PUNCH
consulting engineers

Living Georgian City
58 O'Connell Street

201220-PUNCH-XX-ZZ-RP-C-0001
Engineering Planning Report

December 2022

Document Control

Document Number: **201220-PUNCH-XX-ZZ-RP-C-0001**

Status	Revision	Description	Date	Prepared	Checked	Approved
A0	P01	Planning Issue	15 December 2022	T Nash	J Tiernan	J Tiernan

Table of Contents

1 Introduction

This report was prepared to accompany a planning application for the proposed development on a site located at 58 O'Connell Street, Limerick. The site location is shown in Figure 1-1 below.

The site is rectangular in shape and measures 0.018 Ha. The site forms part of a multi-storey Georgian terrace facing O'Connell Street and is bound by 57 and 59 O'Connell Street to either side. Main access to the site is via the front of the building on O'Connell Street with access also available to the rear via Glentworth Lane.

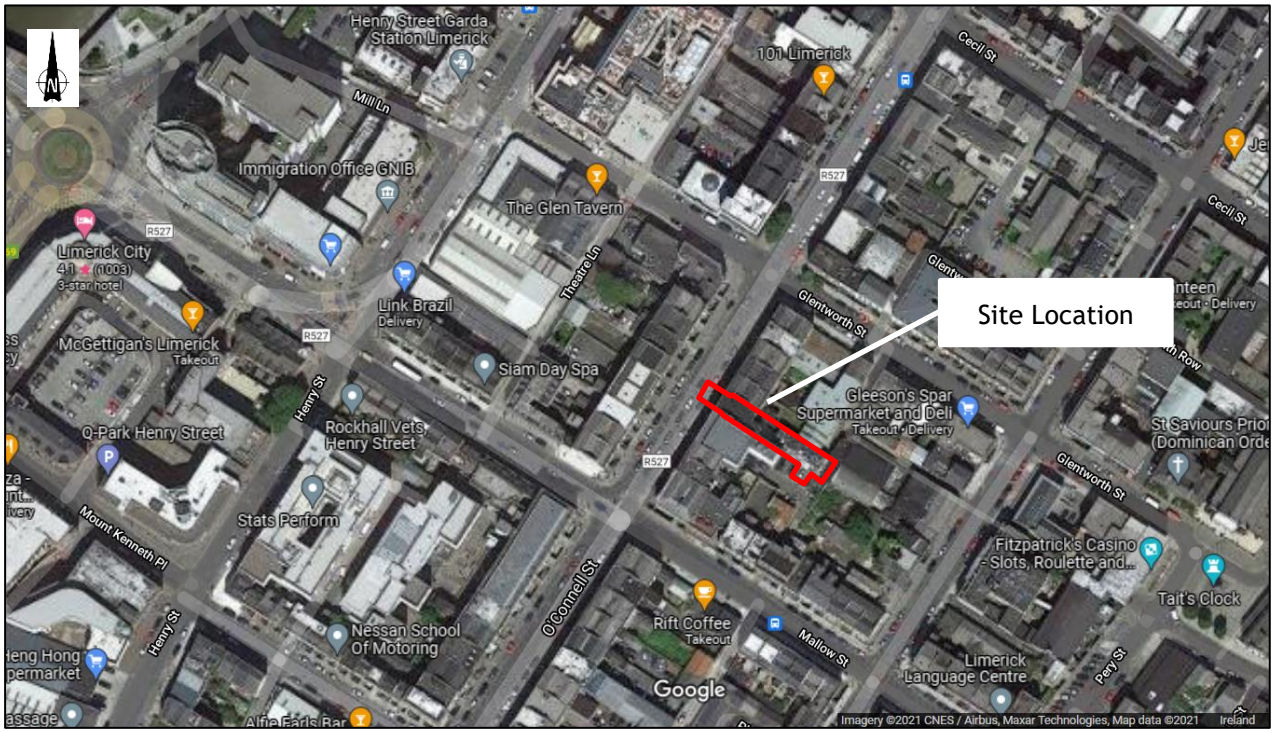


Figure 1-1: Site Location: 58 O'Connell Street – Georgian Housing Limerick

1.1 Proposed Development

The proposed works are outlined in a series of architectural drawings prepared by Paul Keogh Architects and engineering drawings prepared by PUNCH Consulting Engineers and supplied as part of the planning documentation. This report deals specifically with the proposals for the provision of surface water drainage, foul water drainage and watermains associated with the development. The proposed finished ground floor level of the development is 12.20 m AD.

The proposed development consists of the redevelopment of the existing structure on the northwest of the site and a new structure on the southeast of the site. This existing structure renovation consists of a community/commercial/social enterprise unit at ground level and 5no. apartment units above. The proposed structure in the southeast of the site consists of 3no. apartment units. A shared courtyard with bicycle and bin storage areas separates the two structures.

2 Stormwater Drainage Design

2.1 Existing Stormwater Drainage

Record drawings indicate that there is an existing combined brick culvert sewer network located adjacent to the site on both O'Connell St and Glentworth St.

A topographical survey carried out by NCW surveys was undertaken in November 2020. This survey confirmed the presence of the existing combined sewer network.

CCTV survey confirmed an existing combined sewer connection for the building at 58 O'Connell Street to the combined brick sewer on O'Connell St (150mm) along with an existing combined sewer connection (150mm) from the rear of the site to the combined sewer on Glenworth Lane.

An extract of Irish Water Record Drawings is shown in Figure 2-1 below.

Figure 2-1: Existing combined drainage surrounding the site (Extract from Irish Water records)

2.2 Proposed Stormwater Drainage

The proposed surface water drainage system has been designed using Causeway Flow software in accordance with the Department of Environment and Local Government's guidance document "Recommendations for Site Development Works for Housing Areas", with guidance taken from the "Greater Dublin Strategic Drainage Study" (GDSDS) and the Limerick City and County Council Development Plan.

A new surface water sewer network shall be provided for the proposed development. The stormwater network shall remain entirely separated from the foul sewer network within the development. This shall facilitate connection to a public stormwater network should one become available. Prior to entering the main sewer network, the stormwater network shall combine to the foul network. All surface water run-off from roof areas and hardstanding areas are designed to be collected by a gravity pipe network.

The proposed internal network to the front of the property will utilise the existing connection to the combined sewer on O'Connell St. with an invert level of 7.74 mAOD. The internal network at the rear of the property is proposed to discharge to the combined sewer on Glentworth Lane.

The proposed surface water network will use SUDs measures to reduce the outflow and given the existing site is largely impervious it should be accepted that this will be a significant improvement to the existing.

The surface water drainage network has been analysed for the risk of flooding for a 1 in 5 year, 1 in 30 year and 1 in 100 year rainfall event by means of simulating such events in the drainage model. No flooding occurs in the 1 in 5 year, 1 in 30 year or 1 in 100 year rainfall event. Attenuation will be accommodated within the proposed stormwater network.

The proposed stormwater sewers have been designed using Causeway Flow software. Table 2-1 describes the stormwater drainage design parameters used and detailed calculations are enclosed in Appendix A.

Table 2-1: Stormwater Drainage Design Parameters

Description	Value
Total Impervious Site area	0.044 ha
Return period target	Pipe Design 1 in 5 year. Network Design 1 in 30 year + CC. Check 1 in 100 year + CC for flooding.
Climate Change	30%
Urban Creep	10%
M5-60	17.2
Ratio R	0.325
SOIL type	5 (Steep, Rocky Areas)
Soil value	0.5
SAAR	1001mm
Attenuation Storage Volume	Accommodated through SUDs Measures

2.3 SUDs Proposals

The proposed development has been assessed in relation to Sustainable Urban Drainage Systems (SuDS). A variety of SuDS measures may be adopted to comply with Council recommendations. All SuDS measures are to be implemented with reference to the UK Suds Manual and Limerick City and County Council drainage requirements.

Relatively small volumes of rainwater collected on the respective SuDS devices will enter the public sewer network during typical low intensity storms. This is because the proposed SuDS measures will retain rainwater until it is either used via evapotranspiration in the green areas or reused within the development via the rainwater harvesting system.

The SuDS processes decrease the impact of the development on the receiving environment by providing amenity and biodiversity in many cases. Regular maintenance of the SuDS proposals is required to ensure they are operating to their optimal level throughout their design life.

The specific measures adopted for the proposed development comprise the following:

2.3.1 Permeable Pavements

The outdoor ground level areas on site are proposed as permeable pavements. Permeable surfaces along with their base material provide an efficient means of reducing the peak flows.

CIRIA C753 (The SuDS Manual) notes that regarding interception design of pervious pavements, studies have shown that runoff typically does not occur from pervious pavements for rainfall events up to 5 mm.

2.3.2 Tree Root Systems

Proposed surface water within the development's landscaped paved areas where possible will discharge to a SuDS element such as tree root systems for interception and treatment prior to entering the drainage network. The tree root systems will incorporate drainage stone/subsoil and will provide a level of additional attenuation within the tree root system. The base and sides of the tree root system will be lined and a high level overflow to the drainage network within the build-up will accommodate removal of water.

CIRIA C753 (The SuDS Manual) Table 24.6 notes that regarding interception design of tree root system (bio retention areas), pavements drained by tree root systems can be considered to provide Interception, i.e. it can be assumed that there will be zero runoff from the first 5 mm rainfall for 80% of events during the summer and 50% in winter.

3 Foul Water Drainage Design

3.1 Existing Foul Water Drainage

As outlined in Section 2.1 above, an existing combined sewer is located adjacent to the site.

3.2 Proposed Foul Water Drainage

The proposed foul water sewers have been designed using Causeway Flow software in accordance with the DOE's "*Recommendations for Site Development Works for Housing Areas*". The foul loading has been calculated in accordance with "Code of Practice for Wastewater Infrastructure" (particularly clause 36, Appendix C and Appendix D) published by Irish Water.

The proposed internal network to the front of the property will utilise the existing connection to the combined sewer on O'Connell St. The internal network at the rear of the property is proposed to discharge to an existing manhole located on Glentworth Lane with an invert level of 10.74 mAOD which runs to the 765 x 2045 mm combined sewer on Glentworth Street. The section of the existing sewer network between the site and this manhole is in poor condition and will be replaced and any existing connections tied into the new section.

Table 3-1 describes the foul water drainage design parameters used and detailed calculations are enclosed in Appendix B.

Table 3-3-1: Foul Water Drainage Design Parameters

Description	Value
Residential Flow Rate	150 l/per/day
Persons per Dwelling	2.7
Infiltration	10%
Peaking Factor	6 DWF (Residential) 4.5 DWF (Commercial)
Minimum Self Cleansing Velocity	0.75m/s
Minimum Pipe Diameter	150mm

Table 3-2: Foul Water Drainage Design Calculations

Category	Quantity	Flow Rate + Infiltration	Daily Flow (l/day)	DWF (l/s)	Design Peak Flow (l/s)
Residential	8 units 22 persons	165 l/person/day	3,564	0.041	0.248
Commercial	56.4 m^2	14.14 m3/ha/day	80	0.001	0.004
Total				0.042	0.252

A Pre-Connection Enquiry Form has been issued to Irish Water in relation to the proposed development. Irish water has provided a response, advising that the wastewater connections are feasible with some upgrades required, this will consist of the installation of the new sewer on Glentworth Lane, for further details please refer to drawing 202220-PUNCH-XX-XX-DR-C-0100. Please refer to Appendix C for Irish Water correspondence.

4 Watermain Design

4.1 Existing Watermain

Irish Water record drawings indicate that there is an existing watermain network adjacent to the site. There is a 6" cast iron watermain along Glentworth Street which connects to a larger 8" cast iron watermain on O'Connell Street.

A topographical survey carried out by NCW surveys was undertaken in November 2020. This confirmed the presence of the existing watermain network.

An extract is shown in Figure 4-1 below.

Figure 4-1: Existing watermain surrounding the site (Extract from Irish Water records)

4.2 Proposed Watermain

With reference to Irish Water's Code of Practice for Water Infrastructure, the average daily flow is calculated as the number of persons multiplied by the flow rate per person. The average day peak week flow is taken to be 1.25 x the average flow, and the peak demand is taken to be the average day peak week flow multiplied by a peaking factor of 5.

Table 4-1 describes the watermain design parameters used.

Table 4-1: Watermain Design Parameters

Description	Value
Residential Flow Rate	150 l/person/day
Persons per Dwelling	2.7
Commercial Flow Rate	14 m3/ha/ day
Average Demand	1.25 DWF
Peak Demand	5 DWF

Table 4-2: Watermain Design Calculation

Category	Quantity	Flow Rate	Daily Flow (l/day)	DWF (l/s)	Average Demand (1.25DWF) (l/s)	Peak Demand (5DWF) (l/s)
Residential	8 units 22 persons	150l/person/day	3240	0.038	0.0475	0.238
Commercial	56.4 m^2	14 m3/ha/day	79	0.001	0.001	0.005
Total				0.038	0.048	0.192

On the basis of the above tables, the development will have an average water demand of 0.048l/s and a peak water demand of 0.192l/s.

It is proposed to provide a new watermain to serve the proposed development based on the above calculated demand. The proposed watermain will connect to the 150mm main line on Glentworth Street.

A bulk water meter shall be provided at the site boundary at the location of the proposed connection to the existing watermain. The watermain layout has been designed in accordance with "Irish Water Code of Practice for Water Infrastructure". All watermains are to be constructed in accordance with Irish Water Code of Practice and the Local Authority's requirements. Fire coverage is to be reviewed and certified by the fire consultant.

To reduce the water demand on Local Authority water supplies and to reduce the foul discharge from the development, water conservation measures will be incorporated in the sanitary facilities throughout the development, e.g. dual flush toilets, monobloc low volume push taps and waterless urinals.

A Pre-Connection Enquiry Form has been issued to Irish Water in relation to the proposed development. Irish water has provided a response, advising that the watermain connection is feasible without any infrastructure upgrade. Please refer to Appendix C for Irish Water correspondence.

5 Flooding

Planning guidelines on flood risk and development have been published by the OPW and Department of Environment, Heritage and Local Government (DoEHLG). The below sections summarise how the development's design will be assessed in accordance with the main principles of the guidelines.

5.1 Sequential Approach

The sequential approach makes use of flood zones for river and coastal flooding, as described below:

Zone A – High probability. This zone defines areas with the highest risk of flooding. For river flooding it is defined as more than 1% probability or more than 1 in 100 year, and for coastal flooding it is defined as 0.5% probability or more than 1 in 200 year.

Zone B – Moderate probability. This zone defines areas with a moderate risk of flooding. For river flooding it is defined as 0.1% to 1% probability or between 1 in 100 and 1 in 1,000 years, and for coastal flooding 0.1% and 0.5% probability or between 1 in 200 and 1 in 1,000 years.

Zone C – Low probability. This zone defines areas with a low risk of flooding less than 0.1% probability or less than 1 in 1,000 years.

The flood zones are then to be looked at with the vulnerability of the building proposed;

Highly Vulnerable	– Hospitals, Garda stations, homes, motorways etc.
Less Vulnerable	– Commercial, retail, offices etc.
Water Compatible	– Marina's, green areas

A sequential approach is then taken to assess the most favourable location for the development based on its vulnerability.

Zone A - Water Compatible or Justification Test

Zone B - Less Vulnerable if no other lands are available or highly vulnerable with Justification Test

Zone C - Any development

5.2 Development Sequential Test

5.2.1 Coastal Flood Risk

Coastal flooding results from sea levels which are higher than normal and result in sea water overflowing onto the land. Coastal flooding is influenced by the following three factors which often work in combination: high tide level, storm surges and wave action.

There is no risk associated with coastal flooding for this site as general ground levels for the site are much higher than expected extreme coastal flood levels.

5.2.2 Fluvial Flood Risk

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain.

There is no risk associated with fluvial flooding for this site as general ground levels for the site are much higher than expected extreme coastal flood levels.

5.2.3 Pluvial Flood Risk

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall and typically occurs in the

summer months. Pluvial flood risk has not been identified by the Preliminary Flood Risk Assessment (PFRA) mapping as being a risk to this site.

Additionally, the proposed drainage network will alleviate any concerns of pluvial flooding by catering for the 100 year return period plus 10% climate change allowance.

5.2.4 OPW Flood Maps

The OPW Flood Hazard Mapping Website is a record of historic flood events. This database indicates that there is no record of flooding incidents in the area of the proposed development.

5.3 Flood Risk Assessment Conclusions

The site has been assessed in accordance with the "The Planning System and Flood Risk Management" Guidelines. As part of the sequential test, the OPW flood hazard maps have been consulted, as have the Catchment Flood Risk Assessment Maps produced by the OPW.

In all cases it was found that the development is at low risk of flooding and the development is deemed appropriate within the proposed site location.

Appendix A Causeway Stormwater Drainage Design Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	17.200	Minimum Backdrop Height (m)	0.200
Ratio-R	0.325	Preferred Cover Depth (m)	0.800
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1-0		5.00	12.400	450	557404.021	656767.605	1.025
S2-0	0.005	5.00	12.400	450	557415.617	656758.786	0.950
S1-1			12.400	450	557416.604	656760.187	1.111
S1-2			12.300	1200	557422.486	656768.523	1.072
S3-0		5.00	11.860	450	557396.467	656771.718	1.300
S3-1			11.860	450	557395.416	656772.536	3.260
S3-2	0.016	5.00	9.000	450	557392.752	656774.610	0.520
S3-3	0.013	5.00	9.000	450	557380.150	656781.901	0.607
S3-4			9.000	1200	557378.359	656780.156	0.625

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S1.001	S1-1	S1-2	10.202	0.600	11.289	11.228	0.061	167.3	225	5.41	50.0
S2.000	S2-0	S1-1	1.714	0.600	11.450	11.364	0.086	19.9	150	5.01	50.0
S1.000	S1-0	S1-1	14.607	0.600	11.375	11.289	0.086	169.8	225	5.24	50.0
S3.003	S3-3	S3-4	2.501	0.600	8.393	8.375	0.018	138.9	225	5.36	50.0
S3.002	S3-2	S3-3	14.559	0.600	8.480	8.393	0.087	167.3	225	5.32	50.0
S3.001	S3-1	S3-2	3.376	0.600	8.600	8.543	0.057	59.2	100	5.08	50.0
S3.000	S3-0	S3-1	1.332	0.600	10.560	10.537	0.023	57.9	100	5.02	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
S1.001	1.008	40.1	0.7	0.886	0.847	0.005	0.0	22	0.393
S2.000	2.266	40.0	0.7	0.800	0.886	0.005	0.0	14	0.880
S1.000	1.000	39.8	0.0	0.800	0.886	0.000	0.0	0	0.000
S3.003	1.107	44.0	4.0	0.382	0.400	0.029	0.0	45	0.689
S3.002	1.008	40.1	2.2	0.295	0.382	0.016	0.0	36	0.542
S3.001	1.002	7.9	0.0	3.160	0.357	0.000	0.0	0	0.000
S3.000	1.014	8.0	0.0	1.200	1.223	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
S1.001	10.202	167.3	225	Circular	12.400	11.289	0.886	12.300	11.228	0.847
S2.000	1.714	19.9	150	Circular	12.400	11.450	0.800	12.400	11.364	0.886
S1.000	14.607	169.8	225	Circular	12.400	11.375	0.800	12.400	11.289	0.886
S3.003	2.501	138.9	225	Circular	9.000	8.393	0.382	9.000	8.375	0.400
S3.002	14.559	167.3	225	Circular	9.000	8.480	0.295	9.000	8.393	0.382
S3.001	3.376	59.2	100	Circular	11.860	8.600	3.160	9.000	8.543	0.357
S3.000	1.332	57.9	100	Circular	11.860	10.560	1.200	11.860	10.537	1.223

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S1.001	S1-1	450	Manhole	Adoptable	S1-2	1200	Manhole	Adoptable
S2.000	S2-0	450	Manhole	Adoptable	S1-1	450	Manhole	Adoptable
S1.000	S1-0	450	Manhole	Adoptable	S1-1	450	Manhole	Adoptable
S3.003	S3-3	450	Manhole	Adoptable	S3-4	1200	Manhole	Adoptable
S3.002	S3-2	450	Manhole	Adoptable	S3-3	450	Manhole	Adoptable
S3.001	S3-1	450	Manhole	Adoptable	S3-2	450	Manhole	Adoptable
S3.000	S3-0	450	Manhole	Adoptable	S3-1	450	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	240
M5-60 (mm)	17.200	Additional Storage (m³/ha)	20.0
Ratio-R	0.325	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	30	0	10
100	30	0	10

Node S3-0 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.250
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	10.600	Diameter (m)	0.075		

Node S1-0 Online Orifice Control

Flap Valve	x	Invert Level (m)	11.375	Discharge Coefficient	0.250
Replaces Downstream Link	✓	Diameter (m)	0.100		

Node S2-0 Online Orifice Control

Flap Valve	x	Invert Level (m)	11.450	Discharge Coefficient	0.250
Replaces Downstream Link	✓	Diameter (m)	0.100		

Node S3-0 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.659
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	6.0	0.0	1.200	6.0	0.0	1.201	0.0	0.0

Node S3-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.500	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.500
Safety Factor	2.0	Width (m)	2.375	Inf Depth (m)	
Porosity	0.30	Length (m)	4.000		

Node S2-0 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	12.000	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Width (m)	8.000	Inf Depth (m)	
Porosity	0.30	Length (m)	6.000		

Node S1-0 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	11.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	6.0	0.0	1.000	6.0	0.0	1.001	0.0	0.0

Node S3-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.500	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.500
Safety Factor	2.0	Width (m)	2.600	Inf Depth (m)	
Porosity	0.30	Length (m)	4.500		

Results for 30 year +30% CC +10% Q Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1-0	1	11.375	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2-0	11	11.554	0.104	2.1	0.0285	0.0000	OK
15 minute summer	S1-1	11	11.324	0.035	2.0	0.0056	0.0000	OK
15 minute summer	S1-2	11	11.262	0.034	2.0	0.0000	0.0000	OK
15 minute summer	S3-0	1	10.560	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S3-1	1	8.600	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S3-2	10	8.538	0.058	6.1	0.1482	0.0000	OK
15 minute summer	S3-3	10	8.479	0.086	10.9	0.0512	0.0000	OK
15 minute summer	S3-4	10	8.450	0.075	10.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1-0	Orifice	S1-1	0.0				
15 minute summer	S2-0	Orifice	S1-1	2.0				
15 minute summer	S1-1	S1.001	S1-2	2.0	0.524	0.051	0.0395	0.9
15 minute summer	S3-0	Orifice	S3-1	0.0				
15 minute summer	S3-1	S3.001	S3-2	0.0	0.000	0.000	0.0000	
15 minute summer	S3-2	S3.002	S3-3	5.9	0.542	0.148	0.1608	
15 minute summer	S3-3	S3.003	S3-4	10.8	0.845	0.245	0.0320	4.8

Results for 100 year +30% CC +10% Q Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1-0	1	11.375	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2-0	11	11.588	0.138	2.7	0.0378	0.0000	OK
15 minute summer	S1-1	11	11.329	0.040	2.6	0.0063	0.0000	OK
15 minute summer	S1-2	11	11.266	0.038	2.6	0.0000	0.0000	OK
15 minute summer	S3-0	1	10.560	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S3-1	1	8.600	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S3-2	10	8.546	0.066	7.9	0.1783	0.0000	OK
15 minute summer	S3-3	10	8.493	0.100	14.2	0.0593	0.0000	OK
15 minute summer	S3-4	10	8.462	0.087	14.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1-0	Orifice	S1-1	0.0				
15 minute summer	S2-0	Orifice	S1-1	2.6				
15 minute summer	S1-1	S1.001	S1-2	2.6	0.559	0.064	0.0468	1.2
15 minute summer	S3-0	Orifice	S3-1	0.0				
15 minute summer	S3-1	S3.001	S3-2	0.0	0.000	0.000	0.0001	
15 minute summer	S3-2	S3.002	S3-3	7.7	0.580	0.193	0.1949	
15 minute summer	S3-3	S3.003	S3-4	14.1	0.905	0.319	0.0389	6.2

Appendix B Causeway Foul Water Drainage Design Calculations

Design Settings

Frequency of use (kDU)	1.00	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	2676	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.000
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	0.800
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Dwellings	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
F3-0	3	12.400	Adoptable	557415.758	656761.253	0.950
F3-1		12.400	Adoptable	557417.268	656763.513	0.996
F3-2		12.400	Adoptable	557422.042	656770.413	1.475
F3-3		12.228	Adoptable	557430.411	656785.029	1.478
F1-0	5	9.000	Adoptable	557380.448	656785.118	0.950
F1-1		9.000	Adoptable	557376.945	656780.545	1.050
F1-2		9.000	Adoptable	557370.856	656783.887	1.200

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F3.000	F3-0	F3-1	2.718	1.500	11.450	11.404	0.046	59.1	150
F3.001	F3-1	F3-2	8.391	1.500	11.404	11.000	0.404	20.8	150
F3.002	F3-2	F3-3	16.842	1.500	10.925	10.750	0.175	96.2	225
F1.000	F1-0	F1-1	5.760	1.500	8.050	7.953	0.097	59.4	150
F1.001	F1-1	F1-2	6.946	1.500	7.950	7.800	0.150	46.3	225

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
F3.000	0.194	1.141	20.2	0.1	0.800	0.846	0.000	3	0.0	0.0	8	0.277
F3.001	0.266	1.928	34.1	0.1	0.846	1.250	0.000	3	0.0	0.0	6	0.389
F3.002	0.148	1.170	46.5	0.1	1.250	1.253	0.000	3	0.0	0.0	7	0.208
F1.000	0.228	1.138	20.1	0.2	0.800	0.897	0.000	5	0.0	0.0	10	0.320
F1.001	0.215	1.689	67.2	0.2	0.825	0.975	0.000	5	0.0	0.0	8	0.328

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
F3.000	2.718	59.1	150	Circular	12.400	11.450	0.800	12.400	11.404	0.846
F3.001	8.391	20.8	150	Circular	12.400	11.404	0.846	12.400	11.000	1.250
F3.002	16.842	96.2	225	Circular	12.400	10.925	1.250	12.228	10.750	1.253
F1.000	5.760	59.4	150	Circular	9.000	8.050	0.800	9.000	7.953	0.897
F1.001	6.946	46.3	225	Circular	9.000	7.950	0.825	9.000	7.800	0.975

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
F3.000	F3-0	450	Manhole	Adoptable	F3-1	450	Manhole	Adoptable
F3.001	F3-1	450	Manhole	Adoptable	F3-2	1200	Manhole	Adoptable
F3.002	F3-2	1200	Manhole	Adoptable	F3-3	1200	Manhole	Adoptable
F1.000	F1-0	450	Manhole	Adoptable	F1-1	450	Manhole	Adoptable
F1.001	F1-1	450	Manhole	Adoptable	F1-2	1200	Manhole	Adoptable

Appendix C Irish Water Confirmation of Feasibility

Jamie Fennell

97 Henry Street
Limerick
V94YC2H

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

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

www.water.ie

30 November 2021

Re: CDS21007522 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 9 unit(s) at 58 O'Connell Street, Limerick, Co Limerick

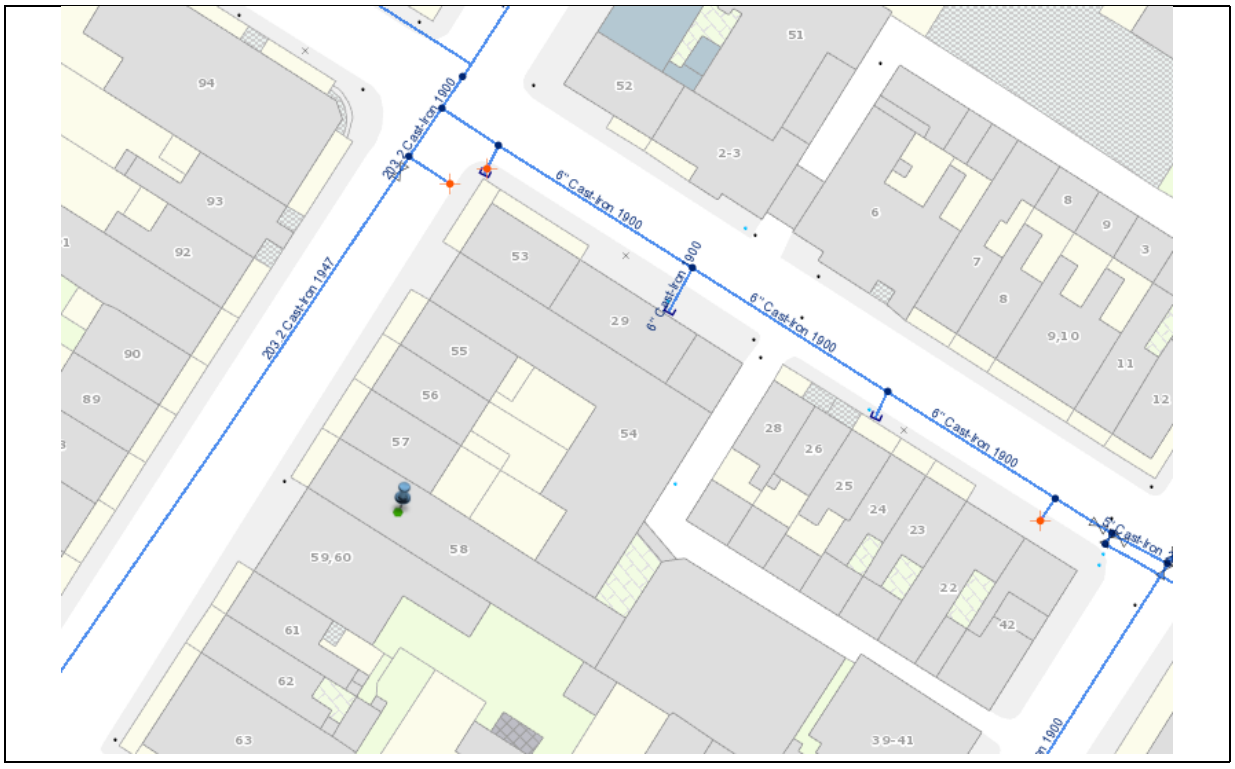
Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at 58 O'Connell Street, Limerick, Co Limerick (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.

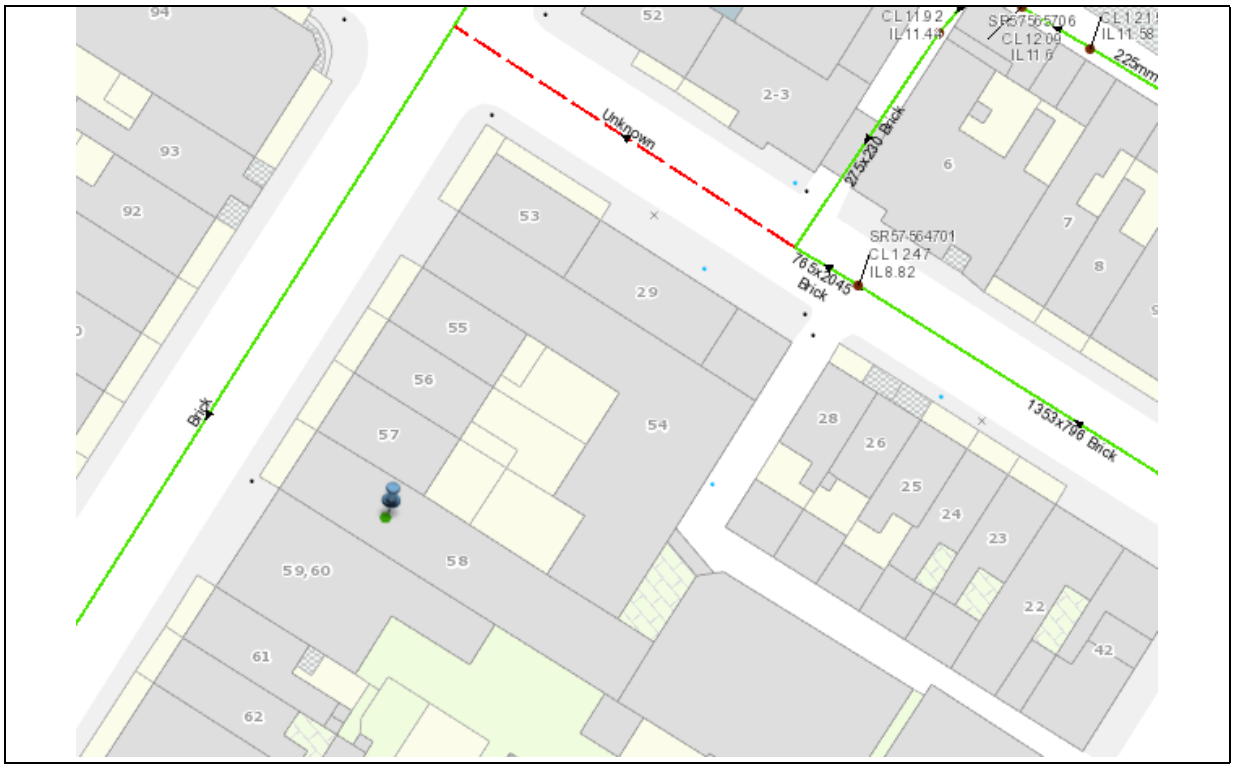
SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible subject to upgrades
SITE SPECIFIC COMMENTS	
Water Connection	The confirmation of feasibility to connect to the Irish Water infrastructure does not extend to your fire flow requirements. Irish Water cannot guarantee that the flow rates and residual pressures will meet the requirements of the Fire Authority.
Wastewater Connection	The nearest foul sewer is approximately 46m from the proposed development. A sewer extension would be required to service the proposed development with the costs borne fully by the developer. Please see https://www.water.ie/connections/information/connection-charges/ for some further information. Connection to the Networks may be through 3rd party infrastructure and all relevant wayleaves and permissions would need to be obtained by the Client.

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.

Map 1. Included below outlines the current Irish Water watermain infrastructure adjacent to your site:



Map 2. Included below outlines the current Irish Water wastewater 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.

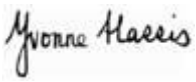
General Notes:

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 Kyle Jackson from the design team on email kyle.jackson@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations