DOSA

DENIS O'SULLIVAN & ASSOCIATES

CONSULTING ENGINEERS

RESIDENTIAL DEVELOPMENT AT SCAIRT CROSS, CASTLETREASURE, DOUGLAS, CORK

INFRASTRUCTURE REPORT

DATE 04/07/2024

REVISION 9

JOB NO. 6415

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DOCUMENT CONTROL

PROJECT NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork

PROJECT NUMBER: 6415

REVISION	DATE	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
0	13.01.2022	DESCRIPTION: Infrastructure Report			
			PREPARED	CHECKED	APPROVED
		INITIAL	BO'S	CO'S	BO'S
		DATE	13.01.2022	14.01.2022	14.01.2022
1	04.03.2022	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
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		INITIAL	BO'S	CO'S	BO'S
		DATE	04.03.2022	04.03.2022	04.03.2022
2	29.06.2022	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
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		DATE	29.06.2022	29.06.2022	29.06.2022
3	22.09.2022	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
			PREPARED	CHECKED	APPROVED
		INITIAL	BO'S	BO'S	BO'S
		DATE	22.09.2022	22.09.2022	22.09.2022
4	26.09.2022	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
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		INITIAL	BO'S	BO'S	BO'S
		DATE	26.09.2022	26.09.2022	26.09.2022

5	04.12.2023	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
			PREPARED	CHECKED	APPROVED
		INITIAL	BO'S	CO'S	BO'S
		DATE	04.12.2023	04.12.2023	04.12.2023
6	11.12.2023	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
			PREPARED	CHECKED	APPROVED
		INITIAL	BO'S	CO'S	BO'S
		DATE	11.12.2023	11.12.2023	11.12.2023
7	13.12.2023	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
			PREPARED	CHECKED	APPROVED
		INITIAL	BO'S	CO'S	BO'S
		DATE	13.12.2023	13.12.2023	13.12.2023
8	02.04.2024	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
			PREPARED	CHECKED	APPROVED
		INITIAL	BO'S	CO'S	BO'S
		DATE	02.04.2024	02.04.2024	02.04.2024
9	04.07.2024	FILE NAME: Residential Development at Scairt Cross, Castletreasure, Douglas, Cork			
		DESCRIPTION: Infrastructure Report			
			PREPARED	CHECKED	APPROVED
		INITIAL	BO'S	CO'S	BO'S
		DATE	04.07.2024	04.07.2024	04.07.2024

Contents

1 Introduction

Denis O'Sullivan & Associates were engaged as Consulting Engineers for the proposed development at Scairt Cross, Castletreasure, Douglas, Cork.

Planning permission is being sought for the construction of 46 no apartments and 8 no residential dwellings and is accessed from Scairt Cross, Castletreasure, Douglas, Cork. The site is located on the outskirts of Cork City and is in close proximity to the town of Douglas. The overall development shall provide a mixture of apartments and dwelling units of varying sizes

1.1 Objectives

Denis O'Sullivan & Associates carried out a number of site investigations and their findings have been incorporated to deal with solutions to:

- Surface Water Drainage Network
- Foul Drainage Network
- Water Supply

The foul sewer & water infrastructure associated with the proposed development were discussed with Mr. Brian Lavelle, Design Engineer, Southern Region, Irish Water. The Confirmation of Feasibility as issued by Irish Water is included in Appendix A of this Report.

Prior to the submission of this application, engineering aspects relating to the proposed stormwater was discussed with Mr. Ken O'Keeffe, Executive Engineer, Cork City Council.

1.2 Site Location & Historical Aerial Photographs

The site is accessed from Scairt Cross, Castletreasure, Douglas, Cork. The site is located on the outskirts of Cork City and is in close proximity to the town of Douglas. The following Figures 1-3 show the various aerials view back to the year 2000.

Figure 1 Aerial View 2013-2018

Figure 2 Aerial View 2005

Figure 3 Aerial View 2000

2 *Surface Water Management*

2.1 Surface Water Design

As was agreed with the engineering section of Cork City Council, the storm water system for the development will involve a network of underground pipelines and manholes discharging to the storm sewer on Donnybrook Hill via an attenuation system, which will be fitted with flow control devices to ensure no increase in peak flows and an oil interceptor to remove any traces of oil washed off road surfaces.

Surface water discharge rates from the proposed surface water drainage network will be controlled by a vortex flow control device (Hydrobrake or equivalent) and associated attenuation tank. Surface water discharge will also pass via a bypass fuel/oil separator (sized in accordance with permitted discharge from the site).

The proposed surface water drainage network will collect surface water runoff from the site via a piped network prior to discharging off site via the attenuation tank, flow control device and separator arrangement as noted above.

2.2 SuDS Appraisal

Stormwater attenuation and treatment measures utilising Sustainable Drainage Systems (SuDS) in addition to attenuation tanks and hydrocarbon interceptors, shall be incorporated into the proposed storm water system.

The SUDS selection process used for this site is in accordance with SUDS selection flow chart, Volume 3, Section 6.5, Figure 48 of the GDSDS. The characteristics of the site are utilised to select the various SUDS techniques that would be applicable.

The applicant has considered the use of all appropriate SUDS devices as part of the site SUDS strategy.

- Bio-retention Planting
- Petrol Interceptor
- Underground Attenuation -below the open space area
- Flow control device (e.g. hydrobrake) - installed at the outfall manhole

The effectiveness of each SUDS / drainage mechanism proposed is outlined below

2.2.1 Bio-retention Planting

Bio-retention planting species can be planted within a range of infiltration SuDS components to improve their performance, as root growth and decomposition increase soil infiltration capacity. Alternatively, they can be used as standalone within soil-filled tree pits, tree planters or structural soils, collecting and storing runoff and providing treatment via filtration and phytoremediation. Tree pits and planters will be designed to collect and attenuate runoff by providing additional storage within the underlying structure. The soils can also be used to filter out pollutants from runoff directly. Tree pits and planters are proposed to be in green space areas to treat and control runoff, while at the same time providing amenity value. This will allow for treatment of first flush and low flows while high flows will discharge into the surface water network during extreme rainfall

events. Rain water gullies will still be provided downstream of any tree pit to drain runoff during an extreme rainfall event.

2.2.2 Underground Attenuation

The system attenuates surface water to restrict the outflow to the equivalent of an agricultural runoff. This ensures the development will not give rise to any impact downstream of the site.

2.2.3 Flow Control Device

It is proposed to provide a hydrobrake, or similar approved, at the outfall of the surface water catchment to restrict the outflow of water from the subject site. The hydro-brakes will be fitted with a pull cord bypass and a penstock valve installed on the inlet to the manhole for maintenance purposes.

2.2.4 Petrol Interceptor

It is proposed to provide a petrol interceptor upstream of both attenuation tanks to ensure that any remaining hydro-carbons or pollutants within the runoff from trafficked areas are treated prior to outfall to the existing combined sewer. It is proposed to provide a Conder Bypass Separator Type or similar approved.

In conclusion the water quality from this catchment should be of a high quality due to the above-mentioned measures, which are applied in a treatment train to treat the water before discharge at a restricted rate to the local network.

The above measures ensure a suitable management train is provided.

2.2.5 Management Train

The management train commences with the introduction of the hydrocarbon interceptors, site control, which provide a degree of treatment before discharging to the attenuation system.

The second stage of the management train, regional control, is provided by the underground attenuation, by slowing the storm water discharge down, promoting infiltration and removing additional silts which may remain in the storm water.

2.3 Surface Water Drainage Network

The surface water drainage network for the proposed development was modelled using the Microdrainage software application. The surface water pipe lengths, slopes, contributing impermeable areas, upstream invert levels, upstream cover levels and pipe diameters were entered into the model using the drawings supplied. Appendix C show the proposed surface water drainage network layout, pipe and manhole numbering.

2.4 Design Criteria

The proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the Department of the Environment's Recommendations for Site Development Works for Housing Areas, the Department of the Environment's Building Regulations "Technical Guidance Document Part H Drainage and Waste Water Disposal" and BS EN 752: 2008 Drain and Sewer Systems Outside Buildings.

- Return period for pipe work design 2 years
- Return period for attenuation design 100 years
- Soil Type 2
- Allowable Outflow 2.0 l/sec
- Time of entry 5 minutes
- M5 – 60 18.80 mm
- Ratio "r" 0.25
- Pipe Friction (Ks) 0.6 mm
- Minimum Velocity (based on pipe flowing full) 1.0 m/s
- Rainfall Runoff from Roads and Footpaths 100%
- Rainfall Runoff from Roofs 80%
- Rainfall Runoff from Driveways 80%
- Rainfall Runoff from Green Areas 20%
- Rainfall Depth Factored for Climate Change (as per GDSDS) 20%

(in accordance with GDSDS Volume 2, Chapter 6, Table 6.2 – see below)

Climate Change Category	Characteristics
River flows	20% increase in flows for all return periods up to 100 years
Sea level	400+mm rise (see Climate Change policy document for sea levels as a function of return period)
Rainfall	10% increase in depth (factor all intensities by 1.1)
	Modify time series rainfall in accordance with the GDSDS climate change policy document

Table 6.2 Climate Change Factors to be Applied to Drainage Design

The global variables required for the model were the M5-60 and Rainfall Ratio. These two factors may be read from maps contained in the Wallingford procedure. They enable the program to calculate the intensity, duration and frequency characteristics of storms.

M5-60 is the rainfall depth based on a 60-minute storm of 5 years return period. Ratio R is the ratio of the 60-minute storm to the 2-day storm for the 5-year return period events. These values are as follows:

- M5-60 = 18.80mm
- Ratio R = 0.25

Microdrainage generates design storms using the principles set out in the Flood Studies Report (NERC 1975). A summer rainfall profile was used for the design of the pipework and a winter rainfall profile was used for the design of the storm water attenuation tank to give the critical design. A summer profile gives higher rainfall intensities and results in higher runoff rates and is used to determine the required capacity of the pipework. A winter rainfall profile gives a flatter more sustained profile and results in higher runoff volumes and is used to determine the attenuation/storage requirements.

The surface water drainage network was assessed for compliance with maximum and minimum velocities, pipe length etc. The network was designed to ensure velocities in the network and pipe gradients did not exceed the maximum velocity of 4.0m/s. The minimum velocity allowed was 0.75m/s.

The design of the drainage network was assessed using events with a range of different durations to determine the critical event for each return period analysed as follows:

- 1 in 2-year return period events were used to ensure that the system did not surcharge;
- 1 in 100 year return period events were used to ensure that flooding did not occur.

The layout of the proposed storm water network is shown on the Proposed Stormwater & Foul Sewer Layout Plan Drawing No. 6415-5020.

NOTE: The surcharging indicated in the design sheets is directly upstream of the restricted outlet. For design purposes the tank has been replaced with a pipe and as a result surcharging occurs. This design approach is acceptable and in reality, there will be no surcharging.

2.5 Stormwater Attenuation Strategy

2.5.1 Pre-Development Conditions

The catchment area of this proposed development area within the overall estate is 0.7 hectares (ha). For this development, the permissible outflow is calculated using the estimation method contained in the Institute of Hydrology Report No. 124: Flood estimation for small catchments.

$$QBAR = 0.00108 \times (AREA)^{0.89} \times (SAAR)^{1.17} \times (SOIL)^{2.17}$$

QBAR = The Mean Annual Peak Flow (Permissible outflow in m3.sec

AREA = Area of the Catchment (site) in km^2

SAAR = Standard Annual Average Rainfall

SOIL = Soil index

As the development is smaller than 50 ha, the analysis for determining the permissible outflow uses 50 ha in the formula and linearly interpolates the flow rate value based on the ratio of the development to 50 ha. This is a statistical based method within the Microdrainage Software utilizing the Regional Flood Frequency by Catchment Characteristics to give the Index Flood (QBAR)

Design summary sheets for the QBAR value are contained in Appendix B. The Mean Annual Peak Flow (permissible outflow) was calculated for the particular design development areas. The allowable runoff estimation method utilises IH 124 and the Soil Index value taken from the Micrcodrainage Design Package mapping system gives a Soil Index of 0.3.

2.5.2 Post-Development Conditions

The stormwater management plan adopted for this particular development area within the estate involves the use of an attenuation tank located in the green area of the development.

Contributing Area	Permissible Outflow (l/sec)
Catchment Area A	2.0 l/sec

The flood peak runoff rates from the post-development grassy permeable area (Q_p grass) and the post-development impervious area (Q_p imp.) using the Rational Method (100% impermeability of hard surfaces) are calculated using Windes 10.4. The Sources Control Module of the Microdrainage Software was used to design the attenuation tank capacities. This module also provides the critical storm duration for the attenuation tank during the design process.

It should be noted that climate change has been accounted for in the design. As per volume 5 of the GDSDS a factor of 10% has been incorporated into the design.

2.6 Attenuation Tank

2.6.1 Volume of Attenuation Tank

The capacity of the attenuation tank is designed to cater for the capacity required for a 1 in 100 year ARI event. This capacity is summarised as follows:

Tank No.	Capacity (m^3)	Restricted Outlet (l/sec)
1	262.5	2.0 l/sec

2.7 Hydrocarbon Treatment

A petrol interceptor is a trap used to filter out hydrocarbon pollutants from rainwater runoff. It is used in construction to prevent fuel contamination of streams carrying away the runoff.

Petrol interceptors work on the premise that some hydrocarbons such as petroleum and diesel float on the top of water. The contaminated water enters the interceptor typically after flowing off roads or hardstanding areas before being deposited into the first tank inside the interceptor.

The first tank builds up a layer of the hydrocarbon as well as other scum. Typically, petrol interceptors have 3 separate tanks each connected with a dip pipe, as more liquid enters the interceptor the water enters into the second tank leaving the majority of the hydrocarbon behind as it cannot enter the dip pipe, whose opening into the second tank is below the surface.

However, some of the contaminants may by chance enter the second tank. This second tank will not build up as much of the hydrocarbon on its surface. As before, the water is pushed into the third tank and more water enters the second.

The third tank should be practically clear of any hydrocarbon floating on its surface. As a precaution, the outlet pipe is also a dip pipe. When the water leaves the third tank via the outlet pipe it should be contaminant free.

For the Catchment Area A, the hard-surfaced area that will be draining to the interceptor between SW.004 & SW.003 is approximately 3,700m^2. A Conder CNSB10s/21 interceptor with a catchment capacity of 5,560m^2 will be provided.

A summary of the proposed interceptor is as per the table below.

Table 2.4 – Petrol Interceptor Details

Catchment Reference	Petrol Interceptor Make & Model	Oil Storage Capacity (l)
Catchment Area A	1 No. Conder CNSB10s/21	150 litres

2.8 Silt Control

The proposed petrol interceptors from Conder Environmental also include a silt storage capacity in addition to the oil storage capacity that allow silt to be collected in the interceptor prior to discharge to the proposed attenuation tanks. This silt build-up can then be removed from the tanks. The amount of silt storage from the proposed petrol interceptor is outlined in Table 2.5 below.

Table 2.5 – Petrol Interceptor Silt Storage Details

Catchment Reference	Petrol Interceptor Make & Model	Silt Storage Capacity (l)
Catchment Area A	1 No. Conder CNSB10s/21	1000 litres

3 *Foul Sewer System*

3.1 Foul Sewer Design

A Pre-Connection Enquiry was submitted to Irish Water. The Irish Water Reference Number for this enquiry is CDS21006893. The response to this Enquiry issued on the 8th December 2023 confirmed that connection to the network was feasible subject to a detailed design survey and investigations to confirm the available capacity of the adjacent network and to determine the full extent of any upgrades which may be required to be completed to Irish Water Infrastructure. Following an on-site survey of the adjoining Irish Water Infrastructure it was determined that approximately 150m of the existing network in Bracken Court would require upgrade works. An alternative discharge location was identified at the junction between Donnybrook Hill and Scairt Hill however due to the concerns of the sewer surcharging on Donnybrook Hill this was ruled out.

The foul sewer has been designed using the System 1 and Simulation Modules of the Micro-drainage package. The foul network design addresses present day design issues and can view velocities at Full Bore, Proportional Depth and 1/3 flow.

A model of the proposed foul drainage network was built using the micro-drainage software applications. The model was analysed and amended until the results met with the design criteria specified.

The network has been designed to achieve self-cleansing velocities at 1/3 flow whilst maintaining minimum gradients. Design summary sheets are contained in Appendix E.

3.1.1 Development Breakdown

54 No. Units

Section 3.6 of The Irish Water Code of Practice Wastewater Infrastructure states that for the gravity sewers shall be designed to carry a minimum wastewater volume of 6 times the dry weather flow (6DWF) which is to be taken as 446 litres per dwelling

Loading = (54) (446) / (24) (60) (60) = 0.28 litres/second

6DWF = 1.68 litres/second

The layout of the proposed foul sewer network is shown on the Proposed Stormwater & Foul Sewer Layout Plan 6415-5020.

The overall quantity of wastewater for the proposed development is estimated at 24.3m^3 per day.

This is based on the unit schedule submitted by the architect. The foul waste within the development will be collected via an internal gravity network and will discharge to the existing public foul sewer on Donnybrook Hill.

All works will be in accordance with Irish Water specifications and requirements.

All works will be in accordance with Irish Water Code of Practice for Wastewater Supply & the Wastewater Infrastructure Standard Details Document Number: IW-CDS-5030-01.

4 Water Supply

As with the drainage network, a Pre-Connection Enquiry was submitted to Irish Water under Reference No. CDS21006893. This confirmed that connection to the network was feasible.

It is proposed to provide a 100mm internal diameter HDPE connection to tie into the existing public main located on Scairt Hill with associated valves and metering requirements. Internally within the development it is proposed to have a loops with associated hydrants, valves and metering requirements.

Water distribution supply to each building will be sized to cater for the requirements of those particular uses. Metered connections will be made to the main in accordance with Irish Water specifications and details.

The layout of the proposed watermain network is shown on the Proposed Watermain Layout Plan 6415-5030.

All works will be in accordance with Irish Water Code of Practice for Water Supply & the Water Infrastructure Standard Details Document Number: IW-CDS-5020-01.

5 *Summary of Results*

The storm water network was built and analysed using the Microdrainage Software application and were assessed for a 1 in 2-year storm & 1 in 100-year storm. A summary of the results is shown in Tables 5.1 below and in the Microdrainage outputs in the Appendices.

The global variables, pipeline and manhole schedules for both the surface water network and foul network were printed and are included in the Appendices. These show the basic pipe details such as pipe length, diameter, roughness coefficient, upstream invert, velocity, etc.

Table 5.1 Summary of Surcharge and Flooding

Attenuation Tank Reference	Storm Event	Results
Attenuation Tank	1 in 2 year	No surcharge of the stormwater network
	1 in 100 year	Surcharge

The stormwater system is designed to ensure no surcharge occurs during a 1 in 2-year return period event. The surcharging that occurs in the pipes highlighted in the summary of the design sheets are the pipes that have been replaced with tanks and hydrobrakes. For the purposes of design this is acceptable.

No flooding was predicted to occur for the 1 in 100-year return period event. Surcharging and flood risk occurred for a number of critical storm events but this is allowed and does not compromise the network.

Table 5.2 Outlet Control Summary

Attenuation Tank Reference	Hydrobrake Reference	Limiting Discharge (l/s)	Design Head (m)	Hydrobrake Diameter (mm)
Attenuation Tank No. 1	MD4	2.0 l/sec	3.5	38

Table 5.3: Storage Tank Summary

Tank No.	Storage Type	Capacity (m^3)	Invert Level (m)	Maximum Storage Level (m)
Attenuation Tank No. 1	RC Concrete/Proprietary System	262.5	82.1	85.6

The foul water network model was built and analysed using the Micro-drainage Software application and was assessed to ensure velocities maintained a self-cleansing velocity. The system will consist of an internal gravity network discharging to the existing Irish Water asset.

Appendix A – Irish Water COF

Brian O' Sullivan

Dennis O'Sullivan and Associates
Joyce House, Barrack Square
Ballincollig
Cork

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

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

www.water.ie

8 December 2023

Re: CDS21006893 pre-connection enquiry - Subject to contract | Contract denied

Connection for Housing Development of 60 unit(s) at Scairt Road, Castletreasure, Cork

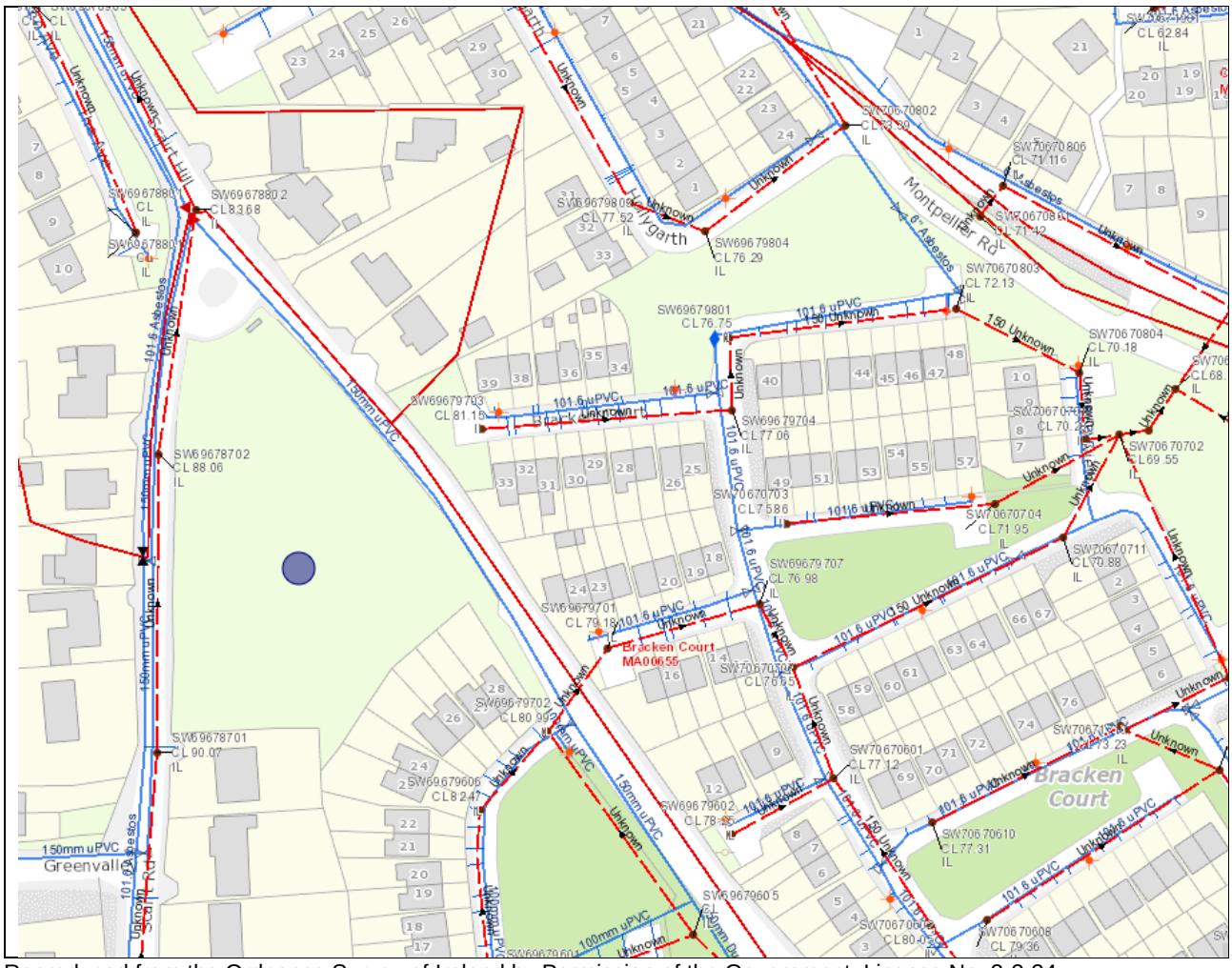
Dear Sir/Madam,

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

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible Subject to upgrades
SITE SPECIFIC COMMENTS	
Water Connection	
Wastewater Connection	It will be necessary to carry out further detailed survey and investigations to confirm the available capacity of the adjacent network and to determine the full extent of any upgrades which may be required to be completed to Irish Water Infrastructure. Should you wish to have such studies and investigations progressed by Irish Water, you will be required to enter into Project Works Service Agreement.

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

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



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

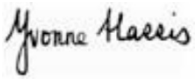
Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish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

General Notes:

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

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

Yours sincerely,



Yvonne Harris

Head of Customer Operations

Appendix B – Allowable Runoff QBAR Values

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.635	Urban	0.000
SAAR (mm)	1138	Region Number	Ireland South

Results l/s

QBAR Rural	2.0
QBAR Urban	2.0
Q100 years	3.8
Q1 year	1.7
Q30 years	3.2
Q100 years	3.8

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 100 (years) (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Ireland South	2.0	2.0	3.7	1.7	3.2	3.7

Appendix C – Storm Sewer Design Sheets

Project:	Date:		
Scairt Hill	28/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

DOSA
DENIS O'SULLIVAN & ASSOCIATES
CONSULTING ENGINEERS

Tank

Type : Tank

Dimensions

Exceedance Elevation (m)	85.250
Depth (m)	3.250
Base Elevation (m)	82.000
Freeboard (mm)	250
Initial Depth (m)	0.000
Porosity (%)	95
Average Slope (1:x)	0.00
Total Volume (m^3)	285.000

Depth (m)	Area (m^2)	Volume (m^3)
0.000	100.00	0.000
3.000	100.00	285.000

Advanced

Perimeter	Circular
Length (m)	14.559

Project: Scairt Hill	Date: 28/11/2023		
	Designed by: B.O'S.	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase	Company Address: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (km^2)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analyzed (km^2)
Catchment Area	SW000		Time of Concentration	0.00087	92	0	92	0.00080
Catchment Area (1)	SW001		Time of Concentration	0.00145	88	0	88	0.00128
Catchment Area (2)	SW007		Time of Concentration	0.00055	39	0	39	0.00021
Catchment Area (3)	SW004		Time of Concentration	0.00089	57	0	57	0.00051
Catchment Area (4)	SW008		Time of Concentration	0.00031	100	0	100	0.00031
Catchment Area (5)	SW005		Time of Concentration	0.00052	100	0	100	0.00052
Catchment Area (6)	SW009		Time of Concentration	0.00057	100	0	100	0.00057
Catchment Area (7)	SW011		Time of Concentration	0.00096	92	0	92	0.00088
TOTAL		**0.0**		**0.00612**				**0.00508**

Project:	Date:		
Scairt Hill	28/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Details:	Company Address:		
Type: Network Design Criteria Storm Phase: Phase	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Flow Options

Peak Flow Calculation	Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

FSR

Type: FSR

Return Period (years)	1.0
Region	Scotland and Ireland
M5-60 (mm)	18.8
Ratio R	0.250

Pipe Options

Lock Slope Options	None
Design Options	Minimize Excavation
Design Level	Level Crowns
Min. Cover Depth (m)	1.200
Min. Slope (1:x)	1000.00
Max. Slope (1:x)	20.00
Min. Backdrop (m)	0.600
Max. Backdrop (m)	3.000
Min. Velocity (m/s)	0.75
Max. Velocity (m/s)	4.0
Use Flow Restriction	☑
Reduce Channel Depths	☑

Manhole Options

Apply Offset	☐

Project:	Date:		
Scairt Hill	28/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Title:	Company Address:		
Rainfall Analysis Criteria	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform First Flush Analysis	☐

Project:	Date:		
Scairt Hill	28/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Title:	Company Address:		
UK and Ireland Rural Runoff Calculator	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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CONSULTING ENGINEERS

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (km^2)	0.00635
SAAR (mm)	1131.0
Soil	0.3
Region	Ireland South
Urban	0
Return Period (years)	100

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 100 (years) (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Ireland South	2.0	2.0	3.7	1.7	3.2	3.7

Project: Scairt Hill	Date: 28/11/2023		
	Designed by: B.O'S.	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (km^2)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 100 years: +20 %: 15 mins: Winter	0.00	34.8	16.130
Catchment Area (1)	FSR: 100 years: +20 %: 15 mins: Winter	0.00	55.8	25.904
Catchment Area (2)	FSR: 100 years: +20 %: 15 mins: Winter	0.00	9.4	4.342
Catchment Area (3)	FSR: 100 years: +20 %: 15 mins: Winter	0.00	22.1	10.230
Catchment Area (4)	FSR: 100 years: +20 %: 15 mins: Winter	0.00	13.6	6.285
Catchment Area (5)	FSR: 100 years: +20 %: 15 mins: Winter	0.00	22.8	10.599
Catchment Area (6)	FSR: 100 years: +20 %: 15 mins: Winter	0.00	24.7	11.440
Catchment Area (7)	FSR: 100 years: +20 %: 15 mins: Winter	0.00	38.5	17.860

Project: Scairt Hill	Date: 28/11/2023		
	Designed by: B.O'S.	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Elevation (m)	Max. DS Elevation (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m^3)	Max. Flooded Volume (m^3)	Total Lost Volume (m^3)	Max. Outflow (L/s)	Total Discharge Volume (m^3)	Percentage Available (%)	Status
Tank	FSR: 100 years: +20 %: 1440 mins: Winter	85.248	85.248	3.248	3.248	29.1	285.269	0.000	0.000	2.1	376.566	-0.095	Flood Risk

Project: Scairt Hill	Date: 28/11/2023		
	Designed by: B.O'S.	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Elevation (m)	Max. US Water Elevation (m)	Max. Flow Depth (m)	Discharge Volume (m^3)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW000	SW001	89.000	87.592	0.141	16.123	1.3	0.35	34.3	OK
Pipe (1)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW001	SW002	87.800	86.489	0.177	42.021	2.6	0.86	87.8	OK
Pipe (2)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW002	SW011	87.250	85.915	0.160	42.012	2.8	0.81	85.3	OK
Pipe (3)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW004	SW005	86.500	84.385	0.185	10.228	0.6	0.67	21.0	OK
Pipe (4)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW005	SW006	86.500	84.304	0.213	31.403	1.1	0.89	61.2	OK
Pipe (9)	FSR: 100 years: +20 %: 1440 mins: Winter	Pipe	Manhole (12)	Manhole (13)	85.300	82.036	0.036	292.990	0.4	0.03	2.1	OK
Pipe (10)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW007	SW008	87.500	86.825	0.071	4.339	1.1	0.46	9.1	OK
Pipe (11)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW008	SW005	87.600	86.548	0.150	10.619	1.3	0.42	22.4	OK
Pipe (12)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW009	SW010	85.150	83.777	0.140	11.452	0.9	0.71	22.8	OK
Pipe (13)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW010	SW011 (1)	85.350	83.484	0.127	11.408	0.9	0.56	20.8	OK
Pipe (5)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW011	Tank	85.800	83.030	0.225	58.669	3.0	3.75	119.4	Surcharged
Pipe (6)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW006	Tank	86.200	83.030	0.225	30.189	1.5	1.87	58.3	Surcharged
Pipe (7)	FSR: 100 years: +20 %: 15 mins: Winter	Pipe	SW011 (1)	Tank	85.600	83.030	0.225	10.203	0.5	0.5	18.3	Surcharged
Pipe (8)	FSR: 100 years: +20 %: 1440 mins: Winter	Pipe	Tank	Manhole (12)	85.250	85.248	0.047	293.055	0.4	0.16	2.1	Flood Risk

Appendix D – Foul Sewer Design Sheets

Project:	Date:		
Scairt Hill	30/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Details:	Company:		
Type: Connections Sanitary Phase: Phase	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Name	Length (m)	Connection Type	Slope (1:x)	Manning's n	Diameter / Base Width (mm)	Upstream Cover Elevation (m)	Upstream Invert Elevation (m)	Downstream Cover Elevation (m)
Pipe	16.737	Pipe	60.207	0.013	150	88.335	86.535	87.900
Pipe (1)	10.675	Pipe	59.307	0.013	150	87.900	85.760	87.180
Pipe (2)	21.966	Pipe	59.367	0.013	150	87.180	84.720	85.950
Pipe (3)	18.272	Pipe	60.906	0.013	225	85.950	84.000	85.200
Pipe (4)	12.920	Pipe	58.728	0.013	150	87.500	86.500	87.600
Pipe (5)	17.753	Pipe	59.175	0.013	150	87.600	85.800	86.500
Pipe (6)	31.884	Pipe	99.636	0.013	150	86.500	84.670	85.950
Pipe (7)	62.790	Pipe	59.800	0.013	150	84.970	84.000	85.200
Pipe (8)	21.010	Pipe	22.115	0.013	225	85.200	82.950	82.750

Name	Downstream Invert Elevation (m)	Lock
Pipe	86.257	All
Pipe (1)	85.580	All
Pipe (2)	84.350	All
Pipe (3)	83.700	All
Pipe (4)	86.280	All
Pipe (5)	85.500	All
Pipe (6)	84.350	All
Pipe (7)	82.950	All
Pipe (8)	82.000	All

Project:	Date:		
Scairt Hill	30/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Details:	Company:		
Type: Network Design Report Sanitary Phase: Phase Flow Path: Flow Path	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Name	From	To	Length (m)	Connection Type	Slope (1:x)	Manning's n	No. of Barrels	Diameter / Base Width (mm)
Pipe	Manhole	Manhole (1)	16.737	Pipe	60.207	0.013	1	150
Pipe (1)	Manhole (1)	Manhole (2)	10.675	Pipe	59.307	0.013	1	150
Pipe (2)	Manhole (2)	Manhole (3)	21.966	Pipe	59.367	0.013	1	150
Branch: Pipe (4)								
Pipe (4)	Manhole (4)	Manhole (5)	12.920	Pipe	58.728	0.013	1	150
Pipe (5)	Manhole (5)	Manhole (6)	17.753	Pipe	59.175	0.013	1	150
Pipe (6)	Manhole (6)	Manhole (3)	31.884	Pipe	99.636	0.013	1	150
Pipe (3)	Manhole (3)	Manhole (8)	18.272	Pipe	60.906	0.013	1	225
Branch: Pipe (7)								
Pipe (7)	Manhole (7)	Manhole (8)	62.790	Pipe	59.800	0.013	1	150
Pipe (8)	Manhole (8)	Manhole (9)	21.010	Pipe	22.115	0.013	1	225

Name	Upstream Cover Elevation (m)	Upstream Invert Elevation (m)	Downstream Cover Elevation (m)	Downstream Invert Elevation (m)	Total Area (km^2)	Volumetric Runoff Coefficient	Local Time of Concentration (mins)	Total Base Flow (L/s)
Pipe	88.335	86.535	87.900	86.257	0.00087	0.750	5	
Pipe (1)	87.900	85.760	87.180	85.580	0.00233	0.750	5	
Pipe (2)	87.180	84.720	85.950	84.350	0.00233		0	
Branch: Pipe (4)								
Pipe (4)	87.500	86.500	87.600	86.280	0.00055	0.750	5	
Pipe (5)	87.600	85.800	86.500	85.500	0.00085	0.750	5	
Pipe (6)	86.500	84.670	85.950	84.350	0.00138	0.750	5	
Pipe (3)	85.950	84.000	85.200	83.700	0.00468	0.750	5	
Branch: Pipe (7)								
Pipe (7)	84.970	84.000	85.200	82.950	0.00057	0.750	5	
Pipe (8)	85.200	82.950	82.750	82.000	0.00524		0	

Name	Proportional Depth (mm)	Proportional Velocity (m/s)	Proportional Velocity At 1/3 Flow (m/s)	Capacity Limited to 75% (L/s)	Full Bore Velocity (m/s)	Capacity (L/s)	Flow (L/s)
Pipe	11	0.364	0.259	17.898	1.111	19.627	0.219
Pipe (1)	16	0.465	0.334	18.033	1.119	19.776	0.469
Pipe (2)	16	0.465	0.333	18.024	1.119	19.766	0.469
Branch: Pipe (4)							
Pipe (4)	9	0.333	0.241	18.122	1.125	19.873	0.156
Pipe (5)	14	0.427	0.299	18.053	1.120	19.798	0.344
Pipe (6)	17	0.380	0.272	13.913	0.863	15.257	0.438
Pipe (3)	21	0.548	0.395	52.465	1.447	57.535	1.000
Branch: Pipe (7)							
Pipe (7)	20	0.529	0.384	17.958	1.114	19.694	0.719
Pipe (8)	21	0.922	0.657	87.066	2.401	95.480	1.719

Project:	Date:		
Scairt Hill	30/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Details:	Company:		
Type: Network Design Report Sanitary Phase: Phase Flow Path: Flow Path (1)	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

Name	From	To	Length (m)	Connection Type	Slope (1:x)	Manning's n	No. of Barrels	Diameter / Base Width (mm)
Pipe (4)	Manhole (4)	Manhole (5)	12.920	Pipe	58.728	0.013	1	150
Pipe (5)	Manhole (5)	Manhole (6)	17.753	Pipe	59.175	0.013	1	150
Pipe (6)	Manhole (6)	Manhole (3)	31.884	Pipe	99.636	0.013	1	150

Name	Upstream Cover Elevation (m)	Upstream Invert Elevation (m)	Downstream Cover Elevation (m)	Downstream Invert Elevation (m)	Total Area (km^2)	Volumetric Runoff Coefficient	Local Time of Concentration (mins)	Total Base Flow (L/s)
Pipe (4)	87.500	86.500	87.600	86.280	0.00055	0.750	5	
Pipe (5)	87.600	85.800	86.500	85.500	0.00085	0.750	5	
Pipe (6)	86.500	84.670	85.950	84.350	0.00138	0.750	5	

Name	Proportional Depth (mm)
Pipe (4)	
Pipe (5)	
Pipe (6)	

Project:	Date:		
Scairt Hill	30/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Details:	Company:		
Type: Network Design Report Sanitary Phase: Phase Flow Path: Flow Path (2)	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

Name	From	To	Length (m)	Connection Type	Slope (1:x)	Manning's n	No. of Barrels	Diameter / Base Width (mm)
Pipe (7)	Manhole (7)	Manhole (8)	62.790	Pipe	59.80	0.013	1	150

Name	Upstream Cover Elevation (m)	Upstream Invert Elevation (m)	Downstream Cover Elevation (m)	Downstream Invert Elevation (m)	Total Area (km^2)	Volumetric Runoff Coefficient	Local Time of Concentration (mins)	Total Base Flow (L/s)
Pipe (7)	84.970	84.000	85.200	82.950	0.00057	0.750	5	

Name	Proportional Depth (mm)
Pipe (7)	

Project:	Date:		
Scairt Hill	30/11/2023		
	Designed by:	Checked by:	Approved By:
	B.O'S.		
Report Details:	Company:		
Type: Network Design Criteria Sanitary Phase: Phase	DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork		

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Pipe Options

Lock Slope Options	None
Design Options	Minimize Excavation
Design Level	Level Inverts
Min. Slope (1:x)	200.00
Max. Slope (1:x)	20.00
Min. Backdrop (m)	0.600
Max. Backdrop (m)	3.000
Velocity Criteria	1/3 Proportional Velocity
Min. Velocity (m/s)	0.2
Max. Velocity (m/s)	2.5
Limit Pipe Full Conditions (%)	75
Use Flow Restriction	☐
Reduce Channel Depths	☐

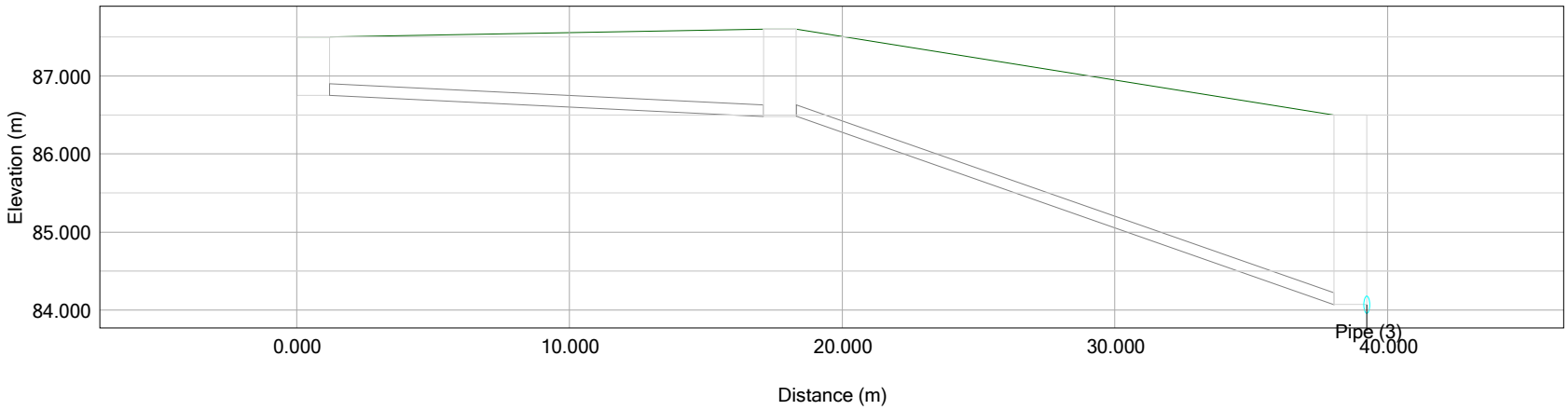
Manhole Options

Apply Offset	☐

Appendix E – Storm Water Longitudinal Sections

Denis O'Sullivan & Associates		Page 1
Project: Scairt Hill	Company Address: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork	
Modified date 28/11/2023 File Model 3 Analysis Tank 1-100.iddx	Designed by B.O'S. Checked by	
	InfoDrainage 2024.4	
Profile - Flow Path (1)	Horizontal Scale 1:234, Vertical Scale 1:85	

1/1

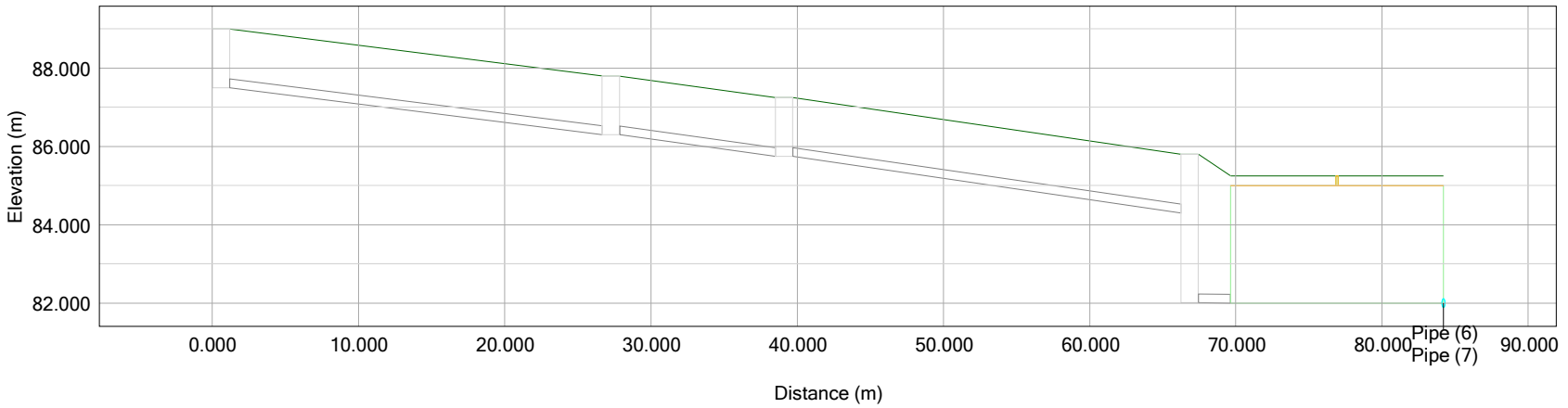


Junction	SW007	SW008	SW005
Type	Manhole	Manhole	Manhole
CE (m)	87.500	87.600	86.500
IE (m)	86.750	86.480	84.070

Connection	Pipe (10)	Pipe (11)
Type	Pipe	Pipe
Curved	No	No
Length (m)	15.907	19.727
Diam (mm)	150	150
Height (mm)		
U/S IE (m)	86.750	86.480
D/S IE (m)	86.480	84.070
C. Splay (mm)		

SWC		
Type		
EE (m)		
BE (m)		

1/1



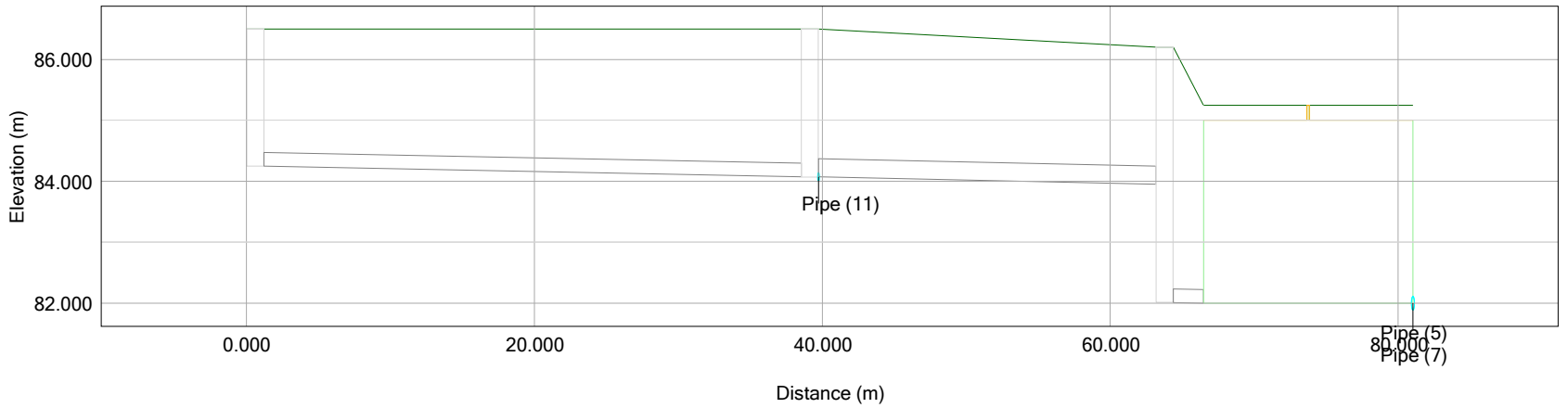
Junction	SW000	SW001	SW002	SW011
Type	Manhole	Manhole	Manhole	Manhole
CE (m)	89.000	87.800	87.250	85.800
IE (m)	87.500	86.300	85.750	82.011

Connection	Pipe	Pipe (1)	Pipe (2)	Pipe (5)
Type	Pipe	Pipe	Pipe	Pipe
Curved	No	No	No	No
Length (m)	25.462	10.651	26.534	2.188
Diam (mm)	225	225	225	225
Height (mm)				
U/S IE (m)	87.500	86.300	85.750	82.011
D/S IE (m)	86.300	85.750	84.300	82.000
C. Splay (mm)				

SWC	Tank
Type	Tank
EE (m)	85.250
BE (m)	82.000

Denis O'Sullivan & Associates		Page 3
Project: Scairt Hill	Company Address: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork	DOSA DENIS O'SULLIVAN & ASSOCIATES CONSULTING ENGINEERS
Modified date 28/11/2023 File Model 3 Analysis Tank 1-100.iddx	Designed by B.O'S. Checked by	
	InfoDrainage 2024.4	
Profile - Flow Path (2)	Horizontal Scale 1:442, Vertical Scale 1:108	

1/1



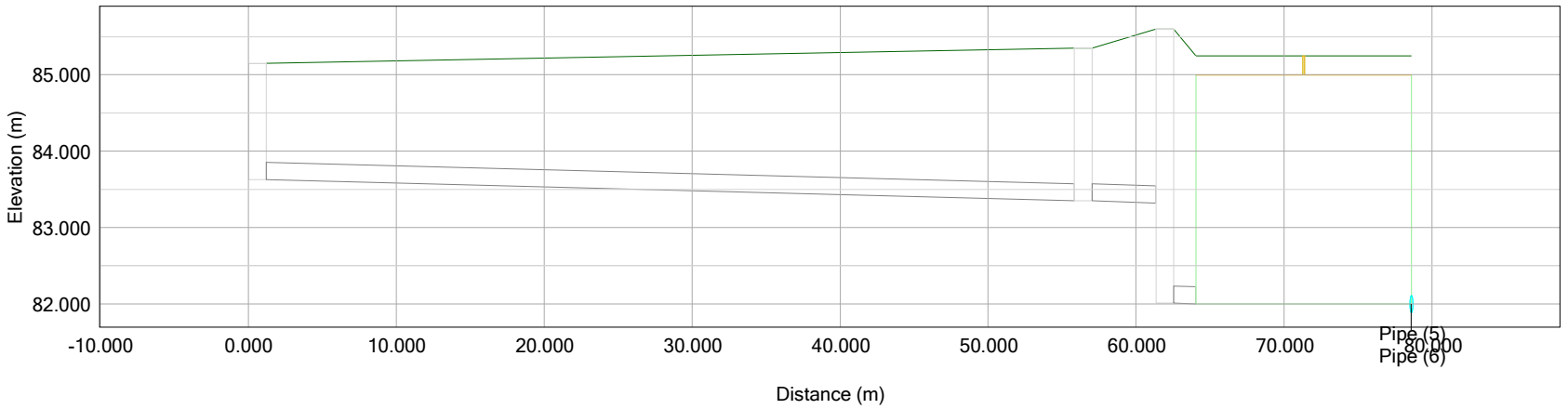
Junction	SW004	SW005	SW006
Type	Manhole	Manhole	Manhole
CE (m)	86.500	86.500	86.200
IE (m)	84.250	84.070	82.010

Connection	Pipe (3)	Pipe (4)	Pipe (6)
Type	Pipe	Pipe	Pipe
Curved	No	No	No
Length (m)	37.344	23.440	2.086
Diam (mm)	225	300	225
Height (mm)			
U/S IE (m)	84.250	84.070	82.010
D/S IE (m)	84.070	83.950	82.000
C. Splay (mm)			

SWC	Tank
Type	Tank
EE (m)	85.250
BE (m)	82.000

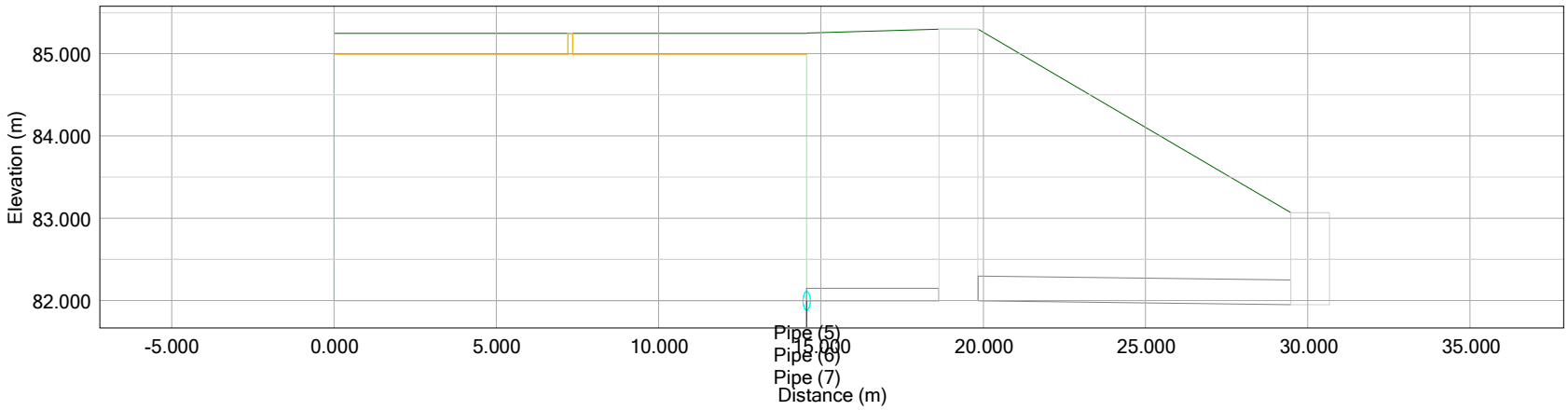
Denis O'Sullivan & Associates		Page 4
Project: Scairt Hill	Company Address: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork	DOSA DENIS O'SULLIVAN & ASSOCIATES CONSULTING ENGINEERS
Modified date 28/11/2023 File Model 3 Analysis Tank 1-100.iddx	Designed by B.O'S. Checked by	
	InfoDrainage 2024.4	
Profile - Flow Path (3)	Horizontal Scale 1:431, Vertical Scale 1:86	

1/1



Junction	SW009		SW010		
Type	Manhole		Manhole		
CE (m)	85.150		85.350		
IE (m)	83.630		83.350		
Connection		Pipe (12)		Pipe (13)	
Type		Pipe		Pipe	
Curved		No		No	
Length (m)		54.619		4.325	
Diam (mm)		225		225	
Height (mm)					
U/S IE (m)		83.630		83.350	
D/S IE (m)		83.350		83.320	
C. Splay (mm)					
SWC					Tank
Type					Tank
EE (m)					85.250
BE (m)					82.000

1/1

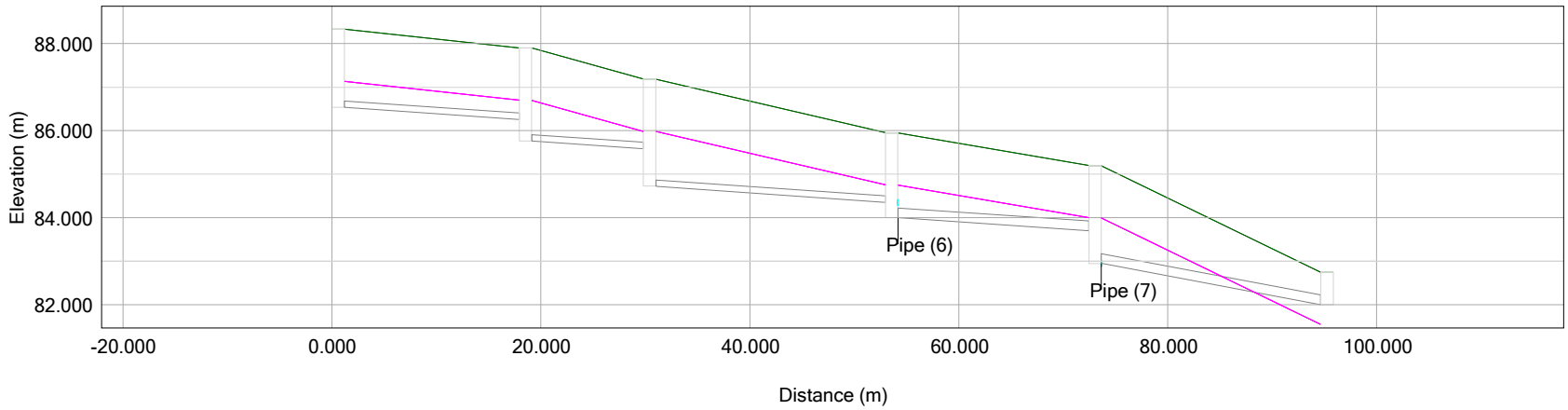


Junction		Manhole (12)	Manhole (13)
Type		Manhole	Manhole
CE (m)		85.300	83.070
IE (m)		82.000	81.950
Connection		Pipe (8)	Pipe (9)
Type		Pipe	Pipe
Curved		No	No
Length (m)		4.074	9.637
Diam (mm)		150	300
Height (mm)			
U/S IE (m)		82.000	82.000
D/S IE (m)		82.000	81.950
C. Splay (mm)			
SWC	Tank		
Type	Tank		
EE (m)	85.250		
BE (m)	82.000		

Appendix F – Foul Sewer Longitudinal Sections

Denis O'Sullivan & Associates		Page 1
Project: Scairt Hill	Company: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork	
Modified date 30/11/2023 File Sanitary test.iddx	Designed by B.O'S. Checked by	
	InfoDrainage 2024.4	
Profile - Flow Path	Horizontal Scale 1:611, Vertical Scale 1:152	

1/1

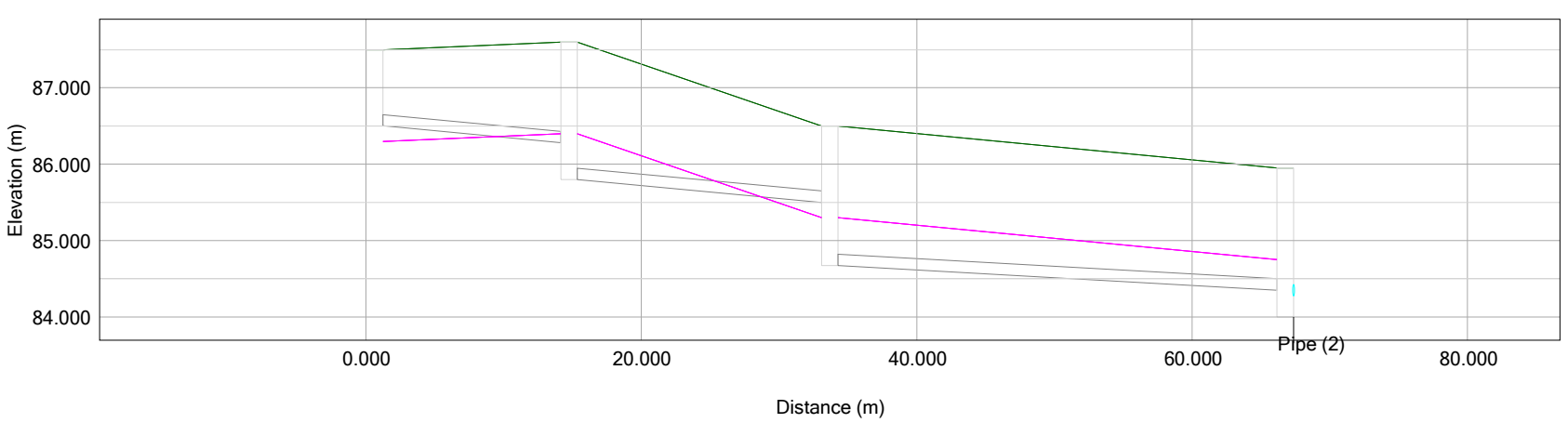


Junction	Manhole	Manhole (1)	Manhole (2)	Manhole (3)	Manhole (8)	Manhole (9)
Type	Manhole	Manhole	Manhole	Manhole	Manhole	Manhole
CE (m)	88.335	87.900	87.180	85.950	85.200	82.750
IE (m)	86.535	85.760	84.720	84.000	82.950	82.000

Connection	Pipe	Pipe (1)	Pipe (2)	Pipe (3)	Pipe (8)
Type	Pipe	Pipe	Pipe	Pipe	Pipe
Curved	No	No	No	No	No
Length (m)	16.737	10.675	21.966	18.272	21.010
Diam (mm)	150	150	150	225	225
Height (mm)					
U/S IE (m)	86.535	85.760	84.720	84.000	82.950
D/S IE (m)	86.257	85.580	84.350	83.700	82.000
C. Splay (mm)					
SWC					
Type					
EE (m)					
BE (m)					

Denis O'Sullivan & Associates		Page 2
Project: Scairt Hill	Company: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork	
Modified date 30/11/2023 File Sanitary test.iddx	Designed by B.O'S. Checked by	
	InfoDrainage 2024.4	
Profile - Flow Path (1)	Horizontal Scale 1:463, Vertical Scale 1:86	

1/1



Junction	Manhole (4)	Manhole (5)	Manhole (6)	Manhole (3)
Type	Manhole	Manhole	Manhole	Manhole
CE (m)	87.500	87.600	86.500	85.950
IE (m)	86.500	85.800	84.670	84.000

Connection	Pipe (4)	Pipe (5)	Pipe (6)
Type	Pipe	Pipe	Pipe
Curved	No	No	No
Length (m)	12.920	17.753	31.884
Diam (mm)	150	150	150
Height (mm)			
U/S IE (m)	86.500	85.800	84.670
D/S IE (m)	86.280	85.500	84.350
C. Splay (mm)			
SWC			
Type			
EE (m)			
BE (m)			

Denis O'Sullivan & Associates		Page 3
Project: Scairt Hill	Company: DOSA Consulting Engineers Joyce House, Barrack Square Ballincollig, Cork	
Modified date 30/11/2023 File Sanitary test.iddx	Designed by B.O'S. Checked by	
	InfoDrainage 2024.4	
Profile - Flow Path (2)	Horizontal Scale 1:420, Vertical Scale 1:54	

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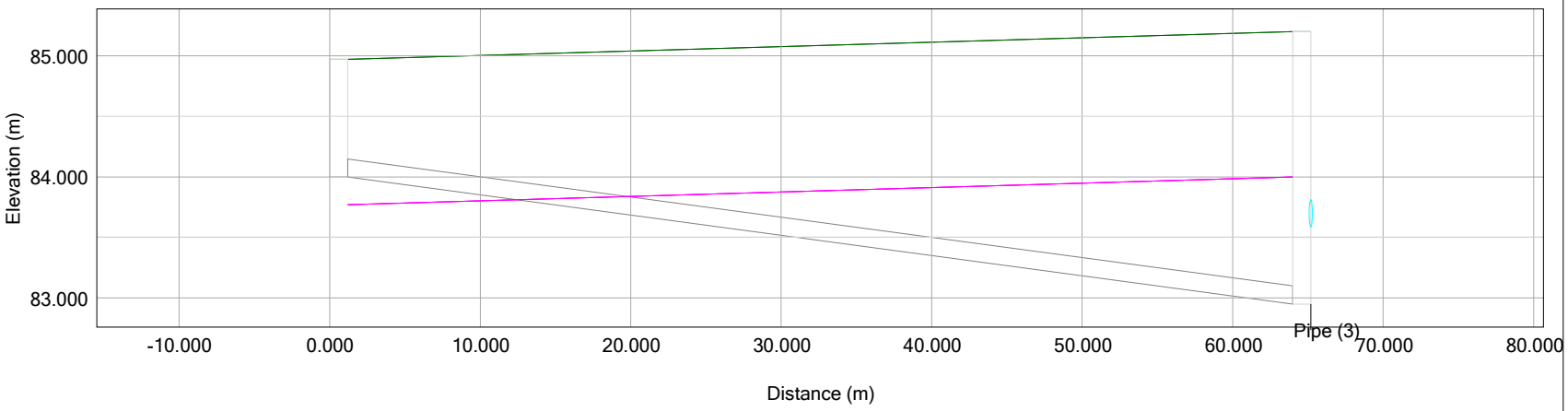


Junction	Manhole (7)		Manhole (8)
Type	Manhole		Manhole
CE (m)	84.970		85.200
IE (m)	84.000		82.950
Connection		Pipe (7)	
Type		Pipe	
Curved		No	
Length (m)		62.790	
Diam (mm)		150	
Height (mm)			
U/S IE (m)		84.000	
D/S IE (m)		82.950	
C. Splay (mm)			
SWC			
Type			
EE (m)			
BE (m)			

Appendix G - Petrol Interceptor Details

Conder® OIL/WATER SEPARATORS

THE PARTNER OF CHOICE

PREMIER TECH AQUA

40 years OF PASSION

The Conder Range of Oil Separators are for installation on surface water drainage systems and are designed to prevent hydrocarbons (e.g. diesel, petrol, engine oil) from mixing with surface water and entering our drainage systems.

Pollution prevention is a critical part of sustainable drainage systems and statutory regulations are in force to control the discharge of hydrocarbons, with severe penalties imposed for non-compliance.

Compliance

The Conder Range of Oil Separators fully conform to both the Environment Agency's latest PPG guidelines and European standard BSEN-858-1-2 and are proven to effectively separate oil and water. Under test, the Conder Bypass performed to less than 1 mg/L and in doing so guarantees minimal environmental impact and ensures public safety.

Classes of Separators

There are two classes of separators which are defined by performance.

Class 1

Class 1 Separators are designed to achieve a concentration of less than 5 mg/L of oil under standard test conditions. These conditions are required for discharges to surface water drains and the water environment.

Class 2*

Class 2 Separators are designed to achieve a concentration of less than 100 mg/L oil under standard test conditions and are suitable for dealing with discharges where a lower quality requirement applies, such as discharges to the foul sewer.

*Class 2 available in forecourt separators only.

Selecting the Right Separator

Premier Tech Aqua offers a full range of Separators for varying use and application:

- Bypass Separator
- Full Retention Separator
- Forecourt Separator
- Wash Down and Silt Separators

If you're unsure of what type of Conder Oil Separator you require, please use the chart below to help you identify the most suitable product for your project.

The guidance given is for the use of separators in surface water drainage systems that discharge to rivers and soakways.

Is there a risk of oil contaminating the drainage from the site?

YES	YES	YES	YES	NO
Risk of infrequent light contamination and potential for small spills only e.g. car park.	Risk of regular contamination of surface water run off with oil and/or risk of larger spills e.g. vehicle maintenance area, goods vehicle parking or vehicle manoeuvring.	Risk of regular Drainage will also contain dissolved oils, detergents or degreasers such as vehicle wash water and trade effluents e.g. industrial sites.	Fuel oils are delivered to and dispensed on site e.g. retail fuel forecourts.	Very low risk of oil contamination e.g. roofwater.
YES				YES
Source control SUDS must be considered and incorporated where suitable.				Separator not required.
IF NOT SUITABLE	YES	YES	YES	
By-pass separator with alarm required. Class 1 if discharge to surface water. Class 2 if discharge to foul sewer.	Full retention separator with alarm required. Class 1 if discharge to surface water. Class 2 if discharge to foul sewer.	Trade effluents must be directed to the foul sewer. It may need to pass through a separator before discharge to sewer to remove.	Full retention forecourt separator with alarm required. Class 1 if discharge to surface water. Class 2 if discharge to foul sewer.	Clean water should not be passed through the separator unless the size of the unit is increased accordingly.

The use of SUDS should be considered at all sites and they should be incorporated where suitable. SUDS can be used to polish the effluent from these separators before it enters the environment.

Source control SUDS should be considered where possible.

Separator Alarms

All oil separators are required by legislation to be fitted with an oil level alarm system with recommendations that the alarm is installed, tested, commissioned and regularly serviced by a qualified technician.

The alarm indicates when the separator is in need of immediate maintenance in order for it to continue to work effectively. Premier Tech Aqua can offer a full technical and service package for a variety of alarm options.

The Conder Range of Bypass Separators

The Conder Range of Bypass Separators are used to fully treat all flows generated by rainfall rates of up to 6.5 mm/hr. Bypass Separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where only small spillages occur and the risk of spillage is small.

Typical Applications

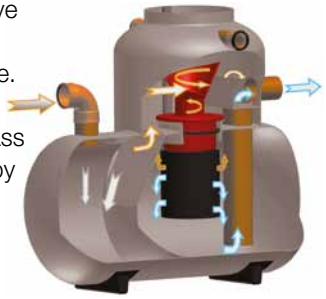
- Car parks
- Roadways and major trunk roads
- Light industrial and goods yards

Features and Benefits

- Innovative design
- Compact and easy to handle/install
- Fully compliant to the Environment Agency's PPG3 guidelines
- Low product and install costs
- Full BSI certification
- Exceeds industry standards
- Easy to service
- Fully tested and verified with a range from CNSB 3 to CNSB 1000 (Class 1)

Performance

Conder Bypass Separators have been designed to treat all flow up to the designed nominal size. Any flow in excess of the nominal size is allowed to bypass the separation chamber, thereby keeping the separated and trapped oil safe.



How it Works

Step 1

During the early part of a rain storm, which is a time of high oil contamination, all of the contaminated water flow passes through the sediment collection chamber and enters the separation chamber through a patented oil skimming and filter device.

Step 2

All of the oil then proceeds to the separation chamber where it is separated to the Class 1 standard of 5 mg/L and safely trapped.

Step 3

As the rainstorm builds up to its maximum and the level of oil contamination reduces significantly, the nominal size flow continues to pass through the separation chamber and any excess flow of virtually clean water is allowed to bypass directly to the outlet.

Specifications

Larger models up to CNSB 1000 are available.

Area Drained (m^2)	Tank Code including Silt	Length including Silt (mm)	Silt Capacity (L)	Oil Storage Capacity (L)	Diameter (mm)	Height (mm)	Base to Inlet Invert (mm)	Base to Outlet Invert (mm)	Access (mm)
1667	CNSB3s/21	1400	300	45	1026	2200	1730	1680	750
2500	CNSB4.5s/21	1785	450	67.5	1026	1875	1270	1220	600
3333	CNSB6s/21	1975	600	90	1026	1875	1270	1220	600
4444	CNSB8s/21	2165	800	120	1026	1875	1270	1220	600
5555	CNSB10s/21	2485	1000	150	1026	1875	1270	1220	600
8333	CNSB15s/21	2670	1500	225	1210	2150	1450	1400	600
11111	CNSB20s/21	3115	2000	300	1210	2150	1450	1400	600
13889	CNSB25s/21	3555	2500	375	1210	2150	1450	1400	600
16667	CNSB30s/21	3470	3000	450	1510	2690	1770	1720	750
22222	CNSB40s/21	4040	4000	600	1510	2690	1770	1720	750
27778	CNSB50s/21	4655	5000	750	1510	2690	1770	1720	750
33333	CNSB60s/21	4415	6000	900	1880	3300	2025	1975	2 x 600
44444	CNSB80s/21	5225	8000	1200	1880	3300	2025	1975	2 x 600
55556	CNSB100s/21	6010	10,000	1500	1880	3300	2025	1975	2 x 600

Note: It is a requirement of PPG3 that you have a silt capacity either in your tank or in an upstream catch pit.

The Conder Range of Full Retention Separators

The Conder Range of Full Retention Separators are designed to treat the full flow that can be delivered by a drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65 mm/hr. Full Retention Separators are used where there is a risk of regular contamination with oil and a foreseeable risk of significant spillages.

Typical Applications

- Sites with a high-risk of oil contamination
- Fuel storage depots
- Refuelling facilities
- Petrol forecourts
- Vehicle maintenance areas/workshops
- Where discharge is to a sensitive environment

Features and Benefits

- All surface water is treated
- Automatic closure device (ACD) fitted as standard

Performance

All Conder Full Retention Separators have an automatic closure device (ACD) fitted as standard. This is compulsory for all PPG3 compliant Full Retention Separators and prevents accumulated pollutants flowing through the unit when maximum storage level is reached.

How it Works

Step 1

Contaminated water enters the separator where the liquid is retained for a sufficient period to ensure that the lighter than water pollutants (such as oil, petrol) separate and rise to the surface of the water.

Step 2

The decontaminated water then passes through the coalescing filter before it is safely discharged from the separator, with the remaining pollutants being retained in the separator.

Step 3

Retained pollutants must be emptied from the separator once the level of oil is reached, or the oil level alarm is activated. This waste should be removed from the separator under the terms of The Waste Management Code of Practice.

Specifications Larger models available upon request.

Area Drained (m^2)	Tank code Incl. Silt	Length including Silt (mm)	Slit Capacity (L)	Oil Storage Capacity	Diameter (mm)	Height (mm)	Base to Inlet Invert (mm)	Base to Outlet Invert (mm)
222	CNS4s/11	2319	400	40	1026	1655	1295	1245
333	CNS6s/11	3414	600	60	1026	1655	1295	1245
444	CNS8s/11	3197	800	80	1210	1855	1480	1430
556	CNS10s/11	3957	1000	100	1210	1855	1480	1430
833	CNS15s/11	3870	1500	150	1510	2180	1780	1730
1111	CNS20s/11	5060	2000	200	1510	2180	1780	1730
1667	CNS30s/11	5369	3000	300	1880	2560	2030	1980
2222	CNS40s/11	7059	4000	400	1880	2560	2030	1980
2778	CNS50s/11	4080	5000	500	2600	3315	2730	2680
3333	CNS60s/11	4805	6000	600	2600	3315	2730	2680
3889	CNS70s/11	5529	7000	700	2600	3315	2730	2680
4444	CNS80s/11	6254	8000	800	2600	3315	2730	2680
5556	CNS100s/11	6751	10,000	1,000	2600	3315	2730	2680

Note: It is a requirement of PPG3 that you have a silt capacity either in your tank or in an upstream catch pit.

Conder Range of Forecourt Separators

Conder Forecourt Separators have been designed for specific use in petrol filling stations and other similar applications. The size of this separator has been specifically increased in order to retain the possible loss of the contents from one compartment of a road tanker, which could be up to 7,600 litres.

Forecourt separators are an essential infrastructure requirement for all forecourts so as to ensure compliance with both health and safety and environmental legislation.

Typical Applications

- Petrol forecourts
- Refuelling facilities
- Fuel storage depot

Features and Benefits

- All surface water is treated
- Available in Class 1 and Class 2
- Automatic Closure Device (ACD) fitted as standard
- Includes 2000L silt capacity

Performance

All Conder Forecourt Separators have an automatic closure device (ACD) fitted as standard. This is compulsory for all PPG3 compliant Full Retention Separators and prevents accumulated pollutants flowing through the unit when maximum storage level is reached.

How it Works

Step 1

Contaminated water enters the separator where the liquid is retained for a sufficient period to ensure that the lighter than water pollutants (such as oil, petrol) separate and rise to the surface of the water.

Step 2

The decontaminated water then passes through the coalescing filter before it is safely discharged from the separator, with the remaining pollutants being retained in the separator.

Step 3

Retained pollutants must be emptied from the separator once the level of oil is reached, or the oil level alarm is activated. This waste should be removed from the separator under the terms of The Waste Management Code of Practice.

Specifications

Tank Code	Volume (L)	Length (mm)	Diameter (mm)	Height (mm)	Base to Inlet (mm)	Base to Outlet (mm)	Access (mm)
ANO/11*	10,000	4,250	1,800	2,100	1,600	1,550	750
ANT/12**	10,000	4,250	1,800	2,100	1,600	1,550	750
LNO/11***	10,000	4,250	1,800	2,100	1,600	1,550	750

*Class 1 Forecourt Separator suitable for discharging to surface water drains

**Class 2 Forecourt Separator suitable for discharging to foul drains only

***Class 1 Forecourt Separator suitable for installation in granular materials

Conder Range of Washdown and Silt Separators

Conder Washdown and Silt Separators are for use in areas such as car washes, pressure wash facilities or other cleaning facilities and must be discharged to the foul water drainage system in accordance with PPG13.

Typical Applications

- Car wash facilities
- Tool hire depots
- Pressure washer facilities

Features and Benefits

- Available in 1,2 and 3 stage options
- Efficient silt and hydrocarbon removal

Performance

The Environment Agency's PPG13 requires that discharge from pressure washers must discharge to a foul drainage system. Where there is no foul drainage available, the effluent must be contained within a sealed drainage system or catchpit for disposal by a licenced waste contractor.

Silt build-up is the primary concern with washdown facilities and so the Conder range of washdown and silt separators are used to remove the silt and will allow some separation of hydrocarbons.

Detergents that are used in wash down areas will break down and disperse hydrocarbons (hindering the separation process). Therefore, it is important to remember the main function of wash down separators is to remove silt.

How it Works

Step 1

Contaminated wash down water enters the unit where the heavier solids, silts and settle to the bottom of the tank.

Step 2

The lighter liquids, hydrocarbons, will rise to the surface and be retained within the tank.

Step 3

Treated water will exit the separator via the dipped outlet.

Specifications

Although it is recognised that single stage separators give the most efficient separation, 2 and 3 chamber Conder Washdown and Silt Separators are available on request.

Tank Code	Capacity (L)	Silt Storage	Diameter (mm)	Length (mm)	Access Diameter (mm)	Base to Inlet Invert (mm)	Base to Outlet Invert (mm)
CWS2/12	2,000	1,000	1,000	2,713	600	1,290	1,240
CWS3/12	3,000	1,500	1,200	2,853	600	1,475	1,425
CWS4/12	4,000	2,000	1,200	3,737	600	1,475	1,425
CWS6/12	6,000	3,000	1,500	3,636	600	1,775	1,725
CWS8/12	8,000	4,000	1,800	3,443	600	2,030	1,980
CWS10/12	10,000	5,000	1,800	4,250	600	2,030	1,980

FST Silt Trap

Large quantities of silt can be associated with washdown areas. The Conder FST silt trap is ideal for easy removal of silt either manually or by a waste disposal contractor.

The FST range of silt traps are available with varying grades of covers from B125 up to E600 to allow installation in all types of vehicle or plant washdown facilities.

Conder Range of Alarm Systems

All separators must be fitted with an alarm in order to provide visual and audible warning when the level of oil reaches 90% of its storage volume, as required by The Environment Agency's PPG3.

The alarm system will then be triggered to indicate that the separator is in need of immediate emptying, in order to continue effective operation.

Features and Benefits

- Option for installation at a remote supervisory point
- Audible and visual
- Eliminates unnecessary waste management visits
- Easy installation
- Audible, visual and text message alert alarm systems available

Mains Powered System

Mains powered alarm systems are best suited to new build situations or sites where installation of the necessary cabling and ducting is straight forward and economical. The probe located in the separator will, when surrounded by floating hydrocarbons, activate an alarm condition on the remote panel to advise that the unit requires emptying.

Solar Powered System (Flashing Beacon)

This option requires no mains power supply or any significant cabling or ducting, making it extremely economical for large sites and retro fitting alarms to existing oil separators. A High Intensity Beacon will flash when a problem is detected.

Solar GSM Alarm

The Solar GSM Alarm sends a status report on your separator to a mobile phone number of your choice. The status of the GSM Alarm can also be tested at any time by simply sending a pre-recorded text message via your directed mobile phone, for additional peace of mind.

Peripherals

Coalescing Filters

The Conder Coalescing Filter is designed to separate residual oil in already separated oil/water and ensures a discharge quality of less than 5 mg/L of oil in water.

Features and Benefits

- Handle for easy removal and cleaning
- Flashing beacons (with option of siren kit)
- Kiosks
- Probe brackets
- Bas 1000 intrinsically safe junction box
- High level probe
- Silt level probe
- Oil level probe

Servicing

The Environmental Agency's PPG3 guidelines stipulate that every 6 months, and in accordance with manufacturer's instructions, experienced personnel should carry out maintenance to both the separator and alarm.

Premier Tech Aqua and our service partners can offer a full technical and service package including separator and alarm installation, commissioning, oil and silt removal and route service contracts.

PREMIER TECH AQUA

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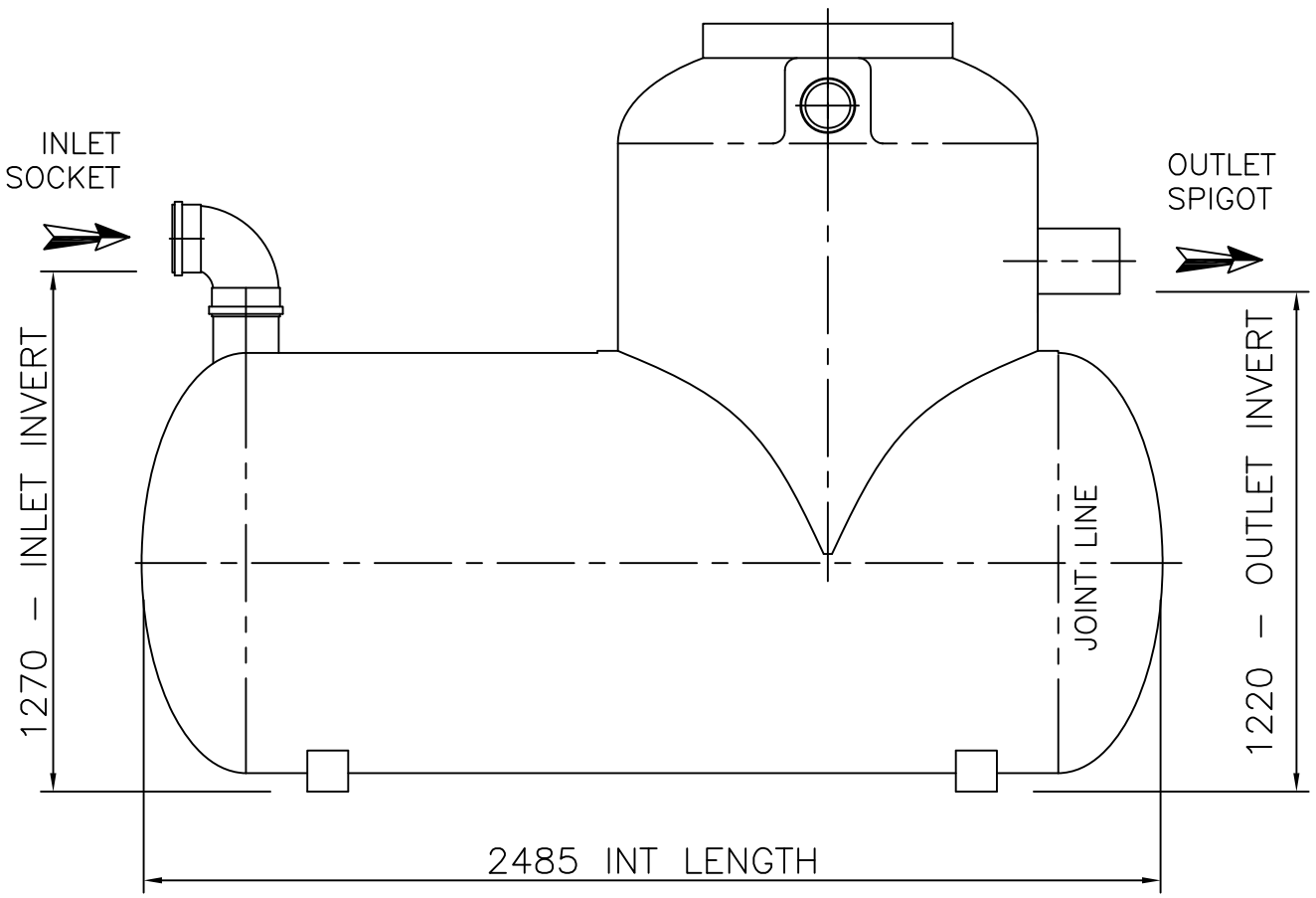
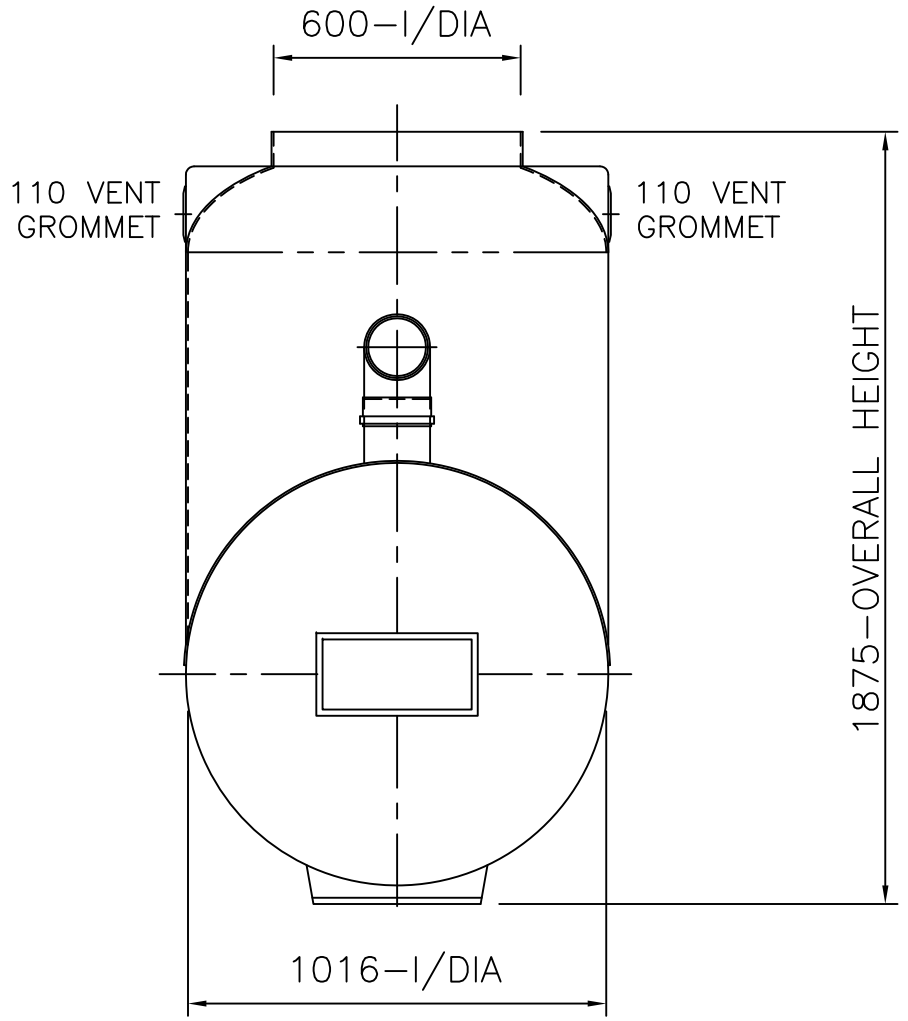
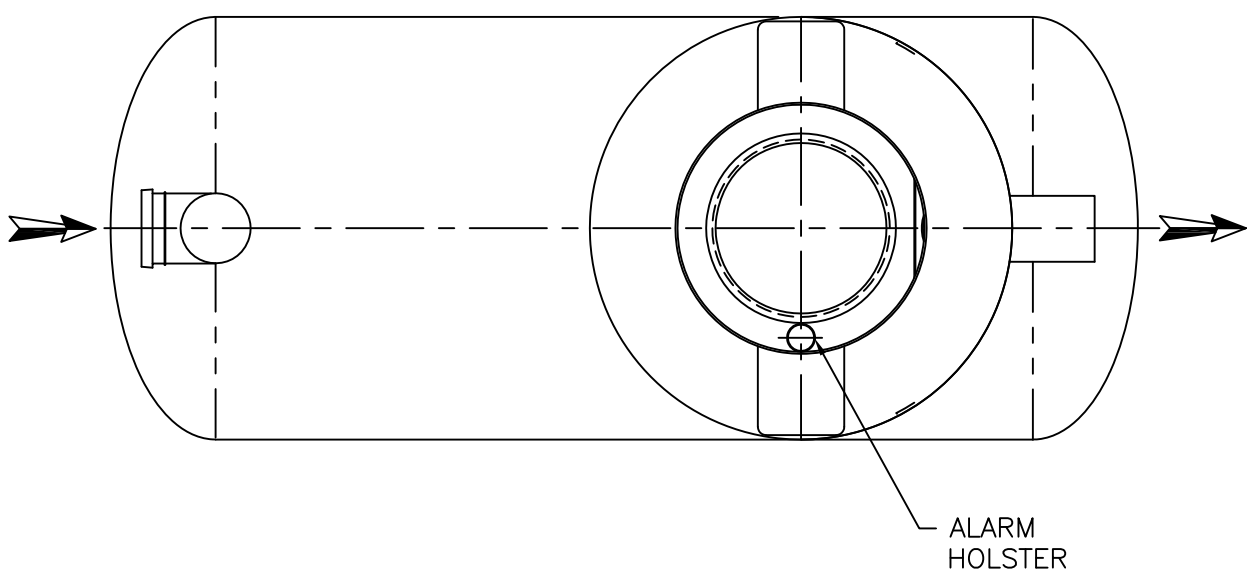






NOTES:

1. PRODUCT INFORMATION

The Conder range of light liquid separators is produced from high grade GRP. Inlets are provided as sockets and outlets as spigots, Connections may be made by steel-banded flexible couplings, nitrile seal joints, rope-seal and mortar or any other appropriate jointing method.

Ventilation specifications should be in accordance with Local Authority requirements. Vent pipework from multiple chambers must never be manifolded below ground level.

2. PERFORMANCE CHARACTERISTICS

Separators are based on the requirements stated in European Standard EN858-1 and Environment Agency guideline PPG3, in particular:-

a. The nominal size has been established from performance tests where the residual oil at the outlet is less than 5mg/l for class 1 separators and less than 100mg/l for class 2 separators.

3. MAINTENANCE AND USE

It is important to recognise that light liquid separators require regular maintenance. The period between maintenance operations can vary depending on the location and use of the separator, therefore routine inspections shall be undertaken at least every six months and a log maintained of inspection date, depth of oil, depth of silt and any cleaning that is undertaken.

A Conder Alarm should be fitted to every separator to give automatic warning that the light liquid capacity has been reached.

Access to the separator should be kept clear and not used for storage.

4. PRODUCT DEVELOPMENT

In line with our policy of constant improvement and development, we reserve the right to change specification without prior notice.

IMPORTANT NOTE

DUE TO THE COMPACT DESIGN AND EASE OF INSTALLATION, CONDER SEPARATORS ARE NOW SUPPLIED AS STANDARD WITH AN IN LINE CONFIGURATION.

PIPE SIZE VARIANTS

100, 150, 225 PVC

300, 375 GRP

IMPORTANT INVERT LEVEL NOTE (RIBBED TANKS ONLY!):

The inlet and outlet Invert Level(IL) shown on this drawing is to internals of the shell unless otherwise stated.

For Invert level to the outside of the shell ribs, see the conversion below:

ø1.0m, 1.2m, 1.5m, 1.8m, 2.5m IL+50mm ('X')

ø3.0m,4.0m IL+75mm ('X')

TANKS SUPPLIED WITH LOOSE SHAFTS DO NOT COME SUPPLIED WITH A FIXING KIT.
THIS IS THE RESPONSIBILITY OF THE SITE CONTRACTOR.

PREMIER TECH AQUA

1ST ANGLE PROJECTION

TITLE

CNSB10S/21/SALES BYPASS SEPARATOR

REV.	DATE	BY	CHKD.	APPD.	DESCRIPTION
6	19.09.11	RU	DG	RU	VENT BOXES AND GROMMETS ADDED

DRAWN BY	CHKD.	APPD.	SCALE	DRAWING No.	REVISION
RU	PB	RP	NTS	CNSB10S/21 SALES	6
DATE 23.03.09	DATE 23.03.09	DATE 23.03.09			

A3 — DO NOT SCALE IF IN DOUBT ASK ALL DIMENSIONS IN MM

GENERAL TOLERANCES (unless noted otherwise)

GRP FABRICATED MACHINED	LINEAR	± 5mm ± 2mm ± 0.5mm	ANGLE	±0.5° ±0.2° ±0.1°

Appendix H – Hydrobrake Details

Hydro-Brake® Flow Control

Modelling Guide

Unit Selection Design Guide

Overview

Hydro-Brake® Flow Controls restrict the flow in surface/storm water or foul/combined sewer systems by inducing a vortex flow pattern in the water passing through the device, having the effect of increasing back-pressure.

Their 'hydrodynamic' rather than 'physical restriction' based operation provides flow regulation whilst maintaining larger clearances than most other types of flow control, making them less susceptible to blockage. Their unique "S"-shaped head-flow characteristic also enables them to pass greater flows at lower heads, which can enable more efficient use of upstream storage facilities.

This document provides guidance relating to the selection and use of Hydro-Brake® Flow Controls for use in surface/storm water and foul/combined sewer systems.

The information provided here is intended for the purposes of general guidance only - individual application requirements may differ. If in doubt, or to enquire about new product additions, please contact HRD Technologies Ltd.

STH Range of Hydro-Brake® Flow Controls

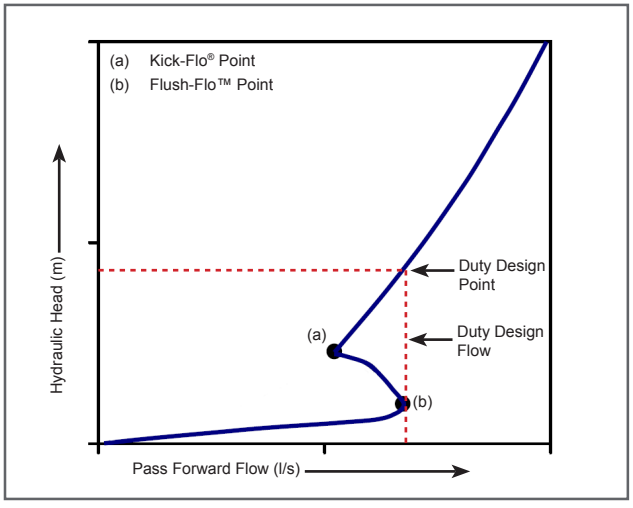
BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4599

See back cover for details.

Hydraulic Characteristics and Specification

Hydro-Brake® Flow Controls should be selected such that the duty/design flow is not exceeded at any point on the head-flow curve, see illustration right. If this is not achievable using the initially selected unit, it may be appropriate to select an alternative option (see selection guidance overleaf).

While the primary aim of a flow control is to provide a particular flow rate at a given upstream head (giving a design/duty point), it is important to note that secondary opportunities, such as potential for optimised storage use, derive from consideration of the full hydraulic characteristic. It is therefore important to ensure that the same flow control, or one confirmed to provide equivalent hydraulic performance, is implemented in any final installation.



Typical Hydro-Brake® Head Versus Flow Characteristics

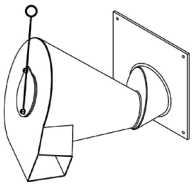
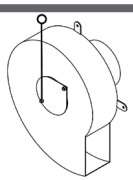
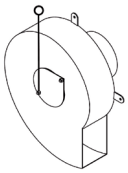
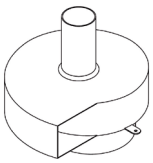
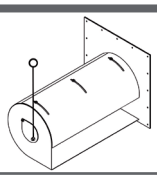
To ensure correct implementation a multiple design-point specification, defining the main hydraulic features of the selected flow control, can be provided by HRD Technologies Ltd. This should include at least the following information:

- outlet size and model of Hydro-Brake® Flow Control
- definition of the duty/design point (head and flow)
- definition of the Flush-Flo™ point (head and flow)
- definition of the Kick-Flo® point (head and flow)

To ensure that a drainage system performs as designed, it is strongly recommended that this information is reproduced on any technical specifications.

Hydro-Brake® Flow Control Models Supported in Micro Drainage

The Table below provides a summary of the Hydro-Brake® Flow Control models currently supported by the Micro Drainage programs, including details of unit styles, applications and design/installation considerations. Advice regarding unit selection is provided in subsequent sections.

WinDes® Reference Code	Style / Typical Shape	Application	Design / Installation Notes
Md1 Md2 Md4 Md14	**Conical** 	Foul / combined and surface / storm water.	With the exception of the Md14, conical units require benching into the intake (the Md14 has a piped intake). They generally require larger manholes than equivalent sump-type units.
Md5 Md6 Md7 Md12	**Sump-Type** 	Surface / storm water only.	Sump-type units require the provision of a sump to accommodate the flow control. As this will always be full of water, sump-type units are unsuitable for use in foul / combined systems.
Md13	**Sump-Type** BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE No 08/4599 STH Range of Hydro-Brake® Flow Controls 	Surface / storm water only.	The Md13 (STH) unit will always have an outlet size in excess of 75 mm and can always be fitted to a 225 mm diameter outlet pipe or larger.
Md8 Md9 Md11	**Vertical Discharge** 	Foul / combined and surface / storm water.	Vertical discharge units require a chamber design to accommodate the vertically directed outlet. They do not have S-shaped head / discharge curves and are for special applications only - please refer to HRD Technologies Ltd for advice.
Md10	**Tubular** 	Foul / combined and surface / storm water.	Tubular units require benching into the intake. They do not have S-shaped head / discharge curves and are for special applications only - please refer to HRD Technologies Ltd for advice.

Note: For system modelling using other software packages, HRD Technologies Ltd can provide individual unit head / flow characteristics in an appropriate format.

General Advice

Selection of the most appropriate Hydro-Brake® Flow Control for a particular application depends on a number of considerations, including the type of sewer system, the hydraulic characteristic of the device, device clearances and overall physical dimensions. The Micro Drainage programs provide outputs for hydraulic characteristic and outlet size.

The table opposite provides general selection guidance taking into account the considerations of type of sewer system, device clearances and overall physical dimensions. This should be considered along with other information provided here and in conjunction with the advice contained within the software design program that is being used.

The Table should be followed from the top, using the left hand column for surface/storm water applications and the right hand column for foul/combined applications. The 'general comments' provided are relevant to both applications.

HRD Technologies Ltd offer a free design service and can assist with unit selection.

General Guidance on Unit Selection

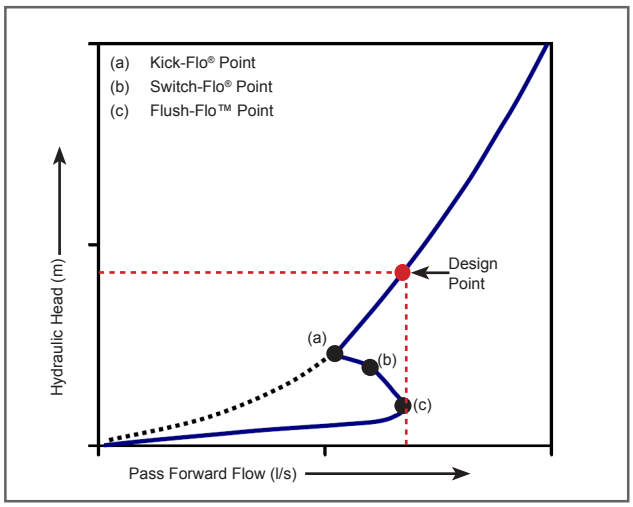
Surface / Storm Water Applications	Foul / Combined Applications
1) Select sump-type Md13 (STH) initially. This is a British Board of Agrément (BBA) approved product that is currently only available in certain sizes – if a size is not available for the specified duty/ design point go to 2) otherwise use Md13 (STH). The Md13 (STH) has a minimum outlet size in excess of 75 mm and can always be fitted to a 225 mm diameter outlet pipe (or greater).	1) Select conical-type Md4 (CX) initially provided the required outlet >150 mm. If the required manhole/ chamber size is too large go to 2) otherwise use Md4 (CX).
2) Select sump-type Md6 (SXH) initially provided the required outlet >75 mm (please seek advice if outlet <75 mm). If required outlet >200 mm go to 3) otherwise use Md6 (SXH).	2) Select conical-type Md2 (CH) provided the required outlet >150 mm. If the required manhole/chamber size is too large go to 3) otherwise use Md2 (CH).
3) Select sump-type Md5 (SH) or Md12 (SMXH) provided the required outlet >75 mm (please seek advice if outlet <75 mm). If required outlet >250 mm (Md5 - SH) or >300 mm (Md12 - SMXH) go to 4) otherwise use Md5 (SH) /Md12 (SMXH).	3) Select conical-type Md1 (C) provided the required outlet >429 mm. If the required manhole/chamber size is too large go to 4) otherwise use Md1 (C).
4) Select conical-type Md4 (CX) provided the required outlet >100 mm. This unit does not require a sump arrangement but requires benching into the intake. If the required manhole/ chamber size is too large go to 5), otherwise use Md4 (CX).	4) Vertical discharge units Md8 (SV), Md9 (SMV) and Md11 (SXV) can be considered if their outlets are >150 mm. Their physical dimensions should be considered - the Md9 (SMV) is typically used when the diameter of the Md8 (SV) and Md11 (SXV) >200 to 250 mm. If none of these units are suitable go to 5).
5) Select conical-type Md2 (CH) unit provided the required outlet >100 mm. This unit does not require a sump arrangement but requires benching into the intake. If the required manhole/ chamber size is too large go to 6), otherwise use Md2 (CH).	5) Select tubular-type Md10 (TH) provided the required outlet >333 mm. This is sometimes the only option that will meet a certain head/discharge relationship (eg. low head, low flow situations). It should only be used when there is no other alternative.
6) Select conical-type Md1 (C) provided the required outlet >285 mm. This unit does not require a sump arrangement but requires benching into the intake. If the required manhole/chamber size is too large go to 7), otherwise use Md1 (C).	For design assistance for any Hydro-Brake® Flow Control please call: **01-4013964** or **e-mail: enquiries@hrdtec.com**
7) Select sump-type Md7 (SMH) provided the required outlet >75 mm. If the required outlet >300 mm then go to 8), otherwise use Md7 (SMH).	
8) Vertical discharge units Md8 (SV), Md9 (SMV) and Md11 (SXV) can be considered provided the required outlet >75 mm. Their physical dimensions should be considered - the Md9 (SMV) is typically used when the diameter of the Md8 (SV) and Md11 (SXV) >200 to 250 mm. If none of these units are suitable go to 9).	
9) Select tubular-type Md10 (TH) provided the required outlet >222 mm. This is sometimes the only option that will meet a certain head/discharge relationship (eg. low head, low flow situations). It should only be used when there is no other alternative.	
General Comments: The minimum sizes quoted for Hydro-Brake® Flow Controls represent sizes based on experience as offering significant reduction in risk of blockage and hence maintenance and derive from general practice in flow control selection in the UK and Ireland. Sizes below the minimum recommended can be specified though it should be recognised these might incur increased risks of blockage and associated maintenance. Sizes above the maximum recommended can also be specified though may require oversized manholes/chambers. For the larger units, refer to HRD Technologies Ltd for advice.	

The information provided here is intended for the purposes of general guidance only - individual application requirements may differ. **If in doubt, please contact HRD Technologies Ltd.**

STH Type Hydro-Brake® Flow Control with BBA Approval

Now included in Win*Des*® W.12.6!

The new STH type Hydro-Brake® Flow Control range has a unique head / discharge performance curve which introduces a very important feature - the Switch-Flo® Point. This point illustrates the unique performance feature of the STH range which can lead to further savings in upstream storage, whilst also enabling increased inlet / outlet size to further reduce the risk of blockage.



Typical STH Head Versus Flow Characteristics

Kick-Flo® (a) - the point at which the vortex has initiated and at which the curve begins to return back to follow the orifice curve and reach the same design point or desired head / flow condition.

NEW Switch-Flo® (b) - marks the transition between the Kick-Flo® and Flush-Flo™, from vortex initiation to stabilisation. This point adds a new layer of resolution to the Hydro-Brake® curve that has implications to upstream storage savings.

Flush-Flo™ (c) - the point at which the vortex begins to initiate and have a throttling effect. This point on the Hydro-Brake® curve is usually much nearer to the maximum design flow (Design Point), than other vortex flow controls leading to more water passing through the unit during the earlier stages of a storm, thus reducing the amount of water that needs to be stored upstream.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4599

STH Range of Hydro-Brake® Flow Controls

The STH Hydro-Brake® Flow Control is the only vortex flow control available today that has been given the prestigious BBA Approval Certificate. The BBA assessment procedure entails rigorous assessment of production and manufacturing standards, and confirms that the hydraulic performance of the Hydro-Brake® Flow Control matches the data given to designers by HRD Technologies with their head / discharge curves.

A worked example showing the steps to model a Hydro-Brake® Flow Control and associated Stormcell® Storage System within Micro Drainage Win*Des*® is available on our website:

www.hrdtec.com

Take a Look at Our New Stormwater Web Resource

Engineering Nature's Way™

www.engineeringnaturesway.co.uk

Engineering Nature's Way is a brand new resource for people working with Sustainable Drainage and flood management in the UK.

The site provides an opportunity to share news, opinion, information and best practice for people working in local and central Government; developers, consulting engineers and contractors. Do you have something to share? We would be delighted to receive your contributions.

turning water around ...®

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