

TOBIN

Galway County Council

Housing Development at
Cosmona, Loughrea,
Co. Galway

Engineering Planning Report



Comhairle Chontae na Gaillimhe
Galway County Council

BUILT ON KNOWLEDGE

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1. INTRODUCTION

1.1 GENERAL

TOBIN have been Galway County Council proposes to carry out the following development.

The construction of a new residential development consisting of:

- a) The construction of 56 new housing units, comprising of: including 44 no. houses and 12 no. apartments, comprising of:
 - 44 no. houses, including
 - 16 no. 2 bedroom houses
 - 25 no. 3 bedroom houses
 - 2 no. 4 bedroom houses
 - 1 no. 5 bedroom house
 - 10 no. apartments, including
 - 6 no. 1 bedroom apartments
 - 6 no. 2 bedroom apartments
- b) Varied boundary treatments and landscaping works;
- c) All ancillary site development works and site services necessary to facilitate the proposed development, including an UE pumping station and parking for the existing graveyard adjacent to the west of the site adjacent to a Burial Ground which is a Protected Structure 323 NIAH GA105066.

See below Figure 1 for site Location and Figure 2 for Proposed Site Layout.



Figure 1 Site Location - Aerial View (Google Maps)

Access to the site is via R350 and 2 vehicle access points via Hazelwood Estate Road, a secondary pedestrian/cycle access will also be provided with Hazelwood Road.

TOBIN are the consultants appointed to provide Civil, Structural and Traffic engineering design services for the planning stage of this project.

As part of the planning submission for the above proposed development, TOBIN have prepared this Engineering Report to address the following design aspects of the proposed development.

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The following drawings are included outlining the design proposals and a Drawing Register is included in **Appendix A**:

- 11942-2000 – Proposed Watermain Layout
- 11942-2001 – Proposed Foul Drainage Layout
- 11942-2002 – Proposed Storm Water Drainage Layout
- 11942-2003 – Proposed SuDS Layout
- 11942-2004 – Proposed Roads Layout
- 11942-2005 – Proposed Visibility Splays
- 11942-2006 – Swept Path Analysis Sht 1 of 3
- 11942-2007 – Swept Path Analysis Sht 2 of 3
- 11942-2008 – Swept Path Analysis Sht 3 of 3
- 11942-2009 – Site Development Details Sheet 1 of 3
- 11942-2010 – Site Development Details Sheet 2 of 3
- 11942-2011 – Site Development Details Sheet 3 of 3
- 11942-2012 – Standard Manhole Details 1 of 2
- 11942-2013 – Standard Manhole Details 2 of 2
- 11942-2014 – Standard Pipe Bedding Details
- 11942-2015 – Standard Watermain Details

2. SURFACE WATER DRAINAGE

Storm water drainage services for the proposed development are considered to include the following:

- ✓ Storm Water Network for internal roads, footpaths, pedestrian areas, and carpark
- ✓ Storm Water Network for roof runoff from the proposed buildings

The storm water drainage design has been designed to cater for surface water runoff from all hardstanding areas. The storm water drainage services have been designed to take account of the requirements of the Department of Environment “Recommendations for Site Development Works for Housing Areas”, 1998, the “Greater Dublin Strategic Study” and “Sewers for Adoption” published by WRC, UK.

The storm water drainage network was designed using Causeway Flow Design software and the following parameters formed the basis of the design:

- The surface water run-off is calculated using the Modified Rational Method (Wallingford Procedure),

$$Q = 2.78 \times C_v \times C_r \times I \times A$$

Where,	Q	=	rate of run-off, l/s
	C _v	=	Volumetric run-off coefficient
	C _r	=	Routing coefficient
	I	=	Intensity of rainfall, mm/hr
	A	=	Impermeable Area, ha

- A design return period of 1 year has been adopted for the sewer network in accordance with good design practice.
- The rainfall intensity is based on rainfall data for Loughrea
- Minimum self-cleansing velocity of 0.75m/s
- M5-60 = 16.4
- Ratio (R) = 0.272

2.1 EXISTING STORM DRAINAGE

It is proposed to discharge wastewater generated by the proposed development to the existing 300mm PCV stormwater line which runs along the R350 Road to the east of the site.

Refer to Drawing 11942-2002 for details of the existing stormwater network.

2.2 PROPOSED STORM DRAINAGE

A dedicated storm water drainage system will be provided to pick up surface water run-off from roofs, car parks and other hardstand areas. Surface water runoff from roads and footpaths throughout the site will be collected by a combination of channel drains and precast concrete gullies with lockable cast iron grating and frame connected to a piped system. The pipe diameter of the new network will range between 150 and a maximum of 300mm and will be laid at gradients varying between 1/60 and 1/200 given the site area and topography.

Surface water drainage is proposed to discharge to the existing storm water drainage network located along the R350 Road located along the eastern site boundary. Discharge from the site will be restricted to greenfield run-off rates.

Prior to discharge to the existing network all surface water will pass through a Class 1 petrol interceptor.

SuDS measures such as rain gardens and swales will be strategically located throughout the development to aid in the storm water management of the site. These measures will assist in preserving the current greenfield runoff on the site. Refer to drawing 11925-2003 for locations of the proposed SuDS measures.

The storm drainage for the entire development has been designed using the Causeway Flow Design Software in accordance with the Recommendations for Site Development Works for Housing Areas and also some of the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). The details of the Causeway Flow Outputs for the pipe design and associated long sections are outlined at **Appendix B** of this report. Refer to drawing 11942 - 2002 for details of the proposed storm drainage network.

2.3 SUSTAINABLE URBAN DRAINAGE SYSTEMS

The existing site is currently a greenfield site with no storm drainage or SuDS measures in place.

To limit surface water runoff from the site, the surface water drainage for the proposed development will be designed in accordance with the principles of Sustainable Urban Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimise the impact of urbanisation by replicating the runoff characteristics of the partly brownfield site.

The requirements of SuDS are typically addressed by provision of the following:

- ✓ Interception storage
- ✓ Treatment storage (not required if interception storage is provided)
- ✓ Attenuation storage
- ✓ Long term storage (if this is not required growth rates should not be applied to Q_{bar})

In the case of the subject site, interception storage can be achieved by implementing swales, rain gardens and attenuation storage tanks. Growth factors will be applied to the allowable discharge for the 100-year event. This means that both treatment storage and long-term storage, neither of which would be practical on this site, are not required. All SuDS measures will

be designed in accordance with the recommendation set out in the EPA's document entitled "Guidance on Authorisation of Discharges to Groundwater 2011".

2.3.1 Water Quality

Water quality is managed in the form of the proposed petrol interceptors. Since spatial restraints limit the use of nature-based SuDS measures specifically for water treatment, the use of a petrol interceptor has been proposed as a general SuDS measure to meet this requirement. In addition, the drainage kerbs and infiltration trench/swale garden combination allow for isolation of hydrocarbons for nature-based treatment within appropriate green zones.

2.3.2 Water Quantity

The use of swales and rain gardens will increase the time to concentration for the network whilst reducing the peak run-off rates. The main drainage system is also designed to achieve the required thresholds in the event of localized exceedance of SuDS measures, or seasonally sensitive capacity reductions, thereby ensuring that greenfield run-off rates are maintained.

2.3.3 Amenity

The proposed filter strips, rain gardens and swales integrate with the broader landscaping strategy to meet this requirement. However, the details of these measures are to be developed during the detailed design stage.

2.3.4 Biodiversity

The landscaping design requires further development in the detailed design stage to accommodate further SuDS measures to leverage opportunities for biodiversity. However, the SuDS measures already proposed support the landscaping measures as might be employed to meet the biodiversity goals of the development.

2.4 SOAKAWAY (BRE 365)

Infiltration testing conducted in October 2022 for the site (**Appendix C**) revealed that at the locations of the proposed development water infiltration was too low to calculate the infiltration rate.

The proposed site is therefore not recommended as suitable for soakaway design and construction.

2.5 ATTENUATION TANKS

It is proposed to install 2 cellular attenuation tanks for the proposed development. One of the units is located centrally within the site, the other in the southeastern corner along the eastern boundary prior to connection to the existing sewer. Hydrobrake manholes control the flow of surface water to allow the attenuation areas fill their capacity.

All cellular storage units will be sized to attenuate the water generated for the largest storage required over a 48-hour storm period with rainfall depths taken for the 100-year return period + 20% for climate change for sliding durations obtained from Met Eireann.

Outputs, including the storage structure information, from Causeway Flow modelling software can be found in **Appendix B**. The proposed cellular unit locations are shown graphically on the proposed drainage layout drawings and a Typical Soakaway/Attenuation detail drawing accompanies this application.

2.6 PETROL INTERCEPTOR

It is proposed to install a Class 1 Bypass Petrol Interceptor upstream of the connection into the existing storm sewer network. The reasoning for this is that the storm water entering the system will include run-off from the roadways and parking areas throughout the site and therefore may have hydrocarbons within their flow. These hydrocarbon pollutants require removal and are not to be discharged back into the environment. The separator has been sized to cater for roads, carparking and footpath areas of the site with an allowance for contributing roof areas.

From the selection tables in the Separator Product Brochure, it is proposed to provide 1 No. Kingspan Klargestar (NSBE025) or similar approved bypass separators to cater for the hydrocarbons which may be present in the storm water.

3. WASTE WATER DRAINAGE

The drainage systems including all pipe sizes and gradients have been designed in accordance with the Uisce Eireann Code of Practice for Wastewater Infrastructure. Refer to Drawing 11942-2001 which outlines the details of the existing and proposed wastewater network.

3.1 EXISTING WASTEWATER DRAINAGE

It is proposed to discharge wastewater generated by the proposed development via rising main to the existing Uisce Eireann owned wastewater located underneath the R350 Road.

Refer to Drawing 11942-2001 which outlines the details of the existing wastewater network.

3.2 PROPOSED WASTEWATER DRAINAGE

Wastewater generated from the proposed development will outfall to an existing Uisce Eireann owned 225mm foul sewer network located adjacent to the east-northern corner of the site on the R350 Road.

Due to site topography and constraints, it will be necessary for the wastewater generated from dwellings to discharge via a gravity foul sewer to a pumping station. The pumping station is located centrally within the site. A rising main, will pump wastewater from the pumping station to the discharge (decompression) manhole to be located At the junction of the Hazelwood Estate prior to flow via gravity to the existing UE foul network.

The pipework for the wastewater drainage system has been designed to provide six times the dry weather flow in accordance with the Uisce Eireann Code of practice and standard details- Appendix B – Gravity Sewer Design Requirements, section 2.2.5 Domestic Wastewater Peaking Factors.

The wastewater drainage services have been designed to take account of the requirements of the Civil Engineering Specification for the Water Industry (CESWI), subject to the particular requirements applied to it by Uisce Eireann, as outlined in the Uisce Eireann Code of Practice for Wastewater Infrastructure. Other design guidelines adhered to include the Department of Environment “Recommendations for Site Development Works for Housing Areas”, 1998, and “Sewers for Adoption” published by WRC, UK.

It is proposed that all pipes will be thermoplastic structured wall pipes with the maximum and minimum pipe sizes being between 150mm and 225mm respectively. The maximum and minimum pipe gradients shall fall between 1/40 and 1/200. All velocities at said gradients will fall within the limits of 0.75m/sec and 3m/sec as set out in Uisce Eireann Code of Practice for Wastewater Infrastructure and “Recommendations for Site Development Works” as published by the Department of Environment.

A confirmation of Feasibility has been obtained from Uisce Eireann and is included in **Appendix D**.

3.3 PUMPING STATION

The pumping station will be designed in accordance with the requirements set out in the Uisce Eireann Code of Practice for Wastewater Infrastructure (UE-CDS-5030-03). It is proposed to



construct a Type 3 pumping station, as it is serving more than 20 units. It is to be located no closer than 15m from the boundary of the nearest property in accordance with Uisce Eireann requirements.

Uisce Eireann - Code of Practice for Wastewater Infrastructure – Doc ref (UE-CDS_5030-03) section 5.2 General Requirements notes that emergency storage capacity of 24-hours Dry Weather Flow (DWF) is required for smaller developments of up to 250 units.

The pumping station will include a 3.7m wide set-down to allow for an occasional small tanker or service vehicles to be parked outside the pumping station. It is estimated that tanker movements to the site would be minimal and subject to the operational efficiencies of the pumping station.

4. WATER SUPPLY

The proposed watermain layout has been designed in accordance with Uisce Eireann Code of Practice for Watermain Infrastructure UE-CDS-5020-03.

Refer to Drawing 11942-2000 which outlines the details of the existing and proposed water supply network.

4.1 EXISTING WATER SUPPLY INFRASTRUCTURE

According to Uisce Eireann information there is an existing watermain running along the R350 Road located along the eastern site boundary. From this it is proposed to provide a 100mm diameter HDPE SDR17 feed to the site.

4.2 PROPOSED WATER SUPPLY INFRASTRUCTURE

As outlined in Section 4.1, it is proposed to supply water to this development through the existing water supply network in the vicinity of the proposed site.

In accordance with Local authority/Uisce Eireann standards, a water meter and Logging Device (Larson Type) are proposed at the connection into the proposed site. A sluice valve, strainer and 100mm diameter by-pass arrangement are also proposed to allow for possible disconnection of water meters by the Local Authority/ Uisce Eireann.

Hydrants, sluice valves, air valves and scour valves or wash-out hydrants will be positioned within the site as per shown on the layout drawings. All watermains are to be commissioned and pressure tested to Uisce Eireann standards. The typical construction details and the meter details accompany this application as part of the engineering drawings pack.

The “National Guidance Document on the Provision of Water for Fire Fighting”, Water UK, Local Government Association, (3rd Edition, Jan 2007), states that Housing developments with units of detached or semidetached houses of not more than two floors should have a water supply capable of delivering a minimum of eight litres per second through any single hydrant.

A flow test should be undertaken at a hydrant located adjacent to the site to establish the achievable flow.

For firefighting purposes, fire hydrants are to be provided within the site to the spacing required by Part B of the Building Regulations including the requirement that hydrants will be provided such the building is within 46 metres from a hydrant.

Any specific requirements as requested by the local fire authority will be incorporated at the detail design stage.

A Confirmation of Feasibility has been obtained for this project and is included in **Appendix D**.

5. ROADS LAYOUT

All internal roads have been designed in accordance with the Design Manual for Urban Roads and Streets (DMURS), May 2019 and the Recommendations for Site Development Works for Housing Areas, 1998. Auto track vehicle swept path analysis has been completed for the proposed site layout for a Large Car, a Refuse Truck, Fire Tender and a small tanker to ensure the vehicles can safely manoeuvre around the site. The swept paths are shown on drawings 11942-2006 to 11942-2009.

As previously noted, the existing site is currently a greenfield site and there are no parking or pedestrian provisions within the site. The proposed development will be accessed through a new junction along R350, 2 vehicle access points and a secondary pedestrian/cycle access via Hazelwood Estate Road. The R350 Road provides a linkage to the town of Loughrea to the south and Road N65 to the north. The proposed site access will be situated within a 50km/h default urban speed zone.

The proposed maximum speed limit within the development is to be 20km/h, with relevant traffic control measures where suitable. Road widths within the development are to be 6.0m wide and 1.8-2m wide footpaths running adjacent.

Road levels for the site have been derived taking cognisance of the existing topography and ground conditions, combined with allowable road gradients. Road makeup shall be in accordance with Galway City Council Taking In-Charge requirements, shown on the typical site works details drawing that accompany this application. The use of raised junctions/crossings and pedestrian crossing points along with strategically positioned drop kerbs and tactile paving will allow for full linkage for visually impaired and less-able pedestrians. Refer to the DMURS 2019 Statement of Consistency for further details on the road's layout. The shared surface shall be finished in different surface material to differentiate them from vehicle priority roads. All roads will include a 1:40 camber and longitudinal gradients of road sections lie between 1:21 and 1:200 to ensure adequate surface water drainage is achieved.

Lockable gullies are located, at a minimum, every 200m² with local low points allowing for double gullies as per Recommendations for Site Development Works for Housing Areas to ensure surface water drainage will not be blocked.

Visibility splay and sightline requirements at the point of vehicular egress are based on a 50 km/h Speed Limit, (Design Speed), of R350 Road and consider Section 4.4.2 and Table 4.2 of the Department of Transport document 'Design Manual for Urban Roads and Streets' (DMURS). The required 45m DMURS visibility sightlines are available for drivers emerging from (Sightlines) and on the approach to the proposed site access junction (Stopping Sight Distance - SSD) as illustrated on the proposed roads layout drawings. Required 14m DMURS visibility splays are also available at internal junctions within the development at the reduced design speed of 20km/h ('Slow Zone' speed limit) and where traffic calming measure enforce slower speeds.

An independent Road Safety Audit has been carried out on the site and the auditor's report is included as an appendix of the Traffic and Transport Assessment Report (TTA), which will accompany this application as a separate document.

6. REFERENCES

Uisce Eireann Code of Practice for Wastewater Infrastructure IW-CDS-5030-03, Revision 2, July 2020

Uisce Eireann Code of Practice for Water Infrastructure IW-CDS-5020-03, Revision 2, July 2020

Design Manual for Urban Roads and Streets, Department of Transport, Tourism and Sport/Department of Housing, Planning and Local Government

National Guidance Document on the Provision of Water for Fire Fighting, 3rd Edition, January 2007, Local Government Association/Water UK

Recommendations for Site Development works for Housing Areas, October 1998, Government of Ireland

Public Health and Plumbing Engineering CIBSE Guide G: 2014, Chartered Institute of Building Services Engineers

Traffic Signs Manual, August 2019, Department of Transport, Tourism and Sport

The SuDS Manual C753, 2015, CIRIA

BRE Digest 365, Building Research Establishment

Appendix A DRAWING REGISTER

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Document and Drawing Issue Register

Project				
11942 - VHA - PROVISION OF FULL INTEGRATED DESIGN TEAM SERVICES FOR 3.3 HECTARE HOUSING SITE DEVELOPMENT AT COSMONA LOUGHREA CO. GALWAY				
PLEASE ACKNOWLEDGE RECEIPT OF DRAWINGS Reasons: AB - As Built, C - For Construction, CM - For Comment, I - For Information, P - Preliminary, T - For Tender MU - Multiple		ISSUE NO.	7	
		ISSUED BY	SB	
		DAY	27	
		MONTH	9	
		YEAR	24	
		ISSUE REASON	I	
DRG NO.	DRAWING/DOCUMENT TITLE	SIZE	SCALE	
11942-2000	Proposed Watermain Layout	A1	As Drawing	P0
11942-2001	Proposed Foul Drainage Layout	A1	As Drawing	P0
11942-2002	Proposed Storm Drainage Layout	A1	As Drawing	P0
11942-2003	Proposed SuDS Layout	A1	As Drawing	P0
11942-2004	Proposed Roads Layout	A1	As Drawing	P0
11942-2005	Visiblity Splays	A1	As Drawing	P0
11942-2006	Vehicle Swept Paths Sheet 1	A1	As Drawing	P0
11942-2007	Vehicle Swept Paths Sheet 2	A1	As Drawing	P0
11942-2009	Site Development Details - Sheet 1	A1	As Drawing	P0
11942-2010	Site Development Details - Sheet 2	A1	As Drawing	P0
11942-2011	Site Development Details - Sheet 3	A1	As Drawing	P0
11942-2012	Standard Pipe Bedding Details	A1	As Drawing	P0
11942-2013	Standard Manhole Details - Sheet 1	A1	As Drawing	P0
11942-2014	Standard Manhole Details - Sheet 2	A1	As Drawing	P0
11942-2015	Standard Watermain Details	A1	As Drawing	P0
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ELECTRONIC FORMATS				
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DOCUMENT AND DRAWING ISSUE REGISTER				

Appendix B CAUSEWAY FLOW STORM DRAINAGE MODEL & LONGSECTIONS



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	15.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	55.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	16.400	Minimum Backdrop Height (m)	1.000
Ratio-R	0.272	Preferred Cover Depth (m)	1.200
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	0.067	5.00	80.851	1200	561682.609	717274.680	0.560
S2	0.083	5.00	80.532	1350	561686.743	717250.128	0.532
S3	0.077	5.00	80.071	1350	561694.352	717198.132	1.405
S4	0.029	5.00	79.419	1350	561745.543	717204.280	1.121
S5	0.066	5.00	80.525	1350	561667.244	717194.619	1.645
S6	0.045	5.00	79.988	1350	561737.332	717143.526	1.372
S7	0.114	5.00	79.359		561748.511	717228.846	1.191
S8	0.123	5.00	79.930	1350	561755.780	717281.815	1.489
S9	0.025	5.00	78.720	1350	561815.198	717220.993	0.882
S10	0.123	5.00	79.392	1350	561822.517	717286.000	0.500
S11			78.500	1350	561809.610	717185.109	0.844
S12	0.109	5.00	79.424	1350	561801.310	717147.449	1.402
S14	0.031	5.00	81.813	1200	561655.466	717152.319	1.856
S17	0.091	5.00	79.856	1350	561739.064	717155.927	1.377
S18			80.165	1350	561692.967	717205.576	1.311
S19	0.050	5.00	80.949	1350	561690.273	717149.323	1.575
S20	0.000	5.00	78.768	1350	561817.255	717242.465	0.823
S21			78.430	1350	561816.844	717183.996	0.800
S22			79.013	1350	561806.103	717185.622	1.185
S23	0.000	5.00	79.171	1350	561819.586	717261.715	1.429

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)
S14-S19	S14	S19	34.936	0.600	79.957	79.374	0.583	59.9	225	5.34	39.1
S19-S17	S19	S17	49.236	0.600	79.374	78.554	0.820	60.0	225	5.83	37.8
S6-S17	S6	S17	12.521	0.600	78.616	78.554	0.062	202.0	225	5.23	39.4
S17-S4	S17	S4	48.785	0.600	78.479	78.298	0.181	269.5	225	6.86	35.5
S1-S2	S1	S2	24.898	0.030	80.291	80.050	0.241	103.3	500	5.30	39.2

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)
S14-S19	1.692	67.3	3.3	1.631	1.350	0.031	0.0	34	0.886
S19-S17	1.691	67.2	8.3	1.350	1.077	0.081	0.0	53	1.158
S6-S17	0.916	36.4	4.8	1.147	1.077	0.045	0.0	55	0.638
S17-S4	0.791	31.5	20.9	1.152	0.896	0.217	0.0	134	0.845
S1-S2	1.380	1380.3	7.1	0.060	-0.018	0.067	0.0	37	0.320

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)
S2-S18	S2	S18	44.985	0.030	80.000	79.600	0.400	112.5	500	5.87	37.8
S18-S3	S18	S3	7.572	0.030	78.854	78.741	0.113	67.0	225	6.08	37.2
S5-S3	S5	S3	27.334	0.600	78.880	78.741	0.139	196.6	225	5.49	38.7
S3-S4	S3	S4	51.559	0.030	78.666	78.298	0.368	140.1	300	7.79	33.7
S4-S7	S4	S7	24.745	0.600	78.298	78.174	0.124	199.6	300	8.17	33.0
S8-S7	S8	S7	53.466	0.600	78.441	78.174	0.267	200.2	225	5.97	37.5
S7-S9	S7	S9	65.944	0.600	78.168	77.838	0.330	199.8	300	9.26	31.4
S10-S23	S10	S23	24.461	0.030	78.892	78.671	0.221	110.7	500	5.31	39.2
S23-S20	S23	S20	19.391	0.030	78.042	77.945	0.097	199.9	225	6.24	36.9
S20-S9	S20	S9	21.570	0.030	77.945	77.838	0.107	201.6	225	7.28	34.6
S9-S11	S9	S11	36.317	0.600	77.838	77.656	0.182	199.5	300	9.81	30.4
S12-S22	S12	S22	38.473	0.600	78.022	77.828	0.194	198.3	225	5.69	38.2
S22-S11	S22	S11	3.544	0.600	77.828	77.781	0.047	75.4	225	5.73	38.1
S11-S21	S11	S21	7.320	0.600	77.656	77.630	0.026	281.5	375	9.92	30.3

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)
S2-S18	1.323	1322.9	15.4	0.032	0.065	0.150	0.0	57	0.395
S18-S3	0.598	23.8	15.1	1.086	1.105	0.150	0.0	131	0.634
S5-S3	0.929	36.9	6.9	1.420	1.105	0.066	0.0	65	0.713
S3-S4	0.501	35.4	26.7	1.105	0.821	0.293	0.0	195	0.550
S4-S7	1.109	78.4	48.2	0.821	0.885	0.539	0.0	170	1.164
S8-S7	0.920	36.6	12.5	1.264	0.960	0.123	0.0	91	0.837
S7-S9	1.108	78.4	66.0	0.891	0.582	0.776	0.0	212	1.237
S10-S23	1.334	1333.5	13.1	0.000	0.000	0.123	0.0	52	0.379
S23-S20	0.346	13.8	12.3	0.904	0.598	0.123	0.0	166	0.391
S20-S9	0.345	13.7	11.5	0.598	0.657	0.123	0.0	159	0.387
S9-S11	1.109	78.4	76.2	0.582	0.544	0.924	0.0	240	1.257
S12-S22	0.925	36.8	11.3	1.177	0.960	0.109	0.0	86	0.817
S22-S11	1.507	59.9	11.3	0.960	0.494	0.109	0.0	65	1.159
S11-S21	1.075	118.7	84.7	0.469	0.425	1.033	0.0	235	1.164

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)
S14-S19	34.936	59.9	225	Circular	81.813	79.957	1.631	80.949	79.374	1.350
S19-S17	49.236	60.0	225	Circular	80.949	79.374	1.350	79.856	78.554	1.077
S6-S17	12.521	202.0	225	Circular	79.988	78.616	1.147	79.856	78.554	1.077
S17-S4	48.785	269.5	225	Circular	79.856	78.479	1.152	79.419	78.298	0.896
S1-S2	24.898	103.3	500	1:3 Swale	80.851	80.291	0.060	80.532	80.050	-0.018

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S14-S19	S14	1200	Manhole	Adoptable	S19	1350	Manhole	Adoptable
S19-S17	S19	1350	Manhole	Adoptable	S17	1350	Manhole	Adoptable
S6-S17	S6	1350	Manhole	Adoptable	S17	1350	Manhole	Adoptable
S17-S4	S17	1350	Manhole	Adoptable	S4	1350	Manhole	Adoptable
S1-S2	S1	1200	Manhole	Adoptable	S2	1350	Manhole	Adoptable

Pipeline Schedule

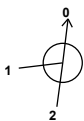
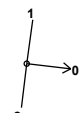
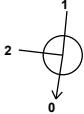
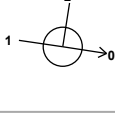
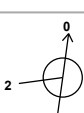
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
S2-S18	44.985	112.5	500	1:3 Swale	80.532	80.000	0.032	80.165	79.600	0.065
S18-S3	7.572	67.0	225	Circular	80.165	78.854	1.086	80.071	78.741	1.105
S5-S3	27.334	196.6	225	Circular	80.525	78.880	1.420	80.071	78.741	1.105
S3-S4	51.559	140.1	300	Circular	80.071	78.666	1.105	79.419	78.298	0.821
S4-S7	24.745	199.6	300	Circular	79.419	78.298	0.821	79.359	78.174	0.885
S8-S7	53.466	200.2	225	Circular	79.930	78.441	1.264	79.359	78.174	0.960
S7-S9	65.944	199.8	300	Circular	79.359	78.168	0.891	78.720	77.838	0.582
S10-S23	24.461	110.7	500	1:3 Swale	79.392	78.892	0.000	79.171	78.671	0.000
S23-S20	19.391	199.9	225	Circular	79.171	78.042	0.904	78.768	77.945	0.598
S20-S9	21.570	201.6	225	Circular	78.768	77.945	0.598	78.720	77.838	0.657
S9-S11	36.317	199.5	300	Circular	78.720	77.838	0.582	78.500	77.656	0.544
S12-S22	38.473	198.3	225	Circular	79.424	78.022	1.177	79.013	77.828	0.960
S22-S11	3.544	75.4	225	Circular	79.013	77.828	0.960	78.500	77.781	0.494
S11-S21	7.320	281.5	375	Circular	78.500	77.656	0.469	78.430	77.630	0.425

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S2-S18	S2	1350	Manhole	Adoptable	S18	1350	Manhole	Adoptable
S18-S3	S18	1350	Manhole	Adoptable	S3	1350	Manhole	Adoptable
S5-S3	S5	1350	Manhole	Adoptable	S3	1350	Manhole	Adoptable
S3-S4	S3	1350	Manhole	Adoptable	S4	1350	Manhole	Adoptable
S4-S7	S4	1350	Manhole	Adoptable	S7		Junction	
S8-S7	S8	1350	Manhole	Adoptable	S7		Junction	
S7-S9	S7		Junction		S9	1350	Manhole	Adoptable
S10-S23	S10	1350	Manhole	Adoptable	S23	1350	Manhole	Adoptable
S23-S20	S23	1350	Manhole	Adoptable	S20	1350	Manhole	Adoptable
S20-S9	S20	1350	Manhole	Adoptable	S9	1350	Manhole	Adoptable
S9-S11	S9	1350	Manhole	Adoptable	S11	1350	Manhole	Adoptable
S12-S22	S12	1350	Manhole	Adoptable	S22	1350	Manhole	Adoptable
S22-S11	S22	1350	Manhole	Adoptable	S11	1350	Manhole	Adoptable
S11-S21	S11	1350	Manhole	Adoptable	S21	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	561682.609	717274.680	80.851	0.560	1200				
S2	561686.743	717250.128	80.532	0.532	1350		1	S1-S2	80.050
							0	S2-S18	80.000
S3	561694.352	717198.132	80.071	1.405	1350		2	S5-S3	78.741
							1	S18-S3	78.741
							0	S3-S4	78.666

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S4	561745.543	717204.280	79.419	1.121	1350		1	S3-S4	78.298	300
							2	S17-S4	78.298	225
							0	S4-S7	78.298	300
S5	561667.244	717194.619	80.525	1.645	1350		0	S5-S3	78.880	225
S6	561737.332	717143.526	79.988	1.372	1350		0	S6-S17	78.616	225
S7	561748.511	717228.846	79.359	1.191			1	S8-S7	78.174	225
							2	S4-S7	78.174	300
							0	S7-S9	78.168	300
S8	561755.780	717281.815	79.930	1.489	1350		0	S8-S7	78.441	225
S9	561815.198	717220.993	78.720	0.882	1350		1	S20-S9	77.838	225
							2	S7-S9	77.838	300
							0	S9-S11	77.838	300
S10	561822.517	717286.000	79.392	0.500	1350		0	S10-S23	78.892	500
S11	561809.610	717185.109	78.500	0.844	1350		1	S22-S11	77.781	225
							2	S9-S11	77.656	300
							0	S11-S21	77.656	375
S12	561801.310	717147.449	79.424	1.402	1350		0	S12-S22	78.022	225
S14	561655.466	717152.319	81.813	1.856	1200		0	S14-S19	79.957	225
S17	561739.064	717155.927	79.856	1.377	1350		1	S6-S17	78.554	225
							2	S19-S17	78.554	225
							0	S17-S4	78.479	225
S18	561692.967	717205.576	80.165	1.311	1350		1	S2-S18	79.600	500
S19	561690.273	717149.323	80.949	1.575	1350		0	S18-S3	78.854	225
							1	S14-S19	79.374	225
							0	S19-S17	79.374	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S20	561817.255	717242.465	78.768	0.823	1350	 1	S23-S20	77.945	225
S21	561816.844	717183.996	78.430	0.800	1350	 1	S20-S9	77.945	225
							S11-S21	77.630	375
S22	561806.103	717185.622	79.013	1.185	1350	 1	S12-S22	77.828	225
							S22-S11	77.828	225
S23	561819.586	717261.715	79.171	1.429	1350	 1	S10-S23	78.671	500
							S23-S20	78.042	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	Scotland and Ireland	Skip Steady State	x
M5-60 (mm)	16.400	Drain Down Time (mins)	60
Ratio-R	0.272	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

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 %)
1	0	0	0
30	10	0	0
100	20	0	0

Node S11 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	77.656	Product Number	CTL-SHE-0134-8000-0844-8000
Design Depth (m)	0.844	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.0	Min Node Diameter (mm)	1200

Node S7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	78.168	Product Number	CTL-SHE-0149-1100-1191-1100
Design Depth (m)	1.191	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	11.0	Min Node Diameter (mm)	1200

Node S11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	77.656
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.96	Time to half empty (mins)	
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	390.4	0.0	0.700	390.4	0.0
			0.701	0.0	0.0

Node S7 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	78.168	Depth (m)	0.640
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	20.800	Number Required	1
Porosity	0.96	Pit Length (m)	25.600		

Node S2 Link Infiltration Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Link	S1-S2
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	80.050		
Safety Factor	2.0	Time to half empty (mins)			

Node S18 Link Infiltration Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Link	S2-S18
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	79.600		
Safety Factor	2.0	Time to half empty (mins)			

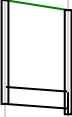
Node S23 Link Infiltration Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Link	S10-S23
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	78.671		
Safety Factor	2.0	Time to half empty (mins)			



Node Name	S14	S19	S17	S4	S7	S9	S11S21
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 74.000							
Link Name	S14-S19	S19-S17	S17-S4	S4-S7	S7-S9	S9-S11	S11
Section Type	225mm	225mm	225mm	300mm	300mm	300mm	375
Slope (1:X)	59.9	60.0	269.5	199.6	199.8	199.5	281
Cover Level (m)	81.813	80.949	79.856	79.419	79.359	78.720	78.500 78.430
Invert Level (m)	79.957	79.374 79.374	78.554 78.479	78.298 78.298	78.174 78.168	77.838 77.838	77.656 77.656
Length (m)	34.936	49.236	48.785	24.745	65.944	36.317	7.3

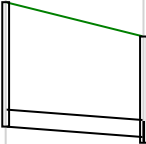


Node Name	S6	S17
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 73.000 		
Link Name	S6-S1	
Section Type	225m	
Slope (1:X)	202.0	
Cover Level (m)	79.988	79.856
Invert Level (m)	78.616 78.554	
Length (m)	12.52	

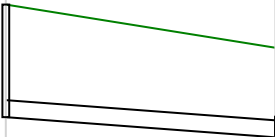


Node Name	S1	S2	S18S3	S4
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 74.000				
Link Name	S1-S2	S2-S18	S18	S3-S4
Section Type	500x500	500x500mm 1:3.225	300mm	
Slope (1:X)	103.3	112.5	67.0	140.1
Cover Level (m)	80.851	80.532	80.165 80.071	79.419
Invert Level (m)	80.291	80.050 80.000	79.600 78.954 78.666	78.298
Length (m)	24.898	44.985	7.5	51.559



Node Name	S5	S3
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 74.000 		
Link Name	S5-S3	
Section Type	225mm	
Slope (1:X)	196.6	
Cover Level (m)	80.525	80.071
Invert Level (m)	78.880	78.741
Length (m)	27.334	



Node Name	S8		S7
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 73.000			
	Link Name		
	S8-S7		
	Section Type		
	225mm		
Slope (1:X)		200.2	
Cover Level (m)		79.930	79.359
Invert Level (m)		78.441	78.174
Length (m)	53.466		



Node Name		S10	S23	S20	S9	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 73.000						
	Link Name	S10-S23	S23-S20	S20-S9		
	Section Type	\ / 500x500	225mm	225mm		
	Slope (1:X)	110.7	199.9	201.6		
	Cover Level (m)		79.392	79.171	78.768	78.720
Invert Level (m)		78.892	78.671	78.042	77.945	77.838
Length (m)		24.461	19.391	21.570		



Node Name	S12		S11	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 73.000				
	Link Name	S12-S22	S11-S12	
	Section Type	225mm	225mm	
	Slope (1:X)	198.3	71.5	
	Cover Level (m)	79.424	79.013	78.500
Invert Level (m)	78.022	77.828	77.628	
Length (m)		38.473	3.0	

Appendix C INFILTRATION TEST RESULTS



GROUND INVESTIGATIONS IRELAND
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IT-01A

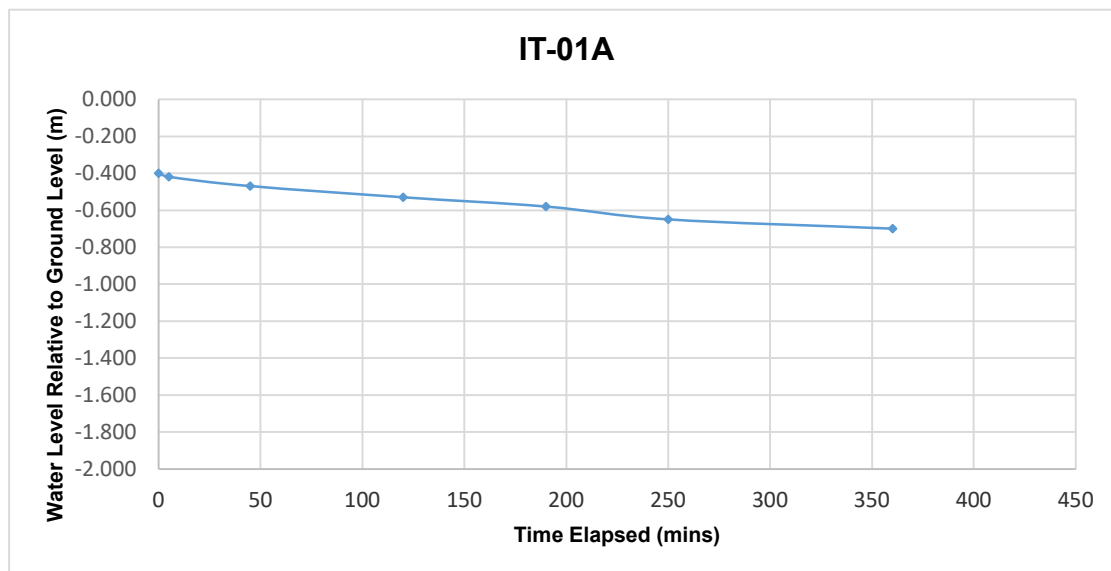
Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 2.30m x 1.00m 1.70m (L x W x D)

Date	Time	Water level (m bgl)
16/05/2022	0	-0.400
16/05/2022	5	-0.420
16/05/2022	45	-0.470
16/05/2022	120	-0.530
16/05/2022	190	-0.580
16/05/2022	250	-0.650
16/05/2022	360	-0.700

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.40	1.700	1.300	0.725	1.375





GROUND INVESTIGATIONS IRELAND
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IT-02

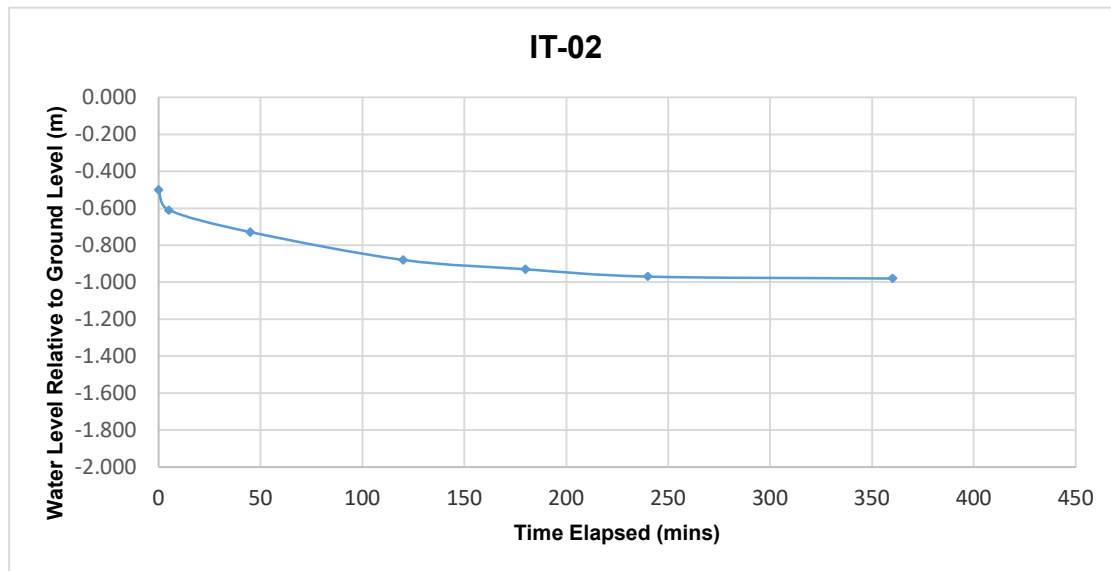
Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 3.30m x 1.10m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
16/05/2022	0	-0.500
16/05/2022	5	-0.610
16/05/2022	45	-0.730
16/05/2022	120	-0.880
16/05/2022	180	-0.930
16/05/2022	240	-0.970
16/05/2022	360	-0.980

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.50	1.500	1.000	0.75	1.25





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Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

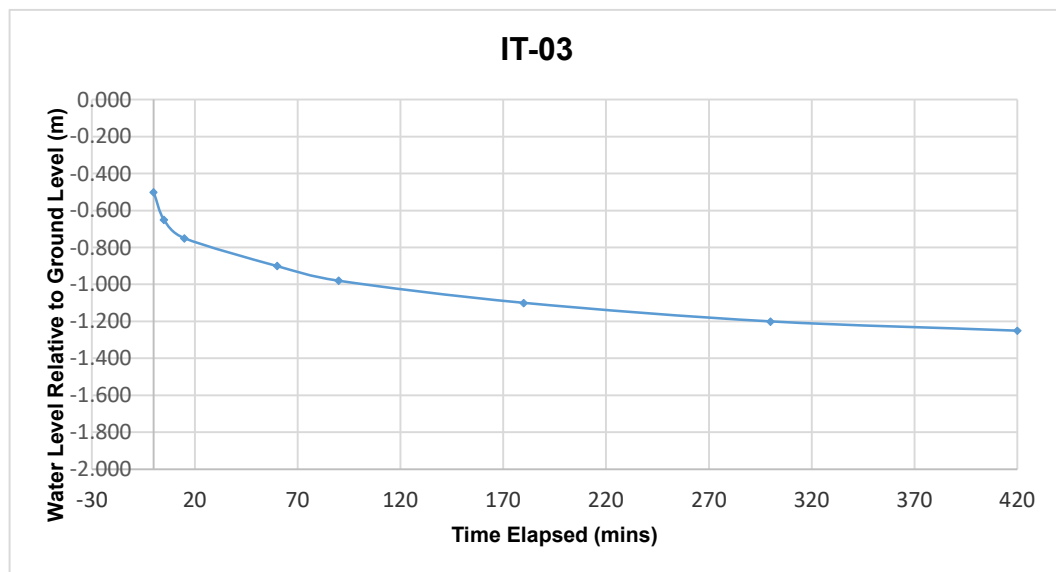
Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

IT-03

Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 3.60m x 1.10m 1.50m (L x W x D)

Date	Time	Water level (m bgl)			
16/05/2022	0	-0.500			
16/05/2022	5	-0.650			
16/05/2022	15	-0.750			
16/05/2022	60	-0.900			
16/05/2022	90	-0.980			
16/05/2022	180	-1.100			
16/05/2022	300	-1.200			
16/05/2022	420	-1.250			
			*data extrapolated		
			*pit filled once		
			*possible bedrock at base of pit		
Start depth	Depth of Pit		Diff	75% full	25%full
0.50	1.500		1.000	0.75	1.25
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
1.500	1.100			0.500	0.83
Tp75-25 (from graph) (s)		24240		50% Eff Depth	ap50 (m2)
				0.500	4.25
f =	8.008E-06	m/s			





GROUND INVESTIGATIONS IRELAND
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IT-04

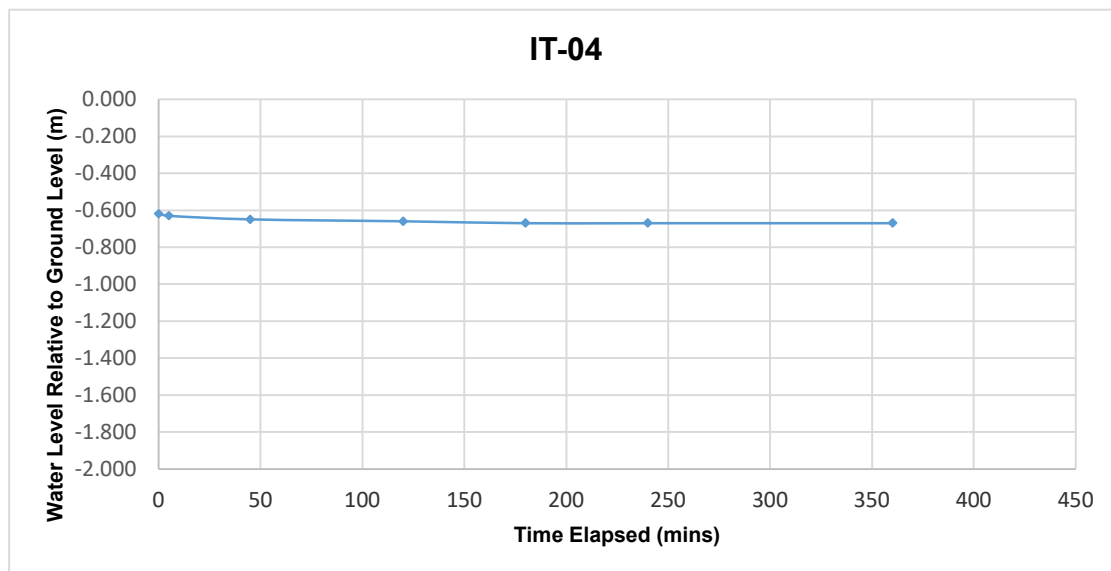
Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 3.40m x 1.10m 1.60m (L x W x D)

Date	Time	Water level (m bgl)
16/05/2022	0	-0.620
16/05/2022	5	-0.630
16/05/2022	45	-0.650
16/05/2022	120	-0.660
16/05/2022	180	-0.670
16/05/2022	240	-0.670
16/05/2022	360	-0.670

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.50	1.600	1.100	0.775	1.325



Cosmona Loughrea – Soakaway Photographs

IT-01



IT-01



Cosmona Loughrea – Soakaway Photographs

IT-01



IT-01



Cosmona Loughrea – Soakaway Photographs

IT-01A



IT-01A



Cosmona Loughrea – Soakaway Photographs

IT-01A



IT-01A



Cosmona Loughrea – Soakaway Photographs

IT-01A



IT-01A



Cosmona Loughrea – Soakaway Photographs

IT-02



IT-02



Cosmona Loughrea – Soakaway Photographs

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Cosmona Loughrea – Soakaway Photographs

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Cosmona Loughrea – Soakaway Photographs

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Cosmona Loughrea – Soakaway Photographs

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Cosmona Loughrea – Soakaway Photographs

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Cosmona Loughrea – Soakaway Photographs

IT-04



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Cosmona Loughrea – Soakaway Photographs

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Cosmona Loughrea – Soakaway Photographs

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IT-04



Appendix D Uisce Eireann Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

Gift Mzembe

Tobin Consulting Engineers
Fairgreen House
Fairgreen Road
Co. Galway
H91AXK8

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

25 September 2024

**Our Ref: CDS24006357 Pre-Connection Enquiry
R350, Cosmona, Loughrea, Co. Galway**

Dear Applicant/Agent,

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

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 56 unit(s) at R350, Cosmona, Loughrea, Galway, (the **Development**).

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

- **Water Connection** - Feasible without infrastructure upgrade by Uisce Éireann
- **Wastewater Connection**
 - Feasible without infrastructure upgrade by Uisce Éireann
 - We note your proposal includes the provision of an onsite pumping station arrangement. Please refer to Section 5 of our Wastewater Codes of Practice, which outlines our requirements for the provision of pumping stations and rising mains.

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

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

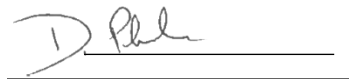
Where can you find more information?

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

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

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

Yours sincerely,

A handwritten signature in dark ink, appearing to read 'D. Phelan', is written over a horizontal line.

Dermot Phelan
Connections Delivery Manager

Section A - What is important to know?

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

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with <i>the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice</i>, available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

