

Fassaroe Phase 1 Planning Application

Engineering Planning Report for Drainage, Potable
Water Supply & Utilities

Cosgrave Property Group

April 2022



Notice

This document and its contents have been prepared and are intended solely as information for Cosgrave Property Group and use in relation to the Fassaroe Phase 1 Planning Application to An Bord Pleanála.

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This document has 16 pages including the cover.

Document history

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1. Introduction

This report details the design development of the drainage, potable water supply and utility engineering elements associated with the works included within this application for Phase 1 of the Fassaroe Development.

The proposed Phase 1 application comprises of the construction of 650 no. residential units comprising a mix of apartments and houses along with a neighbourhood centre, a crèche, a district park, local parks, the diversion and rerouting of ESB electricity lines, a distributor road connecting to Ballyman Road, a new pedestrian / cycle route across the N11 connecting to Dargle Road, historic landfill remediation works, landscaping works, parking facilities, ancillary services and facilities and associated site development works.

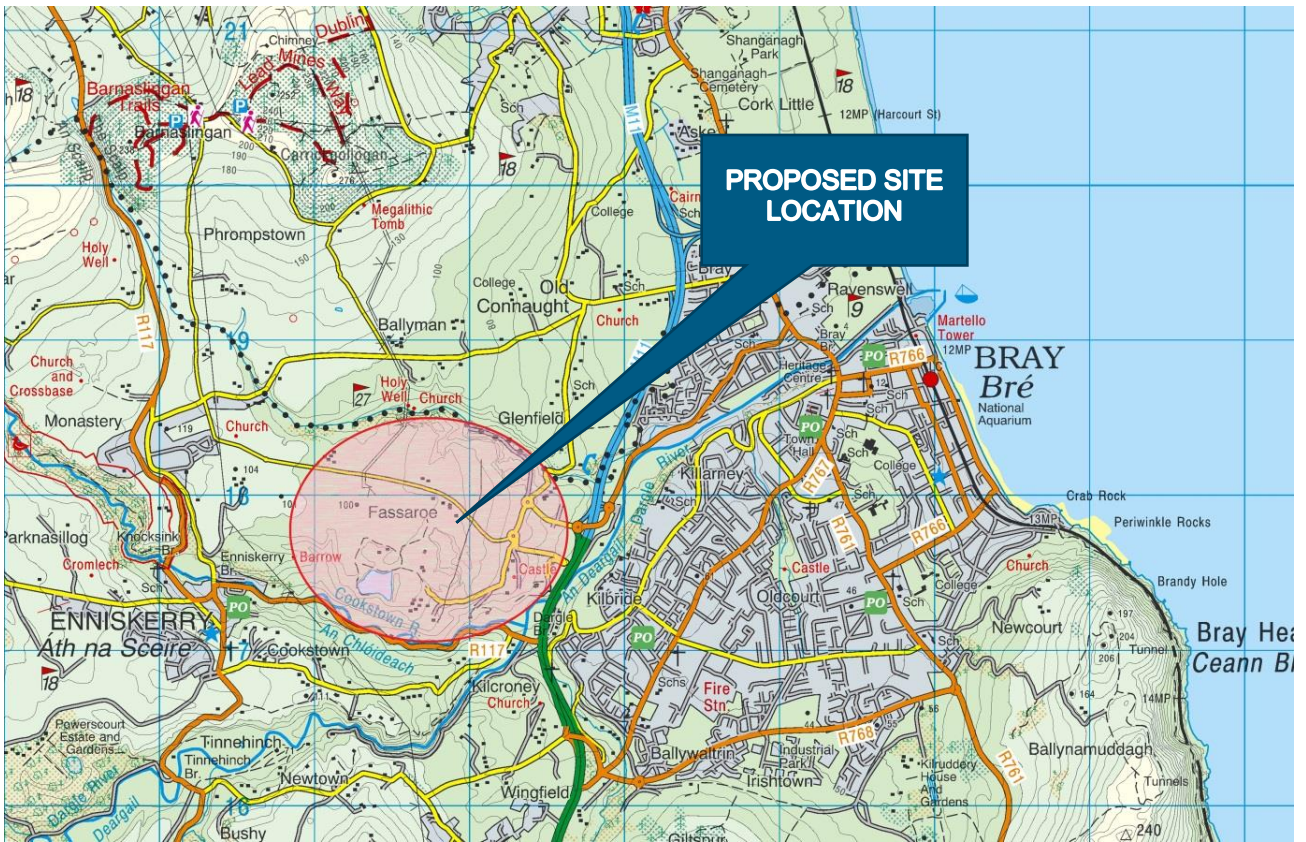
The various elements of the application then include:

- Road link (2.4km) connecting N11 to Ballyman Road (with westerly connection to Ballyman Road already in place).
- Pedestrian / cycle route including bridge across the N11 to Dargle Road Upper.
- 15.3ha of District Park / Active Open Space.
- 650 no. residential units comprising 241 no. houses and 409 no. apartments.
- 3 No. pocket park areas comprising a total of 0.43ha.
- 733sq.m approx. crèche with capacity for approx. 138 no. childcare spaces.
- Retail unit / kiosk (108sq.m.) in district park.
- Neighbourhood Centre Phase 1 comprising:
 - 1,035sq.m. retail
 - 360sq.m. café
 - 480sq.m community concierge (serving entire Fassaroe community)
 - 414sq.m. residential ancillary uses for residents of the neighbourhood centre apartments (residents lounge 256sq.m., residents gym 90sq.m., and residents concierge 68sq.m.)
- Demolition of an existing dwelling at Berryfield Lane.
- Rerouting and undergrounding of overhead ESB lines (110kV and 38kV lines) across site and into existing ESB Substation.
- Site development / ground works on future development areas to ensure sustainable cut and fill balances across the lands
- Water supply, foul and surface water drainage proposals.
- Provisions for public bus services in line with demand towards Bray (DART and Bray bus interchange) and towards the Luas at Cherrywood / Brides Glen.
- Remediation of 5 no. historic landfill sites in line with Certificates of Authorisation issued to Wicklow County Council by the EPA in 2019.

A detailed description of the development is included in Chapter 2 of the Environmental Impact Assessment Report (EIAR) included with this planning application.

The proposed application site forms part of a larger designated new development area under the Bray Municipal District Local Area Plan 2018-2024 (LAP). These wider development lands are identified as an 'Action Area' in the LAP. The lands lie on the western side of Bray. The general location of the site is shown below on Figure 1-1.

Figure 1-1 - Site Location Plan



2. Stormwater Drainage

2.1. Stormwater Impact Assessment

For the proposed Fassaroe Development a Stormwater Impact Assessment Report has been carried out as part of this planning application. Refer to Atkins Stormwater Impact Assessment Report 5186693DG103 for the details of the Storm Water elements associated with Phase 1 of the Proposed Fassaroe Development.

2.2. Flood Risk Assessment

A Flood Risk Assessment report has been undertaken to satisfy the requirements of 'The Planning System and Flood Risk Management Guidelines'. Refer to Atkins Flood Risk Assessment Report 5186693DG0062 for Phase 1 of the Proposed Fassaroe Development.

3. Foul Water Drainage

3.1. Existing Foul Water Drainage

Irish Water (IW) records indicate that the nearest existing public foul drainage network is a 525mm diameter concrete gravity sewer located on the Upper Dargle Road to the east of the N11, circa 800m from the proposed development area. An existing private foul sewer, which was previously installed by the applicant Cosgrave Property Group (CPG) during upgrade works at the junction of the N11, is located between the eastern extent of the Phase 1 development and the Upper Dargle Road. The existing private foul sewer is a 300mm diameter pipe which upsizes to 450mm before crossing under the N11 roadway. This existing foul sewer was installed to facilitate development works at Fassaroe and is currently under the private ownership of the applicant. This sewer will be used to convey foul drainage flows from the proposed development under the N11 and ultimately discharge to the existing public sewer along the Upper Dargle Road identified in IW's records.

Furthermore, an existing foul drainage network is located on the Ballyman Road to the west of the Fassaroe Phase 1 Development. This is a 225mm diameter concrete foul sewer and flows under gravity in a northerly along the Ballyman Road before discharging to the Ballyman Road Wastewater Pumping Station. It is not proposed to utilise this network as the foul discharge location for the Phase 1 development.

3.2. Proposed Development Foul Water Drainage

The proposed Foul Drainage has been designed in accordance with the following IW documents and the key design parameters noted in Table 3-1 below.

- Wastewater Infrastructure Standard Details, Connection and Developer Services, Construction Requirements for Self-Lay Developments, July 2020 (Revision 04) IW-CDS-5030-01;
- Design Risk Assessment for Wastewater Infrastructure Standard Details, Connection and Developer Services, Construction Requirements for Self-Lay Developments, July 2020 (Revision v4.02) IW-CDS-5030-02;
- Code of Practice for Wastewater Infrastructure, Connection and Developer Services, Design & Construction Requirements for Self-Lay Developments, July 2020 (Revision 2) IW-CDS-5030-03;
- Design Risk Assessment Associated with Code of Practice for Wastewater Infrastructure, Connection and Developer Services, July 2020 (Revision 1) IW-CDS-5030-04.

Table 3-1 - Key Design Parameters

Parameter	Value/Requirement
Minimum depth*	1.2 m cover roads 0.9 m open space
Minimum sewer size	225 mm
Roughness	1.5 mm
Max. velocity at pipe full	3.0 m/s
Min. velocity at pipe half full	1.0 m/s (gradient requirements below have been utilised where minimum velocity is not achievable)
Gradient - 3 or more contributing dwelling	1 in 150 minimum
Gradient - 2 contributing dwelling	1 in 80 minimum
Gradient - 1 contributing dwelling	1 in 40 minimum

* Without recourse to concrete. Absolute minimum cover in roads is 0.9m. Pipes with cover between 0.9m and 1.2m shall be bedded and surrounded in concrete, 150mm thick, Class E, in accordance with IW requirements.

Each property will have a separate wastewater connection in accordance with IW requirements.

A pre-connection application form was issued to IW on 16th July 2021, refer to Appendix A for details.

With regards to this discharge location, Irish Water issued a Confirmation of Feasibility (COF) letter on the 8th November 2021 stating, “Wastewater Connection Feasible without upgrades by Irish Water – Further review of the foul network may be required at application stage”. Refer to Appendix B for details of the COF letter from Irish Water.

The reference to “Application Stage” above refers to IW’s Connection Application Stage which occurs after successful grant of planning permission and before construction works commence on site.

In accordance with IW requirements the planning design drawings were issued for review to IW Connection and Developer Services (CDS) in advance of submitting the planning application. The Statement of Design Acceptance (SoDA) was issued by IW on 23rd March 2022. Refer to Appendix C for the SoDA.

The proposed foul drainage layouts are indicated on drawings 5186693_HTR_01_DR_0550-0564 with corresponding longitudinal sections indicated on drawings 5186693_HTR_01_DR_0580-0583.

The majority of the Fassaroe Phase 1 development will discharge to an existing manhole (Ref F53) adjacent to the southern roundabout at the south eastern corner of the development site. The eastern apartment blocks (Blocks 1 – 3) will discharge separately to another existing manhole (Ref F17) to the east of the development site. Furthermore, approximately 385m of the existing 300mm private foul sewer to the east of the development will be replaced by a 375mm diameter sewer as part of the Phase 1 works.

The final planning design estimated foul flows that will be generated from the proposed Fassaroe Phase 1 development are indicated in **Table 3-2** below.

Table 3-2 – Phase 1 Foul Water Flows

Description	Quantity	Average Discharge	Peak Discharge
Residential Houses / Duplex / Apartments	650 Units	3.36 l/s	20.16 l/s
Other Uses Commercial & Residential Support Services	3130m2	0.36 l/s	1.08 l/s
	Total	3.72 l/s	21.24 l/s

The foul drainage network for the proposed Fassaroe Phase 1 development has been designed based upon the criteria set out above including an allowance for the entire extend of lands in CPG ownership (referred to hereafter as the ‘CPG Masterplan Lands’). Additional loading for the CPG Masterplan Lands has been incorporated into the design model of the foul network to future proof the Phase 1 installation and prevent any requirements for future upsizing of the foul network.

“Micro Drainage” which is an industry standard tool for design and assessment of gravity sewer drainage networks has been used to simulate the proposed network, including the future loading from the CPG Masterplan Lands. A full clash detection was also carried out with the proposed storm drainage layout. Appendix D includes the outputs of the foul drainage model.

4. Potable Water Supply

4.1. Existing Water Supply

The existing water supply infrastructure in the area comprises of a 24" trunk main which traverses lands to the east of the of the proposed Fassaroe Phase 1 development and a 33" main which traverses Open Space (OS) within the proposed Fassaroe Phase 1 development western lands of the Fassaroe Development. Both of these mains are fed by the Vartry Reservoir and convey supply to the IW Sandyford reservoir and surrounding environs. An 800mm trunk main interconnector was constructed in 2009. This interconnector pipe runs along Berryfield Lane and connects the 24" and 33" main together.

A 250mm watermain is located along Berryfield Lane to the west of Berryfield Lane Water Pump Station. This main then downsizes to a 100mm diameter pipe before connecting into the water supply network on the Ballyman Road to the west of the Fassaroe Phase 1 Development Lands.

4.2. Proposed Potable Water Supply

The proposed Potable Water Supply has been designed in accordance with the following documents;

- Water Infrastructure Standard Details, Connection and Developer Services, Construction Requirements for Self-Lay Developments, July 2020 (Revision 04) IW-CDS-5020-01;
- Design Risk Assessment for Water Infrastructure Standard Details, Connection and Developer Services, Construction Requirements for Self-Lay Developments, July 2020 (Revision v4.02) IW-CDS-5020-02;
- Code of Practice for Water Infrastructure, Connection and Developer Services, Design & Construction Requirements for Self-Lay Developments, July 2020 (Revision 2) IW-CDS-5020-03;
- Design Risk Assessment Associated with Code of Practice for Water Infrastructure, Connection and Developer Services, July 2020 (Revision 2) IW-CDS-5020-04.

A pre-connection application form was issued to IW on 16th July 2021, refer to Appendix A for details.

With regards to the water supply, Irish Water issued a Confirmation of Feasibility (COF) letter on the 8th November 2021 stating *"Water Connection Feasible Subject to upgrades - In order to accommodate the proposed connection at the development, upgrade works are required to increase the capacity of the water network. Irish Water currently has a project on our current investment plan (Ballyman High Level Reservoir & associated trunk mains) which will provide the necessary upgrade and capacity. This upgrade project is scheduled to be completed by Q1 2022 (this may be subject to change) and the proposed connection could be completed as soon as possibly practicable after this date. In addition, the network will have to be extended by approximately 600 metres via a 300mm watermain in order to connect the development. Irish Water currently does not have any plans to extend its network in this area. Should you wish to consider extending you're the water infrastructure to the point to connection to the Irish Water network, please contact Irish Water."* Refer to Appendix B for details of the COF letter from Irish Water.

Through the SoDA procedure (discussed below in further detail) IW have confirmed that the provision of a temporary reservoir within the proposed development taking a feed from the existing 800mm trunk main interconnector to the proposed Fassaroe Phase 1 development is acceptable until the Ballyman High Level Reservoir & associated trunk mains are completed. Also, IW have confirmed that the Contractor is due to commence works on site in June 2022.

The temporary reservoir has been sized to accommodate the average domestic daily demand based on a pre-capita consumption rate of 150 l/person/day and an average occupancy ratio of 2.7 persons per dwelling in accordance with IW requirements. The required volume of storage for the temporary reservoir is based on the

total number of own door house type dwellings within the Phase 1 development, which is 241 No. housing units. The proposed temporary onsite reservoir will be located within apartment Block 3 within the Eastern area of the development. See Table 4-1 below for details on the temporary reservoir sizing calculations.

Table 4-1 – Temporary Onsite Reservoir Volume Calculation

Units	Demand	Volume
241	405l/d	98m ³

Break tanks within the apartment blocks (409 units) will be designed to accommodate 24-hour storage of water in keeping with standard practise for water supply to apartment blocks.

Following completion of the proposed Ballyman High Level Reservoir & associated trunk mains by IW, potable water supply for the proposed developed will be transferred and the temporary reservoir will be disconnected from the mains supply system.

In accordance with IW requirements the planning design drawings were issued for review to IW CDS in advance of submitting the planning application. The SoDA was issued by IW on 23rd March 2022. Refer to Appendix C for the SoDA. The SoDA confirms IW’s approval of the interim measure of installing a temporary reservoir as discussed within this report and illustrated on the accompanying IW approved planning drawings.

The proposed water supply layouts are indicated on drawings 5186693_HTR_01_DR_2700-2714.

In line Fire Hydrants will be located on the watermains in accordance with Irish Water standard construction details and “2006 Building Regulations” (Part B Fire Safety), so that no Fire Hydrant is > 46m and < 6m from any building. Fire Hydrants will be provided at a minimum rate of 1 for every 1000m² of the area covered at ground level in accordance with “2006 Building Regulations” (Part B Fire Safety).

4.3. Water Demand Calculations

Initial water demand calculations were issued to IW as part of the pre-connection application. The final planning design estimated water demand that will be generated from the proposed development is indicated in Table 4-2 below.

Table 4-2 – Phase 1 Water Demand

Description	Units	Demand Calculation	Total Demand
Houses/ Duplex	241	150 l/person/d * 2.7 * 241 = 97,606 l/d Peak week = 0.356 l/s * 1.25 Peak demand = 1.411 l/s * 5	1.129 l/s 1.411l/s 7.056 l/s
Apartments	409	150 l/person/d * 2.7 * 463 = 187,515 l/d Peak week = 2.170 l/s * 1.25 Peak demand = 2.713 l/s * 5	2.170 l/s 2.713 l/s 13.565 l/s
Other Uses Commercial & Residential Support Services	3130m ²	90 l/person/d * (18 + 63) = 7,290 l/d Peak Week = 0.084 l/s * 1.25 Peak Demand = 0.105 l/s * 5	0.084 l/s 0.105 l/s 0.525 l/s
		Total	1.129 + 2.170 + 0.084 = 3.383 l/s

5. ESB Infrastructure

5.1. Proposed Design

The proposed development requires the undergrounding and alteration of ESB Infrastructure within the vicinity of the site. These have been discussed with ESB Networks prior to this planning submission, and are designed and will be constructed in accordance with ESB requirements as follows;

- ESB Networks will likely impose restrictions on working operations in the vicinity of live overhead lines in all cases, the details of which will be discussed and agreed with ESB Networks at the detailed design stage in advance of construction commencing.
- All ducting, chambers, fittings and fixtures will be specified in accordance with approved ESB materials. Cable to line masts will be specified and installed by ESB.
- Minimum standard clearances will be maintained in accordance with relevant ESB specification. Any occurrences where this minimum standard clearance is not maintained will be considered a 'non-standard' design and will be approved by ESB. All underground services to be situated under impermeable pavement types.
- All ESB Specifications and Standards will be adhered to for works, with a Clerk of Works present as specified by ESB.
- Locations of fittings and fixtures including exact ducting locations, circuit joint bays, chambers etc. are indicative only and may be adjusted in accordance with requirements from ESB.
- All ducting will include jointing bays, chambers and any associated fixtures and fittings as required by ESB Networks and their designers.

This planning application incorporates the undergrounding and alteration of two existing high voltage (HV) overhead lines (2 No 110kV (as a single circuit)) and 2 No 38kV. The proposed works are required to facilitate the development of the land immediately to the north of the existing ESB substation on Berryfield Lane.

The layout of the above proposed diversions is shown on the planning drawings on drawing references 5186693_HTR_01_DR_0652, 0653, 0654, 0655, 0656, 0657, 0659, 0660, 0661, 0662, 0663 and are each described in more detail below.

5.2. 2 x 110kV Diversion

Two No. existing Single Circuit overhead 110kV lines (the Fassaroe – Carrickmines East 110kV and Fassaroe – Carrickmines West 110kV) runs from the north of the site (within Dun Laoghaire Golf Club lands at Ballyman) across Ballyman Glen in a north-south direction. Just to the south of the glen (within the application site) it currently swings south-westwards (from 2 No. existing pylons) to a point on the northern side of Berryfield Lane just to the northwest of the sub-station. From here it swings back to a north-south alignment and enters the ESB substation on its western side.

It is proposed to underground part of the existing route. The existing 2 No. Pylons to the South of the Ballyman Glen will be decommissioned and replaced with 2No. proposed Line Cable Interface Masts (steel lattice masts to a maximum height of 17m), approximately at the location of the existing pylons. From here the 2 No. 110 kV lines will be undergrounded and the 2 No. 110 kV cables will travel in the pre-agreed route with the ESB within the proposed open space areas and through the alignment of proposed future Fassaroe phase 2 roads (as set out by the application in the CPG masterplan). The underground cables will then cross Berryfield Lane to enter the ESB substation underground at its western boundary. The 2 No. new underground route will measure approximately 605m in length.

5.3. 38kV Diversion – Line towards Ballyman Glen

An existing overhead 38kV line (Fassaroe-Little Bray 38kV single circuit) runs from a point to the northeast of the subject site across the proposed development lands to the ESB Fassaroe substation. It is proposed to underground this 38kV overhead line from a point on the southern side of Ballyman Glen to the ESB Fassaroe substation. The proposed underground 38kV cable will be routed through the proposed open space park and within the distributor road alignment. (1.No) new Type 63E - 12meter cable to line interface mast 12m above ground will be required to the South of the Ballyman Glen where the 38kV overhead line is proposed to go underground. Approximately 655m of 38kV overhead line (wires) and (4.No) four double wood. pole sets of the existing 38kV overhead line will be removed from this point back to the ESB Fassaroe substation. The replacement underground 38kV cable route will be a total of 750m.

5.4. 38kV Diversion – Line towards Fassaroe Lane / Roadstone Roundabout

There is also another existing (Fassaroe-Bray 38kV single circuit) overhead line running south-eastwards from the ESB Fassaroe substation to Fassaroe Lane. The current alignment runs to the south of Berryfield Lane to a point adjacent to the Kilbride Lane roundabout. It is proposed to remove 855m of 38kV overhead line (wires), 5 No. pole sets of double wood poles and 1 No. cable to line interface mast between these two points and to replace it with a new underground 38kV cable running from ESB Fassaroe substation along the distributor road to the roundabout and back to start of Berryfield Lane. The replacement underground cable route will be a total of 615m.

5.5. ESB Supply

The diversion of lines as outlined above will be subject to agreed power outages with ESB Networks and EirGrid. It is likely that the 110kV outages would only be permitted during the summer months when electricity demand is at its lowest and it is unlikely that outages for both 110kV lines would be provided simultaneously. Based on the proposed diversion, as agreed with the ESB prior to planning, the power outages can be kept to a minimum as the proposed 2 No. new Terminal Pylons which will facilitate the diversion and undergrounding will be constructed to the south of the existing pylons rather than under the existing lines. The majority of the works can therefore be completed before the switchover from overhead to underground lines takes place.

Appendix A. Irish Water Pre-Connection Application

Pre-connection enquiry form

Large industrial and commercial developments, mixed use developments, housing developments, business developments.



This form is to be filled out by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure. If completing this form by hand, please use BLOCK CAPITALS and black ink.

Please refer to the **Guide to completing the pre-connection enquiry form** on page 12 of this document when completing the form.

Section A | Applicant details

1 WPRN number (where available):

2 Applicant details:

Registered company name (if applicable): C o s g r a v e P r o p e r t y
 G r o u p L t d

Trading name (if applicable):

Company registration number (if applicable):

If you are not a registered company/business, please provide the applicant's name:

Contact name: M i c h a e l C o s g r a v e

Postal address: 1 5 H o g a n P l a c e ,

G r a n d C a n a l S t .

D u b l i n 2

Eircode: D 0 2 D K 2 3

Telephone: 0 1 6 1 1 0 4 0 0

Mobile:

Email: m c o s g r a v e @ c o s g r a v e g r o u p .
com

3 Agent details (if applicable):

Contact name: G a r r y H a n r a t t y

Company name (if applicable): A t k i n s

Postal address: 1 5 0 A i r s i d e B u s i n e s s P a r k

S w o r d s

C o D u b l i n

Eircode: K 6 7 V 3 P 4

Telephone: 0 8 6 1 9 9 5 8 6 1

Email: g a r r y . h a n r a t t y @ a t k i n s g l o b
al.com

Section C | Water connection and demand details

- 14 Is there an existing connection to public water mains at the site? Yes No
- 15 Is this enquiry for an additional connection to the one already installed? Yes No
- 16 Is this enquiry to increase the size of an existing water connection? Yes No
- 17 Is this enquiry for a new water connection? Yes No

18 Approximate date water connection is required:

/ /

19 Please indicate pre-development water demand (if applicable):

Pre-development peak hour water demand		I/s
Pre-development average hour water demand		I/s

Pre-development refers to brownfield sites only. Please include calculations on the attached sheet provided.

20 Please indicate the domestic water demand (housing developments only):

Post-development peak hour water demand	22.88	I/s
Post-development average hour water demand	3.81	I/s

Please include calculations on the attached sheet provided.

21 Please indicate the business water demand (shops, offices, schools, hotels, restaurants, etc.):

Post-development peak hour water demand	1.23	I/s
Post-development average hour water demand	0.41	I/s

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

22 Please indicate the industrial water demand (industry-specific water requirements):

Post-development peak hour water demand		I/s
Post-development average hour water demand		I/s

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

23 What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?

m

24 What is the highest finished floor level of the proposed development above Malin Head Ordnance Datum?

m

Section E | Development details

42 Please outline the domestic and/or industry/business use proposed:

Property type	Total number of units for this application
Domestic	650
Office	
Residential care home	
Hotel	
Factory	
School	
Institution	
Retail unit	
Industrial unit	
Other (please specify)	

43 Approximate start date of proposed development:

1 / 2 / 2022

44 Is the development multi-phased?

Yes No

If 'Yes', application must include a master-plan identifying the development phases and the current phase number.

If 'Yes', please provide details of variations in water demand volumes and wastewater discharge loads due to phasing requirements.

Section F | Supporting documentation

Please provide the following additional information:

- > Site location map: A site location map to a scale of 1:1000, which clearly identifies the land or structure to which the enquiry relates. The map shall include the following details:
 - a) The scale shall be clearly indicated on the map.
 - b) The boundaries shall be delineated in red.
 - c) The site co-ordinates shall be marked on the site location map.
- > Details of planning and development exemptions (if applicable).
- > Calculations (calculation sheets provided below).
- > Site layout map to a scale of 1:500 showing layout of proposed development, water network and wastewater network layouts, additional water/wastewater infrastructure if proposed, connection points to Irish Water infrastructure (if known).
- > Any other information that might help Irish Water assess this pre-connection enquiry.


Section G | Declaration

I/We hereby make this application to Irish Water for a water and/or wastewater connection as detailed on this form.

I/We understand that any alterations made to this application must be declared to Irish Water.

The details that I/we have given with this application are accurate.

I/We have enclosed all the necessary supporting documentation.

Signature: 

Date: 3 0 / 0 6 / 2 0 2 1

Your full name (in BLOCK CAPITALS):

G A R R Y H A N R A T T Y

Irish Water will carry out a formal assessment based on the information provided on this form.

Any future connection offer made by Irish Water will be based on the information that has been provided here.

Please submit the completed form to newconnections@water.ie or alternatively, post to:

Irish Water
PO Box 860
South City Delivery Office
Cork City

For office use only:

Input customer number:

Calculations

Water demand

Calculation Criteria

Domestic Unit Average Occupancy Ratio: 2.7 (IW-CDS-5020-03)

Domestic Per Capita Consumption: 150 l/person/day (IW-CDS-5020-03)

Commercial Unit Average Occupancy Ratio: 1/person/10m²

Commercial Per Capita Consumption: 90 l/person/day (IW-CDS-5020 Full Time Staff)

Average Day / Peak Week Multiplier: 1.25 (IW-CDS-5020-03)

CURRENT APPLICATION

Phase 1A and 1B (Residential)

Total No. of Residential Units - 650 units

Average Demand = $(650 \times 2.7 \times 150) / 86400 = 3.05$ l/s

ADPW Demand = $3.05 \times 1.25 = 3.81$ l/s

Peak Demand = $3.81 \times 6 = 22.88$ l/s

Phase 1A and 1B (Commercial)

Total Floor Area - 3130 m²

Average Demand = $(3130/10) \times 90 / 86400 = 0.33$ l/s

ADPW Demand = $0.33 \times 1.25 = 0.41$ l/s

Peak Demand = $0.41 \times 3 = 1.23$ l/s

Total Average Hour Water Demand for Phase 1A and 1B = 4.22 l/s

Total Peak Hour Water Demand for Phase 1A and 1B = 24.11 l/s

On-site storage

N/A

Fire flow requirements

35 l/s

Foul wastewater discharge

Calculation Criteria

Domestic Unit Average Occupancy Ratio: 2.7 (IW-CDS-5020-03)

Domestic Per Capita Consumption: 150l/person/day (IW-CDS-5020-03)

Commercial Unit Average Occupancy Ratio: 1/person/10m²

Commercial Per Capita Consumption: 90l/person/day (IW-CDS-5020 Full Time Staff)

Infiltration Allowance: 10% of Unit Consumption (IW-CDS-5030-03)

Peak Demand Multiplier: 3 or 6 (IW-CDS-5030-03)

Phase 1A and 1B (Residential)

Total No. of Units - 650 units

Average Discharge = $(650 \times 446) / 86400 = 3.36$ l/s

Peak Discharge = $3.36 \times 6 = 20.16$ l/s

Phase 1A and 1B (Commercial)

Total Floor Area - 3130 m²

Average Discharge = $((3130/10) \times 90 \times 1.1) / 86400 = 0.36$ l/s

Peak Discharge = $0.36 \times 3 = 1.08$ l/s

Total Average Discharge for Phase 1A and 1B = 3.72 l/s

Total Peak Discharge for Phase 1A and 1B = 21.24 l/s



Guide to completing the pre-connection enquiry form

This form should be completed by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure.

The Irish Water Codes of Practice are available at www.water.ie for reference.

Section A | Applicant Details

- Question 1:** 'Water Point Reference Number (WPRN)' is a unique number assigned to every single water services connection in the country. The WPRN is prominently displayed on correspondence received from Irish Water, and can be found on water bills, previous connection offers, or previous enquiries in relation to the site. Existing customers and brownfield sites should have a WPRN. New customers are not required to answer this question.
- Question 2:** This question requires the applicant or company enquiring about the feasibility of a connection to identify themselves, their postal address, and to provide their contact details.
- Question 3:** If the applicant has employed a consulting engineer or an agent to manage the enquiry on their behalf, the agent's address and contact details should be recorded here.
- Question 4:** Please indicate whether it is the applicant or the agent who should receive future correspondence in relation to the enquiry.

Section B | Site details

- Question 5:** This is the address of the site requiring the water/wastewater service connection and for which this enquiry is being made.
- Question 6:** Please provide the Irish Grid co-ordinates of the proposed site. Irish grid positions on maps are expressed in two dimensions as Eastings (E or X) and Northings (N or Y) relative to an origin. You will find these coordinates on your Ordnance Survey map which is required to be submitted with an application.
- Question 7:** Please identify the Local Authority that is or will be dealing with your planning application, for example Cork City Council.
- Question 8:** Please indicate if planning permission has been granted for this application, and if so, please provide the planning permission reference number.
- Question 9:** Please specify the previous use of the site that is proposed to be developed, for example if greenfield, please state 'Agricultural'.
- Question 10:** Please specify the date that the development site was last occupied. Your answer will help us to determine the previous water usage/wastewater load of the development. If the site was previously greenfield, then this question does not need to be completed.
- Question 11:** Please provide details in relation to the ground conditions on the site if they are known to be poor, for example soil with a low bearing capacity, high water table, presence of peat, silt, etc. If a site investigation report is available, please include it with your enquiry.
- Question 12:** Please provide details in relation to contaminated land on your site (if any); this will determine what pipe material will be appropriate in the vicinity of the contaminated ground.
- Question 13:** Please indicate if the development is compliant with the local area development plan. You should contact your Local Authority in this regard and confirm same by ticking the appropriate box.

Section C | Water connection and demand details

- Question 14:** Please indicate if a water connection already exists for this site.
- Question 15:** Please indicate if this enquiry concerns an additional connection to one already installed on the site.
- Question 16:** Please indicate if you are proposing to upgrade the water connection to facilitate an increase in water demand. Irish Water will determine what impact this will have on our infrastructure.
- Question 17:** Please indicate if this enquiry concerns a new water connection for this site.
- Question 18:** Please indicate the approximate date that the proposed connection to the water infrastructure will be required.

- Question 19:** If the site was previously in use, please provide details of the pre-development peak hour and average hour water demand.
- Question 20:** Please provide calculations for domestic water demand and include your calculations on the calculation sheet provided. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.
- Question 21:** If this connection enquiry concerns a business premises, please provide calculations for the water demand and include your calculations on the calculation sheet provided. Business premises include shops, offices, hotels, schools, etc. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.
- Question 22:** If this connection enquiry is for an industrial premises, please calculate the water demand and include your calculations on the calculation sheet provided. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak demand for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.
- Question 23:** Please specify the ground level at the location where connection to the public water mains will be made. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.
- Question 24:** Please specify the highest finished floor level on site. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.
- Question 25:** If storage is required, water storage capacity of 24-hour water demand must usually be provided at the proposed site. In some cases, 24-hour storage capacity may not be required, for example 24-hour storage for a domestic house would be provided in an attic storage tank. Please calculate the 24-hour water storage requirements and include your calculations on the attached sheet provided. Please also confirm that on-site storage is being provided by ticking the appropriate box.
- Question 26:** The water supply system shall be designed and constructed to reliably convey the water flows that are required of the development including fire flow requirements by the Fire Authority. The Fire Authority will provide the requirement for fire flow rates that the water supply system will have to carry. Please note that while flows in excess of your required demand may be achieved in the Irish Water network and could be utilised in the event of a fire, Irish Water cannot guarantee a flow rate to meet your fire flow requirement. To guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development. Please include your calculations on the attached sheet provided, and further provide confirmation of the Fire Authority requirements.
- Question 27:** Please identify proposed additional water supply sources, that is, do you intend to connect to the public water mains or the public mains and supplement from other sources? If supplementing public water supply with a supply from another source, please provide details as to how the potable water supply is to be protected from cross contamination at the premises.

Section D | Wastewater connection and discharge details

- Question 28:** Please indicate if a wastewater connection to a public sewer already exists for this site.
- Question 29:** Please indicate if this enquiry relates to an additional wastewater connection to one already installed.
- Question 30:** Please indicate if you are proposing to upgrade the wastewater connection to facilitate an increased discharge. Irish Water will determine what impact this will have on our infrastructure.
- Question 31:** Please indicate if this enquiry relates to a new wastewater connection for this site.
- Question 32:** Please specify the approximate date that the proposed connection to the wastewater infrastructure will be required.
- Question 33:** If the site was previously in use, please provide details of the pre-development peak and average wastewater discharge.

- Question 34:** Please provide calculations for domestic wastewater discharge and include your calculations on the attached sheet provided. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.
- Question 35:** If this enquiry relates to a business premises, please provide calculations for the wastewater discharge and include your calculations on the attached sheet provided. Business premises include shops, offices, hotels, schools, etc. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.
- Question 36:** If this enquiry relates to an industrial premises, please provide calculations for the wastewater discharge and include your calculations on the calculation sheet provided. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak discharge for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.
- Question 37:** Please specify the maximum and average concentrations and the maximum daily load of each of the wastewater characteristics listed in the wastewater organic load table (if not domestic effluent), and also specify if any other significant concentrations are expected in the effluent. Please complete the table and provide additional supporting documentation if relevant. Note that the concentration shall be in mg/l and the load shall be in kg/day. Note that for business premises (shops, offices, schools, hotels, etc.) for which only domestic effluent will be discharged (excluding discharge from canteens/restaurants which would require a Trade Effluent Discharge licence), there is no need to complete this question.
- Question 38:** In exceptional circumstances, such as brownfield sites, where the only practical outlet for storm/surface water is to a combined sewer, Irish Water will consider permitting a restricted attenuated flow to the combined sewer. Storm/surface water will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer and the applicant must demonstrate how the storm/surface water flow from the proposed site is minimised using sustainable urban drainage system (SUDS). This type of connection will only be considered on a case by case basis. Please advise if the proposed development intends discharging surface water to the combined wastewater collection system.
- Question 39:** Please specify if the development needs to pump its wastewater discharge to gain access to Irish Water infrastructure.
- Question 40:** Please specify the ground level at the location where connection to the public sewer will be made. This is required to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.
- Question 41:** Please specify the lowest floor level of the proposed development. This is required in order to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Section E | Development details

- Question 42:** Please specify the number of different property/premises types by filling in the table provided.
- Question 43:** Please indicate the approximate commencement date of works on the development.
- Question 44:** Please indicate if a phased building approach is to be adopted when developing the site. If so, please provide details of the phase master-plan and the proposed variation in water demand/wastewater discharge as a result of the phasing of the development.

Section F | Supporting documentation

Please provide additional information as listed.

Section G | Declaration

Please review the declaration, sign, and return the completed application form to Irish Water by email or by post using the contact details provided in Section G.

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A large, empty rectangular box with a thin black border, occupying most of the page. It is intended for the user to write their notes.

Appendix B. Irish Water Confirmation of Feasibility

Garry Hanratty
 150 Airside Business Park
 Swords
 Co. Dublin

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

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

www.water.ie

8 November 2021

Re: CDS21005352 pre-connection enquiry - Subject to contract | Contract denied

Connection for Housing Development of 650 unit(s) at Lands At Fassaroe, Bray, Wicklow

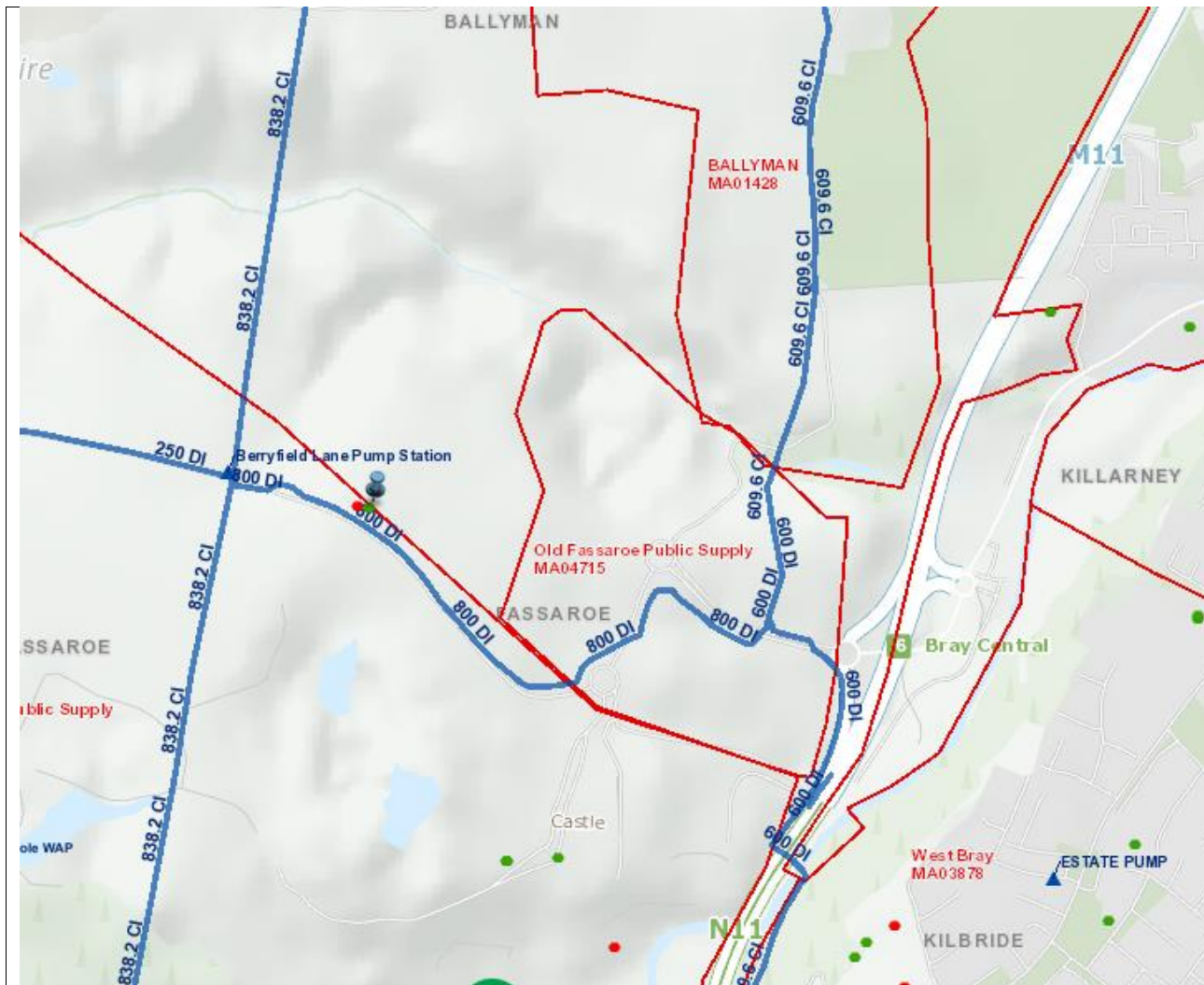
Dear Sir/Madam,

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

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY <u>THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.</u>
Water Connection	Feasible Subject to upgrades
Wastewater Connection	Feasible without upgrades by Irish Water.
SITE SPECIFIC COMMENTS	
Water Connection	In order to accommodate the proposed connection at the development, upgrade works are required to increase the capacity of the water network. Irish Water currently has a project on our current investment plan (Ballyman High Level Reservoir & associated trunk mains) which will provide the necessary upgrade and capacity. This upgrade project is scheduled to be completed by Q1 2022 (this may be subject to change) and the proposed connection could be completed as soon as possibly practicable after this date. In addition, the network will have to be extended by approximately 600 metres via a 300mm watermain in order to connect the development. Irish Water currently does not have any plans to extend its network in this area. Should you wish to consider extending you're the water infrastructure to a point to connect to the Irish Water network, please contact Irish Water.
Wastewater Connection	Further review of the foul network may be required at application stage.

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

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



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

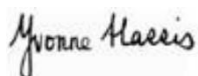
Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish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

General Notes:

- 1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
- 2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
- 3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
- 4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at <https://www.water.ie/connections/get-connected/>
- 5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
- 6) Irish Water Connection Policy/ Charges can be found at <https://www.water.ie/connections/information/connection-charges/>
- 7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
- 8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
- 9) To access Irish Water Maps email datarequests@water.ie
- 10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Patrick O'Neill from the design team on 01 89 25250 or email patoneil@water.ie For further information, visit www.water.ie/connections.

Yours sincerely,



Yvonne Harris

Head of Customer Operations

Appendix C. Irish Water Statement of Design Acceptance



Garry Hanratty
150 Airside Business Park
Swords
Co. Dublin

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

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

www.water.ie

23 March 2022

**Re: Design Submission for Lands At Fassaroe, Bray, Wicklow (the “Development”)
(the “Design Submission”) / Connection Reference No: CDS21005352**

Dear Garry Hanratty,

Many thanks for your recent Design Submission.

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

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

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

Please note that the wayleave over the existing Irish Water Assets within this site must be maintained, also at application stage the applicant must provide detail drawings showing how the existing assets will be protected from the construction of new watermains crossing these.

If you have any further questions, please contact your Irish Water representative:

Name: Patrick O’Neill
Phone: 01 89 25250
Email: patoneil@water.ie

Yours sincerely,

Yvonne Harris
Head of Customer Operations

Appendix A


Document Title & Revision

- Proposed Watermains Layout] 5186693_HTR_01_DR_2700_REV A, 5186693_HTR_01_DR_2701_REV A, 5186693_HTR_01_DR_2702_REV A, 5186693_HTR_01_DR_2703_REV A, 5186693_HTR_01_DR_2704_REV A, 5186693_HTR_01_DR_2705_REV A, 5186693_HTR_01_DR_2706_REV A, 5186693_HTR_01_DR_2707_REV A, 5186693_HTR_01_DR_2708_REV A, 5186693_HTR_01_DR_2709_REV A, 5186693_HTR_01_DR_2710_REV A, 5186693_HTR_01_DR_2711_REV A, 5186693_HTR_01_DR_2712_REV A, 5186693_HTR_01_DR_2713_REV A, 5186693_HTR_01_DR_2714_REV A
- [Proposed Foul Water Layout] 5186693_HTR_01_DR_0550_REV A, 5186693_HTR_01_DR_0551_REV A, 5186693_HTR_01_DR_0552_REV A, 5186693_HTR_01_DR_0553_REV A, 5186693_HTR_01_DR_0554_REV A, 5186693_HTR_01_DR_0555_REV A, 5186693_HTR_01_DR_0556_REV A, 5186693_HTR_01_DR_0557_REV A, 5186693_HTR_01_DR_0558_REV A, 5186693_HTR_01_DR_0559_REV A, 5186693_HTR_01_DR_0560_REV A, 5186693_HTR_01_DR_0561_REV A, 5186693_HTR_01_DR_0562_REV A, 5186693_HTR_01_DR_0563_REV A, 5186693_HTR_01_DR_0564_REV A
- [Proposed Foul Water Drainage Long Sections] 5186693_HTR_01_DR_0580_REV A, 5186693_HTR_01_DR_0581_REV A, 5186693_HTR_01_DR_0582_REV A, 5186693_HTR_01_DR_0583_REV A

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

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

Appendix D. MicroDrainage Foul Outputs

Atkins (Epsom)		Page 1
Woodcoste Grove Ashley Road, Epsom Surrey, KT18 5BW		
Date 01/04/2022 15:38 File Foul Drainage Model-PHA...	Designed by acorrigan Checked by	
Innovyze		Network 2019.1

FOUL SEWERAGE DESIGN















Design Criteria for Foul - Phase 1 Only

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	10
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.900
Flow Per Person (l/per/day)	150.00	Maximum Backdrop Height (m)	6.000
Persons per House	2.70	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)	250

Designed with Level Soffits
















Network Design Table for Foul - Phase 1 Only

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	38.586	0.322	119.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.001	30.176	0.251	120.2	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.002	59.766	0.598	99.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.003	29.146	0.486	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.004	29.146	0.291	100.2	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.005	29.146	0.394	74.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.006	29.546	0.492	60.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.007	19.656	0.328	59.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.008	20.003	0.167	119.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.009	10.229	0.126	81.2	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.010	20.338	0.169	120.3	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.011	19.955	0.166	120.2	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.012	19.501	0.163	119.6	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.013	80.000	0.667	119.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	E Area (ha)	E Base Flow (l/s)	E Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	99.245	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0
F1.001	98.923	0.000	0.0	0	0.0	0	0.00	1.05	41.6	0.0
F1.002	98.672	0.000	0.0	0	0.0	0	0.00	1.15	45.7	0.0
F1.003	98.074	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F1.004	96.688	0.000	0.0	0	0.0	0	0.00	1.15	45.6	0.0
F1.005	96.397	0.000	0.0	0	0.0	0	0.00	1.34	53.1	0.0
F1.006	96.003	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F1.007	95.511	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F1.008	95.183	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0
F1.009	94.070	0.000	0.0	0	0.0	0	0.00	1.27	50.7	0.0
F1.010	93.944	0.000	0.0	0	0.0	0	0.00	1.05	41.6	0.0
F1.011	93.775	0.000	0.0	0	0.0	0	0.00	1.05	41.6	0.0
F1.012	93.609	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0
F1.013	93.446	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0



















Network Design Table for Foul - Phase 1 Only

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.014	20.119	0.168	119.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.015	17.855	0.149	119.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F2.000	38.447	0.641	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F2.001	14.817	0.247	60.0	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F2.002	11.840	0.099	119.6	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.016	22.925	0.382	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F3.000	64.729	1.079	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F4.000	16.504	0.275	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F4.001	15.430	0.206	74.9	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F4.002	34.674	0.578	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F3.001	34.190	0.570	60.0	0.000	13	0.0	1.500	o	225	Pipe/Conduit	
F3.002	17.756	0.265	67.0	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F1.017	20.366	0.339	60.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.018	43.896	0.732	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F5.000	49.676	0.828	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table


PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.014	92.779	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0
F1.015	92.611	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0
F2.000	94.666	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F2.001	93.724	0.000	0.0	5	0.0	9	0.30	1.48	59.0	0.2
F2.002	93.477	0.000	0.0	5	0.0	10	0.24	1.05	41.7	0.2
F1.016	91.723	0.000	0.0	5	0.0	9	0.30	1.48	59.0	0.2
F3.000	94.302	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F4.000	95.718	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F4.001	94.543	0.000	0.0	5	0.0	9	0.28	1.33	52.8	0.2
F4.002	94.337	0.000	0.0	5	0.0	9	0.30	1.48	59.0	0.2
F3.001	93.223	0.000	0.0	18	0.1	16	0.46	1.48	59.0	0.6
F3.002	92.653	0.000	0.0	24	0.1	18	0.48	1.40	55.8	0.7
F1.017	91.341	0.000	0.0	29	0.1	20	0.53	1.48	58.9	0.9
F1.018	90.102	0.000	0.0	29	0.1	20	0.53	1.48	59.0	0.9
F5.000	93.875	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0

Network Design Table for Foul - Phase 1 Only

















PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F5.001	14.211	0.095	149.6	0.000	8	0.0	1.500	o	225	Pipe/Conduit	
F5.002	85.346	0.569	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F5.003	23.272	0.155	150.1	0.000	8	0.0	1.500	o	225	Pipe/Conduit	
F5.004	50.244	0.335	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F5.005	50.808	0.847	60.0	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F6.000	35.021	0.584	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F6.001	41.881	0.698	60.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F6.002	38.263	0.638	60.0	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F6.003	46.045	0.307	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F6.004	28.004	0.187	149.8	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F6.005	32.134	0.214	150.2	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.000	34.629	0.577	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.001	31.173	0.435	71.7	0.000	8	0.0	1.500	o	225	Pipe/Conduit	
F7.002	19.686	0.275	71.6	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.003	20.123	0.281	71.6	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F6.006	67.786	0.451	150.3	0.000	9	0.0	1.500	o	225	Pipe/Conduit	
F1.019	56.244	0.375	150.0	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F1.020	90.105	0.601	149.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add	Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F5.001	93.047	0.000	0.0	8	0.0	13	0.26	0.94	37.3	0.2
F5.002	92.952	0.000	0.0	8	0.0	13	0.26	0.94	37.2	0.2
F5.003	92.383	0.000	0.0	16	0.0	18	0.32	0.94	37.2	0.5
F5.004	92.228	0.000	0.0	16	0.0	18	0.32	0.94	37.2	0.5
F5.005	90.627	0.000	0.0	22	0.1	17	0.49	1.48	59.0	0.7
F6.000	92.758	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F6.001	90.373	0.000	0.0	4	0.0	8	0.28	1.48	59.0	0.1
F6.002	87.912	0.000	0.0	10	0.0	12	0.38	1.48	59.0	0.3
F6.003	87.274	0.000	0.0	10	0.0	15	0.28	0.94	37.2	0.3
F6.004	86.967	0.000	0.0	15	0.0	18	0.31	0.94	37.3	0.5
F6.005	86.780	0.000	0.0	15	0.0	18	0.31	0.94	37.2	0.5
F7.000	92.832	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F7.001	92.255	0.000	0.0	8	0.0	11	0.33	1.36	54.0	0.2
F7.002	91.820	0.000	0.0	8	0.0	11	0.33	1.36	54.0	0.2
F7.003	91.545	0.000	0.0	8	0.0	11	0.33	1.36	54.0	0.2
F6.006	86.566	0.000	0.0	32	0.1	25	0.40	0.94	37.2	1.0
F1.019	86.115	0.000	0.0	89	0.3	42	0.55	0.94	37.2	2.8
F1.020	85.740	0.000	0.0	89	0.3	42	0.55	0.94	37.2	2.8


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Network Design Table for Foul - Phase 1 Only
















PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.021	40.167	0.567	70.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.022	84.926	1.415	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.000	23.043	0.384	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.001	32.437	0.541	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.023	86.758	1.446	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.024	88.416	1.474	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.025	89.922	1.499	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.026	33.256	0.554	60.0	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F9.000	88.882	1.481	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.027	19.581	0.326	60.1	0.000	20	0.0	1.500	o	225	Pipe/Conduit	
F10.000	29.361	0.489	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.001	32.198	0.537	60.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F10.002	6.119	0.102	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.003	42.806	0.713	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F11.000	20.002	0.333	60.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F11.001	74.020	0.493	150.1	0.000	4	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.021	85.139	0.000	0.0	89	0.3	35	0.71	1.36	54.3	2.8
F1.022	84.090	0.000	0.0	89	0.3	33	0.75	1.48	59.0	2.8
F8.000	83.175	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F8.001	82.791	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F1.023	80.726	0.000	0.0	89	0.3	33	0.75	1.48	59.0	2.8
F1.024	77.506	0.000	0.0	89	0.3	33	0.75	1.48	59.0	2.8
F1.025	74.275	0.000	0.0	89	0.3	33	0.75	1.48	59.0	2.8
F1.026	71.883	0.000	0.0	95	0.3	34	0.77	1.48	59.0	2.9
F9.000	72.675	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F1.027	71.194	0.000	0.0	115	0.3	38	0.81	1.48	59.0	3.6
F10.000	83.615	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F10.001	82.226	0.000	0.0	4	0.0	8	0.28	1.48	59.0	0.1
F10.002	81.689	0.000	0.0	4	0.0	8	0.28	1.48	59.0	0.1
F10.003	79.725	0.000	0.0	4	0.0	8	0.28	1.48	59.0	0.1
F11.000	76.367	0.000	0.0	0	0.0	0	0.00	1.48	58.9	0.0
F11.001	76.034	0.000	0.0	4	0.0	10	0.20	0.94	37.2	0.1

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Network Design Table for Foul - Phase 1 Only

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F10.004	55.533	0.595	93.3	0.000	48	0.0	1.500	o	225	Pipe/Conduit	
F12.000	29.569	0.493	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F12.001	10.253	0.171	60.0	0.000	8	0.0	1.500	o	225	Pipe/Conduit	
F12.002	26.303	0.438	60.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.005	81.634	0.875	93.3	0.000	9	0.0	1.500	o	225	Pipe/Conduit	
F10.006	39.674	0.425	93.3	0.000	16	0.0	1.500	o	225	Pipe/Conduit	
F10.007	9.038	0.151	59.9	0.000	16	0.0	1.500	o	225	Pipe/Conduit	
F13.000	50.000	0.833	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F13.001	13.409	0.223	60.1	0.000	20	0.0	1.500	o	225	Pipe/Conduit	
F10.008	20.220	0.337	60.0	0.000	2	0.0	1.500	o	225	Pipe/Conduit	
F14.000	30.000	0.500	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F14.001	16.863	0.281	60.0	0.000	12	0.0	1.500	o	225	Pipe/Conduit	
F14.002	25.556	0.426	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F15.000	34.765	0.579	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F15.001	17.528	0.117	149.8	0.000	5	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F10.004	75.540	0.000	0.0	56	0.2	30	0.56	1.19	47.3	1.7
F12.000	79.446	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F12.001	78.855	0.000	0.0	8	0.0	11	0.35	1.48	59.0	0.2
F12.002	78.524	0.000	0.0	8	0.0	11	0.35	1.48	59.0	0.2
F10.005	74.945	0.000	0.0	73	0.2	34	0.61	1.19	47.3	2.3
F10.006	74.070	0.000	0.0	89	0.3	37	0.64	1.19	47.2	2.8
F10.007	73.645	0.000	0.0	105	0.3	36	0.79	1.49	59.1	3.2
F13.000	74.796	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F13.001	72.817	0.000	0.0	20	0.1	17	0.47	1.48	58.9	0.6
F10.008	72.594	0.000	0.0	127	0.4	40	0.84	1.48	59.0	3.9
F14.000	76.895	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F14.001	76.395	0.000	0.0	12	0.0	13	0.40	1.48	59.0	0.4
F14.002	76.114	0.000	0.0	12	0.0	13	0.40	1.48	59.0	0.4
F15.000	75.314	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F15.001	74.735	0.000	0.0	5	0.0	11	0.22	0.94	37.3	0.2





















Network Design Table for Foul - Phase 1 Only

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F15.002	7.534	0.050	150.7	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F14.003	21.852	0.182	120.1	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F14.004	29.726	0.248	119.9	0.000	2	0.0	1.500	o	225	Pipe/Conduit	
F14.005	29.726	0.248	119.9	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F14.006	29.726	0.248	119.9	0.000	3	0.0	1.500	o	225	Pipe/Conduit	
F14.007	33.379	0.278	120.1	0.000	3	0.0	1.500	o	225	Pipe/Conduit	
F14.008	27.219	0.227	119.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.009	11.540	0.096	120.2	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F10.010	40.233	0.335	120.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.011	16.306	0.136	119.9	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F10.012	41.679	0.347	120.1	0.000	2	0.0	1.500	o	225	Pipe/Conduit	
F10.013	35.586	0.297	119.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F10.014	6.030	0.050	120.6	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F1.028	27.840	0.232	120.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.029	28.624	0.239	119.8	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.030	81.036	0.675	120.1	0.000	20	0.0	1.500	o	300	Pipe/Conduit	
F1.031	90.111	1.502	60.0	0.000	23	0.0	1.500	o	300	Pipe/Conduit	
F1.032	15.797	0.132	119.7	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.033	30.446	0.507	60.1	0.000	0	0.0	1.500	o	300	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add	Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F15.002	74.618	0.000	0.0	5	0.0	11	0.22	0.93	37.1	0.2
F14.003	74.568	0.000	0.0	21	0.1	20	0.38	1.05	41.6	0.6
F14.004	73.776	0.000	0.0	23	0.1	21	0.39	1.05	41.7	0.7
F14.005	72.628	0.000	0.0	27	0.1	22	0.41	1.05	41.7	0.8
F14.006	71.480	0.000	0.0	30	0.1	23	0.42	1.05	41.7	0.9
F14.007	71.232	0.000	0.0	33	0.1	25	0.43	1.05	41.6	1.0
F14.008	70.954	0.000	0.0	33	0.1	25	0.44	1.05	41.7	1.0
F10.009	70.727	0.000	0.0	166	0.5	53	0.71	1.05	41.6	5.1
F10.010	70.631	0.000	0.0	166	0.5	53	0.71	1.05	41.6	5.1
F10.011	70.296	0.000	0.0	170	0.5	54	0.72	1.05	41.7	5.3
F10.012	70.160	0.000	0.0	172	0.5	54	0.72	1.05	41.6	5.3
F10.013	69.813	0.000	0.0	172	0.5	54	0.72	1.05	41.7	5.3
F10.014	69.516	0.000	0.0	178	0.5	55	0.72	1.04	41.5	5.5
F1.028	69.466	0.000	0.0	293	0.8	64	0.81	1.27	89.5	9.1
F1.029	69.234	0.000	0.0	293	0.8	64	0.81	1.27	89.5	9.1
F1.030	68.995	0.000	0.0	313	0.9	67	0.83	1.27	89.4	9.7
F1.031	68.320	0.000	0.0	336	0.9	58	1.08	1.79	126.7	10.4
F1.032	66.669	0.000	0.0	336	0.9	69	0.85	1.27	89.6	10.4
F1.033	64.596	0.000	0.0	336	0.9	58	1.08	1.79	126.6	10.4

Network Design Table for Foul - Phase 1 Only

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.034	38.265	0.319	120.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.035	47.771	0.796	60.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.036	46.669	0.778	60.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F16.000	46.288	0.771	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F16.001	22.746	0.152	149.6	0.000	56	0.0	1.500	o	225	Pipe/Conduit	
F16.002	16.110	0.161	100.1	0.000	56	0.0	1.500	o	225	Pipe/Conduit	
F16.003	38.548	0.642	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F16.004	45.977	0.766	60.0	0.000	106	0.0	1.500	o	225	Pipe/Conduit	
F16.005	13.886	0.231	60.1	0.000	96	0.0	1.500	o	225	Pipe/Conduit	
F16.006	13.232	0.221	59.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F16.007	10.179	0.170	59.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F16.008	12.414	0.207	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F16.009	16.483	0.275	59.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.000	29.934	0.499	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.001	29.961	0.499	60.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.002	26.829	0.288	93.2	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.003	33.148	0.276	120.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.004	20.147	0.168	119.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.005	20.138	0.168	119.9	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.006	10.052	0.084	119.7	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.034	64.089	0.000	0.0	336	0.9	69	0.85	1.27	89.5	10.4
F1.035	61.635	0.000	0.0	336	0.9	58	1.08	1.79	126.7	10.4
F1.036	58.367	0.000	0.0	336	0.9	58	1.08	1.79	126.7	10.4
F16.000	63.775	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F16.001	63.004	0.000	0.0	56	0.2	33	0.47	0.94	37.3	1.7
F16.002	62.852	0.000	0.0	112	0.3	42	0.67	1.15	45.6	3.5
F16.003	60.271	0.000	0.0	112	0.3	37	0.81	1.48	59.0	3.5
F16.004	57.718	0.000	0.0	218	0.6	51	0.98	1.48	59.0	6.7
F16.005	56.952	0.000	0.0	314	0.9	62	1.09	1.48	58.9	9.7
F16.006	54.096	0.000	0.0	314	0.9	62	1.10	1.49	59.0	9.7
F16.007	50.295	0.000	0.0	314	0.9	62	1.10	1.48	59.0	9.7
F16.008	46.582	0.000	0.0	314	0.9	62	1.10	1.48	59.0	9.7
F16.009	43.559	0.000	0.0	314	0.9	62	1.10	1.48	59.0	9.7
F17.000	98.268	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F17.001	96.869	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F17.002	95.470	0.000	0.0	0	0.0	0	0.00	1.19	47.3	0.0
F17.003	95.182	0.000	0.0	0	0.0	0	0.00	1.05	41.6	0.0
F17.004	94.906	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0
F17.005	94.738	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0
F17.006	94.570	0.000	0.0	0	0.0	0	0.00	1.05	41.7	0.0