TOBIN

Galway Port LRD

Civil Works Design Report

LDA
An Ghníomhaireacht um Fhorbairt Talún
The Land Development Agency

BUILT ON KNOWLEDGE

Document Control Sheet	
Document Reference	Civil Works Design Report
Client:	Land Development Agency
Project Reference	11910

Rev	Description	Author	Date	Reviewer	Date	Approval	Date
P01	Issued for Planning	EC	04/07/2025	RB	04/07/2025	RB	04/07/2025
P02	Revised Comments	EC	31/07/2025	RB	31/07/2025	RB	31/07/2025
P03	Minor Revisions	EC	03/09/2025	RB	03/09/2025	RB	03/09/2025
P04	Minor Revisions	JC	15/09/2025	RB	15/09/2025	RB	15/09/2025

Table of Contents

Appendices

List of Figures

1. INTRODUCTION

TOBIN were appointed to provide engineering consultancy services for a 'Large-Scale Residential Development' (LRD) Galway Port at Dock Road and Lough Atalia Road, Galway City, and extending to include parts of both roads. (Figure 1.1 – Site Location & Figure 1.2 - Proposed Site Layout).

This report has been prepared by Emma Connolly and Ryan Bragge of the Building & Infrastructure Civil and Statutory Consents sector of TOBIN Galway.

Emma Connolly holds a Civil Engineering degree from GMIT Galway (now Atlantic Technological University) and has over four years of professional experience as a Design Engineer. Her expertise encompasses the planning, tender, and construction phases of civil engineering projects. She is responsible for the preparation of design documentation, coordination with project stakeholders, and the delivery of engineering solutions in line with technical standards and project requirements.

Ryan Bragge is a Chartered Civil Engineer with over 20 years of experience and currently holds the position of Senior Project Engineer in the Building & Infrastructure Division. He has extensive expertise in both contracting and consulting, having successfully led private and public sector projects across residential, commercial, light industrial, and institutional sectors. His skills include stormwater control design, water and sewerage reticulation design, bulk earthworks design. He obtained his degree in the University of Natal (Durban), Durban, South Africa.

This report has been prepared to detail the civil works planning submission element of the proposed development. This report details the foul & storm drainage design and connection details, the nature-based SuDS solutions design and details, the watermain design and connection details and the roads design for the development. It should be read in conjunction with the engineering drawings as outlined and noted herein and which accompany this report as separate documents for the planning application.

Galway City Council – The Land Development Agency intends to apply to Galway City Council for permission for a 'Large-Scale Residential Development' (LRD) at a site of 1.621 Ha in Galway Port at Dock Road and Lough Atalia Road, Galway City, and extending to include parts of both roads for road infrastructure works and water services infrastructure works.

The proposed development principally consists of the demolition of the existing office / bus depot building (370.2 sq m) and ancillary building (26.0 sq m); the partial demolition of the existing ESB sub-station and ancillary building (67.4 sq m); the demolition of existing boundary walls at the south-west and north-west; and the construction of a mixed-use development.

The proposed mixed-use development primarily comprises: 356 No. residential apartments (172 No. 1-bed, 169 No. 2-bed and 15 No. 3-bed); crèche (255.9 sq m); 2 No. café/restaurant units (totalling 428.4 sq m); and 1 No. retail unit (156.0 sq m).

The development has a total floor area of 32,096.0 sq m and is primarily proposed in 4 No. blocks (identified as A–D) that generally range in height from 6 No. to 13 No. storeys: Block A ranges from 6 No. to 9 No. storeys; Block B ranges from 6 No. to 11 No. storeys; Block C is 6 No. storeys; and Block D ranges from 6 No. to 13 No. storeys.

The proposed development also includes: new internal street and pedestrian network, including a one-way vehicular route at the north-western side of the site and new junctions with Dock Road at the south-west and with the access road from Lough Atalia at the north-west; upgrades to Lough Atalia Road and the access road from it at the north-west of the site, including the provision of a new toucan pedestrian/cycle crossing at Lough Atalia Road; upgrades to the footpath and road interface with Dock Road to the south-west; 37 No. car parking spaces; 1 No. set-down/delivery bay; 741 No. cycle parking spaces; hard and soft landscaping, including as public open spaces and communal amenity spaces; private amenity spaces as balconies and terraces facing all directions; boundary treatments; public lighting; bin stores; double sub-station; plant rooms; green roofs; rooftop lift overruns and plant; rooftop telecommunications, plant and enclosure at Block C; recladding of the existing sub-station and pumping station; and all associated works above and below ground.

An Environmental Impact Assessment Report and a Natura Impact Statement have been prepared in respect of the proposed development.

This report has been prepared in accordance with all relevant national and industry guidance, codes of practice, and statutory requirements governing the design of water, wastewater, stormwater, and road infrastructure in Ireland. The design of foul and watermain infrastructure follows Uisce Éireann's Codes of Practice and Standard Details (2020), ensuring compliance with national connection requirements. The stormwater strategy has been developed in line with the Office of Public Works' *Planning System and Flood Risk Management Guidelines* (2009), the *CIRIA SuDS Manual* (2015), and the Department of Housing's *Nature-based Solutions Guidance* (2022), with reference to EPA guidance on groundwater protection (2014). Road layouts and access arrangements have been designed in accordance with the *Design Manual for Urban Roads and Streets* (DMURS, 2019), the *Traffic Signs Manual* (2019), and the *Recommendations for Site Development Works for Housing Areas* (1998). Firefighting provision has been developed with reference to the *National Guidance Document on the Provision of Water for Firefighting* (2007), as adopted by Uisce Éireann. Collectively, these documents provide the legislative and technical framework underpinning the design proposals and ensure that the development complies with best practice, safety, and sustainability requirements.

Figure 1.1 Site Location

Figure 1.2: Proposed Site Layout

1.1 WASTEWATER DRAINAGE SYSTEM OVERVIEW

It is proposed that the wastewater network will consist of gravity discharge to the existing combined sewer in the direction of the north-west corner of the site.

The foul sewer network was designed using Causeway Flow. Outputs from the foul sewer design can be found in **Appendix A** of this document. The proposed foul sewer network is presented graphically on drawing no. 11910-2002.

A pre-connection enquiry for the wastewater discharge from 400 residential units was submitted to Uisce Eireann. A Confirmation of Feasibility from Uisce Eireann was received and is attached in **Appendix D** of this report. The Confirmation of Feasibility indicates that there is capacity in the external network to cater for this development.

1.2 STORM WATER DRAINAGE SYSTEM OVERVIEW

The proposed stormwater drainage system has been designed to cater for all surface water runoff from hard surfaces within the development including roadways, roofs etc. All surface water generated onsite will pass through oil/petrol interceptors designed to separate hydrocarbons from water before discharging to one of 2 no. proposed attenuation units. Ultimate disposal is to outfall in the public storm culvert adjacent the bridge to the south of the site, which in turn discharges into the Galway Bay at the mouth of Lough Atalia.

1.3 WATERMAIN OVERVIEW

It is proposed to connect a 200mm watermain to an existing 300mm Uisce Eireann watermain, that is located running along the existing Lough Atalia Road, north of the proposed site entrance. The proposed 200mm watermain is the required size to service the development as per Uisce Eireann water infrastructure standards. All proposed watermain designs will be subject to full vetting by Uisce Éireann (formerly Irish Water), as part of the mandatory Connection Agreement Offer process. Design submissions must comply with the Standard Details for Water Infrastructure (IW-CDS-5020-01) and the Code of Practice for Water Infrastructure (IW-CDS-5020-03) developed by Uisce Éireann and required for all new Connection Applications and Connection Agreement Offers

Details of the watermain arrangement for the proposed development is presented in this report and in drawing no. 11910-2001.

A Pre-connection enquiry for the water demand for 400 residential units, was submitted to Uisce Eireann. A Confirmation of Feasibility from Uisce Eireann was received and is attached in **Appendix D** of this report. The Confirmation of Feasibility indicates that there is capacity in the external network to cater for this development.

1.4 ROADS OVERVIEW

Vehicular access to the proposed development will be via a proposed main entrance on the north-west of the site. A second one-way entrance to the south-west of the site is also proposed. The main access roads within the site are proposed to be 5.5m and the maximum speed within the development is to be 30km/hr. It is proposed to provide a 2.0m wide footpath inside the development as shown on drawing no. 11910-2003.

All internal roads have been designed in accordance with the requirements of Design Manual for Urban Roads and Streets (DMURS), 2019.

External connectivity has been enhanced with the proposal of a new footpath to Lough Atalia Road connecting the site with existing footpaths to the north of the site. The scheme also supports the potential for the future development of a waterfront active travel corridor along Lough Atalia's northern bank.

2. WASTEWATER DRAINAGE DESIGN

2.1 INTRODUCTION

It is proposed that the wastewater generated by the development will discharge via gravity to an existing foul sewer in the north of the site as shown on drawing no. 11910-2002.

The proposed foul network has been designed using Causeway Flow software with a capacity of six times the dry weather flow in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03, 2020) and the Standard Details for Wastewater Infrastructure (IW-CDS-5030-01, 2020).

Outputs details can be found in **Appendix A** of this report and the proposed foul sewer network is graphically represented on drawing no. 11910-2002.

2.2 LOADING RATES

In accordance with Section 3.6 of the Uisce Eireann Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03, 2020), dry weather flow (DWF) for domestic wastewater is 450 litres per dwelling. This equates to 2.7 P.E. per unit accounting for a 10% infiltration rate and rounded up. This loading rate has been applied to all dwellings in Causeway Flow modelling and presented in **Appendix A** of this report.

2.3 WASTEWATER DESIGN

Pipework design of the foul sewers was undertaken using Causeway Flow software. The design is presented on drawing no. 11910-2002. All pipework has been designed in accordance with Uisce Eireann Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03, 2020).

It is proposed that all pipes in the network will be thermoplastic structured wall pipes. The maximum pipe diameter is to be 225mm with maximum and minimum gradients of 1/60 and 1/200 respectively. All velocities within the foul network comply with Uisce Eireann Code of Practice for Wastewater Infrastructure requirement for flow velocities greater than self-cleansing velocity (0.75m/sec) and less than 2.5m/s as per Section 3.6 of the Uisce Eireann Code of Practice for Wastewater Infrastructure.

It is proposed that the wastewater network will discharge via gravity to an existing 450mm public foul sewer on the north of the development.

A pre-connection enquiry application was submitted to Uisce Eireann for the connection of 400 units to the wastewater network. A Confirmation of Feasibility from Uisce Eireann was obtained for this demand and is provided in **Appendix D** of this report. It has been confirmed that a wastewater connection for the proposed development is feasible, subject to a 140-metre extension and upgrade of the existing network infrastructure. All Foul sewer designs will be fully vetted by Uisce Eireann prior to receiving an offer to connect.

3. STORM WATER DRAINAGE

3.1 INTRODUCTION

The stormwater drainage design has been undertaken using Causeway Flow modelling software. The analysis considered the 30-year and 100-year return period plus an additional 10% and 20% respectively to account for the effects of climate change in line with the OPW's Planning System and Flood Risk Management Guidelines (2009), which mandate a precautionary approach. This includes designing infrastructure capable of accommodating future uncertainty in rainfall intensity and flood probabilities and ensuring adaptability for evolving climate impacts over the development's lifecycle. The design inputs, results and outputs from the Causeway Flow analysis are shown in **Appendix B** of this report.

Surface water from hard surfaces in the proposed development including roadways and roofs, as shown on drawing no. 11910-2004 will flow by gravity to 2 no. attenuation units.

The oil/petrol interceptor at the inlet to the attenuation unit will serve to prevent hydrocarbons entering the tank.

Ultimate disposal is to outfall in the public storm culvert adjacent the bridge to the south of the site, which in turn discharges into the Galway Bay at the mouth of Lough Atalia.

Detailed design will include further engagement with the Galway City Council Water Services Department. Design development will specifically reference the 2024 Water Action Plan to confirm any requirements beyond those stipulated in the referenced guidance documents and reference standards.

3.2 SUSTAINABLE URBAN DRAINAGE SYSTEMS

The existing site is primarily brownfield with no existing drainage or SuDS measures. Surface water management has been designed to match greenfield runoff rates, improving runoff control. The proposed drainage system will follow Sustainable Urban Drainage Systems (SuDS) principles. Guidance such as the Greater Dublin Strategic Drainage Study (GDSDS) and the policies and guidance outlined in the Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas – Best Practice Interim Guidance Document (March 2022), has informed the design. The GDSDS, although developed for Dublin, its principles of replicating natural runoff and minimizing urbanization impacts are widely applicable and have been adapted for this Galway 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})

For the subject site, interception and attenuation of surface water will be achieved through attenuation tanks with a calculated holding volume. Growth factors will not be applied to the allowable discharge for the 100-year event, as the drainage networks are contained entirely within the site and are not expected to be extended in the future. Consequently, neither treatment storage nor long-term storage—which would be impractical on this site—are

required. All SuDS measures will be designed with reference to the EPA's *Guidance on Authorisation of Discharges to Groundwater* (2014).

The proposed SuDS measures include rain gardens, tree pits, permeable paving, and drainage kerbs with infiltration trenches and filter strips. These measures provide interception storage by temporarily holding rainfall before it infiltrates or drains away. Storage capacity has been calculated and provided in attenuation zones beneath permeable surfaces and planted areas as though no interception storage were available. This approach accounts for the seasonal variability in the performance of these measures, as soil moisture and rainfall patterns can reduce their effectiveness at certain times of the year. By designing in this way, the drainage system remains effective under all conditions.

It is explicitly stated that, until site conditions are demonstrated to be suitable and Galway City Council is satisfied, all permeable paving and stone-fill attenuation zones will be impermeably lined. This measure prevents surface water from infiltrating the ground and potentially mobilizing residual pollutants from the made ground into Galway Bay. While known contaminated soils will be removed at the commencement of the project, as identified in the Waste Classification Investigation conducted by GII, this precaution ensures that any remaining or unknown contaminants are contained, providing additional protection to the environment.

SuDS objectives relate to:

1. Water Quality
2. Water Quantity
3. Amenity
4. Biodiversity

3.2.1 Water Quality

Water quality is managed in tandem between at-source nature-based drainage management measures and the proposed petrol interceptors. Thus, an initial stage of interception and filtration of contaminants is achieved for the majority of the site runoff by means of the permeable hardened surfaces and/or the nature-based measures, trapping suspended solids and (to a degree) hydrocarbons. All run-off passes through petrol interceptors before entering the attenuation zones. Therefore, run-off from surfaces that do not class as permeable or as nature-based will still pass through these petrol interceptors. In this manner, all runoff passes through at least one stage of filtration.

This approach also ensures that seasonal fluctuations in performance or capacity of nature-based and other SuDS measures will not undermine the achievement of an acceptable base-line water quality.

3.2.2 Water Quantity

Spatial restraints limit the use of large-scale SuDS measures but the employment of interception storage measures at source (as mentioned above), permeable surfaces with inherent storage capacity, and the use of stone-fill attenuation zones within the fill zones achieve this requirement. 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.

3.2.3 Amenity

The proposed rain gardens and tree pits integrate with the broader landscaping strategy to meet this requirement. Extensive permeable surfaces within the communal space double as public realm/amenity mixing space while providing a means of ingress into the drainage system and a means of attenuation storage.

3.2.4 Biodiversity

The intensive and context-sensitive landscaping design ensures biodiversity net gain is substantially achieved on the site. The nature-based SuDS measures proposed are integrated into that design and support a water-wise approach to landscaping.

3.3 PROPOSED STORM DRAINAGE

A dedicated storm water drainage system will be provided for the development and will pick up surface water run-off from impermeable surfaces such as roadways, carparks, footways, and roofs. The contained nature of the site constitutes a single catchment area for the outfall, but each surface acts as a localised 'mini' sub-catchment feeding into the drainage system.

The proposed development has been divided into 2 no. networks linked in series: Network A and Network B. These networks will each direct flow through a petrol interceptor before discharging into the proposed attenuation units. All proposed attenuation has been optimally located and scaled to cater for the upstream areas.

Precast concrete gullies including lockable cast iron grating and frame connected to a piped system will be provided at all proposed gully locations.

All velocities within the networks fall within the limits of 0.8 and 3m/sec as set out in the Recommendations for Site Development Works' as published by the Department for the Environment (1998).

The details of the Causeway Flow Outputs and associated long sections for each network are outlined at **Appendix B** of this report and the proposed storm water network can be found presented graphically on drawing no. 11910-2004.

3.4 ATTENUATION DESIGN

The attenuation system is proposed to discharge surface water run-off from the site to the existing storm water network. The required storage requirements have been designed based on the CIRIA SuDS Manual (December 2015) C753 Section 11.3 Hydraulic Design.

All storm water generated from roof; impermeable areas will be discharged to 2 no. attenuation units on the site. Accumulated stormwater will discharge to the existing storm network. The attenuation units are designed to hold water 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. The locations of the attenuation units, along with the volumes and invert levels of each are shown on drawing no. 11910-2004 and the attenuation detail is shown on drawing no. 11910-2014.

3.4.1 ATTENUATION CAPACITY DESIGN

Based on the CIRIA SuDS Manual C753 Section 11.3 Hydraulic Design, runoff coefficients for various surfaces are offered for the purpose of rainwater harvesting volumetric calculations. While the SuDS design is not considering rainwater harvesting per se, the runoff coefficients are of interest.

The manual looks at two different ways to estimate how much rainwater runs off a surface. In both methods, it's assumed that some rain is held on the surface (like in small dips or rough areas), so not all of it flows away. This is why the runoff values are less than 1.0—they show that only part of the rain reaches the drainage system.

Approach 1: Runoff Coefficient without expressed depression storage

TABLE 11.4 Suggested initial runoff coefficients for RWH yield analysis (from BS 8515:2009+A1:2013)

Surface type	Runoff coefficient
Pitched roof with profiled metal sheeting	0.95
Pitched roof with tiles	0.90
Flat roof without gravel	0.80
Flat roof with gravel	0.60
Green roof, intensive[1]	0.30
Green roof, extensive[1]	0.60
Permeable pavement (concrete blocks)[2]	0.60
Road/pavement	0.75

Note

1 Green roof runoff yield is particularly uncertain and varies with season. There may also be negative colouration impacts.

2 This reflects the proportion of rainfall that finds its way through the overlying surface to subsurface collection points for RWH.

Approach 2: Runoff Coefficient with expressed depression storage once collection surfaces are wet

TABLE 11.5 Runoff coefficients with initial losses for RWH yield analysis (from BS 8515:2009+A1:2013)

Surface type	Surface type runoff coefficient	Depression storage loss (mm)
Pitched roof with profiled metal sheeting	1.0	0.2
Pitched roof with tiles	1.0	0.4
Flat roof without gravel	0.95	1.0
Flat roof with gravel	0.95	2.0
Green roof, intensive[1]	0.80	2.0–6.0
Green roof, extensive[1]	0.80	2.0–4.0
Permeable pavement (concrete blocks)	0.90	4.0
Road/pavement	0.90	1.5

Note

1 Green roof runoff yield is particularly uncertain and varies with season. There may also be negative colouration impacts. Intensive and extensive green roofs are described in Chapter 12.

When assessing road or pavement surfaces using the two runoff estimation methods, the difference in runoff coefficients—0.90 from Table 11.4 and 0.75 from Table 11.5—indicates that approximately 1.5mm of rainfall is initially retained on the surface before runoff begins. This 0.15 difference in coefficients suggests that 15% of the rainfall does not immediately contribute to surface flow. This estimation is most applicable to low-intensity rainfall events of approximately 10mm, as calculated by dividing the depression storage (1.5mm) by the coefficient difference (0.15). For more intense or critical storm events, this approach becomes less reliable.

It is acknowledged that this estimate becomes unreliable during high-intensity or critical storm events.When comparing permeable paving with impermeable surfaces such as roads or pavements, the resulting runoff volumes can differ significantly depending on the calculation method used. During pre-planning discussions, Galway City Council expressed concerns regarding the ability of the underlying ground to safely absorb and convey surface water, due to the potential presence of historical contamination. To address this, a Dig Plan was developed to assess and mitigate the associated risks. However, as the plan is based on samples taken from selected locations, it cannot be considered a definitive assessment of the full extent of ground contamination.

For these reasons, in calculating the attenuation storage and pipe capacities, a conservative approach has been adopted wherein no infiltration is permitted. Approach 1 (above) is adopted to provide a simplified basis for design compatible with Causeway Flow modelling software.

Should all contaminated ground be conclusively removed, and subject to Galway City Council's approval, infiltration of surface water into the ground may be considered as a means to reduce pressure on the existing stormwater culvert located within the public roadway. In such a case, the impermeable liner currently proposed beneath permeable surfaces and attenuation areas could be replaced with a suitable permeable geotextile to allow controlled infiltration.

This approach will ensure that an approved design will accommodate the maximum required storage capacity from the outset but also allow for possible reductions in discharge rates into the public storm system as the opportunity presents itself.

3.5 PETROL INTERCEPTOR

It is proposed to install a bypass Petrol Interceptor prior to outfall to each proposed attenuation unit in Network A, and Network B. Locations of the interceptors can be seen graphically on drawing no. 11910-2004.

Notwithstanding the SuDS and nature-based measures proposed, stormwater entering each attenuation unit will include run-off from the roadways and parking areas throughout the site and therefore may contain hydrocarbons. These hydrocarbon pollutants require removal and are not to be discharged back into the environment. The separators have been sized to cater for roads, footways, and driveway areas of each catchment area.

The selection tables in the Separator Product Brochure can be found in **Appendix C**.

4. WATERMAIN

4.1 EXISTING WATERMAIN

There is an existing 300mm watermain line located in the Lough Atalia Road, north of the proposed site entrance as can be seen on drawing no. 11910-2001.

4.2 PROPOSED WATERMAIN

The watermain layout is presented in drawings no. 11910-2001. The watermain layout has been designed in accordance with Uisce Eireann Code of Practice for Water Infrastructure (IW-CDS-5020-03,2020)

The water supply required for the proposed development shall be via a 100mm watermain as per Uisce Eireann requirements. The 200mm PE watermain is proposed to act as the main run through the site to service the development.

It was calculated that the following volumes is required to satisfy the water supply needs of the development based on the schedule of accommodation for the development:

- Total Average Demand = 2.37l/s
- Total Peak Demand = 11.85l/s

In accordance with Uisce Eireann Code of Practice for Water Infrastructure, a water meter and Logging Device (Larson Type) are proposed at the connection into the proposed site. A sluice valve, strainer and 200mm by-pass arrangement is also proposed to allow for possible disconnection of water meters by Uisce Eireann.

Hydrants will be positioned within the site as shown in the drawing no. 11910-2001. All watermains are to be commissioned and pressure tested. The typical construction details and the meter details are shown on drawing no. 11910-2009.

It has been confirmed by Uisce Eireann that the proposed development can be accommodated by the existing water infrastructure without the need for any upgrades. The current network has sufficient capacity to support the anticipated demand. All watermain designs will be fully vetted by Uisce Eireann prior to receiving an offer to connect.

5. FIRE FIGHTING FLOWS

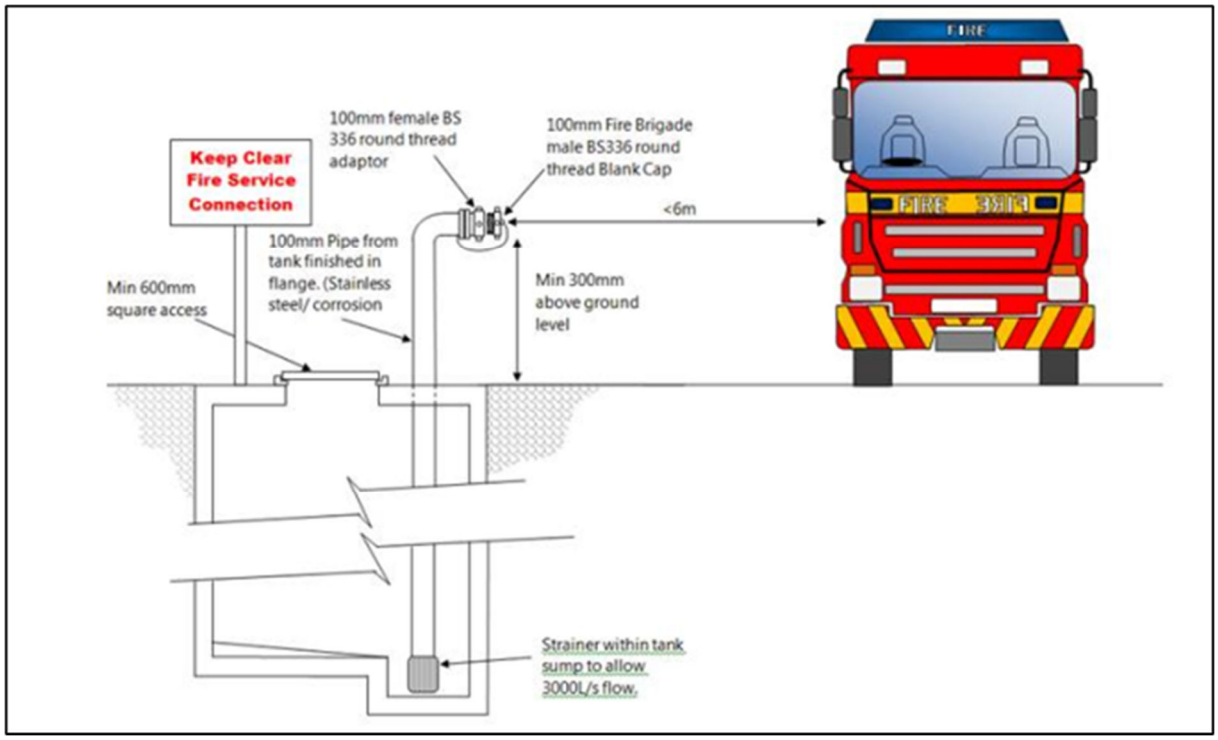
In order to meet required fire flow requirements, it is proposed to install below ground static storage capacity within the site, as per Figure 5.1. This is required as, in general, Uisce Eireann will not guarantee available fire flow within the hydrants located on site. It is proposed to provide an underground storage tank capable a minimum of supplying 35l/s of flow for a 1-hour period. This equates to a minimum volume required for the site of 72m3.

The fire-fighting flow of 35l/s is derived from the 'National Guidance Document on the provisions of water for Firefighting – Water UK 3rd Edition' (January 2007), which is referenced in Uisce Éireann's Interim Fire Flow Policy. This guidance is considered suitable for use in Ireland due to its alignment with national legislation and its adoption by Uisce Éireann for infrastructure planning and design.

The tank is to be located within a grassed area and easily accessible by fire tenders and tankers should they need access. An 80mm diameter top up supply for tank will be provided from the main watermain which will include a shut-off valve should the supply need to be switched off for maintenance or in an emergency. The location of the tank is shown graphically on drawing no. 11910-2001.

It is noted that in addition to the static storage tank, a significant volume of water will still be available from hydrants located throughout the development. Any specific requirements as requested by the local fire authority when applying for the Fire Certification will be incorporated at the detail design stage. It is also noted that should the hydrants be proven to be able to supply 35l/s or more for a 1-hour period, the tank may be omitted from the development at the discretion of the local fire authority.

Figure 5.1 Typical Detail of a Below Ground Static Storage Tank



6. ROAD DESIGN

All internal roads of the proposed development have been designed in accordance with the requirements of Design Manual for Urban Roads and Streets (DMURS), 2019. The proposed internal roads are min. 5.5m wide.

Autotrack Vehicle Swept Path Analysis has been completed for the proposed site layout for Large Car, Refuse Truck and Fire Tender, drawing no. 11910-2006 to 2008, respectively, to ensure the vehicles can safely manoeuvre around the site.

Road levels for the site have been derived taking cognisance of the existing topography, ground conditions, drainage cover levels and Part M Level Access requirements. All roads shall be constructed on a suitable bearing with a road construction makeup as per detail shown on drawing 11910-2003. Roads will include a 1:40 camber from the centre of the road, and longitudinal gradients of road sections lie between 1:21 and 1:200 to ensure adequate surface water drainage is achieved.

Gullies are located, at a minimum, every 200m^2 with local low points allowing for double gullies to mitigate the effect of local blockage as per Recommendations for Site Development Works' as published by the Department for the Environment (1998).

The use of pedestrian crossing points along with strategically positioned drop kerbs and tactile paving will allow for full linkage for visually impaired and less-able pedestrians while also prioritising pedestrian movements over vehicular movements. All footways interconnected within the site, with links to each block of residential units and green open space areas, creating significant inter-connectivity for the development.

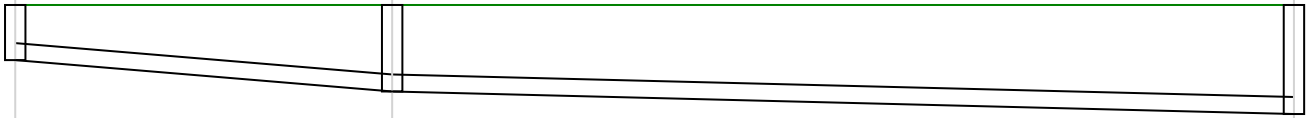
A visibility splay of 49 metres has been achieved at the proposed site entrance, exceeding the minimum Stopping Sight Distance of 45 metres required for a design speed of 50 km/h, in accordance with Section 4.4.5 of the Design Manual for Urban Roads and Streets (DMURS), 2019. A visibility splay is a critical design feature used in road and entrance planning to ensure that drivers have a clear line of sight when entering or exiting a junction or access point. It directly affects road safety by allowing drivers to see oncoming traffic in time to make safe decisions. This ensures safe vehicular access and complies with national urban road design standards.

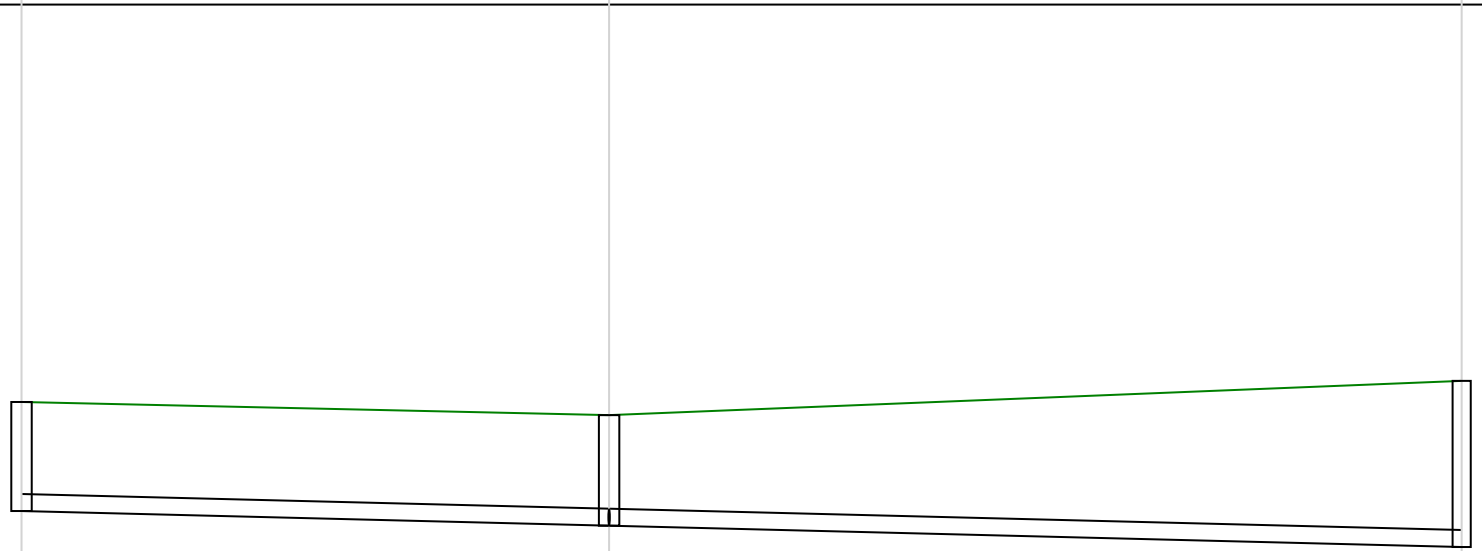
Further comment on the Roads Design, particularly as pertains to the entrance/exit junctions, internal circulation and the integrated provision of active travel facilities is provided in the NRB Consultants Report, issued separately.

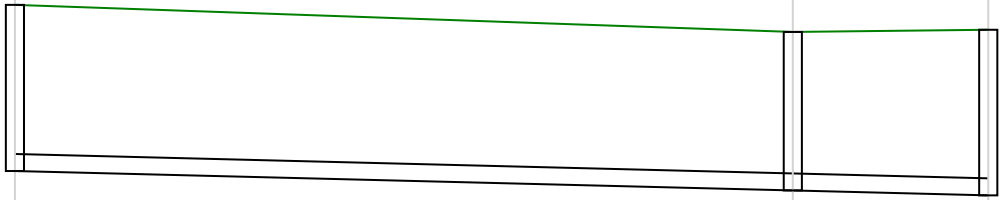
7. REFERENCES

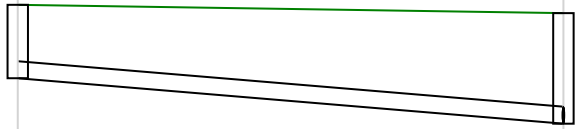
- Uisce Éireann. *Code of Practice for Wastewater Infrastructure* (IW-CDS-5030-03, Revision 2, July 2020).
- Uisce Éireann. *Standard Details for Wastewater Infrastructure* (IW-CDS-5030-01, 2020).
- Uisce Éireann. *Code of Practice for Water Infrastructure* (IW-CDS-5020-03, Revision 2, July 2020).
- Uisce Éireann. *Standard Details for Water Infrastructure* (IW-CDS-5020-01, 2020).
- Department of Transport, Tourism and Sport & Department of Housing, Planning and Local Government. *Design Manual for Urban Roads and Streets (DMURS)*, 2nd Edition, 2019.
- Local Government Association & Water UK. *National Guidance Document on the Provision of Water for Fire Fighting*, 3rd Edition, January 2007.
- Government of Ireland. *Recommendations for Site Development Works for Housing Areas*, October 1998.
- Department of Transport, Tourism and Sport. *Traffic Signs Manual*, August 2019.
- CIRIA. *The SuDS Manual* (C753), December 2015.
- Building Research Establishment. *BRE Digest 365: Soakaway Design*.
- Office of Public Works (OPW). *The Planning System and Flood Risk Management Guidelines for Planning Authorities*, 2009.
- Environmental Protection Agency (EPA). *Good Practice Guidance on the Authorisation of Discharges to Groundwater*, 2014.
- Department of Housing, Local Government and Heritage. *Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas – Best Practice Interim Guidance Document*, March 2022.

Appendix A FOUL DRAINAGE CALCULATION SHEETS

Node Name	F1	F2	F3
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -1.000			
Link Name	1.000	1.001	
Section Type	225mm	225mm	
Slope (1:X)	60.1	200.1	
Cover Level (m)	5.250	5.250	5.250
Invert Level (m)	4.521	4.106	4.106	3.808
Length (m)	24.922	59.623	

Node Name	F3	F4	F5
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -1.000			
Link Name	1.002	1.003	
Section Type	225mm	225mm	
Slope (1:X)	200.3	199.9	
Cover Level (m)	5.250	5.076	5.529
Invert Level (m)	3.808	3.614 / 3.614	3.332
Length (m)	38.850	56.369	

Node Name	F5		F6	Ex. F1
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -1.000				
Link Name		1.004	1.005	
Section Type		225mm	225mm	
Slope (1:X)		200.1	198.8	
Cover Level (m)	5.529		5.171	5.200
Invert Level (m)	3.332	3.075	3.075	3.010
Length (m)		51.432	12.923	

Node Name	F4.1	F4
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -1.000		
Link Name	2.000	
Section Type	225mm	
Slope (1:X)	60.0	
Cover Level (m)	5.186	5.076
Invert Level (m)	4.215	3.614
Length (m)	36.078	

Design Settings

Frequency of use (kDU)	0.50	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	450	Connection Type	Level Inverts
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.010
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
F1	5.250	Adoptable	530258.747	724902.972	0.729
F2	5.250	Adoptable	530251.740	724926.888	1.144
F3	5.250	Adoptable	530280.358	724979.194	1.442
F4.1	5.186	Adoptable	530295.817	725047.013	0.971
F4	5.076	Adoptable	530274.852	725017.652	1.462
F5	5.529	Adoptable	530234.977	725057.494	2.197
F6	5.171	Adoptable	530200.325	725019.489	2.096
Ex. F1	5.200	Adoptable	530189.410	725012.569	2.190

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	F1	F2	24.922	1.500	4.521	4.106	0.415	60.1	225
1.001	F2	F3	59.623	1.500	4.106	3.808	0.298	200.1	225
1.002	F3	F4	38.850	1.500	3.808	3.614	0.194	200.3	225
2.000	F4.1	F4	36.078	1.500	4.215	3.614	0.601	60.0	225
1.003	F4	F5	56.369	1.500	3.614	3.332	0.282	199.9	225
1.004	F5	F6	51.432	1.500	3.332	3.075	0.257	200.1	225
1.005	F6	Ex. F1	12.923	1.500	3.075	3.010	0.065	198.8	225

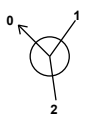
Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.000	1.483	58.9	0.0	0.504	0.919	0.000	0	0.0	0.0	0	0.000
1.001	0.000	0.810	32.2	0.0	0.919	1.217	0.000	0	0.0	0.0	0	0.000
1.002	0.000	0.809	32.2	0.0	1.217	1.237	0.000	0	0.0	0.0	0	0.000
2.000	0.000	1.483	59.0	0.0	0.746	1.237	0.000	0	0.0	0.0	0	0.000
1.003	0.000	0.810	32.2	0.0	1.237	1.972	0.000	0	0.0	0.0	0	0.000
1.004	0.000	0.810	32.2	0.0	1.972	1.871	0.000	0	0.0	0.0	0	0.000
1.005	0.000	0.812	32.3	0.0	1.871	1.965	0.000	0	0.0	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)
1.000	24.922	60.1	225	Circular	5.250	4.521	0.504	5.250	4.106	0.919
1.001	59.623	200.1	225	Circular	5.250	4.106	0.919	5.250	3.808	1.217
1.002	38.850	200.3	225	Circular	5.250	3.808	1.217	5.076	3.614	1.237
2.000	36.078	60.0	225	Circular	5.186	4.215	0.746	5.076	3.614	1.237
1.003	56.369	199.9	225	Circular	5.076	3.614	1.237	5.529	3.332	1.972
1.004	51.432	200.1	225	Circular	5.529	3.332	1.972	5.171	3.075	1.871
1.005	12.923	198.8	225	Circular	5.171	3.075	1.871	5.200	3.010	1.965

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	F1	1350	Manhole	Adoptable	F2	1350	Manhole	Adoptable
1.001	F2	1350	Manhole	Adoptable	F3	1350	Manhole	Adoptable
1.002	F3	1350	Manhole	Adoptable	F4	1350	Manhole	Adoptable
2.000	F4.1	1350	Manhole	Adoptable	F4	1350	Manhole	Adoptable
1.003	F4	1350	Manhole	Adoptable	F5	1200	Manhole	Adoptable
1.004	F5	1200	Manhole	Adoptable	F6	1200	Manhole	Adoptable
1.005	F6	1200	Manhole	Adoptable	Ex. F1	1200	Manhole	Adoptable

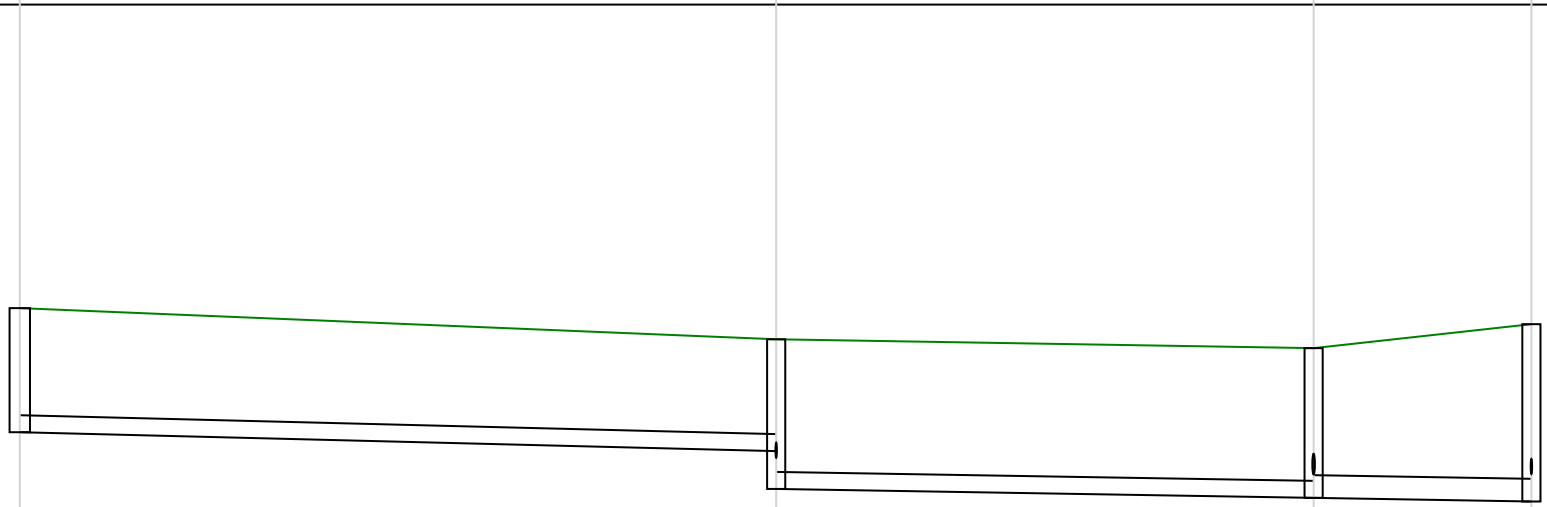
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1	530258.747	724902.972	5.250	0.729	1350				
						0	1.000	4.521	225
F2	530251.740	724926.888	5.250	1.144	1350		1.000	4.106	225
						0	1.001	4.106	225
F3	530280.358	724979.194	5.250	1.442	1350		1.001	3.808	225
						0	1.002	3.808	225
F4.1	530295.817	725047.013	5.186	0.971	1350				
						0	2.000	4.215	225
F4	530274.852	725017.652	5.076	1.462	1350		2.000	3.614	225
							1.002	3.614	225
						0	1.003	3.614	225
F5	530234.977	725057.494	5.529	2.197	1200		1.003	3.332	225
						0	1.004	3.332	225
F6	530200.325	725019.489	5.171	2.096	1200		1.004	3.075	225
						0	1.005	3.075	225

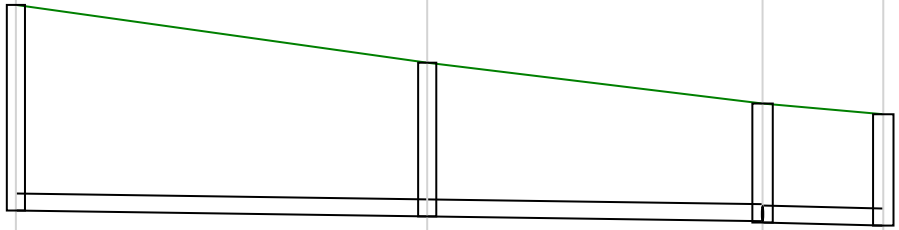
Manhole Schedule

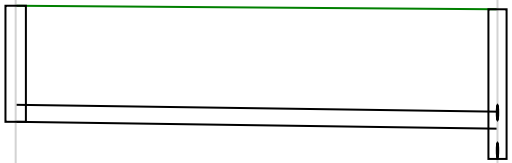
Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Ex. F1	530189.410	725012.569	5.200	2.190	1200	1 	1.005	3.010	225

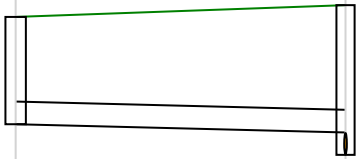
Appendix B STORM DRAINAGE CALCULATION SHEETS

Node Name	SA2.1	SA2	SA3	SA4
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000				
Link Name	1.000	1.001	1.002	
Section Type	225mm	225mm	300mm	
Slope (1:X)	200.0	301.1	300.0	
Cover Level (m)	5.491	5.079	4.962	5.279
Invert Level (m)	3.850	3.600 / 3.100	2.982 / 2.982	2.934
Length (m)	50.012	35.534	14.400	

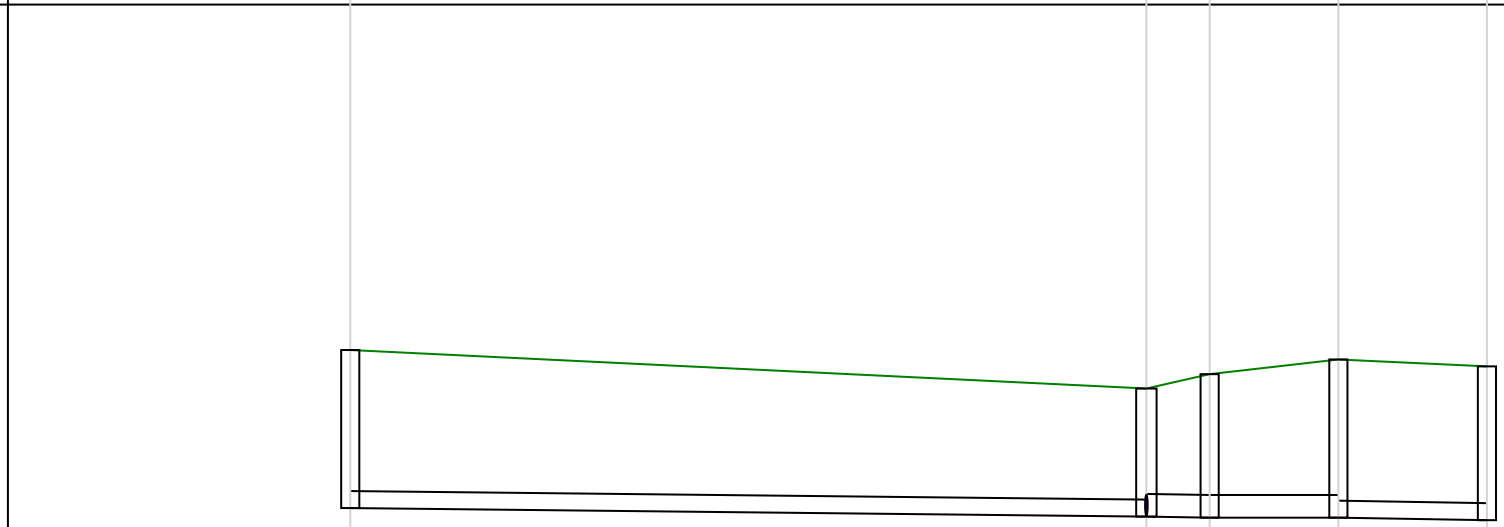
Node Name	SA4		SA5			SA6			SA7	SA8	OA1
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000											
Link Name	1.003		1.004			1.005			1.00	1.007	
Section Type	300mm		300mm			375mm			375	450mm	
Slope (1:X)	299.1		300.1			346.1			367.	354.0	
Cover Level (m)	5.279		5.357			5.357			5.357	5.357	5.322
Invert Level (m)	2.934	2.885	2.885			2.689	2.689		2.627	2.619	2.603
Length (m)	14.657		58.817			21.456			2.93	5.664	

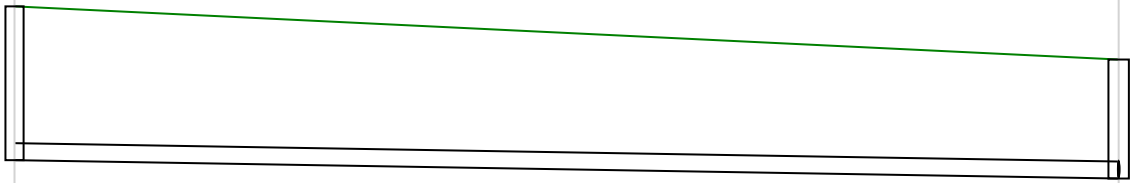
Node Name		OA1	OA2	O3	O4
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000					
Link Name		1.008	1.009	1.010	
Section Type		225mm	225mm	225mm	
Slope (1:X)		348.7	352.0	199.6	
Cover Level (m)		5.322	4.558	4.018	3.876
Invert Level (m)		2.603 / 2.525	2.525 / 2.462	2.444	2.404
Length (m)		27.195	22.173	7.982	

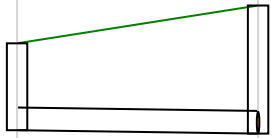
Node Name	SA1	SA2
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000		
Link Name	2.000	
Section Type	225mm	
Slope (1:X)	350.1	
Cover Level (m)	5.126	5.079
Invert Level (m)	3.591	3.500
Length (m)	31.857	

Node Name	SA3.1	SA3
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000		
Link Name	3.000	
Section Type	300mm	
Slope (1:X)	200.1	
Cover Level (m)	4.806	4.962
Invert Level (m)	3.387	3.278
Length (m)	21.810	

Node Name	SA4.1	SA4
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000		
Link Name	4.000	
Section Type	225mm	
Slope (1:X)	82.0	
Cover Level (m)	5.098	5.279
Invert Level (m)	3.748	3.284
Length (m)	38.027	

Node Name	SB1			SB2	SB3	OB1	OB2
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000							
Link Name		5.000		5.001	5.002	5.003	
Section Type		225mm		300m	300mm	225mm	
Slope (1:X)		465.8		298.8	0.0	297.6	
Cover Level (m)	4.937			4.428	4.618	4.812	4.721
Invert Level (m)	2.847		2.734	2.734	2.720	2.720	2.720	2.687
Length (m)		52.638		4.183	8.511	9.821	

Node Name	OB2	O3
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000		
Link Name	5.004	
Section Type	225mm	
Slope (1:X)	300.4	
Cover Level (m)	4.721	4.018
Invert Level (m)	2.687	2.444
Length (m)	73.003	

Node Name		SB2.1	SB2
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -2.000			
Link Name		6.000	
Section Type		300mm	
Slope (1:X)		354.1	
Cover Level (m)		3.928	4.428
Invert Level (m)		2.779	2.734
Length (m)		15.935	

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	0.75
FSR Region	Scotland and Ireland	Connection Type	Level Inverts
M5-60 (mm)	14.700	Minimum Backdrop Height (m)	0.010
Ratio-R	0.254	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)
SA2.1	0.029	5.00	5.491	1350	530238.269	725056.510	1.641
SA1	0.126	5.00	5.126	1350	530293.481	725047.620	1.535
SA2			5.079	1200	530274.500	725022.034	1.979
SA3.1	0.044	5.00	4.806	1350	530318.760	724985.573	1.419
SA3	0.005	5.00	4.962	1200	530301.926	724999.440	1.980
SA4.1		5.00	5.098	1350	530264.920	725012.905	1.350
SA4	0.049	5.00	5.279	1200	530293.469	724987.786	2.345
SA5	0.289	5.00	5.357	1200	530282.373	724978.210	2.472
SA6	0.255	5.00	5.357	1200	530254.075	724926.647	2.668
SA7			5.357	1200	530260.502	724906.177	2.730
SA8			5.357	1200	530263.297	724905.269	2.738
OA1			5.322	1200	530268.044	724902.178	2.719
OA2			4.558	1200	530258.550	724876.694	2.033
SB1	0.011	5.00	4.937	1200	530247.416	724989.607	2.090
SB2.1	0.007	5.00	3.928	1350	530200.961	724940.779	1.149
SB2	0.002	5.00	4.428	1350	530215.161	724948.008	1.694
SB3			4.618	1200	530218.484	724945.468	1.898
OB1			4.812	1200	530218.599	724936.958	2.092
OB2			4.721	1200	530216.842	724927.295	2.034
O3			4.018	1350	530244.343	724859.670	1.574
O4			3.876	1350	530236.970	724856.613	1.472

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)
1.000	SA2.1	SA2	50.012	0.600	3.850	3.600	0.250	200.0	225	5.91	32.6
2.000	SA1	SA2	31.857	0.600	3.591	3.500	0.091	350.1	225	5.77	32.9
1.001	SA2	SA3	35.534	0.600	3.100	2.982	0.118	301.1	225	6.70	31.0
3.000	SA3.1	SA3	21.810	0.600	3.387	3.278	0.109	200.1	300	5.33	33.9
1.002	SA3	SA4	14.400	0.600	2.982	2.934	0.048	300.0	300	6.96	30.6

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)
1.000	0.921	36.6	2.6	1.416	1.254	0.029	0.0	40	0.531
2.000	0.693	27.6	11.2	1.310	1.354	0.126	0.0	100	0.658
1.001	0.748	29.7	13.1	1.754	1.755	0.155	0.0	104	0.724
3.000	1.108	78.3	4.0	1.119	1.384	0.044	0.0	46	0.588
1.002	0.902	63.8	16.9	1.680	2.045	0.204	0.0	105	0.766

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)
4.000	SA4.1	SA4	38.027	0.600	3.748	3.284	0.464	82.0	225	5.44	33.6
1.003	SA4	SA5	14.657	0.600	2.934	2.885	0.049	299.1	300	7.23	30.1
1.004	SA5	SA6	58.817	0.600	2.885	2.689	0.196	300.1	300	8.32	28.4
1.005	SA6	SA7	21.456	0.600	2.689	2.627	0.062	346.1	375	8.69	27.9
1.006	SA7	SA8	2.938	0.600	2.627	2.619	0.008	367.3	375	8.74	27.8
1.007	SA8	OA1	5.664	0.600	2.619	2.603	0.016	354.0	450	8.83	27.7
1.008	OA1	OA2	27.195	0.600	2.603	2.525	0.078	348.7	225	9.48	26.9
1.009	OA2	O3	22.173	0.600	2.525	2.462	0.063	352.0	225	10.02	26.2
5.000	SB1	SB2	52.638	0.600	2.847	2.734	0.113	465.8	225	6.46	31.5
6.000	SB2.1	SB2	15.935	0.600	2.779	2.734	0.045	354.1	300	5.32	33.9
5.001	SB2	SB3	4.183	0.600	2.734	2.720	0.014	298.8	300	6.54	31.3
5.002	SB3	OB1	8.511	0.600	2.720	2.720	0.000	0.0	300	6.73	31.0
5.003	OB1	OB2	9.821	0.600	2.720	2.687	0.033	297.6	225	6.95	30.6
5.004	OB2	O3	73.003	0.600	2.687	2.444	0.243	300.4	225	8.57	28.1
1.010	O3	O4	7.982	0.600	2.444	2.404	0.040	199.6	225	10.16	26.0

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)
4.000	1.445	57.5	0.0	1.125	1.770	0.000	0.0	0	0.000
1.003	0.904	63.9	20.7	2.045	2.172	0.253	0.0	117	0.808
1.004	0.902	63.8	41.8	2.172	2.368	0.542	0.0	177	0.960
1.005	0.968	106.9	60.3	2.293	2.355	0.797	0.0	202	0.996
1.006	0.939	103.7	60.1	2.355	2.363	0.797	0.0	205	0.972
1.007	1.075	170.9	59.8	2.288	2.269	0.797	0.0	183	0.982
1.008	0.694	27.6	58.0	2.494	1.808	0.797	0.0	225	0.707
1.009	0.691	27.5	56.6	1.808	1.331	0.797	0.0	225	0.704
5.000	0.599	23.8	1.0	1.865	1.469	0.011	0.0	31	0.295
6.000	0.830	58.6	0.6	0.849	1.394	0.007	0.0	22	0.273
5.001	0.904	63.9	1.8	1.394	1.598	0.021	0.0	34	0.399
5.002	0.750	53.0	1.7	1.598	1.792	0.021	0.0	0	∞
5.003	0.753	29.9	1.7	1.867	1.809	0.021	0.0	36	0.410
5.004	0.749	29.8	1.6	1.809	1.349	0.021	0.0	35	0.395
1.010	0.922	36.6	57.7	1.349	1.247	0.818	0.0	225	0.939

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)
1.000	50.012	200.0	225	Circular	5.491	3.850	1.416	5.079	3.600	1.254
2.000	31.857	350.1	225	Circular	5.126	3.591	1.310	5.079	3.500	1.354
1.001	35.534	301.1	225	Circular	5.079	3.100	1.754	4.962	2.982	1.755
3.000	21.810	200.1	300	Circular	4.806	3.387	1.119	4.962	3.278	1.384
1.002	14.400	300.0	300	Circular	4.962	2.982	1.680	5.279	2.934	2.045

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SA2.1	1350	Manhole	Adoptable	SA2	1200	Manhole	Adoptable
2.000	SA1	1350	Manhole	Adoptable	SA2	1200	Manhole	Adoptable
1.001	SA2	1200	Manhole	Adoptable	SA3	1200	Manhole	Adoptable
3.000	SA3.1	1350	Manhole	Adoptable	SA3	1200	Manhole	Adoptable
1.002	SA3	1200	Manhole	Adoptable	SA4	1200	Manhole	Adoptable

Pipeline Schedule

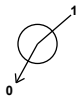
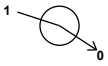
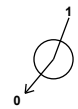
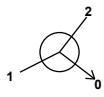
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
4.000	38.027	82.0	225	Circular	5.098	3.748	1.125	5.279	3.284	1.770
1.003	14.657	299.1	300	Circular	5.279	2.934	2.045	5.357	2.885	2.172
1.004	58.817	300.1	300	Circular	5.357	2.885	2.172	5.357	2.689	2.368
1.005	21.456	346.1	375	Circular	5.357	2.689	2.293	5.357	2.627	2.355
1.006	2.938	367.3	375	Circular	5.357	2.627	2.355	5.357	2.619	2.363
1.007	5.664	354.0	450	Circular	5.357	2.619	2.288	5.322	2.603	2.269
1.008	27.195	348.7	225	Circular	5.322	2.603	2.494	4.558	2.525	1.808
1.009	22.173	352.0	225	Circular	4.558	2.525	1.808	4.018	2.462	1.331
5.000	52.638	465.8	225	Circular	4.937	2.847	1.865	4.428	2.734	1.469
6.000	15.935	354.1	300	Circular	3.928	2.779	0.849	4.428	2.734	1.394
5.001	4.183	298.8	300	Circular	4.428	2.734	1.394	4.618	2.720	1.598
5.002	8.511	0.0	300	Circular	4.618	2.720	1.598	4.812	2.720	1.792
5.003	9.821	297.6	225	Circular	4.812	2.720	1.867	4.721	2.687	1.809
5.004	73.003	300.4	225	Circular	4.721	2.687	1.809	4.018	2.444	1.349
1.010	7.982	199.6	225	Circular	4.018	2.444	1.349	3.876	2.404	1.247

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
4.000	SA4.1	1350	Manhole	Adoptable	SA4	1200	Manhole	Adoptable
1.003	SA4	1200	Manhole	Adoptable	SA5	1200	Manhole	Adoptable
1.004	SA5	1200	Manhole	Adoptable	SA6	1200	Manhole	Adoptable
1.005	SA6	1200	Manhole	Adoptable	SA7	1200	Manhole	Adoptable
1.006	SA7	1200	Manhole	Adoptable	SA8	1200	Manhole	Adoptable
1.007	SA8	1200	Manhole	Adoptable	OA1	1200	Manhole	Adoptable
1.008	OA1	1200	Manhole	Adoptable	OA2	1200	Manhole	Adoptable
1.009	OA2	1200	Manhole	Adoptable	O3	1350	Manhole	Adoptable
5.000	SB1	1200	Manhole	Adoptable	SB2	1350	Manhole	Adoptable
6.000	SB2.1	1350	Manhole	Adoptable	SB2	1350	Manhole	Adoptable
5.001	SB2	1350	Manhole	Adoptable	SB3	1200	Manhole	Adoptable
5.002	SB3	1200	Manhole	Adoptable	OB1	1200	Manhole	Adoptable
5.003	OB1	1200	Manhole	Adoptable	OB2	1200	Manhole	Adoptable
5.004	OB2	1200	Manhole	Adoptable	O3	1350	Manhole	Adoptable
1.010	O3	1350	Manhole	Adoptable	O4	1350	Manhole	Adoptable

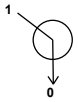
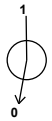
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SA2.1	530238.269	725056.510	5.491	1.641	1350		0	1.000	3.850	225
SA1	530293.481	725047.620	5.126	1.535	1350		0	2.000	3.591	225
SA2	530274.500	725022.034	5.079	1.979	1200		1	2.000	3.500	225
							2	1.000	3.600	225
							0	1.001	3.100	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SA3.1	530318.760	724985.573	4.806	1.419	1350		0	3.000	3.387	300
SA3	530301.926	724999.440	4.962	1.980	1200		1	3.000	3.278	300
							2	1.001	2.982	225
							0	1.002	2.982	300
SA4.1	530264.920	725012.905	5.098	1.350	1350		0	4.000	3.748	225
SA4	530293.469	724987.786	5.279	2.345	1200		1	4.000	3.284	225
							2	1.002	2.934	300
							0	1.003	2.934	300
SA5	530282.373	724978.210	5.357	2.472	1200		1	1.003	2.885	300
							0	1.004	2.885	300
SA6	530254.075	724926.647	5.357	2.668	1200		1	1.004	2.689	300
							0	1.005	2.689	375
SA7	530260.502	724906.177	5.357	2.730	1200		1	1.005	2.627	375
							0	1.006	2.627	375
SA8	530263.297	724905.269	5.357	2.738	1200		1	1.006	2.619	375
							0	1.007	2.619	450
OA1	530268.044	724902.178	5.322	2.719	1200		1	1.007	2.603	450
							0	1.008	2.603	225
OA2	530258.550	724876.694	4.558	2.033	1200		1	1.008	2.525	225
							0	1.009	2.525	225
SB1	530247.416	724989.607	4.937	2.090	1200		0	5.000	2.847	225
SB2.1	530200.961	724940.779	3.928	1.149	1350		0	6.000	2.779	300
SB2	530215.161	724948.008	4.428	1.694	1350		1	6.000	2.734	300
							2	5.000	2.734	225
							0	5.001	2.734	300

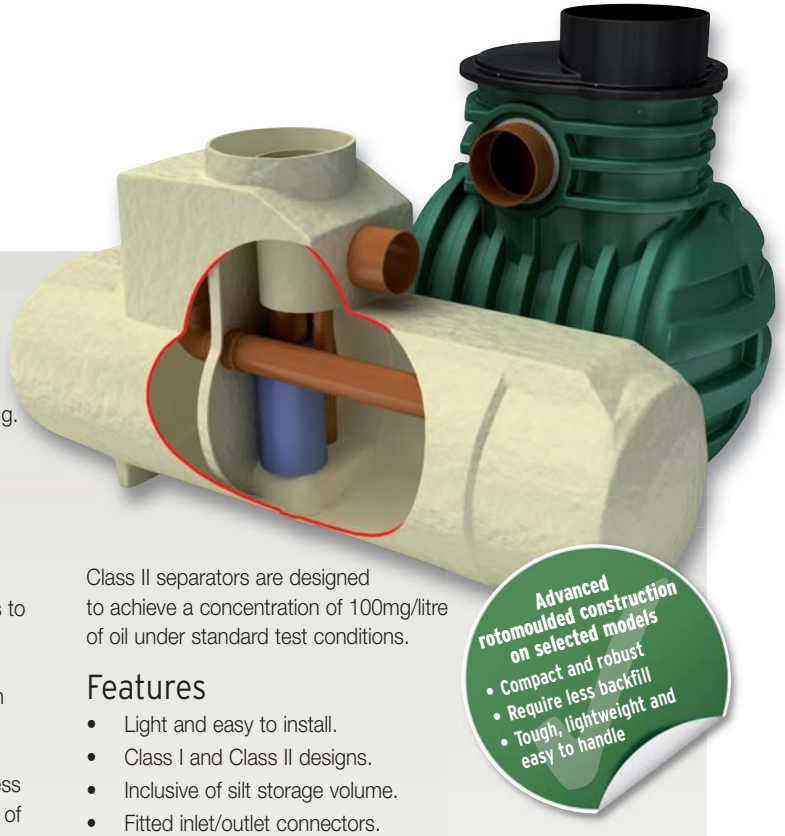
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SB3	530218.484	724945.468	4.618	1.898	1200	 1	5.001	2.720	300
						0	5.002	2.720	300
OB1	530218.599	724936.958	4.812	2.092	1200	 1	5.002	2.720	300
						0	5.003	2.720	225
OB2	530216.842	724927.295	4.721	2.034	1200	 1	5.003	2.687	225
						0	5.004	2.687	225
O3	530244.343	724859.670	4.018	1.574	1350	 1	5.004	2.444	225
						2	1.009	2.462	225
						0	1.010	2.444	225
O4	530236.970	724856.613	3.876	1.472	1350	 1	1.010	2.404	225

Appendix C BYPASS PETROL INTERCEPTOR

Bypass Separator

NSBP Range



Application

Bypass separators are used when it is considered an acceptable risk not to provide full treatment, for very high flows, and are used, for example, where the risk of a large spillage and heavy rainfall occurring at the same time is small, e.g.

- Surface car parks.
- Roadways.
- Lightly contaminated commercial areas.

Performance

Klargester Environmental were one of the first UK manufacturers to have separators tested to EN 858-1 and have now added the NSBP bypass range to their portfolio of certified and tested models. The NSBP number denotes the maximum flow at which the separator treats liquids. The British Standards Institute (BSI) tested the required range of Klargester full retention separators and certified their performance in relation to their flow and process performance assessing the effluent qualities to the requirements of BS EN 858-1. Klargester bypass separator designs follow the parameters determined during the testing of the required range of bypass separators.

Each bypass separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Oil storage volume.
- Silt storage capacity.
- Coalescer.

The unit is designed to treat 10% of peak flow. The calculated drainage areas served by each separator are indicated according to the formula given by PPG3 NSB = 0.0018A(m^2).
Flows generated by higher rainfall rates will pass through part of the separator and bypass the main separation chamber.

Class I separators are designed to achieve a concentration of 5mg/litre of oil under standard test conditions.

Class II separators are designed to achieve a concentration of 100mg/litre of oil under standard test conditions.

Advanced rotomoulded construction on selected models
- Compact and robust
- Require less backfill
- Tough, lightweight and easy to handle

Features

- Light and easy to install.
- Class I and Class II designs.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Oil alarm system available (required by BS EN 858-1 and PPG3).
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size bypass separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the flow is not pumped .
- The required discharge standard. This will decide whether a Class I or Class II unit is required.
- The drain invert inlet depth.
- Pipework type, size and orientation.

Sizes & Specifications:

Unit Nominal Size	Flow (l/s)	Peak Flow Rate (l/s)	Drainage Area (m^2)	Storage Capacity (litres) Silt	Oil	Unit Length (mm)	Unit Dia. (mm)	Access Shaft Diameter (mm)	Base to Inlet Invert (mm)	Base to Outlet Invert (mm)	Standard Fall Across Unit	Min. Inlet Invert (mm)	Standard Pipework Diameter (mm)
NSBP003	3	30	1670	300	45	1700	1350	600	1420	1320	100	500	315
NSBP004	4.5	45	2500	450	68	1700	1350	600	1420	1320	100	500	315
NSBP006	6	60	3335	600	90	1700	1350	600	1420	1320	100	500	315
NSBP008	8	80	4445	800	120	3065	1225	750	1450	1350	100	500	315
NSBP010	10	100	5560	1000	150	3065	1225	750	1450	1350	100	500	315
NSBP012	12	120	6670	1200	180	3915	1225	750	1450	1350	100	500	315
NSBP015	15	150	8335	1500	225	3915	1225	750	1450	1350	100	500	315
NSBP018	18	180	10000	1800	270	3200	2012	600	2110	2010	100	1000	375
NSBP024	24	240	13340	2400	360	3200	2012	600	2110	2010	100	1000	375
NSBP030	30	300	16670	3000	450	3915	2012	600	2110	2010	100	1000	450
NSBP036	36	360	20000	3600	540	3915	2012	600	2110	2010	100	1000	525
NSBP055	55	550	30560	5500	825	5085	2820	600	2310	2060	250	1000	750
NSBP072	72	720	40000	7200	1080	5820	2820	600	2310	2060	250	1500	750
NSBP084	84	840	46670	8400	1260	6200	2820	600	2310	2010	300	1500	750
NSBP096	96	960	53340	9600	1440	7375	2820	600	2310	2010	300	1500	825
NSBP110	110	1100	61110	11000	1650	7925	2820	600	2360	2010	350	1500	825
NSBP130	130	1300	72225	13000	1950	8725	2820	600	2360	2010	350	1500	825

Rotomoulded chamber construction *GRP chamber construction*

Appendix D UISCE EIREANN CORRESPONDENCE

CONFIRMATION OF FEASIBILITY

Dona Thomas
Tobins Consulting Engineers
Fairgreen House
FairgreenRoad
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

23 July 2024

Our Ref: CDS24004596 Pre-Connection Enquiry
Site at, Galway Harbour, Galway, 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 Multi/Mixed Use Development of 408 unit(s) at Site at, Galway Harbour, Galway, 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 Irish Water
  - There is sufficient capacity for the proposed development.
    Please note that according to our records there is an existing water main running through this site (see drawing below).
    Any structures or works over or in close proximity to Uisce Eireann infrastructure that will inhibit access for maintenance or endanger structural or functional integrity of the infrastructure are not allowed.
    The layout of the development must ensure that this pipe is protected and adequate separation distances are provided between Uisce Eireann infrastructure and any structures on site. Alternatively you may

		enter into a diversion agreement with Uisce Eireann and divert the pipe to accommodate your development. If you wish to proceed with this option please contact Uisce Eireann at Diversions@water.ie and submit detailed design drawings before submitting your planning application. It will be necessary to provide a wayleave over this pipe to the benefit of Uisce Eireann and ensure that it is accessible for maintenance. For more information, please see go to the link below: https://www.water.ie/connections/developer-services/diversions/
• **Wastewater Connection**	-	Feasible Subject to upgrades
	-	There is sufficient capacity for the proposed development. The connection from this site by gravity or pumping will be to the 450mm sewer on Bothar na Long. If gravity is feasible then a 140m upgrade/extension of the existing sewer will be required to connect the proposed development to the existing public network. Any such network extension would have to be entirely funded by the Customer. The proposed development would require assessment at connection application stage to ensure capacity exists.

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/

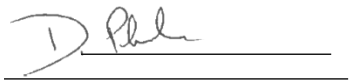
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Uisce Éireann's Network(s)

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,



Dermot Phelan
Connections Delivery Manager

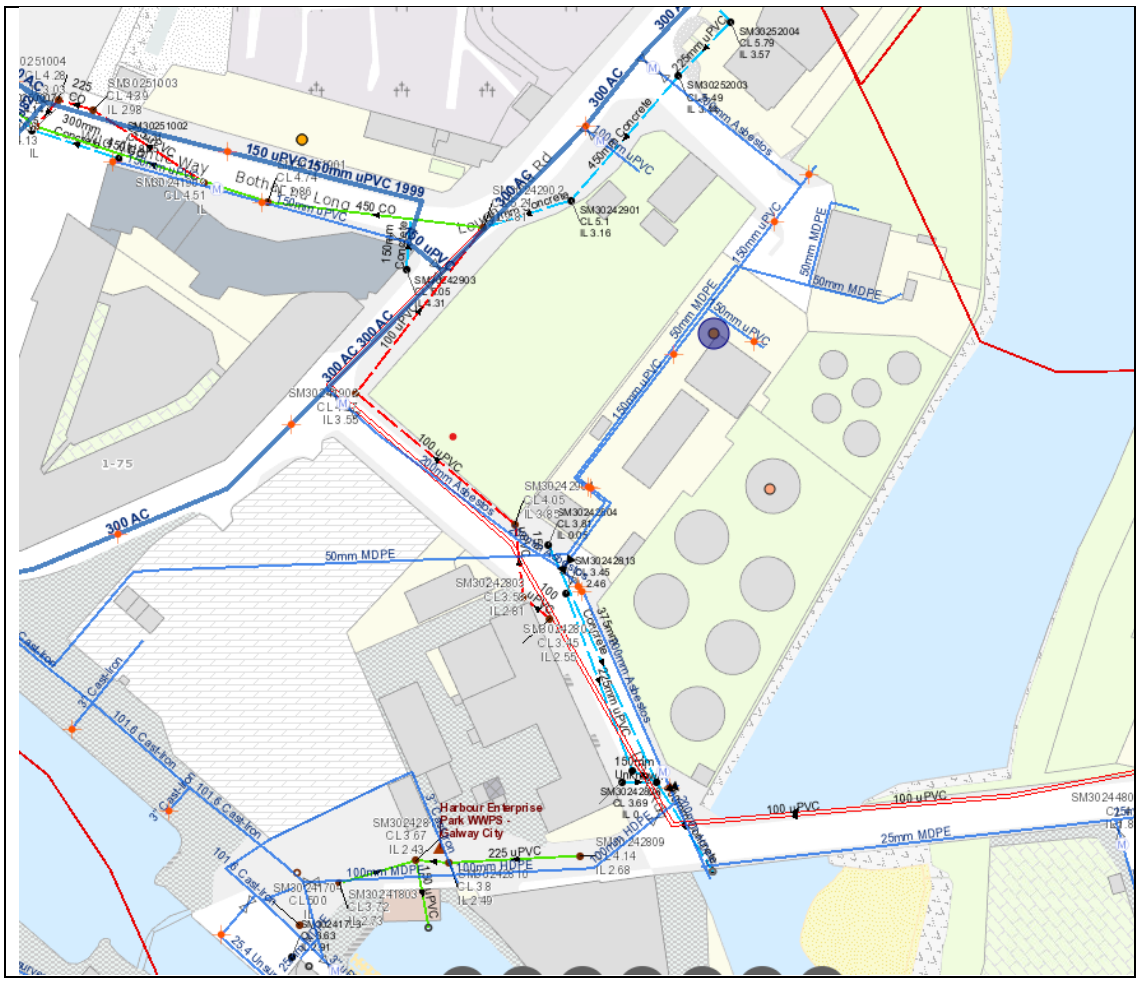
Section A - What is important to know?

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 and be granted and sign 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 ***the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Uisce Éireann's Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email datarequests@water.ie



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

Note: The information provided on the included maps as to the position of Uisce Éireann's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Uisce Éireann.

Whilst every care has been taken in respect of the information on Uisce Éireann's network(s), Uisce Éireann assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Uisce Éireann's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the

exact location of Uisce Éireann’s underground network(s) 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.

www.tobin.ie