KAVANAGH BURKE
CONSULTING ENGINEERS

Civils Design Report

for

Residential Development

at

Ballymount Road Lower,
Walkinstown,
Dublin 12

Job No:	**D1752**
Architect:	**Meitheal Architects**
Date:	**April 2024**
Local Authority:	**South Dublin County Council**
Pre Planning	**LRDPP0118/23**
Revision:	**PL1**




Introduction

Description of Development:

This civils design report has been prepared to accompany a planning application for a development in Ballymount Road Lower, Walkinstown, Dublin 12. This application is a revision to a previously approved planning permission Reg Ref SHD3ABP-309658-21 which is currently under construction. The proposed revisions have a minimal impact on the surface water, wastewater and watermain designs previously granted.

Surface Water Drainage:

The proposed revisions have a minimal impact on the surface water drainage layout and design previously approved under planning Reg Ref. SHD3ABP-309658-21. Appendix 1 of this document contains compliance documents, including drawings and calculations, relating to condition 11 of the granted planning which relates to "Water supply and drainage arrangements…". SDCC have confirmed "Partial Compliance" in a letter dated 20-02-2023. The outstanding issue relating to this condition is relating to a stage 3 surface water audit which can't be undertaken until the project is completed.

Foul Sewer:

The proposed revisions have a minimal impact on the wastewater drainage layout and design previously approved under planning Reg Ref. SHD3ABP-309658-21. Appendix 2 of this document contains a signed copy of the Uisce Éireann connection agreement for the development Ref. CDS1900177002 and a copy of the payment receipt also.

Watermain:

The proposed revisions have a minimal impact on the watermain layout and design previously approved under planning Reg Ref. SHD3ABP-309658-21. Appendix 2 of this document contains a signed copy of the Uisce Éireann connection agreement for the development Ref. CDS1900177002 and a copy of the payment receipt also.

Appendix 1

Previously Approved Surface Water Drawings & Design

Meitheal Architects
44, Northumberland Road
Dublin 4

Date : 20-Feb-2023

Reg. Ref. : **SHD3ABP-309658-21C11**

Proposal : **Demolition of an existing warehouse/factory building and ancillary outbuildings/structures and the construction of a residential development of 171 apartments with supporting tenant amenity facilities (gym, lounges and meeting room), café, creche, landscaping, public realm improvements, and all ancillary site development works. The proposed development will consist of 2 x studio apartments, 59 x 1-bedroom apartments, 103 x 2-bedroom apartments and 7 x 3-bedroom apartments contained in two apartment blocks ranging in height from 1 to 8 storeys. The proposed development provides for outdoor amenity areas, landscaping, under-podium car parking, bicycle racks, bin stores, ancillary plant, and roof mounted solar panels. Vehicular access to the proposed development will be provided via a relocated entrance from Ballymount Road Lower. Any person may, within the period of 5 weeks beginning on the date of receipt by An Bord Pleanála of the application and on payment of the prescribed fee of €20 (except for certain prescribed bodies), make a submission or observations in writing to An Bord Pleanála, 64 Marlborough Street, Dublin 1 or online at www.pleanala.ie. Any enquiries relating to the application process should be directed to the Strategic Housing Development Section of An Bord Pleanála (Tel. 01-8588100).**

Condition 11; Water supply and drainage arrangements, including the attenuation and disposal of surface water, shall comply with the requirements of the planning authority for such works and services. Prior to commencement of development the developer shall submit the following details to the Planning Authority for written agreement:
a) Revised surface water drainage calculations, conveyance and attenuation details (to include SUDS details and details of flow control device) to meet the surface water

Comhairle Contae
Átha Cliath Theas
South Dublin County Council

	storage requirements of the development. The maximum discharge rate for the surface water shall be Qbar rural or c. 2 litres per second. b) Prior to commencement of the development a Stage 2- Detailied Design Stage Stormwater Audit shall be submitted to the Planning Authority for written agreement. c) Upon Completion of the development, a Stage 3 – Completion Stormwater Audit to demonstrate Sustainable Urban Drainage System measures have been installed and are working as designed and that there has been no misconnections or damage to the storm water drainage infrastructure during construction, shall be submitted to the planning authority for written agreement.
Location :	**CHM Premises, Ballymount Road Lower, Walkinstown, Dublin 12**
Applicant :	**Greg McGinn, AAI Walkinstown Ltd.**
Application Type:	**Compliance with Conditions**

Dear Sir/Madam,

I refer to your submission received on 16-Dec-2022 to comply with Condition No 11 of Grant of Permission Order No. shd3abp-309658-21, in connection with the above.

In this regard I wish to inform you that the submission received is deemed **partially** compliant.

Comments:

"Assessment:
The applicant has submitted drawings and documents as required under condition No.11 in relation to water and drainage on the subject site. The compliance documents were referred to the Water Services Section of the council who had the following comments:

Surface Water Report: ***Compliance C11***

Water services ***are satisfied that Condition C11 Part (i) and (ii) only*** *of Planning reference SHD3ABP-309658-21 is being complied with.*

Assessment:
The Water Services Section of the council considers the submitted information to be acceptable and compliant with the condition as set out through the grant of permission. Coinciding with this the planning department consider the submitted information is therefore in agreement with the compliance requirements.

It is noted that part (i) and (ii) of the condition is subject to this documentation and compliance submission and is in compliance as stated by Water Services and part (iii) will be reviewed once the appropriate documentation has been received on completion of the construction of the development.

Recommendation:
It is therefore considered that this submission is **partial compliance** with the condition. The applicant should implement the Water and Drainage as identified by the drawings and documents and submit documents in support of part (iii) of the condition in due course.

Conclusion:
Having regard to the information submitted and the requirements laid out in Condition No.11, the Planning Authority consider that Condition No. 11 is Partially Compliant."

Yours faithfully,

M.C.

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for **Senior Planner**

KAVANAGH BURKE
CONSULTING ENGINEERS

Planning Department
South Dublin County Council,
County Hall, Tallaght,
Dublin 24, D24 A3XC.

16th December 2022

Re: **Planning Compliance for SHD Planning Application Ref. ABP-309658-21 for Residential Development at Former CHM Premises, Ballymount Road Lower, Walkinstown, Dublin 12.**

Dear Sir/Madam,

Enclosed are documents relating to item 9 & 11 of the above planning permission relating to foul & surface water drainage and watermain.

Item 9:

The developer shall enter into water and wastewater connection agreements with Irish Water, prior to commencement of development Included with this document is a copy of the connection agreement from Irish Water.

Item 11:

Water supply and drainage arrangements, including the attenuation and disposal of surface water, shall comply with the requirements of the planning authority for such works and services. Prior to commencement of development the developer shall submit the following details to the Planning Authority for written agreement:

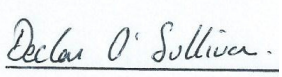
a) Revised surface water drainage calculations, conveyance and attenuation details (to include SUDS details and details of flow control device) to meet the surface water storage requirements of the development. The maximum discharge rate for the surface water shall be Qbar rural or c. 2 litres per second. Included with this document are drawings and calculations showing details as required above. Please note that the maximum surface water discharge rate from the development is 2.0l/sec.

b) Prior to commencement of the development a Stage 2-Detailied Design Stage Stormwater Audit shall be submitted to the Planning Authority for written agreement. Included with this document is a copy of a stage 2 stormwater audit completed by JBA Consulting

c) Upon Completion of the development, a Stage 3 – Completion Stormwater Audit to demonstrate Sustainable Urban Drainage System measures have been installed and are working as designed and that there has been no misconnections or damage to the storm water drainage infrastructure during construction, shall be submitted to the planning authority for written agreement. Noted

If you require any additional information do not hesitate to contact me.

Yours Sincerely,



Declan O'Sullivan
BSc(Eng)Dip(Eng)C.Eng.MIEI MIStructE

KAVANAGH BURKE
CONSULTING ENGINEERS

Drainage Design Report

for

Walkinstown Apartment Development

at

Ballymount Road Lower,
Walkinstown,
Dublin 12.

Job No:	**D1752**
Client:	**Walkinstown Montane Properties Limited**
Date:	**24th October 2022**
Local Authority:	**South Dublin County Council**
Revision:	**Preliminary**
	P2

KAVANAGH BURKE
CONSULTING ENGINEERS

INTRODUCTION

This report details the site development works design for a mixed-used development at Ballymount Road Lower, Walkinstown, Dublin 12 – planning compliance issue.

The proposed brownfield site is c. 0.931ha in size. The land of the proposed development is bounded on the north and east by residential dwellings, on the south by Ballymount Road Lower, and on the west by industrial facilities. The development consists of 2 no. apartment blocks comprising 163 apartment units, a café and a creche.

The site will be serviced primarily through connection to the existing services in the area.

The provision of the new on-site foul sewer, surface water & watermain are described as follows with calculations appended.

1. Surface Water:

1.1. SuDS Management Plan:

The surface water runoff generated from the proposed development will be routed through a series of Sustainable Urban Drainage System (SuDS) elements which will facilitate the detention and infiltration at source. These devices include green roofs, bio-retention, permeable paving, swales, and carriageway runoff infiltration via tree pits, etc. Only once the rainfall has passed through these devices will the excess runoff enter the drainage network and then reach the underground attenuation system. This facility is designed to attenuate 1 in 30-year storm event of any duration; therefore, no flooding will occur on site for any duration events up to 30-year return period as per "Greater Dublin Strategic Drainage Study" (GDSDS) requirements.

In addition to providing attenuation volume, temporary flood storage is checked and provided where needed (as an integrated part of the attenuation system) for 100-year return events as per GDSDS requirements. The restricted discharge from site will be limited by a proprietary flow control device. The maximum allowable discharge is limited to calculated flow (calculated for overall site, see calculations in the succeeding chapters) not exceeding Greenfield runoff rate, QBAR (as per criterion 4.3 "River Flood Protection" chapter 6.3.4 of GDSDS). All flows and runoffs for storm water network design and attenuation sizing are calculated incorporating 20% climate change factor for all rainfall intensities as per chapter 6.3.2.4 of GDSDS table 6.2 "Climate Change Factors". In addition, a computer analysis in the storm network modelling software was performed to confirm the sizing of the pipe network and underground attenuation storage for 1 in 100-year storms of all durations. This analysis includes a specific model of vortex flow control device with discharge of the calculated QBAR and 20% Climate Change Factor. The analysis indicated no on-site flooding (meaning that both the network and all proposed attenuation storage have sufficient capacities).

A flow control device will be placed at the outlet of the manhole MH SW17 to ensure the flow restriction to QBAR for 1 in 30-year storms. For a 1 in 100-year storms plus 20% Climate Change Factor, the High-Water Level satisfy a minimum freeboard of 500 mm from the lowest Finished Floor Level, as shown on enclosed drawing ref. *D1752-KB-XX-XX-C-0001-Storm Water & Foul Sewer Drainage Layout_RevP2* and *D1752-KB-XX-XX-C-0002-RC Underground Attenuation Tank Levels & Details_RevP2*

The network calculations demonstrating pipes capacities and achieved velocities are included in the Appendix A of this drainage report.

1.2. Proposed SuDS elements to improve the quality and reduce run-off:

In considering the above surface water management solution, consideration was given to the SuDS devices therefore the following measures will be installed:

- Bio-Retention Tree Pits (located on the south besides Ballymount Road Lower).
- Trapped Road Gullies (to collect run-off from the road and footpaths).
- Green roof (to all apartment blocks).
- Intensive soft landscaping (to the development podium)
- Permeable paving (to carparking spaces).
- Permeable footpath (across the public green area).
- Permeable wood fibre (to play area and creche outdoor space).
- Swales and French pipes (to collect run-off from the open green area and the access road).
- Silt trap and petrol interceptor (to the inlet of the attenuation tank for pollution prevention).
- Restricted discharge (to the outlet of site for regional control).

All these SuDS devices are shown on accompanying drawing references *D1752-KB-XX-XX-C-0003-Proposed SuDS Layout_rev.P2 & D1752-KB-XX-XX-C-0004-SuDS Details & Sections_RevP2.*

1.3. Proposed Water Strategy:

The proposed surface water management solution for the subject site provides both runoff quality and quantity control. Quality control is provided by ensuring all surface water runoff is dealt with on site as described earlier in this document. Quantity control is also provided through the surface water attenuation system coupled with the downstream flow control device.

In summary, the following figures synopsise the surface water attenuation calculations:

SITE AREA	9,308 m^2 (0.931 Ha)
SAAR	701
SOIL VALUE	0.3

STRUCTURE TYPE	RUNOFF COEFFICIENTS	AREA (ha)
Impermeable Areas *(Standard roofs; Road; Pathways)*	1.0	0.427
Pervious Areas considered impermeable *(Green roofs; Podium Landscaping; Permeable Footpath; Permeable paving; Permeable Woodfibre)*	1.0	0.350
Public landscaping areas	0.3	0.154
TOTAL	-	0.931

2. Foul Sewer:

A new foul sewer has been designed to collect the discharge of the proposed development and discharge to an existing foul sewer manhole at Ballymount Road Lower. Connection to the existing foul sewer network is proposed at an existing manhole S010308907 at the southeast of site, the exact connection location is shown on accompanying drawing reference *D1752-KB-XX-XX-C-0001-Storm Water & Foul Sewer Drainage Layout_RevP2*.

An average of 6 discharge units per dwelling/apartment/office is used in the design of the network (as per EN-752), and 22 discharge units have been assumed for the café and creche, thus resulting in a total of 1,000 discharge units. The proposed foul sewer network complies with the Table: Sewer Size/Gradient for Multiple Properties in section 3.6 of Irish Water Code of Practice for Wastewater Infrastructure.

The proposed foul sewer including manholes and service connections will be constructed in compliance with design standards set out by Irish Water in the IW Code of Practice for Wastewater Infrastructure and Wastewater Infrastructure Standard Details, as shown on *D1752-KB-XX-XX-C-0001-Storm Water & Foul Sewer Drainage Layout_RevP2*.

The network calculations demonstrating pipes capacities and achieved velocities are included in the Appendix B of this drainage report.

3. Watermain:

The watermain proposed to serve the development will form connection from the existing 150mm watermain at Ballymount Road Lower, the exact connection location is shown on accompanying drawing reference *D1752-KB-XX-XX-C-0005- Watermain Layout_rev.P2*.

A new 100mm diameter watermain within the site will be provided with adequate sluice valves, water meter & fire hydrants to provide water supply and for firefighting purposes. Hydrants will not be placed within 6m of a building or structure and at a maximum 46m from proposed buildings.

All associated details including watermain pipe material will be in accordance with the current Irish Water guidelines. Guidelines set out in the Irish Water Publications IW-CDS_5020-1 & IW-CDS-5030-1 have been consulted and adopted within the design of the proposed drainage & watermain networks. Refer to enclosed drawing reference *D1752-KB-XX-XX-C-0005- Watermain Layout_rev.P2* for details.

4. Surface Water Attenuation Calculation

1) Areas for Attenuation Calculation

Site Area of development:	9,308 m^2 (0.931 ha)
Overall landscaping:	1,541 m^2
Contributing landscaping:	1,541 m^2
Pervious surfaces deemed as hardstanding areas (green roofs, permeable paving, permeable footpath, etc.):	3,501 m^2
Impermeable surfaces (standard roofs, road, pathways):	4,266 m^2

2) Interception Storage

Calculate runoff from 5mm of rainfall on developed area.

For this calculation only hardstanding areas are assumed to provide 100% runoff, and non-hardstanding areas are assumed to provide 0% runoff.

The equivalent volume of Interception Storage should be provided on site as no discharge from site should occur for this initial 5mm depth of rainfall. The Interception Storage on this subject site will be provided through the base of attenuation tank.

Design Impermeable Areas: 7,767 m^2 x 1.00 = 7,767 m^2

Total volume for 5mm rainfall: 5mm x 7,767 m^2 = **38.9 m^3**

Therefore, a minimum Interception Storage volume of 39 m^3 should be provided. This will prevent discharge from site during rainfall events of up to 5mm rainfall.

3) Greenfield Runoff Rate – QBAR, (mean annual flood flow):

$Q_{BARrural}$ (m^3/sec) = 0.00108 x $AREA^{0.89}$ x $SAAR^{1.17}$ x $SOIL^{2.17}$

SAAR (E 318950, N 262650): 771 mm (*as per Met Eireann data*)

Soil Index:
S1 (very low runoff)
S2
S3 (moderate runoff)
S4
S5 (very high runoff)

Soil = $0.1(Soil_1) + 0.3(Soil_2) + 0.37(Soil_3) + 0.47(Soil_4) + 0.53(Soil_5)$

As the site is relatively small in catchment terms the soil class will be 100% $Soil_2$ as per online Wallingford Procedure Greenfield runoff estimation tool on www.uksuds.com (see Appendix to Surface Water Design for the HR Wallingford Greenfield runoff rate estimation report).

Soil Class: $Soil_2$
Runoff Potential: Low
Soil Value: 0.3

Q_{BAR}:
As the site area is less than 50 hectares, QBAR for 50 hectares is firstly calculated:

Q_{BAR} (m^3/sec) = 0.00108 x $AREA^{0.89}$ x $SAAR^{1.17}$ x $SOIL^{2.17}$ =
0.00108 x $(0.5)^{0.89}$ x $(771)^{1.17}$ x $(0.3)^{2.17}$ =
91.3 l/sec =
1.83 l/sec/ha

Q_{BAR} for the subject site area:

1.83 l/sec/ha x 0.931 ha =

Q_{BAR} = 1.70 l/sec

According to GDSDS chapter 6.3.1.4 if the separate long-term storage cannot be provided and temporary flood storage forms part of the single attenuation system, all the runoff from the site should be discharged at either a rate of 2.0 l/s/ha or the average annual peak flow rate Q_{BAR}, whichever is greater:

2 l/sec/ha x 0.931 ha = 1.86 l/sec

Minimum applicable value: 2.00 l/sec

Therefore, allowable discharge (Q_{BAR}) will be set at **2.00 l/sec.**

4) Attenuation Storage Volume

INTERCEPTION STORAGE: 39 m^3 to be provided by SuDS elements.

These SuDS elements comprise all permeable surfaces, bio retention tree pits, swales, French drains, and green roofs.

Total Green Roof Area: 2,203 m^2.
- Max Water Storage Capacity in the substrate of these equal: 2,203 m^2 x 50 mm x 35% = 38.5 m^3

ATTENUATION VOLUME REQUIRED: 594 m^3, as per computer analysis.

ATTENUATION VOLUME PROVIDED: 599 m^3

The attenuation volume was calculated in a storm water network modelling software using the site-specific vortex type flow control device. There was no indication of flood or ponding for any storm duration for 1 in 100-year storms with 20% CCF and there is no flooding or ponding during the analysis.
The detailed results of this analysis are enclosed in this report at Surface Water Network Design.

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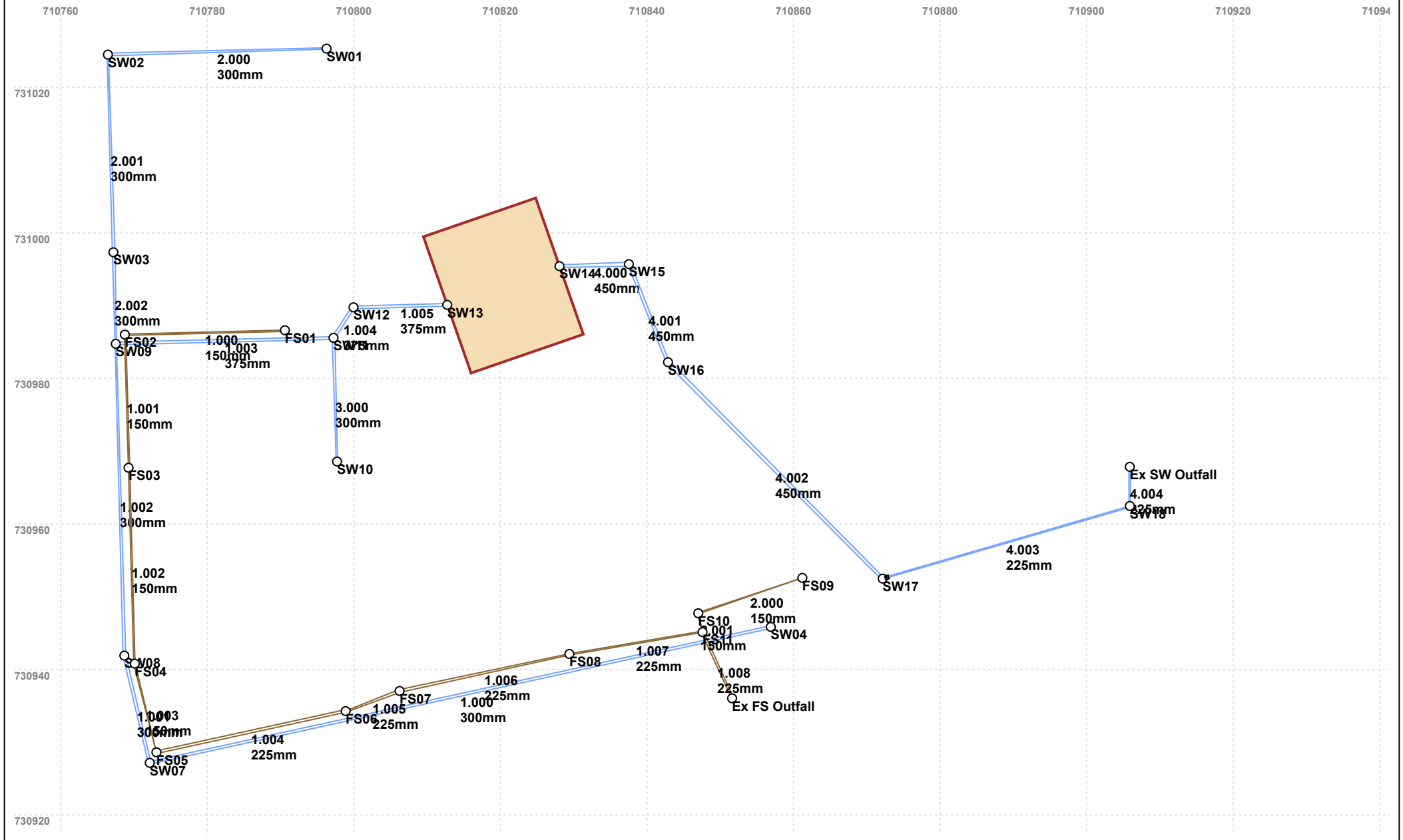
APPENDIX A

Surface Water & Foul Sewer Networks Scheme
Surface Water Network Design

KAVANAGH BURKE CONSULTING ENGINEERS	Kavanagh Burke Ltd Unit F3 Calmount Park Ballymount Dublin 12	File: D1752 SW & FS Model.pfd Network: Storm Network Pablo M Bussi 24-10-2022	Page 1 Walkistown Development SW & FS Network Scheme



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	20	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	17.200	Minimum Backdrop Height (m)	0.200
Ratio-R	0.277	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SW01	0.115	5.00	51.700	1200	710796.275	731025.309	1.790
SW02			51.100	1200	710766.437	731024.485	1.290
SW03			51.480	1200	710767.189	730997.324	1.770
SW04	0.192	5.00	52.400	1200	710856.900	730945.850	1.440
SW07	0.108	5.00	52.600	1200	710772.144	730927.170	1.960
SW08	0.039	5.00	52.300	1200	710768.683	730941.905	1.910
SW09	0.062	5.00	51.650	1200	710767.514	730984.750	2.060
SW10	0.176	5.00	51.300	1200	710797.712	730968.577	1.500
SW11			51.300	1200	710797.225	730985.570	1.800
SW12			51.300	1200	710799.953	730989.762	1.850
SW13			51.300	1200	710812.747	730990.097	2.311
SW14		5.00	51.300	1200	710828.065	730995.416	2.390
SW15	0.131	5.00	51.450	1200	710837.535	730995.696	2.565
SW16			51.500	1200	710842.875	730982.221	2.650
SW17			52.400	1200	710872.169	730952.482	3.650
SW18			50.800	1200	710905.902	730962.459	2.230
Ex SW Outfall			50.800	1200	710905.889	730967.846	2.260

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	SW04	SW07	86.790	1.500	50.960	50.640	0.320	271.2	300	6.72	46.2
1.001	SW07	SW08	15.136	1.500	50.640	50.390	0.250	60.5	300	6.86	45.8
1.002	SW08	SW09	42.861	1.500	50.390	49.665	0.725	59.1	300	7.26	44.7
2.000	SW01	SW02	29.849	1.500	49.910	49.810	0.100	298.5	300	5.62	49.6
2.001	SW02	SW03	27.171	1.500	49.810	49.710	0.100	271.7	300	6.16	47.9
2.002	SW03	SW09	12.578	1.500	49.710	49.665	0.045	279.5	300	6.41	47.1
1.003	SW09	SW11	29.722	1.500	49.590	49.500	0.090	330.2	375	7.82	43.3

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Velocity (m/s)
1.000	SW04	SW07	0.840	59.4	28.9	1.140	1.660	1.660	0.192	0.0	0.834
1.001	SW07	SW08	1.784	126.1	44.7	1.660	1.610	1.660	0.300	0.0	1.633
1.002	SW08	SW09	1.805	127.6	49.3	1.610	1.685	1.685	0.339	0.0	1.690
2.000	SW01	SW02	0.800	56.6	18.6	1.490	0.990	1.490	0.115	0.0	0.717
2.001	SW02	SW03	0.839	59.3	17.9	0.990	1.470	1.470	0.115	0.0	0.735
2.002	SW03	SW09	0.827	58.5	17.6	1.470	1.685	1.685	0.115	0.0	0.725
1.003	SW09	SW11	0.880	97.2	72.7	1.685	1.425	1.685	0.516	0.0	0.963

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)
3.000	SW10	SW11	17.000	1.500	49.800	49.575	0.225	75.6	300	5.18	50.0
1.004	SW11	SW12	5.001	1.500	49.500	49.450	0.050	100.0	375	7.87	43.2
1.005	SW12	SW13	12.798	1.500	49.450	49.250	0.200	64.0	375	7.98	42.9
4.000	SW14	SW15	9.474	1.500	48.910	48.885	0.025	379.0	450	5.17	50.0
4.001	SW15	SW16	14.495	1.500	48.885	48.850	0.035	414.1	450	5.44	50.0
4.002	SW16	SW17	41.744	1.500	48.850	48.750	0.100	417.4	450	6.23	47.7
4.003	SW17	SW18	35.177	1.500	48.750	48.570	0.180	195.4	225	6.95	45.6
4.004	SW18	Ex SW Outfall	5.387	1.500	48.570	48.540	0.030	179.6	225	7.05	45.3

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Velocity (m/s)
3.000	SW10	SW11	1.596	112.8	28.6	1.200	1.425	1.425	0.176	0.0	1.334
1.004	SW11	SW12	1.603	177.1	97.2	1.425	1.475	1.475	0.692	0.0	1.639
1.005	SW12	SW13	2.006	221.5	96.6	1.475	1.675	1.675	0.692	0.0	1.939
4.000	SW14	SW15	0.924	147.0	0.0	1.940	2.115	2.115	0.000	0.0	0.000
4.001	SW15	SW16	0.884	140.6	21.3	2.115	2.200	2.200	0.131	0.0	0.642
4.002	SW16	SW17	0.880	140.0	20.3	2.200	3.200	3.200	0.131	0.0	0.631
4.003	SW17	SW18	0.819	32.6	19.4	3.425	2.005	3.425	0.131	0.0	0.855
4.004	SW18	Ex SW Outfall	0.855	34.0	19.3	2.005	2.035	2.035	0.131	0.0	0.883

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	Scotland and Ireland	Skip Steady State	✓
M5-60 (mm)	17.200	Drain Down Time (mins)	2880
Ratio-R	0.277	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	20	0	0
100	20	0	0

Node SW17 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	48.750	Product Number	CTL-SHE-0056-2000-2100-2000
Design Depth (m)	2.100	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node SW14 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	29.300
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	48.910	Main Channel Slope (1:X)	370.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.017

Inlets

SW13

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	321.5	0.0	1.864	321.5	0.0	1.865	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +20% CC 15 minute summer	246.751	69.822	100 year +20% CC 15 minute summer	320.334	90.643
30 year +20% CC 15 minute winter	173.159	69.822	100 year +20% CC 15 minute winter	224.796	90.643
30 year +20% CC 30 minute summer	169.279	47.900	100 year +20% CC 30 minute summer	221.108	62.566
30 year +20% CC 30 minute winter	118.792	47.900	100 year +20% CC 30 minute winter	155.163	62.566
30 year +20% CC 60 minute summer	117.883	31.153	100 year +20% CC 60 minute summer	152.993	40.432
30 year +20% CC 60 minute winter	78.318	31.153	100 year +20% CC 60 minute winter	101.645	40.432
30 year +20% CC 120 minute summer	74.941	19.805	100 year +20% CC 120 minute summer	96.421	25.481
30 year +20% CC 120 minute winter	49.789	19.805	100 year +20% CC 120 minute winter	64.060	25.481
30 year +20% CC 180 minute summer	58.639	15.090	100 year +20% CC 180 minute summer	74.980	19.295
30 year +20% CC 180 minute winter	38.117	15.090	100 year +20% CC 180 minute winter	48.739	19.295
30 year +20% CC 240 minute summer	46.987	12.417	100 year +20% CC 240 minute summer	59.798	15.803
30 year +20% CC 240 minute winter	31.217	12.417	100 year +20% CC 240 minute winter	39.728	15.803
30 year +20% CC 360 minute summer	36.589	9.416	100 year +20% CC 360 minute summer	46.240	11.899
30 year +20% CC 360 minute winter	23.784	9.416	100 year +20% CC 360 minute winter	30.057	11.899
30 year +20% CC 480 minute summer	29.246	7.729	100 year +20% CC 480 minute summer	36.768	9.717
30 year +20% CC 480 minute winter	19.430	7.729	100 year +20% CC 480 minute winter	24.428	9.717
30 year +20% CC 600 minute summer	24.233	6.628	100 year +20% CC 600 minute summer	30.342	8.299
30 year +20% CC 600 minute winter	16.558	6.628	100 year +20% CC 600 minute winter	20.731	8.299
30 year +20% CC 720 minute summer	21.810	5.845	100 year +20% CC 720 minute summer	27.215	7.294
30 year +20% CC 720 minute winter	14.658	5.845	100 year +20% CC 720 minute winter	18.290	7.294
30 year +20% CC 960 minute summer	18.199	4.792	100 year +20% CC 960 minute summer	22.587	5.948
30 year +20% CC 960 minute winter	12.055	4.792	100 year +20% CC 960 minute winter	14.962	5.948
30 year +20% CC 1440 minute summer	13.511	3.621	100 year +20% CC 1440 minute summer	16.644	4.461
30 year +20% CC 1440 minute winter	9.080	3.621	100 year +20% CC 1440 minute winter	11.186	4.461
30 year +20% CC 2160 minute summer	9.893	2.734	100 year +20% CC 2160 minute summer	12.092	3.342
30 year +20% CC 2160 minute winter	6.816	2.734	100 year +20% CC 2160 minute winter	8.332	3.342
30 year +20% CC 2880 minute summer	8.352	2.238	100 year +20% CC 2880 minute summer	10.148	2.720
30 year +20% CC 2880 minute winter	5.613	2.238	100 year +20% CC 2880 minute winter	6.820	2.720
30 year +20% CC 4320 minute summer	6.452	1.687	100 year +20% CC 4320 minute summer	7.772	2.032
30 year +20% CC 4320 minute winter	4.249	1.687	100 year +20% CC 4320 minute winter	5.118	2.032
30 year +20% CC 5760 minute summer	5.390	1.380	100 year +20% CC 5760 minute summer	6.451	1.651
30 year +20% CC 5760 minute winter	3.488	1.380	100 year +20% CC 5760 minute winter	4.175	1.651
30 year +20% CC 7200 minute summer	4.627	1.180	100 year +20% CC 7200 minute summer	5.509	1.405
30 year +20% CC 7200 minute winter	2.986	1.180	100 year +20% CC 7200 minute winter	3.556	1.405

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.25%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute winter	SW01	2580	50.385	0.475	1.5	1.1487	0.0000	SURCHARGED
2880 minute winter	SW02	2700	50.385	0.575	1.5	0.6504	0.0000	SURCHARGED
2880 minute winter	SW03	2700	50.385	0.675	1.5	0.7637	0.0000	SURCHARGED
15 minute winter	SW04	11	51.218	0.258	61.0	0.9814	0.0000	OK
15 minute winter	SW07	11	50.853	0.213	90.4	0.4763	0.0000	OK
15 minute winter	SW08	12	50.611	0.221	101.6	0.3406	0.0000	OK
2880 minute winter	SW09	2700	50.385	0.795	6.7	1.3779	0.0000	SURCHARGED
2880 minute winter	SW10	2640	50.386	0.586	2.3	2.0390	0.0000	SURCHARGED
2880 minute winter	SW11	2640	50.386	0.886	8.8	1.0019	0.0000	SURCHARGED
2880 minute winter	SW12	2640	50.384	0.934	8.6	1.0562	0.0000	SURCHARGED
2880 minute winter	SW13	2640	50.385	1.396	8.5	1.5784	0.0000	OK
2880 minute winter	SW14	2640	50.385	1.475	6.0	1.6677	0.0000	SURCHARGED
2880 minute winter	SW15	2640	50.385	1.500	3.5	3.2301	0.0000	SURCHARGED
2880 minute winter	SW16	2640	50.385	1.535	3.4	1.7356	0.0000	SURCHARGED
2880 minute winter	SW17	2640	50.385	1.635	2.7	1.8486	0.0000	SURCHARGED
2880 minute winter	SW18	2640	48.607	0.037	1.8	0.0414	0.0000	OK
2880 minute winter	Ex SW Outfall	2640	48.574	0.034	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute winter	SW01	2.000	SW02	1.5	0.345	0.027	2.1019	
2880 minute winter	SW02	2.001	SW03	1.5	0.342	0.025	1.9134	
2880 minute winter	SW03	2.002	SW09	1.5	0.379	0.026	0.8857	
15 minute winter	SW04	1.000	SW07	58.1	0.978	0.978	5.1256	
15 minute winter	SW07	1.001	SW08	89.9	1.716	0.713	0.8168	
15 minute winter	SW08	1.002	SW09	99.4	1.476	0.779	2.7031	
2880 minute winter	SW09	1.003	SW11	6.5	0.508	0.067	3.2782	
2880 minute winter	SW10	3.000	SW11	2.3	0.619	0.020	1.1971	
2880 minute winter	SW11	1.004	SW12	8.6	0.840	0.048	0.5516	
2880 minute winter	SW12	1.005	SW13	8.5	0.847	0.038	1.4116	
2880 minute winter	SW13	Flow through pond	SW14	5.6	0.015	0.000	461.4963	
2880 minute winter	SW14	4.000	SW15	3.5	0.251	0.024	1.5011	
2880 minute winter	SW15	4.001	SW16	3.4	0.286	0.024	2.2966	
2880 minute winter	SW16	4.002	SW17	2.7	0.124	0.019	6.6141	
2880 minute winter	SW17	Hydro-Brake®	SW18	1.8				
2880 minute winter	SW18	4.004	Ex SW Outfall	1.8	0.454	0.053	0.0212	513.4

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.25%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute winter	SW01	2520	50.835	0.925	1.8	2.2342	0.0000	SURCHARGED
2880 minute winter	SW02	2520	50.833	1.023	1.8	1.1574	0.0000	FLOOD RISK
2880 minute winter	SW03	2520	50.835	1.125	1.8	1.2725	0.0000	SURCHARGED
15 minute winter	SW04	12	51.718	0.758	79.2	2.8779	0.0000	SURCHARGED
15 minute winter	SW07	12	51.320	0.680	111.6	1.5191	0.0000	SURCHARGED
15 minute winter	SW08	12	51.112	0.722	109.3	1.1111	0.0000	SURCHARGED
2880 minute winter	SW09	2520	50.830	1.240	7.7	2.1497	0.0000	SURCHARGED
2880 minute winter	SW10	2520	50.826	1.026	2.8	3.5691	0.0000	SURCHARGED
2880 minute winter	SW11	2520	50.880	1.380	10.1	1.5603	0.0000	SURCHARGED
2880 minute winter	SW12	2760	50.788	1.338	10.6	1.5138	0.0000	SURCHARGED
2880 minute winter	SW13	2760	50.787	1.798	10.2	2.0330	0.0000	OK
2880 minute winter	SW14	2760	50.787	1.877	10.0	2.1224	0.0000	SURCHARGED
2880 minute winter	SW15	2760	50.787	1.902	3.2	4.0960	0.0000	SURCHARGED
2880 minute winter	SW16	2760	50.787	1.937	2.6	2.1903	0.0000	SURCHARGED
2880 minute winter	SW17	2760	50.787	2.037	2.4	2.3035	0.0000	SURCHARGED
2880 minute winter	SW18	2760	48.609	0.039	2.0	0.0436	0.0000	OK
2880 minute winter	Ex SW Outfall	2760	48.575	0.035	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute winter	SW01	2.000	SW02	1.8	0.365	0.032	2.1019	
2880 minute winter	SW02	2.001	SW03	1.8	0.355	0.030	1.9134	
2880 minute winter	SW03	2.002	SW09	1.7	0.395	0.029	0.8857	
15 minute winter	SW04	1.000	SW07	67.1	0.976	1.130	6.1117	
15 minute winter	SW07	1.001	SW08	96.2	1.723	0.763	1.0659	
15 minute winter	SW08	1.002	SW09	108.7	1.544	0.852	3.0182	
2880 minute winter	SW09	1.003	SW11	7.5	0.517	0.077	3.2782	
2880 minute winter	SW10	3.000	SW11	2.7	0.627	0.024	1.1971	
2880 minute winter	SW11	1.004	SW12	10.6	0.840	0.060	0.5516	
2880 minute winter	SW12	1.005	SW13	10.0	0.874	0.045	1.4116	
2880 minute winter	SW13	Flow through pond	SW14	9.6	0.015	0.000	589.0792	
2880 minute winter	SW14	4.000	SW15	3.2	0.236	0.022	1.5011	
2880 minute winter	SW15	4.001	SW16	2.6	0.274	0.019	2.2966	
2880 minute winter	SW16	4.002	SW17	2.4	0.113	0.017	6.6141	
2880 minute winter	SW17	Hydro-Brake®	SW18	2.0				
2880 minute winter	SW18	4.004	Ex SW Outfall	2.0	0.466	0.058	0.0229	564.9

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APPENDIX B

Foul Sewer Network Design

Design Settings

Frequency of use (kDU)	0.50	Minimum Velocity (m/s)	1.00
Flow per dwelling per day (l/day)	2680	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	3.000
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Units	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
FS01	120.0	51.380	Foul MH	710790.599	730986.613	0.980
FS02	108.0	51.650	Foul MH	710768.752	730986.010	1.395
FS03	168.0	51.900	Foul MH	710769.257	730967.721	1.770
FS04	168.0	52.460	Foul MH	710770.111	730940.795	2.500
FS05	72.0	52.600	Foul MH	710773.059	730928.618	2.810
FS06	42.0	52.930	Foul MH	710798.884	730934.281	3.280
FS08	120.0	52.850	Foul MH	710829.413	730942.133	3.360
FS09	112.0	52.300	Foul MH	710861.208	730952.583	1.400
FS10	90.0	52.500	Foul MH	710847.004	730947.723	1.850
FS11		52.350	Foul MH	710847.585	730945.132	2.960
Ex FS Outfall		52.350	Foul MH	710851.616	730936.037	3.010
FS07		52.940	Foul MH	710806.242	730937.048	3.330

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	FS01	FS02	21.855	1.500	50.400	50.255	0.145	150.7	150
1.001	FS02	FS03	18.296	1.500	50.255	50.130	0.125	146.4	150
1.002	FS03	FS04	26.939	1.500	50.130	49.960	0.170	158.5	150
1.003	FS04	FS05	12.529	1.500	49.960	49.865	0.095	131.9	150
1.004	FS05	FS06	26.439	1.500	49.790	49.650	0.140	188.8	225
1.005	FS06	FS07	7.861	1.500	49.650	49.610	0.040	196.5	225
1.006	FS07	FS08	23.722	1.500	49.610	49.490	0.120	197.7	225
1.007	FS08	FS11	18.418	1.500	49.490	49.390	0.100	184.2	225
1.008	FS11	Ex FS Outfall	9.948	1.500	49.390	49.340	0.050	199.0	225
2.000	FS09	FS10	15.012	1.500	50.900	50.650	0.250	60.0	150
2.001	FS10	FS11	2.655	1.500	50.650	50.600	0.050	53.1	150

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Velocity (m/s)
1.000	FS01	FS02	0.712	12.6	5.5	0.830	1.245	1.245	0.000	120.0	0.0	0.688
1.001	FS02	FS03	0.723	12.8	7.5	1.245	1.620	1.620	0.000	228.0	0.0	0.753
1.002	FS03	FS04	0.695	12.3	9.9	1.620	2.350	2.350	0.000	396.0	0.0	0.774
1.003	FS04	FS05	0.762	13.5	11.9	2.350	2.585	2.585	0.000	564.0	0.0	0.860
1.004	FS05	FS06	0.834	33.1	12.6	2.585	3.055	3.055	0.000	636.0	0.0	0.777
1.005	FS06	FS07	0.817	32.5	13.0	3.055	3.105	3.105	0.000	678.0	0.0	0.772
1.006	FS07	FS08	0.815	32.4	13.0	3.105	3.135	3.135	0.000	678.0	0.0	0.769
1.007	FS08	FS11	0.844	33.6	14.1	3.135	2.735	3.135	0.000	798.0	0.0	0.807
1.008	FS11	Ex FS Outfall	0.812	32.3	15.8	2.735	2.785	2.785	0.000	1000.0	0.0	0.808
2.000	FS09	FS10	1.132	20.0	5.3	1.250	1.700	1.700	0.000	112.0	0.0	0.957
2.001	FS10	FS11	1.204	21.3	7.1	1.700	1.600	1.700	0.000	202.0	0.0	1.080

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APPENDIX C

Walkinstown Rainfall Return Period data
HR Wallingford Greenfiled runoff rate estimation
Specification / Product Information for:

- Separators.
- Silt Trap.
- Flow Control Device.

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 310770, Northing: 230965,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.4,	3.6,	4.2,	5.2,	5.9,	6.4,	8.2,	10.3,	11.7,	13.7,	15.5,	16.9,	19.1,	20.8,	22.3,	N/A ,
10 mins	3.4,	5.0,	5.9,	7.2,	8.2,	8.9,	11.4,	14.3,	16.2,	19.0,	21.5,	23.5,	26.6,	29.0,	31.1,	N/A ,
15 mins	4.0,	5.9,	6.9,	8.5,	9.6,	10.5,	13.4,	16.8,	19.1,	22.4,	25.3,	27.7,	31.3,	34.2,	36.6,	N/A ,
30 mins	5.2,	7.6,	9.0,	11.0,	12.3,	13.4,	17.0,	21.1,	23.9,	27.9,	31.4,	34.2,	38.5,	41.9,	44.8,	N/A ,
1 hours	6.9,	10.0,	11.6,	14.1,	15.8,	17.2,	21.6,	26.6,	29.9,	34.7,	39.0,	42.3,	47.5,	51.5,	54.8,	N/A ,
2 hours	9.2,	13.0,	15.1,	18.2,	20.3,	21.9,	27.3,	33.4,	37.5,	43.2,	48.3,	52.3,	58.4,	63.2,	67.1,	N/A ,
3 hours	10.8,	15.2,	17.5,	21.1,	23.5,	25.3,	31.4,	38.2,	42.8,	49.1,	54.8,	59.2,	66.0,	71.2,	75.6,	N/A ,
4 hours	12.1,	17.0,	19.5,	23.4,	26.0,	28.0,	34.6,	42.1,	47.0,	53.8,	59.9,	64.7,	71.9,	77.5,	82.2,	N/A ,
6 hours	14.3,	19.8,	22.7,	27.1,	30.1,	32.4,	39.8,	48.1,	53.6,	61.2,	68.0,	73.2,	81.2,	87.4,	92.5,	N/A ,
9 hours	16.8,	23.1,	26.5,	31.5,	34.8,	37.4,	45.7,	55.0,	61.1,	69.6,	77.1,	82.9,	91.7,	98.6,	104.2,	N/A ,
12 hours	18.9,	25.8,	29.5,	34.9,	38.6,	41.4,	50.4,	60.5,	67.1,	76.2,	84.3,	90.5,	100.0,	107.3,	113.3,	N/A ,
18 hours	22.2,	30.2,	34.3,	40.5,	44.6,	47.8,	57.9,	69.2,	76.5,	86.7,	95.6,	102.5,	112.9,	121.0,	127.6,	N/A ,
24 hours	24.9,	33.7,	38.3,	45.0,	49.4,	52.9,	63.9,	76.1,	84.0,	94.9,	104.5,	111.9,	123.1,	131.7,	138.8,	163.2,
2 days	31.0,	40.9,	46.0,	53.5,	58.4,	62.1,	74.0,	87.0,	95.4,	106.8,	116.8,	124.3,	135.8,	144.6,	151.8,	176.4,
3 days	35.9,	46.8,	52.3,	60.4,	65.6,	69.6,	82.3,	96.0,	104.7,	116.6,	127.0,	134.8,	146.7,	155.7,	163.0,	188.1,
4 days	40.1,	51.8,	57.8,	66.3,	71.9,	76.1,	89.4,	103.7,	112.8,	125.2,	135.9,	144.0,	156.2,	165.5,	173.0,	198.7,
6 days	47.6,	60.7,	67.3,	76.7,	82.7,	87.4,	101.8,	117.2,	126.9,	140.1,	151.5,	160.0,	172.9,	182.6,	190.4,	217.1,
8 days	54.2,	68.5,	75.6,	85.7,	92.2,	97.2,	112.6,	128.9,	139.2,	153.1,	165.0,	173.9,	187.3,	197.4,	205.6,	233.3,
10 days	60.2,	75.5,	83.1,	93.9,	100.8,	106.1,	122.3,	139.5,	150.3,	164.8,	177.2,	186.5,	200.4,	210.8,	219.3,	247.8,
12 days	65.9,	82.1,	90.1,	101.5,	108.8,	114.3,	131.3,	149.2,	160.4,	175.5,	188.4,	198.0,	212.4,	223.1,	231.9,	261.2,
16 days	76.3,	94.2,	103.0,	115.4,	123.4,	129.3,	147.7,	167.0,	179.0,	195.1,	208.7,	218.9,	234.1,	245.5,	254.7,	285.5,
20 days	85.9,	105.3,	114.8,	128.2,	136.7,	143.1,	162.7,	183.1,	195.8,	212.8,	227.1,	237.9,	253.8,	265.7,	275.3,	307.4,
25 days	97.2,	118.3,	128.6,	142.9,	152.1,	158.9,	179.9,	201.7,	215.1,	233.1,	248.3,	259.5,	276.3,	288.8,	298.8,	332.4,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Pablo Martin Bussi
Site name:	Walkinstown
Site location:	Dublin

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.31747° N
Longitude:	6.33818° W
Reference:	3095902416
Date:	Sep 12 2022 16:53

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.931

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics	Default	Edited
SAAR (mm):	802	802
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.13	2.13
Growth curve factor 100 years:	2.61	2.61
Growth curve factor 200 years:	2.86	2.86

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	1.99	1.99
1 in 1 year (l/s):	1.69	1.69
1 in 30 years (l/s):	4.24	4.24
1 in 100 year (l/s):	5.19	5.19
1 in 200 years (l/s):	5.69	5.69

Kingspan Klargester

SEPARATORS

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Kingspan Environmental

Separators

A RANGE OF FUEL/OIL SEPARATORS FOR PEACE OF MIND

Surface water drains normally discharge to a watercourse or indirectly into underground waters (groundwater) via a soakaway. Contamination of surface water by oil, chemicals or suspended solids can cause these discharges to have a serious impact on the receiving water.

The Environment Regulators, Environment Agency, England and Wales, SEPA, Scottish Environmental Protection Agency in Scotland and Department of Environment & Heritage in Northern Ireland, have published guidance on surface water disposal, which offers a range of means of dealing with pollution both at source and at the point of discharge from site (so called 'end of pipe' treatment). These techniques are known as 'Sustainable Drainage Systems' (SuDS).

Where run-off is draining from relatively low risk areas such as car-parks and non-operational areas, a source control approach, such as permeable surfaces or infiltration trenches, may offer a suitable means of treatment, removing the need for a separator.

Oil separators are installed on surface water drainage systems to protect receiving waters from pollution by oil, which may be present due to minor leaks from vehicles and plant, from accidental spillage.

Effluent from industrial processes and vehicle washing should normally be discharged to the foul sewer (subject to the approval of the sewerage undertaker) for further treatment at a municipal treatment works.

SEPARATOR STANDARDS AND TYPES

A British (and European) standard (EN 858-1 and 858-2) for the design and use of prefabricated oil separators has been adopted. New prefabricated separators should comply with the standard.

SEPARATOR CLASSES

The standard refers to two 'classes' of separator, based on performance under standard test conditions.

CLASS I

Designed to achieve a concentration of less than 5mg/l of oil under standard test conditions, should be used when the separator is required to remove very small oil droplets.

CLASS II

Designed to achieve a concentration of less than 100mg/l oil under standard test conditions and are suitable for dealing with discharges where a lower quality requirement applies (for example where the effluent passes to foul sewer).

Both classes can be produced as full retention or bypass separators. The oil concentration limits of 5 mg/l and 100 mg/l are only applicable under standard test conditions. It should not be expected that separators will comply with these limits when operating under field conditions.

FULL RETENTION SEPARATORS

Full retention separators treat the full flow that can be delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

On large sites, some short term flooding may be an acceptable means of limiting the flow rate and hence the size of full retention systems.

BYPASS SEPARATORS

Bypass separators fully treat all flows generated by rainfall rates of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

FORECOURT SEPARATORS

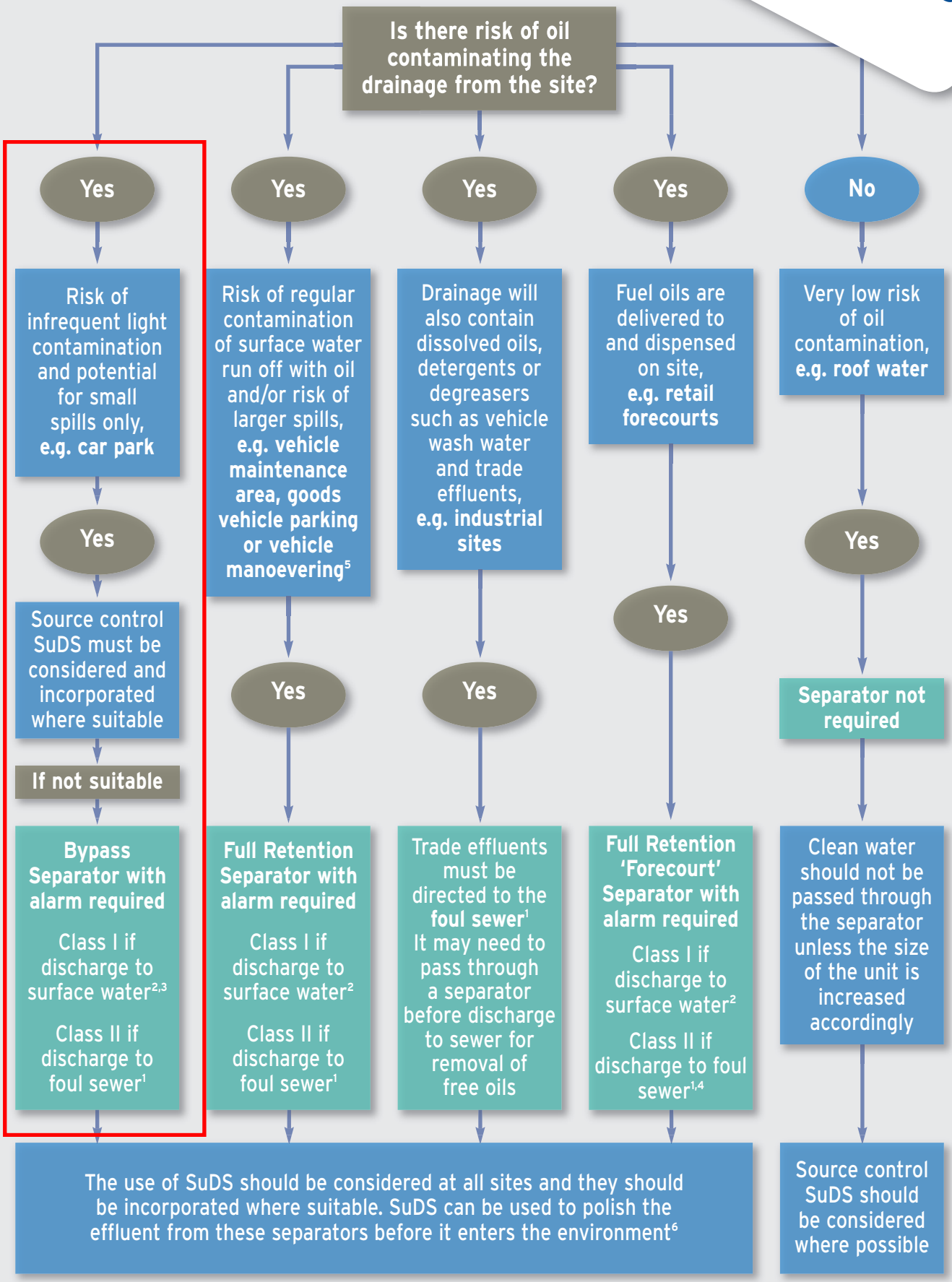
Forecourt separators are full retention separators specified to retain on site the maximum spillage likely to occur on a petrol filling station. They are required for both safety and environmental reasons and will treat spillages occurring during vehicle refuelling and road tanker delivery. The size of the separator is increased in order to retain the possible loss of the contents of one compartment of a road tanker, which may be up to 7,600 litres.

SELECTING THE RIGHT SEPARATOR

The chart on the following page gives guidance to aid selection of the appropriate type of fuel/oil separator for use in surface water drainage systems which discharge into rivers and soakaways.

For further detailed information, please consult the Environment Agency Pollution Prevention Guideline 03 (PPG 3) 'Use and design of oil separators in surface water drainage systems' available from their website.

Klargester has a specialist team who provide technical assistance in selecting the appropriate separator for your application.



1 *You must seek prior permission from your local sewer provider before you decide which separator to install and before you make any discharge.*
2 *You must seek prior permission from the relevant environmental body before you decide which separator to install.*
3 *In this case, if it is considered that there is a low risk of pollution a source control SuDS scheme may be appropriate.*
4 *In certain circumstances, the sewer provider may require a Class 1 separator for discharges to sewer to prevent explosive atmospheres from being generated.*
5 *Drainage from higher risk areas such as vehicle maintenance yards and goods vehicle parking areas should be connected to foul sewer in preference to surface water.*
6 *In certain circumstances, a separator may be one of the devices used in the SuDS scheme. Ask us for advice.*

Bypass NSB 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 were one of the first UK manufacturers to have separators tested to EN 858-1. Klargester have now added the NSB bypass range to their portfolio of certified and tested models. The NSB 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 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.
- Silt storage capacity.
- Oil storage volume.
- 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(m2). 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.

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 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 AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	PEAK FLOW RATE (l/s)	DRAINAGE AREA (m^2)	STORAGE CAPACITY (litres) SILT	STORAGE CAPACITY (litres) OIL	UNIT LENGTH (mm)	UNIT DIA. (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT	STANDARD FALL ACROSS (mm)	MIN. INLET INVERT (mm)	STANDARD PIPEWORK DIA. (mm)
NSBP003	3	30	1670	300	45	1700	1350	600	1420	1320	100	500	160
NSBP004	4.5	45	2500	450	60	1700	1350	600	1420	1320	100	500	160
NSBP006	6	60	3335	600	90	1700	1350	600	1420	1320	100	500	160
NSBE010	10	100	5560	1000	150	2069	1220	750	1450	1350	100	700	315
NSBE015	15	150	8335	1500	225	2947	1220	750	1450	1350	100	700	315
NSBE020	20	200	11111	2000	300	3893	1220	750	1450	1350	100	700	375
NSBE025	25	250	13890	2500	375	3575	1420	750	1680	1580	100	700	375
NSBE030	30	300	16670	3000	450	4265	1420	750	1680	1580	100	700	450
NSBE040	40	400	22222	4000	600	3230	1920	600	2185	2035	150	1000	500
NSBE050	50	500	27778	5000	750	3960	1920	600	2185	2035	150	1000	600
NSBE075	75	750	41667	7500	1125	5841	1920	600	2235	2035	200	950	675
NSBE100	100	1000	55556	10000	1500	7661	1920	600	2235	2035	200	950	750
NSBE125	125	1250	69444	12500	1875	9548	1920	600	2235	2035	200	950	750

Rotomoulded chamber construction *GRP chamber construction* ** Some units have more than one access shaft – diameter of largest shown.*

Full Retention NSF RANGE

APPLICATION

Full retention separators are used in high risk spillage areas such as:

- Fuel distribution depots.
- Vehicle workshops.
- Scrap Yards

PERFORMANCE

Klargester were the first UK manufacturer to have the required range (3-30 l/sec) certified to EN 858-1 in the UK. The NSF number denotes the flow at which the separator operates.

The British Standards Institute (BSI) have witnessed the performance tests of the required range of separators and have certified their performance, in relation to their flow and process performance to ensure that they met the effluent quality requirements of EN 858-1. Larger separator designs have been determined using the formulas extrapolated from the test range.

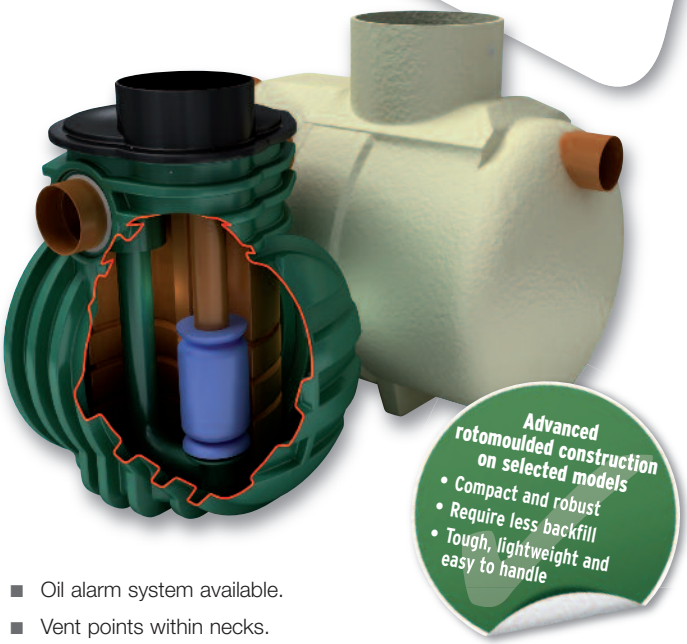
Each full retention separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Silt storage capacity.
- Automatic closure device.
- Oil storage volume.
- Coalescer (Class I units only).

Klargester full retention separators treat the whole of the specified flow.

FEATURES

- Light and easy to install.
- Class I and Class II designs.
- 3-30 l/sec range independently tested and performance sampled, certified by the BSI.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.



- Oil alarm system available.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size full retention 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 influent 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 AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	DRAINAGE AREA (m^2) PPG-3 (0.018)	STORAGE CAPACITY (litres) SILT	OIL	UNIT LENGTH (mm)	UNIT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT	MIN. INLET INLET (mm)	STANDARD PIPEWORK DIA. (mm)
NSFP003	3	170	300	30	1700	1350	1420	1345	500	160
NSFP006	6	335	600	60	1700	1350	1420	1345	500	160
NSFA010	10	555	1000	100	2610	1225	1050	1000	500	200
NSFA015	15	835	1500	150	3910	1225	1050	1000	500	200
NSFA020	20	1115	2000	200	3200	2010	1810	1760	1000	315
NSFA030	30	1670	3000	300	3915	2010	1810	1760	1000	315
NSFA040	40	2225	4000	400	4640	2010	1810	1760	1000	315
NSFA050	50	2780	5000	500	5425	2010	1810	1760	1000	315
NSFA065	65	3610	6500	650	6850	2010	1810	1760	1000	315
NSFA080	80	4445	8000	800	5744	2820	2500	2450	1000	300
NSFA100	100	5560	10000	1000	6200	2820	2500	2450	1000	400
NSFA125	125	6945	12500	1250	7365	2820	2500	2450	1000	450
NSFA150	150	8335	15000	1500	8675	2820	2550	2450	1000	525
NSFA175	175	9725	17500	1750	9975	2820	2550	2450	1000	525
NSFA200	200	11110	20000	2000	11280	2820	2550	2450	1000	600

Rotomoulded chamber construction *GRP chamber construction*

PROFESSIONAL INSTALLERS

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Experience shows that correct installation is a prerequisite for the long-lasting and successful operation of any wastewater treatment product. This is why using an installer with the experience and expertise to install your product is highly recommended.

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- Site survey to establish ground conditions and soil types
- Advice on system design and product selection
- Assistance on gaining environmental consents and building approvals
- Tank and drainage system installation
- Connection to discharge point and electrical networks
- Waste emptying and disposal

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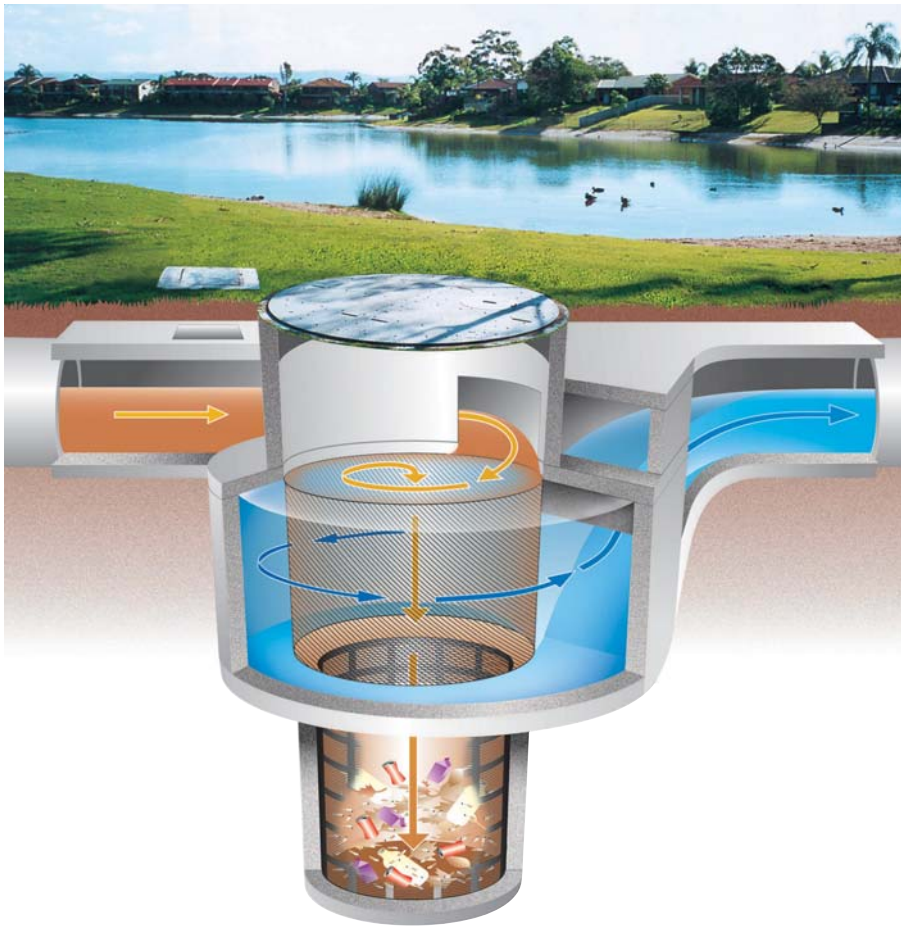
Issue No. 20: August 2014

Specialists in Wastewater Treatment & Stormwater Management

Surface Water Treatment SUDs Protector



The CDS Non Blocking screening technology is an innovative method of liquid / solid separation for Surface Water, Combined Sewer Overflows (CSO) and Foul Sewage Systems.

- ***SurfSep*** for Surface Water applications
- ***OverSep*** for Combined Sewer Overflow applications.

The technology accomplishes high efficiency separation of settleable particulate matter and capture of floatable material.

A unique feature of the CDS Technology is it's compact design. Both the *SurfSep* and *OverSep* are available as packaged systems, which can either be installed inside pre-cast concrete chamber rings, or complete BBA Approved Polyethylene Chambers unit.

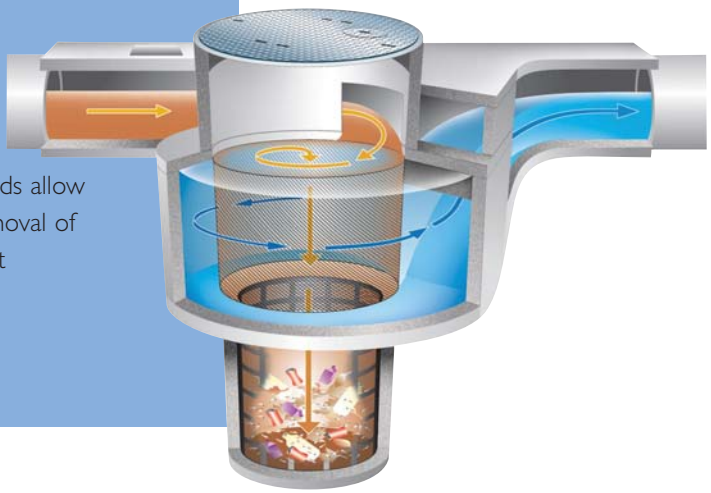
Applications

- Storm-water Treatment
- Combined Sewer Overflow Treatment
- Parking Area Run-Off Treatment
- Vehicle Service Yard Areas
- Pre-treatment for Wetlands, Ponds and Swales
- Rainwater Harvesting
- Pre-treatment for Oil Separators
- Pre-treatment for media and Ground In-filtration Systems

Rapid installation

Primary features

- **Effective**: Capturing more than 95% of solid pollutants.
- **Non-Blocking**: Unique design takes advantage of indirect filtration and properly proportioned hydraulic forces that virtually makes the unit unblockable.
- **Non-Mechanical**: The unit has no moving parts and requires no mechanical devices to support the solid separation function.
- **Low Maintenance Costs**: The system has no moving parts and is fabricated of durable materials.
- **Compact & Flexible**: Design and size flexibility enables the use of various configurations.
- **High Flow Effectiveness**: The technology remains highly effective across a broad spectrum of flow ranges.
- **Assured Pollutant Capture**: All materials captured are retained during high flow conditions.
- **Safe & Easy Pollutant Removal**: Extraction methods allow safe and easy removal of pollutants without manual handling.



Surface Water System

Hydraulic Analysis

In storm water applications, an analysis of the catchment in terms of its size, topography and land use will provide information for determining flow to be expected for various return periods.

The *SurfSep* is designed for the flow that mobilizes the gross pollutants within the catchment. Since there are variations in catchment response due to region, land use and topography, it is recommended that the selection of flow to be treated will be for return periods of between 3 months and 1 year.

Balancing the cost to the operator against the benefits to the environment

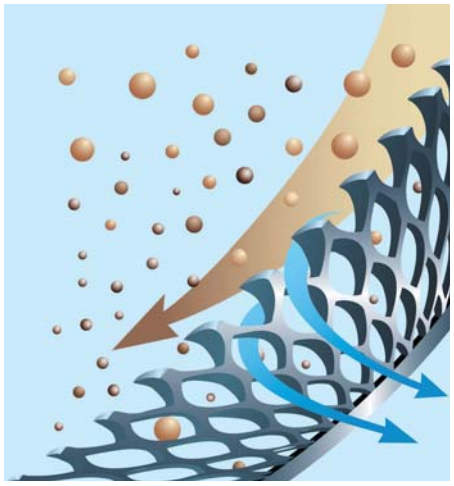
Field evaluations to determine pollutant mobilization have found that the vast majority of pollutants are mobilized in flows that are well below the design capacity' for the conveyance facility - typically known as the 'first flush'.

Therefore it is typical not to design the *SurfSep* models to process the conveyance system's maximum flow in order to achieve a very high level of pollutant removal.

The added value benefit to the operator is reduced civil costs without compromising the benefits to the environment.

How it works

Water and pollutants enter the system and are introduced tangentially inside the separation chamber forming a circular flow motion. Floatables and suspended solids are diverted to the slow moving centre of the flow. Negatively buoyant solids settle out to an undisturbed sump chamber below, while the water passes countercurrently through the separation screen. Floatables remain at the water surface and retained within the screen.



Surface Water Treatment Systems

Hydraulic Design

Every application requires a detailed hydraulic analysis to ensure the final installation will perform to effect optimum solids separation without blocking the screen.

After the design flow has been determined, the appropriate standard model can be selected. A selection table is provided on page 7.

The Ultimate SUDs Protector

There a four principal areas of proprietary SUDs technology;

• Infiltration • Flow Control • Storage/attenuation • Treatment

SurfSeps, although a common form of treatment are unique. When installed upstream of any proprietary SUDs technology, the *SurfSep* protects the receiving SUDs from fine solids and debris that would otherwise accumulate over time rendering the SUDs non-operational, as the worst case.

SurfSeps have been successfully installed in front of;

- Soakaways
- Infiltration Trenches
- Filters
- Wetlands
- Ponds and Water Features
- Detention and Retention Systems
- Oil Separators
- Create storage storage systems

to remove fine solids and debris that would otherwise accumulate over time reducing the down stream effectiveness of downstream SUDs assets.

Various independent field trials have shown that the *SurfSep* can remove high levels of Phosphates, Heavy Metals and PolyAramatic Hydrocarbons (PAH's) from the flow.

Infiltration

SurfSeps have been successfully installed in front of ground Infiltration systems to remove grit, fine solids and debris which accumulates in and around the SUDs causing visual degradation in the short term and accumulation of silt and grits leading to reduced volume in the long term.

Studies have also shown that Heavy metals & PAH's accumulate within the SUDs over time before being released back to the environment resulting in elevated concentrations.

Detention & Retention Systems

SurfSeps have been successfully installed in front of collection and attenuation SUDs to remove grit, fine solids and debris which accumulates in the SUDs leading to potential blockage of flow regulators resulting in increased Occupational Health & Safety risk during the treatment of blockages and during the periodic cleaning operations.

Applications

- Rainwater Harvesting
- Road run off
- New Developments
- Motorways
- A / B Roads
- Local Roads
- Residential
- Industrial
- Commercial

Purpose

Removal of plastics, oil, grit, fine solids, organic and inorganic debris, from point source pollution.

Flow Control Systems

Flow Control

Flow control is often required to reduce flooding of downstream sewer networks or receiving water courses. There are a number of ways to achieve this. The Hydroslide - Float controlled, constant flow regulator, as detailed below is ideally suited to the providing an efficient and reliable means of flow control.

There are four types of standard Hydroslide flow regulators as pictured.

1) Mini
2) HydroLimiter
3) VS - Vertical Standard
4) Combi - self flushing, can be mounted on the dry or wet side of the flow chamber.

Most applications can be dealt with using any of the four models to suit the flow. An accuracy of +/-5% is achievable.

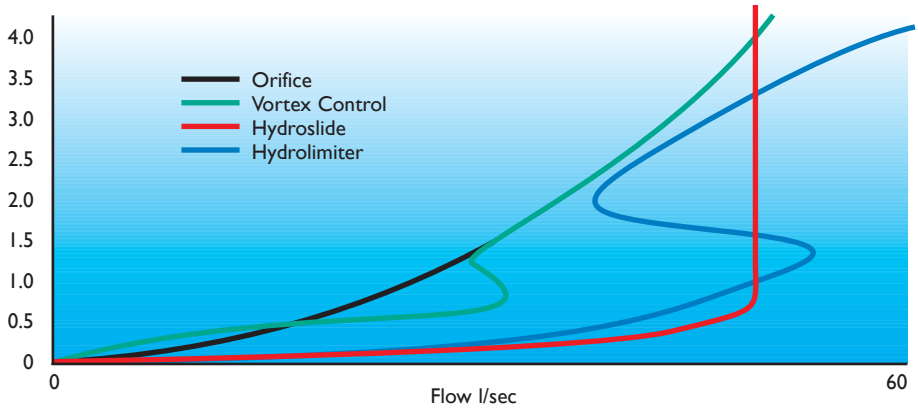
Typical SurfSep installation

Flow Control Technical Design

The Hydroslide regulator does not affect the flow until the flow is approaching the set discharge limit, this allows all flow (the first flush) to be discharged to the sewer. Because the flow to the sewer can be optimised at it's maximum permitted capacity the attentuation/storage capacity can be reduced over other methods of flow control, thus giving cost savings in storage provision. This is best explained by looking at a single storm event and comparing the 3 flow regulation processes as was done independantly by WRc in the report titled 'REDUCING THE COST OF STORMWATER STORAGE', Report No. PT1052, March 1995. The chart below represents 50 l/s control and up to 4m of head. The area difference between the curves being the detention volume saving.

Typically the volume saving when using a Hydroslide regulator is between 7% to 40%

Representation of flow through an orifice



Operation & Performance

Performance Criteria

Note: Screen apertures of 4.8 mm , 2.4 mm and 1.2 mm are available.

The 4.8 and 2.4 mm screens are generally used for Surface Water applications, with foul applications using either 2.4 or 1.2 mm aperture units.

Typical 1.2 mm aperture Performance

- shall remove all solids with a single dimension greater than 1.2 mm and positively contain those solids until the unit is cleaned.
- shall remove and positively contain 100 percent of all neutrally buoyant particles with a single dimension greater than 1.2 mm for all flow conditions to design capacity.
- shall remove and positively contain 100 percent of all floating trash and debris with a single dimension greater than 1.2 mm for all flow conditions to the design capacity.
- shall remove a minimum of 50 percent of oil and grease (as defined as the floating portion of total hexane extractable materials) for all flow conditions to the design capacity, without the addition of absorbents.
- shall provide the following minimum particle removal efficiencies (based on a specific gravity of 2.65):

a) 100 percent of all particles greater than 1100 microns.

b) 95 percent of all particles greater than 550 microns.

c) 90 percent of all particles greater than 367 microns.

d) 20 percent of all particles greater than 200 microns.

Maintenance

SurfSep maintenance can be site and drainage area specific. The installation should be inspected periodically to assure its condition to handle anticipated runoff. If pollutant loadings are known, then a preventive maintenance schedule can be developed based on runoff volumes processed.

Since this is seldom the case we recommend;

New Installations

Check the condition of the installation after the first few events. This includes a visual inspection to ascertain that the unit is operating correctly and measuring the amount of deposition that has occurred in the unit. This may be achieved using a 'Dip Stick'.

Ongoing Operation

For the first 12 months the installations sump full volume should be inspected monthly and recorded. When the inspection indicates that the sump full volume is approaching the top of the sump (base of screen) a cleanout should be undertaken.

Cleaning Methods

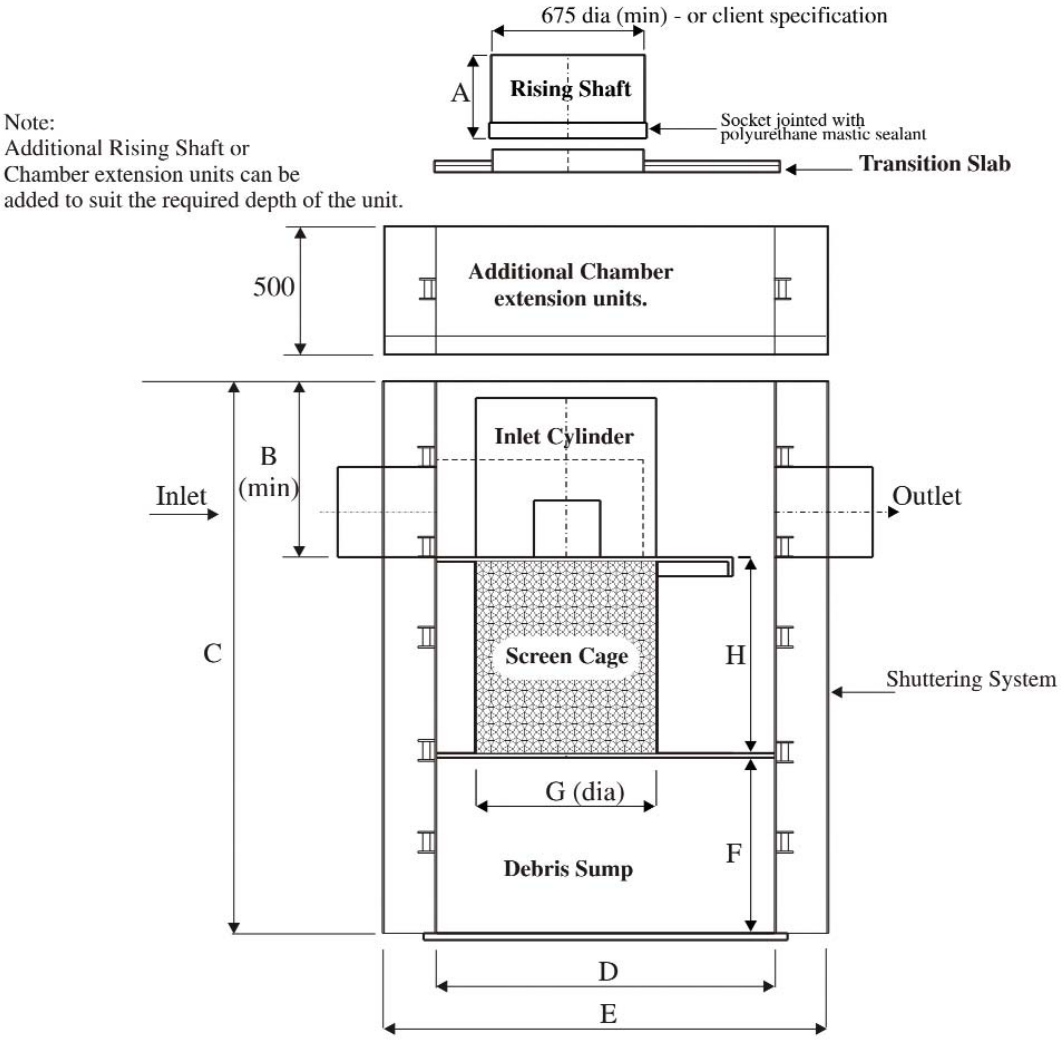
- Eduction (Suction)
- Basket Removal
- Mechanical Grab

Maintenance Cycle

Minimum once per year. Depending on the pollutant load it may be necessary to maintain the installation more frequently.

The operator shall be able to devise the most efficient maintenance schedule for any particular installation over a 12 month operating cycle.

SurfSep Dimensions



***SurfSep* Dimensions (mm)**

	SWI0404	SW0604	SW0606	SW0804	SW0806	SW0808	SWI010	SWI012	SWI015
A	370	370	370	370	370	370	500	500	500
B	444	815	615	810	830	810	800	800	830
C	1250	1985	1985	2080	2300	2480	2800	3000	3330
D	800	1200	1200	1500	1500	1500	2000	2000	2000
E	1112	1665	1665	1966	1966	1966	2475	2475	2475
F	400	700	700	700	700	800	1000	1000	1000
G (dia)	400	600	600	800	800	800	1000	1000	1000
H	400	400	600	400	600	800	1000	1200	1500

Selection Table - *SurfSep*

Model Reference	Hydraulic Peak Flow Rate l/s	Drainage Area - Impermeable m^2	Chamber Diameter (mm)	Internal Pipe Diameter (mm)
SWI 0404	30	2,000	900	150 / 225
SWI 0604	70	5,000	1200	225
SWI 0606 / 01	140	10,000	1200	225 - 375
SWI 0606 / 02	200	15,000	1200	225 - 375
SWI 0804	275	20,000	1500	300
SWI 0806	350	25,000	1500	450
SWI 0808	400	30,000	1500	450
SWI 1010	480	35,000	2000	450
SWI 1012	550	40,000	2000	450 / 750
SWI 1015	700	50,000	2000	450 / 750

* Proposed Peak Flow Rate for each model calculated using Rational Lloyd Davies with a rainfall intensity of 50mm/hr. For greater flows - special design / construction required.

In-Line *SurfSep* Units (SWI)

These units are used with in the drainage system in-line and are supplied as BBA Approved complete Polyethylene Chamber units from the selection table above.

Off-Line *SurfSep* Units (SWO)

These can be designed either using pre-cast concrete or specially designed Polyethylene chambers.

Model Designation

SurfSep models are firstly identified by the letters SW for Surface Water followed by a letter (**I** or **O**) representing the configuration (**I**nline or **O**ffline).

A four digit number representing the screen diameter and screen height then follows to give the standard model designation for a *SurfSep* screen for installation into standard commercially available pre-fabricated manhole chambers i.e SWI 0806. Example: SWI 0806 designates Surface Water Inline with a separation screen dia 0.8 m and screen height of 0.6m.

Surface Water Treatment

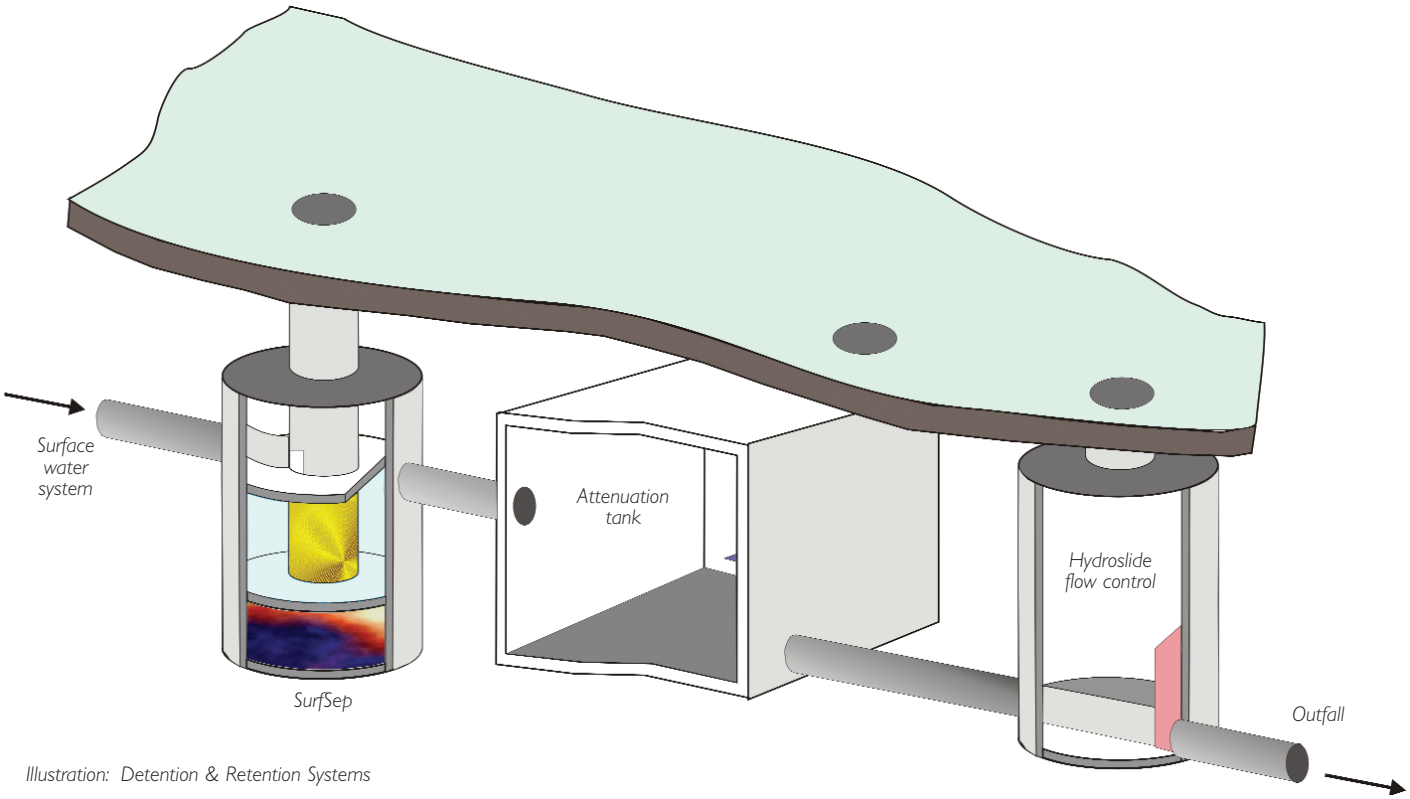


Illustration: Detention & Retention Systems

SurfSeps unit installed in front of attenuation tank / cellular storage system, to remove grit, fine sediments and floating debris which can accumulate within surface water systems. Hydroslide flow control regulating the discharge to the outfall. The Hydroslide can be supplied for installation in an insitu constructed chamber, or as a complete unit housed within a pre-fabricated polyethylene manhole chamber.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

* BBA - THIS CERTIFICATE RELATES TO PIPEX UNIVERSAL MANHOLES AND ACCESS CHAMBERS, WHICH ARE MANUFACTURED FROM WELDED POLYPROPYLENE. This Certificate covers the use of the manholes and chambers for drain and sewer applications where they are used for maintenance to depths of 6 mtrs.

Approved Suppliers

If you would like more information please contact:

CDS Technologies is a multi disciplined, international, company offering a comprehensive product range of; wastewater treatment technologies and processes, and stormwater management solutions for attenuation, infiltration, flow control and overflow treatment. CDS have an established network of Distributors and Representatives. Further information can be found on our website www.cdstech.com.au

Alternatively please contact our approved supplier detailed left.

 Issue 1001/100206

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

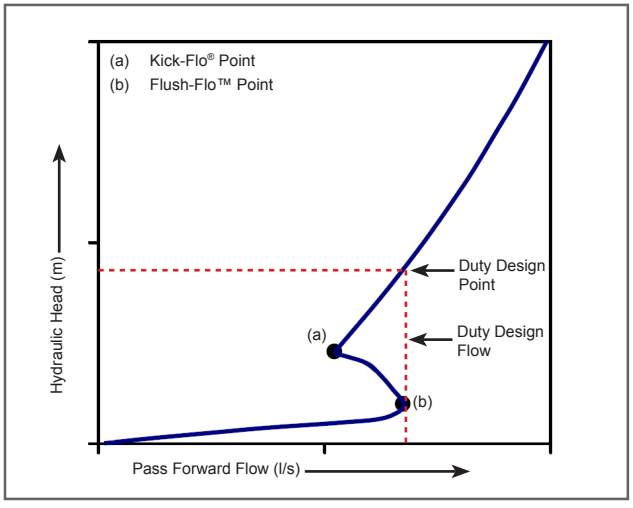
BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4599

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:

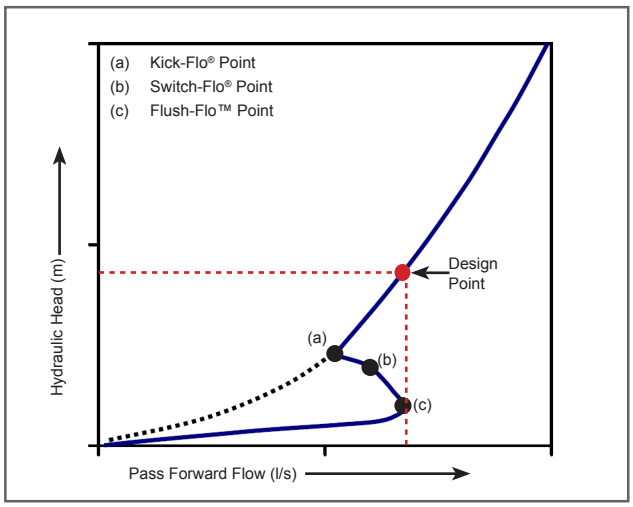
- outlet size and model of Hydro-Brake® Flow Control
- definition of the duty/design point (head and flow)
- definition of the Flush-Flo™ point (head and flow)
- definition of the Kick-Flo® point (head and flow)

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

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 ...®

HRD Technologies Ltd

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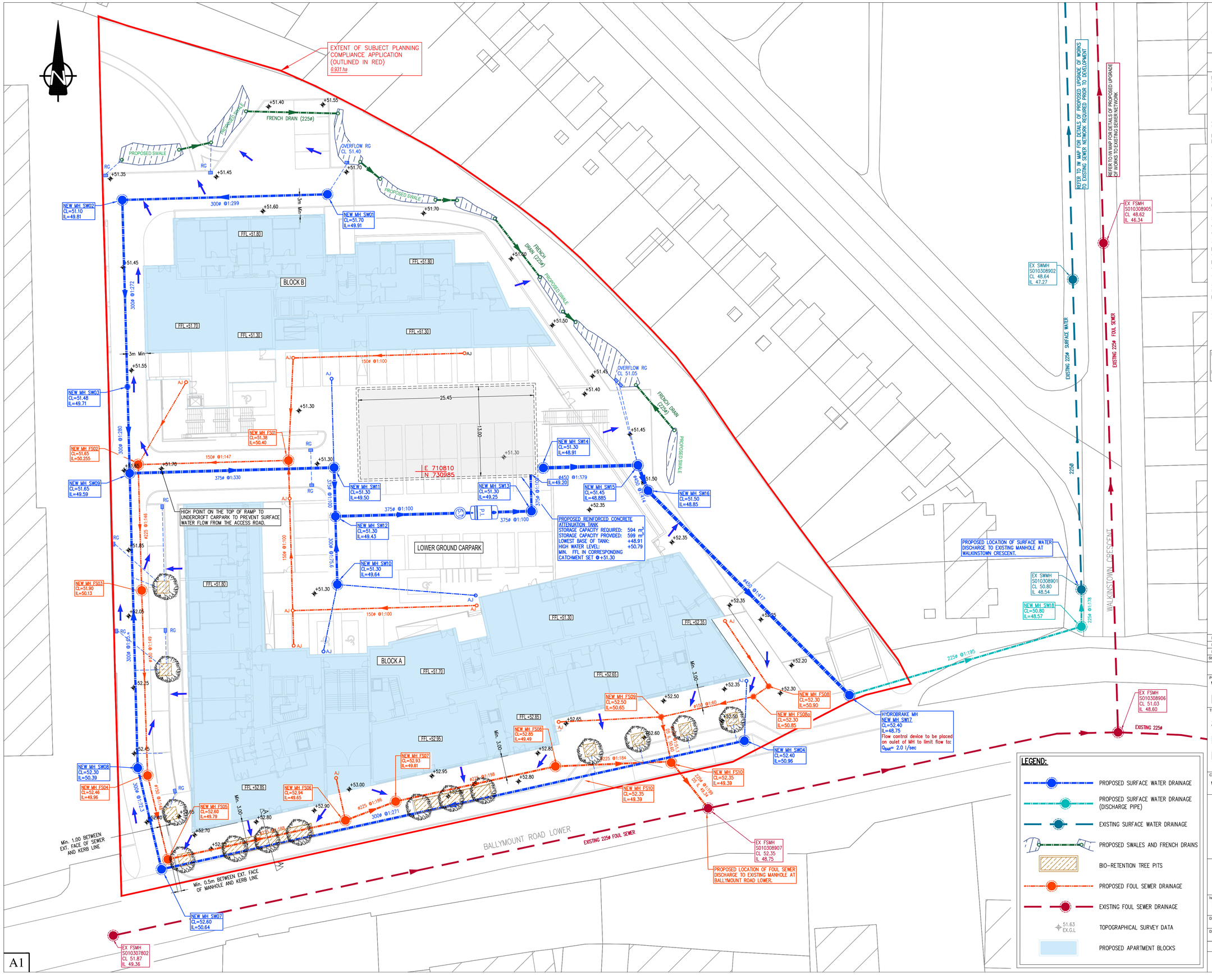
Tel: +353 (0) 1 4013964 • Fax: +353 (0) 1 4013978 • www.hrdtec.com
HRD Technologies Ltd is a subsidiary of Hydro International plc



A1

This drawing should not be scaled. Dimensions to be verified on site.
Any discrepancies should be referred to the Engineer prior to work being put in hand.

GENERAL NOTES

FOR WATERMAIN DETAILS, FOUL SEWER DETAILS, AND ALL ASSOCIATED WORKS DETAILS REFER TO IRISH WATER DETAILS AND IRISH WATER CODE OF PRACTICE FOR WATER AND WASTEWATER INFRASTRUCTURE:

- IW-CDS-5020-1
- IW-CDS-5020-3
- IW-CDS-5030-1
- IW-CDS-5030-3

WASTEWATER PIPE MATERIALS:

Extracted from Irish Water "Code of Practice for Wastewater Infrastructure" Ref. IW-CDS-5030-03

3.13 Gravity Sewer Pipe Material Types

The types and fittings outlined herein shall be used in the construction of the Gravity Sewers. Pipe material should not change between manholes. The list below does not apply to pipes installed by pipe jacking or micro tunnelling.

3.13.1 Concrete; Concrete Sewer pipes with spigot and socket joints and rubber ring fittings shall comply with IS EN 1916 (2002), BS 5911, Part 1 (2002 + 2010) and IS 6 (2004) or equivalent standard, strength Class 120 with minimum crushing loads in accordance with Table 8 of BS 5911-1 (2002+2010). All pipes and fittings shall have gasket type joints of spigot and socket or rebated form. (Pipe diameters 225mm and above)

3.13.2 Thermoplastic Structured Wall Pipes; Thermoplastic structured wall pipes shall comply with the provisions of IS EN 13476 (2007/2009) and with WIS 4-35-01 (2000). Pipes to be of Stiffness Class 8kN/m2 and to be capable of demonstrating a jetting resistance of 4,000 psi (280 Bar) without damage when tested in accordance with Section 6.10 of WIS 4-35-01. (Pipe diameters 150mm up to 450mm);

3.13.3 Unplasticised PVC; Unplasticised PVC pipes, joints and fittings for service connections shall comply with the provisions of BS 4660 and BS EN 1401 – Part 1. Push fit joints shall be spigot and socket. (Pipe diameter 100mm);

3.13.4 Other; The use of alternative pipe types and materials will require the prior written agreement of Irish Water.

NOTE:

TYPICAL SERVICE LAYOUT DISTANCES (HORIZONTALLY AND VERTICALLY) TO BE AS PER IRISH WATER DETAIL STD-WW-05.

Status	Date	Description	By	Chk
P3	13.12.2022	Attenuation tank details updated	PB	DOS
P2	15.11.22	PRELIMINARY. Revised to comply with SW Audit.	PB	DOS
P1	30.09.22	PRELIMINARY	PB	DOS

Amendments

Project
WALKINSTOWN APARTMENT DEVELOPMENT

Title
STORM WATER & FOUL SEWER DRAINAGE LAYOUT

Client
WALKINSTOWN MONTANE PROPERTIES LTD

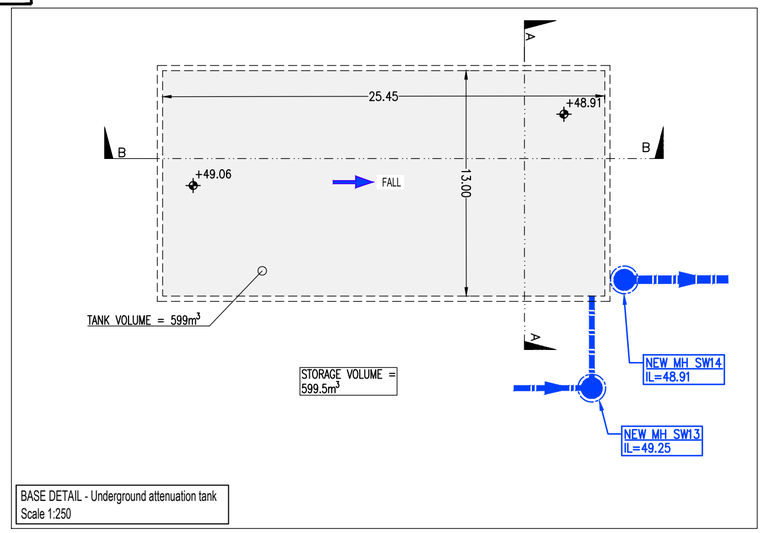
KAVANAGH BURKE CONSULTING ENGINEERS
Unit F3, Block F, Calmount Park
Calmount Avenue, Dublin 12. D12 PX28
E-mail: reception@kavanaghburke.ie
Tel: 01 450 0694

Issue
PRELIMINARY

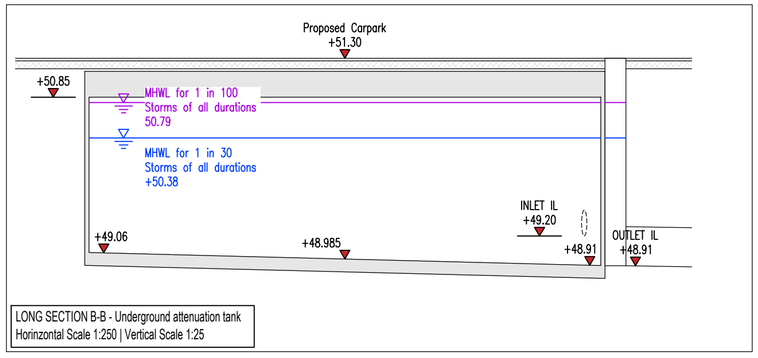
Designed By	Checked By	KB Ref.
PB	DOS	D1752
Drawn By	Date	Scales @ A1
PB	01.11.22	1:250

Project - Originator - Volume - Level - Type - Role - Number: D1752-KB-XX-XX-DR-C-0001
Revision: P3

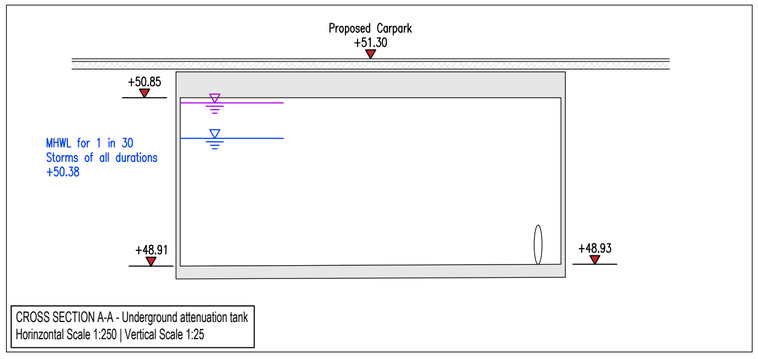
A2



BASE DETAIL - Underground attenuation tank
Scale 1:250



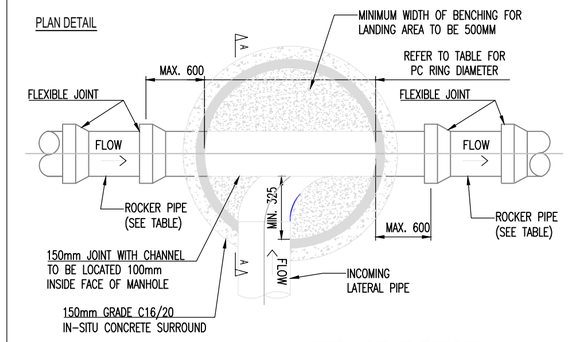
LONG SECTION B-B - Underground attenuation tank
Horinzontal Scale 1:250 | Vertical Scale 1:25

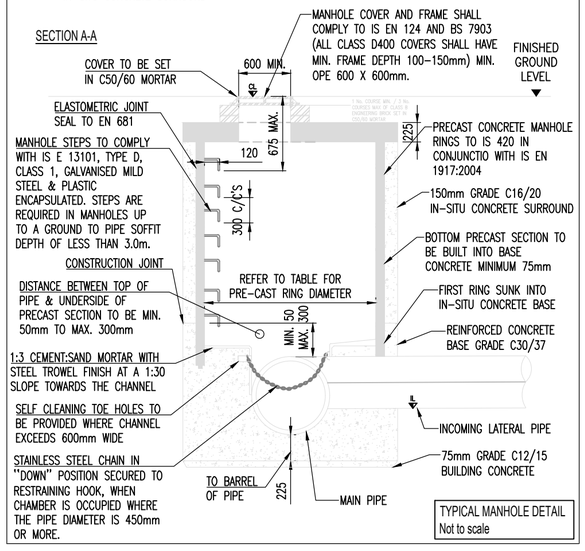


CROSS SECTION A-A - Underground attenuation tank
Horinzontal Scale 1:250 | Vertical Scale 1:25

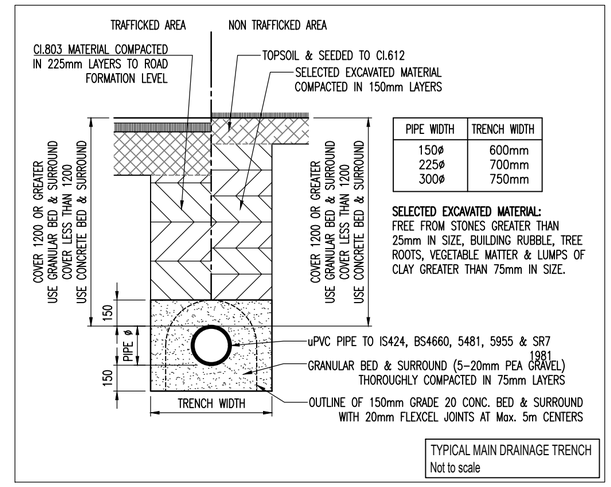
ROCKER PIPE LENGTH	
PIPE DIAMETER (mm)	ROCKER PIPE LENGTH (mm)
150 – 600	600
> 600 – 750	1000
> 750	1250

MINIMUM MANHOLE DIAMETERS	
DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
< 375	1200
375 TO 450	1350
500 TO 750	1500





TYPICAL MANHOLE DETAIL
Not to scale



PIPE WIDTH	TRENCH WIDTH
150ø	600mm
225ø	700mm
300ø	750mm

SELECTED EXCAVATED MATERIAL:
FREE FROM STONES GREATER THAN 25mm IN SIZE, BUILDING RUBBLE, TREE ROOTS, VEGETABLE MATTER & LUMPS OF CLAY GREATER THAN 75mm IN SIZE.

TYPICAL MAIN DRAINAGE TRENCH
Not to scale

Status	Date	Description	By	Chk
P3	13.12.2022	Attenuation tank details updated	PB	DOS
P2	01.11.2022	PRELIMINARY. Revised to comply with SW Audit.	PB	DOS
P1	30.09.2022	PRELIMINARY	PB	DOS

Amendments

Project
WALKINSTOWN APARTMENT DEVELOPMENT

Client
WALKINSTOWN MONTANE PROP. LTD

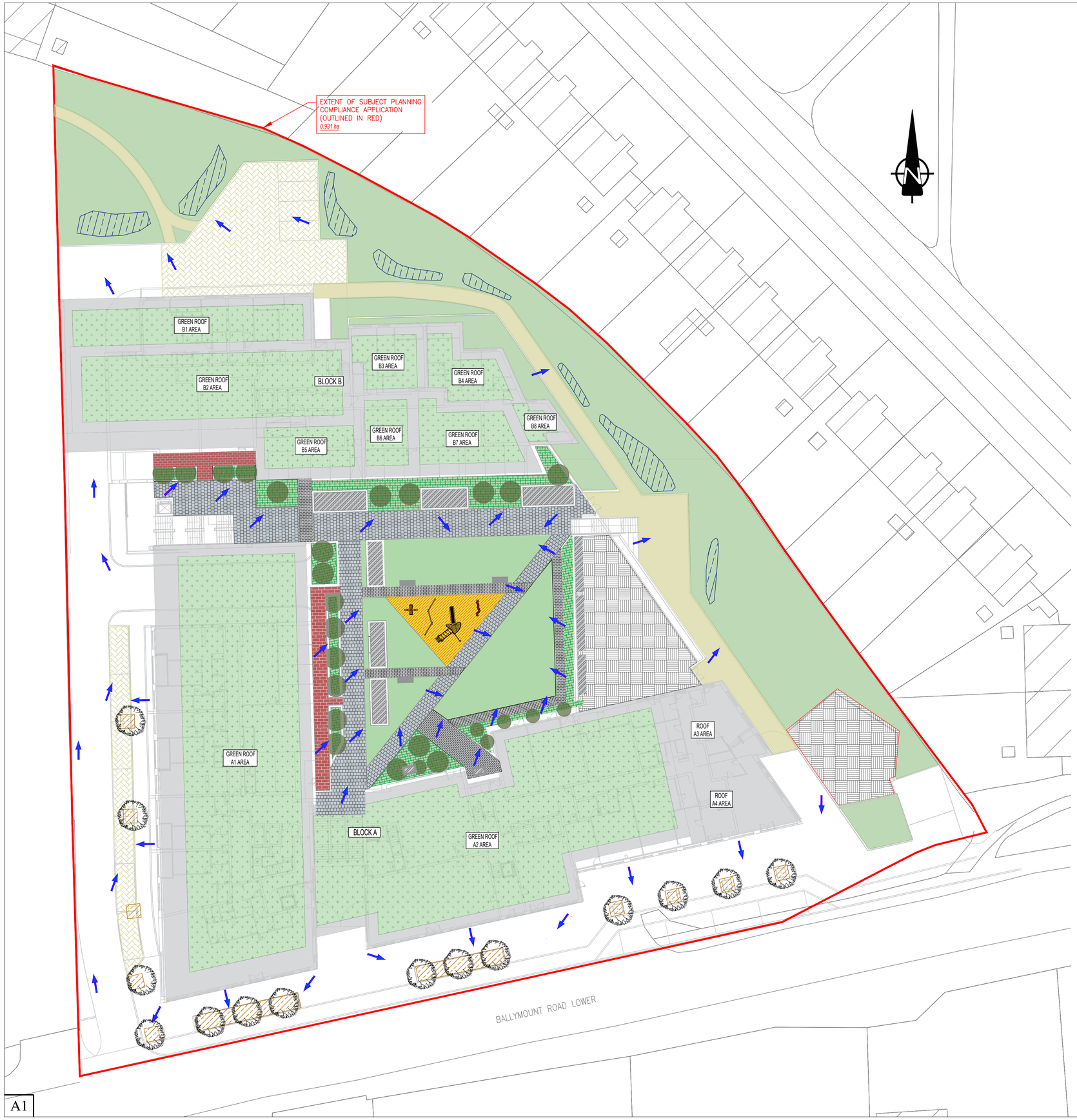
Title
RC TANK, TRENCH & MANHOLE DETAILS

Issue
PRELIMINARY

Drawn By: PB
Designed By: PB
Checked By: DOS
Scales @ A1: As indicated
Date: 01.11.22

KAVANAGH BURKE CONSULTING ENGINEERS
Unit F3, Block F, Calmount Park
Calmount Avenue, Dublin 12. D12 PX28
E-mail: reception@kavanaghburke.ie
Tel: 01 450 0694

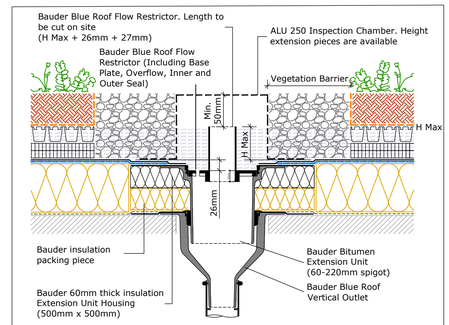
Project - Originator - Volume - Level - Type - Role - Number	Revision
D1752-KB-XX-XX-DR-C-0002	P3



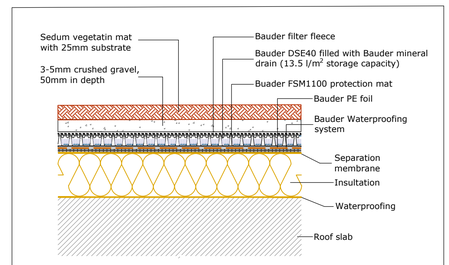
LEGEND:

- PROPOSED APARTMENT BLOCKS (ROOF PLANS)
- PROPOSED GREEN ROOF (ROOF PLANS)
- PROPOSED PODIUM LANDSCAPING (INTENSIVE SOFT LANDSCAPING)
- PERMEABLE PAVING
- PERMEABLE FOOTPATH
- BIO-RETENTION TREE PITS
- PERMEABLE WOOD FIBRE (TO PLAY AREA & CRECHE OUTDOOR SPACE)
- PROPOSED SWALES (TO PUBLIC AREAS)
- PUBLIC LANDSCAPED AREAS

ROOF REF.	ROOF AREA (m^2)	GREEN ROOF AREA (m^2)	GREEN ROOF %
A1	1,079	758	70%
A2	908	731	81%
A3	99	–	0%
A4	119	–	0%
BLOCK A SUBTOTAL	2,205	1,489	68%
B1	202	133	66%
B2	391	272	70%
B3	75	51	68%
B4	78	57	73%
B5	161	59	37%
B6	76	45	59%
B7	132	82	62%
B8	30	15	50%
BLOCK B SUBTOTAL	1,145	714	62%
PODIUM	1,465	505	34%



BAUDER BLUE / GREEN ROOF VERTICAL OUTLET



BAUDER BLUE / PODIUM LANDSCAPING

NOTE: BAUDER DETAILS SHOWN BUT APPROVED EQUAL SYSTEM WILL BE ACCEPTABLE

This drawing should not be scaled. Dimensions to be verified on site.
Any discrepancies should be referred to the Engineer prior to work being put in hand.

GENERAL NOTES

Status	Date	Description	By	Chk
P3	01.12.22	Update preliminary issue	P.B	DOS
P2	15.11.22	PRELIMINARY. Revised to comply with SW Audit.	PB	DOS
P1	30.09.22	PRELIMINARY	PB	DOS

Amendments

Project
WALKINSTOWN APARTMENT DEVELOPMENT.

Title
PROPOSED SUDS LAYOUT & GREEN ROOF DETAILS & CALCULATIONS

Client
WALKINSTOWN MONTANE PROPERTIES LTD

KAVANAGH BURKE CONSULTING ENGINEERS
Unit F3, Block F, Calmount Park
Calmount Avenue, Dublin 12. D12 PX28
E-mail: reception@kavanaghburke.ie
Tel: 01 450 0694

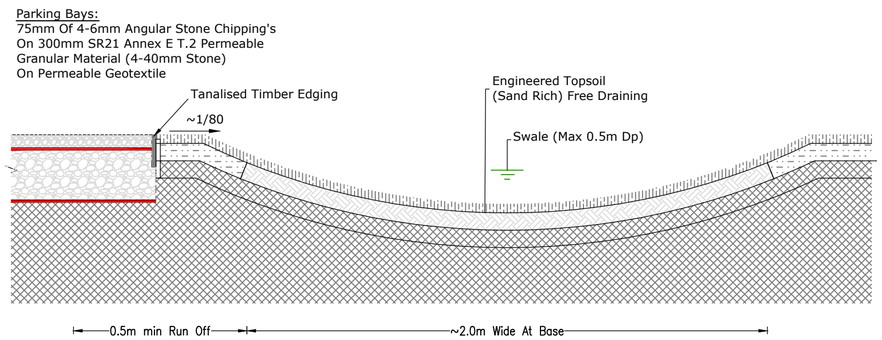
Issue
PRELIMINARY

Designed By	Checked By	KB Ref.
PB	DOS	D1752
Drawn By	**Date**	**Scales @ A1**
PB	01.11.22	1:250

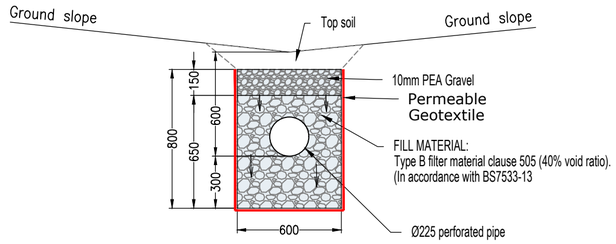
Project - Originator - Volume - Level - Type - Role - Number	Revision
D1752-KB-XX-XX-DR-C-0003	P3

A1

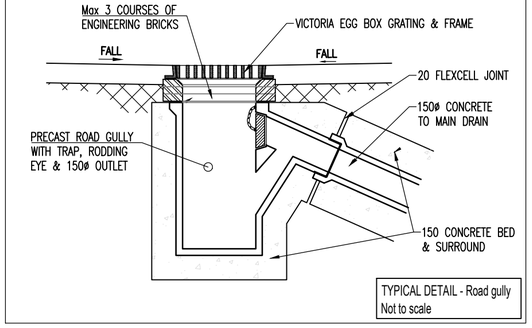
A2



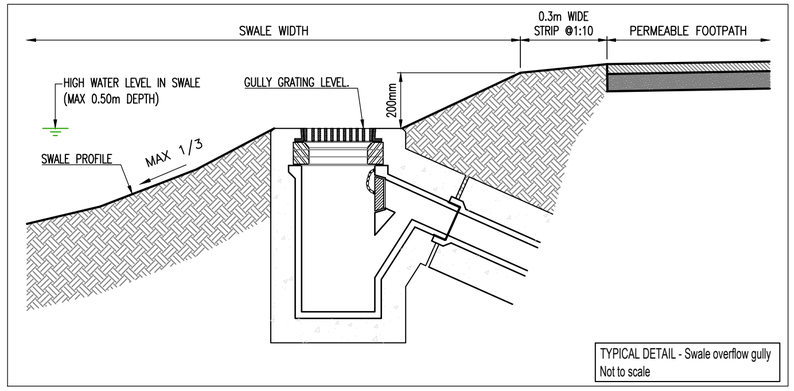
TYPICAL SECTION - Through Swale
Scale 1:10



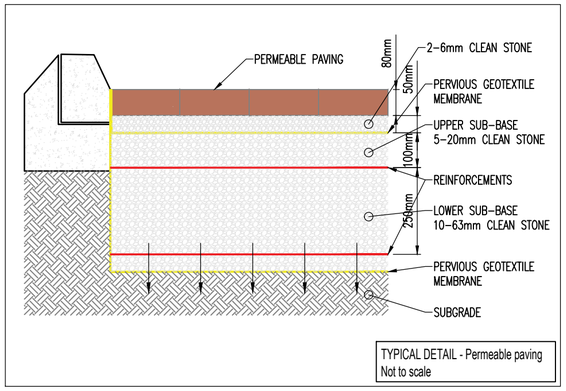
TYPICAL DETAIL - French drain or filter drains
Not to scale



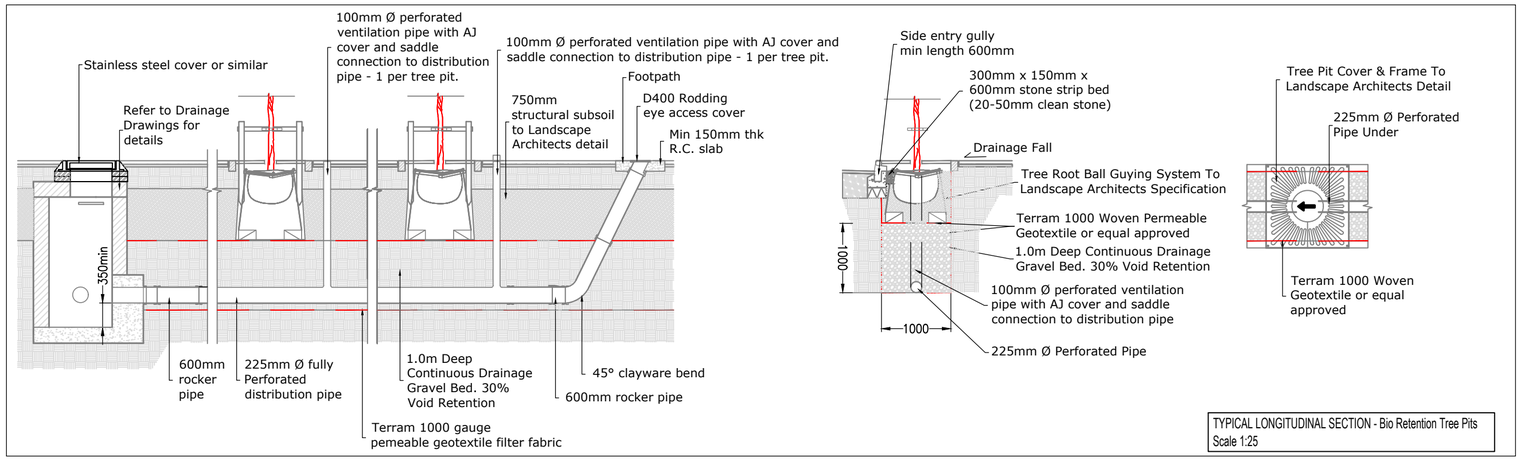
TYPICAL DETAIL - Road gully
Not to scale



TYPICAL DETAIL - Swale overflow gully
Not to scale



TYPICAL DETAIL - Permeable paving
Not to scale



TYPICAL LONGITUDINAL SECTION - Bio Retention Tree Pits
Scale 1:25

Status	Date	Description	By	Chk
P2	15.11.2022	PRELIMINARY. Revised to comply with SW Audit.	PB	DOS
P1	30.09.2022	PRELIMINARY	PB	DOS

Amendments

Project
WALKINSTOWN
APARTMENT
DEVELOPMENT

Client
WALKINSTOWN MONTANE PROP. LTD

Title
SUDS DETAILS
& SECTIONS

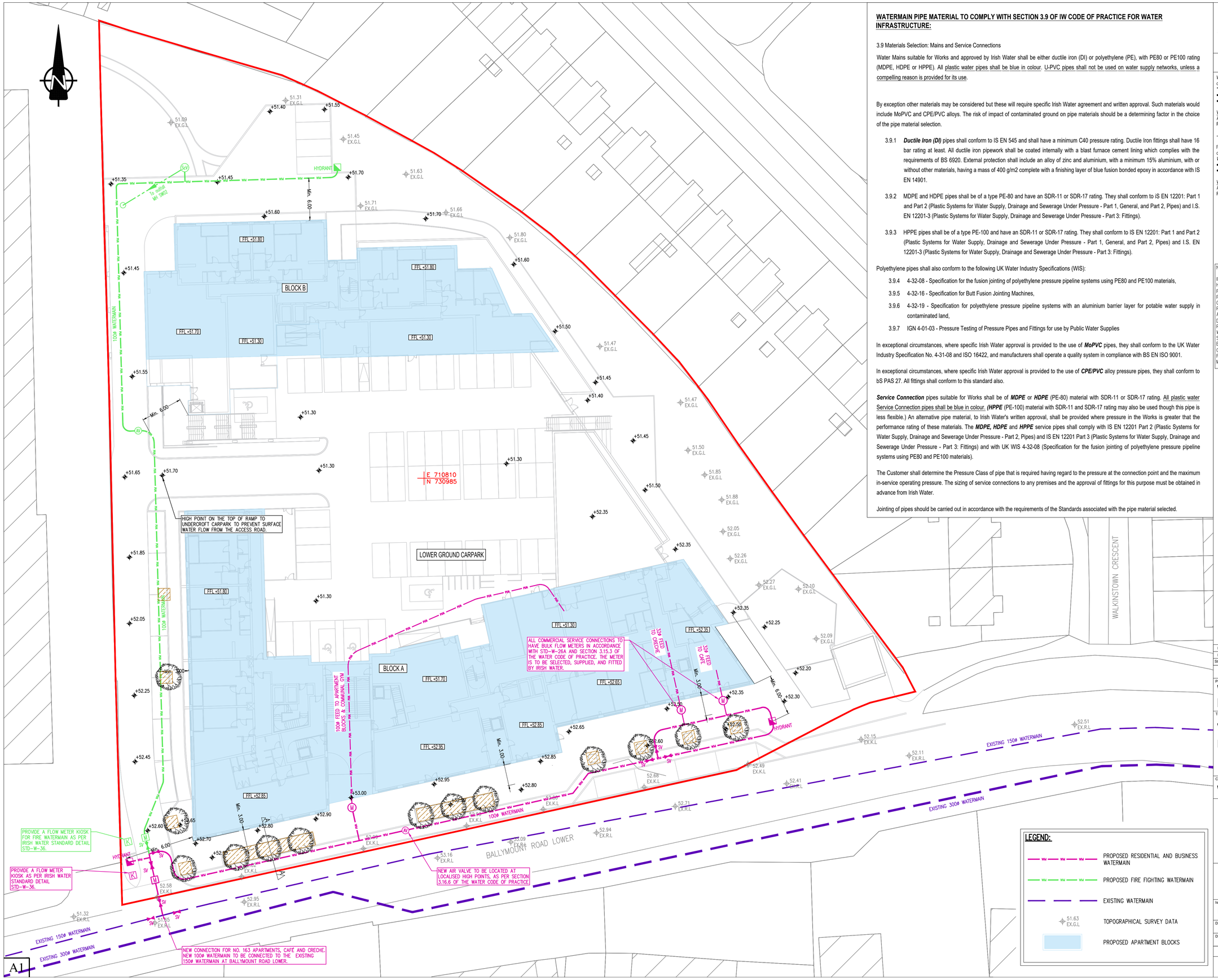
Issue
PRELIMINARY

Drawn By: PB
Designed By: PB
Checked By: DOS
Scales @ A1: As indicated
Date: 01.11.22

KAVANAGH BURKE
CONSULTING ENGINEERS
Unit F3, Block F, Calmount Park
Calmount Avenue, Dublin 12. D12 PX28
E-mail: reception@kavanaghburke.ie
Tel: 01 450 0694

Project - Originator - Volume - Level - Type - Role - Number: D1752-KB-XX-XX-DR-C-0004

Revision: P2



WATERMAIN PIPE MATERIAL TO COMPLY WITH SECTION 3.9 OF IW CODE OF PRACTICE FOR WATER INFRASTRUCTURE:

3.9 Materials Selection: Mains and Service Connections

Water Mains suitable for Works and approved by Irish Water shall be either ductile iron (DI) or polyethylene (PE), with PE80 or PE100 rating (MDPE, HDPE or HPPE). All plastic water pipes shall be blue in colour. U-PVC pipes shall not be used on water supply networks, unless a compelling reason is provided for its use.

By exception other materials may be considered but these will require specific Irish Water agreement and written approval. Such materials would include MoPVC and CPE/PVC alloys. The risk of impact of contaminated ground on pipe materials should be a determining factor in the choice of the pipe material selection.

3.9.1 ***Ductile Iron (DI)*** pipes shall conform to IS EN 545 and shall have a minimum C40 pressure rating. Ductile Iron fittings shall have 16 bar rating at least. All ductile iron pipework shall be coated internally with a blast furnace cement lining which complies with the requirements of BS 6920. External protection shall include an alloy of zinc and aluminium, with a minimum 15% aluminium, with or without other materials, having a mass of 400 g/m2 complete with a finishing layer of blue fusion bonded epoxy in accordance with IS EN 14901.

3.9.2 MDPE and HDPE pipes shall be of a type PE-80 and have an SDR-11 or SDR-17 rating. They shall conform to iS EN 12201: Part 1 and Part 2 (Plastic Systems for Water Supply, Drainage and Sewerage Under Pressure - Part 1, General, and Part 2, Pipes) and I.S. EN 12201-3 (Plastic Systems for Water Supply, Drainage and Sewerage Under Pressure - Part 3: Fittings).

3.9.3 HPPE pipes shall be of a type PE-100 and have an SDR-11 or SDR-17 rating. They shall conform to IS EN 12201: Part 1 and Part 2 (Plastic Systems for Water Supply, Drainage and Sewerage Under Pressure - Part 1, General, and Part 2, Pipes) and I.S. EN 12201-3 (Plastic Systems for Water Supply, Drainage and Sewerage Under Pressure - Part 3: Fittings).

Polyethylene pipes shall also conform to the following UK Water Industry Specifications (WIS):

3.9.4 4-32-08 - Specification for the fusion jointing of polyethylene pressure pipeline systems using PE80 and PE100 materials,

3.9.5 4-32-16 - Specification for Butt Fusion Jointing Machines,

3.9.6 4-32-19 - Specification for polyethylene pressure pipeline systems with an aluminium barrier layer for potable water supply in contaminated land,

3.9.7 IGN 4-01-03 - Pressure Testing of Pressure Pipes and Fittings for use by Public Water Supplies

In exceptional circumstances, where specific Irish Water approval is provided to the use of ***MoPVC*** pipes, they shall conform to the UK Water Industry Specification No. 4-31-08 and ISO 16422, and manufacturers shall operate a quality system in compliance with BS EN ISO 9001.

In exceptional circumstances, where specific Irish Water approval is provided to the use of ***CPE/PVC*** alloy pressure pipes, they shall conform to bS PAS 27. All fittings shall conform to this standard also.

Service Connection pipes suitable for Works shall be of ***MDPE*** or ***HDPE*** (PE-80) material with SDR-11 or SDR-17 rating. All plastic water Service Connection pipes shall be blue in colour. ***(HPPE*** (PE-100) material with SDR-11 and SDR-17 rating may also be used though this pipe is less flexible.) An alternative pipe material, to Irish Water's written approval, shall be provided where pressure in the Works is greater that the performance rating of these materials. The ***MDPE, HDPE*** and ***HPPE*** service pipes shall comply with IS EN 12201 Part 2 (Plastic Systems for Water Supply, Drainage and Sewerage Under Pressure - Part 2, Pipes) and IS EN 12201 Part 3 (Plastic Systems for Water Supply, Drainage and Sewerage Under Pressure - Part 3: Fittings) and with UK WIS 4-32-08 (Specification for the fusion jointing of polyethylene pressure pipeline systems using PE80 and PE100 materials).

The Customer shall determine the Pressure Class of pipe that is required having regard to the pressure at the connection point and the maximum in-service operating pressure. The sizing of service connections to any premises and the approval of fittings for this purpose must be obtained in advance from Irish Water.

Jointing of pipes should be carried out in accordance with the requirements of the Standards associated with the pipe material selected.

LEGEND:

- PROPOSED RESIDENTIAL AND BUSINESS WATERMAIN
- PROPOSED FIRE FIGHTING WATERMAIN
- EXISTING WATERMAIN
- 51.63 EX.G.L — TOPOGRAPHICAL SURVEY DATA
- PROPOSED APARTMENT BLOCKS

This drawing should not be scaled. Dimensions to be verified on site.
Any discrepancies should be referred to the Engineer prior to work being put in hand.

GENERAL NOTES

Watermain network and all associated works to be constructed in accordance with Irish Water *"Code of Practice for Water Infrastructure"* and Irish Water *"Water Infrastructure* Standard Details":

- IW-CDS-5020-1
- IW-CDS-5020-3

WATERMAIN PIPE MATERIALS:
All watermain pipe materials to be in compliance with Section 3.9 of the Irish Water "Code of Practice for Water Infrastructure" Ref. IW-CDS-5020-03.

Foul sewer network and all associated works o be constructed in accordance with Irish Water *"Code of Practice for Wastewater Infrastructure" and Irish Water "Wastewater Infrastructure Standard Details"*:

- IW-CDS-5030-1
- IW-CDS-5030-3

WASTEWATER PIPE MATERIALS:
All sewer pipe materials to be in compliance with Section 3.13 of the Irish Water "Code of Practice for Wastewater Infrastructure" Ref. IW-CDS-5030-03.

NOTE:

IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE 3.15.2 ,AS THIS IS A HIGH–RISE MULTI UNIT PREMISES, WHICH REQUIREMENTS PUMPING TO UPPER FLOORS AND A SHARED SERVICE PIPE FROM A TANK/PUMP TO EACH FLOOR, PROVISION IS BE MADE FOR METERS TO BE INSTALLED IN SERVICE CUPBOARDS ALONG WITH INDIVIDUAL STOP VALVES TO ISOLATE THE EACH PROPERTY AND METER LOCATION. THE WATER SERVICE PIPE WORK IS BE ARRANGED SUCH THAT EACH UNIT CAN BE INDIVIDUALLY METERED. THE DEVELOPER WILL INSTALL THE MANIFOLD (OR PIPE INSERT) INTO THE PLUMBING SYSTEM WHICH WILL FACILITATE THE FUTURE INSTALLATION OF THE WATER METER. THE METER CUPBOARDS ARE BE LOCATED IN THE LANDLORD STAIR CORE AREAS AND INSTALLED AT A LEVEL NO HIGHER THAN 1.50M ON EACH FLOOR LEVEL AND IN A LOCATION WHERE A METER READER CAN BE COMFORTABLY MAINTAINED AND EXCHANGED (IF NECESSARY) IN THE FUTURE. FULL DETAILS OF THE WATER SERVICES ARRANGEMENT ARE SHOWN ON THE M&E DRAWINGS.

P2	15.11.22	PRELIMINARY. Revised to comply with SW Audit.	PB	DOS
P1	30.09.22	PRELIMINARY	PB	DOS
Status	Date	Description	By	Chk

Amendments

Project
WALKINSTOWN APARTMENT DEVELOPMENT

Title
WATERMAIN LAYOUT

Client
WALKINSTOWN MONTANE PROPERTIES LTD

KAVANAGH BURKE CONSULTING ENGINEERS
Unit F3, Block F, Calmount Park
Calmount Avenue, Dublin 12. D12 PX28
E-mail: reception@kavanaghburke.ie
Tel: 01 450 0694

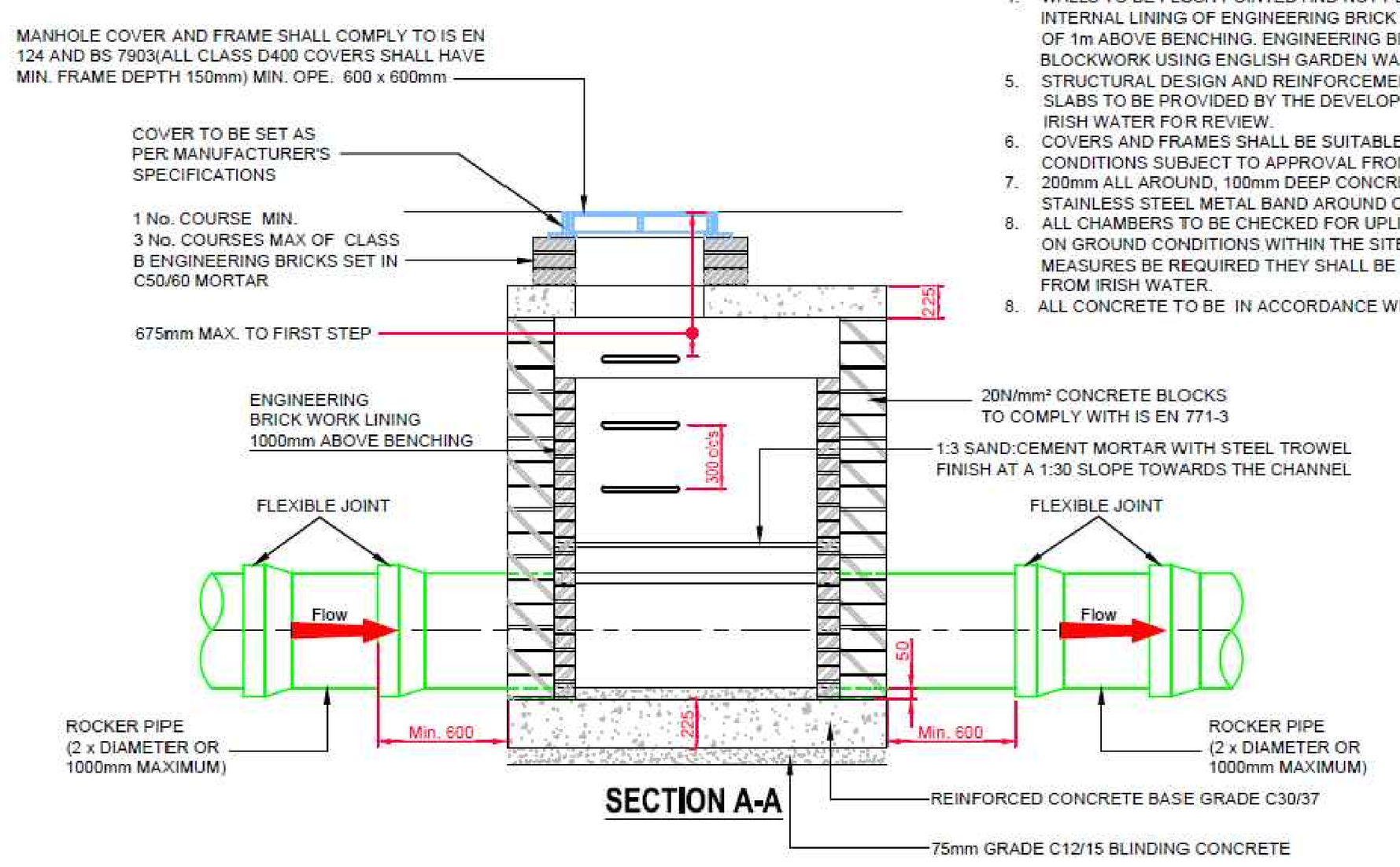
Issue
PRELIMINARY

Designed By	PB	Checked By	DOS
KB Ref.	D1752		
Drawn By	PB	Date	01.11.22
Scales @ A1	1:250		

Project - Originator - Volume - Level - Type - Role - Number	Revision
D1752-KB-XX-XX-DR-C-0005	P2

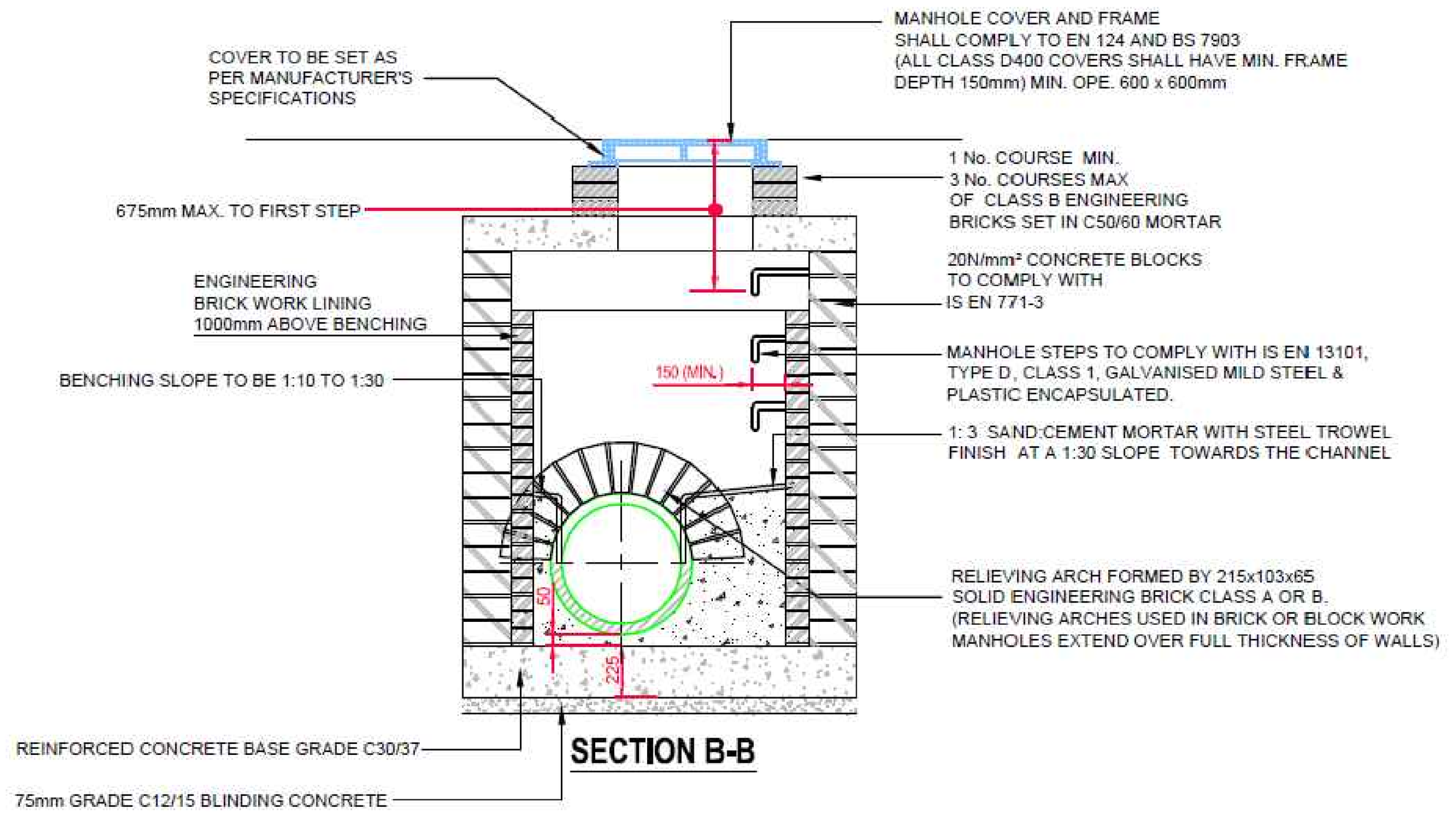
A1

A0

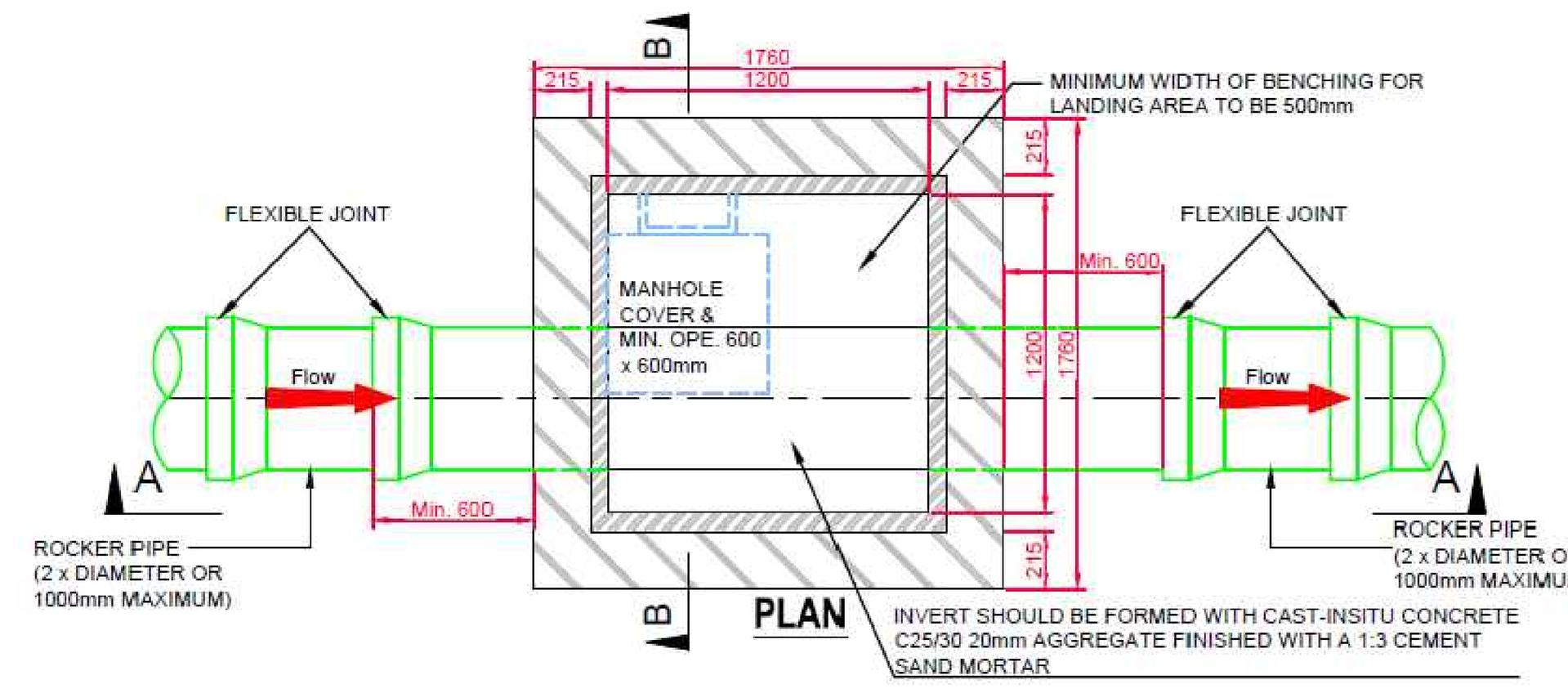


SECTION A-A

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. SOLID BLOCKWORK TO BE OF HIGH STRENGTH (20N/mm²) TO IS EN 771.
3. MAXIMUM DEPTH OF BLOCK WORK MANHOLE IS 1.20m (THE USE OF BLOCK WORK IN DEEPER MANHOLES WILL BE CONSIDERED BUT SUCH USE WILL REQUIRE DETAILED STRUCTURAL DESIGN AND WRITTEN APPROVAL FROM IRISH WATER).
4. WALLS TO BE FLUSH POINTED AND NOT PLASTERED INTERNALLY. INTERNAL LINING OF ENGINEERING BRICK TO IS EN 771-1 TO A HEIGHT OF 1m ABOVE BENCHING. ENGINEERING BRICK TO BE BONDED TO BLOCKWORK USING ENGLISH GARDEN WALL BOND.
5. STRUCTURAL DESIGN AND REINFORCEMENT DETAILS FOR ROOF AND BASE SLABS TO BE PROVIDED BY THE DEVELOPER AND SUBMITTED TO IRISH WATER FOR REVIEW.
6. COVERS AND FRAMES SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS SUBJECT TO APPROVAL FROM IRISH WATER.
7. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH WITH PROTECTIVE STAINLESS STEEL METAL BAND AROUND COVERS IN GREEN AREAS.
8. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO APPROVAL FROM IRISH WATER.
8. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206 : 2013.

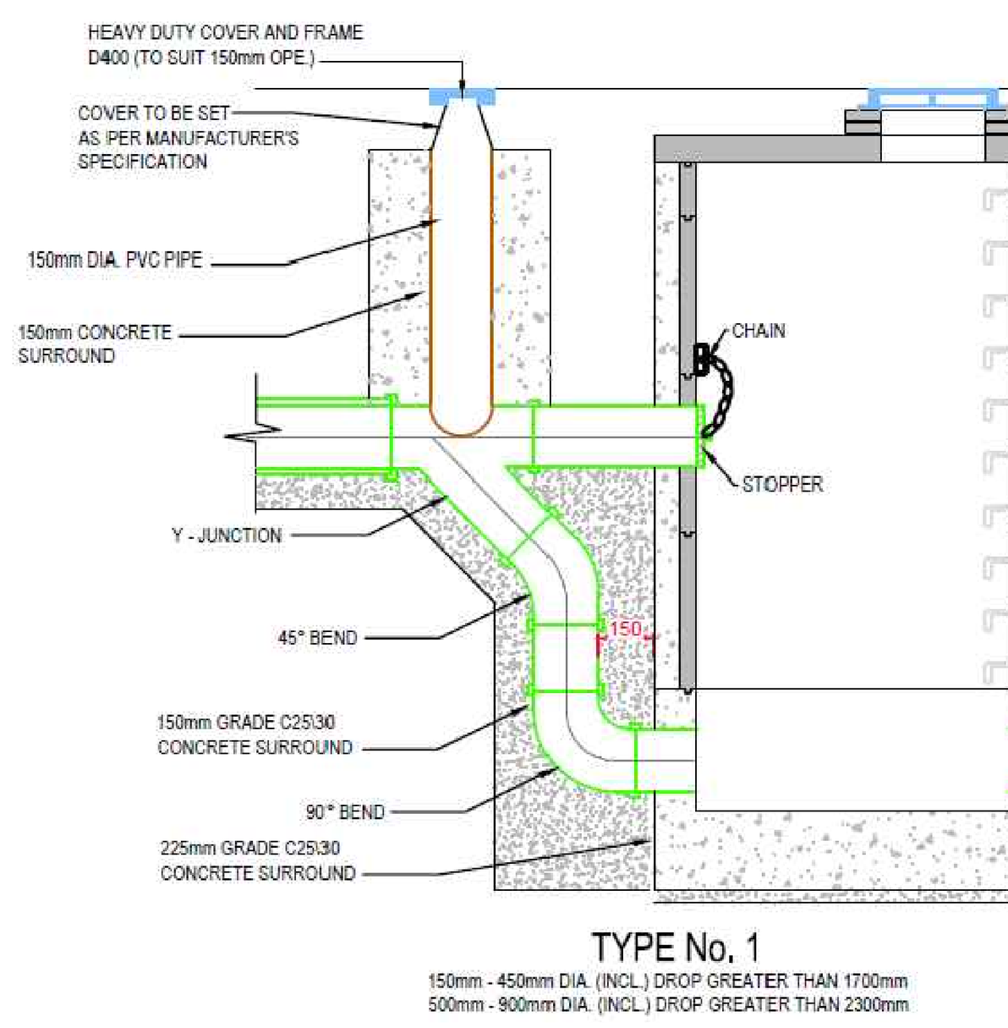


SECTION B-B



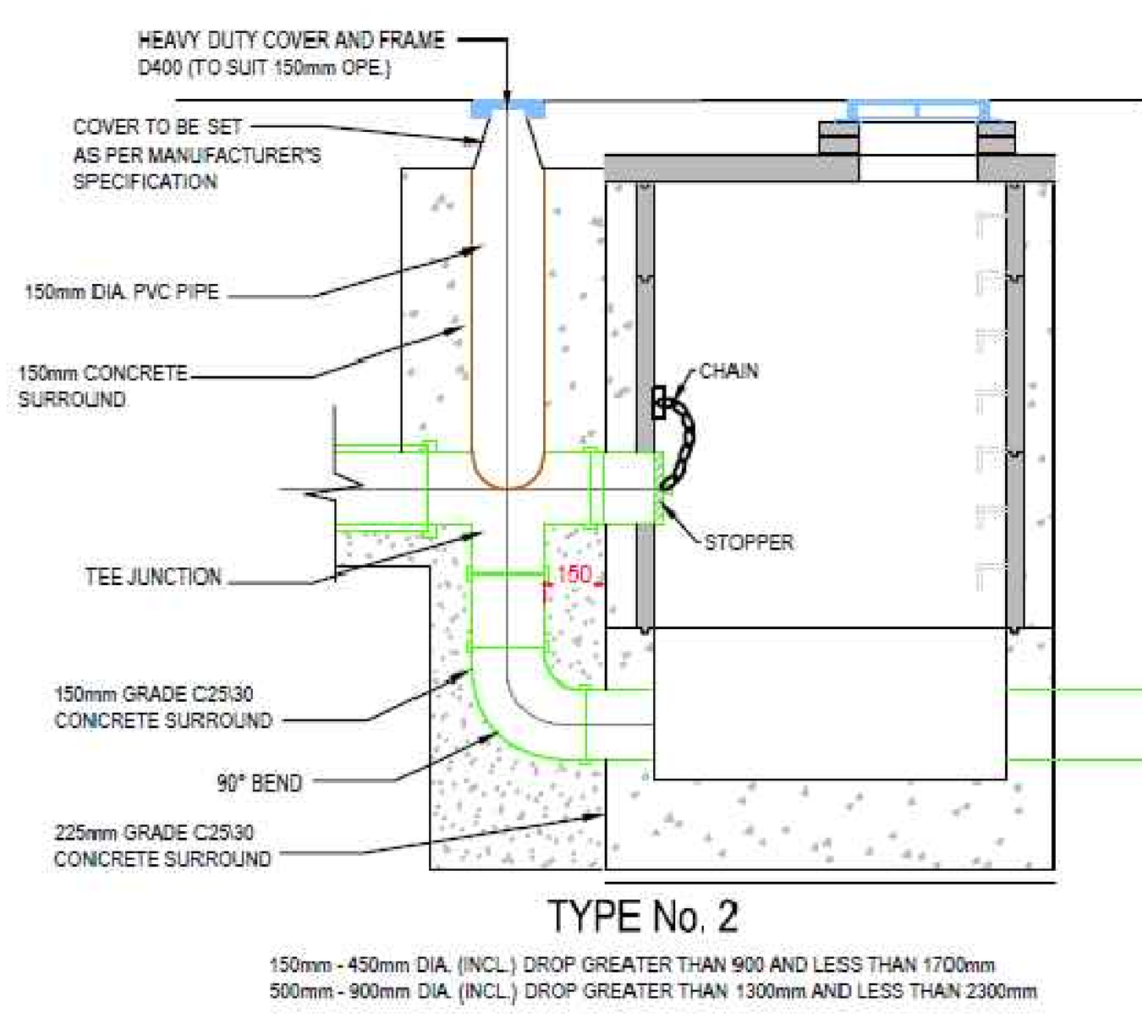
PLAN

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. IN-SITU MANHOLES TO HAVE A MINIMUM WALL AND FLOOR THICKNESS OF 225mm FOR MANHOLE DEPTHS UP TO 3.0m AND 300mm OR MORE WHEN THE MANHOLE DEPTH EXCEEDS 3.0m.
3. STRUCTURAL DESIGN & REINFORCEMENT DETAILS TO BE PROVIDED BY THE DEVELOPER AND SUBMITTED TO IRISH WATER FOR REVIEW.
4. MANHOLES GREATER THAN 3m IN DEPTH WILL REQUIRE A DETAILED STRUCTURAL DESIGN AND BE SUBJECT TO IRISH WATER APPROVAL.
5. COVERS AND FRAMES SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS SUBJECT TO APPROVAL FROM IRISH WATER.
6. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH WITH PROTECTIVE STAINLESS STEEL METAL BAND AROUND COVERS IN GREEN AREAS.
7. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO APPROVAL FROM IRISH WATER.
8. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206 : 2013.



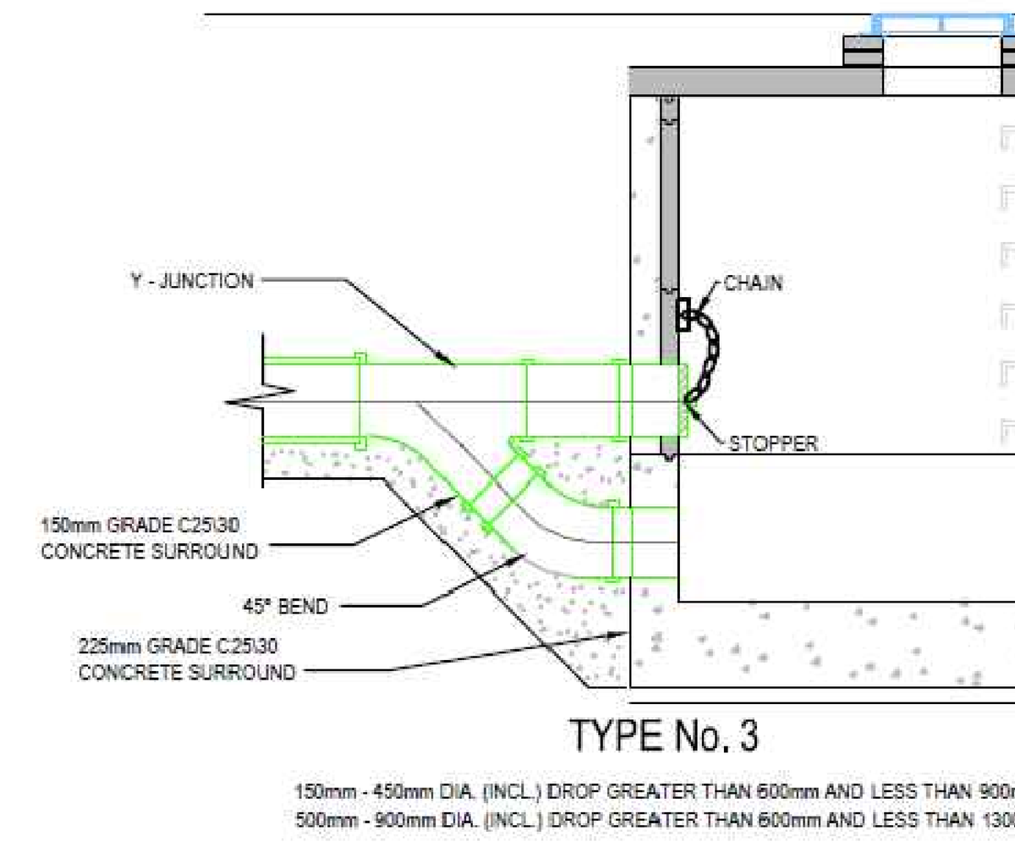
TYPE No. 1

150mm - 450mm DIA. (INCL.) DROP GREATER THAN 1700mm
500mm - 900mm DIA. (INCL.) DROP GREATER THAN 2300mm



TYPE No. 2

150mm - 450mm DIA. (INCL.) DROP GREATER THAN 900 AND LESS THAN 1700mm
500mm - 900mm DIA. (INCL.) DROP GREATER THAN 1300mm AND LESS THAN 2300mm



TYPE No. 3

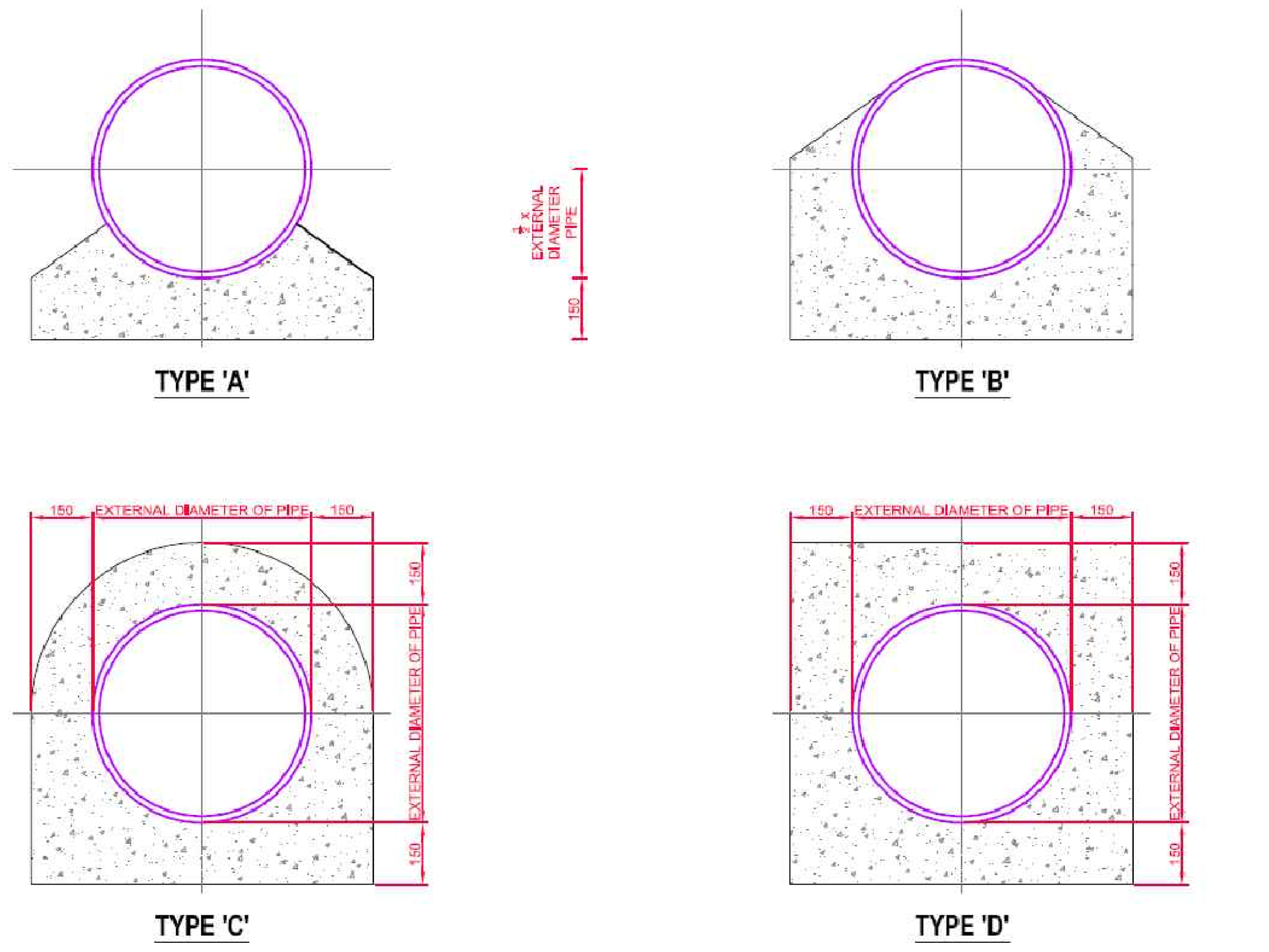
150mm - 450mm DIA. (INCL.) DROP GREATER THAN 600mm AND LESS THAN 900m
500mm - 900mm DIA. (INCL.) DROP GREATER THAN 600mm AND LESS THAN 1300mm

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. RODDING EYE CHAMBER SHALL BE COVERED WITH APPROVED HEAVY DUTY METAL COVERS TO IS 261 AND BS 5834. COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO THE APPROVAL OF IRISH WATER.
3. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO APPROVAL FROM IRISH WATER.
4. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.
5. MANHOLE DETAILS TO BE IN ACCORDANCE WITH STD-WW-09, 10 AND 11

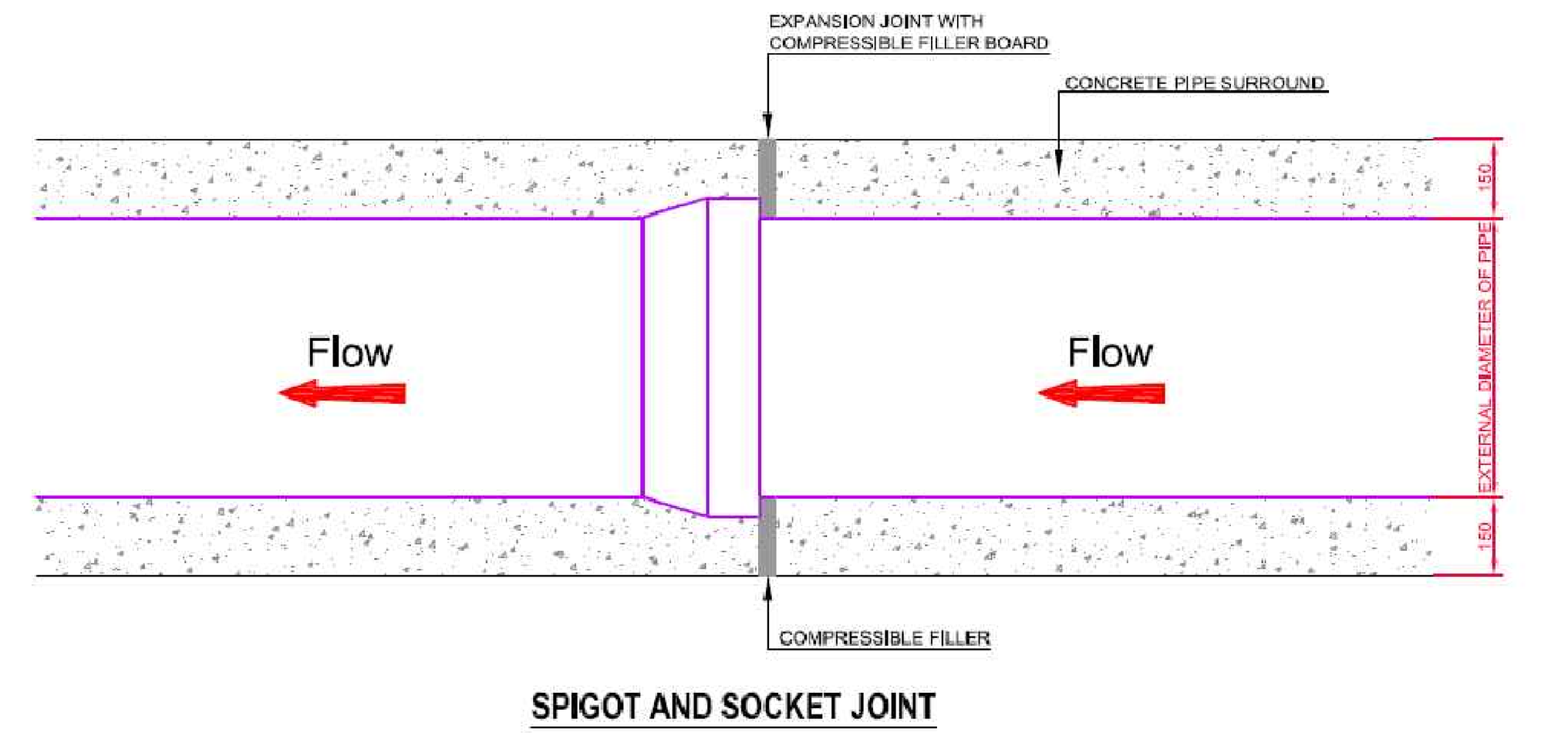
CONCRETE SURROUND TO ALL BLOCK AND PRECAST CONCRETE MANHOLES, HYDRANT CHAMBERS AND AJ'S IN PAVED AND GRASSED AREAS

JOINT BETWEEN ALL STEEL COVERS AND CONCRETE EDGE TO BE SEALED WITH SUITABLE MASTIC.

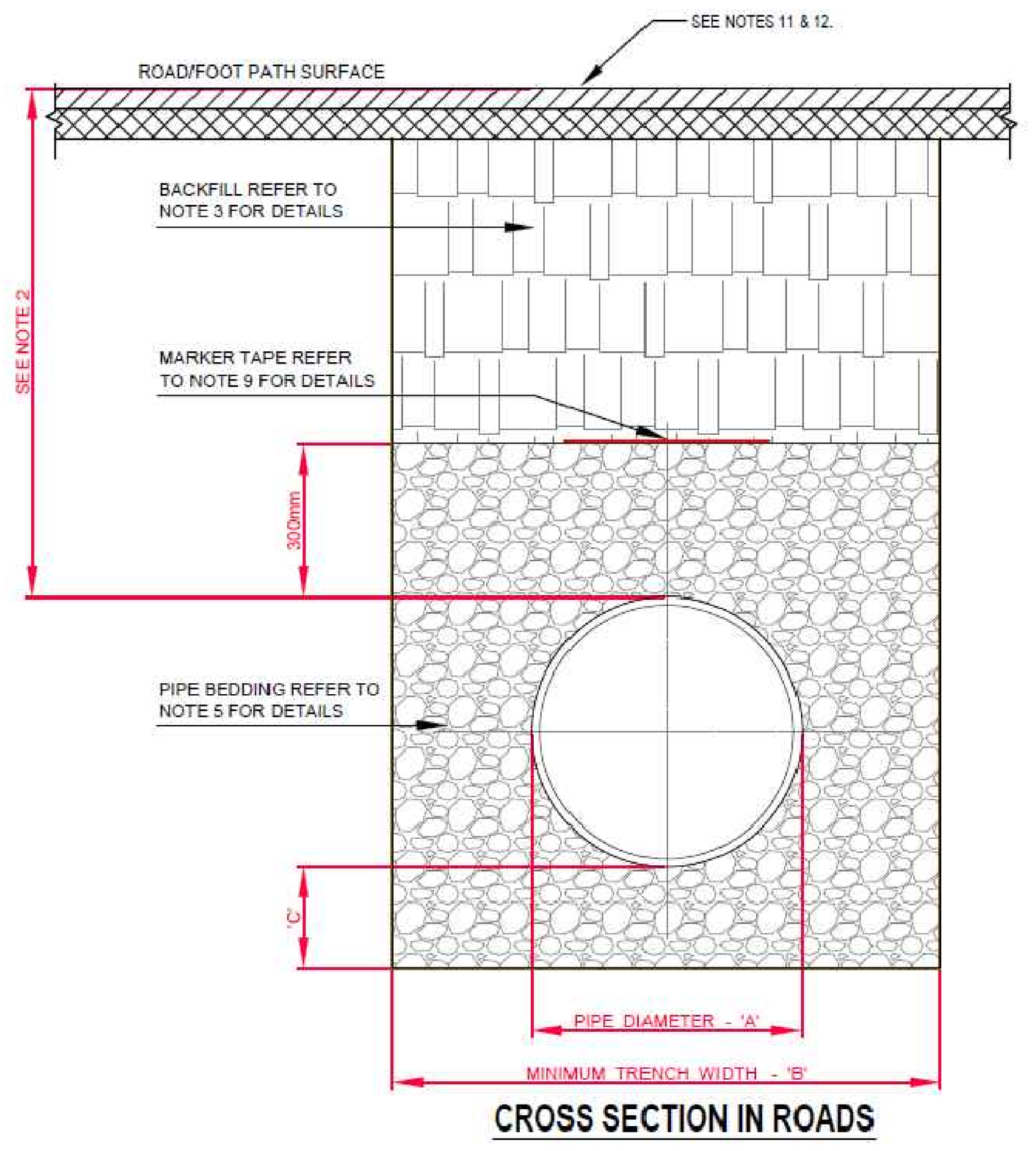
1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. CONCRETE PIPE BEDS AND HAUNCHES MAY BE REQUIRED TO ADDRESS MINIMUM COVER SITUATIONS, AND SHALL BE SUBJECT TO SUBMISSION AND ASSESSMENT BY IRISH WATER BEFORE ADVANCING WITH THE WORKS.
3. CONCRETE PIPE BEDS AND HAUNCHES SHALL HAVE A MINIMUM THICKNESS OF 150mm WITH AN ABSOLUTE MINIMUM DEPTH OF COVER ABOVE THE EXTERNAL CROWN OF THE PIPE OF 750mm.
4. CONCRETE TO BE IN ACCORDANCE WITH IS EN 206 AND TO BE CLASS C16/20.
5. THE HAUNCHES AND SURROUNDS TO BE FORMED USING FORM WORK TO PROVIDE A ROUGH CAST FINISH.
6. EXPANSION JOINTS IN THE CONCRETE SHALL BE PROVIDED AT ALL PIPE JOINTS TO ALLOW FOR PIPE FLEXIBILITY. COMPRESSIBLE FILLER BOARD TO BE IN ACCORDANCE WITH BS EN 622-1 AND BS EN 622-4, AND TO BE 18mm THICK
7. POLYETHYLENE PIPES SHALL BE WRAPPED IN PLASTIC SHEETING HAVING A COMPOSITION IN ACCORDANCE WITH BS 6076 BEFORE BEING CAST INTO CONCRETE.
8. BITUMINOUS MATERIAL SHALL NOT BE PUT IN CONTACT WITH PE OR PVC PIPES



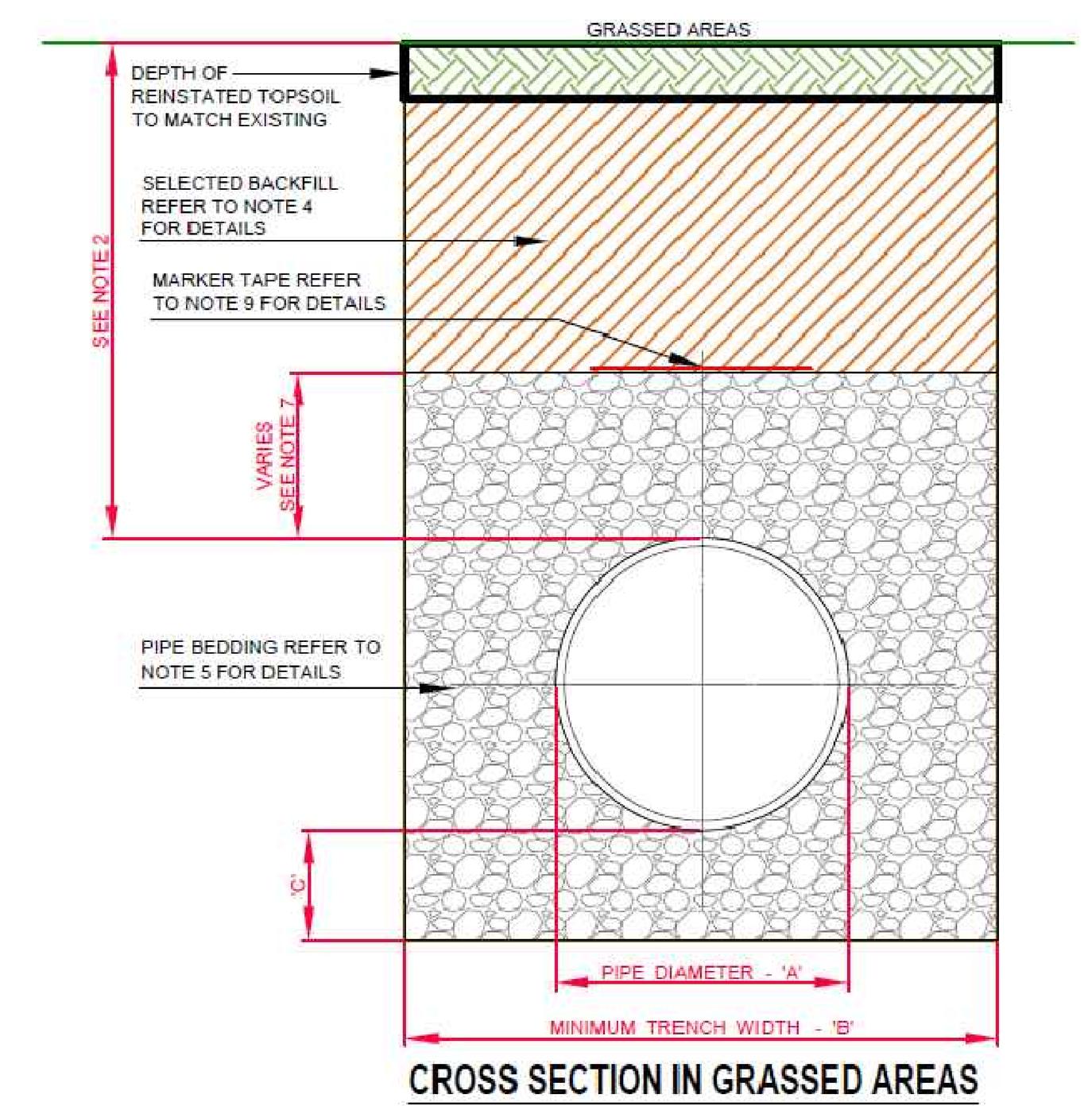
TYPE 'A' TYPE 'B' TYPE 'C' TYPE 'D'



SPIGOT AND SOCKET JOINT



CROSS SECTION IN ROADS

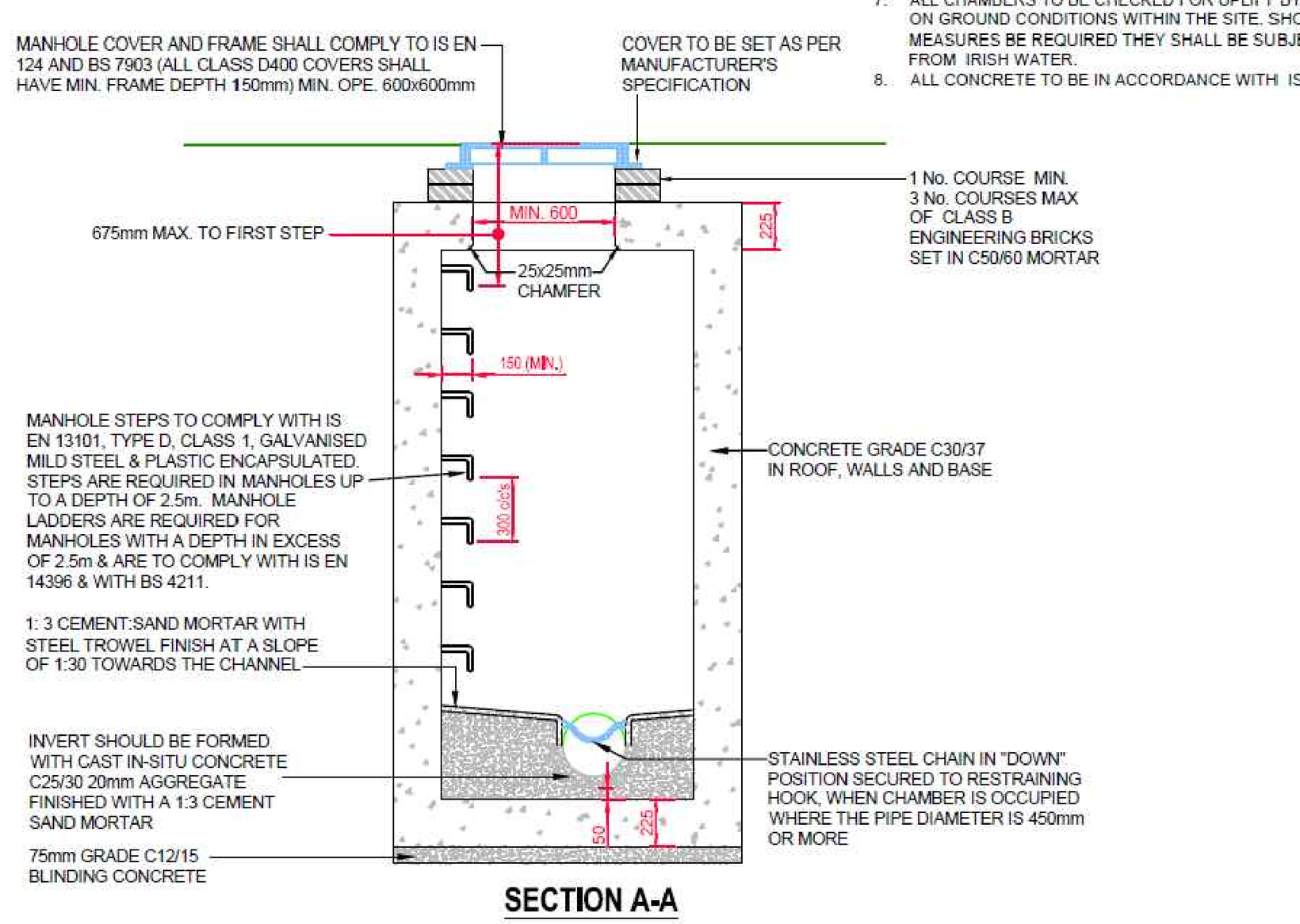


CROSS SECTION IN GRASSED AREAS

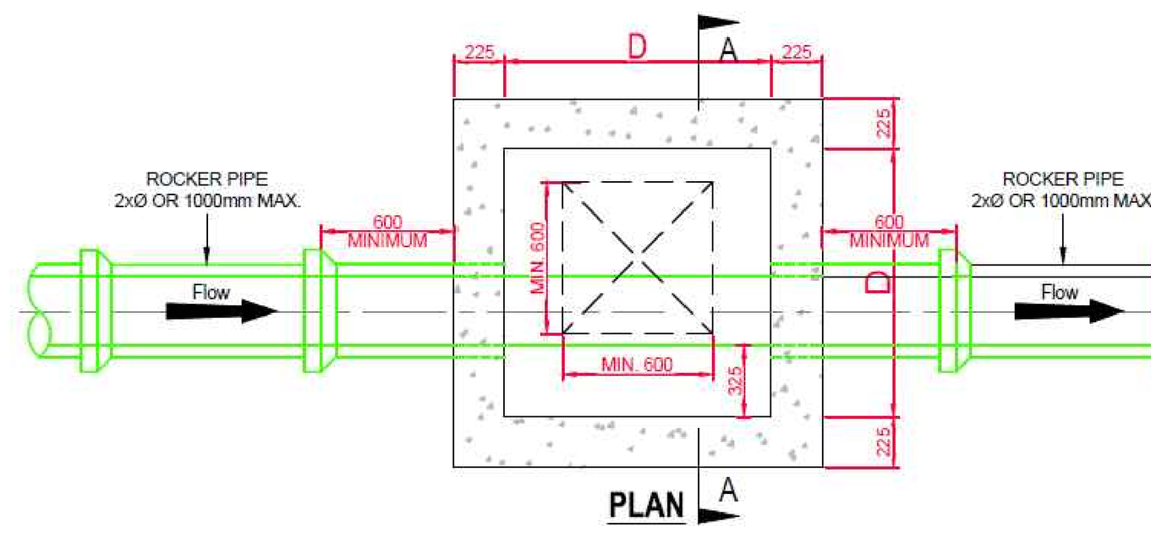
1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. THE MINIMUM DEPTH OF COVER FROM THE FINISHED SURFACE TO THE CROWN OF GRAVITY PIPES **WITHOUT PROTECTION** SHOULD BE AS FOLLOWS:
A) GARDENS AND PATHWAYS WITHOUT ANY POSSIBILITY OF VEHICULAR ACCESS - DEPTH NOT LESS THAN 0.5 M. (THIS WOULD NORMALLY RELATE TO DRAINS IN PRIVATE PROPERTY, SHALLOW PIPES OF THIS NATURE ARE UNDESIRABLE AND SHOULD BE INSTALLED IN ACCORDANCE WITH THE CURRENT BUILDING REGULATIONS).
B) DRIVEWAYS, PARKING AREAS AND YARDS WITH HEIGHT RESTRICTIONS TO PREVENT ENTRY BY VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES - DEPTH NOT LESS THAN 0.75 M.
C) DRIVEWAYS, PARKING AREAS AND NARROW STREETS WITHOUT FOOTWAYS (E.G. MEWS DEVELOPMENTS) WITH LIMITED ACCESS FOR VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES - DEPTH NOT LESS THAN 0.9 M.
D) DEPTHS OF SEWERS IN GATED ESTATES SHALL BE SIMILAR TO THAT OUTLINED ABOVE.
E) AGRICULTURAL LAND AND PUBLIC OPEN SPACE - DEPTH NOT LESS THAN 0.9 M.
F) OTHER HIGHWAYS AND PARKING AREAS WITH UNRESTRICTED ACCESS TO VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES - DEPTH NOT LESS THAN 1.2m.
3. CLAUSE 804 / 808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS IS TO BE USED AS BACKFILL MATERIAL WHERE THE SEWER MAIN IS LOCATED IN ROADS, FOOTPATHS OR WHEN THE NEAREST PART OF THE TRENCH IS WITHIN 1m OF THE PAVED EDGE OF THE ROADWAY. CLAUSE 804 / 808 IS TO BE COMPACTED AS PER CLAUSE 802 OF THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS. CLAUSE 808 IS TO BE USED WITHIN 500mm OF CEMENT BOUND MATERIALS, CONCRETE PAVEMENTS, CONCRETE STRUCTURES OR CONCRETE PRODUCTS. OTHERWISE CLAUSE 804 MAY BE USED. ALTERNATIVE BACKFILL MATERIAL TO THAT DESCRIBED ABOVE (CLAUSE 804 OR CLAUSE 808) OF THE PIPE TRENCH WILL ONLY BE ALLOWED BY IRISH WATER WHERE THE ROADS AUTHORITY IN WHOSE FUNCTIONAL AREA THE DEVELOPMENT IS LOCATED, PROVIDES **WRITTEN APPROVAL** TO THE DEVELOPER TO THE USE SUCH ALTERNATIVE MATERIAL.
4. SELECTED EXCAVATED MATERIAL MAY BE USED IN GREEN-FIELD AREAS ABOVE GRANULAR PIPE SURROUND MATERIAL SUBJECT TO REVIEW BY IRISH WATER.
5. PIPE BEDDING SHALL COMPLY WITH WIS 4-08-02 AND IGN 4-08-01 GRANULAR MATERIAL SHALL BE 14mm TO 5mm GRADED AGGREGATE OR 10mm SINGLE SIZED AGGREGATE IS EN 13242. CONCRETE BED, HAUNCH & SURROUND, WHERE REQUIRED, SHALL BE TO STD-WW-08.
6. IN SOFT GROUND CONDITIONS (CBR < 5) THE MATERIAL SHOULD BE EXCAVATED AND DISPOSED OF IN ACCORDANCE WITH THE WASTE MANAGEMENT ACT AND CLAUSE 804 / 808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS SHALL REPLACE THE EXCAVATED MATERIAL, WRAPPED IN GEO-TEXTILE WRAPPING. ALTERNATIVELY, SPECIAL PIPE SUPPORT ARRANGEMENTS, INCLUDING PILING ETC. MAY BE REQUIRED WHERE THE DEPTH OF SOFT MATERIAL IS EXCESSIVE. SUCH ARRANGEMENTS SHALL BE SUBJECT TO ASSESSMENT BY IRISH WATER BEFORE ADVANCING WITH THE WORK.
7. IN GREEN FIELD AREAS, TYPE B BACKFILL (SELECTED EXCAVATED MATERIAL) WILL BE ALLOWED ABOVE THE SIDE HAUNCH GRANULAR MATERIAL IN THE CASE OF RIGID PIPES. A GRANULAR SURROUND OF A MINIMUM DEPTH OF 150mm ABOVE THE CROWN OF THE PIPE IS REQUIRED FOR FLEXIBLE PIPES , AND TYPE B MATERIAL MAY BE USED AS BACKFILL ABOVE THIS. ALL RISING MAINS IN GREENFIELD AREAS SHALL HAVE A MINIMUM COVER OF 300mm OF GRANULAR MATERIAL ABOVE THE EXTERNAL CROWN OF THE PIPE.
8. PIPES SHALL NOT BE SUPPORTED ON STONES, ROCKS OR ANY HARD OBJECTS AT ANY POINT ALONG THE TRENCH. ROCK SHALL BE EXCAVATED TO A DEPTH OF 150mm BELOW THE ACTUAL DEPTH OF THE TRENCH WITH THE VOID FILLED WITH CLAUSE 804 / 808 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS. THE GRANULAR MATERIAL SHALL BE LAID ABOVE THIS VOID BACKFILL MATERIAL.
9. NON DEGRADABLE MARKER TAPE SHOULD BE INSTALLED AT TOP OF PIPE BEDDING LAYER. IN THE CASE OF NON METAL PIPE MATERIAL, THE MARKER TAPE SHOULD INCORPORATE A TRACE WIRE WHICH IS LINKED TO FITTINGS AND TERMINATED AT THE WASTE WATER PUMPING STATION AND THE DISCHARGE MANHOLE.
10. TRENCH WIDTHS FOR PIPE SIZES ≤80mm MAY BE <500mm, SUBJECT TO CONSIDERATION BEING GIVEN TO THE TRENCH DEPTH, HEALTH & SAFETY & CONSTRUCTION ACCESS REQUIREMENTS.
11. NEW ROAD CONSTRUCTION & SURFACE FINISH TO BE TO ROAD AUTHORITY REQUIREMENTS.
12. EXISTING ROAD REINSTATEMENT TO COMPLY WITH CURRENT VERSION OF "GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS" BY THE DEPT. OF TRANSPORT, TOURISM & SPORT, OR TRANSPORT INFRASTRUCTURE IRELAND REQUIREMENTS.

PIPE DIAMETER 'A' (mm)	TRENCH WIDTH 'B' (mm)
≤ 80 RISING MAIN	SEE NOTE 10.
100	500
150	600
200	600
250	750
300	750
350	750
400	900
450	900

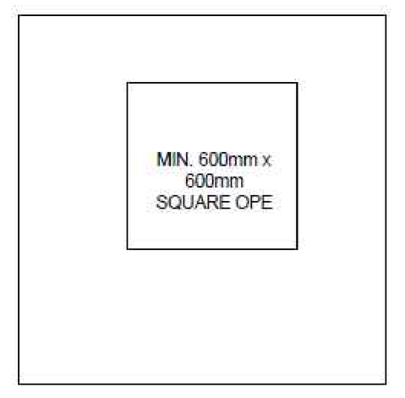
PIPE DIAMETER 'A' (mm)	DEPTH OF BEDDING 'C' (mm)
≤100	100
150 - 450	200



SECTION A-A



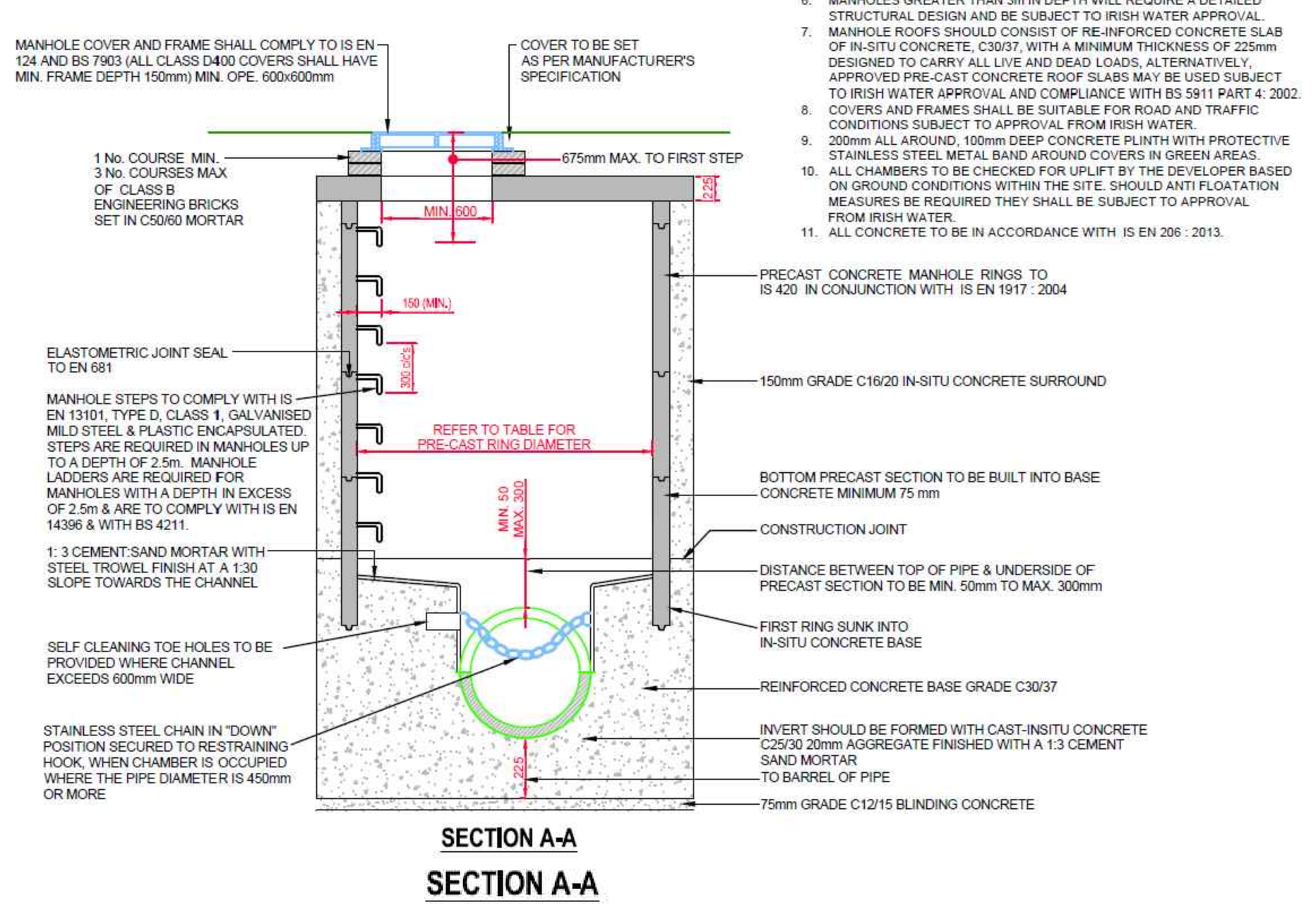
PLAN



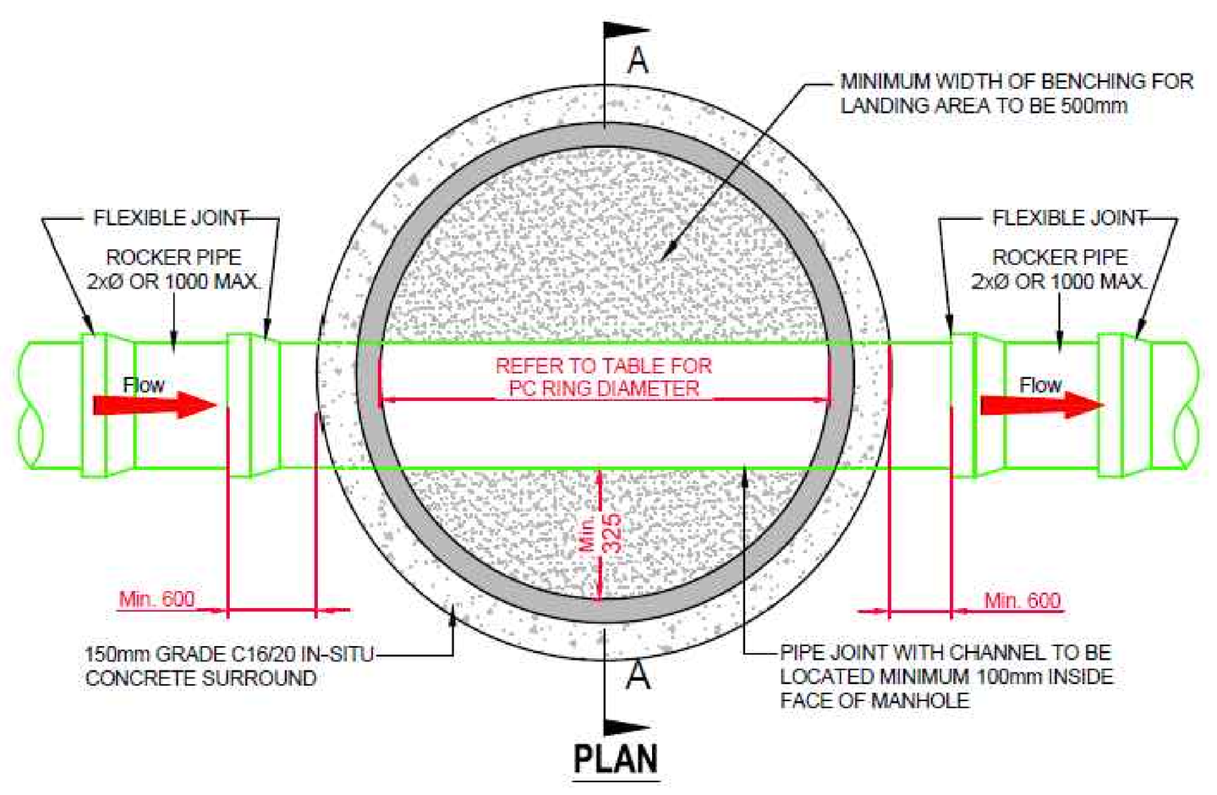
ROOF PLAN

MINIMUM MANHOLE DIMENSION "D"	
DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIMENSION OF MANHOLE (mm)
LESS THAN 375	1200
375 TO 450	1350
500 TO 750	1500

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. PRE-CAST MANHOLES UNITS: COMPLYING WITH REQUIREMENTS OF IS EN 1917 AND BS 5911-PART 3.
3. THICKER MANHOLE BASES REQUIRED FOR SEWERS IN EXCESS OF 3m DEEP WHERE THE SIZE IS GREATER THAN THE STANDARD MINIMUM SIZE
4. APPROVED PRE-CAST CONCRETE BASES MAY BE USED INCORPORATING CHANNELS, BENCHING ETC. SUBJECT TO IRISH WATER APPROVAL AND COMPLYING WITH BS 5911-PART 4 2002.
5. STRUCTURAL DESIGN AND REINFORCEMENT DETAILS TO BE PROVIDED BY THE DEVELOPER AND SUBMITTED TO IRISH WATER FOR REVIEW.
6. MANHOLES GREATER THAN 3m IN DEPTH WILL REQUIRE A DETAILED STRUCTURAL DESIGN AND BE SUBJECT TO IRISH WATER APPROVAL.
7. MANHOLE ROOFS SHOULD CONSIST OF RE-INFORCED CONCRETE SLAB OF IN-SITU CONCRETE, C30/37, WITH A MINIMUM THICKNESS OF 225mm DESIGNED TO CARRY ALL LIVE AND DEAD LOADS, ALTERNATIVELY, APPROVED PRE-CAST CONCRETE ROOF SLABS MAY BE USED SUBJECT TO IRISH WATER APPROVAL AND COMPLIANCE WITH BS 5911 PART 4: 2002.
8. COVERS AND FRAMES SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS SUBJECT TO APPROVAL FROM IRISH WATER.
9. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH WITH PROTECTIVE STAINLESS STEEL METAL BAND AROUND COVERS IN GREEN AREAS.
10. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO APPROVAL FROM IRISH WATER.
11. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206 : 2013.

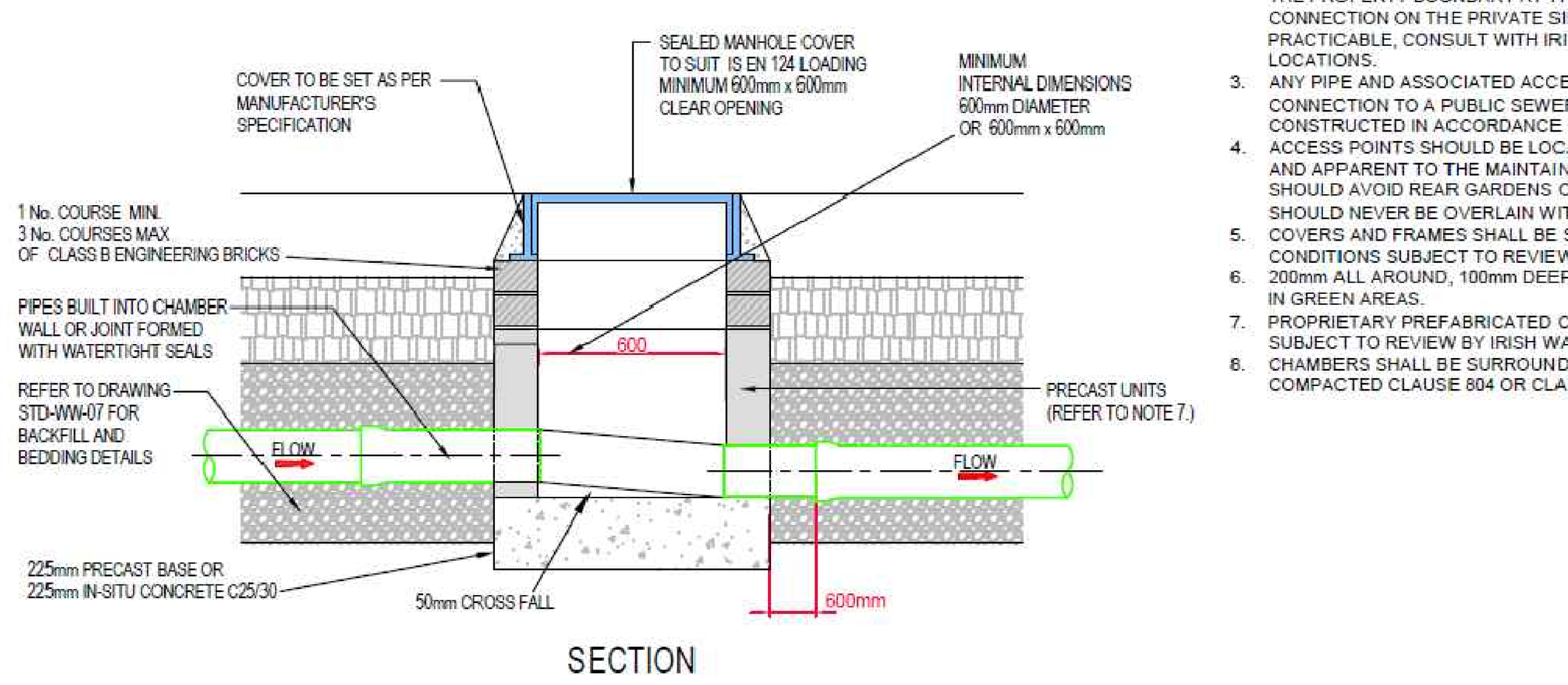


SECTION A-A



PLAN

MINIMUM MANHOLE DIAMETERS	
DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375 TO 450	1350
500 TO 750	1500



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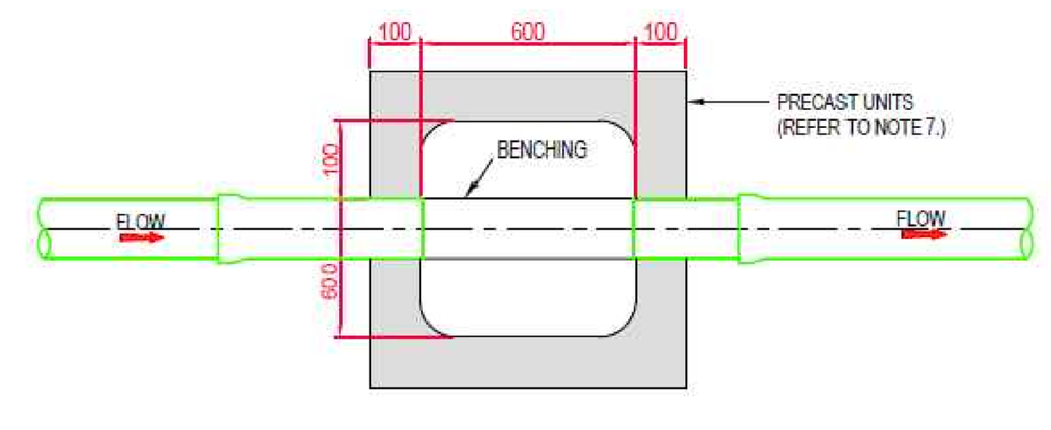
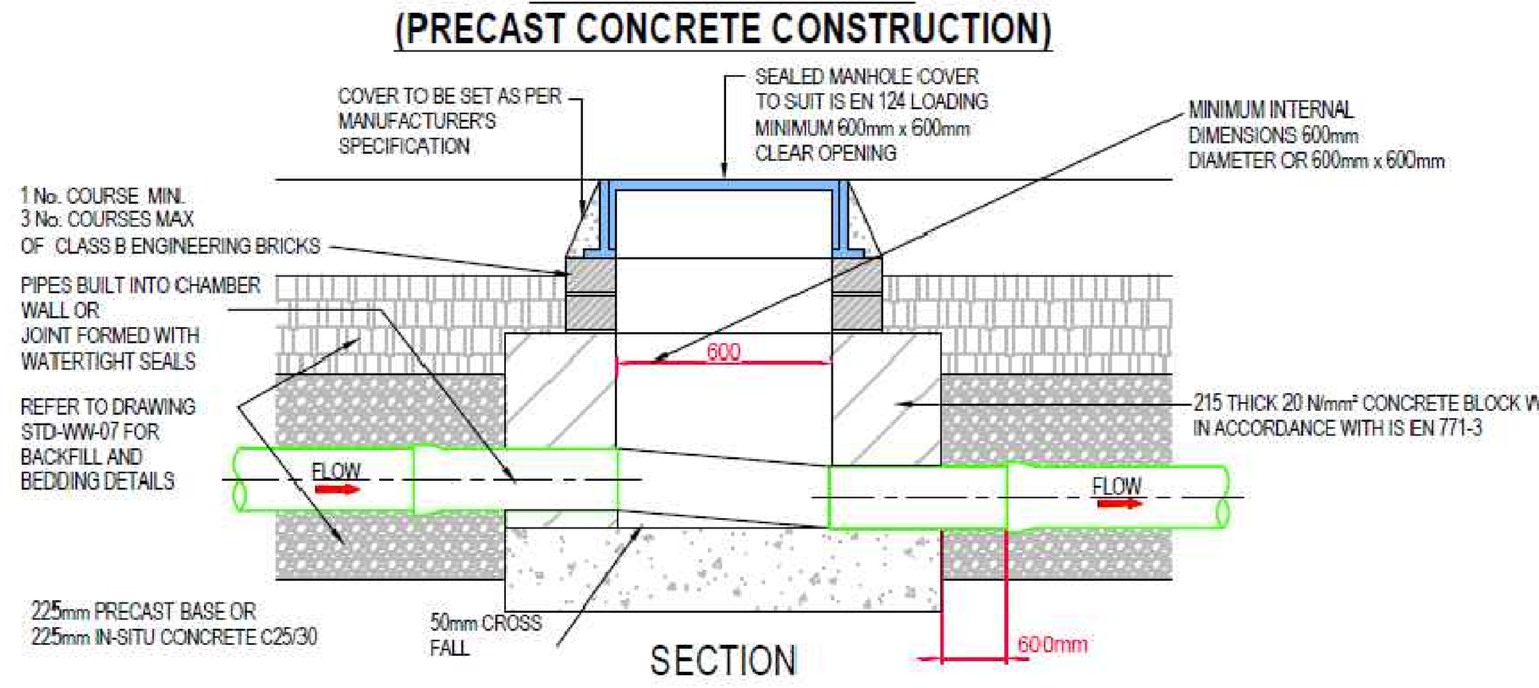
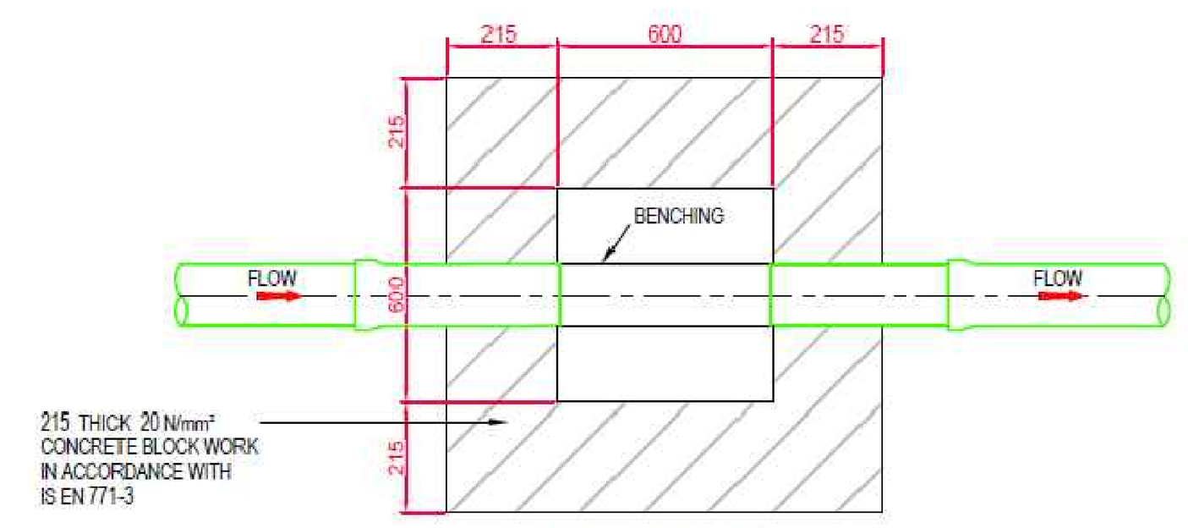


FLOOR PLAN

INSPECTION CHAMBER (PRECAST CONCRETE CONSTRUCTION)



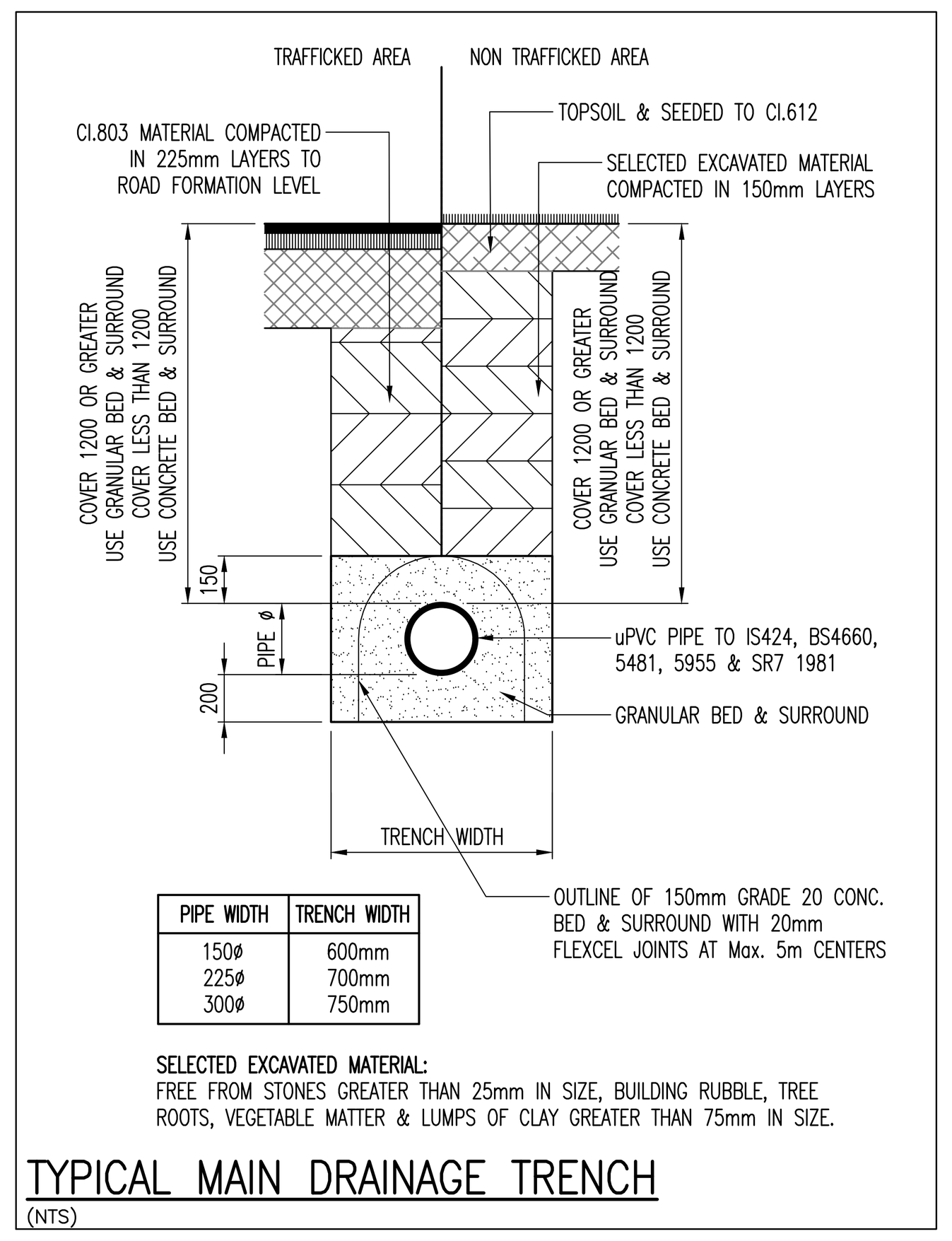
SECTION



FLOOR PLAN

INSPECTION CHAMBER (BLOCK WORK CONSTRUCTION)

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. AN INSPECTION CHAMBER SHOULD BE LOCATED AT OR WITHIN 1m OF THE PROPERTY BOUNDARY AT THE UPSTREAM END OF EACH SERVICE CONNECTION ON THE PRIVATE SIDE OF THE CURTILAGE, IF PRACTICABLE, CONSULT WITH IRISH WATER ON ALTERNATIVE LOCATIONS.
3. ANY PIPE AND ASSOCIATED ACCESS UPSTREAM OF THE POINT OF CONNECTION TO A PUBLIC SEWER IS A PRIVATE DRAIN AND SHOULD BE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS.
4. ACCESS POINTS SHOULD BE LOCATED SO THAT THEY ARE ACCESSIBLE AND APPARENT TO THE MAINTAINER AT ALL TIMES FOR USE. THEY SHOULD AVOID REAR GARDENS OR ENCLOSED LOCATIONS AND THEY SHOULD NEVER BE OVERLAIN WITH SURFACE DRESSING, TOPSOIL, ETC.
5. COVERS AND FRAMES SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS SUBJECT TO REVIEW BY IRISH WATER.
6. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH AROUND COVERS IN GREEN AREAS.
7. PROPRIETARY PREFABRICATED CHAMBER UNITS MAY ALSO BE USED, SUBJECT TO REVIEW BY IRISH WATER.
8. CHAMBERS SHALL BE SURROUNDED BY A MINIMUM OF 150mm COMPACTED CLAUSE 804 OR CLAUSE 808 MATERIAL AS PER STD-WW-07.



TYPICAL MAIN DRAINAGE TRENCH
(NTS)

Mark	Date	By	Chk.	App.	Revision
P1	30-11-22	PB	DOS	___	PRELIMINARY ISSUE

Job Title: WALKINSTOWN APARTMENT DEVELOPMENT

Drawing Title: FOUL SEWER MANHOLES INSPECTION CHAMBER, BACKFILL AND TRENCH DETAILS

Architect/Client: MONTANE PROPERTIES LTD.

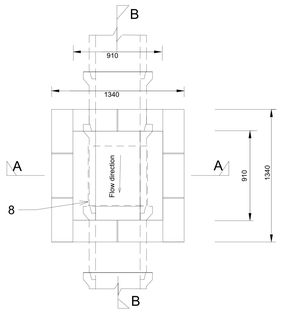
Drawing Status: PRELIMINARY

Drawn: PB
Checked: DOS
Approved: _____
Scales: NTS
Date: 30-11-22

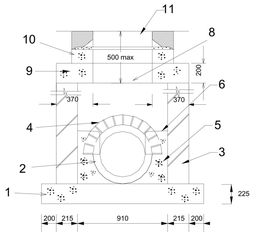
KAVANAGH BURKE
CONSULTING ENGINEERS
Tel. 01 - 450 0694
Fax. 01 - 426 4340
Email: pkavanagh@kavanaghburke.ie
Unit G3, Calmount Pk. Ballymount, Dublin 12.

Job No.: D1752
Drawing No.: DR-C-0012
Rev.: P1

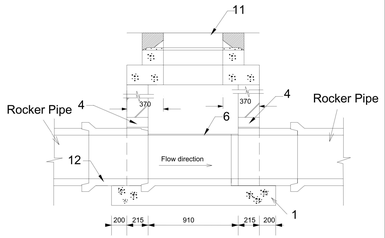
A0



Plan Below Roof Slab



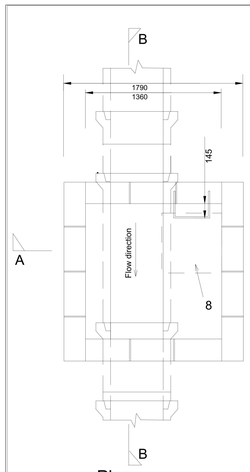
Section A-A



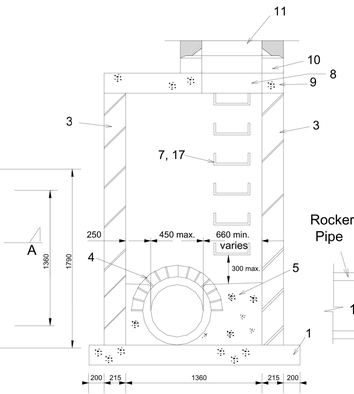
Section B-B

Manhole Details For Pipe Diam's. 150, 225, 300, 375, 450 .
Depth to Invert Less than 1.0m.

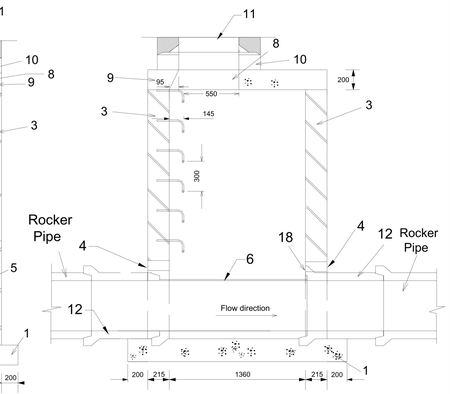
Greater Dublin Regional Code of Practice for Drainage Works			
Project:	STANDARD MANHOLE DETAILS		
Title:	TYPE A MANHOLE		
Drawn: JOM	Checked:	Approved:	
Date: FEB 2000	Scale: NOT TO SCALE	Drawing No.: 2127/01	
Revision		Made by: KOS	Date: 11/11/02



Plan



Section A-A



Section B-B

Manhole Details For Pipe Diam's. 225, 300, 375, 450.
Depth to Invert 1m to 3m.

Greater Dublin Regional Code of Practice for Drainage Works			
Project:	STANDARD MANHOLE DETAILS		
Title:	TYPE B MANHOLE		
Drawn: JOM	Checked:	Approved:	
Date: FEB 2000	Scale: NOT TO SCALE	Drawing No.: 2127/02	
Revision		Made by: KOS	Date: 12/11/02

Drawing Notes:

1) 225mm thick Cl. 20N/20mm Mass Concrete Foundations.

2) Preformed half circle channel pipes. The pipeline may, where practicable, be laid through the manhole and the crown cut out to half diameter, provided flexible joints are situated on each side no further than 600mm from the inner face of manhole wall.

3) Manhole construction.
   - For Surface Water Manholes high-density blocks to Cl.S10 of IS.20 Part 1:1987 or Cl. 30N/20mm insitu concrete.
   - Block work shall be bedded and jointed using mortar to IS406. Beds and vertical joints shall be completely filled with mortar as the blocks are laid.
   - Joints shall be flush pointed as the work proceeds.
   - All Foul Manholes must be faced in solid Engineering Brick (min. class A or B), or insitu concrete for 1 metre above Benching Level.
   - Brick to be bonded to block work using English Garden Wall Bond.

4) Relieving arch formed by 215x103x65 solid engineering brick Class A or B as per drawing.
   Relieving arches used in brick or block work manholes extend over full thickness of wall.
   A Double Arch is to be formed for pipe diameters greater than 600mm.

5) Benching and pipe channel pipe surround - Cl. 20/20 concrete.

6) Benching finished in 2:1 sand-cement mortar with a smooth trowel finish, at 1 in 30 slope towards channel.

7) Standard rungs at 300c/c vertically and galvanized to the latest version ofB.S. 729 or equivalent. Note: Steps Irons are not acceptable.

8) 600mm square ope in roof slab.

9) Precast R.C. Roof Slab shall be 200mm thick in Class 30N/20mm, with 40mm cover to steel.

10) 1 to 2 courses of solid engineering bricks Cl.B to I.S.91:1983 set in 1:3 (cement and mortar).

11) Class D400 or E600 manhole cover and frame to IS/EN 124. 150mm deep frame for roads and 100mm deep for footpaths and green areas. Non-rock design, closed keyways, manufactured from spheroidal graphite cast iron (ductile cast iron), 600 x 600 (600diam.) clear opening, cover and frame coated in bitumen or other approved material, cover to have a minimum mass of 140kg/m2, frame bearing area shall be 80,000mm2 min, frames shall be designed to prevent covers falling into manhole. Frames shall be bedded on approved mortar to manufactures instructions.

12) Short length pipe and pipe joint external to manhole shall not exceed 600mm from the inner face of manhole wall.

13) Toe holes of 230mm minimum depth and galvanized steel safety railings to be provided in benching of sewers greater than 525mm diameter and depth to invert >3m for access to invert.

14) A safety chain is to be provided on pipes that exceed 450mm in diameter. Mild safety chain shall be 10mm nominal size grade M(H) non-calibrated chain, type 1, complying with B.S.4942 Part 2 or equivalent.

15) When depth of manholes to invert is greater than 3.0m ladders shall be used instead of rungs to B.S.4211 or equivalent except that stringers should be not less than 65 x 12mm in section and rungs 25mm in diameter.
   Fixed ladders should meet the dimensional requirements of B.S.4211 or equivalent.

16) Ladder stringers should be adequately supported from the manhole wall at intervals of not more than 2.0m stringers should be bolted to cleats to facilitate renewal.

17) All ladders, rungs, handrails, safety chains etc shall be hot dip galvanized to B.S.729 or equivalent.

18) Pipe should be cut flush with the inside surface of the manhole wall so that the channel extends the full length of the manhole (except for precast manholes).

19) Position of 910 square ope in intermediate roof slab.
   - All manholes shall be watertight to the satisfaction of the Engineer.
   - Formwork to Reinforced Concrete and Mass Concrete shall comply with Class 2, Section 6.2.7, B.S.811 0: Part 1: 1997.
   - Finish to the top of slabs shall comply with Type A, Section 6.2.7,B.S.8110: Part 1:1997.
   - Plan dimensions of manholes are based on block work having a coordinating size of 450 x 225 x 100.
   - Manholes are designed to B.S.8005 and wall thickness to LS.325 block work design code taking granular fill pressure and H.B. surcharge.
   - Reinforcement to slabs to Engineers details.

20) For manholes >3m depth to invert use 30N/20mm insitu concrete. Reinforcing mesh ref. A393 @ 6.16kg/m to be fixed at mid point of wall. Additional reinforcement to be supplied over pipe crown.

21) For Pre cast Manholes, Chamber walls and cover slab to be constructed to IS EN 1917 and IS 420 2004

22) Manhole Openings to be situated furthest from the nearest Carriageway. Manhole steps / access to be positioned to allow viewing of oncoming traffic.

23) For bedding and sealing of Chamber rings, the top ring (to Pre cast cover slab) and bottom ring to be bedded with cement mortar. For intermediate rings, joints to be sealed with approved pre-formed jointing strip.

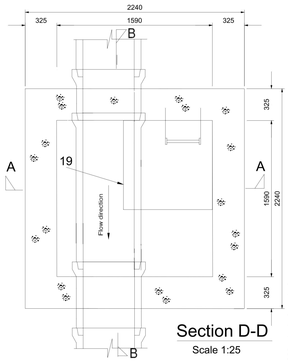
24) Pre cast Manholes to be surrounded with a minimum of 150mm thick Grade C20/40 concrete

General Notes

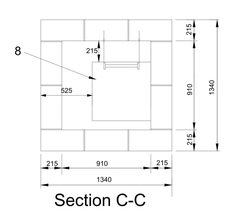
i) All brick to be Solid Engineering Brick Class A or B.

ii) For pipe diameter >750mm use manhole with internal diameter size = pipe size + 1metre + 300mm.

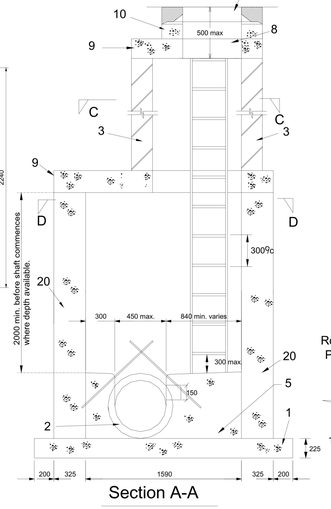
iii) Distance from the top rung of the ladder to ground level must be a maximum of 500mm.



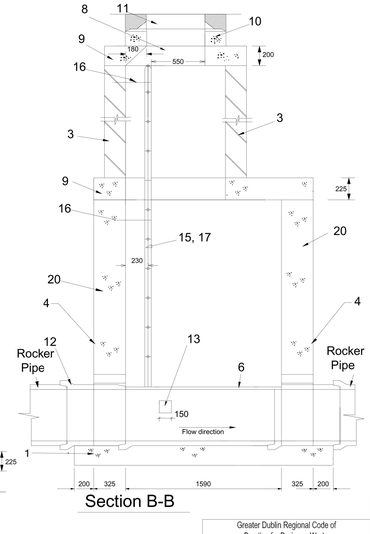
Section D-D
Scale 1:25



Section C-C



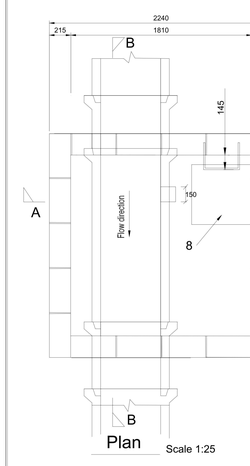
Section A-A



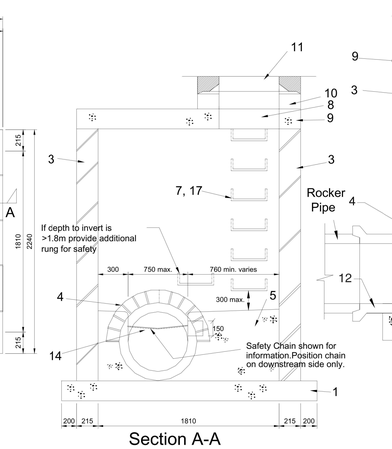
Section B-B

Manhole Details For Pipe Diam's. 225, 300, 375, 450.
Depth to Invert 3m. to 6m.

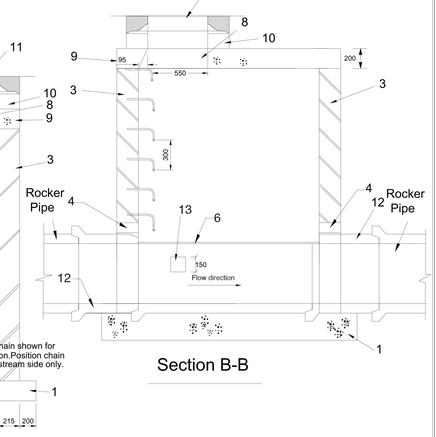
Greater Dublin Regional Code of Practice for Drainage Works			
Project:	STANDARD MANHOLE DETAILS		
Title:	TYPE C MANHOLE		
Drawn: JOM	Checked:	Approved:	
Date: FEB 2000	Scale: NOT TO SCALE	Drawing No.: 2127/03	
Revision		Made by: KOS	Date: 12/11/02



Plan
Scale 1:25



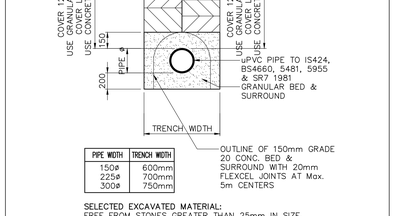
Section A-A



Section B-B

Manhole Details For Pipe Diam's. 525, 600, 675 & 750mm
Depth to Invert 1.0m to 3m.

Greater Dublin Regional Code of Practice for Drainage Works			
Project:	STANDARD MANHOLE DETAILS		
Title:	TYPE D MANHOLE		
Drawn: JOM	Checked:	Approved:	
Date: FEB 2000	Scale: NOT TO SCALE	Drawing No.: 2127/04	
Revision		Made by: KOS	Date: 12/11/02



PIPE WIDTH	TRENCH WIDTH
150ø	600mm
225ø	700mm
300ø	750mm

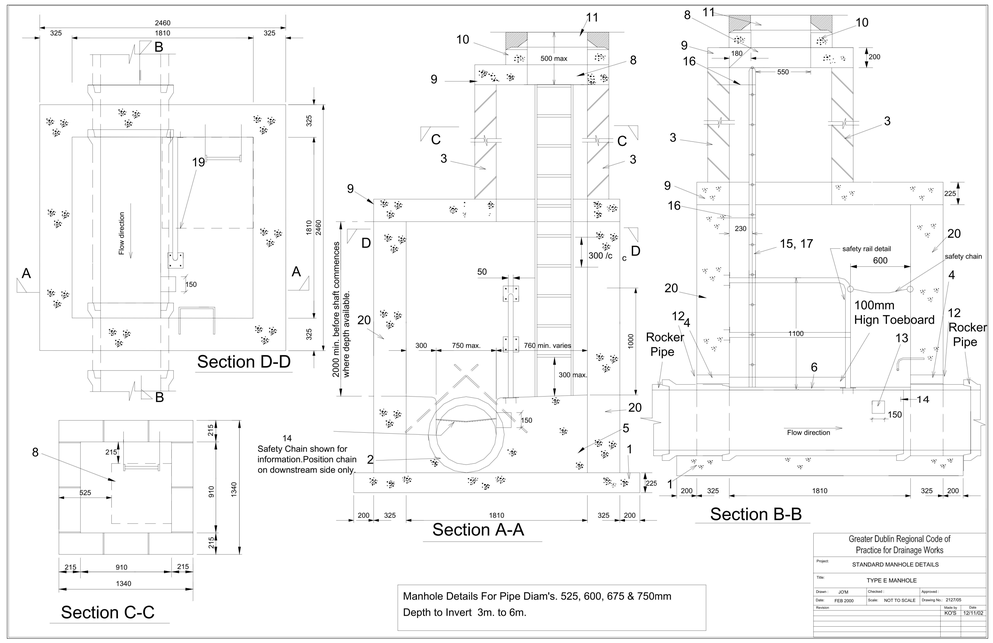
SELECTED EXCAVATED MATERIAL:
FREE FROM STONES GREATER THAN 25mm IN SIZE, BUILDING RUBBLE, TREE ROOTS, VEGETABLE MATTER & LUMPS OF CLAY GREATER THAN 75mm IN SIZE.

TYPICAL MAIN DRAINAGE TRENCH
(NTS)

Mark	Date	By	Chk.	App.	Revision
P1	30-11-22	PB	DOS		PRELIMINARY ISSUE

Job Title: WALKINSTOWN APARTMENT DEVELOPMENT	Drawing Title: SW MANHOLES HYDROBRAKE MH, HEADWALL, AND BACKDROP DETAILS 1 OF 2	Drawn: PB	KAVANAGH BURKE CONSULTING ENGINEERS
		Checked: DOS	Tel. 01 - 450 0694 Unit G3, Calmount Pk.
		Approved: ———	Fax. 01 - 426 4340 Ballymount.
		Scales: NTS	Email: pkavanagh@kavanaghburke.ie Dublin 12.
Architect/Client: MONTANE PROPERTIES LTD.	Drawing Status: PRELIMINARY	Date: 30-11-22	Job No. D1752 / Drawing No. DR-C-0013 / Rev. P1

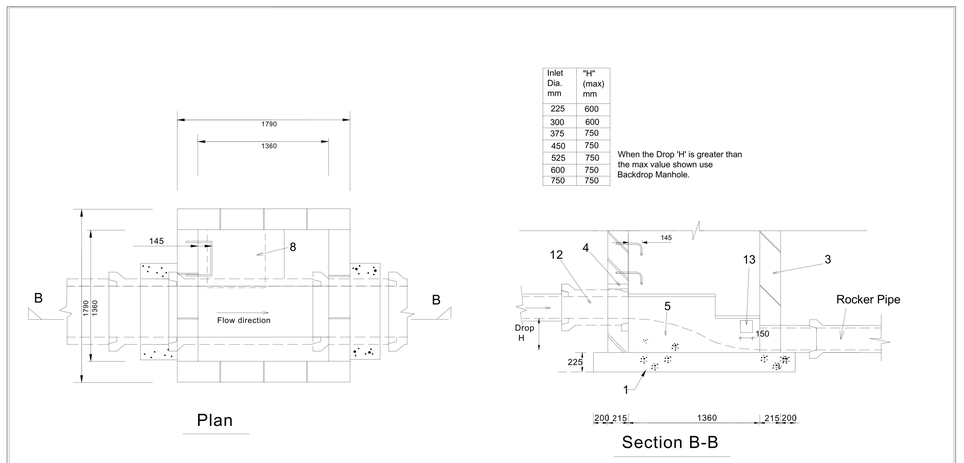
A0



Manhole Details For Pipe Diam's. 525, 600, 675 & 750mm
Depth to Invert 3m. to 6m.

Project:	STANDARD MANHOLE DETAILS
Title:	TYPE E MANHOLE
Drawn: JOM	Checked:
Date: FEB 2000	Scale: NOT TO SCALE
Drawing No.: 2127/05	
Revision	Made by: KO'S Date: 12/11/02

Greater Dublin Regional Code of Practice for Drainage Works



Inlet Dia. mm	"H" (max) mm
225	600
300	600
375	750
450	750
525	750
600	750
750	750

Ramp Manhole Details For Pipe Diam's. 150, 225, 300, 375, 450, 525, 600, 750mm
Drop < 750mm

Project:	STANDARD MANHOLE DETAILS
Title:	TYPE F MANHOLE (RAMP)
Drawn: JOM	Checked: Approved:
Date: MAR 2000	Scale: NOT TO SCALE
Drawing No.: 2127/06	
Revision	Made by: KO'S Date: 12/11/02

Greater Dublin Regional Code of Practice for Drainage Works

Drawing Notes:

1) 225mm thick Cl. 20N/20mm Mass Concrete Foundations.

2) Preformed half circle channel pipes. The pipeline may, where practicable, be laid through the manhole and the crown cut out to half diameter, provided flexible joints are situated on each side no further than 600mm from the inner face of manhole wall.

3) Manhole construction.
   - For Surface Water Manholes high-density blocks to Cl.S10 of IS.20 Part 1:1987 or Cl. 30N/20mm insitu concrete.
   - Block work shall be bedded and jointed using mortar to IS406. Beds and vertical joints shall be completely filled with mortar as the blocks are laid.
   - Joints shall be flush pointed as the work proceeds.
   - All Foul Manholes must be faced in solid Engineering Brick (min. class A or B), or insitu concrete for 1 metre above Benching Level.
   - Brick to be bonded to block work using English Garden Wall Bond.

4) Relieving arch formed by 215x103x65 solid engineering brick Class A or B as per drawing.
   Relieving arches used in brick or block work manholes extend over full thickness of wall.
   A Double Arch is to be formed for pipe diameters greater than 600mm.

5) Benching and pipe channel pipe surround - Cl. 20/20 concrete.

6) Benching finished in 2:1 sand-cement mortar with a smooth trowel finish, at 1 in 30 slope towards channel.

7) Standard rungs at 300c/c vertically and galvanized to the latest version ofB.S. 729 or equivalent. Note: Steps Irons are not acceptable.

8) 600mm square ope in roof slab.

9) Precast R.C. Roof Slab shall be 200mm thick in Class 30N/20mm, with 40mm cover to steel.

10) 1 to 2 courses of solid engineering bricks Cl.B to I.S.91:1983 set in 1:3 (cement and mortar).

11) Class D400 or E600 manhole cover and frame to IS/EN 124. 150mm deep frame for roads and 100mm deep for footpaths and green areas. Non-rock design, closed keyways, manufactured from spheroidal graphite cast iron (ductile cast iron), 600 x 600 (600diam.) clear opening, cover and frame coated in bitumen or other approved material, cover to have a minimum mass of 140kg/m2, frame bearing area shall be 80,000mm2 min, frames shall be designed to prevent covers falling into manhole. Frames shall be bedded on approved mortar to manufactures instructions.

12) Short length pipe and pipe joint external to manhole shall not exceed 600mm from the inner face of manhole wall.

13) Toe holes of 230mm minimum depth and galvanized steel safety railings to be provided in benching of sewers greater than 525mm diameter and depth to invert >3m for access to invert.

14) A safety chain is to be provided on pipes that exceed 450mm in diameter. Mild safety chain shall be 10mm nominal size grade M(H) non-calibrated chain, type 1, complying with B.S.4942 Part 2 or equivalent.

15) When depth of manholes to invert is greater than 3.0m ladders shall be used instead of rungs to B.S.4211 or equivalent except that stringers should be not less than 65 x 12mm in section and rungs 25mm in diameter.
   Fixed ladders should meet the dimensional requirements of B.S.4211 or equivalent.

16) Ladder stringers should be adequately supported from the manhole wall at intervals of not more than 2.0m stringers should be bolted to cleats to facilitate renewal.

17) All ladders, rungs, handrails, safety chains etc shall be hot dip galvanized to B.S.729 or equivalent.

18) Pipe should be cut flush with the inside surface of the manhole wall so that the channel extends the full length of the manhole (except for precast manholes).

19) Position of 910 square ope in intermediate roof slab.
   - All manholes shall be watertight to the satisfaction of the Engineer.
   - Formwork to Reinforced Concrete and Mass Concrete shall comply with Class 2, Section 6.2.7, B.S.8110: Part 1: 1997.
   - Finish to the top of slabs shall comply with Type A, Section 6.2.7,B.S.8110: Part 1:1997.
   - Plan dimensions of manholes are based on block work having a coordinating size of 450 x 225 x 100.
   - Manholes are designed to B.S.8005 and wall thickness to LS.325 block work design code taking granular fill pressure and H.B. surcharge.
   - Reinforcement to slabs to Engineers details.

20) For manholes >3m depth to invert use 30N/20mm insitu concrete. Reinforcing mesh ref. A393 @ 6.16kg/m to be fixed at mid point of wall. Additional reinforcement to be supplied over pipe crown.

21) For Pre cast Manholes, Chamber walls and cover slab to be constructed to IS EN 1917 and IS 420 2004

22) Manhole Openings to be situated furthest from the nearest Carriageway. Manhole steps / access to be positioned to allow viewing of oncoming traffic.

23) For bedding and sealing of Chamber rings, the top ring (to Pre cast cover slab) and bottom ring to be bedded with cement mortar. For intermediate rings, joints to be sealed with approved pre-formed jointing strip.

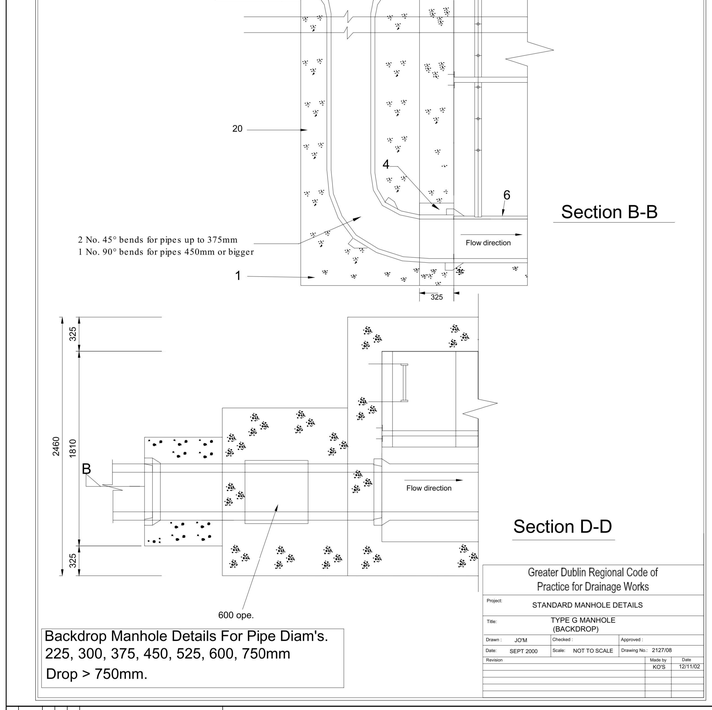
24) Pre cast Manholes to be surrounded with a minimum of 150mm thick Grade C20/40 concrete

General Notes

i) All brick to be Solid Engineering Brick Class A or B.

ii) For pipe diameter >750mm use manhole with internal diameter size = pipe size + 1metre + 300mm.

iii) Distance from the top rung of the ladder to ground level must be a maximum of 500mm.

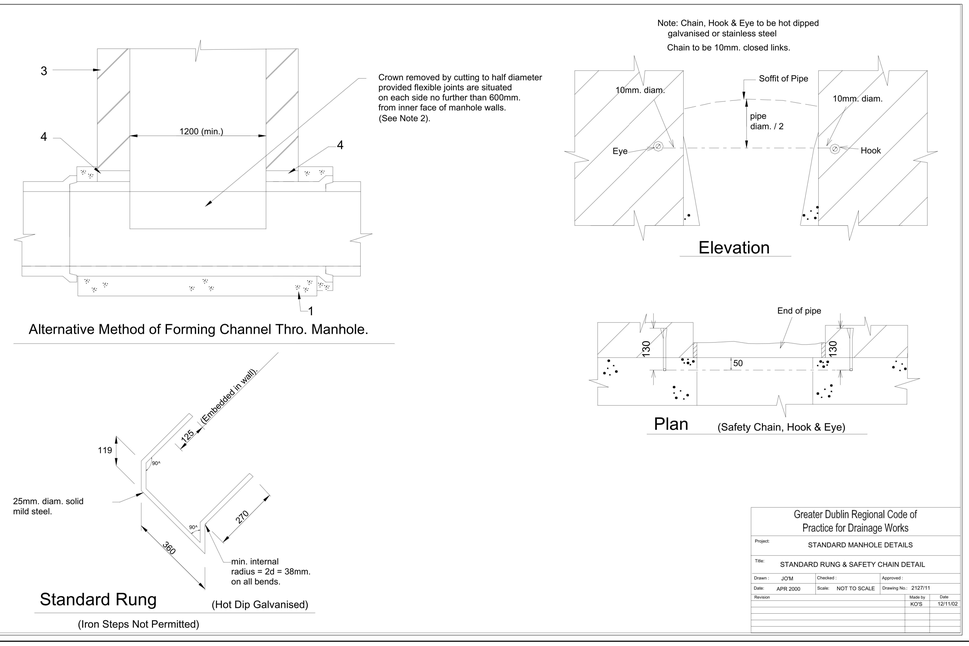


Inlet Dia. mm	Drop Dia. mm
225	300
300	375
375	375
450	450
525	450
600	450
750	600

Backdrop Manhole Details For Pipe Diam's.
225, 300, 375, 450, 525, 600, 750mm
Drop > 750mm.

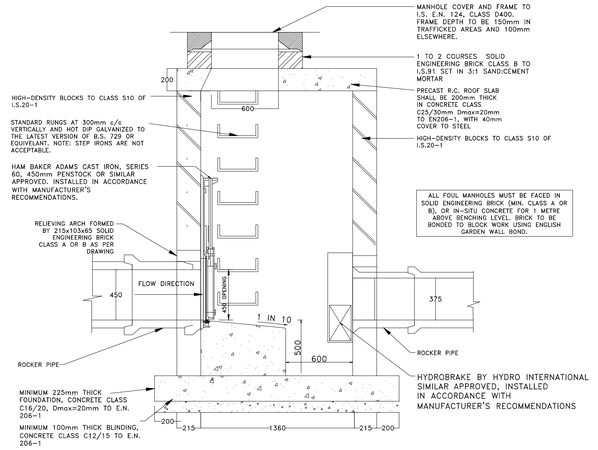
Project:	STANDARD MANHOLE DETAILS
Title:	TYPE G MANHOLE (BACKDROP)
Drawn: JOM	Checked: Approved:
Date: SEPT 2000	Scale: NOT TO SCALE
Drawing No.: 2127/08	
Revision	Made by: KO'S Date: 12/11/02

Greater Dublin Regional Code of Practice for Drainage Works



Project:	STANDARD MANHOLE DETAILS
Title:	STANDARD RUNG & SAFETY CHAIN DETAIL
Drawn: JOM	Checked: Approved:
Date: APR 2000	Scale: NOT TO SCALE
Drawing No.: 2127/11	
Revision	Made by: KO'S Date: 12/11/02

Greater Dublin Regional Code of Practice for Drainage Works



HYDROBRAKE MANHOLE DETAIL

Mark	Date	By	Chk.	App.	Revision
P1	30-11-22	PB	DOS		PRELIMINARY ISSUE

Job Title	WALKINSTOWN APARTMENT DEVELOPMENT
Drawing Title	SW MANHOLES HYDROBRAKE MH, HEADWALL, AND BACKDROP DETAILS 2 OF 2
Architect/Client	MONTANE PROPERTIES LTD.
Drawing Status	PRELIMINARY
Drawn	PB
Checked	DOS
Approved	
Scales	NTS
Date	30-11-22

KAVANAGH BURKE CONSULTING ENGINEERS
Tel. 01 - 450 0694 Unit G3, Calmount Pk.
Fax. 01 - 426 4340 Ballymount,
Email: pkavanagh@kavanaghburke.ie Dublin 12.

Job No.	Drawing No.	Rev.
D1752	DR-C-0014	P1

STORMWATER AUDIT (STAGE 2)

JBA Project Code	2022s1224
Contract	Stage 2 SWA Walkinstown Apartment Development, Dublin 12
Client	Kavanagh Burke
Prepared by	Leanne Leonard
Subject	Stormwater Audit Stage 2 Report

Revision History

Issue	Date	Status	Issued to
S3-P01	06/12/2022	Final issue	Kavanagh Burke
A4-C01	13/12/2022	S2.3.1	Kavanagh Burke

1 Introduction

JBA Consulting have been contracted by Kavanagh Burke Consulting Engineers (KB) to undertake a Stage 2 SW Audit of the surface water drainage design for the proposed Walkinstown Apartment Development on behalf of Montane Developments (Irl) Ltd. Although the development falls within the South Dublin County Council district, this audit has been completed in accordance with Dún Laoghaire Rathdown County Council's (DLRCC) Stormwater Audit Procedure (Rev 0, Jan 2012) as the only available SW Audit guidance. This procedure is set out below.

Stage 2 – Detailed Design Stage *– carried out at the Detailed Design stage, prior to commencement of construction, to check the detail of all the SUDS elements and to ensure that any necessary amendments have been included in the Construction drawings. The Stage 2 Audit report must be submitted to [South Dublin Co Co] for approval prior to commencement of the works. All recommendations shall be complied with, unless otherwise agreed in writing with [South Dublin Co Co]. It should be noted that any proposed changes to the approved scheme must be submitted to [South Dublin Co Co] for formal compliance. Any planning conditions can only be discharged by the Planning Department.*

The development has a conditional grant of planning permission (ABP-311190-21) dated 22 Jun 2022 and condition 11 relates to the disposal of storm water and is set out below;

11. Water supply and drainage arrangements, including the attenuation and disposal of surface water, shall comply with the requirements of the planning authority for such works and services. Prior to commencement of development the developer shall submit the following details to the Planning Authority for written agreement:

(i) Revised surface water drainage calculations, conveyance and attenuation details (to include SUDS details and details of flow control device) to meet the surface water storage requirements of the development. The maximum discharge rate for surface water shall be Qbar rural or c. 2 litres per second.

(ii) Prior to commencement of development a Stage 2 – Detailed Design Stage Storm Water Audit shall be submitted to the Planning Authority for written agreement.

(iii) Upon Completion of the development, a Stage 3 Completion Stormwater Audit to demonstrate Sustainable Urban Drainage System measures have been installed and are working as designed and that there has been no misconnections or damage to storm water drainage infrastructure during construction, shall be submitted to the planning authority for written agreement.

Reason: In the interest of public health and surface water management.

1.1 Report Structure

The Feedback Form in Appendix A identifies queries raised in this report which are to be answered by the Design Engineers. Once an 'Acceptable' status is achieved for each query the audit is deemed to be closed out.

The results of the audit are set out hereunder, where items raised in the feedback form are shown in bold within this report.

1.2 Relevant Studies and Documents

The following documents were considered as part of this surface water audit:

- Greater Dublin Strategic Drainage Strategy (GDSDS);
- Greater Dublin Regional Code of Practice for Drainage Works;
- The SUDs Manual (CIRIA C753).
- South Dublin County Development Plan 2022-2028
- BRE Digest 365

The documentation provided by Kavanagh Burke for review is listed below;

- D1752 Drainage Report P1.pdf
- D1752-KB-XX-XX-DR-C-0001-Drianage & Watermain Layout_RevP1.pdf
- D1752-KB-XX-XX-DR-C-0002-Attenuation Tank Details_RevP1.pdf
- D1752-KB-XX-XX-DR-C-0003-SuDS Layout_RevP1.pdf
- D1752-KB-XX-XX-DR-C-0004-SuDS Details_RevP1.pdf
- Grant.pdf

Planning Stage SW Package (for compliance):

- DR-C-10007 Rev P03 – Proposed SUDS Measures.pdf
- DR-C-10008 Rev P01 – Bio Retention And Tree Pit Details & Sections .pdf
- DR-C-10009 Rev P04 – Proposed Combined Drainage Layout.pdf
- DR-C-10010 Rev P08 – Proposed Watermain Layout.pdf
- DR-C-10011 Rev P08 – Proposed Foul Water Layout.pdf
- DR-C-10012 Rev P09 – Proposed Surface Water Layout.pdf
- DR-C-10013 Rev P07 – Exceedance Scenario Layout.pdf
- DR-C-10014 Rev P04 – Proposed Foul Longitudinal Sections.pdf
- DR-C-10015 Rev P03 – Proposed Surface Longitudinal Sections.pdf
- DR-C-10016 Rev P01 – Standard Watermain Details.pdf
- DR-C-10017 Rev P01 – Standard Manhole Details.pdf
- DR-C-10018 Rev P01 – Standard Trench Details.pdf
- DR-C-10019 Rev P01 – Standard Gully & Kerb Details.pdf
- DR-C-10020 Rev P01 – Standard Attenuation Tank Details.pdf
- Engineering Services Report Addendum Response to PA Opinion.pdf
- MMOS Rev. 04 - Walkinstown Aparts – Engineering Services Report .pdf

1.3 Key Considerations and Benefits of SuDS

The key benefits and objectives of SuDS considered as part of this audit and listed below include:

- Water Quantity
- Water Quality
- Amenity
- Biodiversity

Which can be achieved by:

- Storing runoff and releasing it slowly (attenuation)
- Harvesting and using the rain close to where it falls
- Allowing water to soak into the ground (infiltration)
- Slowly transporting (conveying) water on the surface
- Filtering out pollutants
- Allowing sediments to settle out by controlling the flow of the water

1.3.1 SuDs Management Train

A SuDs Management Train is a robust pollutant removal strategy. The treatment train can comprise four stages:

1. *Prevention*
2. *Source Control*
3. *Site Control*
4. *Regional control*

2 Proposed Development

The site is a brownfield site with existing warehousing and associated small outbuildings and plant to be demolished. The site is stated to be 0.93 hectares and is accessed from the Ballyfermot Road to the South. The location of the site is shown in Figure 1 below.

Figure 1- Site Location

The residential development consists of 171 apartments across two buildings, referred to as Building A and Building B, a creche and café and over a shared basement. Building A is split height ranging from 4 to 8 storeys. Building B is also split height ranging from 2 to 6 storeys. There is a natural gradient of approx. 2m across the site, with a flat central area. There is an existing tree line to the East and North of the site, which will be retained and enhanced with new planting in select locations.

2.1 Review of SW Drainage Proposals

2.1.1 Stage 1 SW Audit

It is not clear whether a Stage 1 SW Audit was undertaken at planning stage as it is not a requirement of South Dublin City Council. Completion of Stage 2 and Stage 3 Audits were included as planning conditions by An Bord Pleanála.

KB to confirm whether or not a Stage 1 SW Audit was undertaken.

2.1.2 Site Characteristics

No details of site investigation have been provided or referenced so it is unclear if any investigation has been carried out. A soil type 2 has been assumed in the Qbar calculations which matches that shown on the uksuds website.

Qbar for the site was calculated as 1.86 l/s using an impermeable area of 0.931 ha and a SAAR of 771mm. KB have adopted a discharge rate of 2.0 l/s, which is greater than Qbar and the 2 l/s/ha (1.9 l/s) limit. However, the difference is minimal and unlikely to significantly impact the attenuation calculations.

KB to advise whether any SI has been carried out and if so, provide details of same.

However, the discharge rate should be agreed with SDCC.

2.1.3 SuDS Measures Considered

SuDS Technology	Comments
Green/Blue Roofs	Green roofs have been proposed to all apartment blocks. **Build up details are provided on drawing DR-C-0003**
Swale, Filter Drain, Infiltration Trench	Swales and French drains are proposed along the north and west of the development to both convey and store runoff prior to entering the attenuation tank. It is not clear whether a permeable or impermeable membrane will be provided to the filter drains and swale as typical details have not been provided. **KB to provide typical details through filter drains and swales and clarify whether a permeable or impermeable liner is proposed to the permeable paving.**
Tree Pits, Bioretention Areas, Rain Gardens	Tree pits are proposed to the south of the development however their proposed locations appear to clash with the proposed watermain. A permeable geotextile has been proposed to the tree pits. Although infiltration is encouraged for interception benefits, groundwater monitoring should be carried out to ensure that infiltration does not occur within 1m of the winter groundwater table. **KB to undertake a clash detection exercise to ensure that the minimum separation distances as set out by Irish Water are achieved.** **KB to advise whether groundwater monitoring has taken place and confirm that infiltration does not occur within 1m of the winter groundwater table.**
Permeable Paving	Permeable paving is proposed to car parking spaces and a permeable footpath has been proposed across the public green area, but no build up details have been provided. It is not clear whether a permeable or impermeable membrane will be provided to the permeable paving **KB to provide details for proposed permeable paving.** **KB to clarify whether a permeable or impermeable liner is proposed to the permeable paving.**
Soakaways	None proposed
Detention Basins, Retention Ponds, Stormwater Wetlands	None proposed
Rainwater	None proposed.

Harvesting	
Petrol Interceptor	Proposed upstream of the attenuation tank.
Attenuation	2 nr. RC attenuation tanks with a combined capacity of 599m3 shown on drawing DR—0001. The planning drawings proposed a StormTech attenuation structure, and it is not clear why this has changed or if it has been agreed with SDCC. **KB to advise why RC tanks are now proposed and advise whether this has been discussed and agreed with SDCC**.
Other	N/A

2.1.4 Review of drainage design and drawings

The Planning drawings proposed StormTech attenuation structures whereas the tender drawings propose RC tanks. Typically, RC tanks should only be used where no other solution exists and they do not provide any water quality benefits, whereas the Isolator Row in the StormTech units provides some benefits.

It is not clear from the drainage layout, how run-off will be directed to the tree pits

KB to advise why RC tanks are now proposed and whether this has been discussed with SDCC.

KB to clarify how run-off will be directed towards the tree pits.

2.1.5 FLOW Calculation

The site area is stated to be 0.903 ha but just 0.821 ha appears to have been modelled in the Flow calculations. It is not clear if reduced runoff factors have been used or whether some areas are deemed not to contribute.

If reduced runoff factors have been applied, it is typically recommended to use Cv factors of 1.0 to avoid “double counting” the reduction factors. Reduced Cv values of 0.75 and 0.84 (software defaults) have been used in the model.

The network has been sized for the 2-year period however, rainfall intensities have been limited to 50mm/hr. As flooding is not shown up to the 100-year event this is not expected to cause any issues.

A 20% allowance has applied to all return periods modelled to account for climate change.

The drainage layout drawing states that 599m3 is provided in the attenuation tanks but a volume of 614m3 has been provided within the model. While the simulation results would suggest that a volume of 599m3 is likely to be sufficient, the model should be updated to reflect the actual site proposals to ensure compliance.

KB to advise if reduced run-off factors have been applied to the design.

If reduced runoff factors have been used, KB to consider increasing the Cv values in the model to 1.0.

KB to update the model to reflect the actual storage volume provided.

2.1.6 Interception/Treatment

Interception of runoff is intended to prevent any runoff for small rainfall events which are less than 5mm

(and up to 10mm if possible). Treatment of 15mm is required if interception is not provided.

Table 24.6 of the CIRIA manual provides indication of deemed to satisfy criteria and it is considered that this should be complied with. All sources of runoff should also be intercepted where possible. A high level of Interception provided for some parts of the site is not to be considered as adequate compensation for a low degree of interception provision for other locations. Compliance is required for the whole site, or at least for road/paved areas, for it to be considered effective. Interception mechanisms are based on runoff retention. This can be achieved using rainwater harvesting or using soil storage and evaporation. Either infiltration or transpiration rates can dispose of the runoff from minor events to enable the next event to be captured.

S4 (2) of the Kavanagh Burke Drainage Report calculates a total interception volume requirement of 38.9m3 based on 5mm interception across the whole site. S 4 (4) notes that this volume will be provided by the green roofs. This analysis is incorrect and does not comply with the concept of interception. Runoff from all areas should pass through at least one SuDS measure and overcompensation in one area cannot remove the requirement in another area. Interception proposals should be in compliance with Table 24.6 of the CIRIA SuDS Manual.

Some gullies are shown to discharge directly to the piped network, suggesting that no interception takes place at these locations.

KB to advise how all areas are intercepted in accordance with Table 24.6 of the CIRIA SuDS Manual.

KB to review the locations of all gullies to ensure that all runoff is intercepted prior to entering the network.

2.1.7 Exceedance Flows

The Planning drawings show a sump pump and rising main arrangement for exceedance events but these have not been included in the tender drawings.

KB to advise how exceedance flows will be managed?

2.2 Health & Safety and Maintenance Issues

The proposed drainage system comprises SuDS devices, traditional road gullies, manholes, attenuation systems, a petrol interceptor, pumped flow controls and suspended/underground pipes. These elements are considered acceptable from a Health & Safety perspective once supplier/manufacturers guides are followed and complied with during the detailed design, construction and operation.

Optimum performance of the SUDs treatment train is subject to the frequency of maintenance provided. It is recommended that a maintenance regime be adopted.

It is recommended that the petrol interceptors be fitted with an audible high-level silt and oil alarm for maintenance and safety purposes. Regular inspection and maintenance is recommended for the petrol interceptor.

Please note that silt and debris removed from the petrol interceptor during maintenance will be classified as contaminated material and should only be handled and transported by a suitably licensed contractor and haulier and disposed of at a suitably licensed landfill only.

2.3 Audit Conclusions

This report outlines the review of the initial submission by Consulting Engineers. JBA comments are also included in the Audit Feedback Form in Appendix A. This Feedback Form shows the audit trail and the responses from the designer and additional data provided. All queries have been satisfactorily addressed, with some items requiring consultation and acceptance of proposed assumptions/approaches with SDCC. The audit is therefore, considered closed.

2.3.1 Post Audit Note

Updated drainage layout (D1752-KB-XX-XX-DR-C-0001-Drainage Layout_RevP3) and attenuation tank details (D1752-KB-XX-XX-DR-C-0002-Attenuation Tank Details_RevP3) drawings were issued on 13th December 2022. These showed replacement of the previously proposed split RC attenuation tank with a singular RC attenuation tank. The plan area has increased marginally, from 322m2 to 331m2, whereas the invert level and top of tank level have not changed. This change is not expected to have an impact on the design and the feedback form remains valid. The audit is therefore, considered closed.

2.4 Audit Report sign Off

Audit Report Prepared by:

Leanne Leonard BEng (Hons) MIEI
Senior Engineer

Approved by:

Chris Wason BEng, CEng MICE
Principal Engineer

Note:

JBA Consulting Engineers & Scientists Ltd. role on this project is as an independent reviewer/auditor. JBA Consulting Engineers & Scientists hold no design responsibility on this project. All issues raised and comments made by JBA are for the consideration of the Design Engineer. Final design, construction supervision, with sign-off and/or commissioning of the surface water system so that the final product is fit for purpose with a suitable design, capacity and life-span, remains the responsibility of the Design Engineers.

Appendix A – Audit Feedback Form

JBA Consulting Stormwater Audit - Stage 2 Feedback Form

Project:	St 2 SWA Walkinstown Apartment Development, Dublin 12
Date:	06/12/2022 (S4-P03)
JBA Reviewers	Leanne Leonard
Project Number:	2022s1224

Item No.	JBA Review Comment	Comment/Clarification Request/Suggested Mitigation	Response from Client/Client Representative	Acceptable / Not Acceptable
	07/10/2022	07/10/2022	16/11/2022	
	Reference Documents •Đ1752 Drainage Report P1.pdf •Đ1752-KB-XX-XX-DR-C-0001-Drianage & Watermain Layout_RevP1.pdf •Đ1752-KB-XX-XX-DR-C-0002-Attenuation Tank Details_RevP1.pdf •Đ1752-KB-XX-XX-DR-C-0003-SuDS Layout_RevP1.pdf •Đ1752-KB-XX-XX-DR-C-0004-SuDS Details_RevP1.pdf •Ğrant.pdf Planning Drainage Package: •ĐR-C-10007 Rev P03 – Proposed SUDS Measures.pdf •ĐR-C-10008 Rev P01 – Bio Retention And Tree Pit Details & Sections .pdf •ĐR-C-10009 Rev P04 – Proposed Combined Drainage Layout.pdf •ĐR-C-10010 Rev P08 – Proposed Watermain Layout.pdf •ĐR-C-10011 Rev P08 – Proposed Foul Water Layout.pdf •ĐR-C-10012 Rev P09 – Proposed Surface Water Layout.pdf •ĐR-C-10013 Rev P07 – Exceedance Scenario Layout.pdf •ĐR-C-10014 Rev P04 – Proposed Foul Longitudinal Sections.pdf •ĐR-C-10015 Rev P03 – Proposed Surface Longitudinal Sections.pdf •ĐR-C-10016 Rev P01 – Standard Watermain Details.pdf •ĐR-C-10017 Rev P01 – Standard Manhole Details.pdf •ĐR-C-10018 Rev P01 – Standard Trench Details.pdf •ĐR-C-10019 Rev P01 – Standard Gully & Kerb Details.pdf •ĐR-C-10020 Rev P01 – Standard Attenuation Tank Details.pdf •Ēngineering Services Report Addendum Response to PA Opinion.pdf •ŴMOS Rev. 04 - Walkinstown Aparts – Engineering Services Report .pdf			
1	A Stage 1 SW Audit has not been provided however, one may not have been completed as it is not a requirement of South Dublin County Council.	KB to confirm whether or not a Stage 1 SW Audit was completed at Planning Stage and if so provide a copy.	As far as we are aware, no Stage 1 SW Audit was completed at Planning Stage.	Acceptable
2	No details of site investigation have been provided or referenced. Have any SI works been undertaken?	KB to advise.	Site Investigations Ltd completed a site investigation in 2014. A copy of this report is attached.	Acceptable
3	Further to the above, a permeable geotextile has been proposed to the tree pits. Although infiltration is encouraged for interception benefits, groundwater monitoring should be carried out to ensure that infiltration does not occur within 1m of the winter groundwater table.	KB to advise whether groundwater monitoring has taken place and confirm that infiltration does not occur within 1m of the winter groundwater table.	In the site investigation completed in 2014, the highest recorded groundwater level was approximately 3.30mbgl. This equates to an approximate OD level of 48.00mOD. In no case will the depth of the proposed SuDS elements including the tree pits be within 1.0m of this depth. Refer to KB Ref D1752-KB-XX-XX-DR-C-0004-SuDS Details & Sections_RevP2.	Acceptable subject to SDCC agreement.
4	Bearing the above in mind, it is not clear whether a permeable or impermeable membrane will be provided to the filter drains, swale and permeable paving areas.	KB to update drawings to identify what type of geotextile is proposed to each SuDS feature.	A permeable membrane will be provided as required, see updated details provided on KB Ref D1752-KB-XX-XX-DR-C-0004-SuDS Details & Sections_RevP2.	Acceptable subject to SDCC agreement.
5	A typical detail for the filter drains or permeable paving have not been provided.	KB to include in details drawing.	Refer to KB Ref D1752-KB-XX-XX-DR-C-0004-SuDS Details & Sections_RevP2 for filter drains and permeable paving details.	Acceptable
6	It is not clear from the drainage layout, how run-off will be directed to the tree pits. Furthermore, the watermain is shown to run through each of the proposed tree pits which is against the IW COP and would suggest there may be a service clash.	KB to review and advise.	Surface water flow arrows added to the drawings to indicate direction of flow towards tree pits, swales, permeable paving, etc. The watermain has been removed from underneath the tree pits. However, due to restrictions on the space available between the building line and the road both the foul and storm lines will be under the trees pits along Ballymount Road Lower. We are currently in discussions with IW about this. Refer to KB Ref D1752-KB-XX-XX-DR-C-0001-RC Storm Water & Foul Sewer Drainage Layout_RevP2, D1752-KB-XX-XX-DR-C-0004-SuDS Details & Sections_RevP2 and D1752-KB-XX-XX-DR-C-0005-Watermain Layout_RevP2.	Acceptable subject to IW agreement.
7	Gullies are shown to discharge directly to the piped network, suggesting that no interception takes place at these locations.	KB to review and update as appropriate.	All gullies are to discharge to tree pits, swales or permeable pavin, as shown on KB Ref D1752-KB-XX-XX-DR-C-0001-RC Storm Water & Foul Sewer Drainage Layout_RevP2.	See Note 14
8	S4 (2) of the Kavanagh Burke Drainage Report calculates a total interception volume requirement of 38.9m3 based on 5mm interception across the whole site. S 4 (4) notes that this volume will be provided by the green roofs. This analysis is incorrect and does not comply with the concept of interception. Runoff from all areas should pass through at least one SuDS measure and overcompensation in one area cannot remove the requirement in another area. Interception proposals should be in compliance with Table 24.6 of the CIRIA SuDS Manual.	KB to advise how all areas are intercepted in accordance with Table 24.6 of the CIRIA SuDS Manual.	To comply with the concept of interception, runoff from all areas pass through at least one SuDS measure, as shown on KB Ref D1752-KB-XX-XX-DR-C-0001-RC Storm Water & Foul Sewer Drainage Layout_RevP2.	Acceptable subject to compliance with Table 24.6
9	The site area is stated to be 0.903 Ha but just 0.821 ha appears to have been modelled in the Flow calculations. Has a reduced run-off factor been applied to the green areas? If so the designer should consider increasing the Cv values to 1.0 to avoid "double counting" the reduction factors.	KB to review and advise.	The 0.154ha public landscaping area is modelled as green area and a 30% permeability factor is applied. Thus, it is reduced to an equivalent contributing area of 0.30 x 0.154ha = 0.046ha. The highest assumed Cv value, the winter Cv, is 0.84. The lost area due to Flow applying this factor to the green area is (1-0.84) x 0.046ha = 0.008ha. On the other hand, 0.350ha of pervious areas considered impermeable, meaning that (1-0.30) x 0.350ha = 0.245ha that could be subtracted are not. This value compensates the lost area and calculations remain conservative. A table summarizing the water attenuation calculations is displayed on the drainage report.	Acceptable subject to SDCC agreement (See Note 15)
10	The drainage layout drawing states that 599m3 is provided in the attenuation tanks but a volume of 614m3 has been provided within the model. While the simulation results would suggest that a volume of 599m3 is likely to be sufficient, the model should be updated to reflect the actual site proposals to ensure compliance.	KB to update the model to reflect the actual storage volume provided.	Attenuation volume calculation is show on KB Ref. D1752-KB-XX-XX-DR-C-0002-RC Tank, Trench & Manhole Details_RevP2. The storage volume figures in the Flow model were adjusted to provide a volume of 599m3, which matches the one indicated on the drawing.	Acceptable (Note: Updated Flow calculations have not been provided)
11	The Planning drawings proposed StormTech attenuation structures but the tender drawings propose RC tanks. Typically RC tanks should only be used where no other solution exists and they do not provide any water quality benefits, whereas the Isolator Row in the StormTech units provides some benefits.	KB to advise why RC tanks are now proposed and whether this has been discussed with SDCC.	The reason the RC attenuation tanks are proposed instead of the StormTech attenuation system are as follows: 1) Interception storage volume is provided throughout the diverse SuDS features proposed across the site, thus on-site infiltration is required through the base of the tanks. 2) All volumes generated by 1 in 100-year storms of all durations is now catered for by the RC attenuation tank. Therefore, the required attenuation volume has increased. To avoid interfering with structural foundations a concrete tank has been adopted.	Acceptable subject to SDCC agreement.

Item No.	JBA Review Comment	Comment/Clarification Request/Suggested Mitigation	Response from Client/Client Representative	Acceptable / Not Acceptable
12	The Planning drawings show a sump pump and rising main arrangement for exceedance events but these have not been included in the tender drawings. How will exceedance flows be managed?	KB to advise.	Exceedance flows will be managed within the SuDS Management Train located along the north-east site boundary, constituted mainly by swales and French drains. As indicated, all flows are directed away from the building footprint, and no flow will run onto the undercroft carpark. Temporary flood storage is checked and provided where needed, as integrated part of the attenuation system, for 100-year return events as per "Great Dublin Strategic Drainage Study" (GDSDS) requirements.	Acceptable
13	Standard drainage details, such as gullies, manhole construction, pipe bedding etc. have not been provided.	KB to provide all tender stage drainage drawings.	Pipe bedding and manhole construction details provided onKB Ref. D1752-KB-XX-XX-DR-C-0002-RC Tank, Trench & Manhole Details_RevP2. Gullies details shown on KB Ref D1752-KB-XX-XX-DR-C-0004-SuDS Details & Sections_RevP2.	See Note 16
	29/11/2022	29/11/2022		
	Reference Documents •D1752-KB-XX-XX-DR-C-0001-Drainage & Watermain Layout_RevP2.pdf •D1752-KB-XX-XX-DR-C-0002-Attenuation Tank Details_RevP2.pdf •D1752-KB-XX-XX-DR-C-0003-SuDS Layout_RevP2.pdf •D1752-KB-XX-XX-DR-C-0004-SuDS Details_RevP2.pdf •D1752-KB-XX-XX-DR-C-0005-Watermain Layout_RevP2.pdf •Site-Investigations-Report-.pdf			
14	Some gullies are still shown to discharge directly to the piped network without first passing through any SuDS feature. E.g. upstream of manhole SW11	KB to review and amend as necessary.	The gullies upstream of the manhole SW11 are under the podium and only for the small amount of water that will run off the cars as they are entering the carpark. It is not possible to run these gullies to a suds feature due to there location.	Acceptable subject to SDCC agreement.
15	Although it is not clear where the figure of 0.35 Ha pervious areas, considered permeable, has come from it seems as though 100% runoff has been assumed from impermeable surfaces. Therefore, the application of Cv factors is unlikely to have a significant impact on the volumes.	No response required.	N/A	N/A
16	Pipe bedding and manhole construction details are not shown on drawing DR-C-0002. Longitudinal sections should also be included in the tender package.	KB to ensure that all details required for tender are included in the tender package.	Details were shown on drawing DR-C-0001. See additional details shown on drawing DR-C-0013 & 0014. Longitudinal sections shown on drg DR-C-00010	Acceptable
17	How is runoff from the podium area collected and intercepted? Drawing DR-C-0003 shows podium landscaping but it is not clear whether these will collect run-off, and if so how they will discharge it back to the system.	KB to clarify how runoff from the podium will be collected, intercepted and discharged back to the network. Details for any proposed SuDS should also be included on the drawings.	Attached is the landscape drawing for the podium. Approximately 45% of the podium is made up of soft landscaping. In so far as possible the run-off from the hard landscaping will be directed towards the soft landscaping. Rainwater outlets will be position in the podium slab to pick up any over flow from the soft landscaping. This has also been indicated on the updated drawing DR-C-003-Rev P3.	Acceptable

Appendix 2

Uisce Éireann Connection Agreement Documents
Ref. CDS1900177002

Declan O' Sullivan
Kavanagh Burke
Unit F3 Calmount Park
Ballymount
Dublin 12

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

CONNECTION OFFER

To: Daryl Skelly
Walkinstown Montane Properties Limited
Unit 51D
Maynooth Business Campus
Maynooth
Kildare
W23D343
Ireland

(the "**Developer**")

Our Ref: **CDS1900177002**

Self-Lay Connection Agreement – CHM Premises, Ballymount Road Lower, Dublin, South Dublin

Date: 24 May 2023

SUBJECT TO CONTRACT

Dear Applicant,

Outcome of your Connection Application - Summary

We have completed the review of your Connection Application.

Irish Water has reviewed your application for a Self-Lay connection(s) to the Network(s). Based upon the details provided by you, Irish Water can offer you a connection(s) for your Development in accordance with the terms of this Connection Offer.

Where can you find more information?

You can find more information about the terms of your Connection Offer in this **Connection Offer letter** and enclosures. Please read this Connection Offer letter and the following enclosed documents, in particular:

- General Conditions for Self-Lay Connections (Appendix 2)
- Special Conditions (Appendix 3)

If you have any queries in relation to this Connection Offer, please contact our Customer Service Department at:

Telephone: 1800 278 278 or +353 1 707 2828

Email: newconnections@water.ie

Web: www.water.ie/contact-us

Next Steps[1] to proceed with this Connection Offer:

- Sign and return the Letter of Acceptance (see attached)
- Pay the Connection Charge (see Section 3(a) below)
- Provide any required Self-Lay Surety (per 3(b) below, including a completed Deposit Agreement)
- Provide any Required Security (see Appendix 8)

You have **90 days** from the date of this Connection Offer to accept the offer.

What to do after Acceptance of the Connection Offer?

- Submit a Commencement Notice (see General Condition 11.3)
- Arrange a Pre-Commencement Meeting (and provide a first draft of the Register of Premises Served) (see General Condition 11.3)

Prior to connection to the Network(s), you must[2]:

- Complete the Water & Wastewater Services Infrastructure in accordance with this Connection Agreement
- Provide all Final Documents
- Provide all required Deeds of Grant of Wayleaves and Easements (including for any Arterial Pipe(s) – see Appendix 3, Part 3 (if applicable)) (per General Condition 13)
- Provide a Register of Premises Serviced (per General Condition 18)

If you wish to proceed with this Connection Offer, please complete the Next Steps listed above.

Yours sincerely

Yvonne Harris

Yvonne Harris
Head of Customer Operations

[1] The purpose of this list is to draw particular attention to the key deliverables in the Connection Agreement. Developers are required to adhere to all requirements specified in the Connection Agreement.

[2] See General Condition 11.15.

Outcome of your Connection Application - Details

Providing a connection between the:

Water Works and Wastewater Works
(the "**Network(s)**")

AND

The development located at CHM Premises, Ballymount Road Lower, Dublin, South Dublin (the "**Development**", as further described below)

Following receipt of your application for a connection of your Development to the Network(s) (the "**Connection Application**", a copy of which is included in **Appendix 1)**, Irish Water is pleased to offer you ("**You**" or the "**Developer**"), a Connection between the Network(s) and the Development, subject to and in accordance with the conditions set out in this Connection Offer(the "**Connection Offer**"), the General Conditions for Self-Lay Connections (the "**General Conditions**", copy attached in Appendix 2) and any Special Conditions pertaining to this connection (the "**Special Conditions**", as may be attached in Appendix 3).

1. Connection Agreement

We enclose a Letter of Acceptance for your consideration.
We would encourage You to read the entirety of this Connection Offer including the appendices hereto and, in particular, the General Conditions and the Special Conditions. If You are satisfied with these and wish to proceed, please:

a) arrange for the Letter of Acceptance, duly executed by You, to be returned to **Irish Water, PO Box 860, South City Delivery Office, Cork City** marked for the attention of *Yvonne Harris, Head of Customer Operations*,

b) arrange for payment of the Connection Charge in accordance with section 3(a) below;

c) provide the required Self-Lay Surety (per 3(b) below);

d) provide confirmation that any Required Security, as specified in Appendix 8 hereto, has been put in place.

You and Irish Water acknowledge that there shall be no intention to create any legally binding contract between You and Irish Water unless and until You have complied with the steps outlined at 1 (a) – (d) above. If, in the opinion of Irish Water, You have not fully complied with any of the steps outlined at 1 (a) – (d) above, no legally binding contract shall come into force between You and Irish Water.

Once You have fully complied with the steps outlined at 1 (a) – (d) above, the Connection Agreement shall become legally binding on You and Irish Water (to the extent that any of the steps outlined at 1 (a) – (d) occur on different days, the Connection Agreement shall commence on the last date on which all the steps have been fully complied with).

The **Connection Agreement** is comprised of this Connection Offer, the General Conditions, the Special Conditions and the remaining appendices hereto. In the event and to the extent that any conflict or inconsistency arises as between these documents, the following order of precedence shall apply:

i. Special Conditions
ii. General Conditions for Self-Lay Connections
iii. Connection Offer (and the remaining appendices hereto).

Irish Water's decision to make a Connection Offer to You is made in reliance on the information contained in and submitted with the Connection Application. If the information supplied is incorrect or found to be materially inaccurate in any way, Irish Water reserves the right to apply additional Connection Charges, to impose additional contract terms and/or take any steps in accordance with the General Conditions.

This Connection Offer is based on a high-level desk top analysis carried out by Irish Water on the feasibility of a connection for your Development. Once the Connection Offer has been accepted by You, Irish Water will begin a detailed design of the connection. If during the process of detailed design Irish Water, at its discretion, forms the opinion (acting reasonably) that either:

A. a connection to your Development is not feasible or practicable or safe to complete; or
B. a connection to your Development would involve the expenditure by Irish Water of monies in excess of that provided for by way of the Connection Charge,

then the Connection Agreement may be terminated by Irish Water by way of written notice to the Customer.

The Connection Agreement shall constitute the entire agreement between You and Irish Water.

Any reference in this Connection Offer to an Appendix is to an appendix to this Connection Offer.

The relevant Local Authority referred to in the General Conditions is: Sth Dublin County Council

2. Validity of Connection Offer

You have 90 days from the date of this Connection Offer to comply with the steps outlined at 1 (a) – (d) above in order to validly accept this Connection Offer. Thereafter, the Connection Offer shall lapse unless otherwise agreed in writing by Irish Water.

3. Connection Charge & Self-Lay Surety

The Connection Charge(s) shall be determined in accordance with Irish Water's Connection Charging Policy as set out in the Water Charges Plan (which can be found at www.water.ie/connections)

(a) **Connection Charge**
The Water Connection Charge is €297,674.00
The Wastewater Connection Charge is €580,209.00

The Connection Charge is €877,883.00 (the "**Connection Charge**"); a breakdown of the Connection Charge is set out in Appendix 4.

Payment of the **Connection Charge** can be made by:

a. Cheque, made payable to "Irish Water" or

b. Money Transfer, by EFT to the following bank account:

Allied Irish Bank, 40/41 Westmoreland Street, Dublin 2, Ireland

Account Name	BIC	IBAN
IW AR-EFT	AIBKIE2D	IE29 AIBK 9333 8464 3085 94

Please note that You must quote the Irish Water reference number specified above in any communications and when making payment (*see 'Our Reference' on the first page of this letter*). The Connection Charge will only be deemed paid when funds have cleared in Irish Water's bank account.

(b) **Self-Lay Surety**

In addition to the Connection Charge, You will also be obliged to provide Irish Water with a Self-Lay Surety in the amount of €0.00 (the "**Self-Lay Surety**"); a breakdown of the Self-Lay Surety is set out in Appendix 4. The Self-Lay Surety can be made in the form of a cash bond (Please see Deposit Agreement in Appendix 8) or, alternatively, in any of the forms outlined in Irish Water's Financial Security Policy (available at www.water.ie/connections).Please refer to General Conditions 10 & 11 for further information in respect of the Self-Lay Surety.

Payment of the **Self-Lay Surety** can be made by:

a. A separate Cheque, made payable to "Irish Water" or

b. Money Transfer, by EFT to the following bank account:

Allied Irish Bank, 40/41 Westmoreland Street, Dublin 2, Ireland

Account Name	BIC	IBAN
IW AR-EFT	AIBKIE2D	IE29 AIBK 9333 8464 3085 94

Please note that You must quote the Irish Water reference number specified above in any communications and when making payment (*see 'Our Reference' on the first page of this letter*). The Self-Lay Surety will only be deemed paid when funds have cleared in Irish Water's bank account.

4. Queries

If You have any queries in relation to the payment of the Connection Charge/Self-Lay Surety or otherwise, please contact Irish Water Customer Service Department:

Telephone: 1800 278 278 or +353 1 707 2828

Email: newconnections@water.ie

Web: www.water.ie/contact-us

5. Disputes

Any dispute in respect of the terms of this Connection Offer (including in relation to the Estimate of Connection Costs) may, upon your application, be referred to the Irish Water complaints process. Details of the Irish Water Complaints Process are available on the Irish Water website.

Once a legally binding Connection Agreement is entered into, all disputes in relation to your agreement with Irish Water shall be resolved pursuant to General Condition 36.

6. Next Steps

Accept the Offer: Once You have complied with the steps outlined at 1 (a) – (d) above, You will receive a receipt of payment and Irish Water or its agent will contact You in accordance with the General Conditions.

Submit Your Commencement Notice at least fourteen (14) days in advance of commencement of the Self-Lay Works – email developerscheduling@water.ie (see General Condition 11.3.1).

Arrange a Pre-Construction Site Meeting with Irish Water – email developerscheduling@water.ie, giving at least ten (10) days' notice (see General Condition 11.3.2).

Letter of Acceptance (This copy to be returned to Irish Water duly completed)
Irish Water
PO Box 860
South City Delivery Office
Cork City

I/We refer to the Connection Offer dated 24/05/2023. I/We confirm that I/we have read and understood the Connection Offer and the Appendices attached to the Connection Offer comprising the following:

Appendix 1	Connection Application
Appendix 2	General Conditions for Self-Lay Connection
Appendix 3	Special Conditions
Appendix 4	Connection Charge Summary
Appendix 5	Specification
Appendix 6	Codes of Practice and Standard Details
Appendix 7	Forms of Deed of Grant
Appendix 8	Required Security (as applicable)
Appendix 9	Quality Assurance Regime
Appendix 10	Register of Premises Serviced

Note: The documentation contained in **Appendix 6** and **Appendix 9** are included in the Memory Stick accompanying the Connection Offer. By accepting this letter, the Developer acknowledges and agrees that he/she has accessed the said Memory Stick and read and understood the contents thereof and that he/she acknowledges that these documents form part of the Connection Offer.

I/We also confirm that I/we will complete the Register of Premises Serviced (contained in **Appendix 10**) and provide it to Irish Water at the required intervals.

I/We acknowledge that the Connection Agreement is formed by acceptance of the Connection Offer, which consists of the documents set out above, and I/we accept Irish Water's Connection Offer for connection to the Network(s) specified in the Connection Offer on the terms and conditions set out therein.

I/we have read, understood, accept and agree to comply in full with the terms of the Connection Offer dated [24/05/2023] and all documents forming part of the Connection Agreement.

I/we further understand and acknowledge that there shall be no intention to create any legally binding contract between me/us and Irish Water unless and until I/we have:

a) completed and returned this Letter of Acceptance;
b) paid the Connection Charge;
c) provided the required Self-Lay Surety. The Self-Lay Surety can be made in the form of a cash bond or, alternatively, in any of the forms outlined in Irish Water's Financial Security Policy (available at www.water.ie/connections).;
d) provided confirmation any Required Security, as specified in Appendix 8 of the Connection Offer, has been put in place.

I/we have made payment for Connection Reference CDS1900177002 via

Electronic Funds Transfer EFT ☐
Cheque ☐

I/we have made Self-Lay Surety payment for Connection Reference CDS1900177002 via

Electronic Funds Transfer EFT ☐
Cheque ☐

I/we have completed any ancillary agreement documents required under the Irish Water Financial Security Policy in connection with the Self-Lay Surety ☐

Developer Name:	WALKINSTOWN MONTANE PROPERTIES LIMITED (Company No. 718025)
Developer Address:	UNIT J1D, MAYNOOTH BUSINESS CAMPUS, MAYNOOTH, KILDARE, W23 D343, IRELAND
Developer Reference:	CDS1900177002
Developer Site Address	CHM Premises, Ballymount Road Lower, Dublin, South Dublin

Developer's signature: _____

For and on behalf of: Walkinstown Montane Properties

Print full name of Developer in BLOCK letters: DARYL SKELLY

Date: 18/9/2023

Your water services bill

000007 IW01NNIA I6ZS358A 9311313937

WALKINSTOWN MONTANE PROPERTIES
LIMITED C/O DARYL SKELLY
Unit 51D
Maynooth Business Campus
Maynooth
Kildare

Supply address
CHM PREMISES
BALLYMOUNT ROAD LOWER
DUBLIN

Bill summary		Amount
Balance brought forward from last bill	€	0.00
Less total payments since last bill	€	-877883.00
Add total charges for this bill period	€	877883.00
Balance	**€**	**0.00**

Bill date	13/10/2023
Account	2718001183

Bill details

Description		Amount
Wastewater connection charge	€	580209.00
Water connection charge	€	297674.00
Total charges for this bill period	**€**	**877883.00**

Payments made

Payment date		Amount
22/09/2023	€	-877883.00
Total payments	**€**	**-877883.00**

I6ZS358A 000007 Page 0001 of 0001