Headford Road Housing

Engineering Services Report

190048-DBFL-Z0-00-RP-C-0001

INFRASTRUCTURE

12 April 2022

DBFL CONSULTING ENGINEERS

Project Title:	Headford Road Housing		
Document Title:	Engineering Services Report		
File Ref:	190048-DBFL-Z0-00-RP-C-0001		
Status:	S3 Suitable for Review and Comment	Rev:	P01.2

Rev.	Date	Description	Prepared	Reviewed	Approved
P01.1	05/04/22	For Information	Michael Mulder	Vincent Eivers	Sarah Curran
P01.2	12/04/22	For Planning	Michael Mulder	Vincent Eivers	Sarah Curran

Contents

Figures

Tables

1 Introduction

This report addresses all civil engineering services (foul water, surface water and watermains), roads and flood risk assessment for the proposed residential development of 24 housing units at Headford Road, Co. Galway, Ireland.

Pursuant to the requirements of Section 177AE(4)(a) of the Planning and Development Act 2000 (as amended) notice is hereby given that Galway City Council proposes to seek approval from An Bord Pleanála to carry out the following development at Headford Road, Galway.

Nature of Development: to construct a social housing development of 24 no residential units, comprising – 3 no. 1-bedroom units, 14 no. 2-bedroom units, 4 no. 3-bedroom units and 3 no. 4-bedroom TTA (Traveller Appropriate Accommodation) units, the provision of a foul water pumping station, associated carparking and bicycle parking, green spaces and landscaping, connections to existing services and all ancillary/enabling site development works.

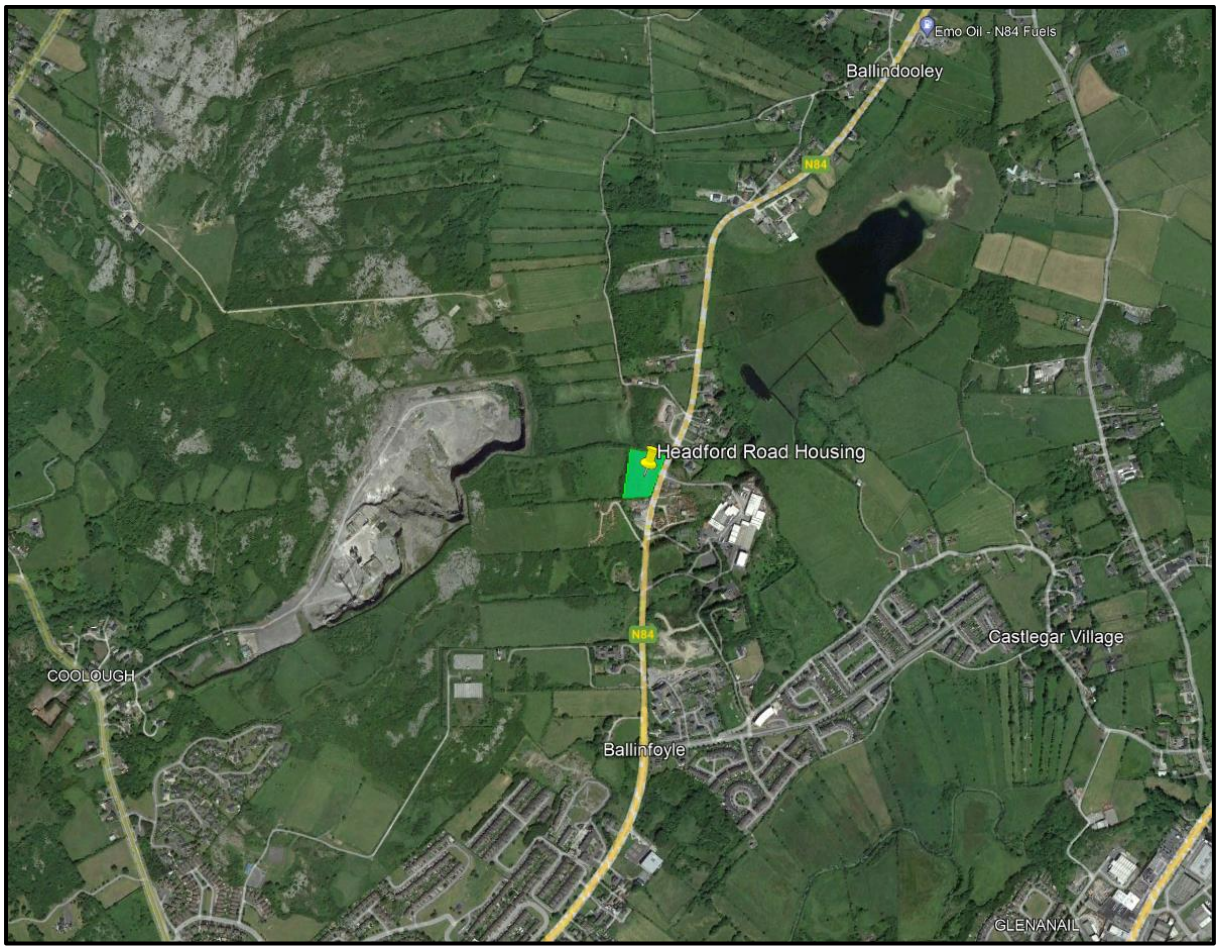


Figure 1-1 Site Locality Plan

1.1 Existing site conditions

The site has a surface area of 6944m² and the surface layer is a greenfield site with approximately 25% hedge growth. The average slope of the existing ground level of the site is ±16% (1:6.2) from the western to the eastern boundary (Headford Road). No ground water was found in any of the test pits or boreholes done as part of the geotechnical site investigation. The depths investigated ranged from 2 to 5.5m.

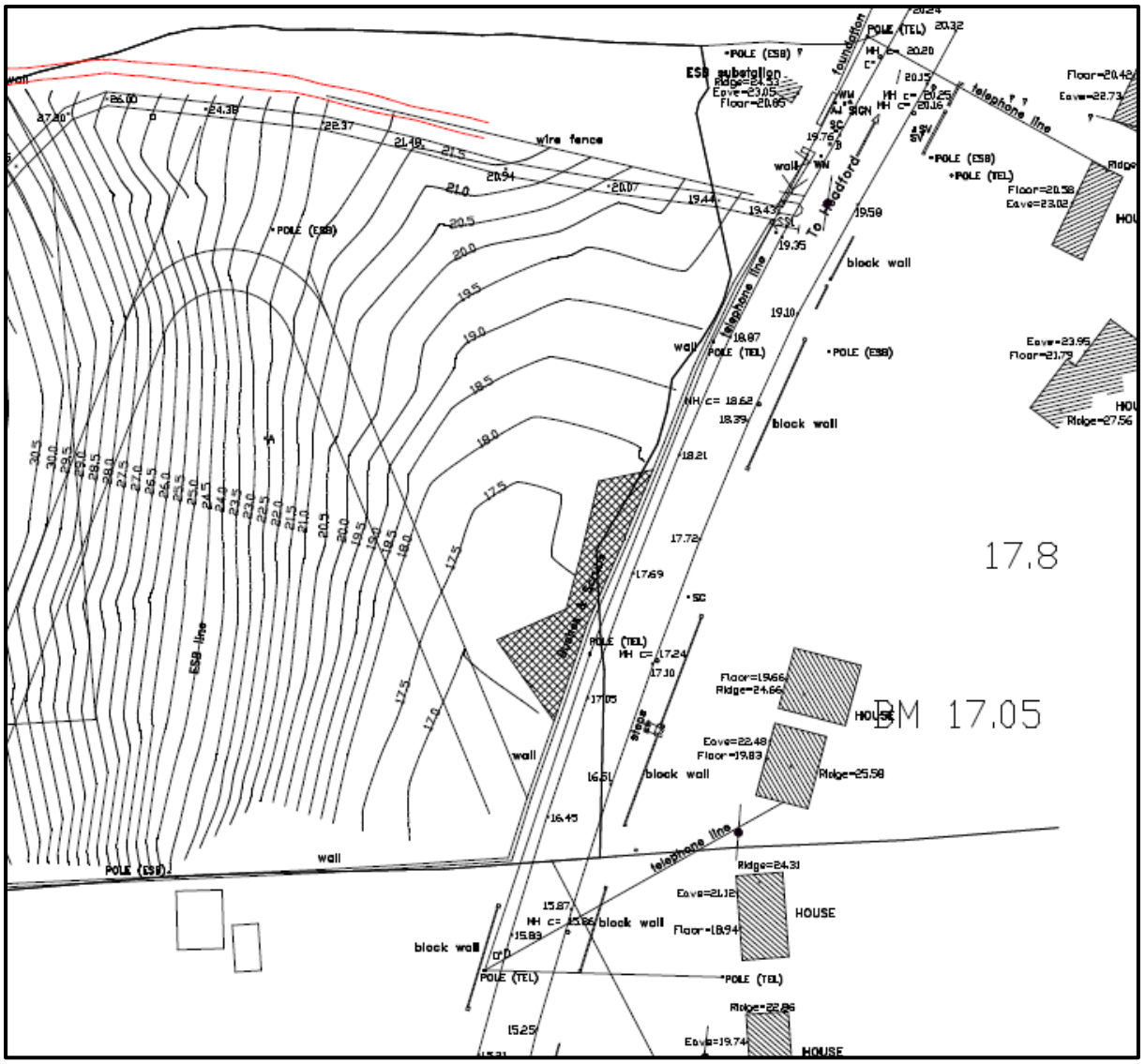


Figure 1-2 Topographical Site Survey

1.2 Objective

The aim of this report is to surmise and substantiate the proposed design through the use of calculations, estimates and assumptions used to design the foul sewers, surface water sewers, surface water attenuation, watermains and roads for the proposed development.

2 Foul Sewer

2.1 Existing Services

There are no existing public gravity foul sewers in the immediate vicinity of the site. The nearest existing public gravity foul sewer is 530m south of the site in Headford Road. There is currently an existing 150Ø foul sewer rising main running along the eastern edge of Headford Road. This existing rising main discharges to the aforementioned gravity system 530m away from the site into a rising main manhole. See Fig 2.1 for the existing foul sewer rising main and the gravity foul sewer tie in point along Headford Road.

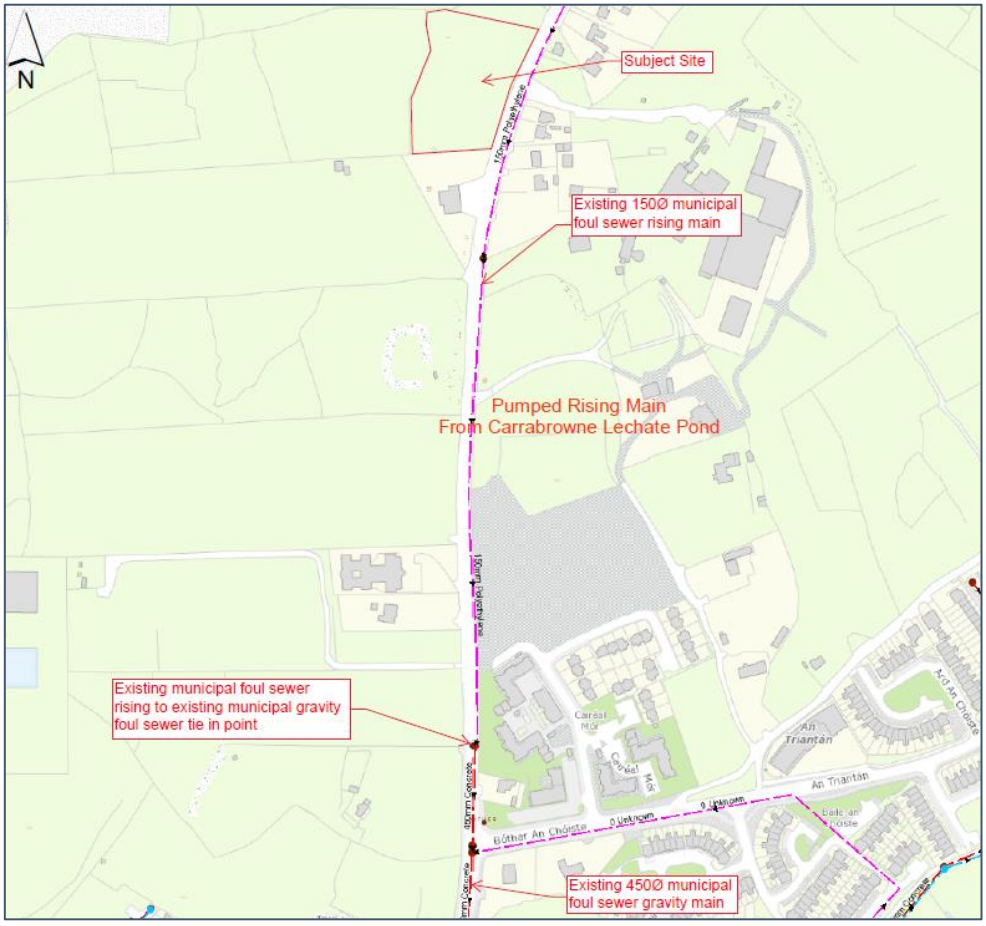


Figure 2-1 Existing Foul Sewer Infrastructure

2.2 Proposed Foul Sewer

It is proposed to have an on-site gravity foul sewer network. Since there is no public gravity sewer in close proximity to the site, the new on-site network will discharge to a foul pump station located within the site. The effluent will then be pumped from the new on-site pump station along Headford road south via a 80mmØ new rising main that will discharge to the gravity system 530m away ("tie in point" as per Fig 2.1).

Foul sewers have been designed and will be constructed in accordance with the Irish Water's 'Standard Details for wastewater infrastructure' and 'Code of practice for wastewater infrastructure'. In addition, foul sewers have been designed to Building Regulations and specifically in accordance with the principles and methods set out in EN 752:2008 and DOE 'Recommendations for Site Development Works'. In addition, HR Wallingford 'Tables for the hydraulic design of pipes, sewers and channels' and Water UK/WRc 'Sewers for Adoption – 6th Edition' have been applied. Values for roughness of uPVC pipes were obtained from Wallingford "Tables for the Hydraulic Design of Pipes, Sewers and Channels" and Wavinsewer systems catalogue.

The on-site foul sewer network was sized using the EN 752 method in WINDES where:

$$Q = kDU\sqrt{\sum DU}$$

The following design criteria have been applied in the design of foul sewers:

(i) Discharge units (DU)	3 per housing unit (6 litre cistern)
(ii) EN 752 Frequency Factor (*k*DU)	0.5
(iii) Pipe Ks	1.5 mm (concrete) 0.6mm (uPVC for flow>0.5D) 0.15mm (uPVC for flow<0.5D)
(iv) Minimum velocity	0.75 m/s (self cleansing vel.)
(v) Maximum velocity	3 m/s
(vi) Minimum gradients:	

No. of Houses	Minimum Pipe Gradient

1	100mm dia. @ 1:60 or self cleansing gradient (private connection)
2-9	150mm dia. @ 1:60 or self cleansing gradient
>10	Min 150mm dia. or self cleansing gradient

Sewers and drains shall be laid to comply with the requirements of the Building Regulations 1997 in accordance with the recommendations contained in the Technical Guidance Documents, Section H (revised 2005). Standard drainage details will be in accordance with the Greater Dublin Regional Code of Practice for Drainage Works and Irish Water Standard Details for Wastewater infrastructure.

A Pre-Connection Enquiry has been submitted to Irish Water who have confirmed that the foul sewer rising main connection to the public network can be accommodated.

Refer to Appendix F for Irish Water Pre-Connection Enquiry response.

The calculations for the foul network system can be seen in Appendix A.

2.2.1 Foul Sewer Pump Station

The foul sewer pump station design was undertaken in accordance with the Irish Wate Code of Practice for wastewater infrastructure. The design calculations for which can be seen in Appendix A. The final design of the sewer pump station will be agreed with Irish Water prior to construction.

Refer to Dwg No. 190048-DBFL-CS-SP-DR-C-1301 for the foul sewer layout.
Refer to Dwg No. 190048-DBFL-FW-SP-DR-C-3002 for the foul sewer long-sections.
Refer to Dwg No. 190048-DBFL-FW-SP-DR-C-5014 for foul sewer pump station details

3 Watermains

3.1 Existing watermains

There are two existing municipal watermains that run within the road reserve of Headford Road. The first being a 100mmØ asbestos cement water main, running along the western edge of the road reserve and the second being a 50mmØ MDPE watermain running along the eastern edge of the road reserve. See Fig 3-1 below for reference.

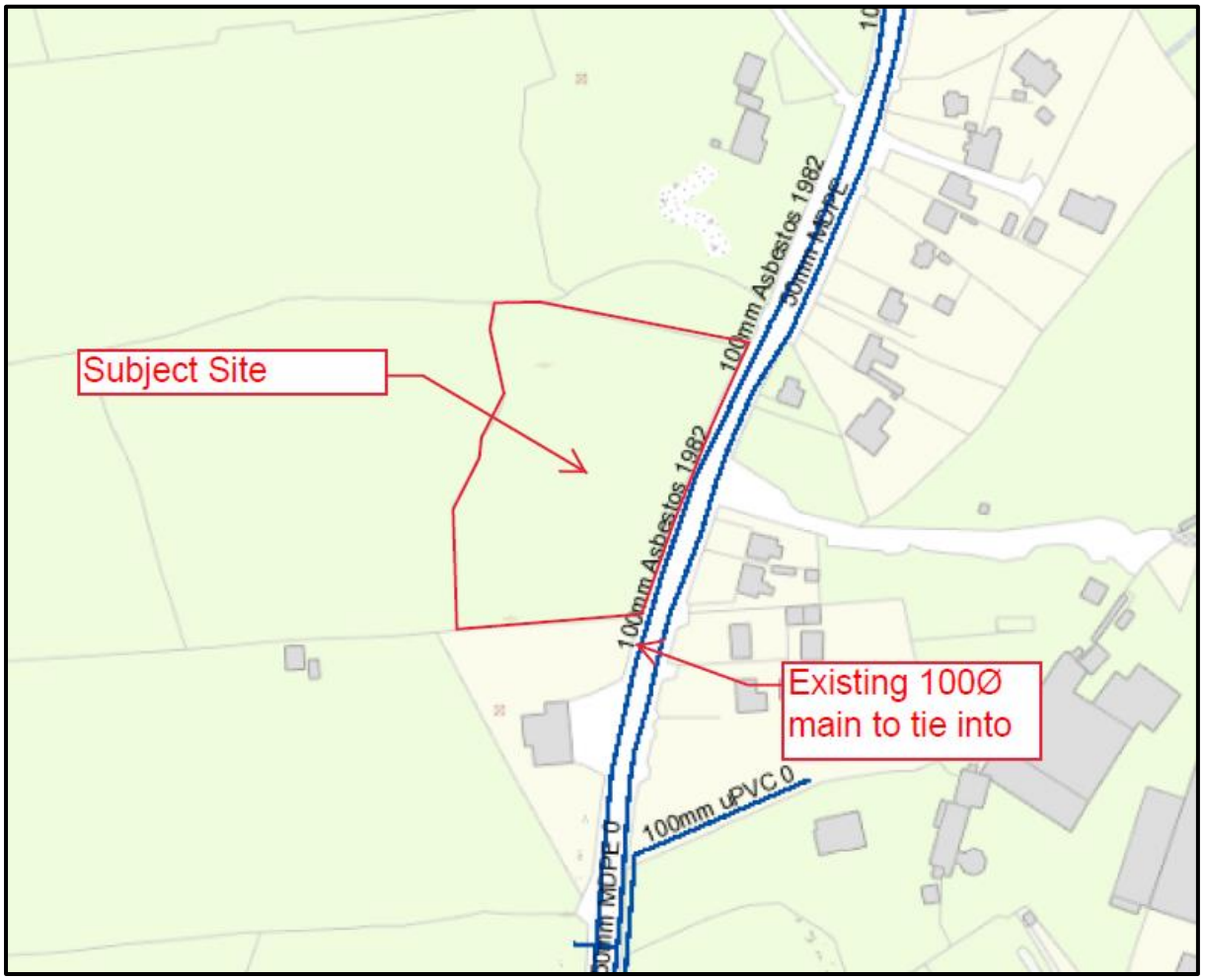


Figure 3-1 Existing Watermain Infrastructure

3.2 Proposed Watermain

It is proposed to tap off of the 100mmØ existing asbestos watermain in Headford Road with a new 100mm tee piece and bulk water meter, to supply water to the site. The new 100mmØ will perform the dual function of supplying potable water to the site as well as provide protection from fire by the addition of 2 fire hydrants.

The required post development average water demand is 0.11l/s and 0.7l/s for the peak water demand. The total daily demand for the proposed development is 9.72m³/day with an average day in a peak week having a demand of 12.15m³/day.

A Pre-Connection Enquiry has been submitted to Irish Water who have confirmed that the watermain connection can be accommodated without upgrade works.

Refer to Appendix F for Irish Water Pre-Connection Enquiry response.

The required domestic demand calculations can be seen in appendix B.

Refer to Dwg No. 190048-DBFL-CS-SP-DR-C-1301 for the watermain layout.

4 Roads

4.1 Existing roads

There are no on site existing roads infrastructure. The only existing road in the vicinity of the site is Headford Road, which borders the site along its eastern boundary.

4.2 Proposed Roads

Access to the development will be from the eastern boundary of the development. The proposed entrance is designed to accommodate access for a bin lorry and to achieve the required sightlines of 2.4m x 59m based on a design speed of 60 Km/h in accordance with the design manual for urban streets and roads (DMURS). This is achieved on both sides of the intersection. All roads and parking areas have a minimum of 2.5% crossfall and 0.667% longitudinal fall.

Road infrastructure within the site comprises of 5.5m access roads, 1.8m wide footpaths and 2.4m x 5m parking spaces. An auto-tracking analysis has been carried out for a bin lorry to ensure sufficient turning manoeuvres are available throughout the site.

Refer to Dwg No. 190048-DBFL-RD-SP-DR-C-1002&1003 for the roads layout.
Refer to Dwg No. 190048-DBFL-RD-SP-DR-C-5001 & 5002 roads details.

5 Surface water drainage

5.1 Existing surface water services

There is no existing public surface water sewer networks in close proximity to the site.

As it stands, all pluvial storm water that falls onto the site currently soaks away to ground or flows as sheet flow overland toward Headford Road. It then flows south along Headford Road and discharges to an existing marsh area. The marsh area is 150m south of the site on Headford Road, on the east side of Headford Road. The estimated soil group for the site is 3.

Figure 5-1 Pluvial storm water discharge point

5.2 Proposed Services

As there is no public surface sewer network close to the site, it has been proposed to use an on-site underground surface water drainage network (gulley, manhole and pipe network) with a below ground soakaway system that will let the surface water runoff to infiltrate to ground.

Surface water management for the proposed development is designed to comply with the 'Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Technical Document – Volume 2, New Developments, 2005' and the 'Greater Dublin Regional Code of Practice for Drainage Works, V6.0 2005'. CIRIA Design Manuals C753, C697 and C609 have also been used to design the surface water drainage system within the site.

The GDSDS guidelines require the following main 4 main criteria to be provided by the development's surface water design;

- Criterion 1: River Water Quality Protection – satisfied by providing interception storage and treatment of run-off within the SuDS features e.g. green roofs, permeable paving, and on-line cellular storage attenuation systems.
- Criterion 2: River Regime Protection – satisfied by infiltrating surface water to ground
- Criterion 3: Level of Service (flooding) for the site – satisfied by the site being outside the 1000 year coastal and fluvial flood levels. Pluvial flood risk addressed by development designed to accommodate a 100 year storm as per GDSDS. Planned flood routing for storms greater than 100 year level considered in design and development run-off contained within site.
- Criterion 4: River flood protection – attenuation provided within the SuDS features e.g. permeable paving construction, and on-line cellular storage attenuation systems.

5.2.1 SuDS

It is proposed to use a sustainable urban drainage system (SuDS) approach to stormwater management throughout the site, the overall strategy aims to provide an effective system to mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in stormwater, contributing to amenity, aesthetics and biodiversity enhancement and allow for the maximum collection of rainwater for re-use where possible. In addition, SuDS features aim to replicate the natural characteristics of rainfall runoff for any site by providing control of run-off at source and this has

been achieved by the current proposals.

SuDS are a requirement under their 'Regional Code of Practice for Drainage Works' and 'The Greater Dublin Strategic Drainage Study'. Additionally, these systems are recommended under the 2009 guidelines, 'The Planning System and Flood Risk Management'.

There are a number of SuDS features proposed which have been designed in accordance with CIRIA documents C753, C697 and C609 as follows:

- Swales (wet): Broad, shallow drainage channels covered in grass which can treat, convey and attenuate runoff, at source, and can infiltrate to the ground where the subgrade is suitable. Swales also can promote biodiversity. These are located adjacent to roads and hard-standing areas.
- Cellular System: Proprietary modular block with an inspection manhole for providing underground surface water soakaway infiltration of runoff to the ground where the subgrade is suitable. This will be the primary attenuation system for the site and will be located underneath the parking area.
- Green roof: Green roofs provide ecological, aesthetic and amenity benefits and intercept and retain rainfall, at source, reducing the volume of runoff and attenuating peak flows. Green roofs absorb most of the rainfall that they receive during ordinary events although they will only contribute to attenuation of flows for larger events. Additionally, green roofs treat surface water through removal of atmospherically deposited urban pollutants. Finally, green roofs may reduce heating (by adding mass and thermal resistance value) and cooling (by evaporative cooling) loads on a building. An extensive green roof provides an area with low growing, low maintenance plants consisting of self-sustaining mosses, sedums, succulents, herbs or grasses over a drainage layer and waterproofing membrane. Extensive green roofs provide ecological, aesthetic and amenity benefits and intercept, treat and retain rainfall, reducing the volume of runoff and attenuation peak flows. Extensive roofs are usually only accessed for maintenance.
- Petrol Interceptor: A proprietary oil/water separator which prevents hazardous chemical and petroleum products from entering watercourses and public sewers. These are proposed at each outfall from the site in addition to a silt trap chamber.
- Silt Trap Chamber: A proprietary hydrodynamic vortex separator which removes settleable solids and oils from runoff. These are proposed at outfalls from the site in addition to a petrol interceptor.

5.2.2 Greenfield Run-off – Pre-Development

For informational purposes only, the existing pre-development greenfield runoff rate for the development has been calculated and is compared to the rate discharged from the site at post-development.

According to the GDSDS section 6.6.1.2, the method used for determining peak flow rates for small greenfield (undeveloped) catchments is the UK 'Institute of Hydrology Report 124, Flood Estimation for Small Catchments'. This method calculates $QBAR_{rural}$ which is the mean annual flood flow from a rural catchment. As the subject site area is less than 50 hectares, the calculated Qbar is to be linearly interpolated from the calculated value to produce a reduced allowable outflow based on the actual site area, as per GDSDS section 6.6.1.

$$QBAR_{rural} = 0.00108 \times (Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$$

where:-

$QBAR_{rural}$ = Mean Annual Flood (m^3/s)

Area = Catchment Area (km^2)

SAAR = Standard Average Annual Rainfall (mm)

SOIL = SOIL index from Flood Studies Report

Since the site will not be discharging surface water run-off to any municipal system the QBAR is effectively 0l/s. Appendix C reflects the calculated permissible site discharge.

The cellular system will allow on-site flood/storm water to enter via the surface sewer pipe network. The water will then be stored in the cellular system and allowed to infiltrate into the ground.

Ground infiltration is the only viable means of discharging the flood waters as there are no nearby surface water sewers. In the event of blockages within the system, the flood waters will discharge

overland to Headford Road via the access carriageway crossing. Therefore ensuring a fail-safe when the surface water sewer network and cellular storage facility is compromised.

5.2.3 Surface water attenuation

Surface water attenuation for the site will be provided within an online attenuation system which consists of an underground 'Pluvial Cube' proprietary modular cube system surrounded by a geotextile to create a tanked system that will infiltrate into the ground as there is good infiltration capacity on-site from the site investigations carried out.

The underground soakaway system will be sized based on the effective runoff catchment area contributing to flows to the system. There will be no outflow pipe and the only discharge of surface water will be via infiltration at the bottom and sides on the cell.

The cellular system was sized for the 100 year event with an allowance of 20% for climate change using the Microdrainage program. The calculations for this (as per Microdrainage) can be seen in appendix D of this document.

The cellular soakaway facility dimensions calculated are 23mx10mx1.6m high. This will allow for the total storage of the 100 year flood under infiltration conditions. The design also makes allowance for the silting/clogging up of the base area of the unit. There will be a silt trap manhole at the inlet to the tank and there will be a manhole at the other side of the tank to provide for maintenance.

5.2.4 Surface water sewers

The surface water sewers were designed in Microdrainage using the Modified Rational method. The return period for sizing pipes. The pipes were sized for the 2 year flood and checked for the 30 year event as well. The evaluated soil group for the site is classified as 3.

The design criteria for the surface sewers can be seen in appendix E of this document. The calculations for this (as per Microdrainage) can be seen in appendix E of this document.

Refer to Dwg No. 190048-DBFL-CS-SP-DR-C-1301 for the surface sewer layout.

Refer to Dwg No. 190048-DBFL-SW-SP-DR-C-5015 for the surface sewer cellular tank details.

6 Flood Risk Assessment

6.1 Approach

This section of the report evaluates 'The Planning System & Flood Risk Management – Guidelines for Planning Authorities' as they relate to the proposed application. This section also takes into account the Galway City Development Plan: Strategic Flood Risk Assessment.

6.2 Planning System & Flood Risk Management Guidelines

6.2.1 Flood Risk Assessment Stages

This site-specific flood risk assessment will use existing flood risk information to determine the flood zone category of the site i.e. to check if the Guidelines Sequential Approach has been applied, see Figure 4 below for details.

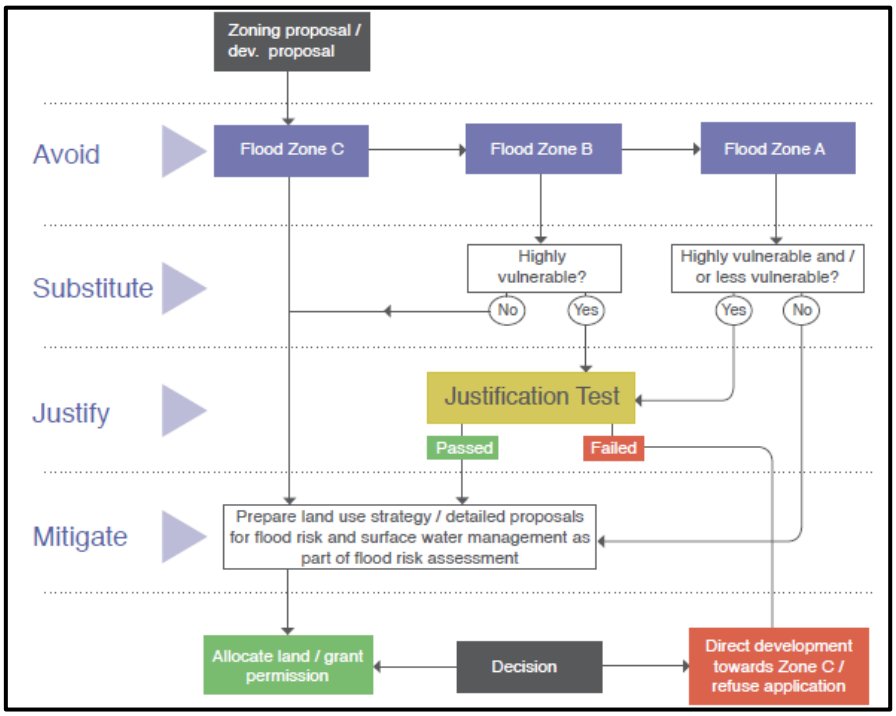


Figure 6-1 Sequential Approach mechanism in the planning process

Flood risk is normally assessed by a flood risk identification stage followed by an initial flood risk assessment. The Galway City Development Plan: Strategic Flood Risk Assessment states that if the risk of flooding is found to be low, there are no restrictions to development. However, if the risk is found to be medium or above, a more detailed flood impact assessment stage must be approved which includes an assessment of surface water management, flood risk and mitigation measures to be applied.

6.3 Flood Risk Identification Stage

6.3.1 General

The flood risk identification stage uses existing information to identify and confirm whether there may be flooding or surface water management issues for the lands in question that may warrant further investigation.

6.3.2 Information Sources Consulted

Information sources consulted for the identification exercise and an assessment are outlined in Table 6-1 below.

Information	Source	Assessment
Predictive and historic flood maps, and benefiting lands maps, such as those available on http://www.floodmaps.ie;	OPW floodmaps.ie website consulted	There were no OPW land commission schemes or benefitting land zones within the subject site's boundary.
Predictive fluvial, coastal, pluvial and groundwater flood maps.	ECFRAMS and ICPSS.	No flood risk to the site was identified on any flood risk map.
Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques;	Site topographic survey undertaken and analysed.	No evidence of flood risk due to topography.
Alluvial deposit maps of the Geological Survey of Ireland. These maps indicate areas that have flooded in the past.	Geotechnical site investigation and GSI maps consulted.	There are no karst features are in this area. The site is primarily made up of pale grey clean skeletal limestone. Groundwater vulnerability is low. Regionally Important Aquifer - Karstified (conduit).
Historical Records of flooding	Flood Report from OPW	Indicate no historical flooding affecting the site.

Table 6-1 Information sources consulted

6.3.3 Source-Pathway-Receptor-Model

A Source-Pathway-Receptor model was produced to summarise the possible sources of floodwater, the people and assets (receptors) that could be affected by potential flooding (with specific reference to the proposals) and the pathways by which flood water for a 0.1%AEP (Annual Exceedance Probability) and 1%AEP storms could reach the receptors, see Table 2. It provides the probability and magnitude of the sources, the performance and response of pathways and the consequences to the receptors in the context of the post primary development proposal.

Source	Pathway	Receptor	Likelihood	Impact	Risk
Tidal	Tidal flooding from 3.5km away.	Residential properties and vehicles parked on site	Very remote to remote	High	Low
Fluvial	Flooding from river Corrib 2.1km south west of site. Flooding from Glenanail channel 1km south east of site.	Residential properties and vehicles parked on site	Possible	High	Low
Surface Water drainage (pluvial)	Flooding from Blocked Residential drainage system.	Residential properties and vehicles parked on site	Remote	Low	Low
Surface Water (pluvial)	Flooding from external overland flows.	Residential properties and vehicles parked on site	Possible	Moderate	Low
Groundwater flooding	Rising GWL on site.	Residential properties and vehicles parked on site	Remote	Low	Very Low
Human or Mechanical Error (pluvial)	Malfunctioning downstream drainage structures.	Residential properties and vehicles parked on site	Possible	Low	Low

Table 6-2 Information sources consulted

6.3.4 Source-Pathway-Receptor-Model Results

It is clear from the above flooding analysis that the proposed site is not at risk from tidal, fluvial, pluvial or groundwater flooding due to its geographic location and topography. Due to proposed levels, if flooding of any road occurs, water will be kept within the road reservation or directed to open spaces and will avoid all buildings. It will then subsequently be discharged to Headford Road as overland flow. Thus, the type of development proposed is appropriate for this flood zone category. The Guidelines Sequential Approach is therefore met and the 'Avoid' principal achieved and an initial flood risk assessment is not required.

6.3.5 Mitigation Measures

The proposed mitigation measures to address residual flood risks is:

- The drainage system will be maintained on a regular basis to reduce the risk of a blockage.
- Stormwater berms will be constructed along the western border of the site to ensure no excess flow enters the on-site system.

In the event of storms exceeding the design capacity of the drainage system, overland flows will be routed towards open spaces within the site and discharge to Headford Road via the carriageway crossing and through the perforated eastern boundary fence.

6.3.6 Residual Risks

There is a low risk of flooding of the site from surcharging of the drainage system. However, localised flooding may occur within site during a 1 in 100 year flood event. The site has been designed so that no property shall be affected by any surface water generated by high-intensity/short duration flood events.

The NIS identified potential hydrogeological links between the Site and nearby Europeans sites and waterbodies. Given the karst bedrock aquifer underlying the Site, there is a likelihood that groundwater within the Site could interact with Lough Corrib, River Corrib and Terryland River, which are ultimately linked with Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC

and the Inner Galway Bay SPA. Typically, there is strong interconnection between surface water and groundwater in karstified bedrock aquifers. We have therefore taken the extra precaution to protect these bodies from hydrocarbons with the implementation of a oil separator before surface water enters into the soakaway.

Appendix A: Foul Sewer Calculations

TITLE		Job Reference	
Headford Road Social Housing, Headford Road, Co. Galway Rev A		190048	
SUBJECT		Calc. Sheet No.	
Wastewater Hydraulic Load - Irish Water-Post Development		1	
DRAWING NUMBER	Calculations by	Checked by	Date
na	VGE	SVC	11/05/2021

Foul Drainage

Housing Units	24	no.
Dry Weather Flow (DWF)[1]	150	litres/person/day
Average Occupancy Ratio[2]	2.7	person/unit
Total Site Occupancy (i.e. population)	65	person
Total Daily Wastewater Discharge + 10% Unit Consumption Allowance[3]	10,692	l/day
Peak Flow Factor[4]	6.0	

Post Development Average Discharge	**0.1**	l/s	Note: This value may be lower than value calculated using MICRODRAINAGE EN752 method for pipe sizing
Post Development Peak Discharge[5]	**0.7**	l/s	

Foul Sewer Organic Loading

	Average Concentration[6]	Maximum Concentration[7]
BOD (mg/l)	168	422
SS (mg/l)	163	435
N (mg/l)	40.6	78.6
P (mg/l)	7.1	15.5
COD (mg/l)	389	1000

Notes:

1. Dry Weather Flow (DWF) is 150 litres/person/day from the Irish Water Code of Practice for Wastewater Infrastructure.
2. Occupancy ratio of 2.7 persons per dwelling from Irish Water Code of Practice for Wastewater Infrastructure.
3. The unit consumption allowance is 10% in accordance with the Irish Water Code of Practice for Wastewater Infrastructure.
4. The Peak Flow factor is taken as 6 times Dry Weather Flow (0 to 750 population), 4.5 DWF for 751 to 1000 and 3.0 DWF for 1001 to 5000
5. The peak discharge is equal to the Total Wastewater Discharge multiplied by the peak flow factor, expressed in litres/second.
6. The average concentrations of wastewater parameters taken from EPA "Wastewater Treatment Manuals, Treatment Systems for Small Communities, Business, Leisure Centres and Hotels".
7. Assumed Maximum concentration is equal to the average concentration plus 2 times the standard deviation (for the 95%ile) taken from EPA "Wastewater Treatment Manuals, Treatment Systems for Small Communities, Business, Leisure Centres and Hotels".

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Unit

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)	0.010
Calculation Method	EN 752	Maximum Backdrop Height (m)	2.000
Frequency Factor	0.50	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)	150

Designed with Level Inverts

Network Design Table for Foul - Unit

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Units	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	18.334	0.316	58.1	0.600	60.0	0.0	0.600	o	225	Pipe/Conduit	
F1.001	56.689	0.945	60.0	0.600	1.0	0.0	0.600	o	225	Pipe/Conduit	
F1.002	9.488	0.158	60.1	0.600	1.0	0.0	0.600	o	225	Pipe/Conduit	
F2.000	9.179	0.153	60.0	0.000	3.0	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Units	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	16.881	0.600	0.0	60.0	0.4	38	0.96	1.72	68.4	4.3
F1.001	16.565	1.200	0.0	61.0	0.4	38	0.96	1.69	67.3	4.3
F1.002	15.620	1.800	0.0	62.0	0.4	38	0.96	1.69	67.2	4.3
F2.000	16.390	0.000	0.0	3.0	0.1	24	0.67	1.00	7.8	1.0

Manhole Schedules for Foul - Unit

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
F3	20.468	3.587	Open Manhole	1200	F1.000	16.881	225				
F2	20.176	3.611	Open Manhole	1200	F1.001	16.565	225	F1.000	16.565	225	
F1	17.853	2.233	Open Manhole	1200	F1.002	15.620	225	F1.001	15.620	225	
F	17.400	1.938	Open Manhole	0		OUTFALL		F1.002	15.462	225	
F4	17.550	1.160	Open Manhole	1200	F2.000	16.390	100				
F	17.853	1.616	Open Manhole	0		OUTFALL		F2.000	16.237	100	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F3	530991.437	728451.656	530991.437	728451.656	Required	
F2	530974.853	728443.839	530974.853	728443.839	Required	
F1	530971.985	728387.223	530971.985	728387.223	Required	
F	530981.463	728386.782			No Entry	
F4	530971.445	728378.060	530971.445	728378.060	Required	
F	530971.985	728387.223			No Entry	

PIPELINE SCHEDULES for Foul - Unit

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	225	F3	20.468	16.881	3.362	Open Manhole	1200
F1.001	o	225	F2	20.176	16.565	3.386	Open Manhole	1200
F1.002	o	225	F1	17.853	15.620	2.008	Open Manhole	1200
F2.000	o	100	F4	17.550	16.390	1.060	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	18.334	58.1	F2	20.176	16.565	3.386	Open Manhole	1200
F1.001	56.689	60.0	F1	17.853	15.620	2.008	Open Manhole	1200
F1.002	9.488	60.1	F	17.400	15.462	1.713	Open Manhole	0
F2.000	9.179	60.0	F	17.853	16.237	1.516	Open Manhole	0

Free Flowing Outfall Details for Foul - Unit

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.002	F	17.400	15.462	16.000	0	0

Free Flowing Outfall Details for Foul - Unit

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F2.000	F	17.853	16.237	16.200	0	0

TITLE Headford Road Development		**Job Reference** 190048
SUBJECT **Foul Pumping Station and Rising Main Hydraulic Calculations PS02 (SDCC)**		**Calc. Sheet No.** 1
DRAWING NUMBER 190048	**Calculations by** MWM	**Checked by** VE

PUMP REQUIREMENTS

Development Type	No	Occupancy	Population	Consumption (l/head/day)	DWF (m^3/day)
Residential Units	24	2.7	65	150	10

Development Type	Area (sqm)	Occupancy (m^2 per person)	Population	Consumption (l/head/day)	DWF (m^3/day)
Retail	0	18	0	50	0
Employment	0	25	0	100	0
Community	0	5	0	40	0
School	0	20	0	90	0

DWF (Excluding Infiltration) =	9.72	m^3/d	
Infiltration I =	0.97	m^3/d	10% of DWF IW COP
DWF =	10.69	m^3/d	
PE =	71	say	6160
Pass forward flow (2.5 x DWF) =	26.73	m^3/d	IW-TEC-800-01
Pump Design Flow =	1.11	m^3/hr	Based on 24 hour Day
Pump Design Flow =	**0.31**	l/s	Based on 24 hour Day

RISING MAIN

Pipe Ks =	0.15	mm	
Rising main diameter =	50	mm	(200mm OD dia. HDPE, SDR 17)
Minimum velocity =	0.7	m/s	(For self cleansing)
Chosen pumping rate =	0.31	l/s	Too low < minimum flow rate

Minimum flow rate for self cleaning velocity =	1.37	l/s
Velocity for pumping rate of 0.31 l/s =	0.070	m/s

TITLE		Job Reference
Headford Road Development		190048
SUBJECT		**Calc. Sheet No.**
Foul Pumping Station and Rising Main Hydraulic Calculations PS02 (SDCC)		1
DRAWING NUMBER	**Calculations by**	**Checked by**
190048	MWM	VE

Rising Main Head

Cover Level at PS =	17.76	m	
Pump Invert Level =	13.00	m	Incoming Sewer = 15.46
Outfall Invert Level =	15.36	m	
Static Lift =	13.00	m	
Length of rising main =	527	m	
Friction Losses (refer to Xylect Head Loss Calcs	2.00	m	
Total Losses =	15.00	m	say 15m

Wet Well Size

Assume 2.3m depth in wet well to minimise depth
IW - no more than 10 starts per hour = pump on every 6 minutes
Conservative = 10 minutes

Assume depth	2.30	m
Volume in 10 minutes (DWF) =	0.06	m^3
Diameter required:	0.19	m
Diameter Used:	2.40	m

Septicity of Rising Main & Wet Well

Length of rising main (initial stage) =	527	m
Volume of rising main =	1.03	m^3
Volume of wet well between cut in/cut out =	10.68	m^3
Total daily flow (development fully constructed) =	10.69	m^3 day
Time interval between clearing of main & wet well (phase 1) =	26.3	hours

26.3hrs < 6.0hrs max retention time ..... septicity Fails ***(IW < 6 hours)***

Emergency Storage		***Storage***	***(based on PE)***
0 to 250	24 hour	*11*	
250 to 333	18 hour	*0*	
334 to 1667	12 hour	*0*	
1668-3333	10 hour	*0*	
Total:		***11***	***m^3***

Appendix B: Watermain Calculations

TITLE		Job Reference
Headford Road Social Housing, Headfrod Road, Co. Galway Rev A		190048
SUBJECT		**Calc. Sheet No.**
Water Demand for Irish Water-Post Development		1
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
na	VGE	SVC	11/05/2021

DEMAND

Housing Units	24	no.
Daily Demand per person [1]	150	litres/person/day
Average Occupancy Ratio[2]	2.7	person/unit
Total Site Occupancy	65	people
Average Daily Demand	9,720	l/day
Average Day in Peak Week[3]	12,150	l/day
Normal Length of Day[4]	24	hours
Peak Factor[5]	5.0	

Post Development Peak Water Demand[6]	**0.70**	l/s
Post Development Average Water Demand	**0.11**	l/s
Normal Demand[7]	**0.1**	l/s

Notes:

1. Daily Demand per person of 150 l/p/d taken from Irish Water Code of Practice 2016 (Doc no. IW-CDS-5020-03)
2. Occupancy ratio of 2.7 persons per dwelling from Irish Water Code of Practice for Water Infrastructure.
3. Average Day in Peak Week is 1.25 times the average daily demand.
4. Assumed normal demand is the total daily demand during the normal length of day. (Variable)
5. Peak Factor for pipe sizing from Irish Water Code of Practice for Water Infrastructure
6. Peak Factor multiplied by Average Day in Peak Week flow
7. Normal demand is the total daily demand during the normal length of day.
8. Fire flow is required at 25l/s as per B.S. 5306-1:1976.

Appendix C: Surface Drainage Calculations

PROJECT			JOB REF.
Headford Road, Co. Galway			190048
SUBJECT			**Calc. Sheet No.**
Surface Water Calculations - Permissible Site Discharge			1
Drawing ref.	**Calculations by**	**Checked by**	**Date**
190048	MWM	SVC	10/05/2019

PERMISSIBLE SURFACE WATER DISCHARGE CALCULATIONS

Site Area

What is the overall site area? **0.6944** Hectares (ha) Site is Less than 50 Hectares

Pre-Development Catchment Soil Characteristics

Are there different soil types present on the pre-developed site? No

Catchment (This refers to the entire site area)	1	
Area	0.69	Hectares (ha)
Drainage Group	1	Class
Depth to Impermeable Layers	2	Class
Permeability Group above Impermeable Layers	1	Class
Slope [(o)]	3	Class
SOIL Type	3	From FSR Table
[1]SOIL Index	0.40	

SOIL	SOIL Value	SPR
1	0.15	0.10
2	0.30	0.30
3	0.40	0.37
4	0.45	0.47
5	0.50	0.53

Site SOIL Index Value **0.40**

Site SPR Value **0.37**

Post-Development Catchment Characteristics

Is the development divided into sub-catchments? No

What is the overall site area for catchment? 0.6944 Hectares (ha)

Catchment 1	Area (m^2)	Runoff Coeff.	Effective Area (m^2)
Roofs - Type 1 (Draining to gullies)	1272	1.00	1272.0
Roofs - Type 2 (Draining to SUDS features)		0.50	0.0
Green Roofs		0.50	0.0
Roads and Footpaths - Type 1 (Draining to gullies)	1627	0.80	1301.6
Roads and Footpaths - Type 2 (Draining to Suds features)		0.70	0.0
Paved Areas	1190	0.60	714.0
Permeable Paving		0.50	0.0
Bioretention Areas	57	0.70	39.9
Grassed Areas	2798	0.37	1035.3
Public Open Space		0.37	0.0

Include Public Open Space in Effective Catchment Area? No — Assumed open space area does not drain to surface water network

Effective Catchment Area **4362.8** m^2

Effective Catchment Runoff Coefficient **0.63**

Long-Term Storage

Is long-term Storage provided? No

Permissible Site Discharge

What is the Standard Average Annual Rainfall (SAAR)? 1219.0 mm — From Met Eireann, Co-ordinates xxxxxxx, xxxxxxxx

Is the overall site area less than 50 hectares? Yes

[5]$QBAR_{Rural}$ calculated for 50 ha and linearly interpolated for area of site 4.5 Litres/sec

[7]Site Discharge = **4.5** Litres/sec

Notes and Formulae

1. SOIL index value calculated from Flood Studies Report - The Classification of Soils from Winter Rainfall Acceptance Rate (Table 4.5).
2. SPR value calculated from GDSDS - Table 6.7.
3. Rainfall depth for 100 year return period, 6 hour duration with additional 10% for climate change.
4. Long-term storage Vol_{ns} (m^3) = Rainfall.Area.10.[(PIMP/100)(0.8.α)+(1-PIMP/100)(β.SPR)-SPR]. (GDSDS Section 6.7.3).
   Where long-term storage cannot be provided on-site due to ground conditions, Total Permissible Outflow is to be kept to $QBAR_{(Rural)}$.
5. Total Permissible Outflow - $QBAR_{(Rural)}$ calculated in accordance with GDSDS - Regional Drainage Policies
   (Volume 2 - Chapter 6), i.e. $QBAR(m3/s)=0.00108x(Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$ - For catchments greater than 50 hectares in area. Flow rates are linearly interpolated for areas samller than 50hectares.
6. Where Total Permissible Outflow is less than 2.0l/s and not achievable, use 2.0 l/s or closest value possible.
7. QBAR multiplied by growth factors of 0.85 for 1 year, 2.1 for 30 year and 2.6 for 100 year return period events, from GDSDS Figure C2.

Appendix D: Soakaway Calculations

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 1594 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	13.750	0.350	0.9	76.6	O K
30 min Summer	13.874	0.474	1.0	103.5	O K
60 min Summer	14.000	0.600	1.1	131.0	O K
120 min Summer	14.135	0.735	1.2	160.5	O K
180 min Summer	14.216	0.816	1.3	178.3	O K
240 min Summer	14.274	0.874	1.4	191.0	O K
360 min Summer	14.354	0.954	1.5	208.3	O K
480 min Summer	14.405	1.005	1.5	219.7	O K
600 min Summer	14.441	1.041	1.6	227.5	O K
720 min Summer	14.466	1.066	1.6	233.0	O K
960 min Summer	14.496	1.096	1.6	239.5	O K
1440 min Summer	14.522	1.122	1.6	245.3	O K
2160 min Summer	14.539	1.139	1.7	248.9	O K
2880 min Summer	14.539	1.139	1.7	248.8	O K
4320 min Summer	14.512	1.112	1.6	242.9	O K
5760 min Summer	14.472	1.072	1.6	234.2	O K
7200 min Summer	14.428	1.028	1.5	224.7	O K
8640 min Summer	14.386	0.986	1.5	215.4	O K
10080 min Summer	14.345	0.945	1.5	206.5	O K
15 min Winter	13.793	0.393	0.9	85.8	O K
30 min Winter	13.931	0.531	1.0	116.0	O K
60 min Winter	14.073	0.673	1.2	147.0	O K

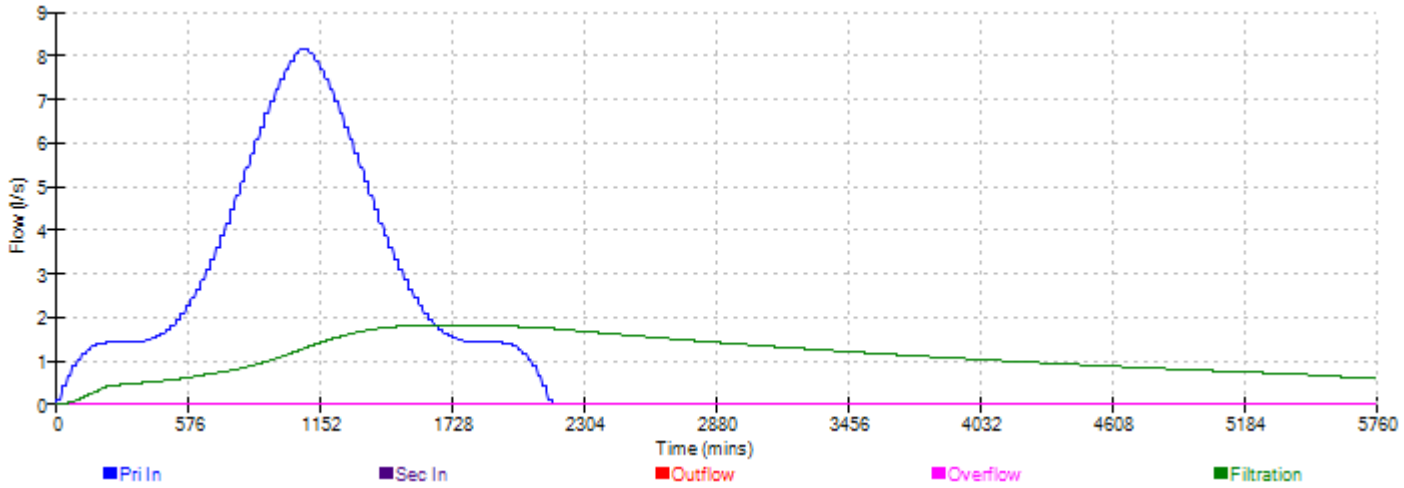
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	95.468	0.0	21
30 min Summer	64.755	0.0	35
60 min Summer	41.301	0.0	64
120 min Summer	25.690	0.0	124
180 min Summer	19.310	0.0	184
240 min Summer	15.733	0.0	242
360 min Summer	11.761	0.0	362
480 min Summer	9.556	0.0	482
600 min Summer	8.129	0.0	602
720 min Summer	7.122	0.0	720
960 min Summer	5.778	0.0	960
1440 min Summer	4.302	0.0	1198
2160 min Summer	3.201	0.0	1576
2880 min Summer	2.593	0.0	1988
4320 min Summer	1.925	0.0	2812
5760 min Summer	1.557	0.0	3640
7200 min Summer	1.320	0.0	4464
8640 min Summer	1.153	0.0	5272
10080 min Summer	1.029	0.0	6056
15 min Winter	95.468	0.0	21
30 min Winter	64.755	0.0	35
60 min Winter	41.301	0.0	64

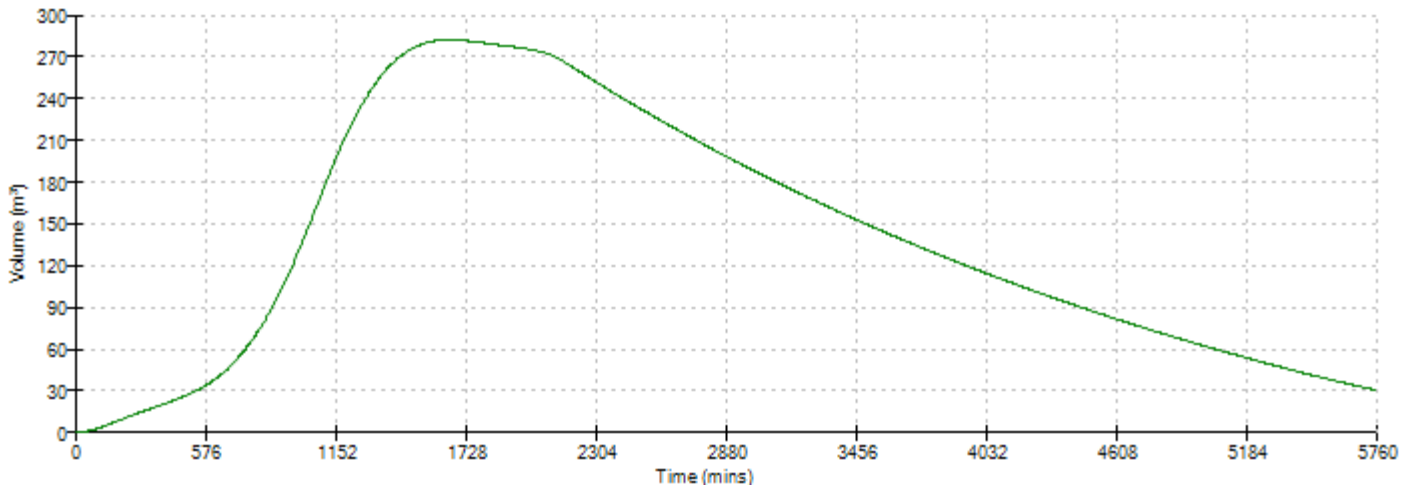
Summary of Results for 100 year Return Period (+20%)

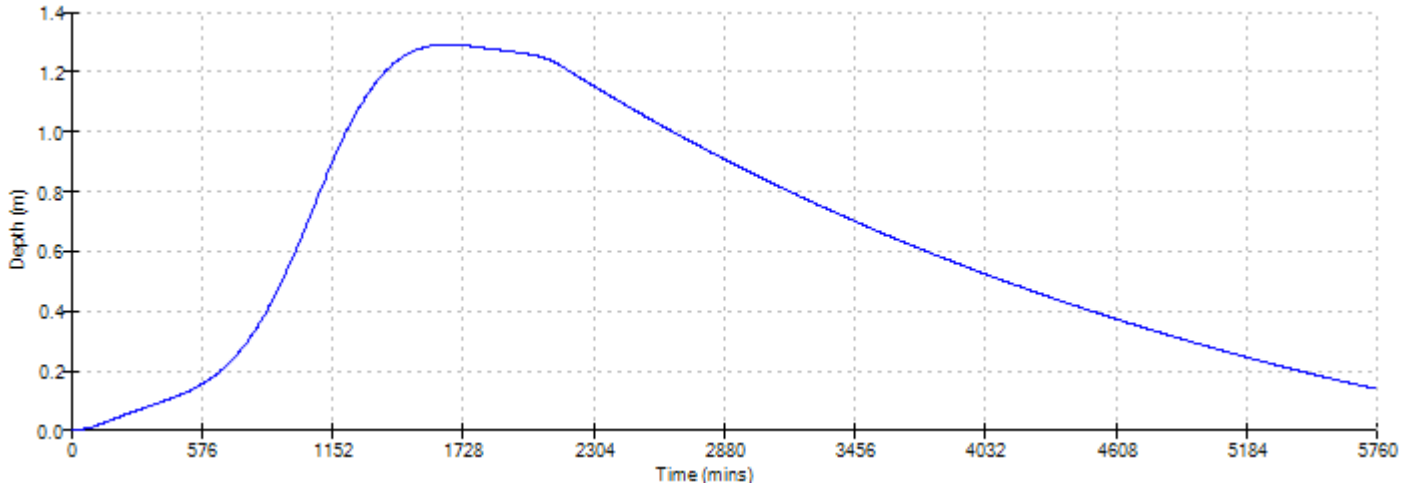
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
120 min Winter	14.225	0.825	1.3	180.2	O K
180 min Winter	14.317	0.917	1.4	200.4	O K
240 min Winter	14.383	0.983	1.5	214.9	O K
360 min Winter	14.475	1.075	1.6	234.8	O K
480 min Winter	14.535	1.135	1.7	248.0	O K
600 min Winter	14.578	1.178	1.7	257.4	O K
720 min Winter	14.609	1.209	1.7	264.2	O K
960 min Winter	14.649	1.249	1.8	272.9	O K
1440 min Winter	14.678	1.278	1.8	279.3	O K
2160 min Winter	14.691	1.291	1.8	282.1	O K
2880 min Winter	14.683	1.283	1.8	280.3	O K
4320 min Winter	14.633	1.233	1.8	269.5	O K
5760 min Winter	14.568	1.168	1.7	255.3	O K
7200 min Winter	14.501	1.101	1.6	240.7	O K
8640 min Winter	14.437	1.037	1.6	226.6	O K
10080 min Winter	14.377	0.977	1.5	213.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
120 min Winter	25.690	0.0	122
180 min Winter	19.310	0.0	180
240 min Winter	15.733	0.0	240
360 min Winter	11.761	0.0	356
480 min Winter	9.556	0.0	472
600 min Winter	8.129	0.0	588
720 min Winter	7.122	0.0	700
960 min Winter	5.778	0.0	924
1440 min Winter	4.302	0.0	1330
2160 min Winter	3.201	0.0	1664
2880 min Winter	2.593	0.0	2132
4320 min Winter	1.925	0.0	3028
5760 min Winter	1.557	0.0	3920
7200 min Winter	1.320	0.0	4760
8640 min Winter	1.153	0.0	5616
10080 min Winter	1.029	0.0	6456

Event: 2160 min Winter







Appendix E: Surface Water Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Water

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	0.000
M5-60 (mm)	16.200	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.272	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	150	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Inverts

Network Design Table for Surface Water

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	16.795	0.504	33.3	0.085	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	38.891	0.298	130.5	0.048	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	8.671	0.100	86.7	0.147	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	1.208	0.200	6.0	0.152	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	15.491	0.100	154.9	0.075	4.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	8.091	0.100	80.9	0.025	4.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	17.981	0.100	179.8	0.038	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.002	28.469	0.200	142.3	0.099	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	6.151	0.100	61.5	0.014	4.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	51.81	4.12	16.960	0.085	0.0	0.0	0.0	2.27	90.4	11.9
S1.001	49.56	4.69	16.456	0.133	0.0	0.0	0.0	1.14	45.4	17.9
S1.002	49.24	4.78	15.060	0.280	0.0	0.0	0.0	1.69	119.4	37.3
S1.003	49.23	4.78	14.960	0.432	0.0	0.0	0.0	6.44	455.0	57.6
S2.000	51.30	4.25	17.000	0.075	0.0	0.0	0.0	1.05	41.7	10.4
S3.000	51.94	4.09	15.420	0.025	0.0	0.0	0.0	1.45	57.8	3.5
S3.001	50.68	4.40	15.320	0.063	0.0	0.0	0.0	0.97	38.6	8.6
S3.002	49.02	4.83	15.220	0.162	0.0	0.0	0.0	1.09	43.5	21.5
S4.000	52.07	4.06	15.700	0.014	0.0	0.0	0.0	1.67	66.4	2.0

Manhole Schedules for Surface Water

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S4	20.397	3.437	Open Manhole	1200	S1.000	16.960	225				
S3	20.033	3.577	Open Manhole	1200	S1.001	16.456	225	S1.000	16.456	225	
S2	18.455	3.395	Open Manhole	1200	S1.002	15.060	300	S1.001	16.158	225	1023
S1	18.317	3.357	Open Manhole	1200	S1.003	14.960	300	S1.002	14.960	300	
S	17.100	2.340	Open Manhole	0		OUTFALL		S1.003	14.760	300	
S9	20.733	3.733	Open Manhole	1200	S2.000	17.000	225				
S	19.200	2.300	Open Manhole	0		OUTFALL		S2.000	16.900	225	
S6	16.600	1.180	Open Manhole	1200	S3.000	15.420	225				
S5	16.795	1.475	Open Manhole	1200	S3.001	15.320	225	S3.000	15.320	225	
S7	17.447	2.227	Open Manhole	1200	S3.002	15.220	225	S3.001	15.220	225	
S	17.380	2.360	Open Manhole	0		OUTFALL		S3.002	15.020	225	
S8	16.759	1.059	Open Manhole	1200	S4.000	15.700	225				
S	17.000	1.400	Open Manhole	0		OUTFALL		S4.000	15.600	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S4	530991.405	728449.653	530991.405	728449.653	Required	
S3	530976.269	728442.375	530976.269	728442.375	Required	
S2	530974.256	728403.536	530974.256	728403.536	Required	
S1	530982.917	728403.113	530982.917	728403.113	Required	
S	530984.124	728403.057			No Entry	
S9	530977.037	728457.847	530977.037	728457.847	Required	
S	530976.269	728442.375			No Entry	
S6	530998.577	728372.252	530998.577	728372.252	Required	
S5	530990.759	728374.337	530990.759	728374.337	Required	
S7	530972.794	728375.105	530972.794	728375.105	Required	
S	530974.256	728403.536			No Entry	
S8	530990.444	728368.194	530990.444	728368.194	Required	
S	530990.759	728374.337			No Entry	

PIPELINE SCHEDULES for Surface Water

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S4	20.397	16.960	3.212	Open Manhole	1200
S1.001	o	225	S3	20.033	16.456	3.352	Open Manhole	1200
S1.002	o	300	S2	18.455	15.060	3.095	Open Manhole	1200
S1.003	o	300	S1	18.317	14.960	3.057	Open Manhole	1200
S2.000	o	225	S9	20.733	17.000	3.508	Open Manhole	1200
S3.000	o	225	S6	16.600	15.420	0.955	Open Manhole	1200
S3.001	o	225	S5	16.795	15.320	1.250	Open Manhole	1200
S3.002	o	225	S7	17.447	15.220	2.002	Open Manhole	1200
S4.000	o	225	S8	16.759	15.700	0.834	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	16.795	33.3	S3	20.033	16.456	3.352	Open Manhole	1200
S1.001	38.891	130.5	S2	18.455	16.158	2.072	Open Manhole	1200
S1.002	8.671	86.7	S1	18.317	14.960	3.057	Open Manhole	1200
S1.003	1.208	6.0	S	17.100	14.760	2.040	Open Manhole	0
S2.000	15.491	154.9	S	19.200	16.900	2.075	Open Manhole	0
S3.000	8.091	80.9	S5	16.795	15.320	1.250	Open Manhole	1200
S3.001	17.981	179.8	S7	17.447	15.220	2.002	Open Manhole	1200
S3.002	28.469	142.3	S	17.380	15.020	2.135	Open Manhole	0
S4.000	6.151	61.5	S	17.000	15.600	1.175	Open Manhole	0

Free Flowing Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.003	S	17.100	14.760	0.000	0	0

Free Flowing Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S2.000	S	19.200	16.900	0.000	0	0

Free Flowing Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S3.002	S	17.380	15.020	0.000	0	0

Free Flowing Outfall Details for Surface Water

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S4.000	S	17.000	15.600	0.000	0	0

Appendix F: Irish Water Pre-Connection Enquiry response

Vincent Ivers
DBFL Consulting Eng
Ormond House
Ormond Quay Upper
Dublin 7
Dublin
D07W704

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

27 October 2021

Re: CDS21003277 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 24 unit(s) at Headford Road Social Housing, Headford Road, Galway

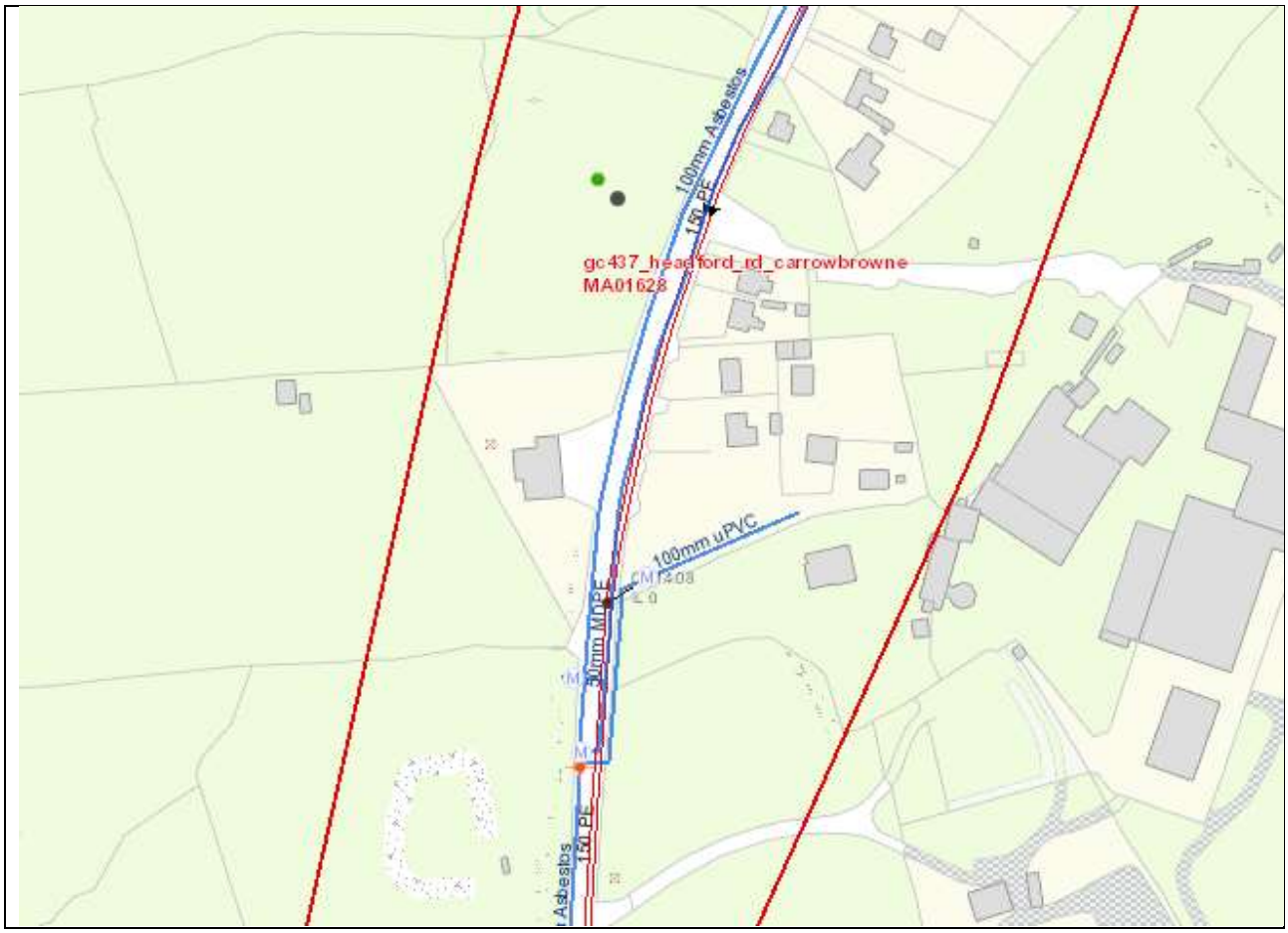
Dear Sir/Madam,

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

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible Subject to upgrades
SITE SPECIFIC COMMENTS	
Water Connection	No constraints identified. 100mm diameter Asbestos Watermain in the public road, at the development entrance has the capacity to service the proposed development. The Asbestos watermain is Irish Water Owned and managed.
Wastewater Connection	The pre-connection enquiry submitted proposes 535m of 90mm diameter rising main, from a pumping station on site, to a discharge Manhole on the Headford Road. In accordance with Irish Water guidelines, a maximum length of 50 meters of rising main for a single domestic is permitted. In this case, 535m will be allowable, based on the proposed 24 unit development. All associated costs with the 535m rising main will be payable by the applicant.

	Please note, that Irish Water as currently allowing the developer to carry out, a self lay in the public road, under a new pilot scheme. Addition information on this scheme is available on our website. https://www.water.ie/connections/developer-services/self-lay-in-the-public-road/ The application for the self-lay scheme in the public road, can be made and reviewed at applications stage.
The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.	

The 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

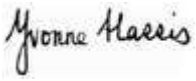
information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying 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 Barry Butler from the design team by email barry.butler@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations

DBFL CONSULTING ENGINEERS

Registered Office
Ormond House
Upper Ormond Quay
Dublin 7 Ireland D07 W704

+ 353 1 400 4000
info@dbfl.ie
www.dbfl.ie

Cork Office
14 South Mall
Cork T12 CT91

+ 353 21 202 4538
info@dbfl.ie
www.dbfl.ie

Waterford Office
Suite 8b The Atrium
Maritana Gate, Canada St
Waterford X91 W028

+ 353 51 309 500
info@dbfl.ie
www.dbfl.ie