill, Co. Galway.

Storm water accumulating within the site will be adequately managed by discharging to the proposed soakaways and bioswales. This will result in all stormwater runoff being retained and managed within the site boundary ensuring no additional volumes are conveyed offsite.

All wastewater and watermain infrastructure have been designed and will be constructed in accordance with Irish Water standard details and relevant codes of practice.

We trust that adequate detail has been provided for the proposed wastewater and storm water drainage systems and watermain layout. Should you require any further detail, we will be happy to meet and supply same, as you may deem appropriate.

APPENDIX A

Irish Water Confirmation of Feasibility & Statement of Design Acceptance

Brendan Heaney
Tobin Consulting Engineers
Fairgreen House
Fairgreen Road
Galway

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

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

www.water.ie

30 October 2020

Re: CDS20006156 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 102 housing unit and a creche at Rosshill, Galway City, Co. Galway

Dear Sir/Madam,

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

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.
Water Connection	Feasible without infrastructure upgrade by Irish Water. Please see the site specific comments below for further information.
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water. Please see the site specific comments below for further information.
SITE SPECIFIC COMMENTS	
Water Connection	The nearest point of connection to the watermain network is to a 200mm diameter watermain which has been extended to a point north of the railway bridge on the Coast Road. A connection can be facilitated to this watermain. This watermain may be third party owned. Should that be the case then you will require permission from any third parties to facilitate a connection. Please be aware that Irish Water is now responsible for the delivery of the connection related works in the public domain. The costs and conditions associated with the connection would be detailed in a connection offer at connection application stage.
Wastewater Connection	Your pre connection enquiry submission indicates a total development of 102 housing units and a creche. It is proposed to connect to the Irish Water network via pumping station and rising main. Your scale of development can be accommodated by the existing network infrastructure subject to you putting in place a night time pumping regime for the discharge to the Irish

	Water network. In order to accommodate any future additional development which may be proposed on your lands outside of that proposed under this pre connection enquiry upgrade works are required to be delivered at Merlin Park No. 1 Pumping Station to provide additional storage. Irish Water is currently delivering a capital project to provide this additional storage. The proposed pumping station layout should be sized to cater for any future development on your lands and any future development on adjoining lands to the south which are currently zoned low residential. The sizing will be confirmed at connection application stage. Your proposed development appears to be high density; therefore the densities of future development on your lands and those adjoining lands will require to be determined.

Irish Water notes that the scale of this development may dictate that that it is subject to the Strategic Housing Development planning process. in advance of submitting your full application to An Bord Pleanala 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.

A design proposal for the water and/or wastewater infrastructure should be submitted to Irish Water for assessment. The design proposal can be submitted to cdsdesignqa@water.ie

The development will be subject to Irish Water's Quality Assurance Requirements for Design and Field Inspections. The overall Quality Assurance requirements will be incorporated into a Connection Agreement at connection application stage as part of a Connection Offer from Irish Water. Please note there is a requirement for wayleaves to be provided along the routes of watermain and wastewater pipes in favour of Irish Water as part of the Connection Agreement. This is to facilitate the vesting of the watermain and wastewater infrastructure. This wayleave requirement extends to the arterial route of connection to the Irish Water network should a connection be proposed via third party/private infrastructure. Further guidance in relation to IW design requirements is available at https://www.water.ie/connections/developer-services/QA-Design-Req-Manual.pdf.

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

The feasibility analysis undertaken by Irish Water as part of the pre-connection enquiry process relates only to the capacity of the Irish Water owned infrastructure to cater for the demand of the proposed development.

General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.

6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact James O'Malley from the design team at jomalley@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Brendan Heaney
Fairgreen House
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Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
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Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

17 June 2021

Re: Design Submission for Rosehill, Galway City, Co. Galway (the "Development") (the "Design Submission") / Connection Reference No: CDS20006156

Dear Brendan Heaney,

Many thanks for your recent Design Submission.

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

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

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

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

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

Document Title & Revision

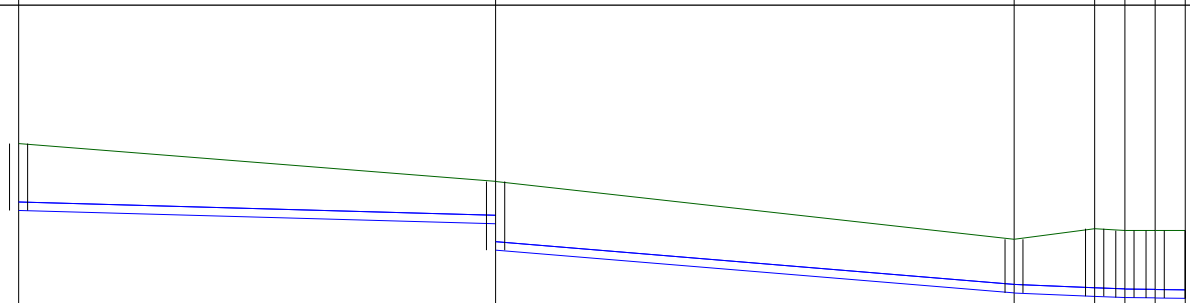
10690-2100 - Combined Services Layout Key Plan
10690-2101 - Watermain Layout (Sheet 1 of 2)
10690-2102 - Watermain Layout (Sheet 2 of 2)
10690-2103 - Drainage Layout (Sheet 1 of 2)
10690-2104 - Drainage Layout (Sheet 2 of 2)
10690-2105 - Rising Main & Watermain Connection
10690-2110 - Fire Fighting Requirements
10690-2116 - Typical Pumping Station Details
10690-2124 - Foul Long Section (Sheet 1 of 7)
10690-2125 - Foul Long Section (Sheet 2 of 7)
10690-2126 - Foul Long Section (Sheet 3 of 7)
10690-2127 - Foul Long Section (Sheet 4 of 7)
10690-2128 - Foul Long Section (Sheet 5 of 7)
10690-2129 - Foul Long Section (Sheet 6 of 7)
10690-2130 - Foul Long Section (Sheet 7 of 7)

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

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

APPENDIX B

Storm Sewer Network & Calculations

MH Name		S1		S2					S
Hor Scale 500 Ver Scale 200 Datum (m)9.000									
PN		S1.000		S1.001					
Dia (mm)		225		225					
Slope (1:X)		88.9		30.2					
Cover Level (m)		17.200		16.200		14.670	14.950	14.900	14.900	14.900
Invert Level (m)		15.430	15.075	14.380	13.245	13.245	13.156	13.156	13.123	13.113
Length (m)		31.577		34.315					

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	2.000
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	20	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.005		

Designed with Level Soffits

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	31.577	0.355	88.9	0.053	5.00	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	41.27	5.38	15.430	0.053	0.0	0.0	1.4	1.39	55.1	8.5

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
S1.001	34.315	1.135	30.2	0.062	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	5.340	0.089	60.0	0.018	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	2.000	0.033	60.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	2.000	0.010	200.0	0.000	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)
S1.001	40.58	5.62	14.380	0.115	0.0	0.0	3.0	2.39	95.0	18.2
S1.002	40.43	5.67	13.245	0.133	0.0	0.0	3.5	1.69	67.3	21.0
S1.003	40.38	5.69	13.156	0.133	0.0	0.0	3.5	1.69	67.3	21.0
S1.004	40.28	5.73	13.123	0.133	0.0	0.0	3.5	0.92	36.6	21.0
S1.005	40.18	5.76	13.113	0.133	0.0	0.0	3.5	0.92	36.6	21.0

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	17.200	1.770	Open Manhole	1200	S1.000	15.430	225				
S2	16.200	1.820	Open Manhole	1200	S1.001	14.380	225	S1.000	15.075	225	695
S3	14.670	1.425	Open Manhole	1200	S1.002	13.245	225	S1.001	13.245	225	
S4	14.950	1.794	Open Manhole	1200	S1.003	13.156	225	S1.002	13.156	225	
S6	14.900	1.777	Open Manhole	1200	S1.004	13.123	225	S1.003	13.123	225	
S7	14.900	1.787	Open Manhole	1200	S1.005	13.113	225	S1.004	13.113	225	
S	14.900	1.797	Open Manhole	0		OUTFALL		S1.005	13.103	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	17.200	15.430	1.545	Open Manhole	1200
S1.001	o	225	S2	16.200	14.380	1.595	Open Manhole	1200
S1.002	o	225	S3	14.670	13.245	1.200	Open Manhole	1200
S1.003	o	225	S4	14.950	13.156	1.569	Open Manhole	1200
S1.004	o	225	S6	14.900	13.123	1.552	Open Manhole	1200
S1.005	o	225	S7	14.900	13.113	1.562	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	31.577	88.9	S2	16.200	15.075	0.900	Open Manhole	1200
S1.001	34.315	30.2	S3	14.670	13.245	1.200	Open Manhole	1200
S1.002	5.340	60.0	S4	14.950	13.156	1.569	Open Manhole	1200
S1.003	2.000	60.0	S6	14.900	13.123	1.552	Open Manhole	1200
S1.004	2.000	200.0	S7	14.900	13.113	1.562	Open Manhole	1200
S1.005	2.000	200.0	S	14.900	13.103	1.572	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	1	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S7, DS/PN: S1.005, Volume (m³): 2.1

Invert Level (m) 13.113

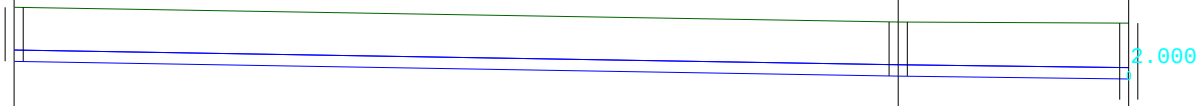
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	0.0000	1.200	0.0000	2.200	0.0000	3.200	0.0000	4.200	0.0000	5.200	0.0000
0.400	0.0000	1.400	0.0000	2.400	0.0000	3.400	0.0000	4.400	0.0000	5.400	0.0000
0.600	0.0000	1.600	0.0000	2.600	0.0000	3.600	0.0000	4.600	0.0000	5.600	0.0000
0.800	0.0000	1.800	0.0000	2.800	0.0000	3.800	0.0000	4.800	0.0000	5.800	0.0000
1.000	0.0000	2.000	0.0000	3.000	0.0000	4.000	0.0000	5.000	0.0000	6.000	0.0000

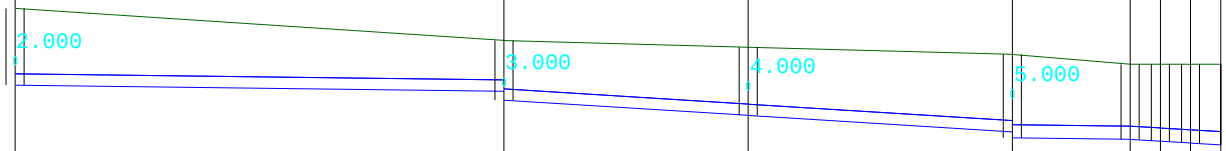
Storage Structures for Storm

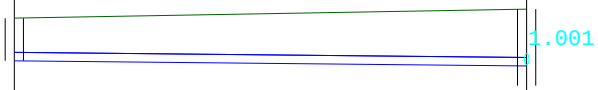
Cellular Storage Manhole: S6, DS/PN: S1.004

Invert Level (m) 12.148 Infiltration Coefficient Side (m/hr) 0.91851 Porosity 0.40
Infiltration Coefficient Base (m/hr) 0.91851 Safety Factor 2.0

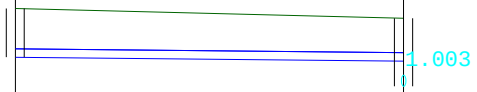
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	39.0	39.0	1.200	39.0	69.0	1.300	0.0	69.0

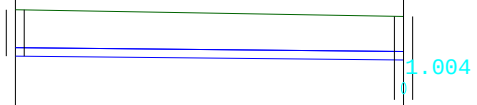
MH Name		S1	S2	S4
Hor Scale 500 Ver Scale 200 Datum (m)11.000				
PN		S1.000	S1.001	
Dia (mm)		300	300	
Slope (1:X)		150.0	200.0	
Cover Level (m)		18.600	18.210	18.180
Invert Level (m)		17.170	16.780 / 16.780	16.704
Length (m)		58.522	15.254	

MH Name		S4	S6	S8	S10				SSoakaway 2
Hor Scale 500 Ver Scale 200 Datum (m)10.000									
PN		S1.002	S1.003	S1.004	S1.005				
Dia (mm)		300	300	300	350				
Slope (1:X)		200.0	40.0	40.0	200.0				
Cover Level (m)		18.180	17.330	17.150	16.960	16.700	16.700	16.700	16.700
Invert Level (m)		16.150	15.988 15.750	15.346 15.346	14.909 14.750	14.711 14.711	14.661	14.611	
Length (m)		32.359	16.171	17.479	7.800				

MH Name		S3	S4
Hor Scale 500 Ver Scale 200 Datum (m)11.000			
PN		S2.000	
Dia (mm)		225	
Slope (1:X)		250.0	
Cover Level (m)		17.940	18.180
Invert Level (m)		16.815	16.679
Length (m)		33.908	

MH Name		S5	S6
Hor Scale 500 Ver Scale 200 Datum (m)11.000			
PN		S3.000	
Dia (mm)		225	
Slope (1:X)		249.5	
Cover Level (m)		17.490	17.330
Invert Level (m)		16.220	16.117
Length (m)		25.700	

MH Name		S7	S8
Hor Scale 500 Ver Scale 200 Datum (m)10.000			
PN		S4.000	
Dia (mm)		225	
Slope (1:X)		250.0	
Cover Level (m)		17.410	17.150
Invert Level (m)		16.120	16.017
Length (m)		25.700	

MH Name		S9	S10
Hor Scale 500 Ver Scale 200 Datum (m)10.000			
PN		S5.000	
Dia (mm)		225	
Slope (1:X)		250.0	
Cover Level (m)		17.140	16.960
Invert Level (m)		15.910	15.807
Length (m)		25.700	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	2.000
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	20	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.005		

Designed with Level Soffits

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	58.522	0.390	150.0	0.185	5.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	40.18	5.76	17.170	0.185	0.0	0.0	4.8	1.28	90.6	29.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	15.254	0.076	200.0	0.030	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	33.908	0.136	250.0	0.051	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	32.359	0.162	200.0	0.038	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	25.700	0.103	249.5	0.065	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	16.171	0.404	40.0	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	39.56	5.99	16.780	0.215	0.0	0.0	5.5	1.11	78.3	33.2
S2.000	40.39	5.69	16.815	0.051	0.0	0.0	1.3	0.82	32.7	8.0
S1.002	38.33	6.48	16.150	0.304	0.0	0.0	7.6	1.11	78.3	45.4
S3.000	40.86	5.52	16.220	0.065	0.0	0.0	1.7	0.82	32.7	10.4
S1.003	38.07	6.59	15.750	0.453	0.0	0.0	11.2	2.49	176.2	67.2

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
S4.000	25.700	0.103	250.0	0.041	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	17.479	0.437	40.0	0.069	0.00	0.0	0.600	o	300	Pipe/Conduit	
S5.000	25.700	0.103	250.0	0.034	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	7.800	0.039	200.0	0.061	0.00	0.0	0.600	o	350	Pipe/Conduit	
S1.006	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	350	Pipe/Conduit	
S1.007	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	350	Pipe/Conduit	
S1.008	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	350	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)
S4.000	40.86	5.52	16.120	0.041	0.0	0.0	1.1	0.82	32.7	6.5
S1.004	37.79	6.70	15.346	0.563	0.0	0.0	13.8	2.49	176.2	83.0
S5.000	40.86	5.52	15.910	0.034	0.0	0.0	0.9	0.82	32.7	5.4
S1.005	37.54	6.81	14.750	0.658	0.0	0.0	16.1	1.22	117.6	96.3
S1.006	37.51	6.82	14.711	0.658	0.0	0.0	16.1	2.75	264.6	96.3
S1.007	37.48	6.83	14.661	0.658	0.0	0.0	16.1	2.75	264.6	96.3
S1.008	37.45	6.84	14.611	0.658	0.0	0.0	16.1	2.75	264.6	96.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	18.600	1.430	Open Manhole	1200	S1.000	17.170	300				
S2	18.210	1.430	Open Manhole	1200	S1.001	16.780	300	S1.000	16.780	300	
S3	17.940	1.125	Open Manhole	1200	S2.000	16.815	225				
S4	18.180	2.030	Open Manhole	1200	S1.002	16.150	300	S1.001	16.704	300	554
								S2.000	16.679	225	454
S5	17.490	1.270	Open Manhole	1200	S3.000	16.220	225				
S6	17.330	1.580	Open Manhole	1200	S1.003	15.750	300	S1.002	15.988	300	238
								S3.000	16.117	225	292
S7	17.410	1.290	Open Manhole	1200	S4.000	16.120	225				
S8	17.150	1.804	Open Manhole	1200	S1.004	15.346	300	S1.003	15.346	300	
								S4.000	16.017	225	596
S9	17.140	1.230	Open Manhole	1200	S5.000	15.910	225				
S10	16.960	2.210	Open Manhole	1200	S1.005	14.750	350	S1.004	14.909	300	109
								S5.000	15.807	225	932
S11	16.700	1.989	Open Manhole	1200	S1.006	14.711	350	S1.005	14.711	350	
S12	16.700	2.039	Open Manhole	1200	S1.007	14.661	350	S1.006	14.661	350	
S13	16.700	2.089	Open Manhole	1200	S1.008	14.611	350	S1.007	14.611	350	
SSoakaway 2	16.700	2.139	Open Manhole	0		OUTFALL		S1.008	14.561	350	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	18.600	17.170	1.130	Open Manhole	1200
S1.001	o	300	S2	18.210	16.780	1.130	Open Manhole	1200
S2.000	o	225	S3	17.940	16.815	0.900	Open Manhole	1200
S1.002	o	300	S4	18.180	16.150	1.730	Open Manhole	1200
S3.000	o	225	S5	17.490	16.220	1.045	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	58.522	150.0	S2	18.210	16.780	1.130	Open Manhole	1200
S1.001	15.254	200.0	S4	18.180	16.704	1.176	Open Manhole	1200
S2.000	33.908	250.0	S4	18.180	16.679	1.276	Open Manhole	1200
S1.002	32.359	200.0	S6	17.330	15.988	1.042	Open Manhole	1200
S3.000	25.700	249.5	S6	17.330	16.117	0.988	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.003	o	300	S6	17.330	15.750	1.280	Open Manhole	1200
S4.000	o	225	S7	17.410	16.120	1.065	Open Manhole	1200
S1.004	o	300	S8	17.150	15.346	1.504	Open Manhole	1200
S5.000	o	225	S9	17.140	15.910	1.005	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.003	16.171	40.0	S8	17.150	15.346	1.504	Open Manhole	1200
S4.000	25.700	250.0	S8	17.150	16.017	0.908	Open Manhole	1200
S1.004	17.479	40.0	S10	16.960	14.909	1.751	Open Manhole	1200
S5.000	25.700	250.0	S10	16.960	15.807	0.928	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	o	350	S10	16.960	14.750	1.860	Open Manhole	1200
S1.006	o	350	S11	16.700	14.711	1.639	Open Manhole	1200
S1.007	o	350	S12	16.700	14.661	1.689	Open Manhole	1200
S1.008	o	350	S13	16.700	14.611	1.739	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	7.800	200.0	S11	16.700	14.711	1.639	Open Manhole	1200
S1.006	2.000	40.0	S12	16.700	14.661	1.689	Open Manhole	1200
S1.007	2.000	40.0	S13	16.700	14.611	1.739	Open Manhole	1200
S1.008	2.000	40.0	SSoakaway 2	16.700	14.561	1.789	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	100	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S13, DS/PN: S1.008, Volume (m^3): 2.4

Invert Level (m) 14.614

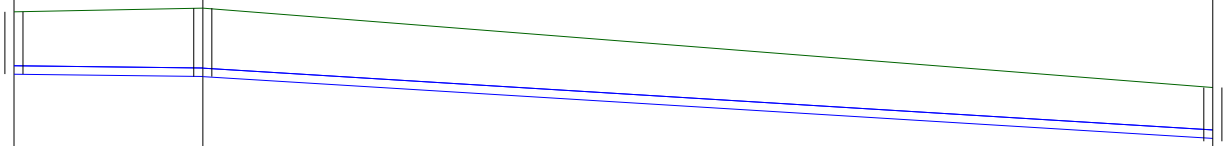
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	0.0000	1.200	0.0000	2.200	0.0000	3.200	0.0000	4.200	0.0000	5.200	0.0000
0.400	0.0000	1.400	0.0000	2.400	0.0000	3.400	0.0000	4.400	0.0000	5.400	0.0000
0.600	0.0000	1.600	0.0000	2.600	0.0000	3.600	0.0000	4.600	0.0000	5.600	0.0000
0.800	0.0000	1.800	0.0000	2.800	0.0000	3.800	0.0000	4.800	0.0000	5.800	0.0000
1.000	0.0000	2.000	0.0000	3.000	0.0000	4.000	0.0000	5.000	0.0000	6.000	0.0000

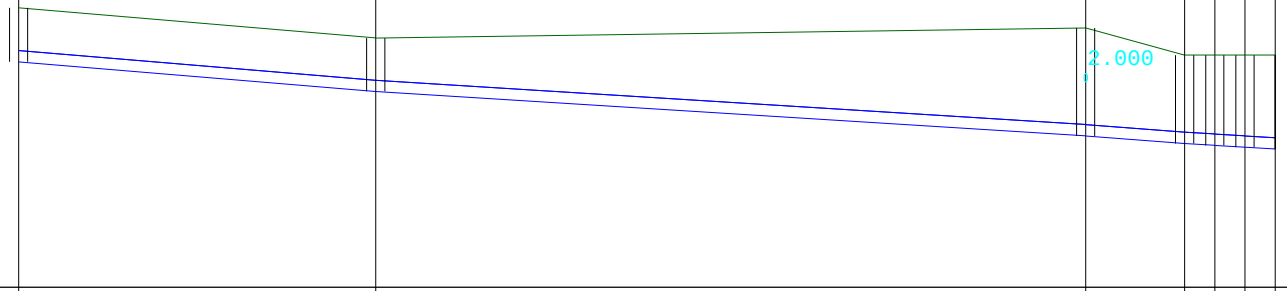
Storage Structures for Storm

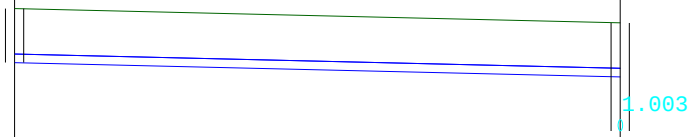
Cellular Storage Manhole: S12, DS/PN: S1.007

Invert Level (m) 13.764 Infiltration Coefficient Side (m/hr) 0.91851 Porosity 0.40
Infiltration Coefficient Base (m/hr) 0.91851 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	147.0	147.0	2.000	147.0	269.0	2.100	0.0	269.0

MH Name		S1	S2	S3
Hor Scale 500 Ver Scale 200 Datum (m)12.000				
PN		S1.000	S1.001	
Dia (mm)		225	225	
Slope (1:X)		200.0	40.7	
Cover Level (m)		19.400	19.500	17.400
Invert Level (m)		17.750 / 17.688	17.688	16.046
Length (m)		12.500	66.862	

MH Name		S3	S4	S6				S
Hor Scale 500 Ver Scale 200 Datum (m)10.000								
PN		S1.002	S1.003	S1.004				
Dia (mm)		300	300	300				
Slope (1:X)		30.0	40.0	32.7				
Cover Level (m)		17.400	16.600	16.870	16.150	16.150	16.150	16.150
Invert Level (m)		15.971	15.183 15.183	14.008 14.008	13.808 13.808	13.758	13.708	
Length (m)		23.635	47.000	6.543				

MH Name		S5	S6
Hor Scale 500 Ver Scale 200 Datum (m)10.000			
PN		S2.000	
Dia (mm)		225	
Slope (1:X)		106.1	
Cover Level (m)		17.250	16.870
Invert Level (m)		15.820	15.442
Length (m)		40.090	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	2.000
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	20	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.005		

Designed with Level Soffits

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	12.500	0.063	200.0	0.000	5.00	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	41.72	5.23	17.750	0.000	0.0	0.0	0.0	0.92	36.6	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	66.862	1.642	40.7	0.185	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	23.635	0.788	30.0	0.103	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	47.000	1.175	40.0	0.083	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	40.090	0.378	106.1	0.125	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	6.543	0.200	32.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.007	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	40.16	5.77	17.688	0.185	0.0	0.0	4.8	2.06	81.8	29.0
S1.002	39.79	5.90	15.971	0.288	0.0	0.0	7.4	2.88	203.7	44.7
S1.003	38.97	6.22	15.183	0.371	0.0	0.0	9.4	2.49	176.2	56.4
S2.000	40.84	5.53	15.820	0.125	0.0	0.0	3.3	1.27	50.5	19.9
S1.004	38.87	6.26	14.008	0.496	0.0	0.0	12.5	2.76	195.0	75.2
S1.005	38.84	6.27	13.808	0.496	0.0	0.0	12.5	2.49	176.2	75.2
S1.006	38.80	6.29	13.758	0.496	0.0	0.0	12.5	2.49	176.2	75.2
S1.007	38.77	6.30	13.708	0.496	0.0	0.0	12.5	2.49	176.2	75.2

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	19.400	1.650	Open Manhole	1200	S1.000	17.750	225				
S2	19.500	1.813	Open Manhole	1200	S1.001	17.688	225	S1.000	17.688	225	
S3	17.400	1.430	Open Manhole	1200	S1.002	15.971	300	S1.001	16.046	225	
S4	16.600	1.417	Open Manhole	1200	S1.003	15.183	300	S1.002	15.183	300	
S5	17.250	1.430	Open Manhole	1200	S2.000	15.820	225				
S6	16.870	2.862	Open Manhole	1200	S1.004	14.008	300	S1.003	14.008	300	
								S2.000	15.442	225	1359
S7	16.150	2.342	Open Manhole	1200	S1.005	13.808	300	S1.004	13.808	300	
S8	16.150	2.392	Open Manhole	1200	S1.006	13.758	300	S1.005	13.758	300	
S9	16.150	2.442	Open Manhole	1200	S1.007	13.708	300	S1.006	13.708	300	
S	16.150	2.492	Open Manhole	0		OUTFALL		S1.007	13.658	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	19.400	17.750	1.425	Open Manhole	1200
S1.001	o	225	S2	19.500	17.688	1.588	Open Manhole	1200
S1.002	o	300	S3	17.400	15.971	1.130	Open Manhole	1200
S1.003	o	300	S4	16.600	15.183	1.117	Open Manhole	1200
S2.000	o	225	S5	17.250	15.820	1.205	Open Manhole	1200
S1.004	o	300	S6	16.870	14.008	2.562	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	12.500	200.0	S2	19.500	17.688	1.588	Open Manhole	1200
S1.001	66.862	40.7	S3	17.400	16.046	1.130	Open Manhole	1200
S1.002	23.635	30.0	S4	16.600	15.183	1.117	Open Manhole	1200
S1.003	47.000	40.0	S6	16.870	14.008	2.562	Open Manhole	1200
S2.000	40.090	106.1	S6	16.870	15.442	1.203	Open Manhole	1200
S1.004	6.543	32.7	S7	16.150	13.808	2.042	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	o	300	S7	16.150	13.808	2.042	Open Manhole	1200
S1.006	o	300	S8	16.150	13.758	2.092	Open Manhole	1200
S1.007	o	300	S9	16.150	13.708	2.142	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	2.000	40.0	S8	16.150	13.758	2.092	Open Manhole	1200
S1.006	2.000	40.0	S9	16.150	13.708	2.142	Open Manhole	1200
S1.007	2.000	40.0	S	16.150	13.658	2.192	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	100	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S9, DS/PN: S1.007, Volume (m³): 2.8

Invert Level (m) 13.708

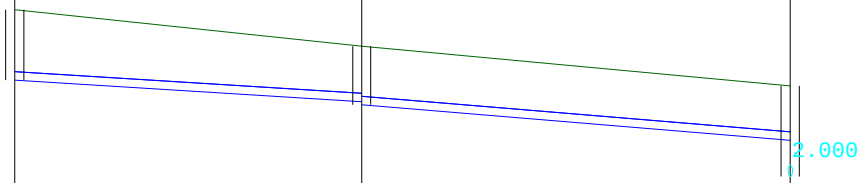
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0000	0.600	0.0000	1.100	0.0000	1.600	0.0000	2.100	0.0000	2.600	0.0000
0.200	0.0000	0.700	0.0000	1.200	0.0000	1.700	0.0000	2.200	0.0000	2.700	0.0000
0.300	0.0000	0.800	0.0000	1.300	0.0000	1.800	0.0000	2.300	0.0000	2.800	0.0000
0.400	0.0000	0.900	0.0000	1.400	0.0000	1.900	0.0000	2.400	0.0000	2.900	0.0000
0.500	0.0000	1.000	0.0000	1.500	0.0000	2.000	0.0000	2.500	0.0000	3.000	0.0000

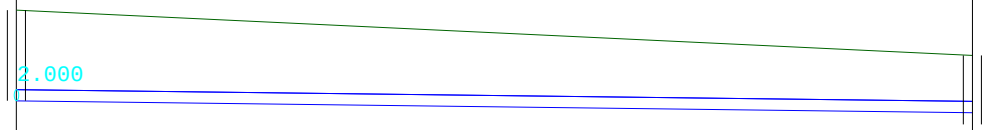
Storage Structures for Storm

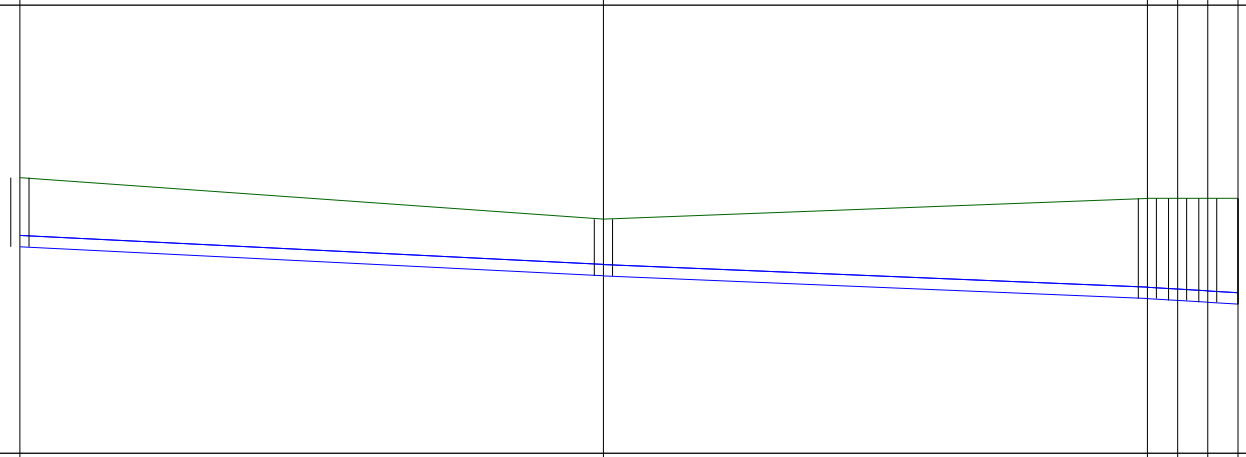
Cellular Storage Manhole: S8, DS/PN: S1.006

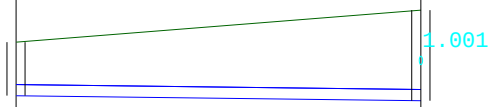
Invert Level (m) 12.858 Infiltration Coefficient Side (m/hr) 1.02136 Porosity 0.40
Infiltration Coefficient Base (m/hr) 1.02136 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	180.0	180.0	1.200	180.0	247.2	1.300	0.0	247.2

MH Name		S1	S2	S4
Hor Scale 500 Ver Scale 200 Datum (m)11.000				
PN		S1.000	S1.001	
Dia (mm)		225	225	
Slope (1:X)		40.0	30.0	
Cover Level (m)		19.520	18.550	17.500
Invert Level (m)		17.650 17.076	17.000 16.055	
Length (m)		22.970	28.360	

MH Name		S4	S5
Hor Scale 500 Ver Scale 200 Datum (m)10.000			
PN		S1.002	
Dia (mm)		300	
Slope (1:X)		200.3	
Cover Level (m)		17.500	16.300
Invert Level (m)		15.096	14.780
Length (m)		63.280	

MH Name		S5	S6				S
Hor Scale 500 Ver Scale 200 Datum (m)9.000							
PN		S1.003	S1.004				
Dia (mm)		300	300				
Slope (1:X)		50.0	60.0				
Cover Level (m)		16.300	15.200	15.750	15.750	15.750	15.750
Invert Level (m)		14.470	13.697 / 13.697	13.097	13.097	13.047	12.997
Length (m)		38.630	36.000				

MH Name		S3	S4
Hor Scale 500 Ver Scale 200 Datum (m)10.000			
PN		S2.000	
Dia (mm)		300	
Slope (1:X)		200.0	
Cover Level (m)		16.650	17.500
Invert Level (m)		15.230	15.096
Length (m)		26.800	

Fairgreen House Fairgreen Road Galway	Phase 1 - Storm Network D SHD Residential Development Rosshill, Galway
Date 18/06/2021 File 10690-STORM DESIGN NETWORK D.MDX	Designed by Shane Howard Checked by Richard Daly
Micro Drainage	Network 2018.1.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	2.000
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	20	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.005		

Designed with Level Soffits

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	22.970	0.574	40.0	0.067	5.00	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	41.85	5.18	17.650	0.067	0.0	0.0	1.8	2.07	82.5	10.9

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
S1.001	28.360	0.945	30.0	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	26.800	0.134	200.0	0.085	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	63.280	0.316	200.3	0.131	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	38.630	0.773	50.0	0.075	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	36.000	0.600	60.0	0.073	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.007	2.000	0.050	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	41.26	5.38	17.000	0.117	0.0	0.0	3.1	2.40	95.3	18.8
S2.000	41.20	5.40	15.230	0.085	0.0	0.0	2.3	1.11	78.3	13.7
S1.002	38.63	6.36	15.096	0.333	0.0	0.0	8.4	1.11	78.3	50.2
S1.003	37.92	6.64	14.470	0.408	0.0	0.0	10.1	2.23	157.6	60.3
S1.004	37.24	6.94	13.697	0.481	0.0	0.0	11.6	2.03	143.7	69.9
S1.005	37.21	6.95	13.097	0.481	0.0	0.0	11.6	2.49	176.2	69.9
S1.006	37.18	6.97	13.047	0.481	0.0	0.0	11.6	2.49	176.2	69.9
S1.007	37.15	6.98	12.997	0.481	0.0	0.0	11.6	2.49	176.2	69.9

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	19.520	1.870	Open Manhole	1200	S1.000	17.650	225				
S2	18.550	1.550	Open Manhole	1200	S1.001	17.000	225	S1.000	17.076	225	76
S3	16.650	1.420	Open Manhole	1200	S2.000	15.230	300				
S4	17.500	2.404	Open Manhole	1200	S1.002	15.096	300	S1.001	16.055	225	884
								S2.000	15.096	300	
S5	16.300	1.830	Open Manhole	1200	S1.003	14.470	300	S1.002	14.780	300	310
S6	15.200	1.503	Open Manhole	1200	S1.004	13.697	300	S1.003	13.697	300	
S7	15.750	2.653	Open Manhole	1200	S1.005	13.097	300	S1.004	13.097	300	
S8	15.750	2.703	Open Manhole	1200	S1.006	13.047	300	S1.005	13.047	300	
S9	15.750	2.753	Open Manhole	1200	S1.007	12.997	300	S1.006	12.997	300	
S	15.750	2.803	Open Manhole	0		OUTFALL		S1.007	12.947	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	19.520	17.650	1.645	Open Manhole	1200
S1.001	o	225	S2	18.550	17.000	1.325	Open Manhole	1200
S2.000	o	300	S3	16.650	15.230	1.120	Open Manhole	1200
S1.002	o	300	S4	17.500	15.096	2.104	Open Manhole	1200
S1.003	o	300	S5	16.300	14.470	1.530	Open Manhole	1200
S1.004	o	300	S6	15.200	13.697	1.203	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	22.970	40.0	S2	18.550	17.076	1.249	Open Manhole	1200
S1.001	28.360	30.0	S4	17.500	16.055	1.220	Open Manhole	1200
S2.000	26.800	200.0	S4	17.500	15.096	2.104	Open Manhole	1200
S1.002	63.280	200.3	S5	16.300	14.780	1.220	Open Manhole	1200
S1.003	38.630	50.0	S6	15.200	13.697	1.203	Open Manhole	1200
S1.004	36.000	60.0	S7	15.750	13.097	2.353	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	o	300	S7	15.750	13.097	2.353	Open Manhole	1200
S1.006	o	300	S8	15.750	13.047	2.403	Open Manhole	1200
S1.007	o	300	S9	15.750	12.997	2.453	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	2.000	40.0	S8	15.750	13.047	2.403	Open Manhole	1200
S1.006	2.000	40.0	S9	15.750	12.997	2.453	Open Manhole	1200
S1.007	2.000	40.0	S	15.750	12.947	2.503	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	1	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S9, DS/PN: S1.007, Volume (m³): 3.2

Invert Level (m) 12.997

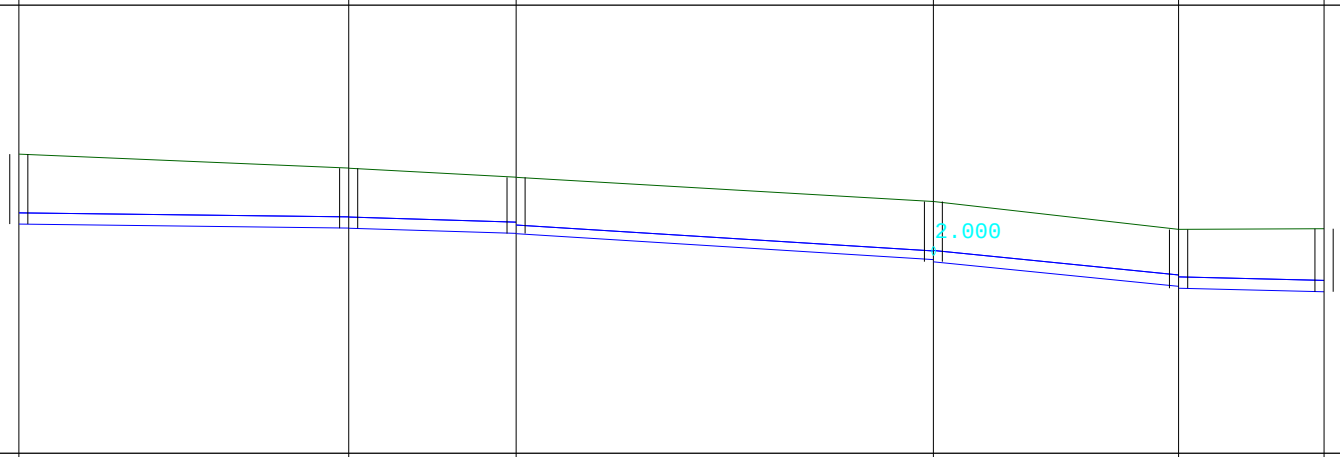
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	0.0000	1.200	0.0000	2.200	0.0000	3.200	0.0000	4.200	0.0000	5.200	0.0000
0.400	0.0000	1.400	0.0000	2.400	0.0000	3.400	0.0000	4.400	0.0000	5.400	0.0000
0.600	0.0000	1.600	0.0000	2.600	0.0000	3.600	0.0000	4.600	0.0000	5.600	0.0000
0.800	0.0000	1.800	0.0000	2.800	0.0000	3.800	0.0000	4.800	0.0000	5.800	0.0000
1.000	0.0000	2.000	0.0000	3.000	0.0000	4.000	0.0000	5.000	0.0000	6.000	0.0000

Storage Structures for Storm

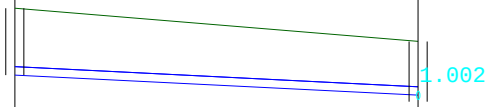
Cellular Storage Manhole: S8, DS/PN: S1.006

Invert Level (m) 11.250 Infiltration Coefficient Side (m/hr) 0.08316 Porosity 0.40
Infiltration Coefficient Base (m/hr) 0.08316 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	240.0	240.0	2.000	240.0	364.0	2.100	0.0	364.0

MH Name		S1	S2	S3	S5	S6	S7
Hor Scale 500 Ver Scale 200 Datum (m)8.000							
PN		S1.000	S1.001	S1.002	S1.003	S1.004	
Dia (mm)		300	300	225	300	300	
Slope (1:X)		200.0	80.0	40.0	25.0	100.3	
Cover Level (m)		15.920	15.550	15.310	14.670	13.930	13.950
Invert Level (m)		14.070 → 13.961	13.960 → 13.822	13.820 → 13.130	13.070 → 12.421	12.370 → 12.274	
Length (m)		21.840	11.080	27.620	16.230	9.630	

MH Name					S
Hor Scale 500 Ver Scale 200 Datum (m)7.000					
PN					
Dia (mm)					
Slope (1:X)					
Cover Level (m)		13.950	13.950	13.950	13.950
Invert Level (m)		12.274	12.264	12.254	
Length (m)					

MH Name		S4	S5
Hor Scale 500 Ver Scale 200 Datum (m)8.000			
PN		S2.000	
Dia (mm)		225	
Slope (1:X)		50.0	
Cover Level (m)		15.550	14.670
Invert Level (m)		13.780	13.246
Length (m)		26.700	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	2.000
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	20	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.005		

Designed with Level Soffits

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	21.840	0.109	200.0	0.037	5.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	41.42	5.33	14.070	0.037	0.0	0.0	1.0	1.11	78.3	6.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	11.080	0.139	80.0	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	27.620	0.691	40.0	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	26.700	0.534	50.0	0.029	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	16.230	0.649	25.0	0.015	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	9.630	0.096	100.3	0.005	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.007	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	41.11	5.43	13.960	0.046	0.0	0.0	1.2	1.76	124.4	7.4
S1.002	40.48	5.66	13.820	0.068	0.0	0.0	1.8	2.07	82.5	10.7
S2.000	41.68	5.24	13.780	0.029	0.0	0.0	0.8	1.85	73.7	4.7
S1.003	40.24	5.74	13.070	0.112	0.0	0.0	2.9	3.16	223.1	17.6
S1.004	39.96	5.84	12.370	0.117	0.0	0.0	3.0	1.57	111.0	18.2
S1.005	39.88	5.87	12.274	0.117	0.0	0.0	3.0	1.11	78.3	18.2
S1.006	39.80	5.90	12.264	0.117	0.0	0.0	3.0	1.11	78.3	18.2
S1.007	39.72	5.93	12.254	0.117	0.0	0.0	3.0	1.11	78.3	18.2

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	15.920	1.850	Open Manhole	1200	S1.000	14.070	300				
S2	15.550	1.590	Open Manhole	1200	S1.001	13.960	300	S1.000	13.961	300	1
S3	15.310	1.490	Open Manhole	1200	S1.002	13.820	225	S1.001	13.822	300	77
S4	15.550	1.770	Open Manhole	1200	S2.000	13.780	225				
S5	14.670	1.600	Open Manhole	1200	S1.003	13.070	300	S1.002	13.130	225	
								S2.000	13.246	225	101
S6	13.930	1.560	Open Manhole	1200	S1.004	12.370	300	S1.003	12.421	300	51
S7	13.950	1.676	Open Manhole	1200	S1.005	12.274	300	S1.004	12.274	300	
S8	13.950	1.686	Open Manhole	1200	S1.006	12.264	300	S1.005	12.264	300	
S9	13.950	1.696	Open Manhole	1200	S1.007	12.254	300	S1.006	12.254	300	
S	13.950	1.706	Open Manhole	0		OUTFALL		S1.007	12.244	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	15.920	14.070	1.550	Open Manhole	1200
S1.001	o	300	S2	15.550	13.960	1.290	Open Manhole	1200
S1.002	o	225	S3	15.310	13.820	1.265	Open Manhole	1200
S2.000	o	225	S4	15.550	13.780	1.545	Open Manhole	1200
S1.003	o	300	S5	14.670	13.070	1.300	Open Manhole	1200
S1.004	o	300	S6	13.930	12.370	1.260	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	21.840	200.0	S2	15.550	13.961	1.289	Open Manhole	1200
S1.001	11.080	80.0	S3	15.310	13.822	1.189	Open Manhole	1200
S1.002	27.620	40.0	S5	14.670	13.130	1.316	Open Manhole	1200
S2.000	26.700	50.0	S5	14.670	13.246	1.199	Open Manhole	1200
S1.003	16.230	25.0	S6	13.930	12.421	1.209	Open Manhole	1200
S1.004	9.630	100.3	S7	13.950	12.274	1.376	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	o	300	S7	13.950	12.274	1.376	Open Manhole	1200
S1.006	o	300	S8	13.950	12.264	1.386	Open Manhole	1200
S1.007	o	300	S9	13.950	12.254	1.396	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	2.000	200.0	S8	13.950	12.264	1.386	Open Manhole	1200
S1.006	2.000	200.0	S9	13.950	12.254	1.396	Open Manhole	1200
S1.007	2.000	200.0	S	13.950	12.244	1.406	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	1	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S9, DS/PN: S1.007, Volume (m³): 2.0

Invert Level (m) 12.254

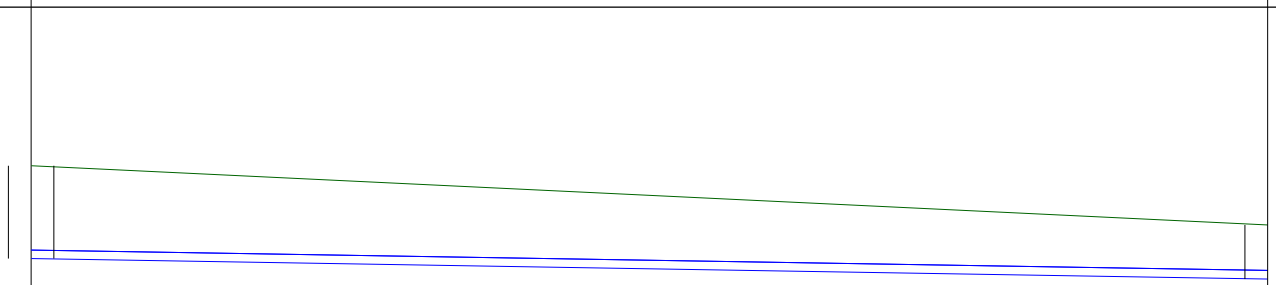
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	0.0000	1.200	0.0000	2.200	0.0000	3.200	0.0000	4.200	0.0000	5.200	0.0000
0.400	0.0000	1.400	0.0000	2.400	0.0000	3.400	0.0000	4.400	0.0000	5.400	0.0000
0.600	0.0000	1.600	0.0000	2.600	0.0000	3.600	0.0000	4.600	0.0000	5.600	0.0000
0.800	0.0000	1.800	0.0000	2.800	0.0000	3.800	0.0000	4.800	0.0000	5.800	0.0000
1.000	0.0000	2.000	0.0000	3.000	0.0000	4.000	0.0000	5.000	0.0000	6.000	0.0000

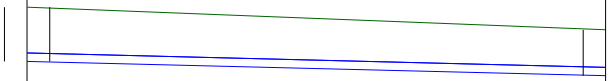
Storage Structures for Storm

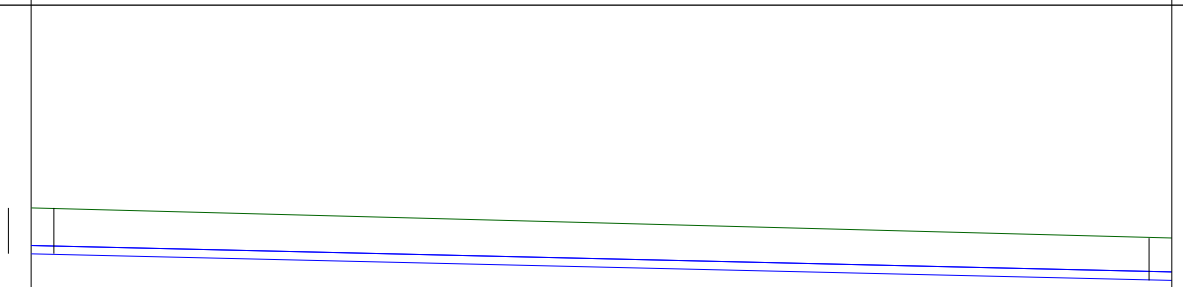
Cellular Storage Manhole: S8, DS/PN: S1.006

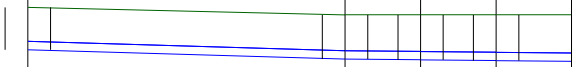
Invert Level (m) 11.466 Infiltration Coefficient Side (m/hr) 0.08316 Porosity 0.40
Infiltration Coefficient Base (m/hr) 0.08316 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	96.0	96.0	1.000	96.0	136.0	1.100	0.0	136.0

MH Name		S1	S2
Hor Scale 200 Ver Scale 200 Datum (m)5.000			
PN		S1.000	
Dia (mm)		225	
Slope (1:X)		60.0	
Cover Level (m)		12.670	11.100
Invert Level (m)		10.210	9.664
Length (m)		32.739	

MH Name		S2	S3
Hor Scale 200 Ver Scale 200 Datum (m)4.000			
PN		S1.001	
Dia (mm)		225	
Slope (1:X)		40.0	
Cover Level (m)		11.100	10.500
Invert Level (m)		9.664	9.281
Length (m)		15.320	

MH Name		S3	S4
Hor Scale 200 Ver Scale 200 Datum (m)4.000			
PN		S1.002	
Dia (mm)		225	
Slope (1:X)		42.8	
Cover Level (m)		10.500	9.700
Invert Level (m)		9.281	8.575
Length (m)		30.200	

MH Name		S4				S
Hor Scale 200 Ver Scale 200 Datum (m)3.000						
PN		S1.003				
Dia (mm)		225				
Slope (1:X)		33.6				
Cover Level (m)		9.700	9.500	9.500	9.500	9.500
Invert Level (m)		8.575	8.325 / 8.325	8.305 / 8.305	8.285 / 8.285	8.265
Length (m)		8.400				

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	2.000
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	20	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.005		

Designed with Level Soffits

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	32.739	0.546	60.0	0.030	5.00	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	41.44	5.32	10.210	0.030	0.0	0.0	0.8	1.69	67.3	4.8

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	15.320	0.383	40.0	0.011	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	30.200	0.706	42.8	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	8.400	0.250	33.6	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	2.000	0.020	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	2.000	0.020	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	2.000	0.020	100.0	0.000	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)
S1.001	41.07	5.45	9.664	0.041	0.0	0.0	1.1	2.07	82.5	6.6
S1.002	40.36	5.70	9.281	0.066	0.0	0.0	1.7	2.01	79.7	10.4
S1.003	40.19	5.76	8.575	0.079	0.0	0.0	2.1	2.26	90.0	12.4
S1.004	40.12	5.78	8.325	0.079	0.0	0.0	2.1	1.31	52.0	12.4
S1.005	40.05	5.81	8.305	0.079	0.0	0.0	2.1	1.31	52.0	12.4
S1.006	39.98	5.83	8.285	0.079	0.0	0.0	2.1	1.31	52.0	12.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	12.670	2.460	Open Manhole	1200	S1.000	10.210	225				
S2	11.100	1.436	Open Manhole	1200	S1.001	9.664	225	S1.000	9.664	225	
S3	10.500	1.219	Open Manhole	1200	S1.002	9.281	225	S1.001	9.281	225	
S4	9.700	1.125	Open Manhole	1200	S1.003	8.575	225	S1.002	8.575	225	
S5	9.500	1.175	Open Manhole	1200	S1.004	8.325	225	S1.003	8.325	225	
S6	9.500	1.195	Open Manhole	1200	S1.005	8.305	225	S1.004	8.305	225	
S7	9.500	1.215	Open Manhole	1200	S1.006	8.285	225	S1.005	8.285	225	
S	9.500	1.235	Open Manhole	0		OUTFALL		S1.006	8.265	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	12.670	10.210	2.235	Open Manhole	1200
S1.001	o	225	S2	11.100	9.664	1.211	Open Manhole	1200
S1.002	o	225	S3	10.500	9.281	0.994	Open Manhole	1200
S1.003	o	225	S4	9.700	8.575	0.900	Open Manhole	1200
S1.004	o	225	S5	9.500	8.325	0.950	Open Manhole	1200
S1.005	o	225	S6	9.500	8.305	0.970	Open Manhole	1200
S1.006	o	225	S7	9.500	8.285	0.990	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	32.739	60.0	S2	11.100	9.664	1.211	Open Manhole	1200
S1.001	15.320	40.0	S3	10.500	9.281	0.994	Open Manhole	1200
S1.002	30.200	42.8	S4	9.700	8.575	0.900	Open Manhole	1200
S1.003	8.400	33.6	S5	9.500	8.325	0.950	Open Manhole	1200
S1.004	2.000	100.0	S6	9.500	8.305	0.970	Open Manhole	1200
S1.005	2.000	100.0	S7	9.500	8.285	0.990	Open Manhole	1200
S1.006	2.000	100.0	S	9.500	8.265	1.010	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	100	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S7, DS/PN: S1.006, Volume (m³): 1.4

Invert Level (m) 8.285

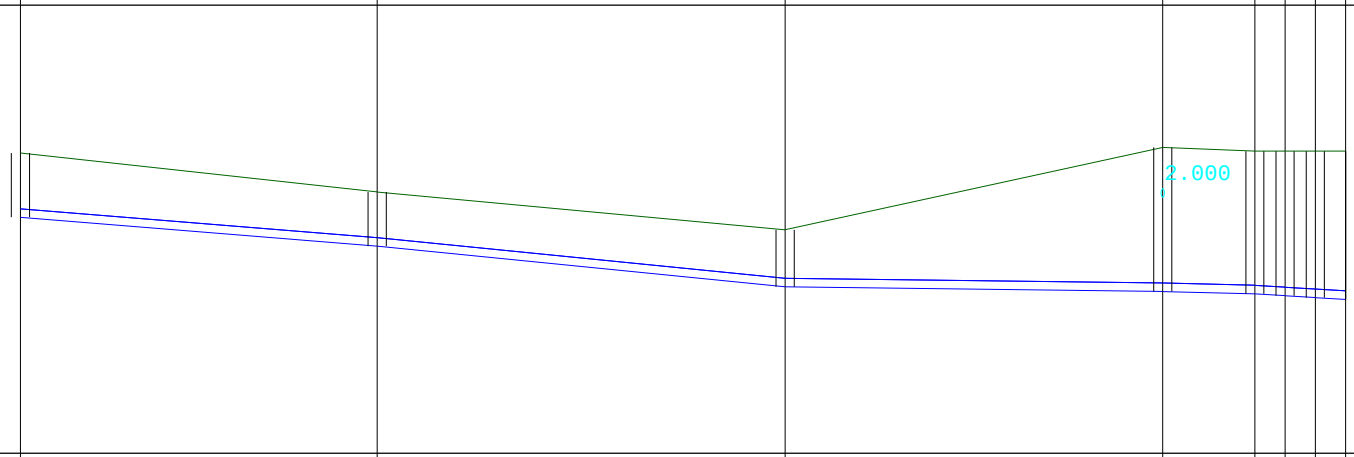
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	0.0000	1.200	0.0000	2.200	0.0000	3.200	0.0000	4.200	0.0000	5.200	0.0000
0.400	0.0000	1.400	0.0000	2.400	0.0000	3.400	0.0000	4.400	0.0000	5.400	0.0000
0.600	0.0000	1.600	0.0000	2.600	0.0000	3.600	0.0000	4.600	0.0000	5.600	0.0000
0.800	0.0000	1.800	0.0000	2.800	0.0000	3.800	0.0000	4.800	0.0000	5.800	0.0000
1.000	0.0000	2.000	0.0000	3.000	0.0000	4.000	0.0000	5.000	0.0000	6.000	0.0000

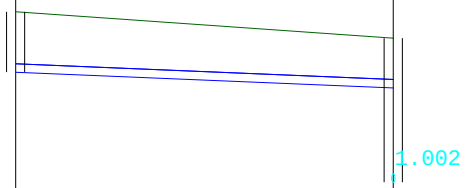
Storage Structures for Storm

Cellular Storage Manhole: S6, DS/PN: S1.005

Invert Level (m) 6.530 Infiltration Coefficient Side (m/hr) 0.08316 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.08316 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	25.2	25.2	2.000	25.2	66.4	2.100	0.0	66.4

MH Name		S1	S2	S3					S
Hor Scale 500 Ver Scale 200 Datum (m)7.000									
PN		S1.000	S1.001	S1.002					
Dia (mm)		225	225	225					
Slope (1:X)		31.0	25.0	200.0					
Cover Level (m)		14.950	13.920	12.920	15.100	15.000	15.000	15.000	
Invert Level (m)		13.250	12.488 12.488	11.408 11.408	11.283 11.283	11.222 11.222	11.172	11.122	
Length (m)		23.620	27.000	25.000					

MH Name		S4	S5
Hor Scale 500 Ver Scale 200 Datum (m)8.000			
PN		S2.000	
Dia (mm)		225	
Slope (1:X)		60.0	
Cover Level (m)		15.800	15.100
Invert Level (m)		14.200	13.783
Length (m)		25.000	

Fairgreen House Fairgreen Road Galway	Phase 1 - Storm Network G SHD Residential Development Rosshill, Galway
Date 18/06/2021 File 10690-STORM DESIGN NETWORK G.MDX	Designed by Shane Howard Checked by Richard Daly
Micro Drainage	Network 2018.1.1

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)	100	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	13.700	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

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	23.620	0.762	31.0	0.049	5.00	0.0	1.500	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	5.19	13.250	0.049	0.0	0.0	0.0	2.07	82.1	6.6

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	27.000	1.080	25.0	0.059	0.00	0.0	1.500	o	225	Pipe/Conduit	
S1.002	25.000	0.125	200.0	0.016	0.00	0.0	1.500	o	225	Pipe/Conduit	
S2.000	25.000	0.417	60.0	0.027	5.00	0.0	1.500	o	225	Pipe/Conduit	
S1.003	6.100	0.061	100.0	0.003	0.00	0.0	1.500	o	225	Pipe/Conduit	
S1.004	2.000	0.050	40.0	0.000	0.00	0.0	1.500	o	225	Pipe/Conduit	
S1.005	2.000	0.050	40.0	0.000	0.00	0.0	1.500	o	225	Pipe/Conduit	
S1.006	2.000	0.050	40.0	0.000	0.00	0.0	1.500	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)
S1.001	50.00	5.39	12.488	0.108	0.0	0.0	0.0	2.30	91.5	14.6
S1.002	50.00	5.90	11.408	0.124	0.0	0.0	0.0	0.81	32.2	16.8
S2.000	50.00	5.28	14.200	0.027	0.0	0.0	0.0	1.48	59.0	3.7
S1.003	50.00	5.99	11.283	0.154	0.0	0.0	0.0	1.15	45.6	20.9
S1.004	50.00	6.01	11.222	0.154	0.0	0.0	0.0	1.82	72.3	20.9
S1.005	50.00	6.03	11.172	0.154	0.0	0.0	0.0	1.82	72.3	20.9
S1.006	50.00	6.04	11.122	0.154	0.0	0.0	0.0	1.82	72.3	20.9

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	14.950	1.700	Open Manhole	1200	S1.000	13.250	225				
S2	13.920	1.432	Open Manhole	1200	S1.001	12.488	225	S1.000	12.488	225	
S3	12.920	1.512	Open Manhole	1200	S1.002	11.408	225	S1.001	11.408	225	
S4	15.800	1.600	Open Manhole	1200	S2.000	14.200	225				
S5	15.100	3.817	Open Manhole	1200	S1.003	11.283	225	S1.002	11.283	225	
								S2.000	13.783	225	2500
S6	15.000	3.778	Open Manhole	1200	S1.004	11.222	225	S1.003	11.222	225	
S7	15.000	3.828	Open Manhole	1200	S1.005	11.172	225	S1.004	11.172	225	
S8	15.000	3.878	Open Manhole	1200	S1.006	11.122	225	S1.005	11.122	225	
S	15.000	3.928	Open Manhole	0		OUTFALL		S1.006	11.072	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	14.950	13.250	1.475	Open Manhole	1200
S1.001	o	225	S2	13.920	12.488	1.207	Open Manhole	1200
S1.002	o	225	S3	12.920	11.408	1.287	Open Manhole	1200
S2.000	o	225	S4	15.800	14.200	1.375	Open Manhole	1200
S1.003	o	225	S5	15.100	11.283	3.592	Open Manhole	1200
S1.004	o	225	S6	15.000	11.222	3.553	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	23.620	31.0	S2	13.920	12.488	1.207	Open Manhole	1200
S1.001	27.000	25.0	S3	12.920	11.408	1.287	Open Manhole	1200
S1.002	25.000	200.0	S5	15.100	11.283	3.592	Open Manhole	1200
S2.000	25.000	60.0	S5	15.100	13.783	1.092	Open Manhole	1200
S1.003	6.100	100.0	S6	15.000	11.222	3.553	Open Manhole	1200
S1.004	2.000	40.0	S7	15.000	11.172	3.603	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	o	225	S7	15.000	11.172	3.603	Open Manhole	1200
S1.006	o	225	S8	15.000	11.122	3.653	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.005	2.000	40.0	S8	15.000	11.122	3.653	Open Manhole	1200
S1.006	2.000	40.0	S	15.000	11.072	3.703	Open Manhole	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Simulation Criteria for Storm

Rainfall Model	FSR	M5-60 (mm)	13.700	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S8, DS/PN: S1.006, Volume (m³): 4.4

Invert Level (m) 11.122

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)	Depth (m)	Flow (l/s)
0.100	0.0000	0.600	0.0000	1.100	0.0000	1.600	0.0000	2.100	0.0000	2.600	0.0000
0.200	0.0000	0.700	0.0000	1.200	0.0000	1.700	0.0000	2.200	0.0000	2.700	0.0000
0.300	0.0000	0.800	0.0000	1.300	0.0000	1.800	0.0000	2.300	0.0000	2.800	0.0000
0.400	0.0000	0.900	0.0000	1.400	0.0000	1.900	0.0000	2.400	0.0000	2.900	0.0000
0.500	0.0000	1.000	0.0000	1.500	0.0000	2.000	0.0000	2.500	0.0000	3.000	0.0000

Storage Structures for Storm

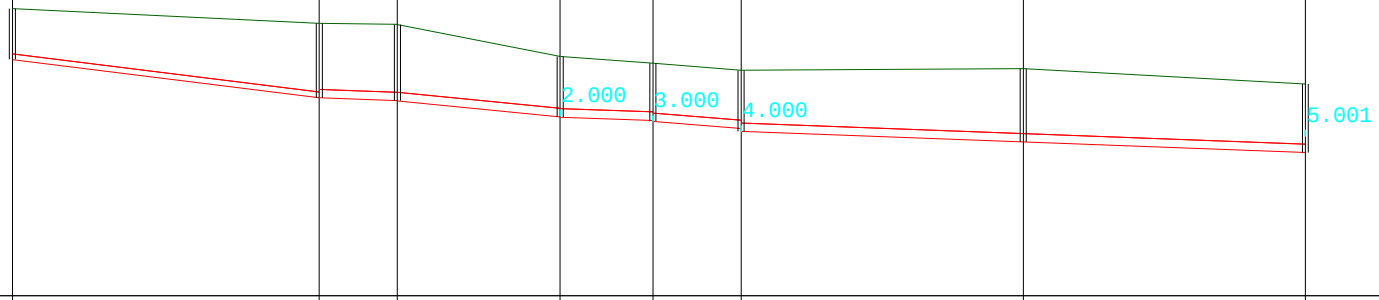
Cellular Storage Manhole: S7, DS/PN: S1.005

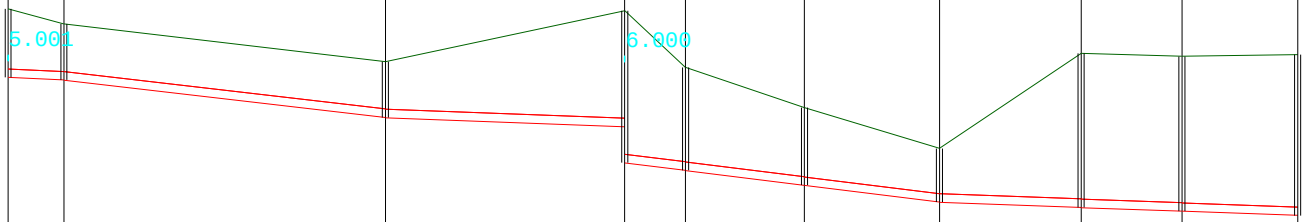
Invert Level (m) 10.220 Infiltration Coefficient Side (m/hr) 0.08310 Porosity 0.40
Infiltration Coefficient Base (m/hr) 0.08310 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	120.0	120.0	1.000	120.0	164.0	1.100	0.0	164.0

APPENDIX C

Foul Sewer Network & Calculations

MH Name		F1		F3	F5		F9	F10	F13
Hor Scale 1500 Ver Scale 200 Datum (m)11.000									
PN		F1.000		F1.002	F1.003		F1.005	F1.006	
Dia (mm)		150		225	225		225	225	
Slope (1:X)		60.0		75.0	200.4		200.0	200.0	
Cover Level (m)		18.600	18.210	18.180	17.330	17.150	16.960	17.010	16.600
Invert Level (m)		17.250 16.235	16.235 16.157	16.157 15.726	15.726 15.634	15.610 15.415	15.346 15.066	15.066 14.786	
Length (m)		60.930		32.330	18.440		56.020	56.020	

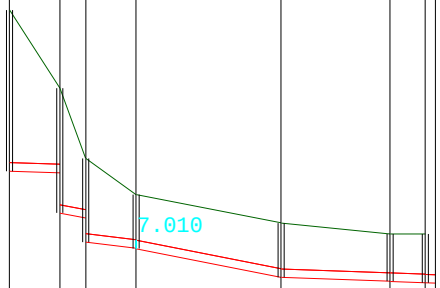


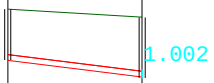
Hor Scale 1500

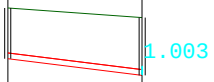
Ver Scale 200

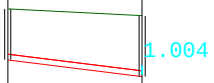
Datum (m)8.000

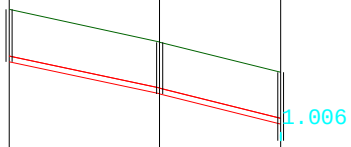
MH Name			F14	F15		F18	F19	F20	F21	F22	F23
PN			F1.008	F1.009		F1.011	F1.012	F1.013	F1.014	F1.015	
Dia (mm)			225	225		225	225	225	225	225	
Slope (1:X)			64.0	200.0		60.0	60.0	200.0	200.0	200.0	
Cover Level (m)		16.600	16.200	15.200	16.550	15.050	13.980	12.900	15.420	15.340	15.390
Invert Level (m)		14.786 14.712	14.712 13.715	13.715 13.477	12.520 12.319	12.319 11.925	11.925 11.478	11.478 11.338	11.338 11.238	11.238 11.123	
Length (m)			63.830	47.520		23.620	26.830	28.140	20.000	23.000	

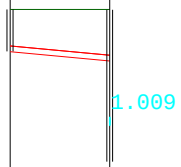
MH Name					F38	F39		F
Hor Scale 1500 Ver Scale 200 Datum (m)6.000								
PN					F1.019	F1.020		
Dia (mm)					225	225		
Slope (1:X)					38.0	200.0		
Cover Level (m)		15.390		11.460	10.500	9.750	9.460	0.000
Invert Level (m)		11.123		9.240	9.064 8.307	8.307 8.199	8.199	
Length (m)					28.760	21.650		

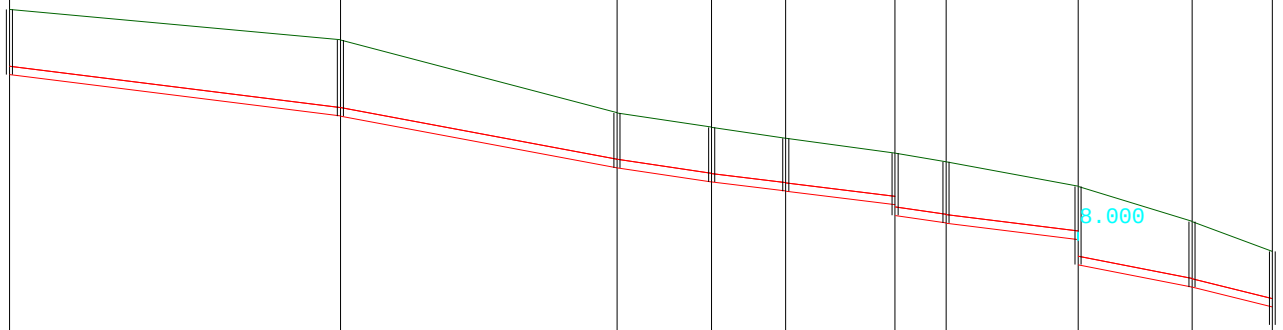
MH Name		F4	F5
Hor Scale 1500 Ver Scale 200 Datum (m)11.000			
PN		F2.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)		17.550	17.330
Invert Level (m)		16.200	15.756
Length (m)		26.650	

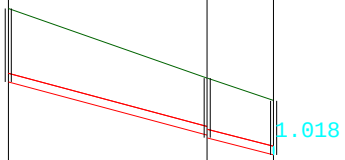
MH Name		F6	F7
Hor Scale 1500 Ver Scale 200 Datum (m)10.000			
PN		F3.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)		17.410	17.150
Invert Level (m)		16.060	15.616
Length (m)		26.650	

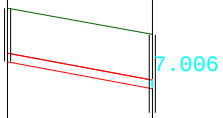
MH Name		F8	F9
Hor Scale 1500 Ver Scale 200 Datum (m)10.000			
PN		F4.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)		17.140	16.960
Invert Level (m)		15.790	15.346
Length (m)		26.650	

MH Name		F11	F12	F13
Hor Scale 1500 Ver Scale 200 Datum (m)10.000				
PN		F5.000	F5.001	
Dia (mm)		150	150	
Slope (1:X)		35.0	30.0	
Cover Level (m)		18.270	17.400	16.600
Invert Level (m)		16.880 16.027	16.027 15.225	
Length (m)		29.860	24.060	

MH Name		F16	F17
Hor Scale 1500 Ver Scale 200 Datum (m)8.000			
PN		F6.000	
Dia (mm)		150	
Slope (1:X)		80.0	
Cover Level (m)		16.557	16.550
Invert Level (m)		15.440	15.193
Length (m)		19.750	

MH Name		F26	F27	F28		F30		F32	F34		F36
Hor Scale 1500 Ver Scale 200 Datum (m)9.000											
PN		F7.000	F7.001	F7.002		F7.004		F7.006	F7.007		
Dia (mm)		225	225	225		225		225	225		
Slope (1:X)		60.0	40.0	50.0		60.0		60.0	38.0		
Cover Level (m)		19.360	18.550	16.620	16.240	15.950	15.550	15.320	14.670	13.740	12.950
Invert Level (m)		17.630 16.535	16.535 15.161	15.161 14.786	14.786 14.540	14.540 14.178	13.900	13.698 13.261	12.600 12.005	12.000 11.468	
Length (m)		65.710	54.940	18.760		21.730		26.220	22.620		

MH Name		F36		F38
Hor Scale 1500 Ver Scale 200 Datum (m)5.000				
PN		F7.009		
Dia (mm)		225		
Slope (1:X)		28.0		
Cover Level (m)		12.950	11.100	10.500
Invert Level (m)		11.000 9.590	9.520 9.064	
Length (m)		39.480		

MH Name		F33	F34
Hor Scale 1500 Ver Scale 200 Datum (m)8.000			
PN		F8.000	
Dia (mm)		225	
Slope (1:X)		40.0	
Cover Level (m)		15.370	14.670
Invert Level (m)		13.950	13.232
Length (m)		28.730	

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Domestic (l/s/ha)	0.00	Maximum Backdrop Height (m)	3.000
Industrial Peak Flow Factor	0.00	Domestic Peak Flow Factor	6.00	Min Design Depth for Optimisation (m)	1.200
Flow Per Person (l/per/day)	150.00	Add Flow / Climate Change (%)	20	Min Vel for Auto Design only (m/s)	0.75
Persons per House	2.70	Minimum Backdrop Height (m)	0.005	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	60.930	1.016	60.0	0.000	10	0.0	1.500	o	150	Pipe/Conduit	
F1.001	15.490	0.077	200.0	0.000	1	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	17.250	0.000	0.0	10	0.1	14	0.41	1.13	20.0	0.3
F1.001	16.235	0.000	0.0	11	0.1	17	0.26	0.81	32.2	0.4

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.002	32.330	0.431	75.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F2.000	26.650	0.444	60.0	0.000	18	0.0	1.500	o	150	Pipe/Conduit	
F1.003	18.440	0.092	200.4	0.000	1	0.0	1.500	o	225	Pipe/Conduit	
F3.000	26.650	0.444	60.0	0.000	8	0.0	1.500	o	150	Pipe/Conduit	
F1.004	17.510	0.195	90.0	0.000	1	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.002	16.157	0.000	0.0	11	0.1	14	0.37	1.33	52.7	0.4
F2.000	16.200	0.000	0.0	18	0.1	18	0.50	1.13	20.0	0.6
F1.003	15.726	0.000	0.0	30	0.2	28	0.36	0.81	32.2	1.0
F3.000	16.060	0.000	0.0	8	0.0	13	0.38	1.13	20.0	0.3
F1.004	15.610	0.000	0.0	39	0.2	26	0.52	1.21	48.1	1.3

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F4.000	26.650	0.444	60.0	0.000	12	0.0	1.500	o	150	Pipe/Conduit	
F1.005	56.020	0.280	200.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F1.006	56.020	0.280	200.0	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F5.000	29.860	0.853	35.0	0.000	10	0.0	1.500	o	150	Pipe/Conduit	
F5.001	24.060	0.802	30.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F1.007	11.090	0.074	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.008	63.830	0.997	64.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F4.000	15.790	0.000	0.0	12	0.1	15	0.44	1.13	20.0	0.4
F1.005	15.346	0.000	0.0	55	0.3	37	0.44	0.81	32.2	1.9
F1.006	15.066	0.000	0.0	60	0.3	38	0.45	0.81	32.2	2.0
F5.000	16.880	0.000	0.0	10	0.1	12	0.50	1.48	26.2	0.3
F5.001	16.027	0.000	0.0	13	0.1	13	0.57	1.60	28.3	0.4
F1.007	14.786	0.000	0.0	73	0.4	39	0.53	0.94	37.2	2.5
F1.008	14.712	0.000	0.0	77	0.4	33	0.72	1.44	57.1	2.6

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.009	47.520	0.238	200.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F6.000	19.750	0.247	80.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F1.010	12.060	0.201	60.0	0.000	1	0.0	1.500	o	225	Pipe/Conduit	
F1.011	23.620	0.394	60.0	0.000	2	0.0	1.500	o	225	Pipe/Conduit	
F1.012	26.830	0.447	60.0	0.000	3	0.0	1.500	o	225	Pipe/Conduit	
F1.013	28.140	0.141	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.014	20.000	0.100	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.015	23.000	0.115	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.009	13.715	0.000	0.0	81	0.5	45	0.49	0.81	32.2	2.7
F6.000	15.440	0.000	0.0	3	0.0	9	0.25	0.98	17.3	0.1
F1.010	12.520	0.000	0.0	85	0.5	34	0.76	1.48	59.0	2.9
F1.011	12.319	0.000	0.0	87	0.5	34	0.77	1.48	59.0	2.9
F1.012	11.925	0.000	0.0	90	0.5	35	0.77	1.48	59.0	3.0
F1.013	11.478	0.000	0.0	90	0.5	47	0.51	0.81	32.2	3.0
F1.014	11.338	0.000	0.0	90	0.5	47	0.51	0.81	32.2	3.0
F1.015	11.238	0.000	0.0	90	0.5	47	0.51	0.81	32.2	3.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.016	10.000	0.050	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.017	5.140	0.129	40.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.018	10.000	0.167	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.000	65.710	1.095	60.0	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F7.001	54.940	1.374	40.0	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F7.002	18.760	0.375	50.0	0.000	2	0.0	1.500	o	225	Pipe/Conduit	
F7.003	14.720	0.245	60.0	0.000	1	0.0	1.500	o	225	Pipe/Conduit	
F7.004	21.730	0.362	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.005	10.120	0.202	50.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.016	11.123	0.000	0.0	90	0.5	47	0.51	0.81	32.2	3.0
F1.017	10.010	0.000	0.0	90	0.5	32	0.89	1.82	72.3	3.0
F1.018	9.240	0.000	0.0	90	0.5	35	0.77	1.48	59.0	3.0
F7.000	17.630	0.000	0.0	5	0.0	9	0.31	1.48	59.0	0.2
F7.001	16.535	0.000	0.0	11	0.1	12	0.46	1.82	72.3	0.4
F7.002	15.161	0.000	0.0	13	0.1	14	0.45	1.63	64.6	0.4
F7.003	14.786	0.000	0.0	14	0.1	15	0.43	1.48	59.0	0.5
F7.004	14.540	0.000	0.0	14	0.1	15	0.43	1.48	59.0	0.5
F7.005	13.900	0.000	0.0	14	0.1	14	0.46	1.62	64.6	0.5

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F7.006	26.220	0.437	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.000	28.730	0.718	40.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.007	22.620	0.595	38.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.008	15.950	0.532	30.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.009	39.480	1.410	28.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.010	13.210	0.456	29.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.019	28.760	0.757	38.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F7.006	13.698	0.000	0.0	14	0.1	15	0.43	1.48	59.0	0.5
F8.000	13.950	0.000	0.0	0	0.0	0	0.00	1.82	72.3	0.0
F7.007	12.600	0.000	0.0	14	0.1	13	0.50	1.86	74.2	0.5
F7.008	12.000	0.000	0.0	14	0.1	12	0.55	2.10	83.5	0.5
F7.009	11.000	0.000	0.0	14	0.1	12	0.56	2.17	86.4	0.5
F7.010	9.520	0.000	0.0	14	0.1	12	0.55	2.14	85.0	0.5
F1.019	9.064	0.000	0.0	104	0.6	33	0.95	1.87	74.2	3.5

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.020	21.650	0.108	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.021	7.000	0.035	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.022	2.000	0.010	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.020	8.307	0.000	0.0	104	0.6	50	0.53	0.81	32.2	3.5
F1.021	8.199	0.000	0.0	104	0.6	50	0.53	0.81	32.2	3.5
F1.022	8.164	0.000	0.0	104	0.6	50	0.53	0.81	32.2	3.5

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
F1	18.600	1.350	Open Manhole	1200	F1.000	17.250	150				
F2	18.210	1.976	Open Manhole	1200	F1.001	16.235	225	F1.000	16.235	150	
F3	18.180	2.023	Open Manhole	1200	F1.002	16.157	225	F1.001	16.157	225	
F4	17.550	1.350	Open Manhole	1200	F2.000	16.200	150				
F5	17.330	1.604	Open Manhole	1200	F1.003	15.726	225	F1.002	15.726	225	
								F2.000	15.756	150	
F6	17.410	1.350	Open Manhole	1200	F3.000	16.060	150				
F7	17.150	1.540	Open Manhole	1200	F1.004	15.610	225	F1.003	15.634	225	24
								F3.000	15.616	150	
F8	17.140	1.350	Open Manhole	1200	F4.000	15.790	150				
F9	16.960	1.614	Open Manhole	1200	F1.005	15.346	225	F1.004	15.415	225	69
								F4.000	15.346	150	
F10	17.010	1.944	Open Manhole	1200	F1.006	15.066	225	F1.005	15.066	225	
F11	18.270	1.390	Open Manhole	1200	F5.000	16.880	150				
F12	17.400	1.373	Open Manhole	1200	F5.001	16.027	150	F5.000	16.027	150	
F13	16.600	1.814	Open Manhole	1200	F1.007	14.786	225	F1.006	14.786	225	
								F5.001	15.225	150	364
F14	16.200	1.488	Open Manhole	1200	F1.008	14.712	225	F1.007	14.712	225	
F15	15.200	1.485	Open Manhole	1200	F1.009	13.715	225	F1.008	13.715	225	

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
F16	16.557	1.117	Open Manhole	1200	F6.000	15.440	150				
F17	16.550	4.030	Open Manhole	1200	F1.010	12.520	225	F1.009	13.477	225	957
								F6.000	15.193	150	2598
F18	15.050	2.731	Open Manhole	1200	F1.011	12.319	225	F1.010	12.319	225	
F19	13.980	2.055	Open Manhole	1200	F1.012	11.925	225	F1.011	11.925	225	
F20	12.900	1.422	Open Manhole	1200	F1.013	11.478	225	F1.012	11.478	225	
F21	15.420	4.082	Open Manhole	1200	F1.014	11.338	225	F1.013	11.338	225	
F22	15.340	4.102	Open Manhole	1200	F1.015	11.238	225	F1.014	11.238	225	
F23	15.390	4.267	Open Manhole	1200	F1.016	11.123	225	F1.015	11.123	225	
F24	13.320	3.310	Open Manhole	1200	F1.017	10.010	225	F1.016	11.073	225	1063
F25	11.460	2.220	Open Manhole	1200	F1.018	9.240	225	F1.017	9.882	225	641
F26	19.360	1.730	Open Manhole	1200	F7.000	17.630	225				
F27	18.550	2.015	Open Manhole	1200	F7.001	16.535	225	F7.000	16.535	225	
F28	16.620	1.459	Open Manhole	1200	F7.002	15.161	225	F7.001	15.161	225	
F29	16.240	1.454	Open Manhole	1200	F7.003	14.786	225	F7.002	14.786	225	
F30	15.950	1.410	Open Manhole	1200	F7.004	14.540	225	F7.003	14.540	225	
F31	15.550	1.650	Open Manhole	1200	F7.005	13.900	225	F7.004	14.178	225	278
F32	15.320	1.622	Open Manhole	1200	F7.006	13.698	225	F7.005	13.698	225	
F33	15.370	1.420	Open Manhole	1200	F8.000	13.950	225				

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
F34	14.670	2.070	Open Manhole	1200	F7.007	12.600	225	F7.006	13.261	225	661
								F8.000	13.232	225	632
F35	13.740	1.740	Open Manhole	1200	F7.008	12.000	225	F7.007	12.005	225	5
F36	12.950	1.950	Open Manhole	1200	F7.009	11.000	225	F7.008	11.468	225	468
F37	11.100	1.580	Open Manhole	1200	F7.010	9.520	225	F7.009	9.590	225	70
F38	10.500	1.436	Open Manhole	1200	F1.019	9.064	225	F1.018	9.073	225	9
								F7.010	9.064	225	
F39	9.750	1.443	Open Manhole	1200	F1.020	8.307	225	F1.019	8.307	225	
F40	9.460	1.261	Open Manhole	1200	F1.021	8.199	225	F1.020	8.199	225	
F41	9.460	1.296	Open Manhole	1200	F1.022	8.164	225	F1.021	8.164	225	
F	0.000		Open Manhole	0		OUTFALL		F1.022	8.154	225	

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	150	F1	18.600	17.250	1.200	Open Manhole	1200
F1.001	o	225	F2	18.210	16.235	1.751	Open Manhole	1200
F1.002	o	225	F3	18.180	16.157	1.798	Open Manhole	1200
F2.000	o	150	F4	17.550	16.200	1.200	Open Manhole	1200
F1.003	o	225	F5	17.330	15.726	1.379	Open Manhole	1200
F3.000	o	150	F6	17.410	16.060	1.200	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	60.930	60.0	F2	18.210	16.235	1.826	Open Manhole	1200
F1.001	15.490	200.0	F3	18.180	16.157	1.798	Open Manhole	1200
F1.002	32.330	75.0	F5	17.330	15.726	1.379	Open Manhole	1200
F2.000	26.650	60.0	F5	17.330	15.756	1.424	Open Manhole	1200
F1.003	18.440	200.4	F7	17.150	15.634	1.291	Open Manhole	1200
F3.000	26.650	60.0	F7	17.150	15.616	1.384	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.004	o	225	F7	17.150	15.610	1.315	Open Manhole	1200
F4.000	o	150	F8	17.140	15.790	1.200	Open Manhole	1200
F1.005	o	225	F9	16.960	15.346	1.389	Open Manhole	1200
F1.006	o	225	F10	17.010	15.066	1.719	Open Manhole	1200
F5.000	o	150	F11	18.270	16.880	1.240	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.004	17.510	90.0	F9	16.960	15.415	1.320	Open Manhole	1200
F4.000	26.650	60.0	F9	16.960	15.346	1.464	Open Manhole	1200
F1.005	56.020	200.0	F10	17.010	15.066	1.719	Open Manhole	1200
F1.006	56.020	200.0	F13	16.600	14.786	1.589	Open Manhole	1200
F5.000	29.860	35.0	F12	17.400	16.027	1.223	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F5.001	o	150	F12	17.400	16.027	1.223	Open Manhole	1200
F1.007	o	225	F13	16.600	14.786	1.589	Open Manhole	1200
F1.008	o	225	F14	16.200	14.712	1.263	Open Manhole	1200
F1.009	o	225	F15	15.200	13.715	1.260	Open Manhole	1200
F6.000	o	150	F16	16.557	15.440	0.967	Open Manhole	1200
F1.010	o	225	F17	16.550	12.520	3.805	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F5.001	24.060	30.0	F13	16.600	15.225	1.225	Open Manhole	1200
F1.007	11.090	150.0	F14	16.200	14.712	1.263	Open Manhole	1200
F1.008	63.830	64.0	F15	15.200	13.715	1.260	Open Manhole	1200
F1.009	47.520	200.0	F17	16.550	13.477	2.848	Open Manhole	1200
F6.000	19.750	80.0	F17	16.550	15.193	1.207	Open Manhole	1200
F1.010	12.060	60.0	F18	15.050	12.319	2.506	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.011	o	225	F18	15.050	12.319	2.506	Open Manhole	1200
F1.012	o	225	F19	13.980	11.925	1.830	Open Manhole	1200
F1.013	o	225	F20	12.900	11.478	1.197	Open Manhole	1200
F1.014	o	225	F21	15.420	11.338	3.857	Open Manhole	1200
F1.015	o	225	F22	15.340	11.238	3.877	Open Manhole	1200
F1.016	o	225	F23	15.390	11.123	4.042	Open Manhole	1200
F1.017	o	225	F24	13.320	10.010	3.085	Open Manhole	1200
F1.018	o	225	F25	11.460	9.240	1.995	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.011	23.620	60.0	F19	13.980	11.925	1.830	Open Manhole	1200
F1.012	26.830	60.0	F20	12.900	11.478	1.197	Open Manhole	1200
F1.013	28.140	200.0	F21	15.420	11.338	3.857	Open Manhole	1200
F1.014	20.000	200.0	F22	15.340	11.238	3.877	Open Manhole	1200
F1.015	23.000	200.0	F23	15.390	11.123	4.042	Open Manhole	1200
F1.016	10.000	200.0	F24	13.320	11.073	2.022	Open Manhole	1200
F1.017	5.140	40.0	F25	11.460	9.882	1.354	Open Manhole	1200
F1.018	10.000	60.0	F38	10.500	9.073	1.202	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.000	o	225	F26	19.360	17.630	1.505	Open Manhole	1200
F7.001	o	225	F27	18.550	16.535	1.790	Open Manhole	1200
F7.002	o	225	F28	16.620	15.161	1.234	Open Manhole	1200
F7.003	o	225	F29	16.240	14.786	1.229	Open Manhole	1200
F7.004	o	225	F30	15.950	14.540	1.185	Open Manhole	1200
F7.005	o	225	F31	15.550	13.900	1.425	Open Manhole	1200
F7.006	o	225	F32	15.320	13.698	1.397	Open Manhole	1200
F8.000	o	225	F33	15.370	13.950	1.195	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.000	65.710	60.0	F27	18.550	16.535	1.790	Open Manhole	1200
F7.001	54.940	40.0	F28	16.620	15.161	1.234	Open Manhole	1200
F7.002	18.760	50.0	F29	16.240	14.786	1.229	Open Manhole	1200
F7.003	14.720	60.0	F30	15.950	14.540	1.185	Open Manhole	1200
F7.004	21.730	60.0	F31	15.550	14.178	1.147	Open Manhole	1200
F7.005	10.120	50.1	F32	15.320	13.698	1.397	Open Manhole	1200
F7.006	26.220	60.0	F34	14.670	13.261	1.184	Open Manhole	1200
F8.000	28.730	40.0	F34	14.670	13.232	1.213	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.007	o	225	F34	14.670	12.600	1.845	Open Manhole	1200
F7.008	o	225	F35	13.740	12.000	1.515	Open Manhole	1200
F7.009	o	225	F36	12.950	11.000	1.725	Open Manhole	1200
F7.010	o	225	F37	11.100	9.520	1.355	Open Manhole	1200
F1.019	o	225	F38	10.500	9.064	1.211	Open Manhole	1200
F1.020	o	225	F39	9.750	8.307	1.218	Open Manhole	1200
F1.021	o	225	F40	9.460	8.199	1.036	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.007	22.620	38.0	F35	13.740	12.005	1.510	Open Manhole	1200
F7.008	15.950	30.0	F36	12.950	11.468	1.257	Open Manhole	1200
F7.009	39.480	28.0	F37	11.100	9.590	1.285	Open Manhole	1200
F7.010	13.210	29.0	F38	10.500	9.064	1.211	Open Manhole	1200
F1.019	28.760	38.0	F39	9.750	8.307	1.218	Open Manhole	1200
F1.020	21.650	200.0	F40	9.460	8.199	1.036	Open Manhole	1200
F1.021	7.000	200.0	F41	9.460	8.164	1.071	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

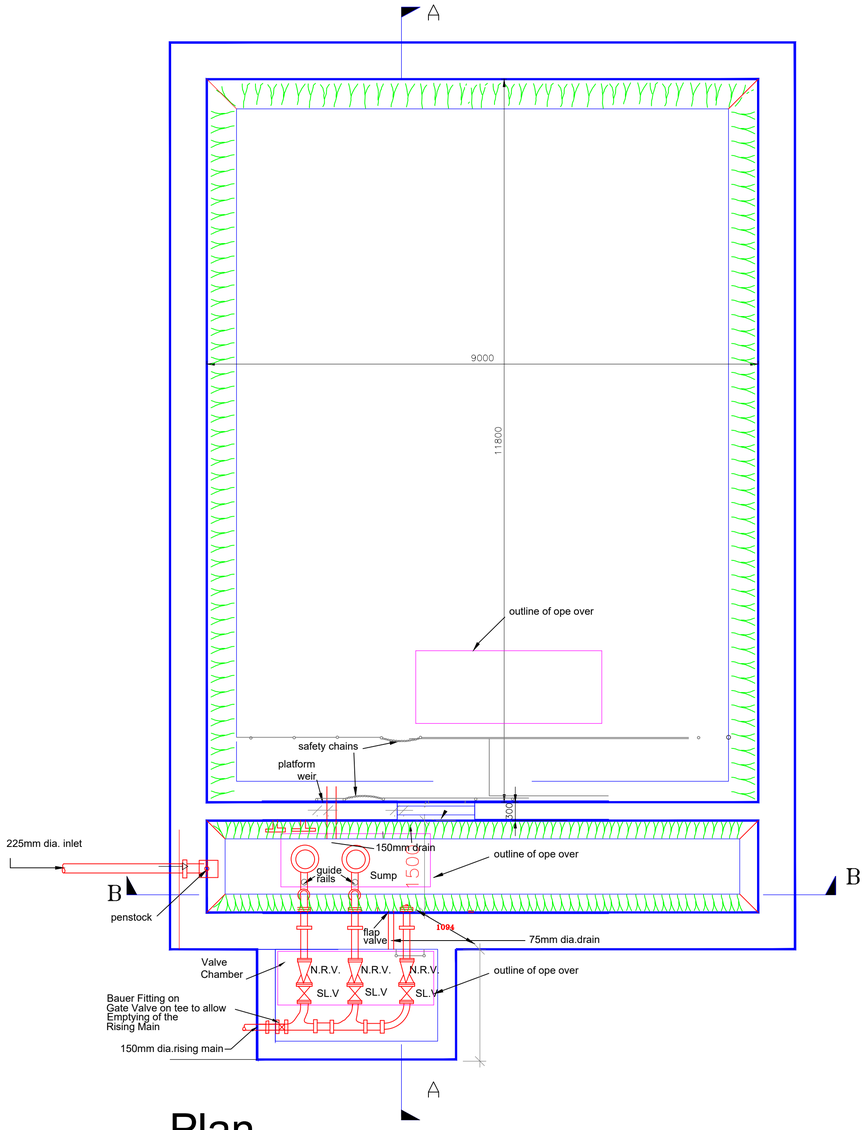
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.022	o	225	F41	9.460	8.164	1.071	Open Manhole	1200

Downstream Manhole

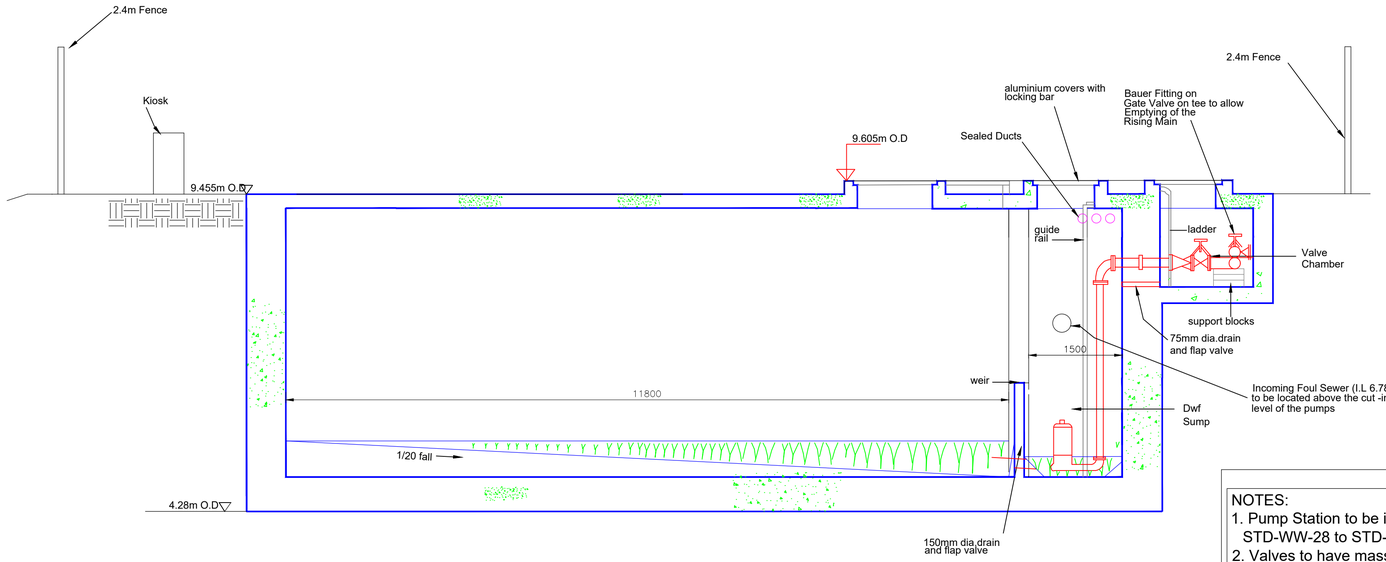
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.022	2.000	200.0	F	0.000	8.154		Open Manhole	0

APPENDIX D

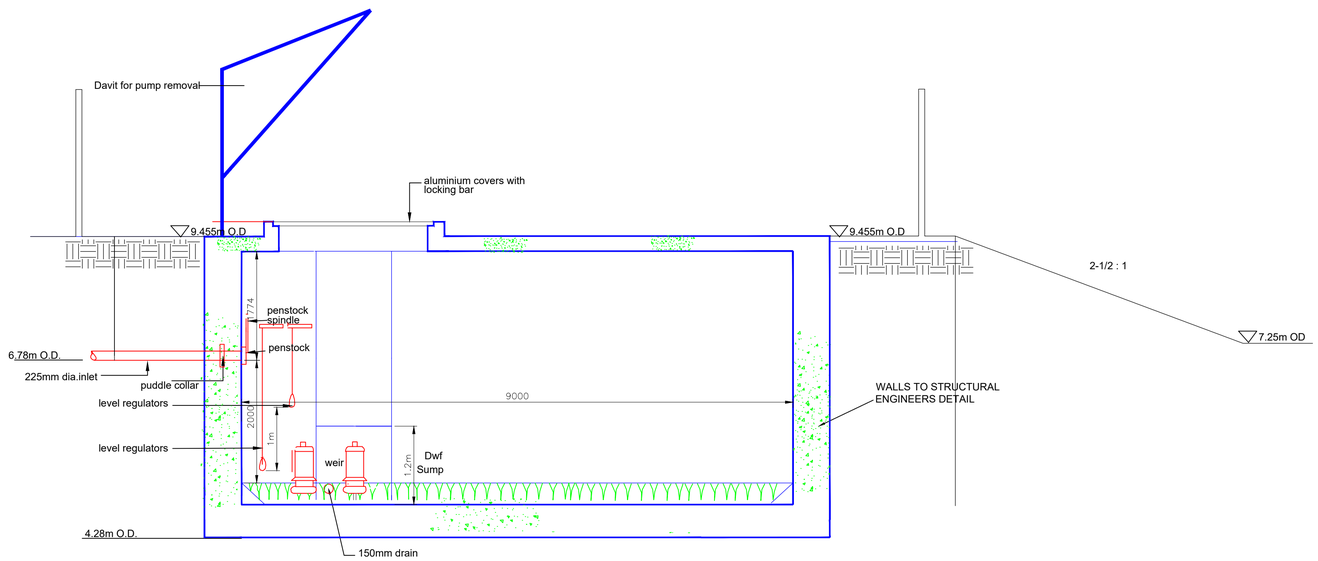
Typical Pumping Station Detail



Plan



Section A-A



Section B-B

NOTES:
1. Pump Station to be in accordance with STD-WW-28 to STD-WW-28B.
2. Valves to have mass concrete thrust blocks as per standard detail STD-WW-28 & STD-WW-14 .

N O T E S :

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
6. FINISHED LEVELS SUBJECT TO ARCHITECTS APPROVAL

P03	16.06.2021	Issue for Planning Revision to Drainage	EC	RD
P02	19.05.2021	Issued For Planning	EC	SH
P01	12.05.2021	First Issue	MN	RD
Rev	Date	Description	By	Chkd.

Client: ALBER DEVELOPMENTS

Project: Rosshill Residential Development

Title: Typical Pumping Station Details

Scale @ A1: 1:50 / @A3: 1:100

Prepared by:	Checked:	Date:
MN	RD	June 2021

Project Director: Micheal McDonnell

Drawing Status: Planning

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Drawing No.: 10690-2116 P03

Revision:

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