DOSA

DENIS O'SULLIVAN & ASSOCIATES

CONSULTING ENGINEERS

INFRASTRUCTURE REPORT, OLD WHITECHURCH ROAD, KILNAP, CORK

INFRASTRUCTURE REPORT

DATE 25/06/2024

REVISION 4

JOB NO. 6254

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Contents

1 Introduction

DOSA Consulting Engineers were engaged as Consulting Engineers for the proposed development at Old Whitechurch Road, Kilnap, Cork.

DOSA Consulting Engineers carried out a number of site investigations and their findings have been incorporated to deal with solutions to:

- Surface Water Drainage Network
- Foul Drainage Network
- Water Supply

The proposals for the foul sewer & water infrastructure associated with this development were discussed with Mr. Michael Galvin Senior Design Engineer, Southern Region, Irish Water and Mr. James King, Design Engineer, Southern Region, Irish Water.

1.1 Site Description

The Council is the owner of the site at Kilnap off the Old Whitechurch Road (OWR). It comprises of some 22 hectares (54 acres) of a southerly sloping site zoned residential in the Cork City Development Plan located in the North of the City ("Development Site"). The Development Site is ideally located at the north-western gateway to the City near the proposed North Ring Road. It is located within a reasonable cycling and walking distance of the Blackpool Retail and Business Park while at the same time bounding the Glenamought Valley. The Development Site should create a sustainable residential neighbourhood, which would derive character from its location, topography, amenity, urban design quality and would be a most attractive place to live at the Northern gateway to the City.

Pre-enabling works have been carried out by the Council and the site has been fully serviced from an infrastructural aspect.

The site currently has the following infrastructure in place

- Access
- Foul Connection Infrastructure
- Stormwater Connection Infrastructure
- Water Connection Infrastructure
- Utility Infrastructure

A snapshot of the overall council landholding is outlined in Figure 2.1 below.

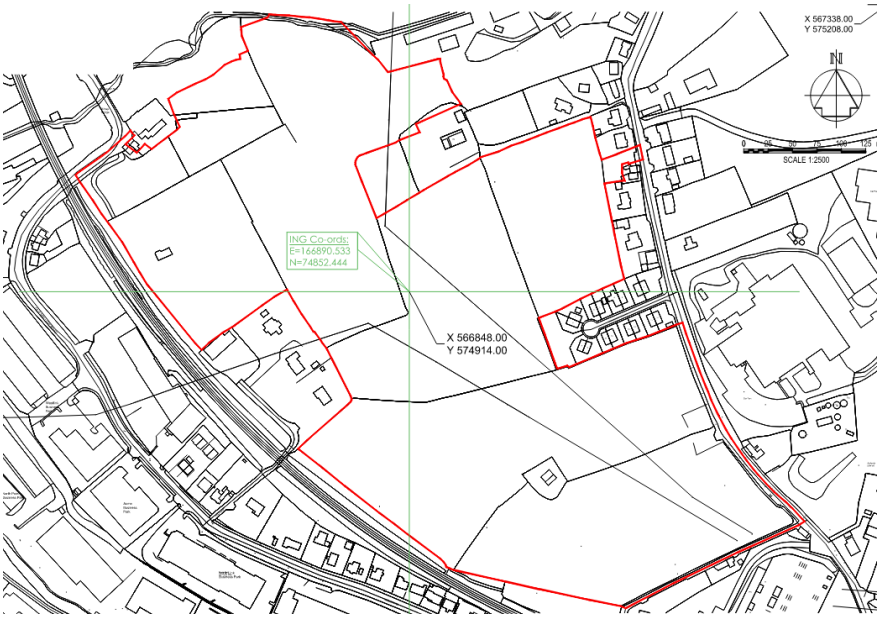


Figure 2.1 – Context Map

1.2 Development Description

Phase one of the development is 3.7 ha, with a developable area of 2.74 ha. It is situated approximately 3.5 km north of Cork City Centre, in an area characterised by commercial and residential use. It is located off the N20 and a new road that meanders through the site to connect Old Mallow Road in the north with Old Whitechurch Road in the Southeast.

The proposed development will consist of 1 no. accessible 4 bed detached, 72 no. 3 bed semi-detached, 8 no. 3 be townhouses, 6 no. 2 bed townhouses, 4 no. 3 bd duplex apartments & 4 no. 1 bed apartments. The form, architecture and scale of the development is consistent with the immediate context and it will enhance the visual amenity of the site as a whole.

1.3 Site Topography

The topography of the site slopes from the southwest in a north and easterly direction as per the contouring below.

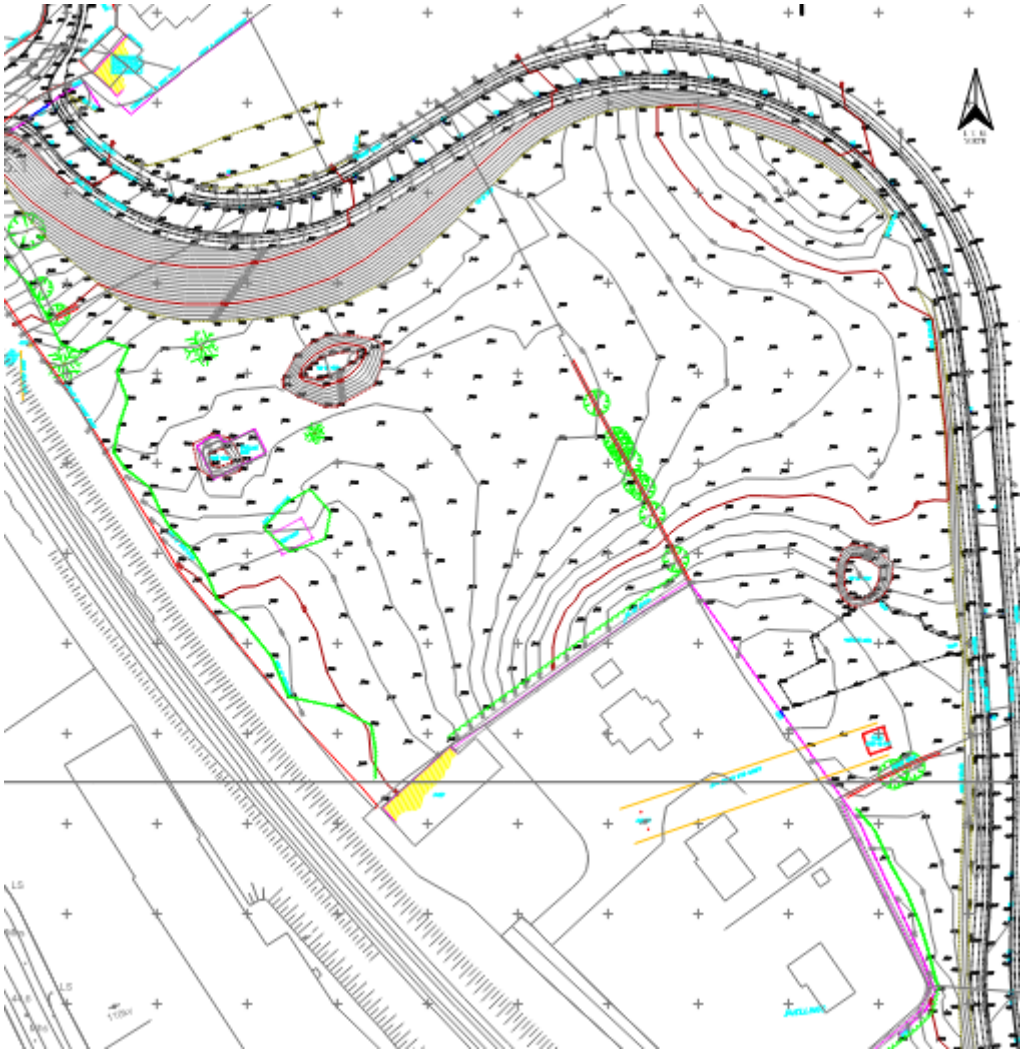


Figure 1.3 – Site Topography

2 *Surface Water Design Overview*

The completed development site is a mix of soft landscaping and hard paving or roofing. The existing topography is a single catchment. Groundwater flow direction is interpreted to be to the north / northeast, providing baseflow to the Glennamought River (which is directly north of the site.)

The runoff from the entire developed site will however discharge to the Glennamought River. . The increased runoff flows will be attenuated to greenfield runoff rates prior to discharging to watercourse.

Discharge from Phase 1 will be into the existing stormwater network and attenuation infrastructure provided by Cork City Council as part of an enabling works package.

The proposed storm water drainage system has been designed to cater for all surface water runoff from all hard surfaces within the proposed development including roadways, roofs, parking areas and green areas etc. The development has been split into a number of catchment areas. The only areas excluded from the catchment areas is the green areas downstream of the development.

The proposed surface water drainage network will collect surface water runoff from the site via a piped network prior to discharging off site via the attenuation tanks, flow control devices and separator arrangement. Final discharge rates will be at Qbar greenfield run-off rates.

Prior to entering the system, the stormwater generated will be treated through a number of nature-based solutions in line with adopted SuDS measures.

The storm sewer network was designed using Innovyze Micro Drainage modelling software. Outputs from the storm sewer design can be found in the Appendices of the Infrastructure Report.

Refer to DOSA Drawings for details of the proposed surface water network.

All flow velocities within the network fall within the limits of 0.75 and 3m/sec as set out in "Recommendations for Site Development Works" as published by the Department of Environment. The storm water network and infiltration basin are designed to accommodate the 100-year return period plus an additional 20% to account for the effects of climate change. Prior to submitting the Services Report we consulted with Cork City Council in relation to the existing drainage services in the area of the proposed development. The existing development contains an existing stormwater network along the spine road and the attenuation for the proposed site has already been accounted for within this network.

2.1 Surface Water Drainage Network

2.1.1 Existing Infrastructure

Pre-enabling works have been carried out by the Council and the site has been fully serviced from an infrastructural aspect.

The site currently has the following infrastructure in place

- Stormwater Connection Infrastructure

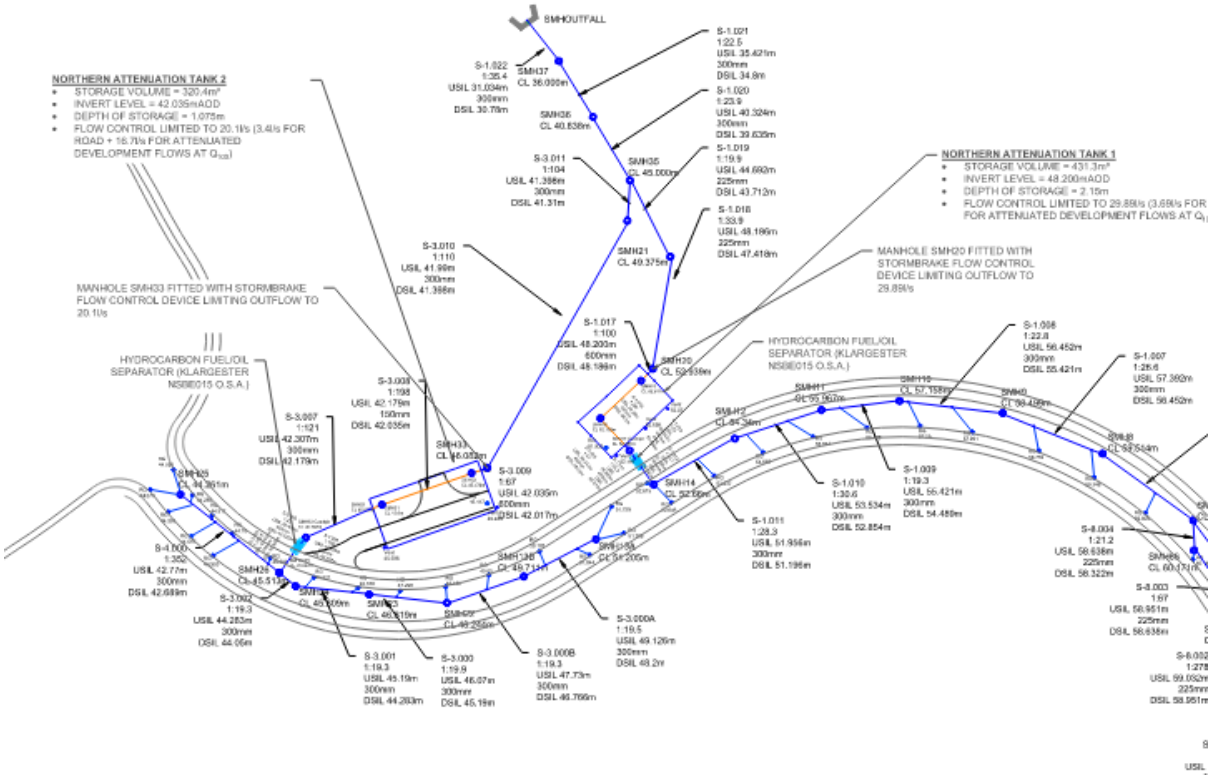


Figure 2.1 – Existing Stormwater Infrastructure

Figure 2.2– Existing Attenuation Tank Locations

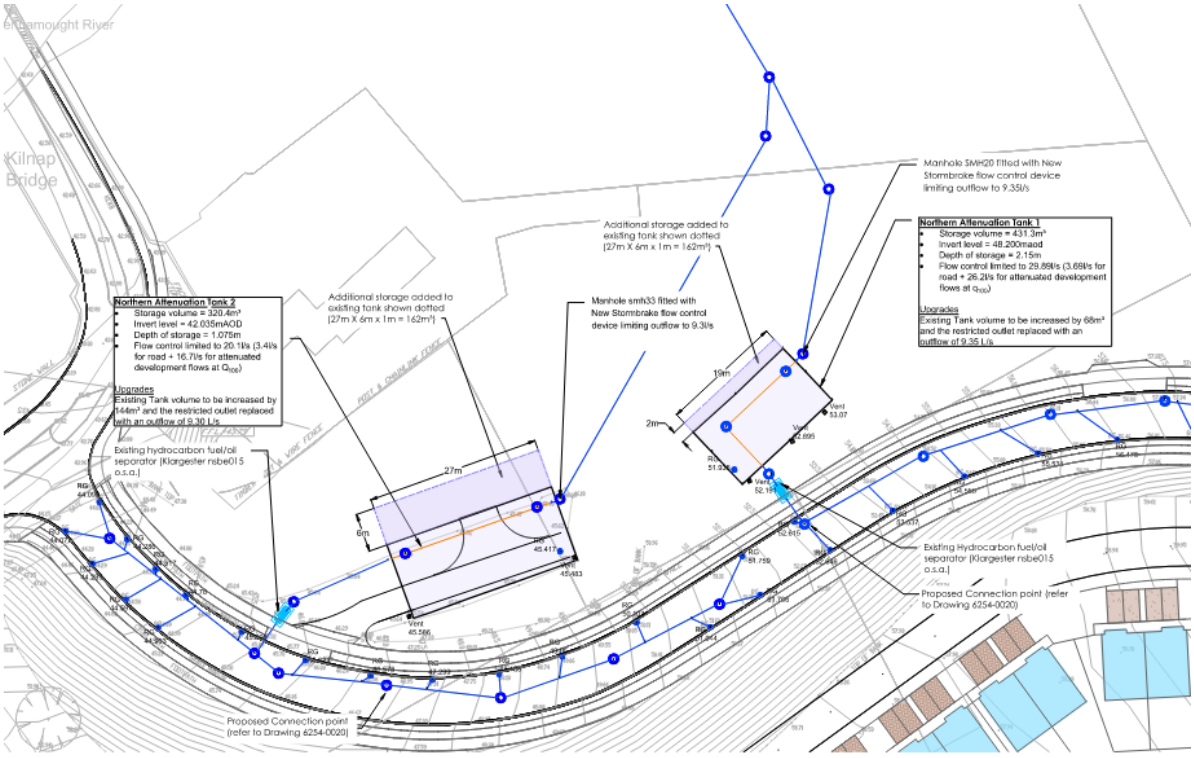


Figure 2.3–Proposed Tank Upgrades

Petrol interceptors have been provided upstream of the attenuation tanks to ensure that any remaining hydro-carbons or pollutants within the runoff from trafficked areas are treated prior to outfall to the existing watercourse. The existing Interceptors are summarised below

		Petrol Interceptor Specification
Catchment 1	Tank No. 1	Klargester NSBE015 O.S.A
Catchment 2	Tank No. 2	Klargester NSBE015 O.S.A

Table 2.0 – Interceptor Details

The attenuation volume provided by Cork City Council as part of the enabling works would appear to be less than that required to cater for a 1 in 100-year return period. The current design indicates a revised Qbar and attenuation volume. As a result, it is proposed to increase the storage volumes of the existing tanks and replace the restricted outlets to cater for the revised design.

	Attenuation Volume Provided (Enabling Works)	Allowance for Road (Enabling Works)	Volume dedicated to Development (Enabling Works)
Tank 1	431.3 m^3	54.3 m^3	377 m^3
Tank 2	320.4 m^3	54.4m^3	266 m^3

Table 2.1 – Summary of Existing Attenuation Tanks

	Volume dedicated to Development (Enabling Works)	Revised Attenuation Required for Proposed Development	Additional Attenuation Required for Proposed Development
Tank 1	377 m^3	445 m^3	68 m^3
Tank 2	266 m^3	410 m^3	144 m^3

Table 2.2 – Summary of Additional Attenuation Volumes

The existing tanks are provided a hydro brake at the outfall of the surface water catchment to restrict the outflow of water from the subject site

		Restricted Outlet Development (Enabling Works)	Restricted Outlet Road (Enabling Works)	Total (Enabling Works)
Catchment 1	Tank 1	26.2 l/s	3.69 l/s	29.89 l/s
Catchment 2	Tank 2	16.7 l/s	3.4 l/s	20.10 l/s

Table 2.3 – Summary of Existing Restricted Outlets

		Restricted Outlet Development (Proposed Works)	Restricted Outlet Road (Enabling Works)	Revised Total
Catchment 1	Tank 1	5.66 l/s	3.69 l/s	9.35 l/s
Catchment 2	Tank 2	5.90 l/s	3.4 l/s	9.30 l/s

Table 2.4 – Summary of revised Restricted Outlets

As-built drawings of the Existing Stormwater Infrastructure and proposed upgrades are attached in Appendix H. The revised Qbar calculations are in Appendix K.

2.1.2 Proposed Stormwater Infrastructure

The surface water drainage network for the proposed development was modelled using the Microdrainage software application. The surface water pipe lengths, slopes, contributing impermeable areas, upstream invert levels, upstream cover levels and pipe diameters were entered into the model using the drawings supplied.

The global variables required for the model were the M5-60 and Rainfall Ratio. These two factors may be read from maps contained in the Wallingford procedure. They enable the program to calculate the intensity, duration and frequency characteristics of storms.

M5-60 is the rainfall depth based on a 60-minute storm of 5 years return period. Ratio R is the ratio of the 60-minute storm to the 2-day storm for the 5-year return period events. These values are as follows:

- M5-60 = 18.80mm
- Ratio R = 0.250

Microdrainage generates design storms using the principles set out in the Flood Studies Report (NERC 1975).

Both a summer and winter rainfall profile was used for the design of the pipework. A summer profile gives higher rainfall intensities and results in higher runoff rates and is used to determine the required capacity of the pipework.

The surface water drainage network was assessed for compliance with maximum and minimum velocities, pipe length etc. The network was designed to ensure velocities in the network and pipe gradients did not exceed the maximum velocity of 4.0m/s. The minimum velocity allowed was 0.75m/s.

The design of the drainage network was assessed using events with a range of different durations to determine the critical event for each return period analysed as follows:

- 1 in 2-year return period events were used to ensure that the system did not surcharge;
- 1 in 100-year return period events were used to ensure that flooding did not occur.

2.2 Design Criteria:

The proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the Department of the Environment's Recommendations for Site Development Works for Housing Areas, the Department of the Environment's Building Regulations "Technical Guidance Document Part H Drainage and Waste Water Disposal" and BS EN 752: 2008 Drain and Sewer Systems Outside Buildings.

- Catchment Area 1 1.769 Ha
- Catchment Area 2 1.839 Ha
- Return period for pipe work design 2 years
- Return period for attenuation design 100 years
- Soil Type 2
- Allowable Outflow (Catchment 1) 26.2 l/
- Allowable Outflow (Catchment 2) 16.7 l/
- Time of entry 5 minutes
- M5 – 60 18.80 mm
- Ratio "r" 0.250
- Pipe Friction (Ks) 0.6 mm
- Minimum Velocity (based on pipe flowing full) 1.0 m/s
- Rainfall Runoff from Roads and Footpaths 100%
- Rainfall Runoff from Roofs 80%
- Rainfall Runoff from Driveways 80%
- Rainfall Runoff from Green Areas 20%
- Rainfall Depth Factored for Climate Change (as per GDSDS) 20%

(in accordance with GDSDS Volume 2, Chapter 6, Table 6.2 – see below)

Climate Change Category	Characteristics
River flows	20% increase in flows for all return periods up to 100 years
Sea level	400+mm rise (see Climate Change policy document for sea levels as a function of return period)
Rainfall	10% increase in depth (factor all intensities by 1.1)
	Modify time series rainfall in accordance with the GDSDS climate change policy document

Table 6.2 Climate Change Factors to be Applied to Drainage Design

2.3 Catchments

The development has been divided into 2 Catchments as indicated in Fig 2.3 Below

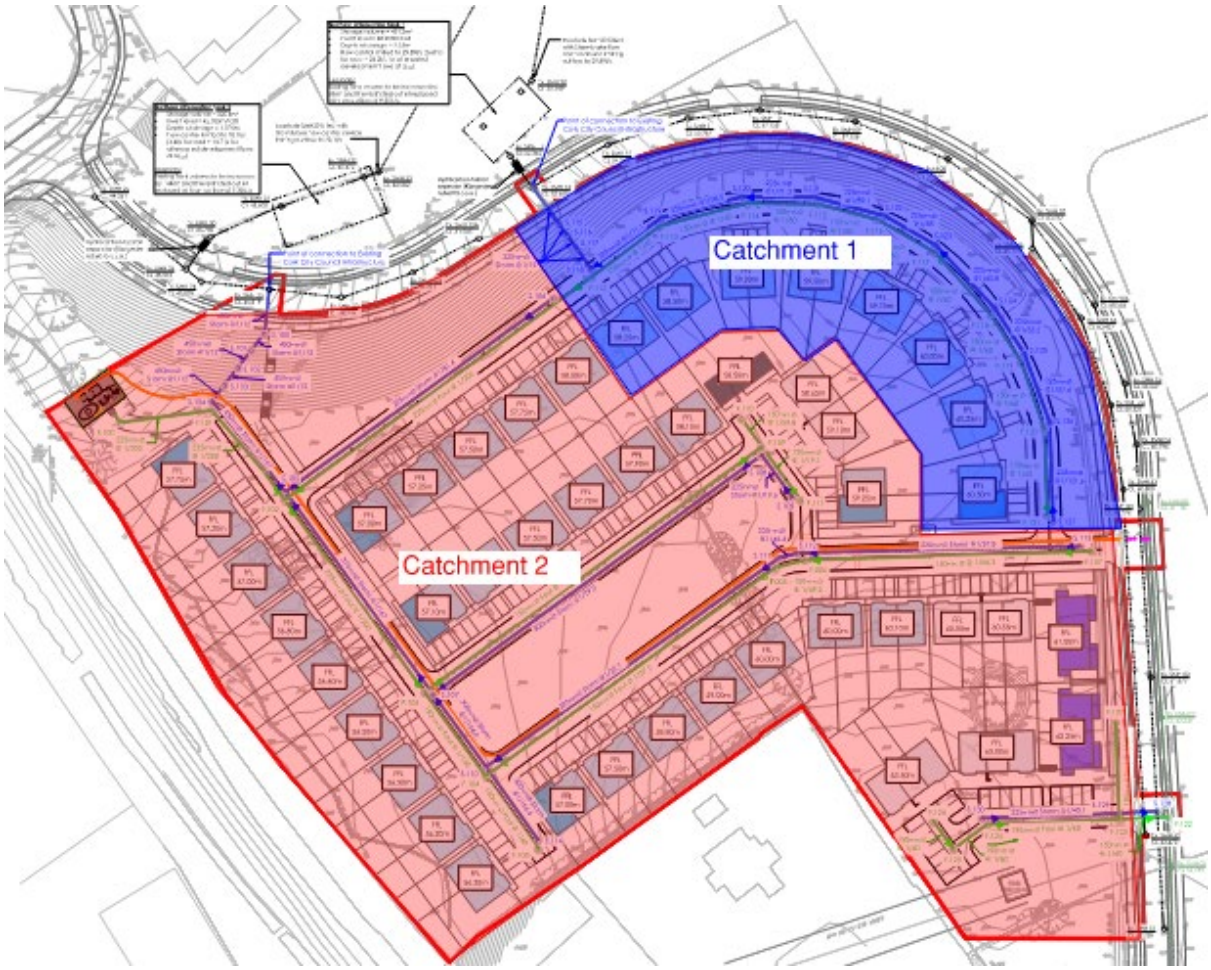


Figure 2.3– Catchment Plan

3 *Foul Sewer System*

3.1.1 Existing Infrastructure

Pre-enabling works have been carried out by the Council and the site has been fully serviced from an infrastructural aspect.

The site currently has the following infrastructure in place

- Foul Connection Infrastructure

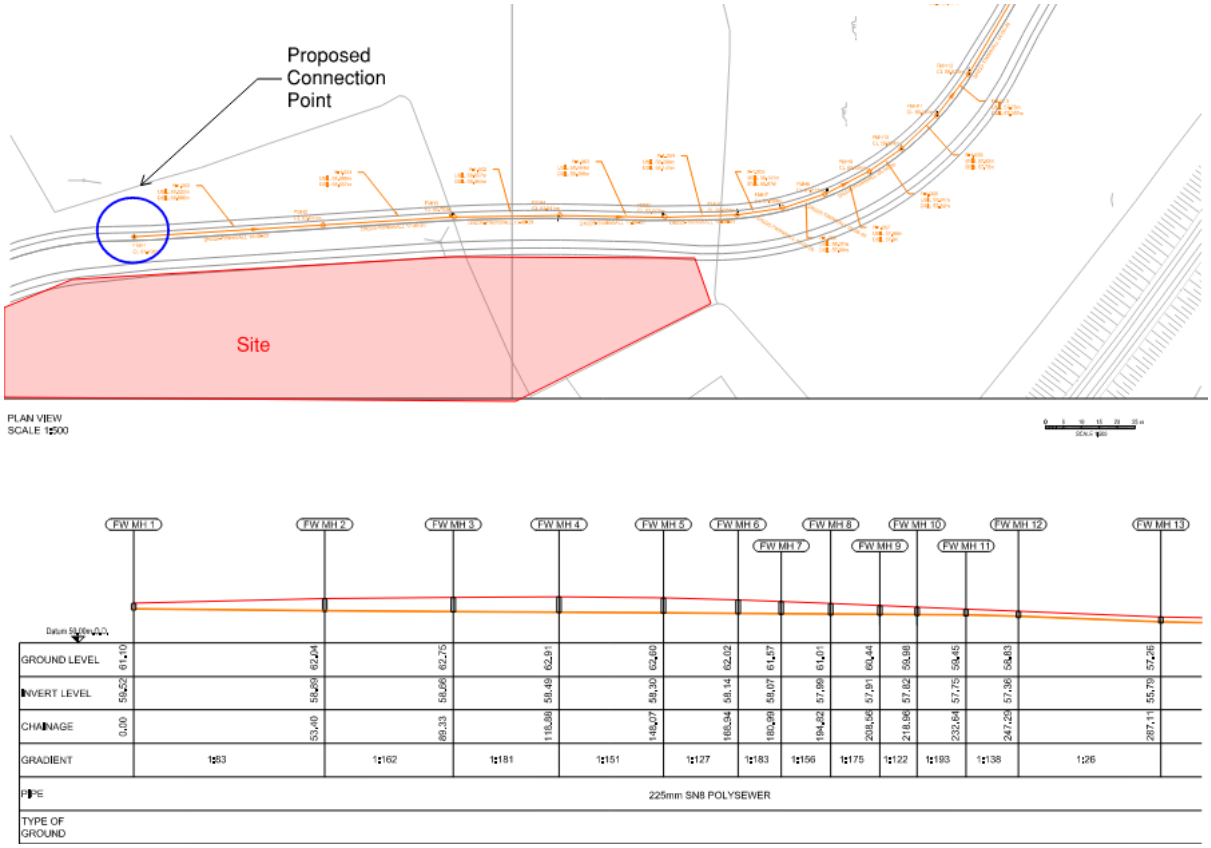


Figure 3.1 – Existing Foul Infrastructure

3.2 Foul Sewer Design

A Pre-Connection Enquiry was submitted to Irish Water. The Irish Water Reference Number for this enquiry is CDS22007050. The response to this Enquiry was issued by Irish Water on 11th November 2022. This confirmed that, subject to a valid connection agreement being put in place, the proposed connection to the Irish Water network could be facilitated. The Confirmation of Feasibility document is included in Appendix A.

The foul sewer has been designed using the System 1 and Simulation Modules of the Micro-drainage package. The foul network design addresses present day design issues and can view velocities at Full Bore, Proportional Depth and 1/3 flow.

A model of the proposed foul drainage network was built using the micro-drainage software applications. The model was analysed and amended until the results met with the design criteria specified.

The network has been designed to achieve self-cleansing velocities at 1/3 flow whilst maintaining minimum gradients.

3.2.1 Development Breakdown

95 No. Residential Units

Section 3.6 of The Irish Water Code of Practice Wastewater Infrastructure states that for the gravity sewers shall be designed to carry a minimum wastewater volume of 6 times the dry weather flow (6DWF) which is to be taken as 446 litres per dwelling

Loading = (95) (446) / (24) (60) (60) = 0.490 litres/second

6DWF = 2.94 litres/second

The layout of the proposed foul sewer network is shown on the Proposed Stormwater & Foul Sewer Layout Plan 6254-0020.

The overall quantity of wastewater for the proposed development is estimated at42.34m³ per day.

The foul waste within the development will be collected via an internal gravity network and will discharge to the existing public foul sewer.

All works will be in accordance with Irish Water specifications and requirements.

All works will be in accordance with Irish Water Code of Practice for Wastewater Supply & the Wastewater Infrastructure Standard Details Document Number: IW-CDS-5030-01.

3.3 Pump Chamber Design

3.3.1 Pump Chamber Breakdown

Based on the development breakdown, 86 no. dwelling houses will discharge to the pumping station.

Dry weather flows (DWF) is taken as 446 litres per dwelling as per the Irish Water Code of Practice for Wastewater Infrastructure

Proposed Storage = 24 hours

Storage Capacity required = (446) (86) = 38,356 litres or 39.36m³

It is proposed to provide a pumping chamber with a storage capacity of 40.0m³ and pump the effluent generated via an 100mm diameter HDPE rising main and connect to the gravity sewer on the main road as shown on the Proposed Drainage Layout Drawing 6254-0020.

4 *Water Supply*

4.1.1 Existing Infrastructure

Pre-enabling works have been carried out by the Council and the site has been fully serviced from an infrastructural aspect.

The site currently has the following infrastructure in place

- Water Connection Infrastructure

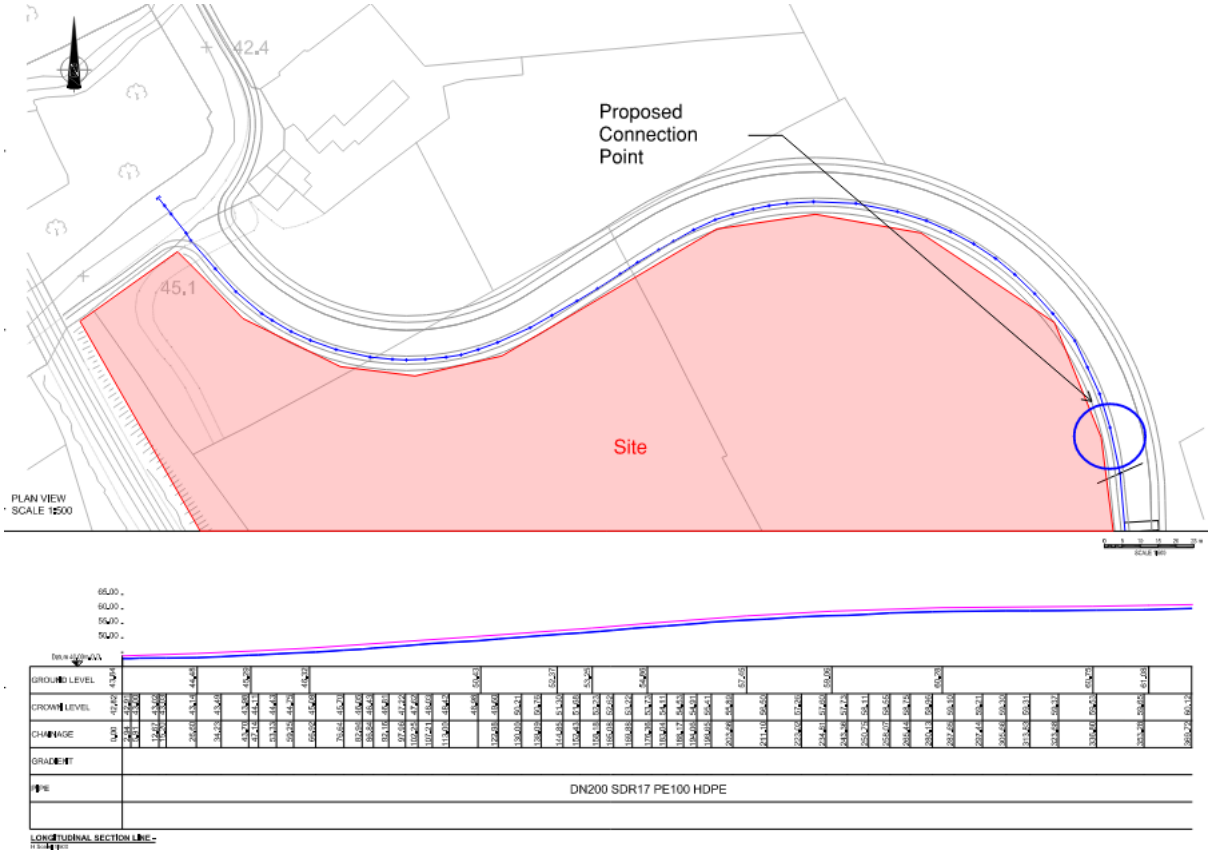


Figure 4.1 – Existing Watermain Infrastructure

As with the drainage network, a Pre-Connection Enquiry was submitted to Irish Water under Reference No. CDS22002703. This confirmed that, subject to a valid connection agreement being put in place, the proposed connection to the Irish Water network could be facilitated.

It is proposed to provide a new 100mm I.D. Ø (inside diameter) HDPE connection to the public watermain with associated valves and metering requirements. Internally within the development it is proposed to have a series of 100mm I.D. branches and loops with associated hydrants, valves and metering requirements.

Water distribution supply to each building will be sized to cater for the requirements of those particular uses. Metered connections will be made to the main in accordance with Irish Water specifications and details.

The layout of the proposed watermain network is shown on the Proposed Watermain Layout Plan 6254-0030.

All works will be in accordance with Irish Water Code of Practice for Water Supply & the Water Infrastructure Standard Details Document Number: IW-CDS-5020-01.

Details of the proposed Pump Station have been included in Appendix J

5 Summary of Results

The storm water network was built and analysed using the Microdrainage Software application and were assessed for a 1 in 2 year storm & 1 in 100 year storm. A summary of the results is shown in Tables 5.1 below

The global variables, pipeline and manhole schedules for modelled and these show the basic pipe details such as pipe length, diameter, roughness coefficient, upstream invert, velocity, etc.

Table 5.1 Summary of Surcharge and Flooding

Storm Event	Results
1 in 2 year	No surcharge of the stormwater network
1 in 100 year	Surcharge

The stormwater system is designed to ensure no surcharge occurs during a 1 in 2-year return period event. No flooding was predicted to occur for the 1 in 100-year return period event. Surcharging occurred for a number of critical storm events, but this is allowed and does not compromise or flood the network. The location of the critical storm events for each pipe run within the Micro-drainage Software model is indicated in Appendices B & C. The text specifying Flood Risk in the output data is indicated when the surcharging of the pipe run approaches within 300mm of the MH cover and this does not indicate flooding. The critical storm event for each catchment area is indicated in the output in the Appendices.

In relation to Attenuation it is proposed to increase the volume of the existing tanks

	Volume dedicated to Development (Enabling Works)	Revised Attenuation Required for Proposed Development	Additional Attenuation Required for Proposed Development
Tank 1	377 m^3	445 m^3	68 m^3
Tank 2	266 m^3	410 m^3	144 m^3

Table 5.1 – Summary of Additional Attenuation Volumes

In relation to the restricted outlets it is proposed to replace the existing

		Restricted Outlet Development (Proposed Works)	Restricted Outlet Road (Enabling Works)	Total (Proposed Works)
Catchment 1	Tank 1	5.66 l/s	3.69 l/s	9.35 l/s
Catchment 2	Tank 2	5.90 l/s	3.4 l/s	9.30 l/s

Table 5.2 – Summary of Revised Restricted Outlets

The foul water network model was built and analysed using the Micro-drainage Software application and was assessed to ensure velocities maintained a self-cleansing velocity.

The foul water network model was built and analysed using the Micro-drainage Software application and was assessed to ensure velocities maintained a self-cleansing velocity. The system

will consist of an internal gravity network discharging to the existing Irish Water asset via a pumping station.

Appendix A –Irish Water Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

Uisce Éireann
Bosca OP448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

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

www.water.ie

Stephen O'Grady
DOSA, Joyce House
Barrack Square
Ballincollig
Co. Cork
P31 KP84

11 November 2022

Our Ref: CDS22007050 Pre-Connection Enquiry
Kilnap, Old Whitechurch Road, Cork

Dear Stephen,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 472 unit(s) at Kilnap, Old Whitechurch Road, Cork, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection** - Feasible without infrastructure upgrade by Irish Water
- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

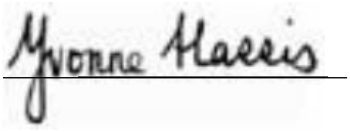
Where can you find more information?

- **Section A -** What is important to know?

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit **www.water.ie/connections, email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Yvonne Harris
Head of Customer Operations

Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• 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,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Appendix B – 1 in 2 Year Design Sheets

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	Add Flow / Climate Change (%)	10
M5-60 (mm)	18.800	Minimum Backdrop Height (m)	0.200
Ratio R	0.250	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.628	4-8	0.583

Total Area Contributing (ha) = 1.211

Total Pipe Volume (m³) = 36.215

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.000	69.410	1.200	57.8	0.185	5.00	0.0	0.600	o	225
S1.001	4.640	0.100	46.4	0.001	0.00	0.0	0.600	o	225
S1.002	71.950	3.250	22.1	0.195	0.00	0.0	0.600	o	225
S2.000	22.045	0.132	167.0	0.045	5.00	0.0	0.600	o	300

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.67	59.350	0.185	0.0	0.0	2.5	1.72	68.5	27.6
S1.001	50.00	5.71	58.150	0.186	0.0	0.0	2.5	1.93	76.6	27.7
S1.002	50.00	6.14	58.050	0.381	0.0	0.0	5.2	2.79	111.1	56.8
S2.000	50.00	5.30	54.500	0.045	0.0	0.0	0.6	1.21	85.8	6.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.003	21.990	0.132	166.6	0.074	0.00	0.0	0.600	o	300
S3.000	12.725	0.650	19.6	0.067	5.00	0.0	0.600	o	225
S3.001	99.900	1.250	79.9	0.273	0.00	0.0	0.600	o	300
S1.004	61.515	0.368	167.0	0.156	0.00	0.0	0.600	o	375
S4.000	81.440	1.000	81.4	0.162	5.00	0.0	0.600	o	225
S1.005	28.850	0.173	167.0	0.053	0.00	0.0	0.600	o	450
S1.006	5.085	0.424	12.0	0.000	0.00	0.0	0.600	o	450
S1.007	5.495	0.458	12.0	0.000	0.00	0.0	0.600	o	450
S1.008	5.265	0.439	12.0	0.000	0.00	0.0	0.600	o	450
S1.009	5.245	0.437	12.0	0.000	0.00	0.0	0.600	o	450
S1.010	11.035	0.920	12.0	0.000	0.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.003	50.00	6.44	54.368	0.500	0.0	0.0	6.8	1.22	85.9	74.5
S3.000	50.00	5.07	57.300	0.067	0.0	0.0	0.9	2.97	118.1	10.0
S3.001	50.00	6.02	56.650	0.340	0.0	0.0	4.6	1.76	124.4	50.6
S1.004	50.00	7.18	54.236	0.996	0.0	0.0	13.5	1.40	154.5	148.4
S4.000	50.00	5.94	56.500	0.162	0.0	0.0	2.2	1.45	57.7	24.1
S1.005	50.00	7.48	53.868	1.211	0.0	0.0	16.4	1.57	249.8	180.4
S1.006	50.00	7.50	53.324	1.211	0.0	0.0	16.4	5.90	937.6	180.4
S1.007	50.00	7.51	51.108	1.211	0.0	0.0	16.4	5.89	937.4	180.4
S1.008	50.00	7.53	49.089	1.211	0.0	0.0	16.4	5.90	937.6	180.4
S1.009	50.00	7.54	47.087	1.211	0.0	0.0	16.4	5.89	937.3	180.4
S1.010	50.00	7.57	46.650	1.211	0.0	0.0	16.4	5.89	937.6	180.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	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)
SS.113	60.850	1.500	1050	S1.000	59.350	225				
SS.112	59.650	1.500	1050	S1.001	58.150	225	S1.000	58.150	225	
SS.111	59.550	1.500	1050	S1.002	58.050	225	S1.001	58.050	225	
SS.114	56.000	1.500	1050	S2.000	54.500	300				
SS.110	56.300	1.932	1200	S1.003	54.368	300	S1.002	54.800	225	357
							S2.000	54.368	300	
SS.109	58.800	1.500	1050	S3.000	57.300	225				
SS.108	58.150	1.500	1050	S3.001	56.650	300	S3.000	56.650	225	
SS.107	57.000	2.764	1350	S1.004	54.236	375	S1.003	54.236	300	
							S3.001	55.400	300	1089
SS.106	58.000	1.500	1050	S4.000	56.500	225				
SS.105	57.000	3.132	1350	S1.005	53.868	450	S1.004	53.868	375	
							S4.000	55.500	225	1407
SS.104	56.500	3.176	1350	S1.006	53.324	450	S1.005	53.695	450	371
SS.103	54.250	3.142	1350	S1.007	51.108	450	S1.006	52.900	450	1792
SS.102	52.000	2.911	1350	S1.008	49.089	450	S1.007	50.650	450	1561
SS.102	50.000	2.913	1350	S1.009	47.087	450	S1.008	48.650	450	1563
SS.101	48.000	1.350	1350	S1.010	46.650	450	S1.009	46.650	450	
SEx.SMH23	46.819	1.089	0		OUTFALL		S1.010	45.730	450	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	o	225	SS.113	60.850	59.350	1.275	1050
S1.001	o	225	SS.112	59.650	58.150	1.275	1050
S1.002	o	225	SS.111	59.550	58.050	1.275	1050
S2.000	o	300	SS.114	56.000	54.500	1.200	1050
S1.003	o	300	SS.110	56.300	54.368	1.632	1200
S3.000	o	225	SS.109	58.800	57.300	1.275	1050
S3.001	o	300	SS.108	58.150	56.650	1.200	1050
S1.004	o	375	SS.107	57.000	54.236	2.389	1350
S4.000	o	225	SS.106	58.000	56.500	1.275	1050
S1.005	o	450	SS.105	57.000	53.868	2.682	1350
S1.006	o	450	SS.104	56.500	53.324	2.726	1350
S1.007	o	450	SS.103	54.250	51.108	2.692	1350
S1.008	o	450	SS.102	52.000	49.089	2.461	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	69.410	57.8	SS.112	59.650	58.150	1.275	1050
S1.001	4.640	46.4	SS.111	59.550	58.050	1.275	1050
S1.002	71.950	22.1	SS.110	56.300	54.800	1.275	1200
S2.000	22.045	167.0	SS.110	56.300	54.368	1.632	1200
S1.003	21.990	166.6	SS.107	57.000	54.236	2.464	1350
S3.000	12.725	19.6	SS.108	58.150	56.650	1.275	1050
S3.001	99.900	79.9	SS.107	57.000	55.400	1.300	1350
S1.004	61.515	167.0	SS.105	57.000	53.868	2.757	1350
S4.000	81.440	81.4	SS.105	57.000	55.500	1.275	1350
S1.005	28.850	167.0	SS.104	56.500	53.695	2.355	1350
S1.006	5.085	12.0	SS.103	54.250	52.900	0.900	1350
S1.007	5.495	12.0	SS.102	52.000	50.650	0.900	1350
S1.008	5.265	12.0	SS.102	50.000	48.650	0.900	1350

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.009	o	450	SS.102	50.000	47.087	2.463	1350
S1.010	o	450	SS.101	48.000	46.650	0.900	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.009	5.245	12.0	SS.101	48.000	46.650	0.900	1350
S1.010	11.035	12.0	SEx.SMH23	46.819	45.730	0.639	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.010	SEx.SMH23	46.819	45.730	45.319	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.250		

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

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2
Climate Change (%) 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	2	0%					
S1.001	15 Winter	2	0%					
S1.002	15 Winter	2	0%					
S2.000	15 Winter	2	0%					
S1.003	15 Winter	2	0%					
S3.000	15 Winter	2	0%					
S3.001	15 Winter	2	0%					
S1.004	15 Winter	2	0%					
S4.000	15 Winter	2	0%					
S1.005	15 Winter	2	0%					
S1.006	15 Winter	2	0%					
S1.007	15 Winter	2	0%					
S1.008	15 Winter	2	0%					
S1.009	15 Winter	2	0%					
S1.010	15 Winter	2	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	SS.113	59.458	-0.117	0.000	0.45	0.0	29.8	OK
S1.001	SS.112	58.286	-0.089	0.000	0.67	0.0	30.1	OK
S1.002	SS.111	58.166	-0.109	0.000	0.53	0.0	56.7	OK
S2.000	SS.114	54.656	-0.144	0.000	0.09	0.0	6.5	OK
S1.003	SS.110	54.649	-0.019	0.000	0.95	0.0	71.7	OK
S3.000	SS.109	57.349	-0.176	0.000	0.11	0.0	11.1	OK
S3.001	SS.108	56.784	-0.166	0.000	0.41	0.0	49.6	OK
S1.004	SS.107	54.530	-0.081	0.000	0.94	0.0	136.7	OK
S4.000	SS.106	56.610	-0.115	0.000	0.48	0.0	26.9	OK
S1.005	SS.105	54.171	-0.146	0.000	0.79	0.0	167.9	OK
S1.006	SS.104	53.538	-0.236	0.000	0.46	0.0	168.2	OK
S1.007	SS.103	51.316	-0.242	0.000	0.44	0.0	168.1	OK
S1.008	SS.102	49.300	-0.239	0.000	0.45	0.0	167.7	OK
S1.009	SS.102	47.299	-0.238	0.000	0.45	0.0	166.9	OK
S1.010	SS.101	46.822	-0.278	0.000	0.31	0.0	167.0	OK

Denis O'Sullivan & Associates		Page 1
Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area 2 Kinap, Old Whitechurch Rd Cork	
Date 23/07/2024 File SW Model - Catchm...	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

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	Add Flow / Climate Change (%)	10
M5-60 (mm)	18.800	Minimum Backdrop Height (m)	0.200
Ratio R	0.250	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.239	4-8	0.095

Total Area Contributing (ha) = 0.334

Total Pipe Volume (m³) = 7.695

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.000	24.315	0.200	121.6	0.045	5.00	0.0	0.600	o	225
S1.001	18.005	0.350	51.4	0.039	0.00	0.0	0.600	o	225
S1.002	13.295	0.250	53.2	0.040	0.00	0.0	0.600	o	225
S1.003	21.275	0.350	60.8	0.018	0.00	0.0	0.600	o	225
S1.004	14.490	0.250	58.0	0.036	0.00	0.0	0.600	o	225
S1.005	17.815	0.200	89.1	0.037	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.34	59.150	0.045	0.0	0.0	0.6	1.18	47.1	6.7
S1.001	50.00	5.51	58.950	0.084	0.0	0.0	1.1	1.83	72.7	12.5
S1.002	50.00	5.63	58.600	0.124	0.0	0.0	1.7	1.80	71.5	18.5
S1.003	50.00	5.84	58.350	0.142	0.0	0.0	1.9	1.68	66.8	21.2
S1.004	50.00	5.98	58.000	0.178	0.0	0.0	2.4	1.72	68.4	26.5
S1.005	50.00	6.20	57.750	0.215	0.0	0.0	2.9	1.39	55.1	32.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.006	17.830	0.250	71.3	0.030	0.00	0.0	0.600	o	225
S1.007	20.485	0.350	58.5	0.034	0.00	0.0	0.600	o	225
S1.008	21.330	0.300	71.1	0.055	0.00	0.0	0.600	o	225
S1.009	5.895	0.491	12.0	0.000	0.00	0.0	0.600	o	225
S1.010	4.335	0.361	12.0	0.000	0.00	0.0	0.600	o	225
S1.011	3.265	0.272	12.0	0.000	0.00	0.0	0.600	o	225
S1.012	11.205	0.915	12.2	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.006	50.00	6.39	57.550	0.245	0.0	0.0	3.3	1.55	61.6	36.5
S1.007	50.00	6.59	57.300	0.279	0.0	0.0	3.8	1.71	68.1	41.6
S1.008	50.00	6.81	56.950	0.334	0.0	0.0	4.5	1.55	61.7	49.8
S1.009	50.00	6.84	56.366	0.334	0.0	0.0	4.5	3.80	151.0	49.8
S1.010	50.00	6.86	54.236	0.334	0.0	0.0	4.5	3.80	151.0	49.8
S1.011	50.00	6.87	52.347	0.334	0.0	0.0	4.5	3.80	151.0	49.8
S1.012	50.00	6.92	52.075	0.334	0.0	0.0	4.5	3.76	149.5	49.8

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	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)
SS.127	60.650	1.500	1050	S1.000	59.150	225				
SS.126	60.450	1.500	1050	S1.001	58.950	225	S1.000	58.950	225	
SS.125	60.100	1.500	1050	S1.002	58.600	225	S1.001	58.600	225	
SS.124	59.850	1.500	1050	S1.003	58.350	225	S1.002	58.350	225	
SS.123	59.500	1.500	1050	S1.004	58.000	225	S1.003	58.000	225	
SS.122	59.250	1.500	1050	S1.005	57.750	225	S1.004	57.750	225	
SS.121	59.050	1.500	1050	S1.006	57.550	225	S1.005	57.550	225	
SS.120	58.800	1.500	1050	S1.007	57.300	225	S1.006	57.300	225	
SS.119	58.450	1.500	1050	S1.008	56.950	225	S1.007	56.950	225	
SS.118	58.150	1.784	1200	S1.009	56.366	225	S1.008	56.650	225	284
SS.117	57.000	2.764	1200	S1.010	54.236	225	S1.009	55.875	225	1639
SS.116	55.000	2.653	1200	S1.011	52.347	225	S1.010	53.875	225	1528
SS.115	53.500	1.425	1050	S1.012	52.075	225	S1.011	52.075	225	
SEx.SMH17	52.660	1.500	0		OUTFALL		S1.012	51.160	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	o	225	SS.127	60.650	59.150	1.275	1050
S1.001	o	225	SS.126	60.450	58.950	1.275	1050
S1.002	o	225	SS.125	60.100	58.600	1.275	1050
S1.003	o	225	SS.124	59.850	58.350	1.275	1050
S1.004	o	225	SS.123	59.500	58.000	1.275	1050
S1.005	o	225	SS.122	59.250	57.750	1.275	1050
S1.006	o	225	SS.121	59.050	57.550	1.275	1050
S1.007	o	225	SS.120	58.800	57.300	1.275	1050
S1.008	o	225	SS.119	58.450	56.950	1.275	1050
S1.009	o	225	SS.118	58.150	56.366	1.559	1200
S1.010	o	225	SS.117	57.000	54.236	2.539	1200
S1.011	o	225	SS.116	55.000	52.347	2.428	1200
S1.012	o	225	SS.115	53.500	52.075	1.200	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	24.315	121.6	SS.126	60.450	58.950	1.275	1050
S1.001	18.005	51.4	SS.125	60.100	58.600	1.275	1050
S1.002	13.295	53.2	SS.124	59.850	58.350	1.275	1050
S1.003	21.275	60.8	SS.123	59.500	58.000	1.275	1050
S1.004	14.490	58.0	SS.122	59.250	57.750	1.275	1050
S1.005	17.815	89.1	SS.121	59.050	57.550	1.275	1050
S1.006	17.830	71.3	SS.120	58.800	57.300	1.275	1050
S1.007	20.485	58.5	SS.119	58.450	56.950	1.275	1050
S1.008	21.330	71.1	SS.118	58.150	56.650	1.275	1200
S1.009	5.895	12.0	SS.117	57.000	55.875	0.900	1200
S1.010	4.335	12.0	SS.116	55.000	53.875	0.900	1200
S1.011	3.265	12.0	SS.115	53.500	52.075	1.200	1050
S1.012	11.205	12.2	SEx.SMH17	52.660	51.160	1.275	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.012	SEx.SMH17	52.660	51.160	51.160	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.250		

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

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2
Climate Change (%) 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	2	0%					
S1.001	15 Winter	2	0%					
S1.002	15 Winter	2	0%					
S1.003	15 Winter	2	0%					
S1.004	15 Winter	2	0%					
S1.005	15 Winter	2	0%					
S1.006	15 Winter	2	0%					
S1.007	15 Winter	2	0%					
S1.008	15 Winter	2	0%					
S1.009	15 Winter	2	0%					
S1.010	15 Winter	2	0%					
S1.011	15 Winter	2	0%					
S1.012	15 Winter	2	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	SS.127	59.213	-0.162	0.000	0.17	0.0	7.3	OK
S1.001	SS.126	59.018	-0.157	0.000	0.20	0.0	12.8	OK
S1.002	SS.125	58.684	-0.141	0.000	0.30	0.0	18.4	OK
S1.003	SS.124	58.441	-0.134	0.000	0.34	0.0	21.0	OK
S1.004	SS.123	58.104	-0.121	0.000	0.43	0.0	26.0	OK
S1.005	SS.122	57.880	-0.095	0.000	0.63	0.0	31.0	OK
S1.006	SS.121	57.681	-0.094	0.000	0.63	0.0	35.0	OK
S1.007	SS.120	57.432	-0.093	0.000	0.64	0.0	39.3	OK
S1.008	SS.119	57.109	-0.066	0.000	0.83	0.0	46.7	OK
S1.009	SS.118	56.476	-0.115	0.000	0.47	0.0	46.9	OK
S1.010	SS.117	54.356	-0.105	0.000	0.55	0.0	47.0	OK
S1.011	SS.116	52.478	-0.094	0.000	0.64	0.0	46.9	OK
S1.012	SS.115	52.170	-0.130	0.000	0.37	0.0	46.8	OK

Denis O'Sullivan & Associates		Page 1
Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area 3 Kinap, Old Whitechurch Rd Cork	
Date 23/07/2024 File SW Model - Catchm...	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

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	Add Flow / Climate Change (%)	10
M5-60 (mm)	18.800	Minimum Backdrop Height (m)	0.200
Ratio R	0.250	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.140	4-8	0.044

Total Area Contributing (ha) = 0.184

Total Pipe Volume (m³) = 1.700

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.000	30.200	0.700	43.1	0.145	5.00	0.0	0.600	o	225
S1.001	12.550	0.075	167.3	0.039	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.25	61.500	0.145	0.0	0.0	2.0	2.00	79.4	21.6
S1.001	50.00	5.46	60.800	0.184	0.0	0.0	2.5	1.01	40.1	27.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	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)
SS.130	63.000	1.500	1050	S1.000	61.500	225				
SS.129	62.300	1.500	1050	S1.001	60.800	225	S1.000	60.800	225	
SS.128	62.470	1.745	0		OUTFALL		S1.001	60.725	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	o	225	SS.130	63.000	61.500	1.275	1050
S1.001	o	225	SS.129	62.300	60.800	1.275	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	30.200	43.1	SS.129	62.300	60.800	1.275	1050
S1.001	12.550	167.3	SS.128	62.470	60.725	1.520	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	SS.128	62.470	60.725	60.725	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.250		

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

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2
Climate Change (%) 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	2	0%					
S1.001	15 Winter	2	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	SS.130	61.588	-0.137	0.000	0.32	0.0	23.9	OK
S1.001	SS.129	60.962	-0.063	0.000	0.85	0.0	29.3	OK

Appendix C – 1 in 100 Year Design Sheets

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	Add Flow / Climate Change (%)	10
M5-60 (mm)	18.800	Minimum Backdrop Height (m)	0.200
Ratio R	0.250	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.628	4-8	0.583

Total Area Contributing (ha) = 1.211

Total Pipe Volume (m³) = 36.215

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.000	69.410	1.200	57.8	0.185	5.00	0.0	0.600	o	225
S1.001	4.640	0.100	46.4	0.001	0.00	0.0	0.600	o	225
S1.002	71.950	3.250	22.1	0.195	0.00	0.0	0.600	o	225
S2.000	22.045	0.132	167.0	0.045	5.00	0.0	0.600	o	300

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.67	59.350	0.185	0.0	0.0	2.5	1.72	68.5	27.6
S1.001	50.00	5.71	58.150	0.186	0.0	0.0	2.5	1.93	76.6	27.7
S1.002	50.00	6.14	58.050	0.381	0.0	0.0	5.2	2.79	111.1	56.8
S2.000	50.00	5.30	54.500	0.045	0.0	0.0	0.6	1.21	85.8	6.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.003	21.990	0.132	166.6	0.074	0.00	0.0	0.600	o	300
S3.000	12.725	0.650	19.6	0.067	5.00	0.0	0.600	o	225
S3.001	99.900	1.250	79.9	0.273	0.00	0.0	0.600	o	300
S1.004	61.515	0.368	167.0	0.156	0.00	0.0	0.600	o	375
S4.000	81.440	1.000	81.4	0.162	5.00	0.0	0.600	o	225
S1.005	28.850	0.173	167.0	0.053	0.00	0.0	0.600	o	450
S1.006	5.085	0.424	12.0	0.000	0.00	0.0	0.600	o	450
S1.007	5.495	0.458	12.0	0.000	0.00	0.0	0.600	o	450
S1.008	5.265	0.439	12.0	0.000	0.00	0.0	0.600	o	450
S1.009	5.245	0.437	12.0	0.000	0.00	0.0	0.600	o	450
S1.010	11.035	0.920	12.0	0.000	0.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.003	50.00	6.44	54.368	0.500	0.0	0.0	6.8	1.22	85.9	74.5
S3.000	50.00	5.07	57.300	0.067	0.0	0.0	0.9	2.97	118.1	10.0
S3.001	50.00	6.02	56.650	0.340	0.0	0.0	4.6	1.76	124.4	50.6
S1.004	50.00	7.18	54.236	0.996	0.0	0.0	13.5	1.40	154.5	148.4
S4.000	50.00	5.94	56.500	0.162	0.0	0.0	2.2	1.45	57.7	24.1
S1.005	50.00	7.48	53.868	1.211	0.0	0.0	16.4	1.57	249.8	180.4
S1.006	50.00	7.50	53.324	1.211	0.0	0.0	16.4	5.90	937.6	180.4
S1.007	50.00	7.51	51.108	1.211	0.0	0.0	16.4	5.89	937.4	180.4
S1.008	50.00	7.53	49.089	1.211	0.0	0.0	16.4	5.90	937.6	180.4
S1.009	50.00	7.54	47.087	1.211	0.0	0.0	16.4	5.89	937.3	180.4
S1.010	50.00	7.57	46.650	1.211	0.0	0.0	16.4	5.89	937.6	180.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	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)
SS.113	60.850	1.500	1050	S1.000	59.350	225				
SS.112	59.650	1.500	1050	S1.001	58.150	225	S1.000	58.150	225	
SS.111	59.550	1.500	1050	S1.002	58.050	225	S1.001	58.050	225	
SS.114	56.000	1.500	1050	S2.000	54.500	300				
SS.110	56.300	1.932	1200	S1.003	54.368	300	S1.002	54.800	225	357
							S2.000	54.368	300	
SS.109	58.800	1.500	1050	S3.000	57.300	225				
SS.108	58.150	1.500	1050	S3.001	56.650	300	S3.000	56.650	225	
SS.107	57.000	2.764	1350	S1.004	54.236	375	S1.003	54.236	300	
							S3.001	55.400	300	1089
SS.106	58.000	1.500	1050	S4.000	56.500	225				
SS.105	57.000	3.132	1350	S1.005	53.868	450	S1.004	53.868	375	
							S4.000	55.500	225	1407
SS.104	56.500	3.176	1350	S1.006	53.324	450	S1.005	53.695	450	371
SS.103	54.250	3.142	1350	S1.007	51.108	450	S1.006	52.900	450	1792
SS.102	52.000	2.911	1350	S1.008	49.089	450	S1.007	50.650	450	1561
SS.102	50.000	2.913	1350	S1.009	47.087	450	S1.008	48.650	450	1563
SS.101	48.000	1.350	1350	S1.010	46.650	450	S1.009	46.650	450	
SEx.SMH23	46.819	1.089	0		OUTFALL		S1.010	45.730	450	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	o	225	SS.113	60.850	59.350	1.275	1050
S1.001	o	225	SS.112	59.650	58.150	1.275	1050
S1.002	o	225	SS.111	59.550	58.050	1.275	1050
S2.000	o	300	SS.114	56.000	54.500	1.200	1050
S1.003	o	300	SS.110	56.300	54.368	1.632	1200
S3.000	o	225	SS.109	58.800	57.300	1.275	1050
S3.001	o	300	SS.108	58.150	56.650	1.200	1050
S1.004	o	375	SS.107	57.000	54.236	2.389	1350
S4.000	o	225	SS.106	58.000	56.500	1.275	1050
S1.005	o	450	SS.105	57.000	53.868	2.682	1350
S1.006	o	450	SS.104	56.500	53.324	2.726	1350
S1.007	o	450	SS.103	54.250	51.108	2.692	1350
S1.008	o	450	SS.102	52.000	49.089	2.461	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	69.410	57.8	SS.112	59.650	58.150	1.275	1050
S1.001	4.640	46.4	SS.111	59.550	58.050	1.275	1050
S1.002	71.950	22.1	SS.110	56.300	54.800	1.275	1200
S2.000	22.045	167.0	SS.110	56.300	54.368	1.632	1200
S1.003	21.990	166.6	SS.107	57.000	54.236	2.464	1350
S3.000	12.725	19.6	SS.108	58.150	56.650	1.275	1050
S3.001	99.900	79.9	SS.107	57.000	55.400	1.300	1350
S1.004	61.515	167.0	SS.105	57.000	53.868	2.757	1350
S4.000	81.440	81.4	SS.105	57.000	55.500	1.275	1350
S1.005	28.850	167.0	SS.104	56.500	53.695	2.355	1350
S1.006	5.085	12.0	SS.103	54.250	52.900	0.900	1350
S1.007	5.495	12.0	SS.102	52.000	50.650	0.900	1350
S1.008	5.265	12.0	SS.102	50.000	48.650	0.900	1350

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.009	o	450	SS.102	50.000	47.087	2.463	1350
S1.010	o	450	SS.101	48.000	46.650	0.900	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.009	5.245	12.0	SS.101	48.000	46.650	0.900	1350
S1.010	11.035	12.0	SEx.SMH23	46.819	45.730	0.639	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.010	SEx.SMH23	46.819	45.730	45.319	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.250		

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

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	0%	100/15 Summer				
S1.001	15 Winter	100	0%	100/15 Summer				
S1.002	15 Winter	100	0%	100/15 Summer				
S2.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			4
S1.003	15 Winter	100	0%	100/15 Summer				
S3.000	15 Winter	100	0%					
S3.001	15 Winter	100	0%	100/15 Summer				
S1.004	15 Winter	100	0%	100/15 Summer				
S4.000	15 Winter	100	0%	100/15 Summer				
S1.005	15 Winter	100	0%	100/15 Summer				
S1.006	15 Winter	100	0%					
S1.007	15 Winter	100	0%					
S1.008	15 Winter	100	0%					
S1.009	15 Winter	100	0%					
S1.010	15 Winter	100	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	SS.113	60.174	0.599	0.000	0.87	0.0	57.8	SURCHARGED
S1.001	SS.112	59.320	0.945	0.000	1.43	0.0	63.8	SURCHARGED
S1.002	SS.111	59.174	0.899	0.000	0.97	0.0	105.0	SURCHARGED
S2.000	SS.114	56.009	1.209	0.000	0.88	0.0	66.6	FLOOD RISK
S1.003	SS.110	56.092	1.424	0.000	2.20	0.0	166.4	FLOOD RISK
S3.000	SS.109	57.378	-0.147	0.000	0.26	0.0	26.6	OK
S3.001	SS.108	57.228	0.278	0.000	1.03	0.0	124.4	SURCHARGED
S1.004	SS.107	55.893	1.282	0.000	1.87	0.0	271.1	SURCHARGED
S4.000	SS.106	56.874	0.149	0.000	1.07	0.0	60.3	SURCHARGED
S1.005	SS.105	54.586	0.269	0.000	1.63	0.0	347.6	SURCHARGED
S1.006	SS.104	53.670	-0.104	0.000	0.95	0.0	347.5	OK
S1.007	SS.103	51.443	-0.115	0.000	0.91	0.0	347.0	OK
S1.008	SS.102	49.429	-0.110	0.000	0.93	0.0	345.9	OK
S1.009	SS.102	47.429	-0.108	0.000	0.93	0.0	346.3	OK
S1.010	SS.101	46.913	-0.186	0.000	0.64	0.0	346.9	OK

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Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area 2 Kinap, Old Whitechurch Rd Cork	
Date 23/07/2024 File SW Model - Catchm...	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

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	Add Flow / Climate Change (%)	10
M5-60 (mm)	18.800	Minimum Backdrop Height (m)	0.200
Ratio R	0.250	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.239	4-8	0.095

Total Area Contributing (ha) = 0.334

Total Pipe Volume (m³) = 7.695

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.000	24.315	0.200	121.6	0.045	5.00	0.0	0.600	o	225
S1.001	18.005	0.350	51.4	0.039	0.00	0.0	0.600	o	225
S1.002	13.295	0.250	53.2	0.040	0.00	0.0	0.600	o	225
S1.003	21.275	0.350	60.8	0.018	0.00	0.0	0.600	o	225
S1.004	14.490	0.250	58.0	0.036	0.00	0.0	0.600	o	225
S1.005	17.815	0.200	89.1	0.037	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.34	59.150	0.045	0.0	0.0	0.6	1.18	47.1	6.7
S1.001	50.00	5.51	58.950	0.084	0.0	0.0	1.1	1.83	72.7	12.5
S1.002	50.00	5.63	58.600	0.124	0.0	0.0	1.7	1.80	71.5	18.5
S1.003	50.00	5.84	58.350	0.142	0.0	0.0	1.9	1.68	66.8	21.2
S1.004	50.00	5.98	58.000	0.178	0.0	0.0	2.4	1.72	68.4	26.5
S1.005	50.00	6.20	57.750	0.215	0.0	0.0	2.9	1.39	55.1	32.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.006	17.830	0.250	71.3	0.030	0.00	0.0	0.600	o	225
S1.007	20.485	0.350	58.5	0.034	0.00	0.0	0.600	o	225
S1.008	21.330	0.300	71.1	0.055	0.00	0.0	0.600	o	225
S1.009	5.895	0.491	12.0	0.000	0.00	0.0	0.600	o	225
S1.010	4.335	0.361	12.0	0.000	0.00	0.0	0.600	o	225
S1.011	3.265	0.272	12.0	0.000	0.00	0.0	0.600	o	225
S1.012	11.205	0.915	12.2	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.006	50.00	6.39	57.550	0.245	0.0	0.0	3.3	1.55	61.6	36.5
S1.007	50.00	6.59	57.300	0.279	0.0	0.0	3.8	1.71	68.1	41.6
S1.008	50.00	6.81	56.950	0.334	0.0	0.0	4.5	1.55	61.7	49.8
S1.009	50.00	6.84	56.366	0.334	0.0	0.0	4.5	3.80	151.0	49.8
S1.010	50.00	6.86	54.236	0.334	0.0	0.0	4.5	3.80	151.0	49.8
S1.011	50.00	6.87	52.347	0.334	0.0	0.0	4.5	3.80	151.0	49.8
S1.012	50.00	6.92	52.075	0.334	0.0	0.0	4.5	3.76	149.5	49.8

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	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)
SS.127	60.650	1.500	1050	S1.000	59.150	225				
SS.126	60.450	1.500	1050	S1.001	58.950	225	S1.000	58.950	225	
SS.125	60.100	1.500	1050	S1.002	58.600	225	S1.001	58.600	225	
SS.124	59.850	1.500	1050	S1.003	58.350	225	S1.002	58.350	225	
SS.123	59.500	1.500	1050	S1.004	58.000	225	S1.003	58.000	225	
SS.122	59.250	1.500	1050	S1.005	57.750	225	S1.004	57.750	225	
SS.121	59.050	1.500	1050	S1.006	57.550	225	S1.005	57.550	225	
SS.120	58.800	1.500	1050	S1.007	57.300	225	S1.006	57.300	225	
SS.119	58.450	1.500	1050	S1.008	56.950	225	S1.007	56.950	225	
SS.118	58.150	1.784	1200	S1.009	56.366	225	S1.008	56.650	225	284
SS.117	57.000	2.764	1200	S1.010	54.236	225	S1.009	55.875	225	1639
SS.116	55.000	2.653	1200	S1.011	52.347	225	S1.010	53.875	225	1528
SS.115	53.500	1.425	1050	S1.012	52.075	225	S1.011	52.075	225	
SEx.SMH17	52.660	1.500	0		OUTFALL		S1.012	51.160	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	o	225	SS.127	60.650	59.150	1.275	1050
S1.001	o	225	SS.126	60.450	58.950	1.275	1050
S1.002	o	225	SS.125	60.100	58.600	1.275	1050
S1.003	o	225	SS.124	59.850	58.350	1.275	1050
S1.004	o	225	SS.123	59.500	58.000	1.275	1050
S1.005	o	225	SS.122	59.250	57.750	1.275	1050
S1.006	o	225	SS.121	59.050	57.550	1.275	1050
S1.007	o	225	SS.120	58.800	57.300	1.275	1050
S1.008	o	225	SS.119	58.450	56.950	1.275	1050
S1.009	o	225	SS.118	58.150	56.366	1.559	1200
S1.010	o	225	SS.117	57.000	54.236	2.539	1200
S1.011	o	225	SS.116	55.000	52.347	2.428	1200
S1.012	o	225	SS.115	53.500	52.075	1.200	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	24.315	121.6	SS.126	60.450	58.950	1.275	1050
S1.001	18.005	51.4	SS.125	60.100	58.600	1.275	1050
S1.002	13.295	53.2	SS.124	59.850	58.350	1.275	1050
S1.003	21.275	60.8	SS.123	59.500	58.000	1.275	1050
S1.004	14.490	58.0	SS.122	59.250	57.750	1.275	1050
S1.005	17.815	89.1	SS.121	59.050	57.550	1.275	1050
S1.006	17.830	71.3	SS.120	58.800	57.300	1.275	1050
S1.007	20.485	58.5	SS.119	58.450	56.950	1.275	1050
S1.008	21.330	71.1	SS.118	58.150	56.650	1.275	1200
S1.009	5.895	12.0	SS.117	57.000	55.875	0.900	1200
S1.010	4.335	12.0	SS.116	55.000	53.875	0.900	1200
S1.011	3.265	12.0	SS.115	53.500	52.075	1.200	1050
S1.012	11.205	12.2	SEx.SMH17	52.660	51.160	1.275	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.012	SEx.SMH17	52.660	51.160	51.160	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.250		

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

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	0%					
S1.001	15 Winter	100	0%	100/15 Winter				
S1.002	15 Winter	100	0%	100/15 Summer				
S1.003	15 Winter	100	0%	100/15 Summer				
S1.004	15 Winter	100	0%	100/15 Summer				
S1.005	15 Winter	100	0%	100/15 Summer				
S1.006	15 Winter	100	0%	100/15 Summer				
S1.007	15 Winter	100	0%	100/15 Summer				
S1.008	15 Winter	100	0%	100/15 Summer				
S1.009	15 Winter	100	0%					
S1.010	15 Winter	100	0%	100/15 Summer				
S1.011	15 Winter	100	0%	100/15 Summer				
S1.012	15 Winter	100	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	SS.127	59.269	-0.106	0.000	0.41	0.0	17.6	OK
S1.001	SS.126	59.237	0.062	0.000	0.51	0.0	33.1	SURCHARGED
S1.002	SS.125	59.191	0.366	0.000	0.73	0.0	45.2	SURCHARGED
S1.003	SS.124	59.115	0.540	0.000	0.74	0.0	45.2	SURCHARGED
S1.004	SS.123	58.986	0.761	0.000	0.83	0.0	49.7	SURCHARGED
S1.005	SS.122	58.838	0.863	0.000	1.18	0.0	58.1	SURCHARGED
S1.006	SS.121	58.570	0.795	0.000	1.20	0.0	66.3	SURCHARGED
S1.007	SS.120	58.217	0.692	0.000	1.23	0.0	75.8	SURCHARGED
S1.008	SS.119	57.695	0.520	0.000	1.64	0.0	92.1	SURCHARGED
S1.009	SS.118	56.538	-0.053	0.000	0.94	0.0	92.3	OK
S1.010	SS.117	54.517	0.056	0.000	1.09	0.0	92.4	SURCHARGED
S1.011	SS.116	52.720	0.148	0.000	1.25	0.0	91.9	SURCHARGED
S1.012	SS.115	52.219	-0.081	0.000	0.73	0.0	92.1	OK

Denis O'Sullivan & Associates		Page 1
Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area 3 Kinap, Old Whitechurch Rd Cork	
Date 23/07/2024 File SW Model - Catchm...	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

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	Add Flow / Climate Change (%)	10
M5-60 (mm)	18.800	Minimum Backdrop Height (m)	0.200
Ratio R	0.250	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.140	4-8	0.044

Total Area Contributing (ha) = 0.184

Total Pipe Volume (m³) = 1.700

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.000	30.200	0.700	43.1	0.145	5.00	0.0	0.600	o	225
S1.001	12.550	0.075	167.3	0.039	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.25	61.500	0.145	0.0	0.0	2.0	2.00	79.4	21.6
S1.001	50.00	5.46	60.800	0.184	0.0	0.0	2.5	1.01	40.1	27.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	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)
SS.130	63.000	1.500	1050	S1.000	61.500	225				
SS.129	62.300	1.500	1050	S1.001	60.800	225	S1.000	60.800	225	
SS.128	62.470	1.745	0		OUTFALL		S1.001	60.725	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	o	225	SS.130	63.000	61.500	1.275	1050
S1.001	o	225	SS.129	62.300	60.800	1.275	1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
S1.000	30.200	43.1	SS.129	62.300	60.800	1.275	1050
S1.001	12.550	167.3	SS.128	62.470	60.725	1.520	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	SS.128	62.470	60.725	60.725	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.250		

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

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	0%					
S1.001	15 Winter	100	0%	100/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	SS.130	61.683	-0.042	0.000	0.76	0.0	56.6	OK
S1.001	SS.129	61.271	0.246	0.000	2.08	0.0	71.8	SURCHARGED

Appendix D – Foul Sewer Design Sheets

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	446.00	Maximum Backdrop Height (m)	1.500
Persons per House	1.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.000	70.390	1.250	56.3	0.000	10	0.0	1.500	o	150
F1.001	7.375	0.150	49.2	0.000	0	0.0	1.500	o	150
F1.002	87.865	3.200	27.5	0.000	10	0.0	1.500	o	150
F2.000	22.075	0.368	60.0	0.000	4	0.0	1.500	o	150
F1.003	25.515	0.170	150.0	0.000	3	0.0	1.500	o	225
F3.000	16.235	0.850	19.1	0.000	4	0.0	1.500	o	150
F4.000	8.555	0.143	59.8	0.000	4	0.0	1.500	o	150

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ DWF (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	59.050	0.000	0.0	10	0.0	13	0.41	1.17	20.7	0.3
F1.001	57.800	0.000	0.0	10	0.0	13	0.43	1.25	22.1	0.3
F1.002	57.650	0.000	0.0	20	0.0	15	0.65	1.68	29.6	0.6
F2.000	54.150	0.000	0.0	4	0.0	9	0.30	1.13	20.0	0.1
F1.003	53.782	0.000	0.0	27	0.0	24	0.38	0.94	37.2	0.8
F3.000	57.150	0.000	0.0	4	0.0	7	0.44	2.01	35.5	0.1
F4.000	56.443	0.000	0.0	4	0.0	9	0.30	1.13	20.0	0.1

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
F3.001	102.685	1.711	60.0	0.000	12	0.0	1.500	o	150
F1.004	58.375	0.292	200.0	0.000	7	0.0	1.500	o	225
F5.000	20.915	0.349	60.0	0.000	2	0.0	1.500	o	150
F5.001	17.570	0.293	60.0	0.000	2	0.0	1.500	o	150
F5.002	13.525	0.225	60.0	0.000	1	0.0	1.500	o	150
F5.003	20.755	0.346	60.0	0.000	1	0.0	1.500	o	150
F5.004	16.400	0.273	60.0	0.000	2	0.0	1.500	o	150
F5.005	14.800	0.247	60.0	0.000	2	0.0	1.500	o	150
F5.006	17.500	0.292	60.0	0.000	2	0.0	1.500	o	150
F5.007	22.637	0.377	60.0	0.000	2	0.0	1.500	o	150
F5.008	21.175	0.353	60.0	0.000	2	0.0	1.500	o	150
F5.009	92.990	1.198	77.6	0.000	11	0.0	1.500	o	225
F1.005	28.605	0.143	200.0	0.000	4	0.0	1.500	o	225
F1.006	22.713	0.114	200.0	0.000	0	0.0	1.500	o	225

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F3.001	56.300	0.000	0.0	20	0.0	18	0.50	1.13	20.0	0.6
F1.004	53.612	0.000	0.0	54	0.0	35	0.42	0.81	32.2	1.7
F5.000	58.750	0.000	0.0	2	0.0	6	0.24	1.13	20.0	0.1
F5.001	58.401	0.000	0.0	4	0.0	9	0.30	1.13	20.0	0.1
F5.002	58.109	0.000	0.0	5	0.0	10	0.32	1.13	20.0	0.2
F5.003	57.883	0.000	0.0	6	0.0	11	0.34	1.13	20.0	0.2
F5.004	57.537	0.000	0.0	8	0.0	12	0.37	1.13	20.0	0.2
F5.005	57.264	0.000	0.0	10	0.0	13	0.40	1.13	20.0	0.3
F5.006	57.017	0.000	0.0	12	0.0	14	0.42	1.13	20.0	0.4
F5.007	56.726	0.000	0.0	14	0.0	16	0.45	1.13	20.0	0.4
F5.008	56.348	0.000	0.0	16	0.0	17	0.47	1.13	20.0	0.5
F5.009	55.995	0.000	0.0	27	0.0	20	0.47	1.30	51.8	0.8
F1.005	53.320	0.000	0.0	85	0.0	44	0.49	0.81	32.2	2.6
F1.006	53.177	0.000	0.0	85	0.0	44	0.49	0.81	32.2	2.6

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	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)
FF.107	60.900	1.850	1200	F1.000	59.050	150				
FF.106	59.650	1.850	1200	F1.001	57.800	150	F1.000	57.800	150	
FF.105	59.500	1.850	1200	F1.002	57.650	150	F1.001	57.650	150	
FF.108	56.000	1.850	1200	F2.000	54.150	150				
FF.104	56.300	2.518	1200	F1.003	53.782	225	F1.002	54.450	150	593
							F2.000	53.782	150	
FF.111	59.000	1.850	1200	F3.000	57.150	150				
FF.110	58.250	1.807	1200	F4.000	56.443	150				
FF.109	58.150	1.850	1200	F3.001	56.300	150	F3.000	56.300	150	
							F4.000	56.300	150	
FF.103	56.900	3.288	1200	F1.004	53.612	225	F1.003	53.612	225	
							F3.001	54.589	150	902
FF.121	60.600	1.850	1200	F5.000	58.750	150				
FF.120	60.400	1.999	1200	F5.001	58.401	150	F5.000	58.401	150	
FF.119	60.100	1.991	1200	F5.002	58.109	150	F5.001	58.109	150	
FF.118	59.900	2.017	1200	F5.003	57.883	150	F5.002	57.883	150	
FF.117	59.550	2.013	1200	F5.004	57.537	150	F5.003	57.537	150	
FF.116	59.300	2.036	1200	F5.005	57.264	150	F5.004	57.264	150	
FF.115	59.100	2.083	1200	F5.006	57.017	150	F5.005	57.017	150	
FF.114	58.800	2.074	1200	F5.007	56.726	150	F5.006	56.726	150	
FF.113	58.400	2.052	1200	F5.008	56.348	150	F5.007	56.348	150	
FF.112	58.100	2.105	1200	F5.009	55.995	225	F5.008	55.995	150	
FF.102	57.000	3.680	1200	F1.005	53.320	225	F1.004	53.320	225	
							F5.009	54.797	225	1477
FF.101	57.500	4.323	1200	F1.006	53.177	225	F1.005	53.177	225	
FF.100	56.000	2.936	0		OUTFALL		F1.006	53.064	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 DIAM., L*W (mm)
F1.000	o	150	FF.107	60.900	59.050	1.700	1200
F1.001	o	150	FF.106	59.650	57.800	1.700	1200
F1.002	o	150	FF.105	59.500	57.650	1.700	1200
F2.000	o	150	FF.108	56.000	54.150	1.700	1200
F1.003	o	225	FF.104	56.300	53.782	2.293	1200
F3.000	o	150	FF.111	59.000	57.150	1.700	1200
F4.000	o	150	FF.110	58.250	56.443	1.657	1200
F3.001	o	150	FF.109	58.150	56.300	1.700	1200
F1.004	o	225	FF.103	56.900	53.612	3.063	1200
F5.000	o	150	FF.121	60.600	58.750	1.700	1200
F5.001	o	150	FF.120	60.400	58.401	1.849	1200
F5.002	o	150	FF.119	60.100	58.109	1.841	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
F1.000	70.390	56.3	FF.106	59.650	57.800	1.700	1200
F1.001	7.375	49.2	FF.105	59.500	57.650	1.700	1200
F1.002	87.865	27.5	FF.104	56.300	54.450	1.700	1200
F2.000	22.075	60.0	FF.104	56.300	53.782	2.368	1200
F1.003	25.515	150.0	FF.103	56.900	53.612	3.063	1200
F3.000	16.235	19.1	FF.109	58.150	56.300	1.700	1200
F4.000	8.555	59.8	FF.109	58.150	56.300	1.700	1200
F3.001	102.685	60.0	FF.103	56.900	54.589	2.161	1200
F1.004	58.375	200.0	FF.102	57.000	53.320	3.455	1200
F5.000	20.915	60.0	FF.120	60.400	58.401	1.849	1200
F5.001	17.570	60.0	FF.119	60.100	58.109	1.841	1200
F5.002	13.525	60.0	FF.118	59.900	57.883	1.867	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 DIAM., L*W (mm)
F5.003	o	150	FF.118	59.900	57.883	1.867	1200
F5.004	o	150	FF.117	59.550	57.537	1.863	1200
F5.005	o	150	FF.116	59.300	57.264	1.886	1200
F5.006	o	150	FF.115	59.100	57.017	1.933	1200
F5.007	o	150	FF.114	58.800	56.726	1.924	1200
F5.008	o	150	FF.113	58.400	56.348	1.902	1200
F5.009	o	225	FF.112	58.100	55.995	1.880	1200
F1.005	o	225	FF.102	57.000	53.320	3.455	1200
F1.006	o	225	FF.101	57.500	53.177	4.098	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
F5.003	20.755	60.0	FF.117	59.550	57.537	1.863	1200
F5.004	16.400	60.0	FF.116	59.300	57.264	1.886	1200
F5.005	14.800	60.0	FF.115	59.100	57.017	1.933	1200
F5.006	17.500	60.0	FF.114	58.800	56.726	1.924	1200
F5.007	22.637	60.0	FF.113	58.400	56.348	1.902	1200
F5.008	21.175	60.0	FF.112	58.100	55.995	1.955	1200
F5.009	92.990	77.6	FF.102	57.000	54.797	1.978	1200
F1.005	28.605	200.0	FF.101	57.500	53.177	4.098	1200
F1.006	22.713	200.0	FF.100	56.000	53.064	2.711	0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.006	FF.100	56.000	53.064	53.064	0	0

Simulation Criteria for Foul - Main

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	446.00	Maximum Backdrop Height (m)	1.500
Persons per House	1.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	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)
FF.126	63.350	1.850	1200	F1.000	61.500	150				
FF.125	63.350	1.990	1200	F1.001	61.360	150	F1.000	61.360	150	
FF.124	63.000	1.812	1200	F1.002	61.188	150	F1.001	61.188	150	
FF.127	62.100	1.050	1050	F2.000	61.050	150				
FF.123	62.300	1.653	1200	F1.003	60.647	150	F1.002	60.647	150	
							F2.000	60.650	150	3
FF.122	62.300	1.851	0		OUTFALL		F1.003	60.449	150	

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
F1.000	o	150	FF.126	63.350	61.500	1.700	1200
F1.001	o	150	FF.125	63.350	61.360	1.840	1200
F1.002	o	150	FF.124	63.000	61.188	1.662	1200
F2.000	o	150	FF.127	62.100	61.050	0.900	1050
F1.003	o	150	FF.123	62.300	60.647	1.503	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
F1.000	8.425	60.2	FF.125	63.350	61.360	1.840	1200
F1.001	10.335	60.0	FF.124	63.000	61.188	1.662	1200
F1.002	32.465	60.0	FF.123	62.300	60.647	1.503	1200
F2.000	24.015	60.0	FF.123	62.300	60.650	1.500	1200
F1.003	11.885	60.0	FF.122	62.300	60.449	1.701	0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.003	FF.122	62.300	60.449	60.449	0	0

Simulation Criteria for Foul - Main

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Appendix E – Storm Water Longitudinal Sections

Denis O'Sullivan & Associates		Page 1
Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area No. 1 Kinap, Old Whitechurch Rd Cork	
Date 24/06/2024 File SW Model.MDX	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

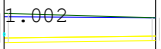
MH Name	SS.111		SS.113	
Hor Scale 1100 Ver Scale 500 Datum (m) 48.000				
PN			S1.000	
Dia (mm)			225	
Slope (1:X)			57.8	
Cover Level (m)	59.550	59.650	60.850	
Invert Level (m)		58.150	58.150	59.350
Length (m)			69.410	

MH Name	SS.107	SS.110	SS.111	
Hor Scale 1100 Ver Scale 500 Datum (m) 45.000		3.001	2.000	
PN		S1.003	S1.002	
Dia (mm)		300	225	
Slope (1:X)		166.6	22.1	
Cover Level (m)	57.000	56.300	59.550	
Invert Level (m)		54.236	54.368	54.800 58.050
Length (m)		21.990	71.950	

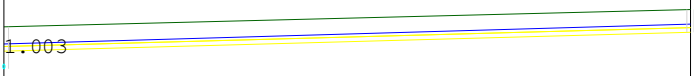
Denis O'Sullivan & Associates		Page 2
Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area No. 1 Kinap, Old Whitechurch Rd Cork	
Date 24/06/2024 File SW Model.MDX	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

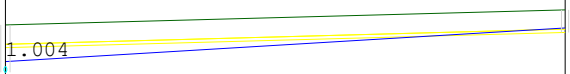
MH Name	SS.103		SS.105	SS.107	
Hor Scale 1100 Ver Scale 500 Datum (m) 43.000			4.000	3.001	
PN			S1.005	S1.004	
Dia (mm)			450	375	
Slope (1:X)			167.0	167.0	
Cover Level (m)	54.250	56.500	57.000	57.000	
Invert Level (m)		53.324	53.695 53.868	53.868 54.236	
Length (m)			28.850	61.515	

MH Name	SEx.SMH23					
Hor Scale 1100 Ver Scale 500 Datum (m) 38.000						
PN						
Dia (mm)						
Slope (1:X)						
Cover Level (m)	46.819	48.000	50.000	52.000	54.250	
Invert Level (m)		45.730 46.650	47.087	49.089	51.108	
Length (m)						

MH Name	SS.110	SS.114	
Hor Scale 1100 Ver Scale 500 Datum (m) 44.000			
PN		S2.000	
Dia (mm)		300	
Slope (1:X)		167.0	
Cover Level (m)	56.300	56.000	
Invert Level (m)		54.368 54.500	
Length (m)		22.045	

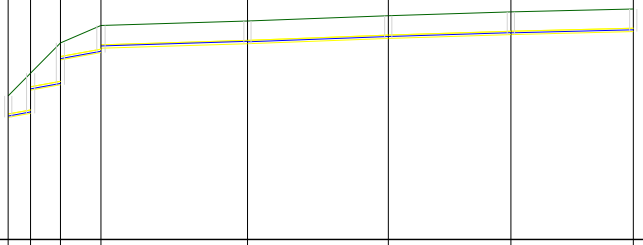
MH Name	SS.108		
Hor Scale 1100 Ver Scale 500 Datum (m) 46.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	58.150	58.800	
Invert Level (m)		56.650 57.300	
Length (m)			

MH Name	SS.107	SS.108	
Hor Scale 1100 Ver Scale 500 Datum (m) 45.000			
PN		S3.001	
Dia (mm)		300	
Slope (1:X)		79.9	
Cover Level (m)	57.000	58.150	
Invert Level (m)	55.400	56.650	
Length (m)		99.900	

MH Name	SS.105	SS.106	
Hor Scale 1100 Ver Scale 500 Datum (m) 44.000			
PN		S4.000	
Dia (mm)		225	
Slope (1:X)		81.4	
Cover Level (m)	57.000	58.000	
Invert Level (m)	55.500	56.500	
Length (m)		81.440	

Denis O'Sullivan & Associates		Page 1
Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area 2 Kinap, Old Whitechurch Rd Cork	
Date 23/07/2024 File SW Model - Catchm...	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

MH Name	SS.122	SS.123	SS.124	SS.125	SS.126	SS.127	
Hor Scale 1100 Ver Scale 500 Datum (m) 48.000							
PN		S1.004	S1.003	S1.002	S1.001	S1.000	
Dia (mm)		225	225	225	225	225	
Slope (1:X)		58.0	60.8	53.2	51.4	121.6	
Cover Level (m)	59.250	59.500	59.850	60.100	60.450	60.650	
Invert Level (m)		57.750 58.000	58.000 58.350	58.350 58.600	58.600 58.950	58.950 59.150	
Length (m)		14.490	21.275	13.295	18.005	24.315	

MH Name	SS.115				SS.119	SS.120	SS.121	SS.122	
Hor Scale 1100 Ver Scale 500 Datum (m) 44.000									
PN					S1.008	S1.007	S1.006	S1.005	
Dia (mm)					225	225	225	225	
Slope (1:X)					71.1	58.5	71.3	89.1	
Cover Level (m)	53.500		57.000	58.150	58.450	58.800	59.050	59.250	
Invert Level (m)			54.236	56.366	56.650 56.950	56.950 57.300	57.300 57.550	57.550 57.750	
Length (m)					21.330	20.485	17.830	17.815	

MH Name	SEx.SMH17		
Hor Scale 1100 Ver Scale 500 Datum (m) 41.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	52.660	53.500	
Invert Level (m)		51.160 52.075	
Length (m)			

Denis O'Sullivan & Associates		Page 1
Unit 5, Joyce House Barrack Square Ballincollig, Co. Cork	Catchment Area 3 Kinap, Old Whitechurch Rd Cork	
Date 23/07/2024 File SW Model - Catchm...	Designed By S.O.'Grady Checked By	
Micro Drainage	Network W.12.4	

MH Name	SS.128	SS.129	SS.130	
Hor Scale 1000 Ver Scale 500 Datum (m)50.000				
PN		S1.001	S1.000	
Dia (mm)		225	225	
Slope (1:X)		167.3	43.1	
Cover Level (m)	62.470	62.300	63.000	
Invert Level (m)		60.725 60.800	60.800 61.500	
Length (m)		12.550	30.200	

Appendix F – Foul Sewer Longitudinal Sections

MH Name	FF.105		FF.107	
Hor Scale 1150 Ver Scale 1000 Datum (m)36.000				
PN			F1.000	
Dia (mm)			150	
Slope (1:X)			56.3	
Cover Level (m)	59.500	59.650	60.900	
Invert Level (m)		57.800	57.800	59.050
Length (m)			70.390	

MH Name	FF.104	FF.105	
Hor Scale 1150 Ver Scale 1000 Datum (m)34.000			
PN		F1.002	
Dia (mm)		150	
Slope (1:X)		27.5	
Cover Level (m)	56.300	59.500	
Invert Level (m)	54.450	57.650	
Length (m)		87.865	

MH Name	FF.102	FF.103	FF.104	
Hor Scale 1150 Ver Scale 1000 Datum (m)32.000		5.009	3.001	2.000
PN		F1.004	F1.003	
Dia (mm)		225	225	
Slope (1:X)		200.0	150.0	
Cover Level (m)	57.000	56.900	56.300	
Invert Level (m)	53.320	53.612	53.612	53.782
Length (m)		58.375	25.515	

MH Name	FF.100	FF.101	FF.102	
Hor Scale 1150 Ver Scale 1000 Datum (m)32.000				5.009
PN		F1.006	F1.005	
Dia (mm)		225	225	
Slope (1:X)		200.0	200.0	
Cover Level (m)	56.000	57.500	57.000	
Invert Level (m)		53.064	53.177	53.320
Length (m)		22.713	28.605	

MH Name	FF.104	FF.108	
Hor Scale 1150 Ver Scale 1000 Datum (m)32.000		1.002	
PN		F2.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)	56.300	56.000	
Invert Level (m)		53.782 54.150	
Length (m)		22.075	

MH Name	FF.109	FF.111	
Hor Scale 1150 Ver Scale 1000 Datum (m)35.000		4.000	
PN		F3.000	
Dia (mm)		150	
Slope (1:X)		19.1	
Cover Level (m)	58.150	59.000	
Invert Level (m)		56.300 57.150	
Length (m)		16.235	

MH Name	FF.103	FF.109	
Hor Scale 1150 Ver Scale 1000 Datum (m)33.000		1.003	4.000
PN		F3.001	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)	56.900	58.150	
Invert Level (m)		54.589	56.300
Length (m)		102.685	

MH Name	FF.109		
Hor Scale 1150 Ver Scale 1000 Datum (m)34.000		3.000	
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	58.150	58.250	
Invert Level (m)		56.300 56.443	
Length (m)			

MH Name	FF.115	FF.116	FF.117	FF.118		FF.120	FF.121	
Hor Scale 1150 Ver Scale 1000 Datum (m) 36.000								
PN		F5.005	F5.004	F5.003		F5.001	F5.000	
Dia (mm)		150	150	150		150	150	
Slope (1:X)		60.0	60.0	60.0		60.0	60.0	
Cover Level (m)	59.100	59.300	59.550	59.900	60.100	60.400	60.600	
Invert Level (m)		57.017	57.264	57.537	57.883	58.109	58.401	58.750
Length (m)		14.800	16.400	20.755		17.570	20.915	

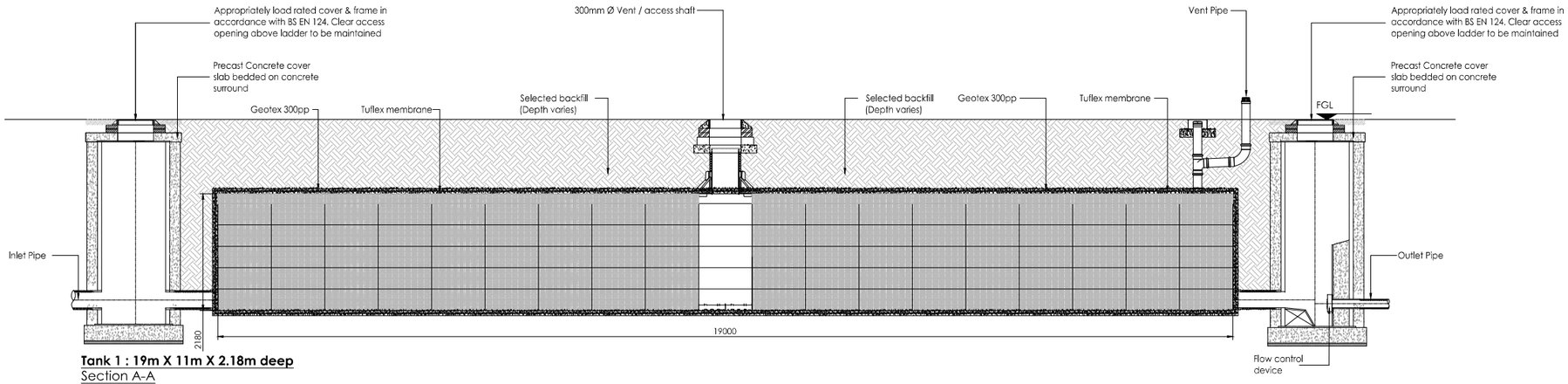
MH Name	FF.112	FF.113	FF.114	FF.115	
Hor Scale 1150 Ver Scale 1000 Datum (m) 35.000					
PN		F5.008	F5.007	F5.006	
Dia (mm)		150	150	150	
Slope (1:X)		60.0	60.0	60.0	
Cover Level (m)	58.100	58.400	58.800	59.100	
Invert Level (m)		55.995	56.348	56.348	56.726	56.726	57.017	
Length (m)		21.175	22.637	17.500	

MH Name	FF.102	FF.112	
Hor Scale 1150 Ver Scale 1000 Datum (m)33.000			
PN		F5.009	
Dia (mm)		225	
Slope (1:X)		77.6	
Cover Level (m)	57.000	58.100	
Invert Level (m)	54.797	55.995	
Length (m)		92.990	

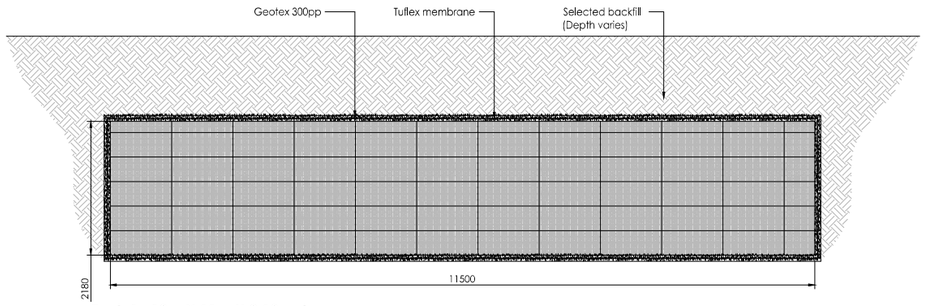
MH Name	FF.122		FF.124			
Hor Scale 1000 Ver Scale 500 Datum (m)50.000			2.000			
PN			F1.002			
Dia (mm)			150			
Slope (1:X)			60.0			
Cover Level (m)	62.300	62.300	63.000	63.350	63.350	
Invert Level (m)		60.449 60.647	60.647 61.188	61.188 61.360	61.360 61.500	
Length (m)			32.465			

MH Name	FF.123	FF.127	
Hor Scale 1000 Ver Scale 500 Datum (m)50.000		1.002	
PN		F2.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)	62.300	62.100	
Invert Level (m)		60.650 61.050	
Length (m)		24.015	

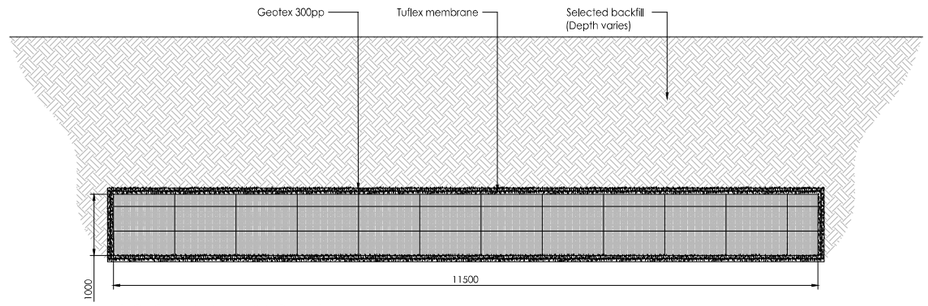
Appendix H – Existing Infrastructure & Proposed Upgrades



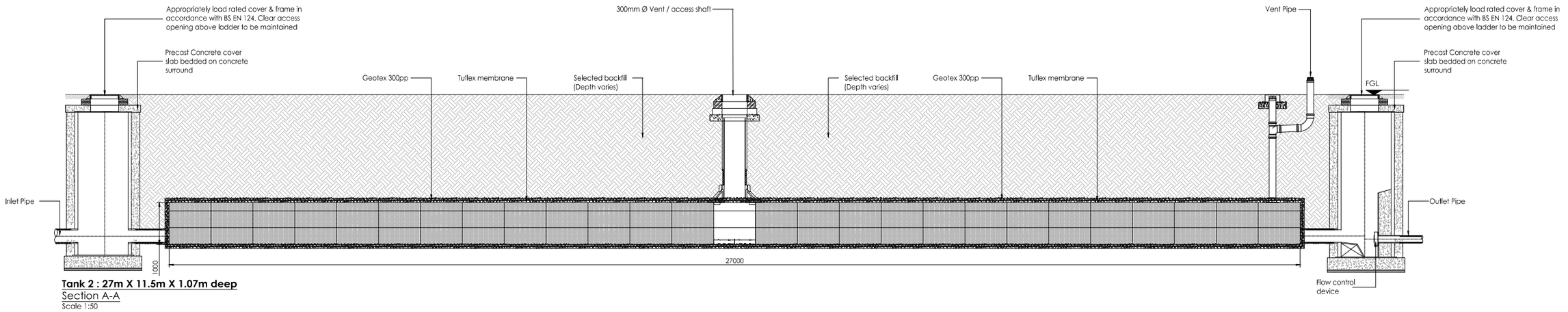
Tank 1 : 19m X 11m X 2.18m deep
Section A-A
Scale 1:50



Tank 1 : 19m X 11m X 2.18m deep
Section B-B
Scale 1:50



Tank 2 : 27m X 11.5m X 1.07m deep
Section B-B
Scale 1:50



Tank 2 : 27m X 11.5m X 1.07m deep
Section A-A
Scale 1:50

Note:
To be read in conjuction with drawing number 6254-0022 - Existing Cork City Council Infrastructure

DOSA
DENIS O'SULLIVAN & ASSOCIATES
CONSULTING ENGINEERS

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Barrack Square
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REV.	DRAWN	CHKD	APPRVD	DATE	DETAILS
A	K.M.	L.O'T.	L.O'T.	25.07.'24	Issued for Planning

CLIENT

PROJECT
Residential Development at Kilnap, Old Whitechurch road

DRAWING TITLE
Existing Attenuation Tank Sections

SHEET
A1

SCALE
1/50

PROJECT NO. 6254 _ DRAWING NO. 0027 _ STATUS/ISSUE A

0 5 10 15 20 25 m
SCALE 1:500

Enniamought River

Kilnap Bridge

Northern Attenuation Tank 2
- Storage volume = 320.4m³
- Invert level = 42.035mAOD
- Depth of storage = 1.075m
- Flow control limited to 20.1l/s (3.4l/s for road + 16.7l/s for attenuated development flows at Q_{100})

Upgrades
Existing Tank volume to be increased by 144m³ and the restricted outlet replaced with an outflow of 9.30 L/s

Existing hydrocarbon fuel/oil separator (Klargester nsbe015 o.s.a.)

Additional storage added to existing tank shown dotted (27m X 6m x 1m = 162m³)

Additional storage added to existing tank shown dotted (27m X 6m x 1m = 162m³)

Manhole smh33 fitted with New Stormbrake flow control device limiting outflow to 9.3l/s

Manhole SMH20 fitted with New Stormbrake flow control device limiting outflow to 9.35l/s

Northern Attenuation Tank 1
- Storage volume = 431.3m³
- Invert level = 48.200maod
- Depth of storage = 2.15m
- Flow control limited to 29.89l/s (3.69l/s for road + 26.2l/s for attenuated development flows at q_{100})

Upgrades
Existing Tank volume to be increased by 68m³ and the restricted outlet replaced with an outflow of 9.35 L/s

Existing Hydrocarbon fuel/oil separator (Klargester nsbe015 o.s.a.)

Proposed Connection point (refer to Drawing 6254-0020)

Proposed Connection point (refer to Drawing 6254-0020)

RG 44.096
RG 44.077
RG 44.286
RG 44.517
RG 44.293
RG 44.78
RG 44.597
RG 44.903
RG 45.268
RG 45.821
RG 46.578
RG 47.299
RG 48.186
RG 49.05
RG 50.103
RG 51.044
RG 51.759
RG 51.706
RG 52.615
RG 52.646
RG 53.537
RG 54.555
RG 55.531
RG 56.478
RG 57.29
RG 51.936
Vent 52.695
Vent 53.07
Vent 52.191
Vent 45.586
RG 45.417
Vent 45.483
19m
2m
27m
6m

Existing Infrastructure Upgrades
Scale 1:500

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REV.	DRAWN	CHKD	APPRVD	DATE	DETAILS
A	K.M.	L.O'T.	L.O'T.	25.07.'24	Issued for Planning

CLIENT

PROJECT: Residential Development at Kilnap, Old Whitechurch road

DRAWING TITLE: Proposed upgrade to existing attenuation system

SHEET: A3

SCALE: 1/500

PROJECT NO. 6254 _ DRAWING NO. 0028 _ STATUS/ISSUE A

Geoline Limited

Ballybrack, Kilmacthomas, Co. Waterford.
Phone: 051-294090 Fax: 051-294091
E-mail: info@geoline.ie
Web: www.geoline.ie

No: 571

Stormwater Attenuation System
Installation Acceptance / Completion Certificate

Project Name: OLD WHITECHURCH Rd **Customer:** WARP + BURKE

Project Number: Tank2 **Date:** 09/09/20

Location: CORK **Partial:** ..... **Final:** /

The Purpose of this acceptance/completion certificate is to accurately define the scope of work which has been completed by Geoline Ltd. in accordance with the project plans and specifications. Completing this scope of work allows Geoline Ltd. to transfer title to the contractor/owner, thereby allowing additional work to proceed or use by the owner as appropriate. It is acknowledged by Geoline Ltd. that certain additional documentation may be submitted after demobilisation.

Description of Work accepted by Client or Contractor

	Quantity	Comments
PVC Sealing Membrane	732 m²	
Protective Geotextile	732 m²	
Inlet Pipe Penetration	1 No.	Diameter 450 mm
Outlet Pipe Penetration	1 No.	Diameter 600 mm
Air Vent Unit	2 3 No.	Diameter 110mm / (160mm) / Other
Tank Dimensions	24 m x 11.5 m x 1.075 m deep	as per ESS Ltd. Drawing
Central Distribution Pipe	ACCESS CHAMBER 2 NO m	Diameter 600 mm mm Slotted
Filter Geotextile To Pipe	Yes / (No)	
Flow Control Device	(Yes) / No	_____ Litre/Second Release Rate
Inspection Point	(Yes) / No	
Backfilling Supervised	Yes / (No)	Backfill Material Used: Clause 804 / As Dug Material
Conc. Trust Blocks	(Yes) / No / Advised to Client or Clients Representative	
Guaranteed Seal	(Yes) / No	BYPASS Separator (Yes) / No — Debris Basket Yes / No

A set of Low Flow Holes as per Drawing

For E.S.S Ltd. / Geoline Ltd.	For Client / Contractor
PRINT: BARRY HAYES	PRINT: THOMAS BARRETT
Signature:	Signature:

REFERENCE DRAWINGS:

COMPANY	DRAWING No.	Rev.

NORTHERN ATTENUATION TANK 2
- STORAGE VOLUME = 320.4m³
- INVERT LEVEL = 42.035mAOD
- DEPTH OF STORAGE = 1.075m
- FLOW CONTROL LIMITED TO 20.1l/s (3.4l/s FOR ROAD + 16.7l/s FOR ATTENUATED DEVELOPMENT FLOWS AT Q_{100})

NORTHERN ATTENUATION TANK 1
- STORAGE VOLUME = 431.3m³
- INVERT LEVEL = 48.200mAOD
- DEPTH OF STORAGE = 2.15m
- FLOW CONTROL LIMITED TO 29.89l/s (3.69l/s FOR R… FOR ATTENUATED DEVELOPMENT FLOWS AT Q_{100})

MANHOLE SMH33 FITTED WITH STORMBRAKE FLOW CONTROL DEVICE LIMITING OUTFLOW TO 20.1l/s

MANHOLE SMH20 FITTED WITH STORMBRAKE FLOW CONTROL DEVICE LIMITING OUTFLOW TO 29.89l/s

HYDROCARBON FUEL/OIL SEPARATOR (KLARGESTER NSBE015 O.S.A.)

HYDROCARBON FUEL/OIL SEPARATOR (KLARGESTER NSBE015 O.S.A.)

SMHOUTFALL

S-1.021
1:22.5
USIL 35.421m
300mm
DSIL 34.8m

S-1.022
1:35.4
USIL 31.034m
300mm
DSIL 30.78m

SMH37
CL 36.000m

S-1.020
1:23.9
USIL 40.324m
300mm
DSIL 39.635m

SMH36
CL 40.838m

S-1.019
1:19.9
USIL 44.692m
225mm
DSIL 43.712m

S-3.011
1:104
USIL 41.398m
300mm
DSIL 41.31m

SMH35
CL 45.000m

S-1.018
1:33.9
USIL 48.186m
225mm
DSIL 47.418m

S-3.010
1:110
USIL 41.99m
300mm
DSIL 41.398m

SMH21
CL 49.375m

S-1.017
1:100
USIL 48.200m
600mm
DSIL 48.186m

SMH20
CL 52.939m

S-1.008
1:22.8
USIL 56.452m
300mm
DSIL 55.421m

S-1.007
1:26.6
USIL 57.392m
300mm
DSIL 56.452m

SMH10
CL 57.158m

SMH11
CL 55.967m

SMH9
CL 58.499m

SMH12
CL 54.34m

SMH8
CL 59.514m

S-3.008
1:198
USIL 42.179m
150mm
DSIL 42.035m

S-3.007
1:121
USIL 42.307m
300mm
DSIL 42.179m

SMH33
CL 46.082m

S-3.009
1:67
USIL 42.035m
600mm
DSIL 42.017m

SMH25
CL 44.261m

S-4.000
1:352
USIL 42.77m
300mm
DSIL 42.689m

SMH26
CL 45.513m

SMH24
CL 45.809m

SMH23
CL 46.819m

SMH22
CL 48.244m

SMH13B
CL 49.711m

SMH13A
CL 51.205m

SMH14
CL 52.66m

S-3.002
1:19.3
USIL 44.283m
300mm
DSIL 44.05m

S-3.001
1:19.3
USIL 45.19m
300mm
DSIL 44.283m

S-3.000
1:19.9
USIL 46.07m
300mm
DSIL 45.19m

S-3.000B
1:19.3
USIL 47.73m
300mm
DSIL 46.766m

S-3.000A
1:19.5
USIL 49.126m
300mm
DSIL 48.2m

S-1.011
1:28.3
USIL 51.956m
300mm
DSIL 51.196m

S-1.010
1:30.6
USIL 53.534m
300mm
DSIL 52.854m

S-1.009
1:19.3
USIL 55.421m
300mm
DSIL 54.489m

S-8.004
1:21.2
USIL 58.638m
225mm
DSIL 58.322m

SMH66
CL 60.171m

S-8.003
1:67
USIL 58.951m
225mm
DSIL 58.638m

S-8.002
1:278
USIL 59.032m
225mm
DSIL 58.951m

DO NOT SCALE DRAWING, IF IN DOUBT ASK.

REV	DATE	DESCRIPTION	DRN	CHK	APP	PM
A	09/12/20	As Build	MMCN			

WARD & BURKE CONSTRUCTION LIMITED

Client: CORK CITY COUNCIL

Project Title: Old Whitechurch Road Infrastructure Project Main Contract

Drawing Title: Stormwater Drainage As-Built Drawing 4 of 6

Project No.:

Drg No.:

Revision:

Scale:

A | B | C | D | E | F | G

PLAN VIEW
SCALE 1:500

0 5 10 15 20 25 m
SCALE 1:500

65.00
60.00
55.00
50.00

Datum 40.00m.O.D.

GROUND LEVEL: 43.84, 44.48, 45.29, 46.32, 50.43, 52.37, 53.25, 54.86, 57.45, 59.06, 60.28, 60.75, 61.08

CHAINAGE	CROWN LEVEL
0.00	42.82
2.94	42.91
5.91	43.00
12.67	43.02
15.20	43.03
26.60	43.14
34.23	43.49
43.70	43.98
47.14	44.11
53.33	44.43
59.25	44.75
66.92	45.08
76.64	45.70
82.94	46.05
86.84	46.43
92.16	46.81
97.96	47.22
102.25	47.62
107.21	48.03
113.00	48.42
	48.98
122.98	49.60
130.00	50.21
138.09	50.76
144.85	51.30
152.43	51.68
158.18	52.23
165.08	52.62
169.88	53.22
176.36	53.73
183.04	54.11
188.17	54.53
194.06	54.91
198.65	55.41
203.66	55.89
211.10	56.50
223.02	57.26
234.81	57.60
243.36	57.73
250.75	58.11
258.07	58.55
265.44	58.75
280.13	58.96
287.65	59.10
297.44	59.21
305.66	59.30
313.83	59.31
323.68	59.37
336.80	59.53
353.28	59.65
369.72	60.12

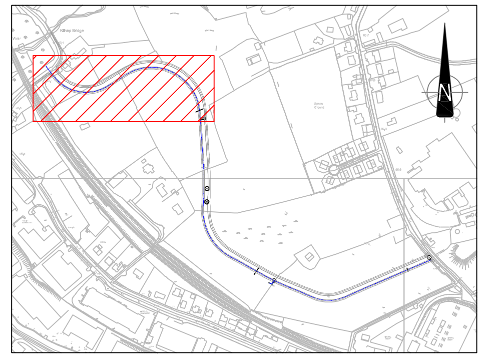
GRADIENT

PIPE: DN200 SDR17 PE100 HDPE

LONGITUDINAL SECTION LINE -
H Scale: 1:500
V Scale: 1:500

BIM QUALITY SHEET No. : SMPQS-WBC-ZZ-XX-QS-Z-1001

NOTES



LEGEND:

AV	AIR CONTROL VALVE
SV	SLUICE VALVE
FH	FIRE HYDRANT
ScV	SCOUR VALVE
	CAP END
	DIRECTIONAL FLOW
	OPEN VALVE
	CONSTRUCTED WATER MAIN

STATUS	REV	DATE	DESCRIPTION	BA	CHKD	APP
CR	C02	03-02-21	AS CONSTRUCTED	DDL	MMcN	JC
CR	C01	11-11-20	AS CONSTRUCTED	DDL	MMcN	JC

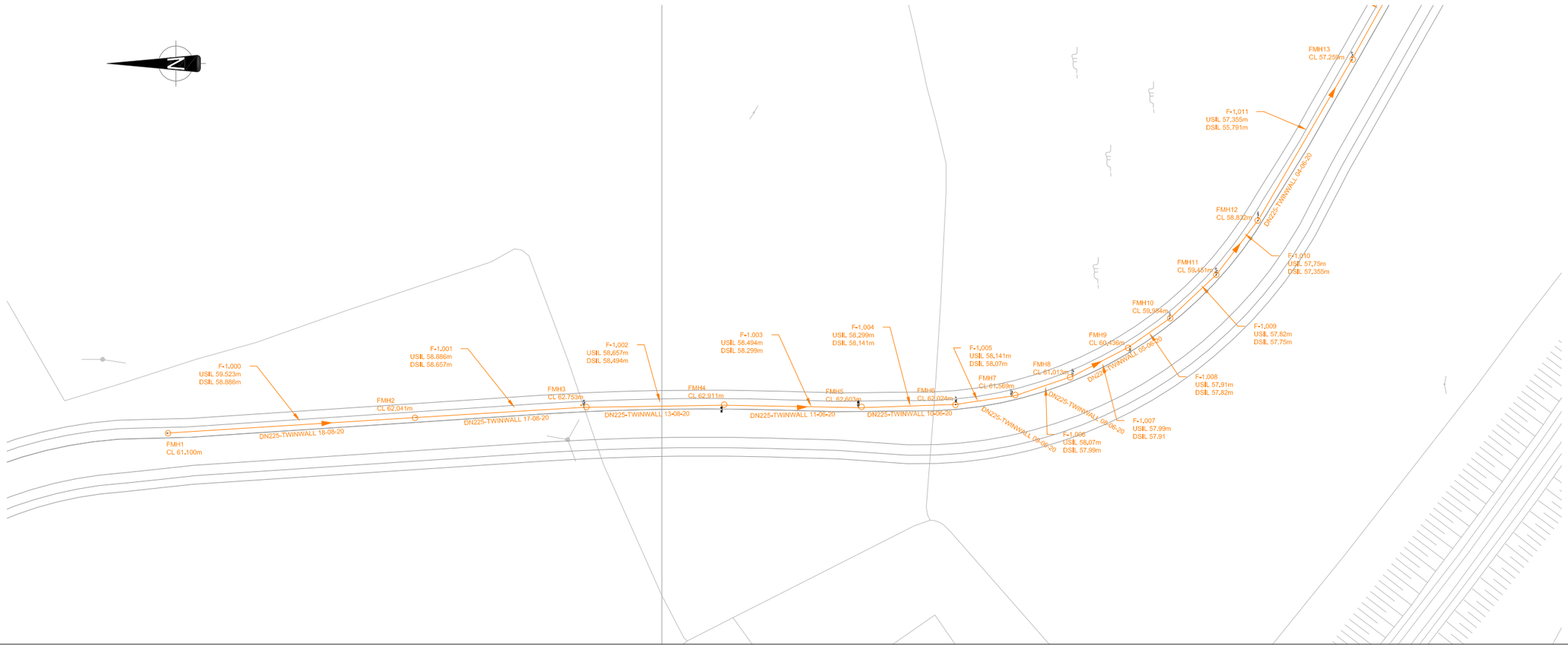
REVISIONS

UISCE ÉIREANN : IRISH WATER

WARD & BURKE CONSTRUCTION LIMITED

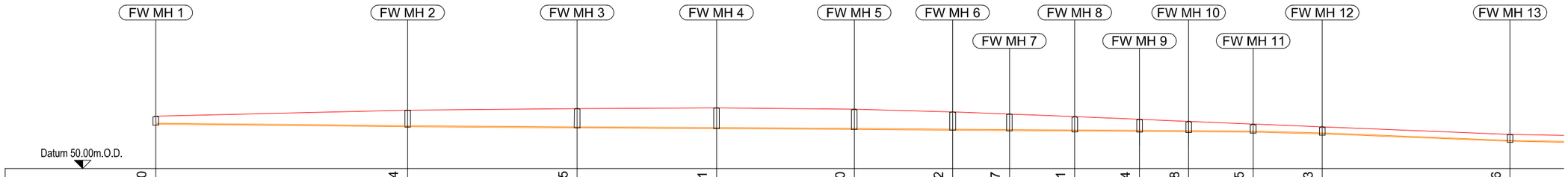
CONTRACT NUMBER:	C588a
PROJECT CODE:	WHITEC
PROJECT TITLE:	OLD WHITECHURCH -ADV WKS
CLIENT:	IRISH WATER
SITE LOCATION ID:	BLACKPOOL
DRAWING TITLE:	GENERAL ARRANGEMENT DRAWING WATERMAIN LAYOUT PLAN & SECTIONS
SHEET SIZE:	A1
W&B DRAWING No:	WHITEC-WBC-01-00-DR-W-50101
REV:	C02
CLIENT DRAWING No:	MTC0718-RPS-00-XX-DR-D-DR0501
SCALE:	AS SHOWN
CAD FILE:	WHITEC-WAB-01-00-M2-W-501

CR=As Construction Record documentation



PLAN VIEW
SCALE 1:500

0 5 10 15 20 25 m
SCALE 1:500



GROUND LEVEL	61.10	62.04	62.75	62.91	62.60	62.02	61.57	61.01	60.44	59.98	59.45	58.83	57.26
INVERT LEVEL	59.52	58.89	58.66	58.49	58.30	58.14	58.07	57.99	57.91	57.82	57.75	57.36	55.79
CHAINAGE	0.00	53.40	89.33	118.88	148.07	168.94	180.99	194.82	208.56	218.96	232.64	247.29	287.11
GRADIENT		1:83	1:162	1:181	1:151	1:127	1:183	1:156	1:175	1:122	1:193	1:138	1:26
PIPE	225mm SN8 POLYSEWER												
TYPE OF GROUND													

LONGITUDINAL SECTION LINE -
H Scale: 1:500
V Scale: 1:500

BIM QUALITY SHEET No. : SMPQS-WBC-ZZ-XX-QS-Z-1001

NOTES

LEGEND:

DIRECTIONAL FLOW

CONSTRUCTED FOUL RISING MAIN

STATUS	REV	DATE	DESCRIPTION	BY	CHKD	APP
CR	C01	11-11-20	AS CONSTRUCTED	DDL	MMcN	JC

△ REVISIONS

UISCE ÉIREANN : IRISH WATER

WARD & BURKE CONSTRUCTION LIMITED

CONTRACT NUMBER: C588a
PROJECT CODE: WHITEC
PROJECT TITLE: OLD WHITECHURCH -ADV WKS
CLIENT: IRISH WATER
SITE LOCATION ID: BLACKPOOL
DRAWING TITLE: GENERAL ARRANGEMENT DRAWING WASTEWATER PIPE LAYOUT PLAN & SECTIONS

SHEET SIZE:	W&B DRAWING No:	REV:
A1	WHITEC-WBC-01-00-DR-W-50201	C01
	CLIENT DRAWING No: MTC0718-RPS-00-XX-DR-D-DR0502	SCALE: AS SHOWN
	CAD FILE: WHITEC-WAB-01-00-M2-W-502	

CR=As Construction Record documentation

Appendix J – Proposed Foul Pump Station

MES3535 KILNAP HOUSES

Whitechurch Rd, Co. Cork

FOUL WATER PUMP SUMP – PROPOSAL

Shane Fox BEng PhD MIEI


MOLLOY
ENVIRONMENTAL SYSTEMS
molloyprecast.com


Oxigen

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Contents

Company no. 97677. VAT no. 4735884D. Company directors: Donal Molloy (Managing), Dolores Molloy. Secretary: Donal Molloy

1 Introduction

This report details a proposal for the installation of a foul water pump sump for a proposed housing development in Whitechurch Rd, Co. Cork. This pump sump is designed as per part 5 of the Irish Water Code of Practice for wastewater infrastructure.

2 Design Criteria

The design conditions are as follows:

Hydraulic load:	96 housing units @ 446litres/unit = 42,816 litres
Rising main length:	310m
Static head:	10.6m (inc. pump sump)
Total head:	14.2m
Flow rate:	5.77 l/s
Rising main:	110mm HDPE SDR17
Inlet pipe:	225mm
Inlet invert	3.380m below ground level

*Assumes 2.7 persons per house with a load of 150 l/person/day and a 10% allowance for infiltration

3 Hydraulic Calculation

Please see attached friction loss calculation sheet and pump datasheet for pump details. The velocities were maintained between 0.75 and 1.8m/s within the rising main.

The levels within the pump sump are set to pump approximately 920 litres per discharge (250mm between cut in and cut out levels with a surface area of 3.68m2). Assuming the daily hydraulic load is concentrated over a 10-hour period the hourly flow rate would be 4,282 litres per hour. This would equate to approximately 5 starts per hour. This pump will run for approx. 2.65 minute per discharge (920 litres/cycle/ 5.77l/s = 159 seconds; or 2.65 minute).

4 Proposed Tankage

This proposal consists of approximately 45,200 litres of emergency storage (>24hr capacity), which is made up of the available capacity in the holding tank and pump sump and isolation chamber. The entire emergency storage is created between the pump's cut in level and the inlet invert level. In general, day-to-day operation influent enters the pump sump and is pumped via the rising main into the receiving sewer line. Flow is prevented from entering the holding tank by a flap valve. In the event of power or equipment failure the pump sump overflows into the holding tank. When the system returns to normal operation flow moves from the holding tank into the pump sump via the flap valve by gravity. A summary of the tankage is as follows:

- 1 no. isolation chamber
- 1 no. precast concrete pump sump
- 1 no. holding tank
- 1 no. precast concrete valve chamber
- 1 no. precast concrete meter chamber

4.1 Buoyancy check

The below buoyancy check includes for a water table at ground level and empty tanks. Density of materials are as follows:

Material	Density (kN/m^3)	Legend
Concrete	24	D_c
Stone	20	D_{st}
Soil	18	D_s
Water	10	D_w

PUMP SUMP

Component		Total Volume (m^3)		Weight (kg)	Provided Force (kN)
Tank		39.32		23,510.4	230.637
Risers		1.21		1,231	12.08
Overburden (stone)		1.47		2,940	28.84
Total	V_p	42.00		27,681	271.55
Minimum required force to prevent floatation (FOS of	F_r=	494.45	kN	$F_r=V_pX1.2X9.81$	
Difference between req. and provided force	F_d=	222.89	kN	$F_d=F_r-F_p$	
Required volume of concrete to prevent flotation	C_v=	15.92	m^3	$C_v=(F_d/(D_c-D_w)$	
Comments	16m^3 of concrete should be placed evenly around the toe of the tank.				

HOLDING TANK

Component		Total Volume (m^3)		Weight (kg)	Provided Force (kN)
Tank		48.69		27,400	268.79
Risers		4.25		3,423	33.58
Overburden (stone)		36.57		73,141	717.51
Total	V_p	89.51275		103,964	1019.89
Minimum required force to prevent floatation (FOS of	F_r=	1053.74	kN	$F_r=V_pX1.2X9.81$	
Difference between req. and provided force	F_d=	33.85	kN	$F_d=F_r-F_p$	
Required volume of concrete to prevent flotation	C_v=	2.42	m^3	$C_v=(F_d/(D_c-D_w)$	
Comments	4.5m3 of concrete should be placed equally about the joint and top of the tank.				

VALVE CHAMBER

Component		Total Volume (m^3)		Weight (kg)	Provided Force (kN)
Tank		7.30		7,709	75.63
Risers		0.29		344	3.37
Overburden (stone)		1.04		2,497	24.50
Total	V_p	8.623		10,550	103.50
Minimum required force to prevent floatation (FOS of	F_r=	101.51	kN	$F_r=V_pX1.2X9.81$	
Difference between req. and provided force	F_d=	-1.99	kN	$F_d=F_r-F_p$	
Required volume of concrete to prevent flotation	C_v=	-0.14	m^3	$C_v=(F_d/(D_c-D_w)$	
Comments	Sufficient force is available to counteract uplift, therefore no anti-flotation measures are required.				

METER CHAMBER

Component		Total Volume (m^3)		Weight (kg)	Provided Force (kN)
Tank		3.41		3,410	33.45
Risers		0.12		190	1.86
Overburden (stone)		0.58		1,395	13.68
Total	V_p	4.11		4,995	49.00
Minimum required force to prevent floatation (FOS of	F_r=	48.38	kN	$F_r=V_pX1.2X9.81$	
Difference between req. and provided force	F_d=	-0.62	kN	$F_d=F_r-F_p$	
Required volume of concrete to prevent flotation	C_v=	-0.04	m^3	$C_v=(F_d/(D_c-D_w)$	
Comments	Sufficient force is available to counteract uplift, therefore no anti-flotation measures are required.				

ISOLATION CHAMBER

Component		Total Volume (m^3)		Weight (kg)	Provided Force (kN)
Tank		2.32		3,846	37.73
Risers		4.61		3,681	36.11
Total	V_p	6.9286		7,527	73.84
Minimum required force to prevent floatation (FOS of	F_r=	81.56	kN	$F_r=V_pX1.2X9.81$	
Difference between req. and provided force	F_d=	7.73	kN	$F_d=F_r-F_p$	
Required volume of concrete to prevent flotation	C_v=	0.55	m^3	$C_v=(F_d/(D_c-D_w)$	
Comments	$0.55m^3$ of concrete should be placed evenly around the toe of the tank.				

4.2 Isolation Chamber

This isolation chamber houses a penstock valve connected to the inlet.

- The precast concrete unit shall conform to BS 5911-4 and IS EN 1917. Joints shall provide equivalent water resistance as required in IS EN1992 – Part 3 (2006). The tank joints should be surrounded with not less than 150mm thickness of C20/25 to IS EN 206, 20mm aggregate size to IS EN 12620

4.3 Pump Sump

The pump sump should follow the following specifications:

- Precast concrete 6m deep 2.4m diameter pump sump
- Precast concrete 45-degree benching
- The precast concrete unit shall conform to BS 5911-4 and IS EN 1917. The tank should be backfilled with 500mm width of Clause 808 material, compacted in 300mm layers.
- For odour control should be installed as per STD-WW-34 (to be supplied and installed by others)
- The proposed pumps are 2 no. 4 pole Flygt NP 3102 foul submersible pumps (or similar)
- Pumps to be equipped with an automatic decoupling arrangement complete with twin stainless steel guide rails, easy lift, etc
- Automatic selection rotation of the duty/standby to be provided on an hours run basis with manual over-ride
- Pumps to be ex rated in accordance to hazardous area classification for foul wastewater
- Pumps to be operated as duty/standby
- The proposed pumps have an 80mm discharge connection
- The design should limit the number of starts to 10 per hour
- Pumps to be labelled at the top of pump sump and in kiosk
- Pumps to be equipped with certified stainless-steel lifting chain (IS EN 818-Part 7 (2009), suitably sized, with large links at 1m centres
- DN100/DN80 EN598 ductile iron pipework within the wet well to be bracketed using stainless steel brackets
- Motors to include stator over temperature protection which automatically re-set when temperature returns to normal
- High level float switch
- An ultrasonic level sensor is used to communicate adjustable set points for pump unit cut in and cut out as well as top level liquid level cut in and low-level over-ride cut out to the control panel (Pulsar Ultra Lite with snore function)

4.4 Emergency Overflow and Storage

A separate precast concrete emergency overflow tank (holding tank) is required to create 24 hours emergency storage. This together with the storage above the cut in level is used to create this storage.

- 1 no. 38m3 precast concrete tank
- The precast concrete unit shall conform to BS 5911-4 and IS EN 1917. Joints shall provide equivalent water resistance as required in IS EN1992 – Part 3 (2006). The tank should be backfilled with 500mm width of Clause 808 material, compacted in 300mm layers.
- A 250mm dia. high level overflow is to be provided

- A 250mm dia. return pipe feeding back to the pump sump fitted with a proprietary flap valve within the wet well chamber

4.5 Valve Chamber

A separate valve chamber is required and should have the following specifications:

- The precast concrete unit shall conform to BS 5911-4 and IS EN 1917. The tank should be backfilled with 500mm width of Clause 808 material, compacted in 300mm layers. Ductile iron pipework complete with bends, valves, fittings, etc. to link all fittings
- A gate valve for each pump mounted horizontally
- A non-return valve for each pump mounted horizontally
- A gate valve mounted vertically equipped with a Bauer coupling linked to the rising main for pumping out of the rising main
- The chamber should be equipped with a drain to allow draining of the chamber into the pump sump

4.6 Meter Chamber

A separate meter chamber is required and should have the following specifications:

- The precast concrete unit shall conform to BS 5911-4 and IS EN 1917. The tank should be backfilled with 500mm width of Clause 808 material, compacted in 300mm layers.1 no. magnetic flow meter (DN80 Siemens Mag 5100)
- Ductile iron pipework complete with fittings, etc. to link valve chamber to rising main

4.7 Control Kiosk

Control kiosk measuring 2.2m wide by 1.2m deep by 2m high shall be installed. This kiosk will have multiple locks to LPS 1175, SR3 or IS EN16257. An isolation station shall be provided within 2m of the pump sump to house connections. A small, galvanised steel kiosk shall be installed next to the control kiosk to house a 15m hose reel.

4.8 Control Panel

The following will be provided on the main control panel and within the control kiosk.

Control panel to be constructed to Form 2 in line with WIMES Electrical Specification and incorporate the following:

• Separate distribution board for an electrical heater, light, 220v and 110v waterproof socket	• Trip Indicator
• Soft Start operation	• Control Relays

• Duty standby assist operation	• Terminal Block
• 16amp 220v socket – sockets to be wall mounted	• Ammeters
• MCCBs with door interlocks	• Hour run meters
• Contactor	• Generator change-over switch
• Ventilation Fan, Filter and Stat	• Ultrasonic
• Hand/Off/Auto Selector Switch	• Flow meter
• Start Switch	• Dial out GSM for – high water, pump trip, power loss
• Stop Button	• Separate to the GSM please include for terminals for the above alarms (for future connection to a telemetry system)
• Run Indicator	• Adequate 3 phase power supply to be provided by others

5 Access

C250 galvanised steel lift assist covers will be provided for the following components:

Pump sump: 1 no. 1,400 X 800mm clear opening

Valve chamber: 1 no. 1,400 X 800mm clear opening

All covers should be as follows:

- lockable, fabricated from steel, galvanised to IS EN 1461 (2009) with non-slip surface and finished flush with roof slab of chamber
- Hinged with recessed padlock
- Each leaf to have assistance to ensure a lifting effort of 25kg
- Double, hinged access covers to be provided with inert gas charged or hydraulic operated springs suitable for solo lift

The meter chamber & holding tank is to be equipped with D400 800mm by 700mm ductile iron hinged cover.

6 System Guarantee

Molloy Environmental Systems provides a 2-year warranty to remedy any fault in products provided:

- That the fault is due to defects in design, materials or workmanship
- That the fault is reported to Molloy Environmental Systems during the guarantee period
- That the product has been used only under the conditions described in the care and maintenance instructions, and in applications for which it is intended
- That all service and repair is carried out by Molloy environmental personnel as per the maintenance requirements
- Therefore, this warrantee does not apply to faults resulting from lack of maintenance, inadequate civil works, repair works carried out improperly or normal wear and tear
- Furthermore, Molloy Environmental Systems disclaims any liability in case of physical injuries, material or economic damages for those mentioned above.

7 Maintenance Requirements

Operator's Inspection and maintenance duties

It is the responsibility of the owner to:

- Ensure the pump sump is operated and maintained in proper order
- Familiarise himself/herself with this operation and maintenance manual
- Familiarise himself/herself with operation safety instructions
- Ensure the system is serviced
- Ensure any faults are dealt with in a timely manner

The operation of the pump sump is the owner's responsibility. The general duties would involve.

Daily

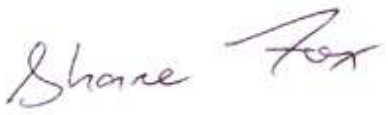
- General visual check to see if alarm beacon is flashing

Annually

- Arrange for tests and a full service of pump and control equipment by Molloy Environmental System

Please contact me if you require any additional information.

Yours sincerely,



Shane Fox BEng PhD MIEI
Environmental Process Engineer

Molloy Environmental Systems

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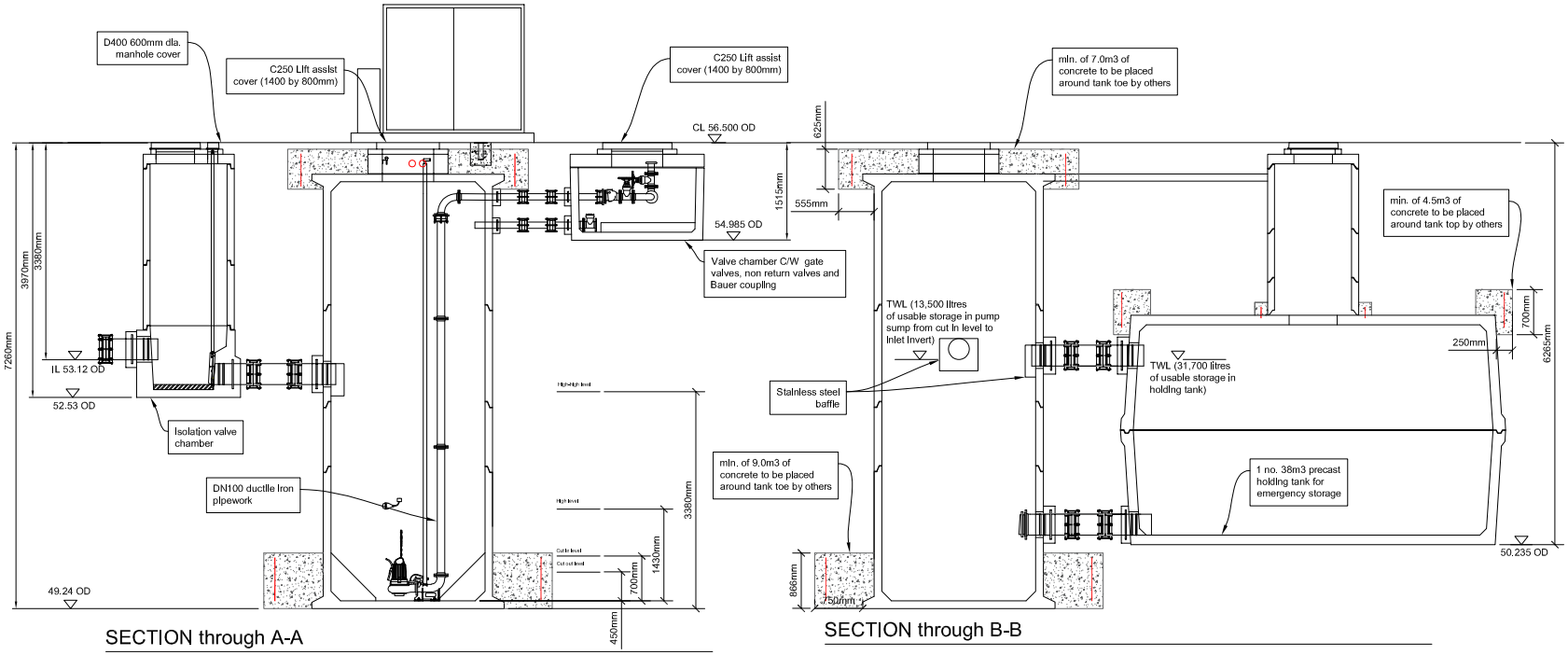
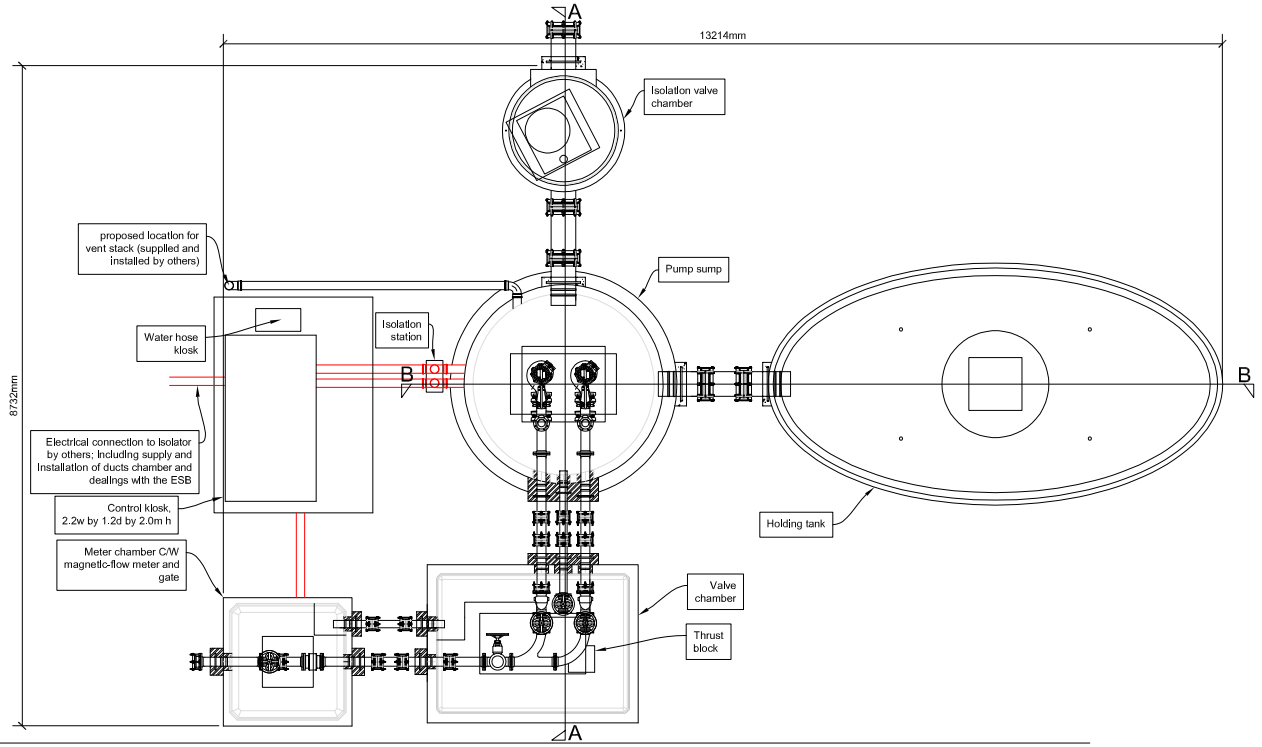


SECTION through A-A

SECTION through B-B



PLAN

Tank lifting limitations:
Max chain angle < 60°

< 60° ✓ > 60° ✗

Damage caused by incorrect lifting is the responsibility of others

Notes:

- Backfill around each precast concrete component shall be placed so that a 500mm width of Clause 808 material, compacted in 300mm layers is provided to ensure adequate support beneath any structures or structural surrounds.
- Free draining granular material, 500mm wide, shall be provided round the wet well close to ground level of the unit
- Observe all safety regulations in regard to excavation and lifting requirements. Never leave opening uncovered or unattended at any time
- Specify any specific requirements prior to ordering. All civil works by customer
- Do not scale from this drawing. Only for illustration purposes

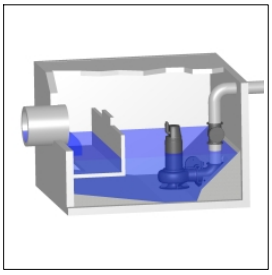
MOLLOY
ENVIRONMENTAL SYSTEMS
Clara Rd., Tullamore, Co. Offaly
T: 057 9326000 E: info@molloyprecast.com
F: 057 9326060 W: www.molloyprecast.com

Title: Kilnap Houses proposed foul water pumping station

Drg. no.: MES3535_FPS_151223

Date: 15/12/2023

Drawn by: SF



Friction loss calculation

Pumped fluid Water, pure	**Static head** 10.1	**Layout** Wet well installation
Flow 6.37 l/s	**Number of pumps** 1	**Calculation model** Colebrook-White
Viscosity 1.569 mm²/s	**Nature of system** Single head pump	

Type	Ø (mm)	? or L	Qty.	v (m/s)	k (mm)	ΔH (m)
Ø = Diameter v = Velocity k = Pipe roughness ΔH = Head loss						
Common discharge side pipe - Metal / Ductile iron cement lining PN 16 / DN 100 (118x4x4 mm) / K factor for Wastewater acc. DWA-A110						
Pipe length	102	14 m	1	0.7796	0.25	0.1167
Discharge Connection	102	0.3	1	0.7796		0.009292
Elbows	102	0.9	3	0.7796		0.02788
Inlet	102	1	1	0.7796		0.03097
Non-return valves	102	0.9	1	0.7796		0.02788
Outlet	102	1	1	0.7796		0.03097
T-piece	102	0.4	1	0.7796		0.01239
Valve	102	0.3	1	0.7796		0.009292
Total friction head						**0.2654**
Common discharge side pipe - GB / HPPE (PE100) SDR17 / DN 110 (110) / K factor for Wastewater acc. DWA-A110						
Pipe length	96.3	310 m	1	0.8746	0.25	3.467
Discharge Connection	96.3	0.3	1	0.8746		0.0117
Elbows	96.3	0.6	2	0.8746		0.02339
Inlet	96.3	1	1	0.8746		0.03898
Outlet	96.3	1	1	0.8746		0.03898
Valve	96.3	0.3	1	0.8746		0.0117
Total friction head						**3.592**
Friction loss head						3.857 m
Total static head						10.1 m
Total head						**13.96 m**

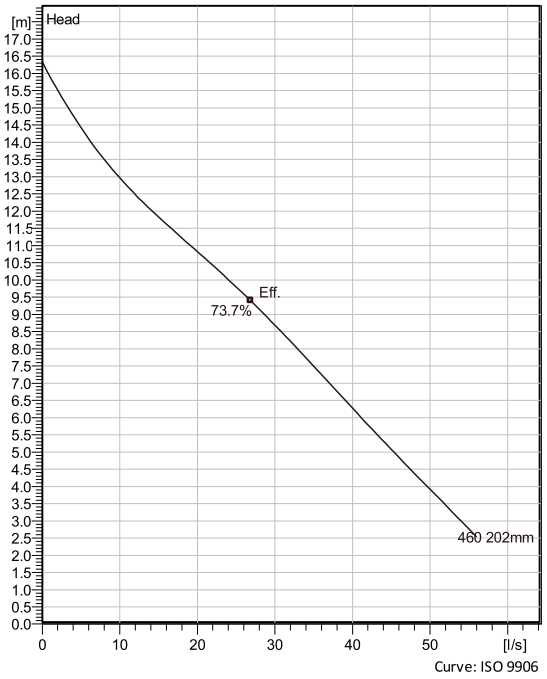
Project	**Created by**		**Last update**	12/15/2023
Block	**Created on**	12/15/2023		

NP 3102 MT 3~ Adaptive 460

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%],4 °C,999.9 kg/m³,1.5692 mm²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3102.900 18-11-4AS-W IE3 3.5KW

Installation type
P - Semi permanent, Wet

Impeller diameter
202 mm

Discharge diameter
100 mm

Pump information

Impeller diameter
202 mm

Discharge diameter
100 mm

Inlet diameter
100 mm

Maximum operating speed
1500 rpm

Number of blades
2

Max. fluid temperature
40 °C

Material

Impeller
Grey cast iron

Stator housing material
Grey cast iron

Project	Xylect-21591198	**Created by**			
Block		**Created on**	12/15/2023	**Last update**	12/15/2023

NP 3102 MT 3~ Adaptive 460

Technical specification

Motor - General

Motor number N3102.900 18-11-4AS-W IE3 3.5KW	**Phases** 3~	**Rated speed** 1500 rpm	**Rated power** 3.5 kW
Approval No	**Number of poles** 4	**Rated current** 6.1 A	**Stator variant** 62
Frequency 50 Hz	**Rated voltage** 400 V	**Insulation class** H	**Type of Duty** S1
Version code 900			

Motor - Technical

Power factor - 1/1 Load 0.91	**Motor efficiency - 1/1 Load** 90.9 %	**Total moment of inertia** 0.0315 kg m²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.86	**Motor efficiency - 3/4 Load** 91.4 %	**Starting current, direct starting** 38 A	
Power factor - 1/2 Load 0.75	**Motor efficiency - 1/2 Load** 89.5 %	**Starting current, star-delta** 12.7 A	

Project	Xylect-21591198	**Created by**			
Block		**Created on**	12/15/2023	**Last update**	12/15/2023

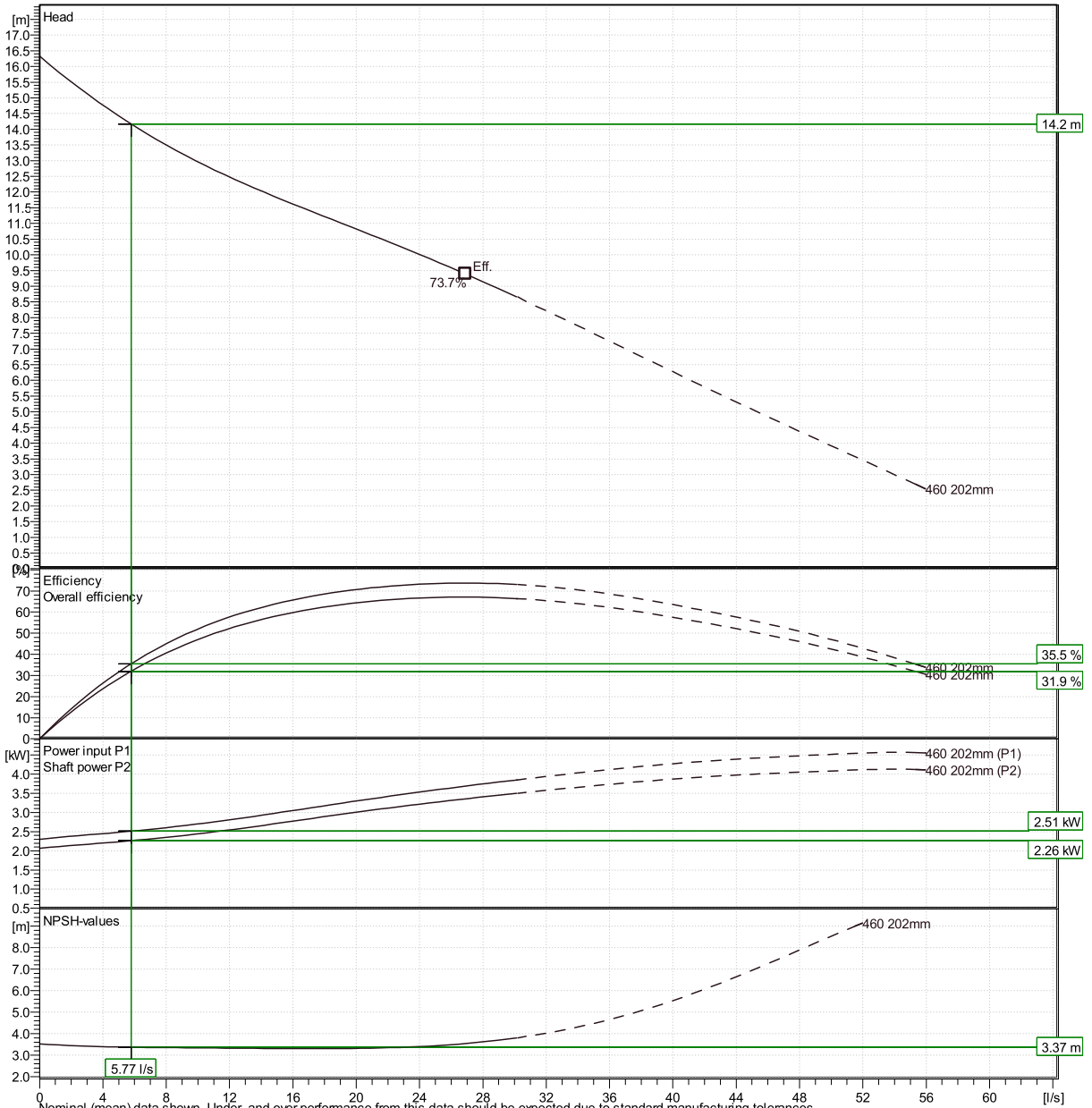
NP 3102 MT 3~ Adaptive 460

Performance curve

Duty point

Flow	Head
5.77 l/s	14.2 m

Curves according to: Water, pure Water, pure [100%],4 °C,999.9 kg/m³,1.5692 mm²/s



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Please consult your local Flygt representative for performance guarantees.

Curve: ISO 9906

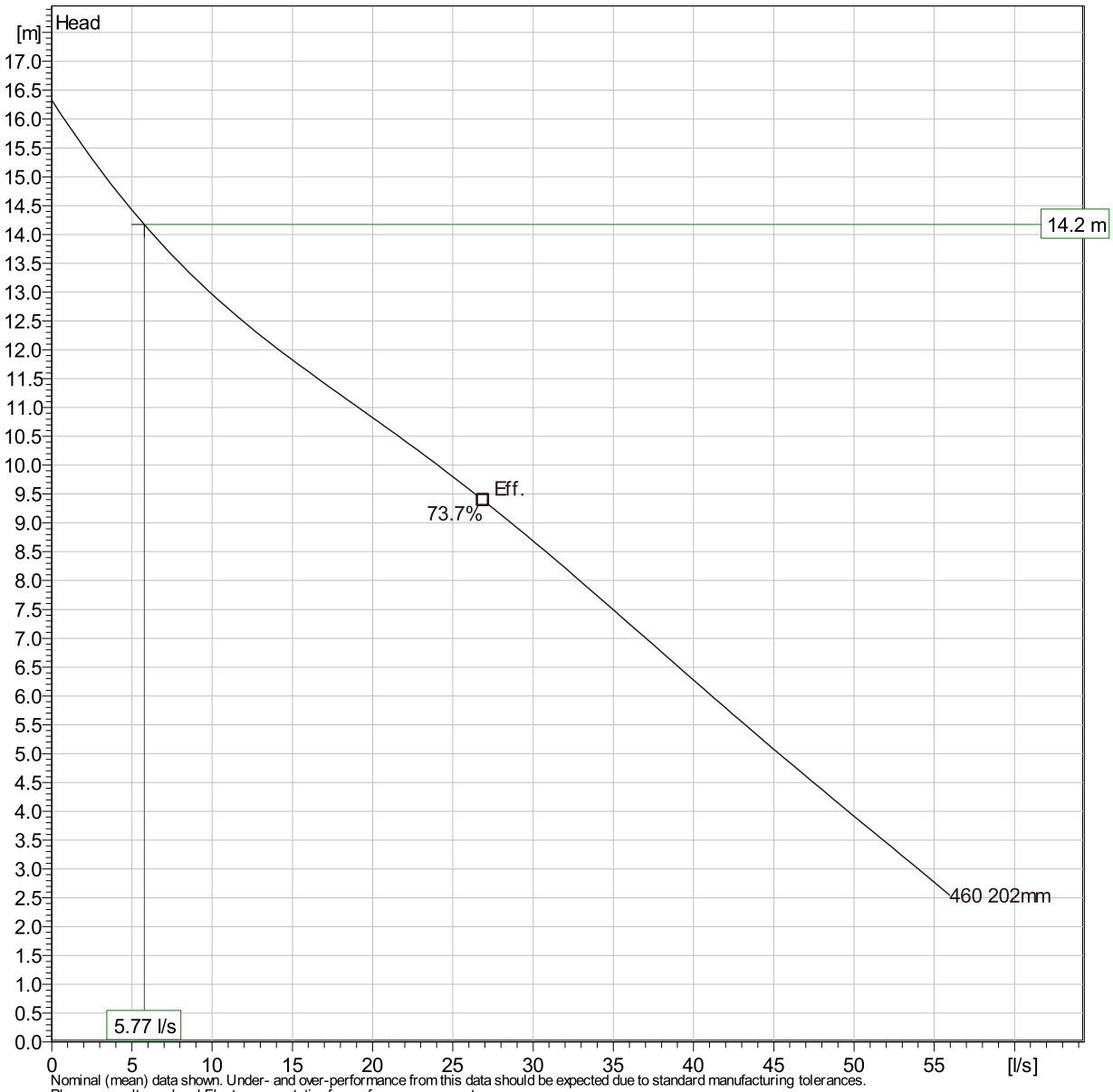
Xylect-21591198

Created on 12/15/2023 **Last update** 12/15/2023

NP 3102 MT 3~ Adaptive 460

Duty Analysis

Curves according to: Water, pure [100%] ; 4°C; 999.9kg/m³; 1.5692mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Operating characteristics

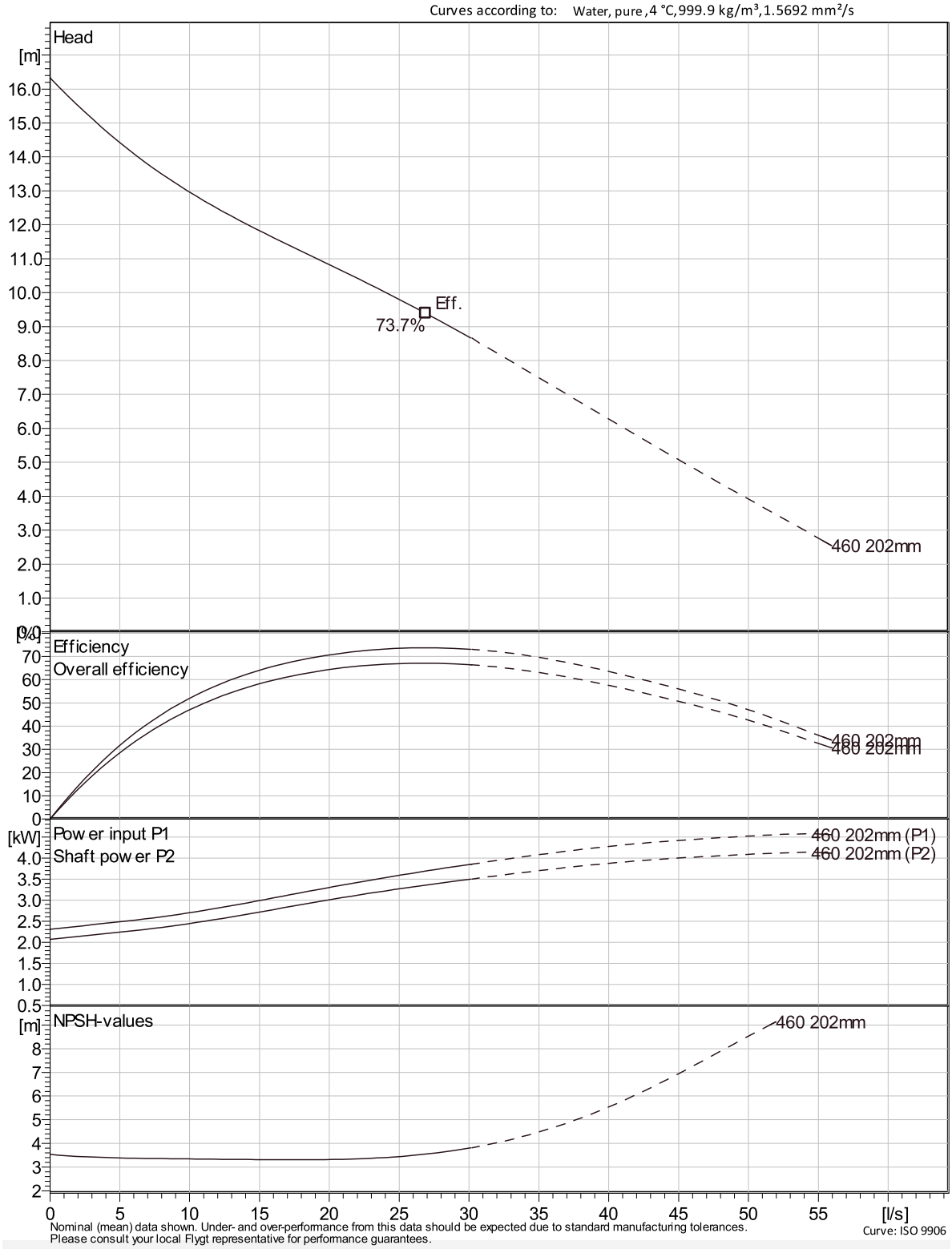
Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	l/s	m	kW	l/s	m	kW		kWh/m³	m
1	5.77	14.2	2.26	5.77	14.2	2.26	35.5 %	0.121	3.37

Project		**Created by**			
Block	Xylect-21591198	**Created on**	12/15/2023	**Last update**	12/15/2023

NP 3102 MT 3~ Adaptive 460

VFD Curve

Curves according to: Water, pure ,4 °C,999.9 kg/m³,1.5692 mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

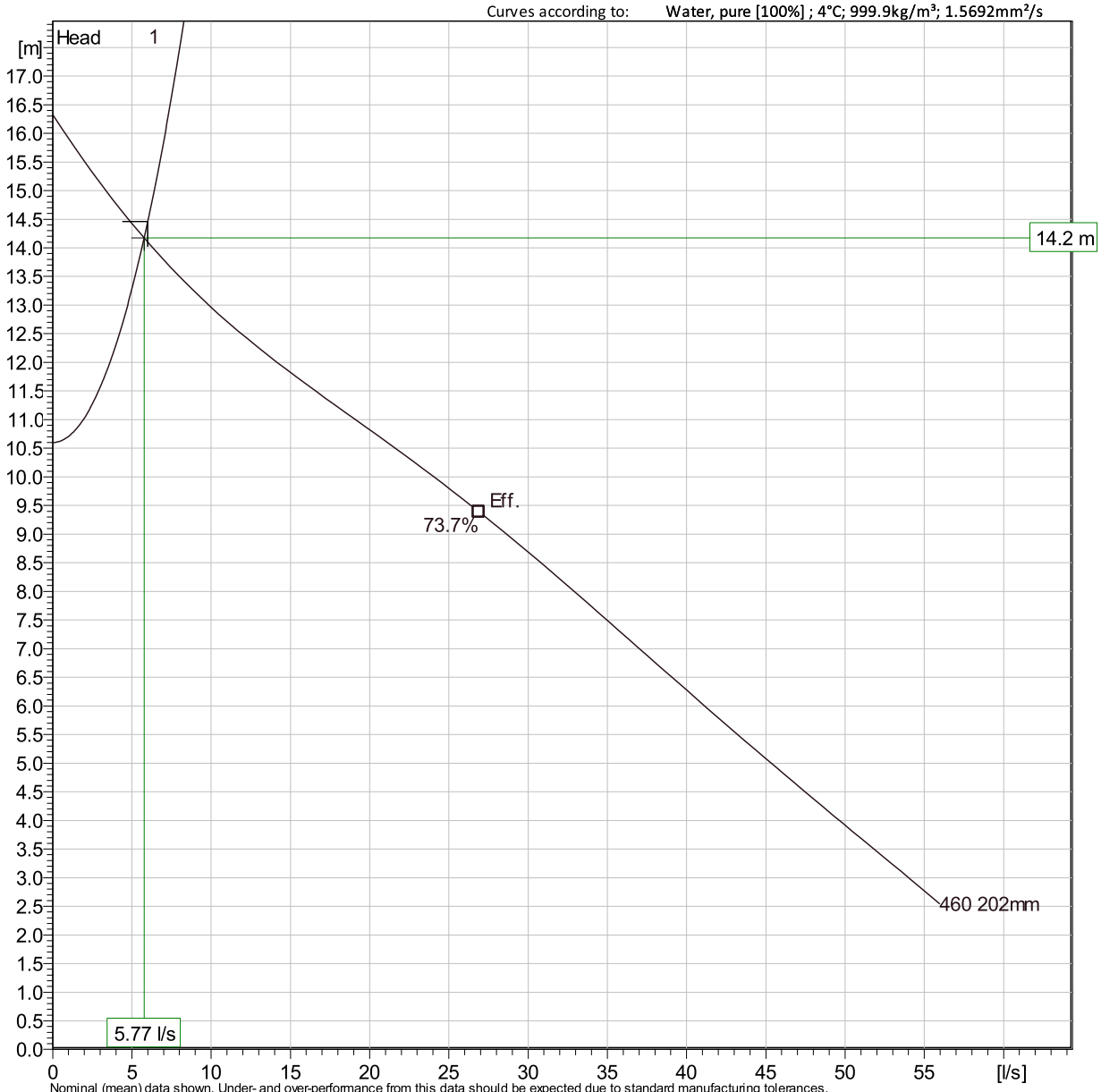
Curve: ISO 9906

Project	Xylect-21591198	**Created by**			
Block		**Created on**	12/15/2023	**Last update**	12/15/2023

NP 3102 MT 3~ Adaptive 460

VFD Analysis

Curves according to: Water, pure [100%] ; 4°C; 999.9kg/m³; 1.5692mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

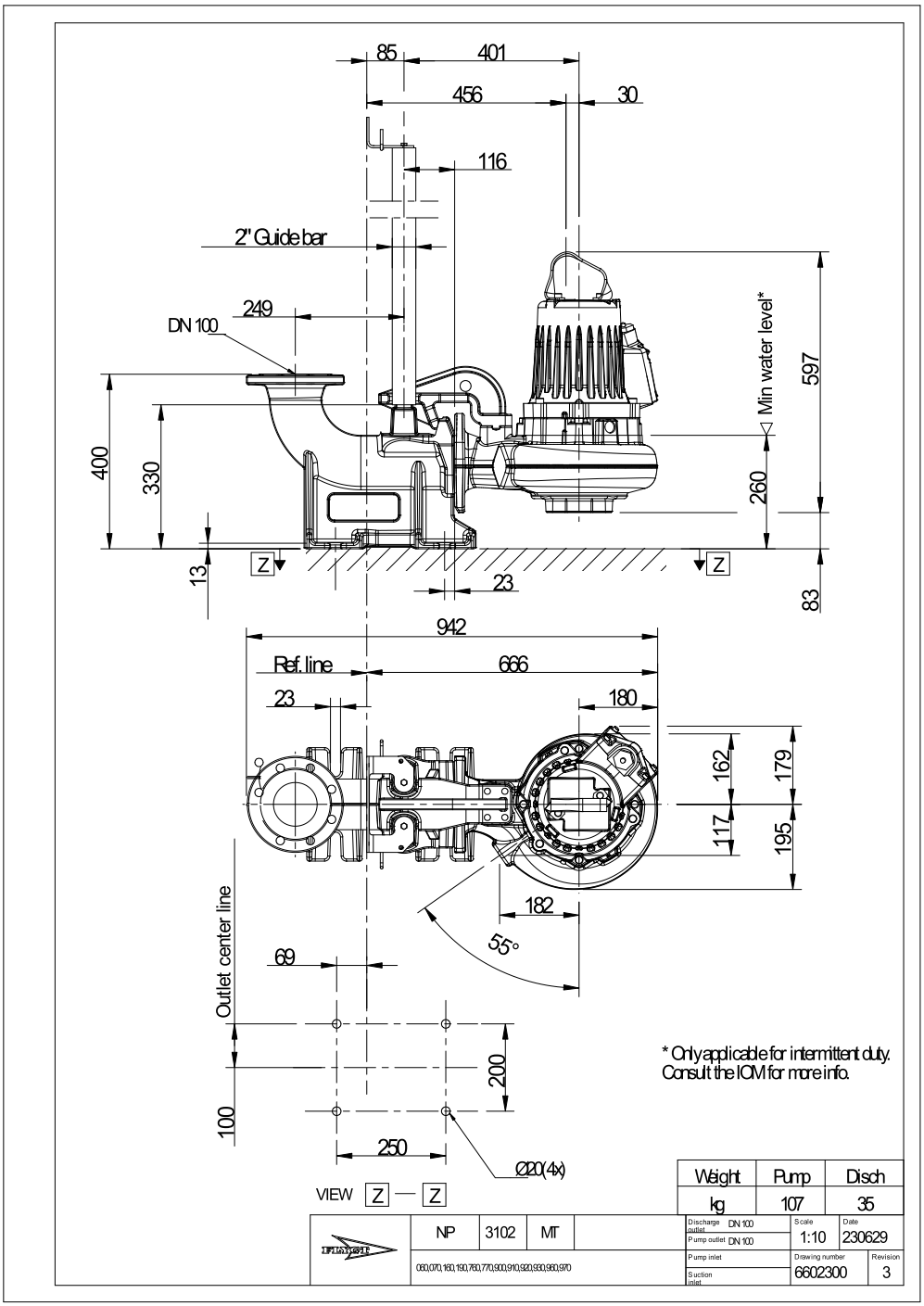
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
1	50 Hz	5.77	14.2	2.26	5.77	14.2	2.26	35.5 %	0.121	3.37

Project	Xylect-21591198	**Created by**			
Block		**Created on**	12/15/2023	**Last update**	12/15/2023

NP 3102 MT 3~ Adaptive 460

Dimensional drawing



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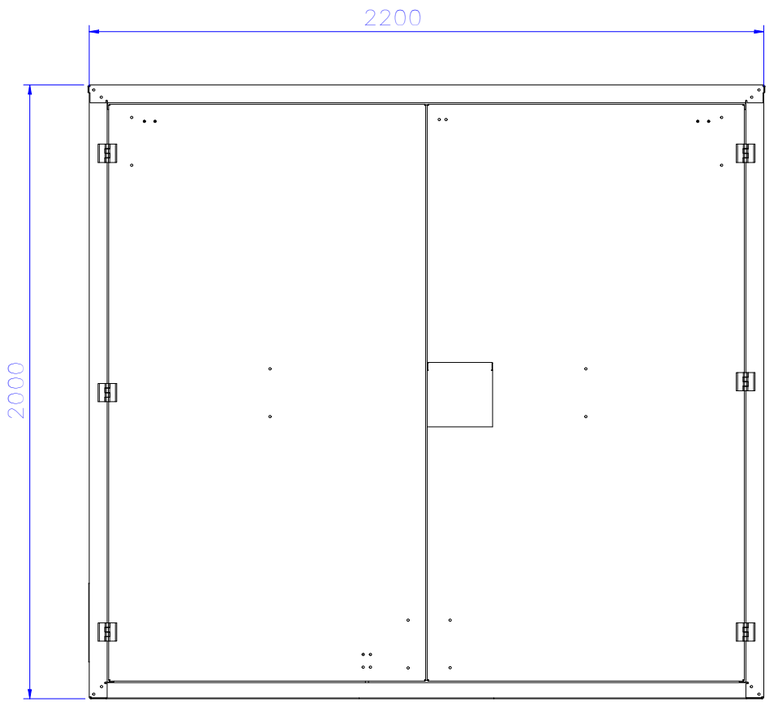
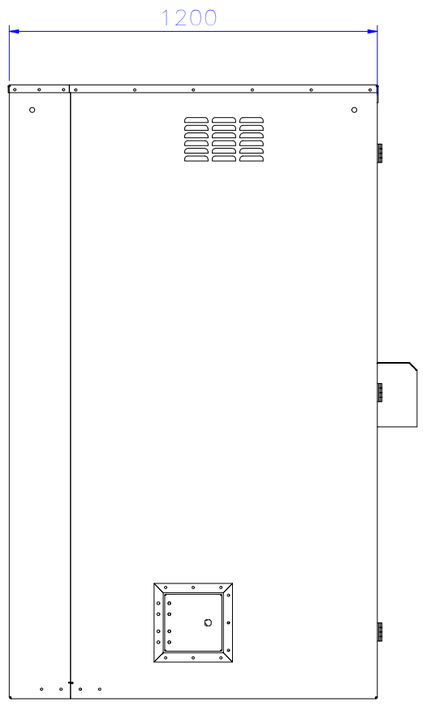
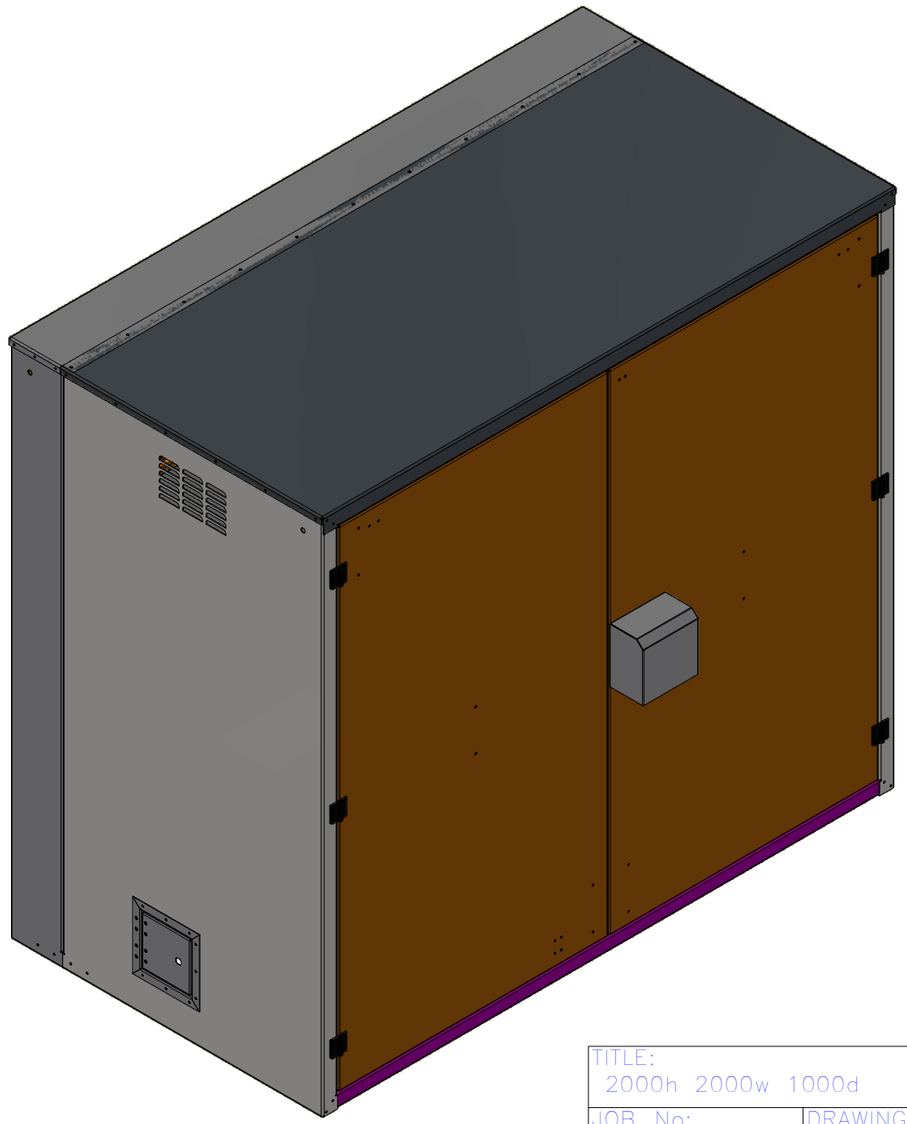
Block		**Created on**	12/15/2023 **Last update** 12/15/2023







2200W 2000H 1200D

3mm Galvanised Steel
Vented High & Low
Double door hinged 90°
Fully lockable door hasp, 3 point locking system
Door Stays
Generator Hatch
Lock Cover
90° Door stays
IP Rated
Finish in Moss Grenn (RAL6005)

TITLE: 2000h 2000w 1000d	
JOB No: EPS	DRAWING QTY: 1 OF 4
DRAWN BY: JL	DRAWN DATE: 23/03/2020
APPROVED BY:	APPROVED DATE:

Appendix K – Qbar Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	1.769	Urban	0.000
SAAR (mm)	1135	Region Number	Ireland South

Results l/s

QBAR Rural	5.7
QBAR Urban	5.7
Q100 years	10.4
Q1 year	4.8
Q30 years	9.0
Q100 years	10.4

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	1.839	Urban	0.000
SAAR (mm)	1135	Region Number	Ireland South

Results l/s

QBAR Rural	5.9
QBAR Urban	5.9
Q100 years	10.9
Q1 year	5.0
Q30 years	9.4
Q100 years	10.9