PUNCH
CONSULTING ENGINEERS

Parkway Valley LRD

Stage 1 Stormwater Audit
231171-PUNCH-XX-XX-RP-C-0009

May 2026

Document Control

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Status	Rev	Description	Date	Prepared	Checked	Approved
A0	C01	Planning Issue	11/05/2026	A. O'Gorman	K. Manavhela	D. Gallery

Report by: Aine O'Gorman Date: 10 March 2026

Graduate Engineer, BEng, MIEI

PUNCH Consulting Engineers

Checked by: Khathutshelo Manavhela Date: 24 April 2026

Project Engineer, BSc (Hons), MIEI

PUNCH Consulting Engineers

Approved by: Donal Gallery Date: 24 April 2026

Technical Director, BEng (Hons), PGDipHSC, MIEI, MIOSH

PUNCH Consulting Engineers

Table of Contents

1 Introduction

1.1 Purpose of Report

This report presents a Stage 1 Stormwater Audit carried out for the proposed large residential development in Parkway Valley, Limerick City.

PUNCH Consulting Engineers have been appointed to carry out a Stage 1 Stormwater Audit in line with Limerick City and County Council requirements.

1.2 Site Details

The site is primarily a brownfield site and is approximately 6.18 hectares in area. It is bounded by the Dublin Road to the north, Parkway Valley commercial shops and residential to the east and southeast. The site is surrounded by greenfield to the other boundaries. Construction works were carried out on the site previously but were never completed. The previous development was a proposed mixed-use development comprised of an RC and streel frame. A retaining wall has been retained along the western boundary, but the remainder of the previous construction works have been demolished, and the site has a gravel footprint as of now.

1.3 Report Details

The Stage 1 stormwater audit was carried out by Aine O'Gorman, checked by Khathutshelo Manavhela, and approved by Donal Gallery between the dates of March 10th and April 24th, 2026.

In the absence of a Surface Water Audit Procedure by the relevant local authority, Limerick City and County Council, this Stage 1 Surface Water Audit has been undertaken in accordance with the procedures set out by Dún Laoghaire–Rathdown County Council (DLRCC), as outlined in the DLRC Development Plan 2022–2028, Appendix 7: *Stormwater Management Policy, including Stormwater Audit Procedure*. Compliance with the SuDS requirements of the Limerick Development Plan 2022–2028, Section 11.3.11, has also been assessed as part of this audit. Both documents are informed by the principles and guidance contained within the CIRIA C753 SuDS Manual and the Greater Dublin Strategic Drainage Study (GDSDS).

The auditor has examined only those issues within the design relating to surface water drainage and Sustainable Drainage Systems (SuDS) implications of the scheme and has therefore not examined or verified the compliance of the design to any other criteria. Design responsibility for the stormwater drainage and SuDS remains solely with the Design Engineer.

Appendix A contains the copies of drawings and documents examined by the auditor. Appendix B contains the Stage 1 Surface Water Audit Feedback form.

All findings outlined in Section 2 of this report are considered by the auditor to require action to improve the stormwater credentials of the scheme.

1.4 Drawings & Documents Reviewed

Planning RFI Stage

Drawings:

1. 231171-PUNCH-XX-XX-DR-C-0101 : Proposed Drainage Layout Sheet 1
2. 231171-PUNCH-XX-XX-DR-C-0102 : Proposed Drainage Layout Sheet 2
3. 2311711-PUNCH-XX-XX-DR-C-0151 : Proposed SuDS Strategy Sheet 1
4. 231171-PUNCH-XX-XX-DR-C-0152 : Proposed SuDS Strategy Sheet 2
5. 231171-PUNCH-XX-XX-DR-C-0201 : Surface Water Drainage Sections
6. 231171-PUNCH-XX-XX-DR-C-0505 : Drainage Details Sheet 5 of 9
7. 231171-PUNCH-XX-XX-DR-C-0506 : Drainage Details Sheet 6 of 9
8. 231171-PUNCH-XX-XX-DR-C-0507 : Drainage Details Sheet 7 of 9
9. 231171-PUNCH-XX-XX-DR-C-0508 : Drainage Details Sheet 8 of 9
10. 231171-PUNCH-XX-XX-DR-C-0509 : Drainage Details Sheet 9 of 9

Reports and other Documents:

1. 231171-PUNCH-XX-XX-RP-C-0002-S3-P03 : Engineering Planning Report – Stormwater

2 Stage 1 Audit Findings

2.1 General Requirements as per LCCC Development Plan 2022-2028

Table 2-1 below outlines the result of a review of the scheme designer's proposals against the general requirements outlined in the LCCC Development Plan 2022-2028.

Table 2-1 General Requirements for all developments greater than a single house

	Requirements as per DLRCC 2022-2028 Development Plan	Addressed by Scheme Designer?
2.1.1	**Climate Change** All developments must apply a minimum factor of 1.3 to their drainage design and attenuation volumes to accommodate climate change.	Y
2.1.2	**Urban Creep** All developments must apply a factor of 1.1 to their drainage design and attenuation volumes to accommodate urban creep.	Y
2.1.3	**Blockage Analysis** Scheme Designers must submit details of the proposed surface water drainage system in the event of blockage or partial blockage of the system, commenting on any surcharging or flood risk that may be identified, particularly in relation to freeboard used in the simulation analysis. The proposal must include a drawing confirming that safe overland flow routes do not negatively impact properties both within and without the site. The overland flow route plan should identify drop kerbs or ramps required for channelling the flow and address low point areas in the site and detail how properties, both within the development and on adjacent lands, will be protected in the event of excessive overland flows.	Highlighted as part of Section 2.3 of this Audit.
2.1.4	**Utility Clash Check** The Scheme Designer must undertake a utilities clash check to ensure all utilities' vertical and horizontal separation distances can be provided throughout the scheme. The Scheme Designer should demonstrate this with cross-sections at critical locations such as junctions, site thresholds and connection points to public utilities. Minimum separation distances must be in accordance with applicable Codes of Practice.	Highlighted as part of Section 2.4 of this Audit.
2.1.5	**Private Drains** Where an applicant's land is crossed by a private drain, the applicant is responsible for acquiring any rights or permissions necessary to connect to, or to increase the discharge into, or to build over, or divert, or to ensure the adequate capacity is not exceeded, or otherwise alter any private drains not in their exclusive ownership or control, and for ensuring their adequacy.	N/A
2.1.6	**Pumping of Surface Water**	N/A
2.1.7	**Sustainable Drainage Systems (SuDS):** The proposal must demonstrate that they meet the requirements of the Greater Dublin Strategic Drainage Study (GDSDS) policies in relation to Sustainable Drainage Systems (SuDS). The design must incorporate SuDS measures appropriate to the scale of the proposed development such as green roofs, bioretention areas, permeable paving, rainwater harvesting,	Highlighted as part of Section 2.9 and Section 2.10 of this Audit.

	swales, etc. that minimise flows to the public drainage system and maximises local infiltration potential. The Scheme Designer should provide cross-sections and long-sections, and commentary that demonstrates all proposed SuDS measures have been designed in accordance with the relevant industry standards and the recommendations of The SuDS Manual (CIRIA C753)	
2.1.8	**Infiltration:** The Scheme Designer should submit Site Investigation Report and results, including infiltration tests, and a plan showing the trial pits/soakaway test locations across the site. The report should address instances where groundwater, if any, was encountered during testing and its impact.	Highlighted as part of Section 2.6 of this Audit.
2.1.9	**Hardstanding/Parking Areas:** All proposed parking and hardstanding areas should maximise local infiltration before discharge to the surface water drainage system, via a specifically designed permeable paving/porous asphalt system, in accordance with the requirements of Section 12.4.8 of the County Development Plan 2022-2028.	Y
2.1.10	**Basement:** If basement carparking is provided, then all incidental run-off from the basement should be shown to drain to the foul system and not the surface water system	N/A
2.1.11	**Run-off Factors:** Where Scheme Designers propose to use reduced run-off factors (or reduced impermeable contributing areas) for areas of their site that drain to SuDS measures these factors must be agreed with Municipal Services, preferable during the pre-planning process. It should be noted that standard surface water simulation software uses default Cv values of 0.84 for Winter and 0.75 for Summer. If the Scheme Designer proposes to use their own reduced run-off rates, then the default Cv values should be amended to a value of 1.0. Maintaining the default Cv values in conjunction with the Scheme Designers proposed rates reduces the run-off in simulations of rainfall events, giving inaccurate simulation results which may lead to under sizing of the drainage system and attenuation storage required.	Y
2.1.12	**Hydrological Parameters** Scheme Designers must use site specific or local data in their Qbar, attenuation volume and surface water system design such as: • SAAR • Soil Type • Rainfall Return Period Table (available from MET Eireann) • Rainfall intensity • Other hydrological parameters	Y
2.1.13	**Discharge Rate:** Surface Water discharge from a development must be restricted to 2 l/s/ha or the calculated Qbar, whichever is greater. The Qbar should be calculated using the net area drained and not the gross area of the site (i.e. red line boundary). This discharge rate should be marked on the drainage drawing on the manhole in which the flow restricting device if located. The manhole in which the flow restricting device is located should not have a bypass pipe and, a penstock and silt trap should be provided. Flow restricting devices with an orifice of less than 50mm in diameter should be avoided. Where this is not possible then the Scheme Designer must submit a robust maintenance regime to ensure blockages are avoided, to the satisfaction of dlr. Scheme Designers are recommended to use the HR Wallingford UK SuDS Greenfield runoff rate estimation tool to estimate Qbar for their site: https://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate-estimation	Highlighted as part of Section 2.5 of this Audit.
2.1.14	**Attenuation:** If an attenuation system is proposed it should, where possible, not be located under the internal roads but in/under open space or parking areas. Attenuation	Y

	systems must be inline. The preference is for attenuation systems that allow for infiltration and/or treatment within the site. The Scheme Designer should note that certain landscaping items, such as trees, may not be compatible with attenuation systems. The Scheme Designer must provide fully dimensioned plans and sections of the attenuation storage system. All relevant inlet and outlet levels, dimensioned clearances between other utilities, and actual depths of cover to the system should be provided. Details of the proposed inlet and outlet manholes and arrangements to facilitate draw down and maintenance should also be provided. Scheme Designers are recommended to use the HR Wallingford UK SuDS Surface water storage volume estimation tool to estimate the attenuation storage required for their site: https://www.uksuds.com/drainage-calculation-tools/surface-water-storage.	
2.1.15	**Green Roof:** The proposal should consider green roof as per the LCC Development Plan 2022-2028.	Y
2.1.16	**Interception and Treatment:** The Scheme Designer must demonstrate that required interception and/or treatment of surface water run-off is achieved in accordance with GDSDS policy. To be in compliance with GDSDS Volume 2 Section 6.3.3 Table 6.3 Criterion 1, interception of the first 5-10mm is required. If interception of first 5-10mm can't be achieved, then treatment of first 15mm is required.	Y
2.1.17	**Maintenance:** Scheme Designers must submit a post-construction maintenance specification and schedule for the drainage system, including SuDS measures and attenuation system to LCCC for approval. This maintenance specification and schedule must be included in the Safety File.	Y
2.1.18	**New Connections:** Prior to submission of the planning application, the Scheme Designer must obtain the sewer network records from LCCC and assess if a new connection to the public sewer is technically feasible.	To be addressed by Scheme Designer at Construction Stage

2.2 Surface Cover Type Table

Table 2-2 Surface Cover Type - Completed by Scheme Designer

Surface Cover Type	Area (m^2)
Wetland or open water (semi-natural; not chlorinated) maintained or established on site.	5,800
Semi-natural vegetation (e.g. hedgerows, trees, woodland, species-rich grassland) maintained or established on site.	14,054
Reuse of existing soils and seed source to develop vegetation cover	0
Standard trees planted in connected tree pits with a minimum soil volume equivalent to at least two thirds of the projected canopy area of the mature tree.	0
Standard trees planted in pits with soil volumes less than two thirds of the projected canopy area of the mature tree.	0
Intensive green roof or vegetation over structure. Substrate minimum settled depth of 150mm.	0
Non intensive Brown Roof (Biodiversity Roof). Substrate minimum settled depth of 150mm. Design will be site specific and developed by a suitably qualified ecologist.	0
Extensive green roof with substrate of minimum settled depth of 80mm (or 60mm beneath vegetation blanket)	0
Extensive green roof of sedum mat or other lightweight systems	4,900
Green wall –modular system or climbers rooted in soil.	0
Rain gardens and other vegetated sustainable drainage elements.	0
Flower-rich perennial planting.	0
Hedges (line of mature shrubs one or two shrubs wide).	0
Hedgerows or double hedgerow of native species (may have an associated ditch and bank)	0
Groundcover planting.	0
Amenity grassland entire area or sections managed for lesser mowing frequencies for pollinators (e.g. six-week meadow)	0
Amenity grassland (species-poor, regularly mown lawn).	0
Water features (chlorinated) or unplanted detention basins.	0
Permeable paving.	0
Sealed surfaces (e.g. concrete, asphalt, waterproofing, stone)	0
Blue roof	0

2.3 Blockage Analysis

Problem: In the event that there is a blockage in the drainage network, overland flow route to be established.

Recommendation: Scheme designer to establish overland flow routes.

2.4 Utility Clash Check

Problem: The Scheme Designer must undertake a utilities clash check to ensure all utilities' vertical and horizontal separation distances can be provided throughout the scheme. The Scheme Designer should demonstrate this with cross-sections at critical locations such as junctions, site thresholds and connection points to public utilities.

Recommendation: Scheme designer to ensure minimum separation distances (i.e. between storm and foul sewer and/or watermains) are in accordance with the Uisce Eireann Code of Practice.

2.5 Discharge Rate

Problem: Surface Water discharge from a development must be restricted to 2 l/s/ha or the calculated Qbar, whichever is greater. The engineering planning report states the controlled outflow is 15.7l/s.

Recommendation: Scheme designer to ensure that the discharge rate is in accordance with the LCCC Development Plan.

2.6 Infiltration

Problem: From the provided documentation, it is not evident that an infiltration test has been carried out to demonstrate the site's suitability for infiltration to ground.

Recommendation: Scheme Designer to ensure that a Site Investigation Report including infiltration tests, and a plan showing the trial pits/soakaway test locations across the site. The report should address instances where groundwater, if any, was encountered during testing and its impact. Furthermore, the Scheme Designer is to ensure the groundwater level is not less than 1000mm below the formation level of build-up of all SuDS measures in accordance with CIRIA 753, SuDS Manual.

2.7 Pipe Velocities

Problem: It is noted that the velocity in pipe S6.003 is less than the recommend minimum of 1.0m/s in accordance with the GDSDS Chapter 6.5.

Recommendation: The Scheme Designer is to ensure that all pipes achieve self-cleansing velocities.

2.8 Drainage Network - Labels

Problem: It has been noted that the *Proposed Drainage Layout* drawings (231171-PUNCH-XX-XX-DR-C-0101 and 0102) do not include essential information for the surface water network. Specifically, the manholes are not labelled with their names, cover levels and invert levels, and the pipe links do not show link names, flow directions, or gradients. Labels for flow control devices (device type and discharge limits), attenuation (storage capacity) and proprietary devices (device type) are not indicated as well.

Recommendation: Scheme designer to revise the Proposed Drainage Layout drawings to improve clarity and ensure they can be used in conjunction with related documentation i.e. Drainage Longitudinal Sections, Causeway Flow Results, etc.

2.9 SuDS - Swale

Problem: From the Proposed Drainage Layout drawings, the swales appear to be standalone drainage systems with no connectivity to the surface water network. However, Section 2.3.4 of the Engineering Planning Report states the following;

"The base of the swale and infiltration trench will be lined and a high-level overflow to the drainage network within the build-up will accommodate removal of water"

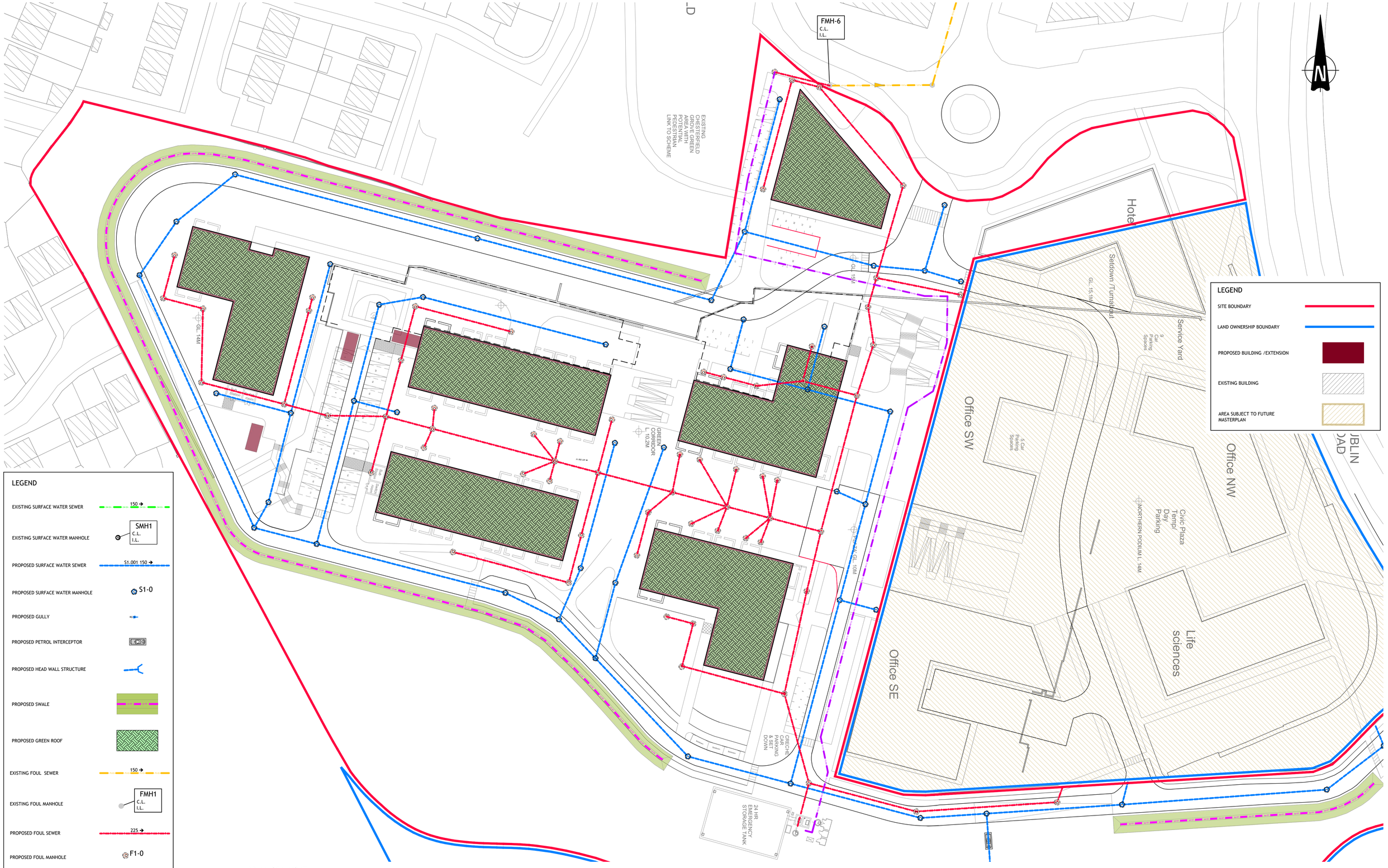
Recommendation: Scheme designer to clarify.

2.10 SuDS – Rain Gardens, Infiltration Trenches & Tree Root Systems

Problem: Section 2.3 of the Engineering Planning Report lists Rain Gardens, Infiltration Trenches and Tree Root Systems as part of the proposed SuDS measures. However, the locations of these measures are not clearly indicated in the SuDS Layout drawings. Furthermore, there is no evidence of the Typical details for infiltration trenches in the provided documentation.

Recommendation: Scheme designer to clarify and rectify where necessary.

Appendix A Drawings and Documents Examined by the Author



DRAINAGE LAYOUT
SCALE 1:500

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I.S. EN ISO 19650-2:2018
NSAI Certified

Rev	Amendment	By	Date
P01	ISSUED FOR REVIEW & COMMENT	PJM	2025-09-24
P02	ISSUED FOR REVIEW & COMMENT	PJM	2025-10-14

Client:

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Project: PARKWAY VALLEY LRD
Title: PROPOSED DRAINAGE LAYOUT - SHEET 1

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
PJ Mulcahy	2025-09-23	PJ Mulcahy	Tracey O Connell	Julie Tiernan
Project No: 231171	Model Ref: 231171-PUNCH-XX-XX-M2-C-0101-0102		Drawing Status: S3 (Review & Comment)	
Scale @ A1: As Shown	Document No: 231171-PUNCH-XX-XX-DR-C-0101		Revision No: P02	

AREA SUBJECT TO
FUTURE MASTERPLAN

GL. 13.66

DUBLIN RD ACCESS

GL. 12.98

GL. 11.82

GL. 10.28

GL. 10.24

N

LEGEND

SITE BOUNDARY

LAND OWNERSHIP BOUNDARY

PROPOSED BUILDING /EXTENSION

EXISTING BUILDING

AREA SUBJECT TO FUTURE MASTERPLAN

LEGEND

EXISTING SURFACE WATER SEWER -SW-EX- 150 -SW-EX-

EXISTING SURFACE WATER MANHOLE SMH1 C.L. I.L.

PROPOSED SURFACE WATER SEWER S1.001 150

PROPOSED SURFACE WATER MANHOLE S1-0

PROPOSED GULLY

PROPOSED PETROL INTERCEPTOR

PROPOSED HEAD WALL STRUCTURE

PROPOSED SWALE LD-PR

PROPOSED GREEN ROOF

EXISTING FOUL SEWER -FS-EX- 150 -FS-EX-

EXISTING FOUL MANHOLE FMH1 C.L. I.L.

PROPOSED FOUL SEWER 225

PROPOSED FOUL MANHOLE F1-0

PROPOSED FOUL RISING MAIN FS-RM 100 FS-RM

DRAINAGE LAYOUT
SCALE 1:500

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Rev	Amendment	By	Date
P01	ISSUED FOR REVIEW & COMMENT	PJM	2025-09-24

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Project: PARKWAY VALLEY SITE
Title: PROPOSED DRAINAGE LAYOUT - SHEET 2

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
PJ Mulcahy	2025-09-24	PJ Mulcahy	Tracey O Connell	Julie Tiernan

Project No:	Model Ref:	Drawing Status:
231171	231171-PUNCH-XX-XX-M2-C-0101-0102	S3 (Review & Comment)

Scale @ A1:	Document No:	Revision No:
As Shown	231171-PUNCH-XX-XX-DR-C-0102	P01

LEGEND

SITE BOUNDARY	
LAND OWNERSHIP BOUNDARY	
PROPOSED BUILDING /EXTENSION	
EXISTING BUILDING	
EXISTING SURFACE WATER SEWER	SW-EX 150 SW-EX
EXISTING SURFACE WATER MANHOLE	SMH1 C.L. I.L.
PROPOSED SURFACE WATER SEWER	S1.001 150
PROPOSED SURFACE WATER MANHOLE	S1-0
PROPOSED GULLY	
PROPOSED PETROL INTERCEPTOR	
PROPOSED HEAD WALL STRUCTURE	
PROPOSED SWALE	LD-PR
PROPOSED GREEN ROOF	

COLOUR DRAWING

bmtrada ISO 9001 CERTIFICATION · bmtrada ISO 14001 CERTIFICATION · bmtrada ISO 45001 CERTIFICATION

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Rev	Amendment	By	Date	Rev	Amendment	By	Date
P01	ISSUED FOR REVIEW & COMMENT	PJM	2025-09-19				

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Project: PARKWAY VALLEY LRD				
Title: PROPOSED SUDS LAYOUT - SHEET 1				
Drawn: PJ Mulcahy	Date drawn: 2025-09-18	Technician Check: PJ Mulcahy	Engineer Check: Tracey O Connell	Approved: Julie Tiernan
Project No: 231171	Model Ref: 231171-PUNCH-XX-XX-M2-C-0151		Drawing Status: S3 (Review & Comment)	
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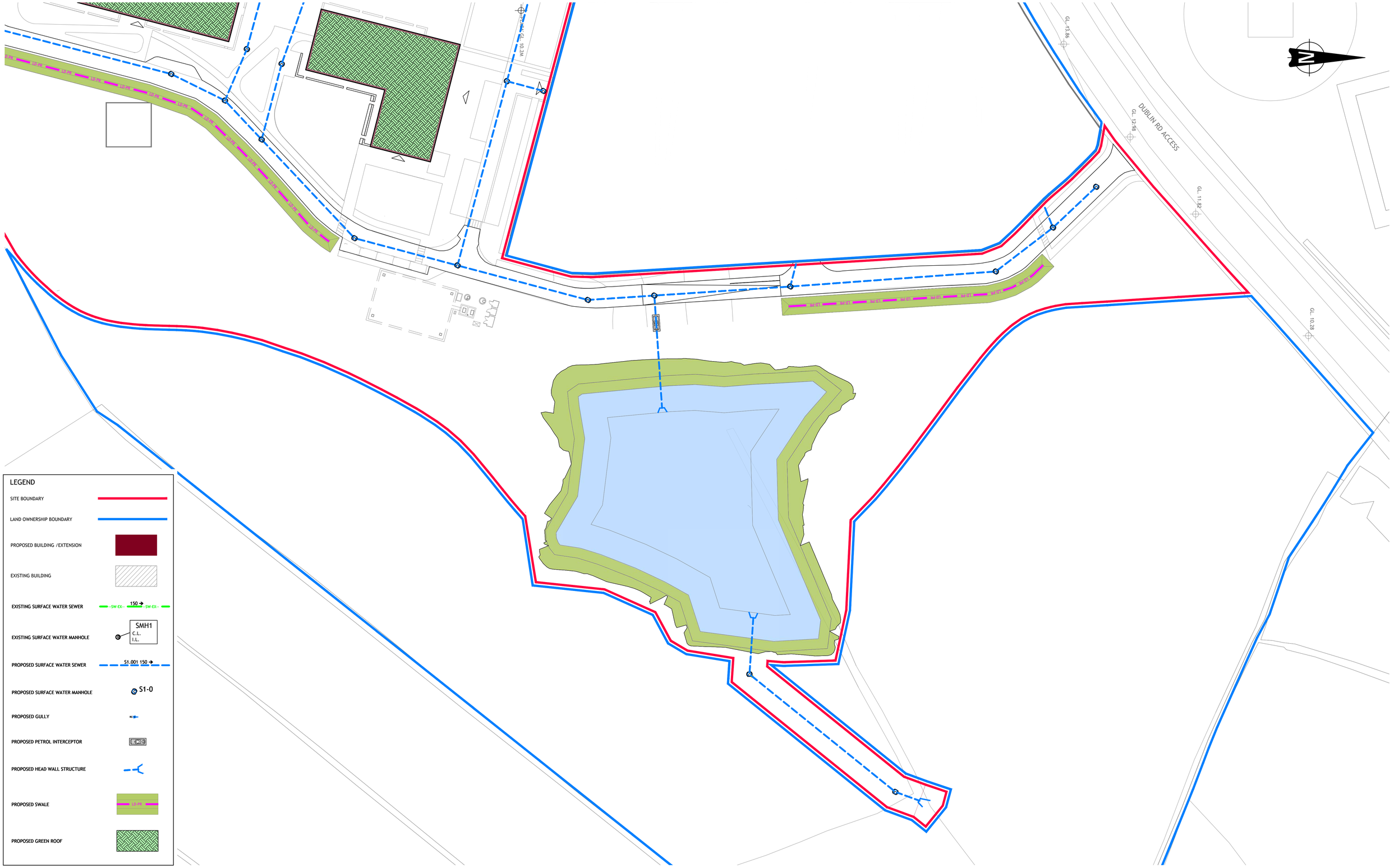

LEGEND

- SITE BOUNDARY
- LAND OWNERSHIP BOUNDARY
- PROPOSED BUILDING /EXTENSION
- EXISTING BUILDING
- EXISTING SURFACE WATER SEWER -SW-EX- 150 -SW-EX-
- EXISTING SURFACE WATER MANHOLE SMH1 C.L. I.L.
- PROPOSED SURFACE WATER SEWER S1.001 150
- PROPOSED SURFACE WATER MANHOLE S1-0
- PROPOSED GULLY
- PROPOSED PETROL INTERCEPTOR
- PROPOSED HEAD WALL STRUCTURE
- PROPOSED SWALE
- PROPOSED GREEN ROOF

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Rev	Amendment	By	Date
P01	ISSUED FOR REVIEW & COMMENT	PJM	2025-09-19

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Project: PARKWAY VALLEY LRD
Title: PROPOSED SUDS LAYOUT - SHEET 2

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
PJ Mulcahy	2025-09-18	PJ Mulcahy	Tracey O Connell	Julie Tiernan

Project No:	Model Ref:	Drawing Status:
231171	231171-PUNCH-XX-XX-M2-C-0152	S3 (Review & Comment)

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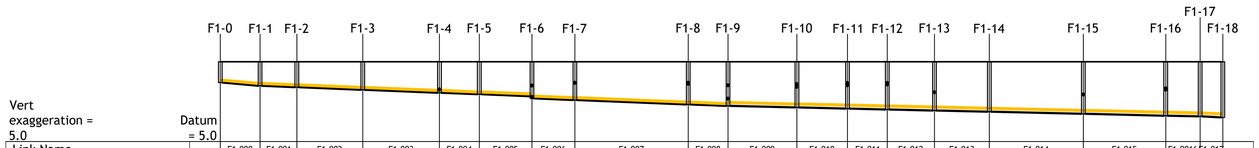

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Invert Level (m)		8.850	8.633 8.633	8.541 8.541	8.375 8.375	8.182 8.182	8.082 8.082	7.950 7.812	7.704 7.704	7.419 7.419	7.319 7.319	7.219 7.219	7.146 7.146	7.088 7.088	7.020 7.020	6.940 6.940	6.804 6.804	6.684 6.684	6.634 6.634	6.574
Length (m)		13.001	11.999	21.528	25.029	13.000	17.205	14.000	37.001	13.000	22.500	16.499	13.000	15.401	17.897	30.693	26.912	11.231	7.399

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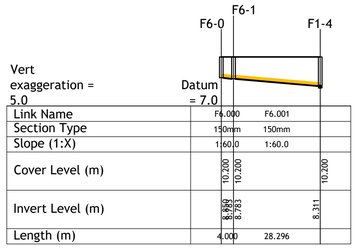

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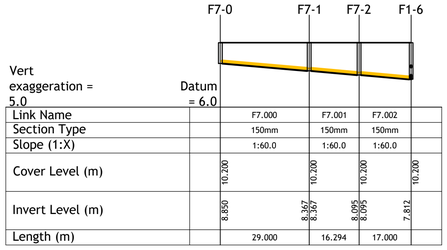

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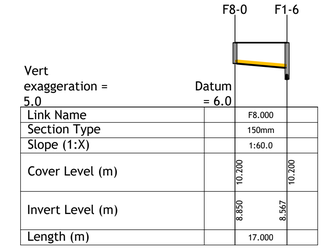
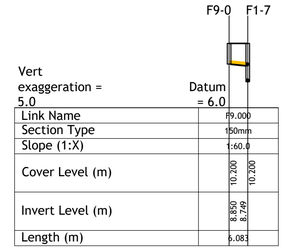
PIPERUN 3 - FOUL - F7-0 TO F1-6 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



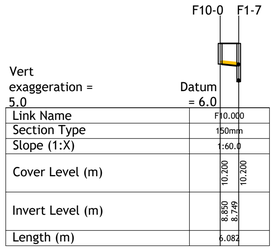
Link Name		F8.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.567
Length (m)		17.000	

PIPERUN 4 - FOUL - F8-0 TO F1-6 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



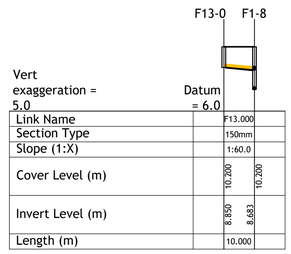
Link Name		F9.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.749
Length (m)		6.083	

PIPERUN 5 - FOUL - F9-0 TO F1-7 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



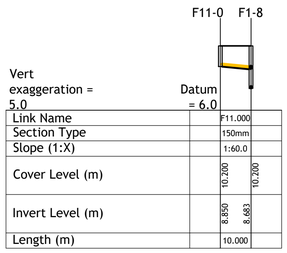
Link Name		F10.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.749
Length (m)		6.082	

PIPERUN 6 - FOUL - F10-0 TO F1-7 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



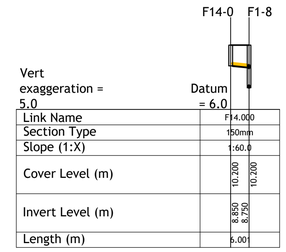
Link Name		F13.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.683
Length (m)		10.000	

PIPERUN 7 - FOUL - F13-0 TO F1-8 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



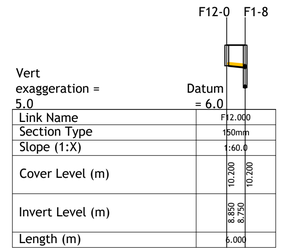
Link Name		F11.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.683
Length (m)		10.000	

PIPERUN 8 - FOUL - F11-0 TO F1-8 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



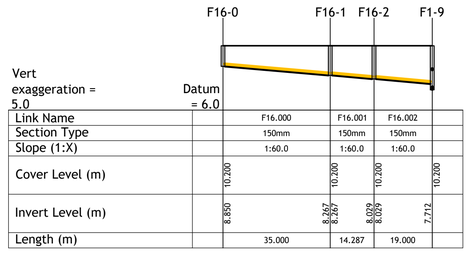
Link Name		F14.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.750
Length (m)		6.001	

PIPERUN 9 - FOUL - F14-0 TO F1-8 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



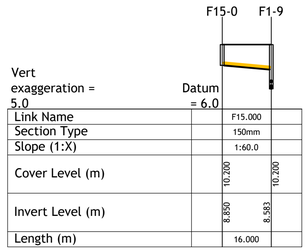
Link Name		F12.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.750
Length (m)		6.000	

PIPERUN 10 - FOUL - F12-0 TO F1-8 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



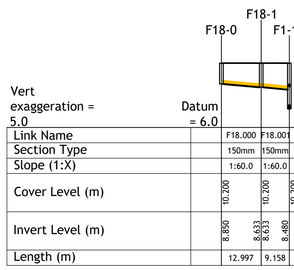
Link Name		F16.000	F16.001	F16.002	
Section Type		150mm	150mm	150mm	
Slope (1:X)		1:60.0	1:60.0	1:60.0	
Cover Level (m)		10.200	10.200	10.200	10.200
Invert Level (m)		8.850	8.267 8.267	8.029 8.029	7.712
Length (m)		35.000	14.287	19.000	

PIPERUN 11 - FOUL - F16-0 TO F1-9 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



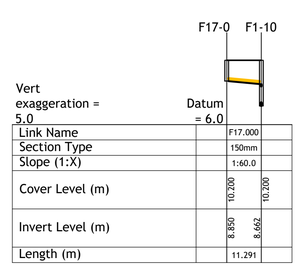
Link Name		F15.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.583
Length (m)		16.000	

PIPERUN 12 - FOUL - F15-0 TO F1-9 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



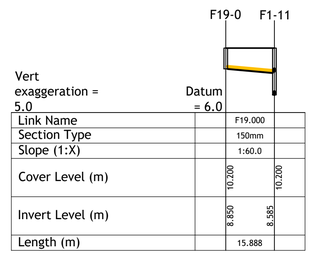
Link Name		F18.000	F18.001	
Section Type		150mm	150mm	
Slope (1:X)		1:60.0	1:60.0	
Cover Level (m)		10.200	10.200	10.200
Invert Level (m)		8.850	8.633	8.480
Length (m)		12.997	9.158	

PIPERUN 13 - FOUL - F18-0 TO F1-10 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



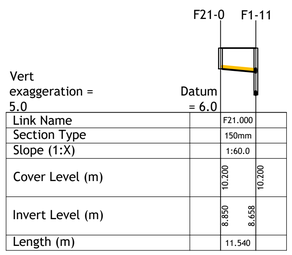
Link Name		F17.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.662
Length (m)		11.291	

PIPERUN 14 - FOUL - F17-0 TO F1-10 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



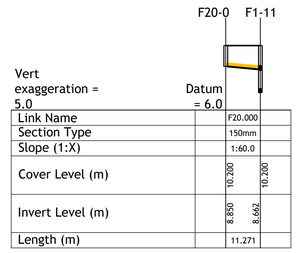
Link Name		F19.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.585
Length (m)		15.888	

PIPERUN 15 - FOUL - F19-0 TO F1-11 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



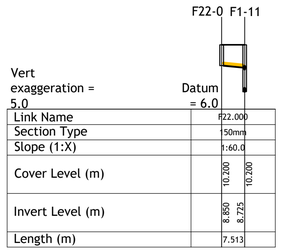
Link Name		F21.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.658
Length (m)		11.540	

PIPERUN 16 - FOUL - F21-0 TO F1-11 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



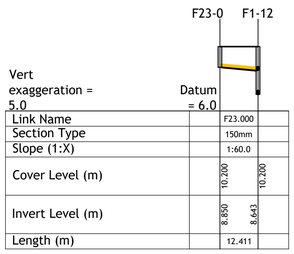
Link Name		F20.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.662
Length (m)		11.271	

PIPERUN 17 - FOUL - F20-0 TO F1-11 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



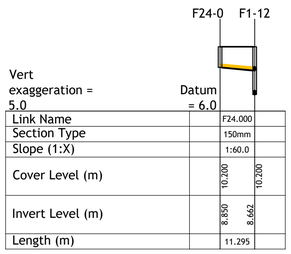
Link Name		F22.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.725
Length (m)		7.513	

PIPERUN 18 - FOUL - F22-0 TO F1-11 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



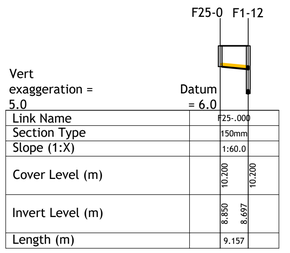
Link Name		F23.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.643
Length (m)		12.411	

PIPERUN 19 - FOUL - F23-0 TO F1-12 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



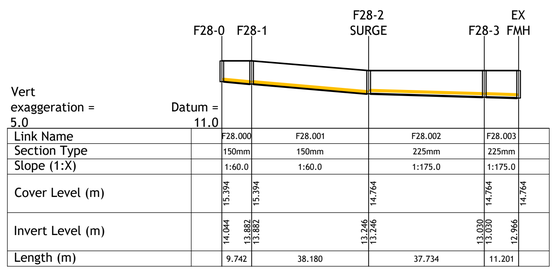
Link Name		F24.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.662
Length (m)		11.295	

PIPERUN 20 - FOUL - F24-0 TO F1-12 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



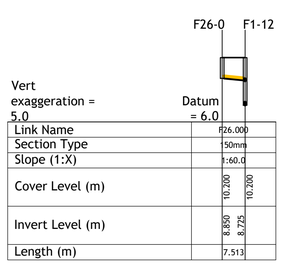
Link Name		F25.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.697
Length (m)		9.157	

PIPERUN 21- FOUL - F25-0 TO F1-12 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



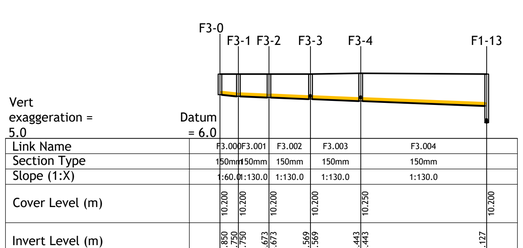
Link Name		F28.000	F28.001	F28.002	F28.003
Section Type		150mm	150mm	225mm	225mm
Slope (1:X)		1:60.0	1:60.0	1:175.0	1:175.0
Cover Level (m)		15.394	15.394 14.764	14.764	14.764
Invert Level (m)		14.044 13.882	13.882 13.246	13.246 13.030	13.030 12.966
Length (m)		9.742	38.180	37.734	11.201

PIPERUN 27 - FOUL - F28-0 TO EX MH - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



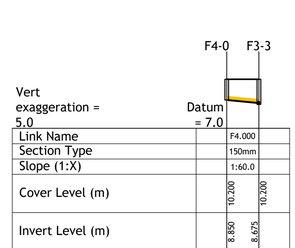
Link Name		F26.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.725
Length (m)		7.513	

PIPERUN 22 - FOUL - F26-0 TO F1-12
- LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



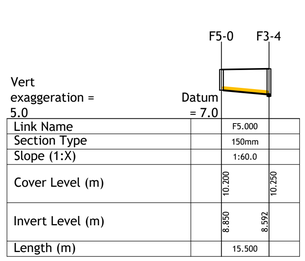
Link Name		F3.000	F3.001	F3.002	F3.003	F3.004	
Section Type		150mm	150mm	150mm	150mm	150mm	
Slope (1:X)		1:60.0	1:130.0	1:130.0	1:130.0	1:130.0	
Cover Level (m)		10.200	10.200	10.200	10.200	10.250	10.200
Invert Level (m)		8.850 8.750	8.750 8.673	8.673 8.569	8.569 8.443	8.443	8.127
Length (m)		6.000	10.000	13.551	16.390	41.131	

PIPERUN 23 - FOUL - F3-0 TO F1-13 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



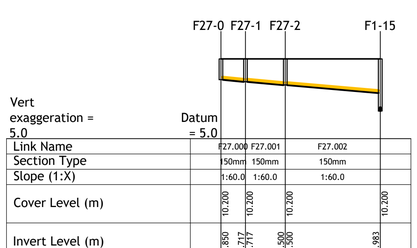
Link Name		F4.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.850	8.675
Length (m)		10.502	

PIPERUN 24 - FOUL - F4-0 TO F3-3
- LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



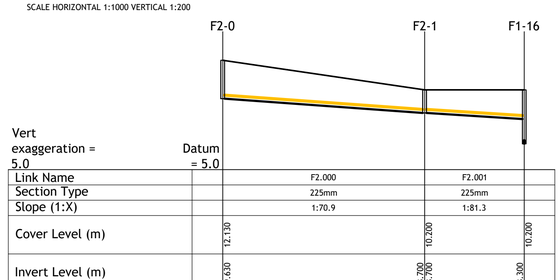
Link Name		F5.000	
Section Type		150mm	
Slope (1:X)		1:60.0	
Cover Level (m)		10.200	10.250
Invert Level (m)		8.850	8.592
Length (m)		15.500	

PIPERUN 24 - FOUL - F5-0 TO F3-4
- LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



Link Name		F27.000	F27.001	F27.002	
Section Type		150mm	150mm	150mm	
Slope (1:X)		1:60.0	1:60.0	1:60.0	
Cover Level (m)		10.200	10.200	10.200	10.200
Invert Level (m)		8.850 8.717	8.717 8.500	8.500 8.500	7.983
Length (m)		7.999	13.001	30.994	

PIPERUN 25 - FOUL - F27-0 TO F1-15 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



Link Name		F2.000		F2.001	
Section Type		225mm		225mm	
Slope (1:X)		1:70.9		1:81.3	
Cover Level (m)		12.130	10.200		10.200
Invert Level (m)		9.630	8.700 8.700		8.300
Length (m)		65.902		32.508	

PIPERUN 26 - FOUL - F2-0 TO F1-16 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200

Rev	Amendment	By	Date
P01	ISSUED FOR REVIEW & COMMENT	PJM	2025-10-30

Client:

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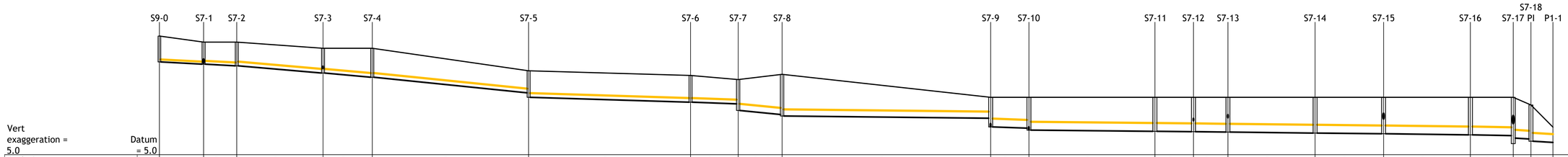
Project: PARK VALLEY LRD
Title: FOUL DRAINAGE SECTIONS

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
PJ Mulcahy	2025-10-30	PJ Mulcahy	Tracey O Connell	Julie Tiernan

Project No:	Model Ref:	Drawing Status:
231171	231171-PUNCH-XX-XX-M2-C-0175	S3 (Review & Comment)

Scale @ A1:	Document No:	Revision No:
As Shown	231171-PUNCH-XX-XX-DR-C-0175	P01

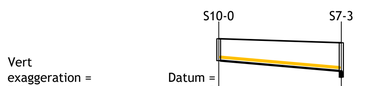


Link Name		S9.000	S7.001	S7.002	S7.003	S7.004	S7.005	S7.006	S7.007	S7.008	S7.009	S7.010	S7.011	S7.012	S7.013	S7.014	S7.015	S7.016	S7.017	S7.018
Section Type		225mm	300mm	375mm	375mm	375mm	375mm	375mm	600mm	600mm	750mm	750mm	750mm	750mm	750mm	750mm	750mm	750mm	750mm	750mm
Slope (1:X)		1:100.0	1:100.0	1:59.5	1:59.4	1:50.0	1:165.0	1:143.7	1:55.0	1:465.0	1:150.0	1:522.6	1:512.8	1:400.0	1:450.0	1:500.0	1:392.5	1:300.0	1:100.0	1:90.0
Cover Level (m)		15.750	15.200	15.200	14.636	14.636	12.600	12.180	11.800	12.278	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	10.200	9.500	7.500
Invert Level (m)		13.400	13.200 13.200	13.050 13.050	12.394 12.394	12.019 12.019	10.605 10.200	9.756 9.756	9.606 9.000	8.639 8.500	8.267 7.517	7.401 7.226	7.117 7.117	7.083 7.083	7.044 7.044	6.936 6.936	6.804 6.804	6.794 6.794	6.729 6.560	6.420 6.220	6.110
Length (m)		20.000	15.000	38.999	22.282	70.689	73.224	21.552	19.870	94.304	17.328	56.960	17.436	15.592	39.411	31.006	39.246	19.371	8.000	9.941

PIPERUN 1 - STORM - S9-0 TO DETENTION POND - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200

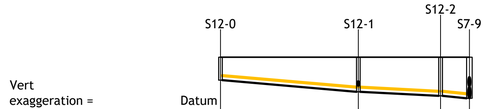
Link Name		S7.000	
Section Type		375mm	
Slope (1:X)		1:100.0	
Cover Level (m)		15.000	15.200
Invert Level (m)		13.400	13.290
Length (m)		11.001	

PIPERUN 2 - STORM - S7-0 TO S7-1 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



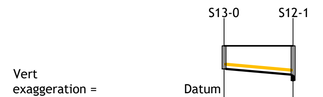
Link Name		S10.000	
Section Type		225mm	
Slope (1:X)		1:59.4	
Cover Level (m)		14.891	14.636
Invert Level (m)		13.466	12.793
Length (m)		40.001	

PIPERUN 3 - STORM - S10-0 TO S7-3 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



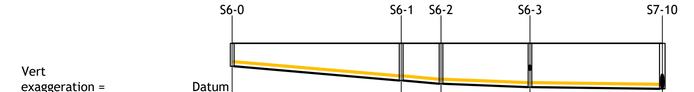
Link Name		S12.000	S12.001	S12.002
Section Type		300mm	300mm	300mm
Slope (1:X)		1:59.4	1:100.0	1:59.5
Cover Level (m)		10.200	10.200	10.200 10.200
Invert Level (m)		8.700	7.943 7.943	7.675 7.675 7.517
Length (m)		45.000	26.841	9.402

PIPERUN 4 - STORM - S12-0 TO S7-9 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



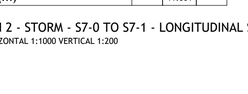
Link Name		S13.000	
Section Type		300mm	
Slope (1:X)		1:59.4	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.700	8.321
Length (m)		22.520	

PIPERUN 5 - STORM - S13-0 TO S12-1 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



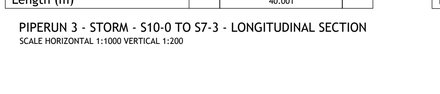
Link Name		S6.000	S6.001	S6.002	S6.003
Section Type		300mm	300mm	300mm	300mm
Slope (1:X)		1:59.5	1:59.4	1:132.0	1:400.0
Cover Level (m)		10.200	10.200 10.200	10.200	10.200
Invert Level (m)		8.700	7.773 7.773	7.584 7.584	7.334 7.334 2.226
Length (m)		55.162	13.000	29.044	43.212

PIPERUN 6 - STORM - S6-0 TO S7-10 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



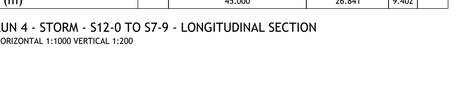
Link Name		S11.000	
Section Type		300mm	
Slope (1:X)		1:51.2	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.700	8.446
Length (m)		13.001	

PIPERUN 7 - STORM - S11-0 TO S6-3 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



Link Name		S8.000	S8.001
Section Type		225mm	225mm
Slope (1:X)		1:107.7	1:45.2
Cover Level (m)		10.200	10.200 10.200
Invert Level (m)		8.775	8.423 8.423 8.063
Length (m)		37.903	16.279

PIPERUN 8 - STORM - S8-0 TO S7-12 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



Link Name		S4.000	S4.001
Section Type		300mm	300mm
Slope (1:X)		1:84.0	1:33.8
Cover Level (m)		11.000	10.600 10.200
Invert Level (m)		9.500	9.000 9.000 8.325
Length (m)		42.001	22.790

PIPERUN 9 - STORM - S4-0 TO S7-13 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200

Link Name		S3.000	S3.001	S3.002	S3.003	S3.004	S3.005	S3.006
Section Type		225mm	225mm	225mm	225mm	300mm	525mm	525mm
Slope (1:X)		1:75.0	1:60.0	1:22.4	1:22.9	1:150.0	1:322.4	1:405.2
Cover Level (m)		14.764	14.764	15.130	12.750	10.200	10.200	10.200	10.200
Invert Level (m)		13.339	13.141 13.141	12.746 12.346	11.220 9.550	8.700 8.625	8.458 8.458	8.359 8.359	8.222
Length (m)		14.845	23.703	25.000	19.000	25.088	31.918	55.517	

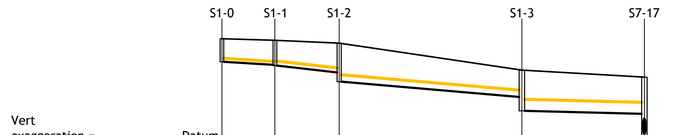
PIPERUN 10 - STORM - S3-0 TO S7-15 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200

Link Name		S5.000	
Section Type		225mm	
Slope (1:X)		1:27.6	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.775	8.458
Length (m)		8.756	

PIPERUN 11 - STORM - S5-0 TO S3-5 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200

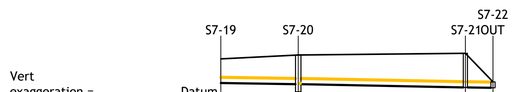
Link Name		S2.000	
Section Type		225mm	
Slope (1:X)		1:26.4	
Cover Level (m)		10.200	10.200
Invert Level (m)		8.775	8.359
Length (m)		11.000	

PIPERUN 12 - STORM - S2-0 TO S3-6 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



Link Name		S1.000	S1.001	S1.002	S1.003
Section Type		225mm	300mm	450mm	750mm
Slope (1:X)		1:86.5	1:46.6	1:59.6	1:200.0
Cover Level (m)		12.760	12.600	12.411	10.650	10.200
Invert Level (m)		11.200	11.000 10.950	10.500 9.900	8.900 8.000	7.800
Length (m)		17.298	20.983	59.634	39.997	

PIPERUN 13 - STORM - S1-0 TO S7-17 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200



Link Name		S7.019	S7.020	S7.021
Section Type		375mm	375mm	375mm
Slope (1:X)		1:320.0	1:259.8	1:321.9
Cover Level (m)		7.500	7.750	7.860	6.000
Invert Level (m)		5.925	5.846 5.846	5.636 5.636	5.608
Length (m)		25.264	54.555	9.014

PIPERUN 14 - STORM - S7-19 TO S7-22 - LONGITUDINAL SECTION
SCALE HORIZONTAL 1:1000 VERTICAL 1:200

BUILDING INFORMATION MODELLING (BIM) I.S. EN ISO 19650-2:2018 NSAI Certified

Rev	Amendment	By	Date	Rev	Amendment	By	Date
P01	ISSUED FOR REVIEW & COMMENT	PJM	2025-10-30				

Client:

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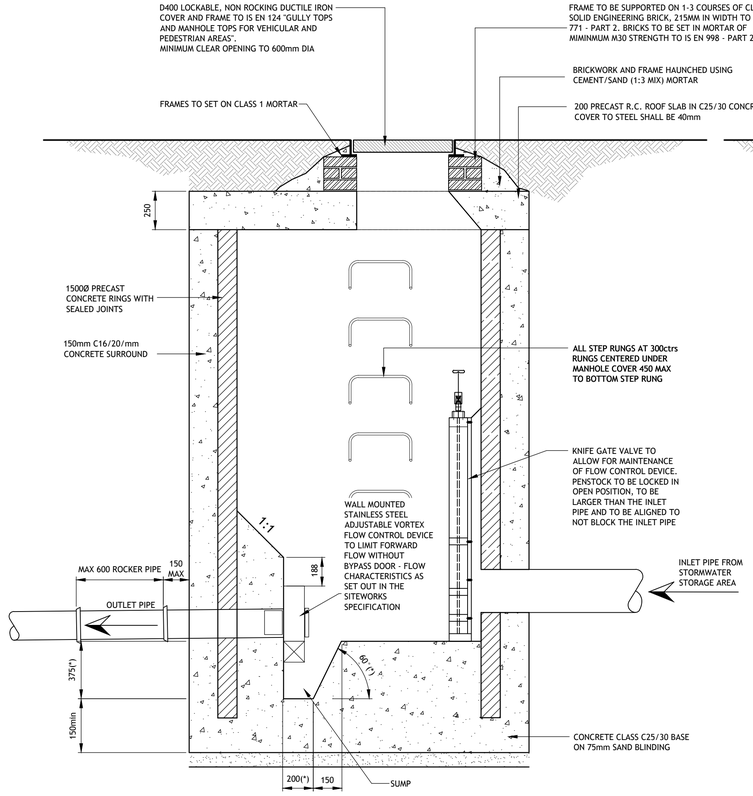
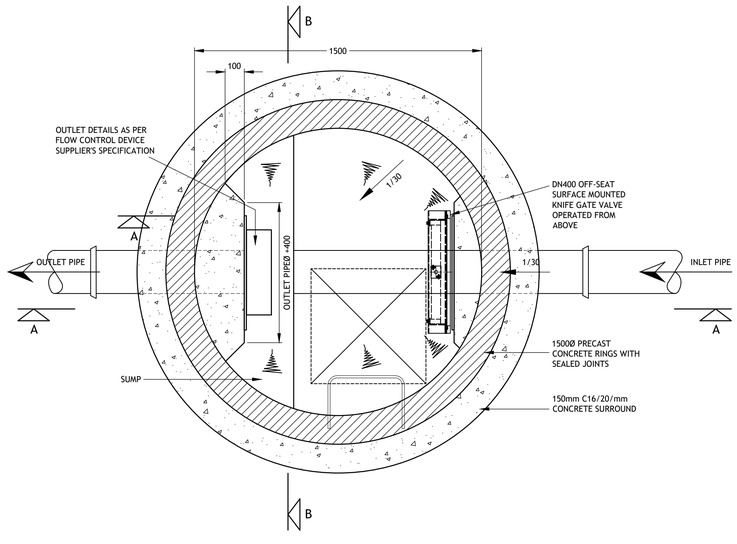
Project: PARK VALLEY LRD
Title: SURFACE WATER DRAINAGE SECTIONS

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
PJ Mulcahy	2025-10-30	PJ Mulcahy	Tracey O Connell	Julie Tiernan
Project No: 231171	Model Ref: 231171-PUNCH-XX-XX-M2-C-0201		Drawing Status: S3 (Review & Comment)	
Scale @ A1: As Shown	Document No: 231171-PUNCH-XX-XX-DR-C-0201			Revision No: P01



(*) DIMENSION TO BE APPROVED BY FLOW CONTROL DEVICE SUPPLIER



TYPICAL FLOW CONTROL DEVICE MANHOLE DETAIL

SCALE 1:20

TABLE M1 - INTERNAL DIAMETER OF MANHOLES	
DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375 - 750	1500
750 - 900	1800
> 900	CONSULT LOCAL AUTHORITY

NOTE :

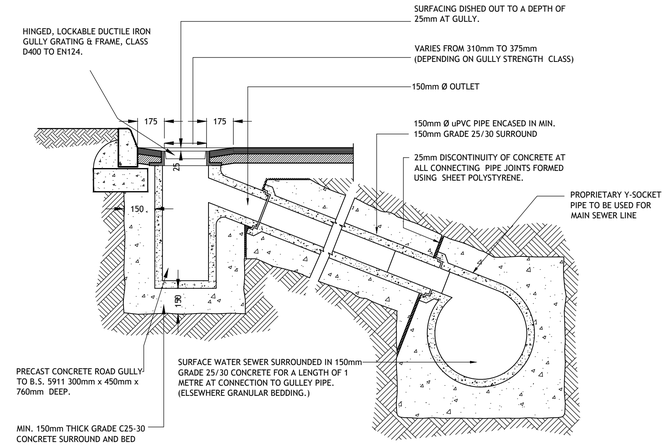
USE 1050 DIAMETER RINGS FOR PIPES LESS THAN 375mm DIAMETER WHERE DEPTH TO SOFFIT IS 1.35 - 1.5m

TABLE M2 - ROCKER PIPE LENGTH	
NOMINAL PIPE DIAMETER (mm)	EFFECTIVE LENGTH (M)
150 to 600	0.60
675 to 750	1.00
Over 750	1.25

- MANHOLE COVER TO BE HINGED AT RIGHT ANGLES TO KERBLINE SO THAT THEY CLOSE IN DIRECTION OF TRAFFIC.
- MANHOLE COVERS ON ROADS SHOULD BE LOCATED IN THE MIDDLE OF TRAFFICKED LANES INSIDE WHEEL TRACKS
- COVER AND FRAME TO BE INSTALLED SO THAT NO PART OF THE UNIT IS RAISED OR SUNKEN IN A WAY THAT COULD CAUSE A HAZARD TO PEDESTRIAN OR VEHICULAR TRAFFIC

NOTE :

1. MANHOLES WITH OUTGOING PIPES GREATER THAN 600mm DIA. SHOULD BE FITTED WITH GUARD BARS, SAFETY CHAINS OR OTHER SAFETY DEVICES.
2. FOR DEPTHS TO INVERT >2.700m AN ACCESS SHAFT OF MIN. 900mm DIAMETER AND REDUCING SLAB MAY BE USED.
3. WHERE THE DEPTH TO INVERT IS 1.00m OR LESS A 450mm x 450mm (OR 450mm DIA.) INSPECTION CHAMBER WITH MINIMUM COVER SIZES OF 450mm DIA. MAY BE USED SUBJECT TO ACCOMMODATION OF CONNECTIONS AND APPROVAL OF THE LOCAL AUTHORITY.
4. ON COMPLETION OF CONSTRUCTION INTERNAL SURFACES OF MANHOLE & SEWERS TO THOROUGHLY CLEANSED TO REMOVE ALL DELETERIOUS MATERIAL, WITHOUT SUCH MATTER BEING PASSED FORWARD INTO PUBLIC SEWERS OR WATERCOURSES
5. FIRST MANHOLE UPSTREAM FROM CONNECTION TO THE (EXISTING) PUBLIC SEWER TO BE FITTED WITH A SCREEN IN ORDER TO PREVENT DEBRIS ENTERING THE PUBLIC SEWER. THE SCREEN NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO OCCUPATION OF PREMISES TO BE SERVED BY SEWER.



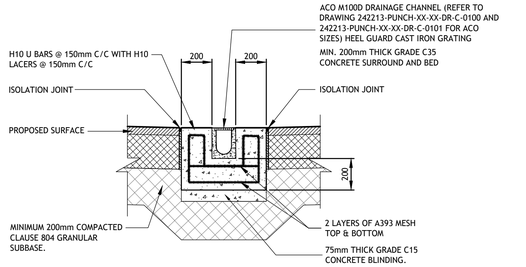
FOR STRENGTH CLASS OF GULLY REFER TO EN 124 : 2015, CLAUSE 5

NOTE 1 : PLACE OF INSTALLATION & FIGURES 9A AND 9B PROPRIETARY FITTINGS TO BE USED ON ALL PIPEWORK CONNECTIONS

NOTE 2 :
GROUP 1 - MIN. CLASS A15 GROUP 4 - MIN. CLASS D400
GROUP 2 - MIN. CLASS B125 GROUP 5 - MIN. CLASS E600
GROUP 3 - MIN. CLASS C250 GROUP 6 - MIN. CLASS F900

PRECAST CONCRETE GULLY IN MACADAM AREA

SCALE 1:20

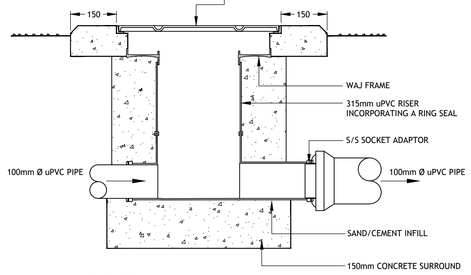


ACO CHANNEL DETAIL

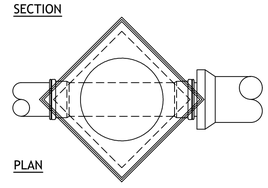
SCALE 1:20

IN GARDENS / GRASSED AREAS:
GLYNWED STANDARD 300x300mm CLEAR OPENING LIGHT DUTY SINGLE SEAL COVER & FRAME IN GREY IRON, BLACK COATED AND INCORPORATING COUNTERSUNK LOCKING SCREWS.

IN PAVED AREAS:
450 x 450, STAINLESS STEEL RECESSED COVER TO RECEIVE 80mm DEEP BRICK PAVING IN PEDESTRIAN AREAS AND 100MM DEEP CITY PAVE BRICK IN TRAFFICKED AREAS. D400 LOAD CLASS IN ACCORDANCE WITH EN124.



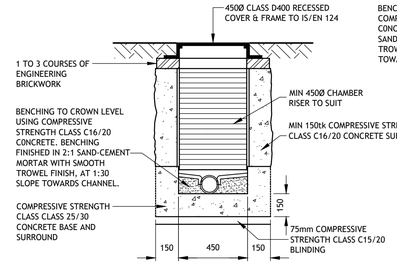
SECTION



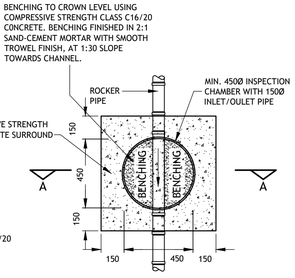
PLAN

ACCESS JUNCTION DETAIL

SCALE: 1:10



SECTION A-A



INSPECTION CHAMBER BASE

INSPECTION CHAMBER (UP TO 1.0m DEEP)

SCALE 1:20

BUILDING INFORMATION MODELLING (BIM) I.S. EN ISO 19650-2:2018 NSAI Certified

Rev	Amendment	By	Date	Rev	Amendment	By	Date
C01	ISSUED FOR PLANNING	PJM	2025-10-17				

Client:

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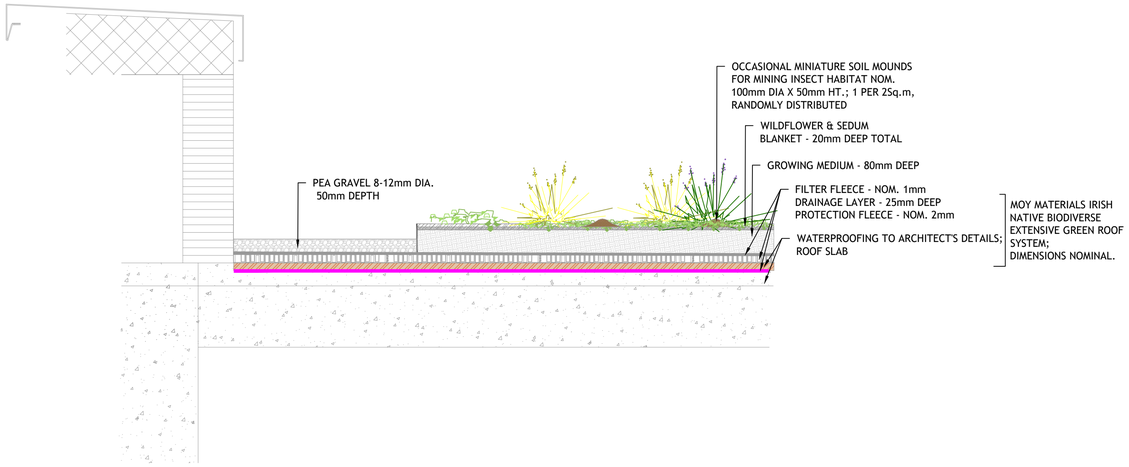
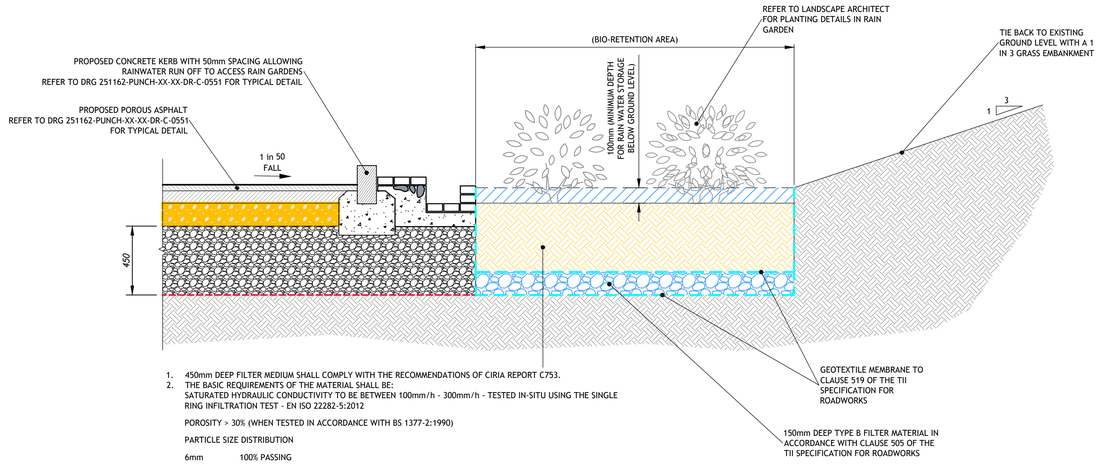
Project: PARKWAY VALLEY LRD			
Title: DRAINAGE DETAILS - SHEET 5			
Drawn: PJ Mulcahy	Date drawn: 2025-10-07	Technician Check: PJ Mulcahy	Engineer Check: Tracey O Connell	Approved: Julie Tiernan
Project No.: 231171	Model Ref.: 231171-PUNCH-XX-XX-M2-C-0505	Drawing Status: S3 (Review & Comment)	
Scale @ A1: As Shown	Document No.: 231171-PUNCH-XX-XX-DR-C-0505	Revision No.: P01	



1- EXTENSIVE GREEN ROOF TYPICAL SECTION
SCALE 1:10



1. 450mm DEEP FILTER MEDIUM SHALL COMPLY WITH THE RECOMMENDATIONS OF CIRIA REPORT C753.
2. THE BASIC REQUIREMENTS OF THE MATERIAL SHALL BE:
   SATURATED HYDRAULIC CONDUCTIVITY TO BE BETWEEN 100mm/h - 300mm/h - TESTED IN-SITU USING THE SINGLE RING INFILTRATION TEST - EN ISO 22282-5:2012

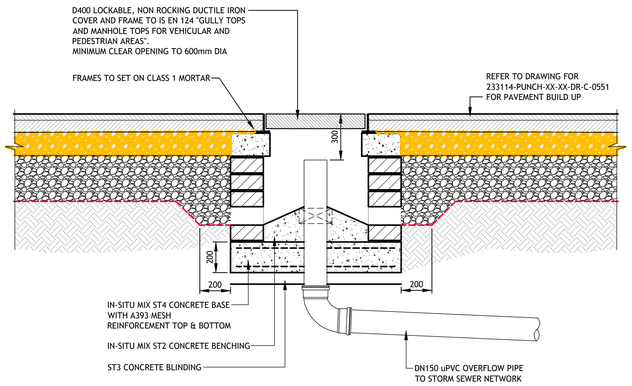
   POROSITY > 30% (WHEN TESTED IN ACCORDANCE WITH BS 1377-2:1990)

   PARTICLE SIZE DISTRIBUTION

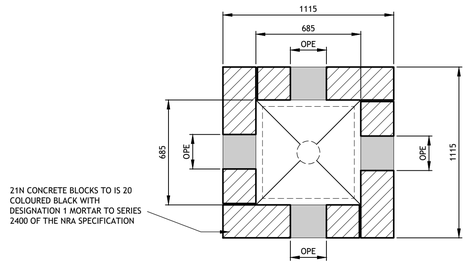
6mm	100% PASSING
2mm	90-100% PASSING
0.6mm	40-70% PASSING
0.2mm	5-20% PASSING
0.063mm	<5% PASSING

3. ORGANIC MATER CONTENT - 3-5% (w/w)
4. SOILS SHALL BE ASSESSED BY HORTICULTURIST TO ENSURE THAT IT WILL SUPPORT HEALTHY VEGETATION COMMUNITY.
5. ANY COMPONENT FOUND TO CONTAIN HIGH LEVELS OF SALT, CLAY OR SILT PARTICLES OR OTHER EXTREMES WHICH MAY BE CONSIDERED RETARDENT TO PLANT GROWTH SHALL BE REJECTED.

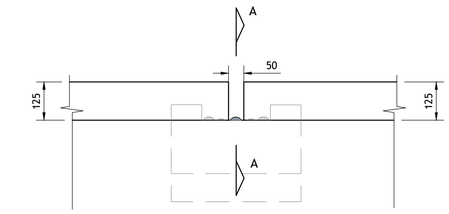
BIO-RETENTION SYSTEM - TYPICAL SECTION
NOT TO SCALE



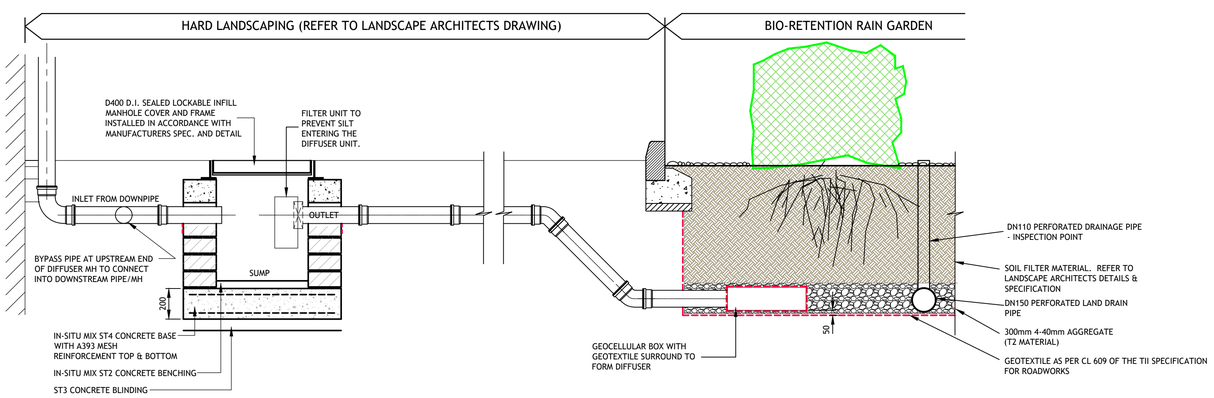
OVERFLOW CHAMBER - SECTION
SCALE 1:20



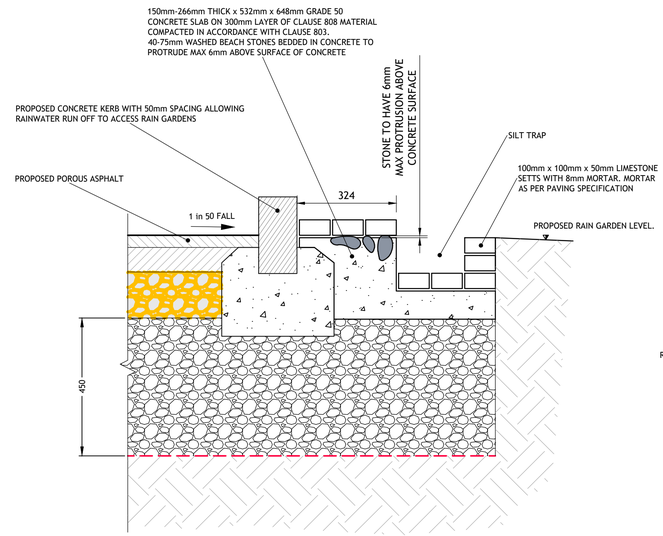
OVERFLOW CHAMBER - PLAN
SCALE 1:20



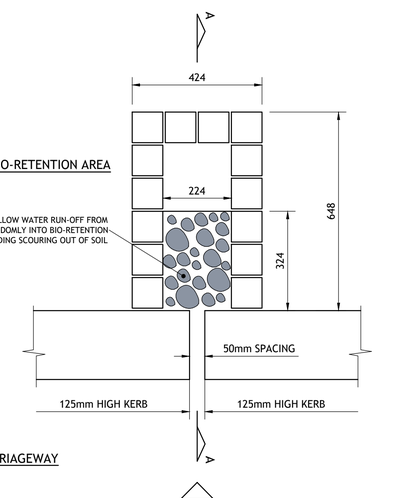
VIEW OF KERBS ON ARROW "X"
NOT TO SCALE



FLOW DIFFUSER TO DISTRIBUTE ROOF RUN OFF
SCALE 1:20



SECTION A-A
NOT TO SCALE



BIO-RETENTION INLET DETAIL
NOT TO SCALE

BUILDING INFORMATION MODELLING (BIM) I.S. EN ISO 19650-2:2018 NSAI Certified

Rev	Amendment	By	Date
P01	ISSUED FOR REVIEW & COMMENT	PJM	2025-10-30

Client:

PUNCH consulting engineers
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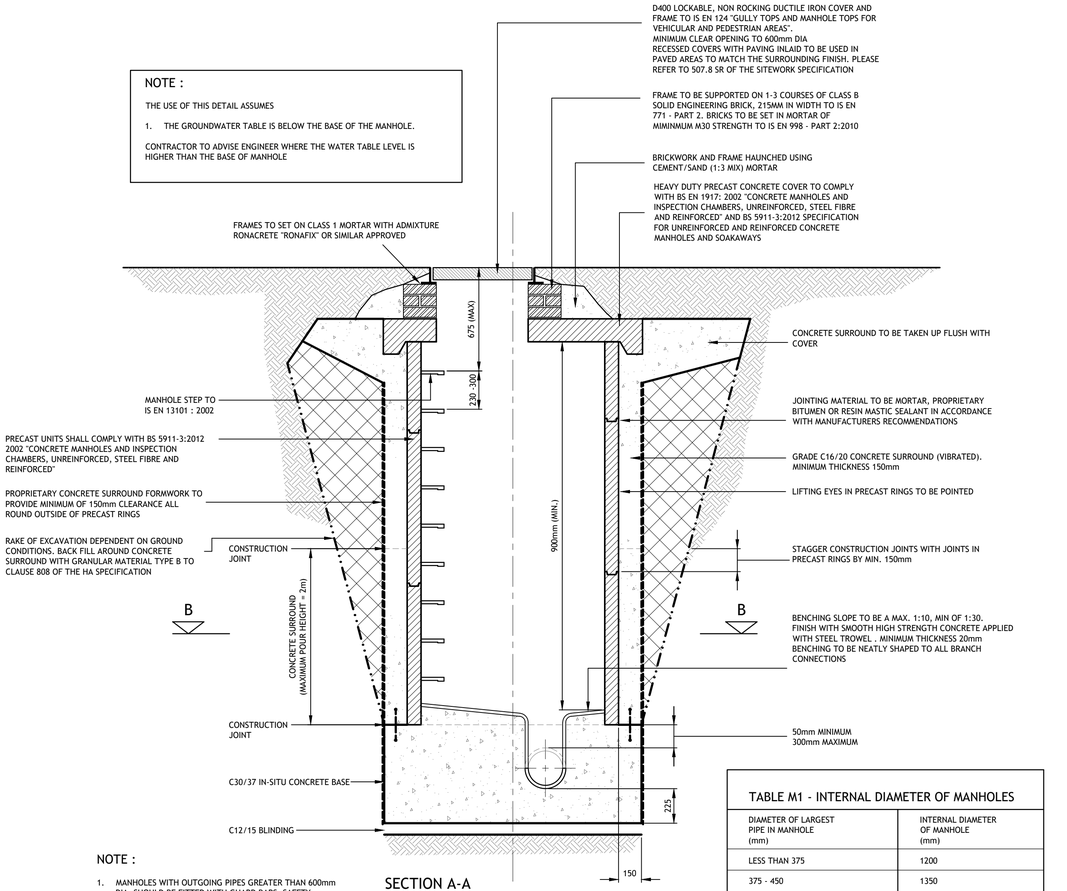
Project: PARKWAY VALLEY LRD
Title: DRAINAGE DETAILS - SHEET 6

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
PJ Mulcahy	2025-10-07	PJ Mulcahy	Tracey O Connell	Julie Tiernan

Project No:	Model Ref:	Drawing Status:
231171	231171-PUNCH-XX-XX-M2-C-0506	S3 (Review & Comment)

Scale @ A1:	Document No:	Revision No:
As Shown	231171-PUNCH-XX-XX-DR-C-0506	P01



SECTION A-A
SCALE 1:20

NOTE :

1. MANHOLES WITH OUTGOING PIPES GREATER THAN 600mm DIA. SHOULD BE FITTED WITH GUARD BARS, SAFETY CHAINS OR OTHER SAFETY DEVICES.
2. FOR DEPTHS TO INVERT >2.700m AN ACCESS SHAFT OF MIN. 900mm DIAMETER AND REDUCING SLAB MAY BE USED.
3. WHERE THE DEPTH TO INVERT IS 1.00m OR LESS A 450mm x 450mm (OR 450mm DIA.) INSPECTION CHAMBER WITH MINIMUM COVER SIZES OF 450mm DIA. MAY BE USED SUBJECT TO ACCOMMODATION OF CONNECTIONS AND APPROVAL OF THE LOCAL AUTHORITY.
4. ON COMPLETION OF CONSTRUCTION INTERNAL SURFACES OF MANHOLE & SEWERS TO THOROUGHLY CLEANSED TO REMOVE ALL DELETERIOUS MATERIAL, WITHOUT SUCH MATTER BEING PASSED FORWARD INTO PUBLIC SEWERS OR WATERCOURSES
5. FIRST MANHOLE UPSTREAM FROM CONNECTION TO THE (EXISTING) PUBLIC SEWER TO BE FITTED WITH A SCREEN IN ORDER TO PREVENT DEBRIS ENTERING THE PUBLIC SEWER. THE SCREEN NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO OCCUPATION OF PREMISES TO BE SERVED BY SEWER.

TABLE M1 - INTERNAL DIAMETER OF MANHOLES

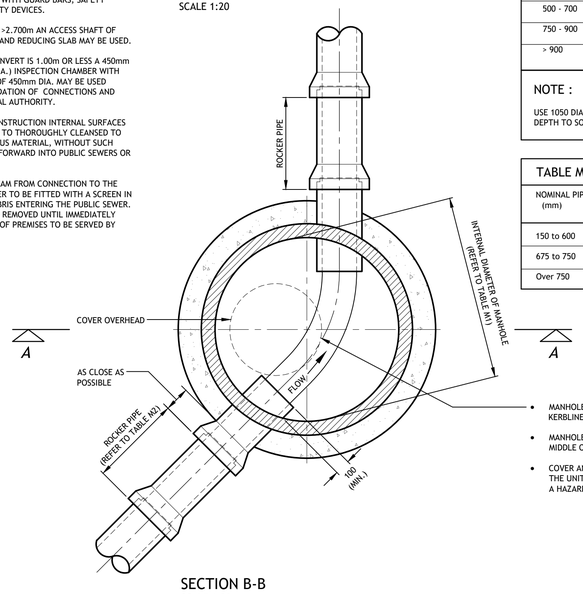
DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375 - 450	1350
500 - 700	1500
750 - 900	1800
> 900	CONSULT LOCAL AUTHORITY

NOTE :

USE 1050 DIAMETER RINGS FOR PIPES LESS THAN 375mm DIAMETER WHERE DEPTH TO SOFFIT IS 1.35 - 1.5m

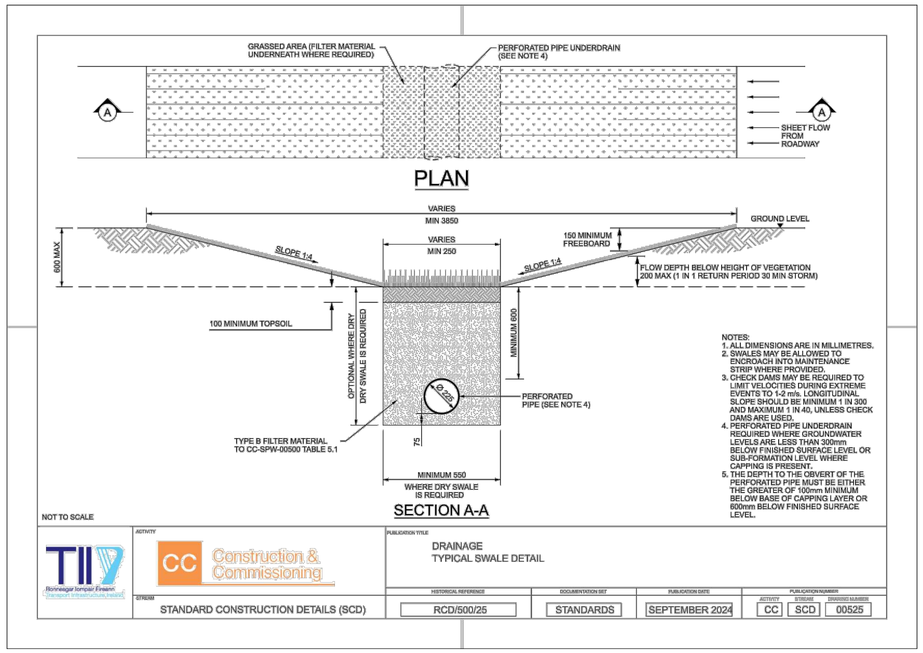
TABLE M2 - ROCKER PIPE LENGTH

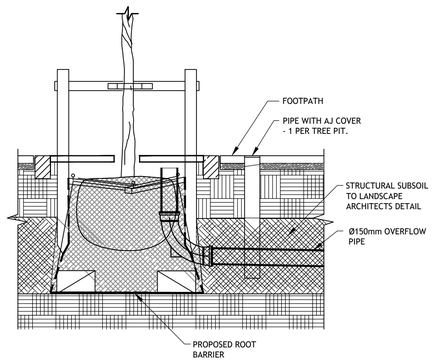
NOMINAL PIPE DIAMETER (mm)	EFFECTIVE LENGTH (M)
150 to 600	0.6
675 to 750	1.0
Over 750	1.2



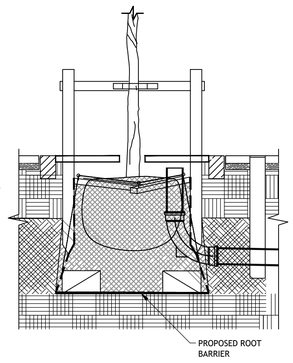
SECTION B-B
SCALE 1:20

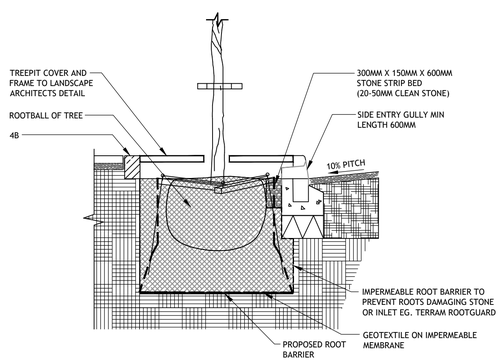
- MANHOLE COVER TO BE HINGED AT RIGHT ANGLES TO KERBLINE SO THAT THEY CLOSE IN DIRECTION OF TRAFFIC.
- MANHOLE COVERS ON ROADS SHOULD BE LOCATED IN THE MIDDLE OF TRAFFICKED LANES INSIDE WHEEL TRACKS
- COVER AND FRAME TO BE INSTALLED SO THAT NO PART OF THE UNIT IS RAISED OR SUNKEN IN A WAY THAT COULD CAUSE A HAZARD TO PEDESTRIAN OR VEHICULAR TRAFFIC





TREE PIT SYSTEM DETAIL
NOT TO SCALE





TREE PIT SYSTEM - CROSS SECTION
NOT TO SCALE

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Rev	Amendment	By	Date
C01	ISSUED FOR PLANNING	PJM	2025-10-17

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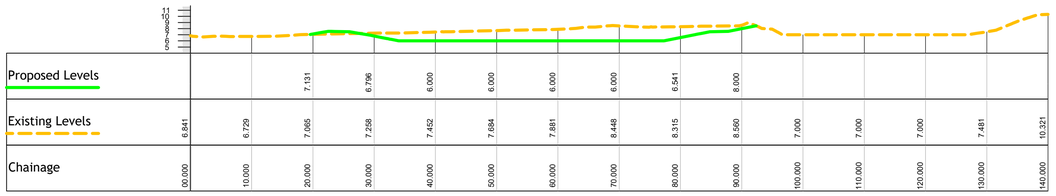
Project: PARKWAY VALLEY LRD			
Title: DRAINAGE DETAILS - SHEET 7			
Drawn: PJ Mulcahy	Date drawn: 2025-10-07	Technician Check: PJ Mulcahy	Engineer Check: Tracey O Connell / Julie Tiernan
Project No: 231171	Model Ref: 231171-PUNCH-XX-XX-M2-C-0507	Drawing Status: S3 (Review & Comment)	
Scale @ A1: As Shown	Document No: 231171-PUNCH-XX-XX-DR-C-0507	Revision No: P01	



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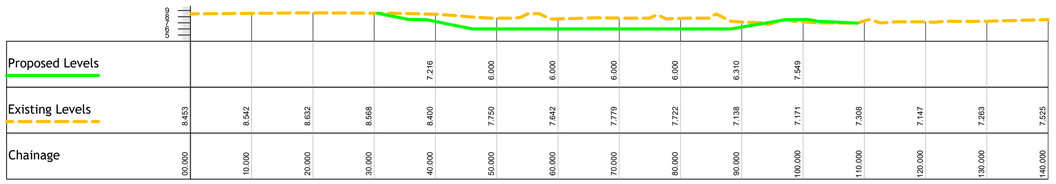

SECTION X-X - LONGSECTION
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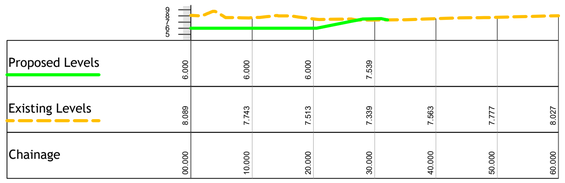

SECTION Y-Y - LONGSECTION
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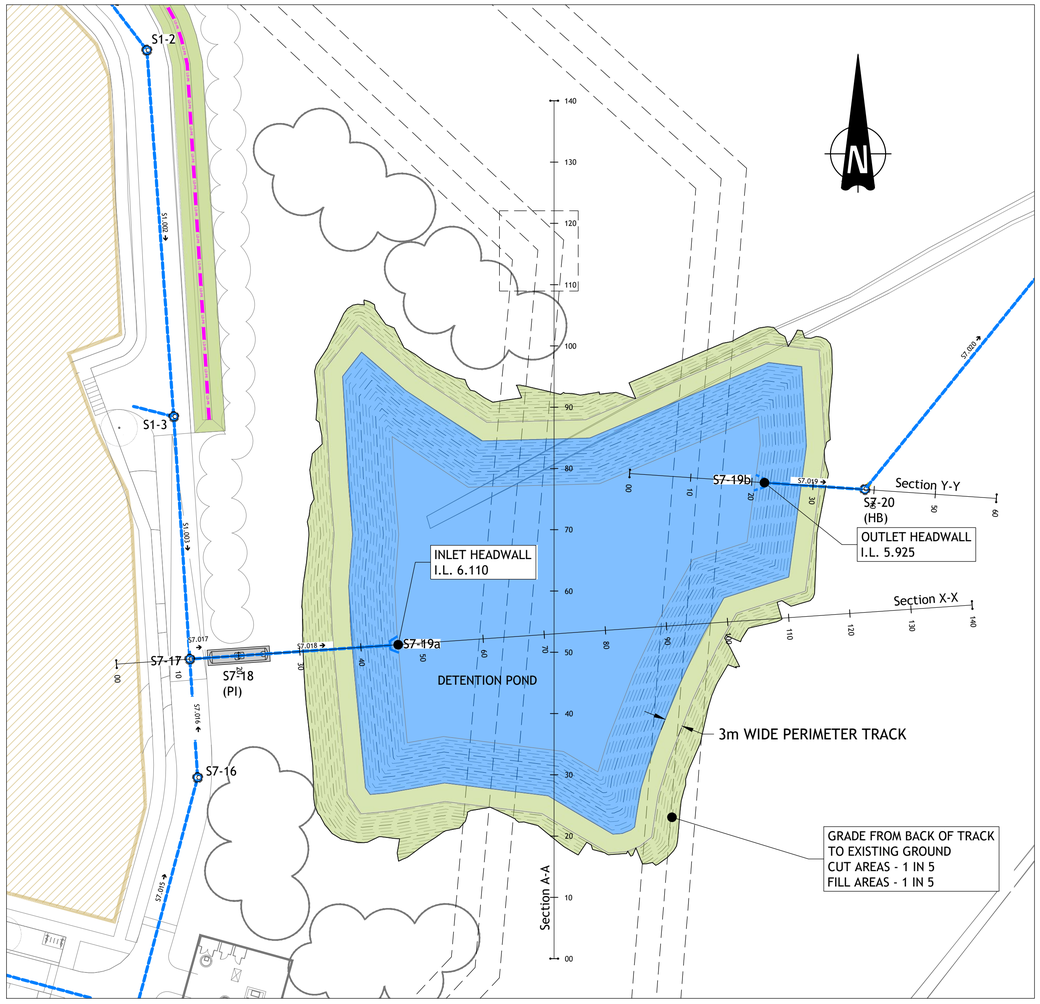
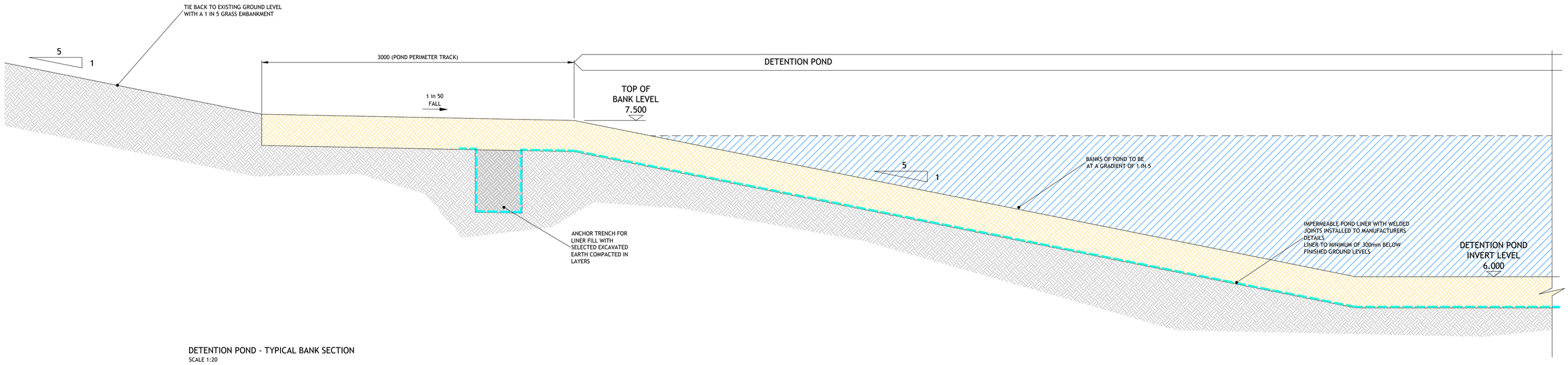


DETENTION POND LAYOUT
SCALE 1:500

LEGEND

- PROPOSED SURFACE WATER SEWER — S1.001 150
- PROPOSED SURFACE WATER MANHOLE — S1-0
- PROPOSED PETROL INTERCEPTOR
- PROPOSED HEAD WALL STRUCTURE
- PROPOSED SWALE



DETENTION POND - TYPICAL BANK SECTION
SCALE 1:20

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Title: DRAINAGE DETAILS - SHEET 8			
Drawn: PJ Mulcahy	Date drawn: 2025-10-29	Technician Check: PJ Mulcahy	Engineer Check: Tracey O' Connell / Julie Tiernan
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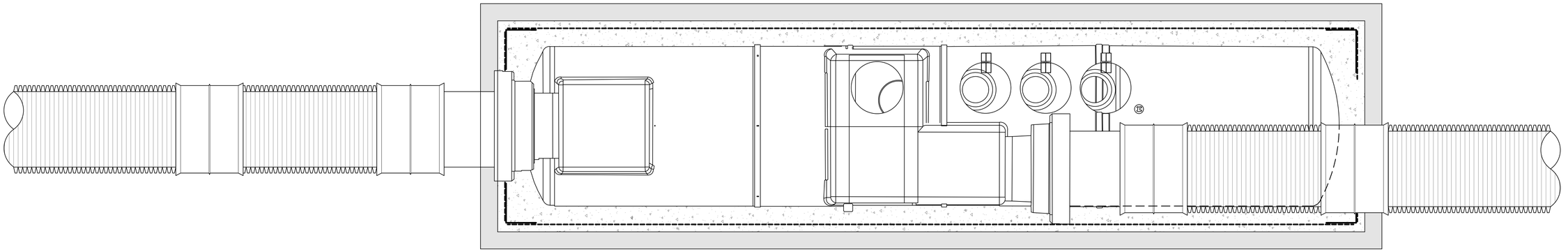
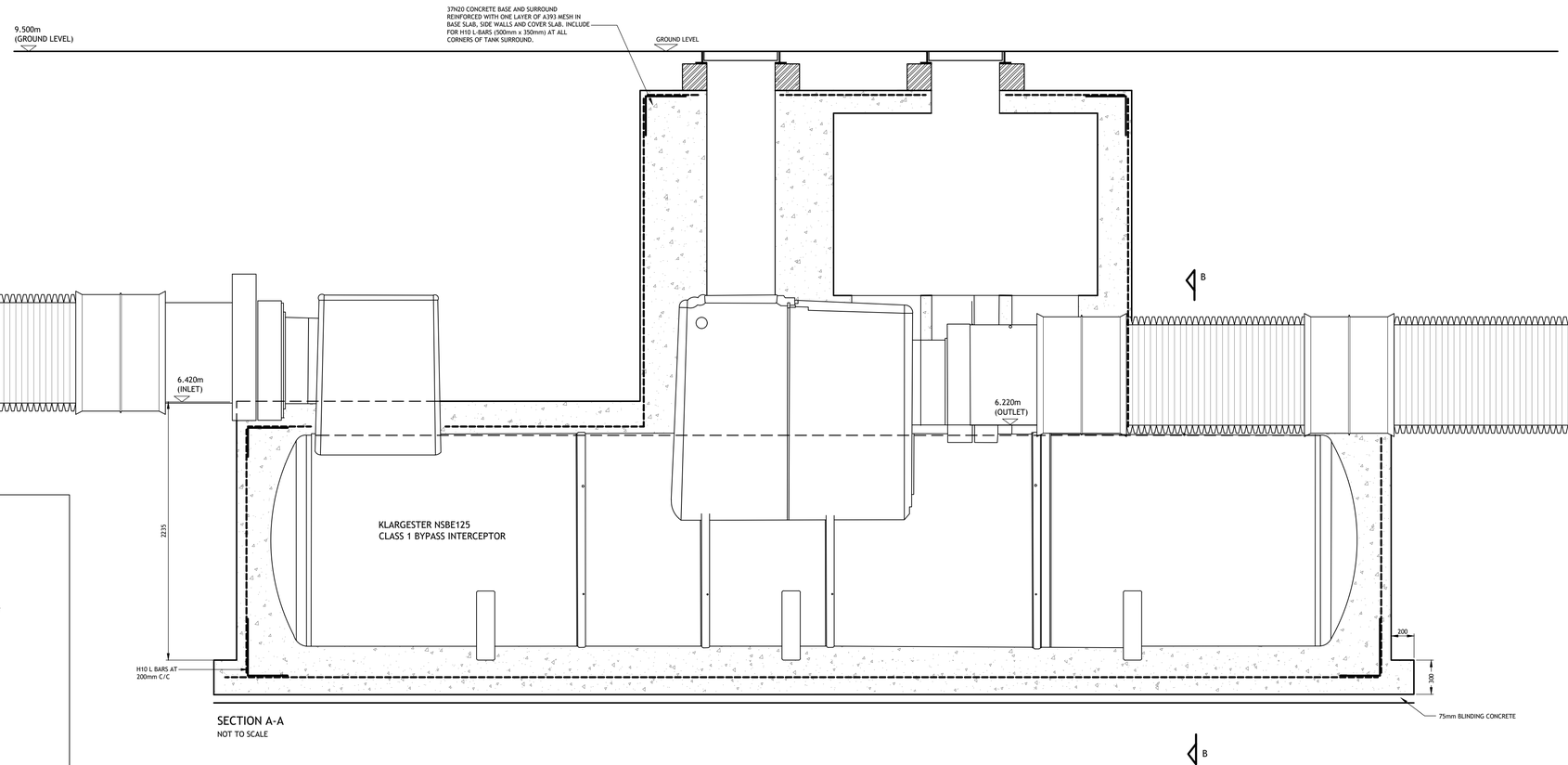
Scale @ A1: As Shown	Document No: 231171-PUNCH-XX-XX-DR-C-0508	Revision No: P01	



PLAN C-C
NOT TO SCALE



SECTION A-A
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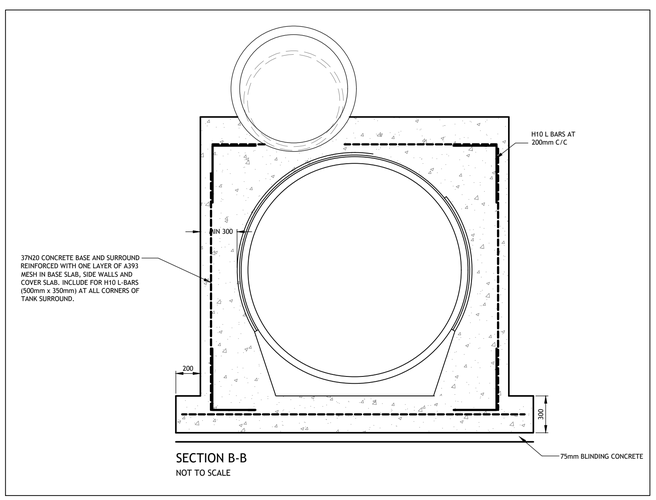

SECTION B-B
NOT TO SCALE

BUILDING INFORMATION MODELLING (BIM)
I.S. EN ISO 19650-2:2018
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Project: PARKWAY VALLEY LRD
Title: DRAINAGE DETAILS - SHEET 9

Drawn:	Date drawn:	Technician Check:	Engineer Check:	Approved:
Sajitha K	2025-10-31	PJ Mulcahy	Tracey O Connell	Julie Tiernan
Project No: 231171	Model Ref: 231171-PUNCH-XX-XX-M2-C-0509		Drawing Status: S3 (Review & Comment)	
Scale @ A1: As Shown	Document No: 231171-PUNCH-XX-XX-DR-C-0509			Revision No: P01

PUNCH
consulting engineers

Parkway Valley LRD

Engineering Planning Report
231171-PUNCH-XX-XX-RP-C-0002

October 2025

Document Control

Document Number: 231171-PUNCH-XX-XX-RP-C-0002

Status	Rev	Description	Date	Prepared	Checked	Approved
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S3	P02	Draft Issue	17/10/2025	A. Lane	T. O'Connell	J. Tiernan
S3	P03	S32B Issue	30/10//2025	A. Lane	T. O'Connell	J. Tiernan

Table of Contents

1 Introduction

PUNCH Consulting Engineers was appointed by Kirkland Investments to carry out this Engineering Planning Report for a proposed development in Parkway Valley in Limerick City.

This report was prepared to accompany a planning application for the proposed large residential development which is detailed in a series of planning drawings provided by Reddy Architecture. The site location is shown in Figure 1-1 below.

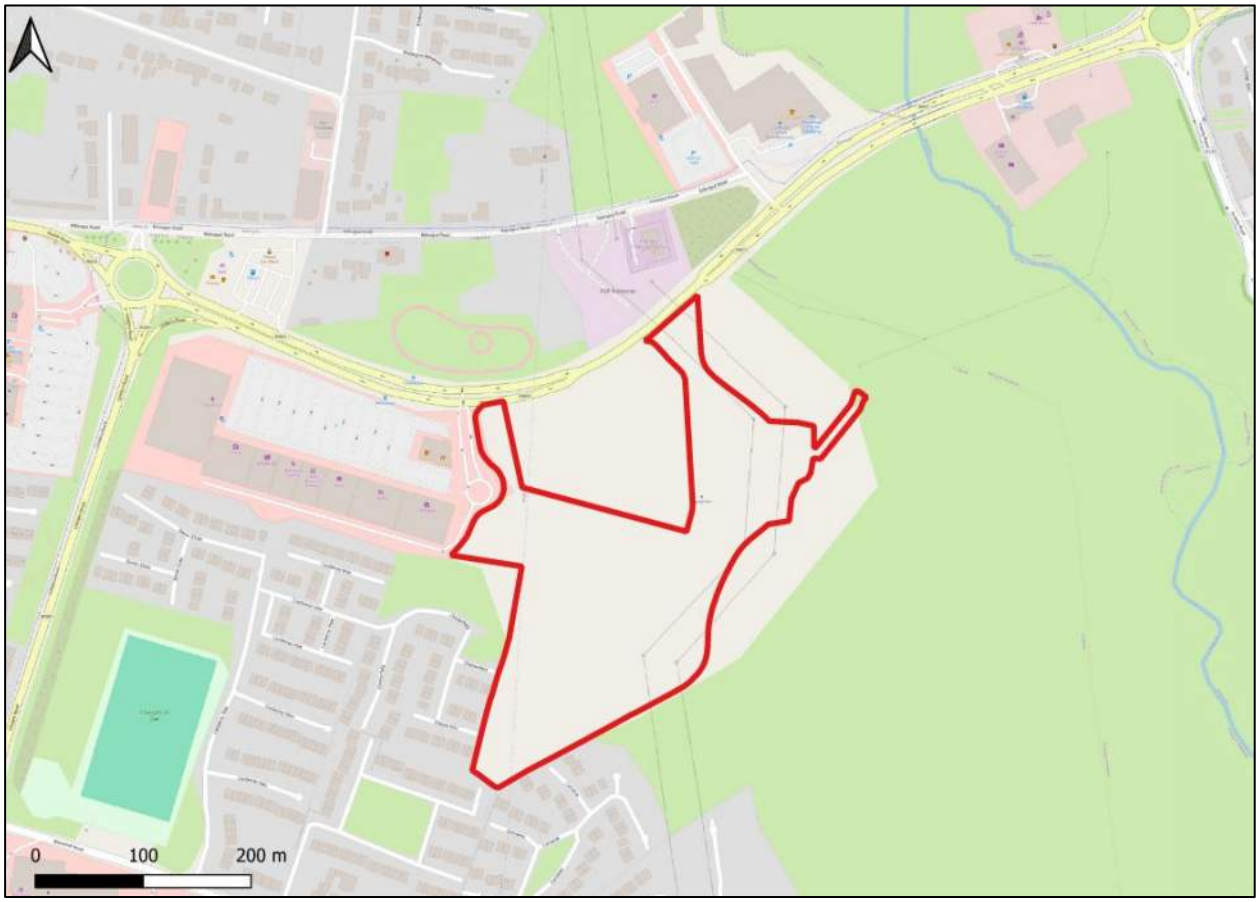


Figure 1-1: Site Extent

The site is primarily a brownfield site and is approximately 7.907 hectares in area. It is bounded by the Dublin Road to the north, Parkway Valley commercial shops and residential to the east and southeast. The site is surrounded by greenfield to the other boundaries. Construction works were carried out on the site previously but were never completed. The previous development was a proposed mixed-use development comprised of an RC and streel frame. A retaining wall has been retained along the western boundary, but the remainder of the previous construction works have been demolished and the site has a gravel footprint as of now.

Reddy Architecture has developed a set of architectural drawings outlining the proposed works. The scheme comprises five multistorey residential blocks (A, B, C, D, E) for 403 No. 1-bed and 2-bed apartment units. In addition, the development includes a creche at ground level within Block B and a medical centre located at the entrance into the development.

1.1 Proposed Development

The proposed LRD development comprises 5 no. blocks with a total of 403 no. residential units, ranging from 5 to 8 storeys in height; a medical centre located at the western edge of the site; a creche located at ground level within Block B; and all associated site works and development.

The current LRD development proposals also extend to the R445 to accommodate a proposed entrance from the R445. They will also include a proposed nature based surface water drainage solution within the neighbouring Groody Valley green wedge.

Specifically, the proposed uses for the LRD development are:

Medical Centre

A c. 2,800sq. m, 3-storey over podium level medical centre is proposed to be located at the western extent of the application site.

Creche

A c. 288 sq. m creche is proposed on the lower ground floor level of Block B.

Residential Development

The subject proposals will provide a total of 403 no. units comprising of 246 No. 1 Bed units, 32 No. 2 Bed (3 person) units and 125 No. 2 Bed (4 person) units.

The proposed works are outlined in a series of architectural drawings prepared by Reddy Architecture and engineering drawings prepared by PUNCH Consulting Engineers and supplied as part of the planning documentation.

An extract from the site layout is included in Figure 1-2.

Figure 1-2: Proposed Site Layout

1.2 Site Topography

A topographical survey of the site and its environs was completed by Control Surveys on the 10th of March 2023. As shown in Figure 1-2, the site is bounded by the Dublin Road to the north, Parkway Retail Park to the northeast and greenfield to the south and west.

The survey shows that, while there are some localised raised areas surrounding the site, existing ground levels on the site are generally flat and range from 8.4 to 9.64mAOD.

The site has a gravel ramp in the northeast corner which connects the low-level ground to the level of the surrounding roads. The also shows some low-level ponding which is retained by a short retaining wall roughly a metre in height.

The topographical survey extent is shown in Figure 1-3. Refer to image below for an indication of the site topography along the Dublin Road boundary.

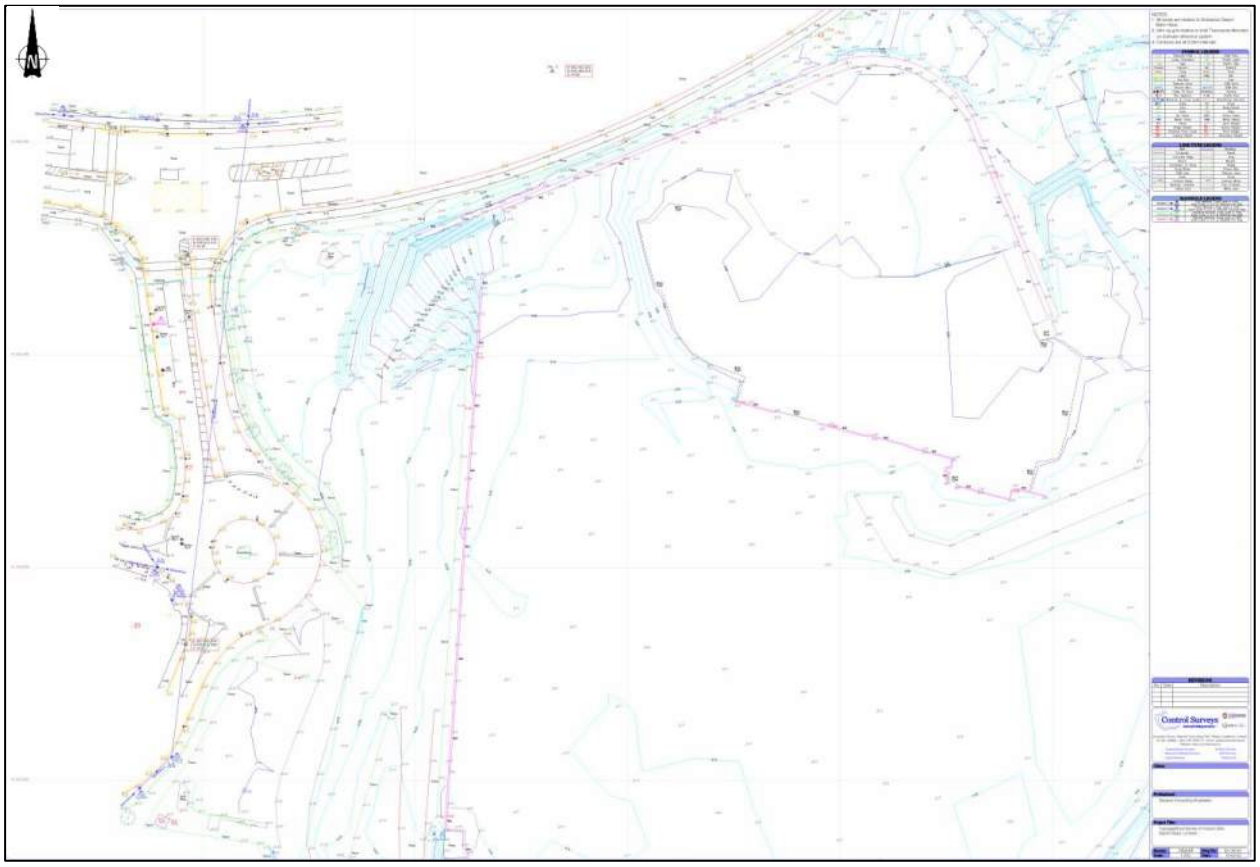


Figure 1-3: Image showing existing site topography of northern side of the site

2 Stormwater Drainage Design

2.1 Existing Stormwater Drainage

2.1.1 Existing On-Site Drainage

There is no onsite drainage, but there is a secondary stream off the Groody River located approximately 300m to the east of the site. The main river is a further 100m east of this stream. There are a number of drainage ditches shown on the EPA website throughout the site however following a site walk over, these were not evident within the proposed development site.

No upstream catchments are believed to connect to these drains as all upstream site have been developed with their own surface water networks which discharge into the main drainage.

A new surface water network will cater for on site drainage.

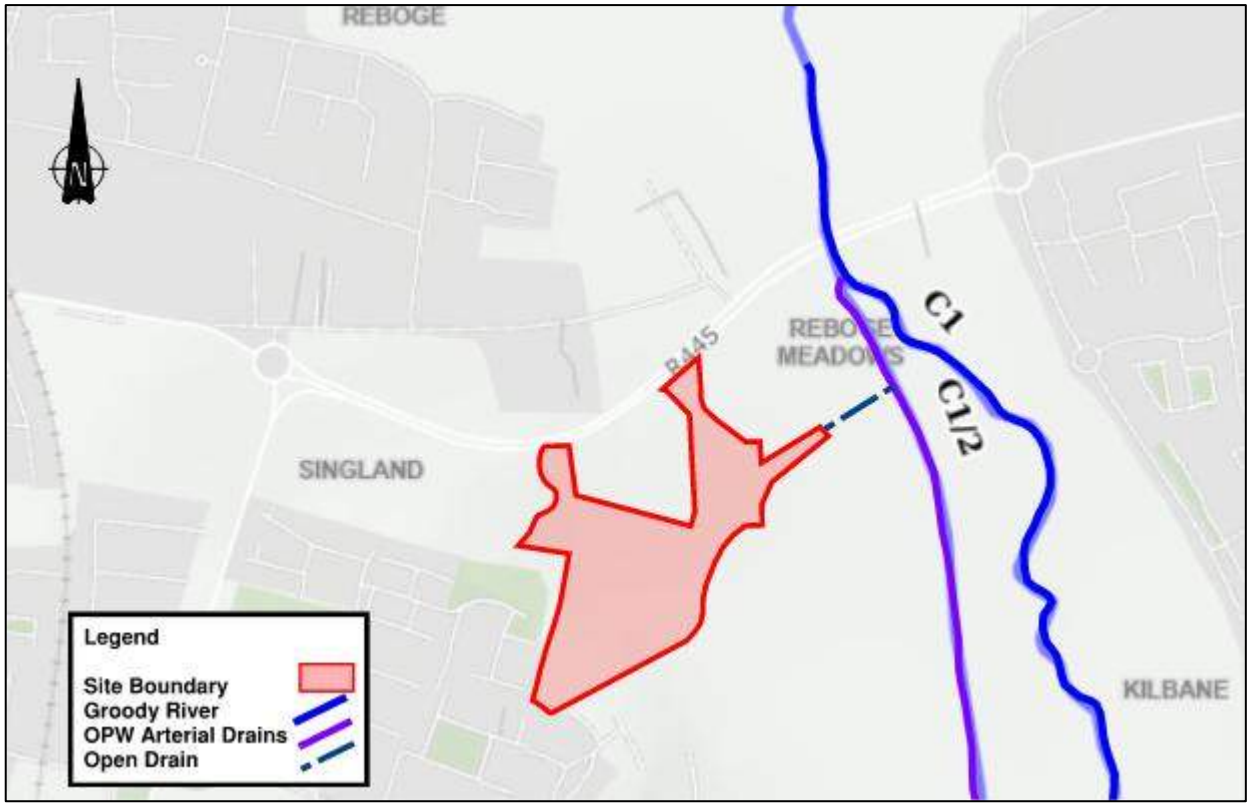


Figure 2-1: Existing Arterial Drains

During the ground investigation works, it was found that there is a perched water table on the site. Testing is to be carried out in accordance with the relevant guidelines and dewatering will be carried out in line with best practice.

2.1.2 Existing Pipe network

A review of record drawings provided by Limerick City & County Council shows no evidence of a surface water pipe network in the area.

A review of record drawings provided by Uisce Éireann shows evidence of storm sewers in the adjacent residential development west of the site. There are also existing storm sewers 200m north west of the site.

There is no evidence of storm sewers in the Dublin Road.

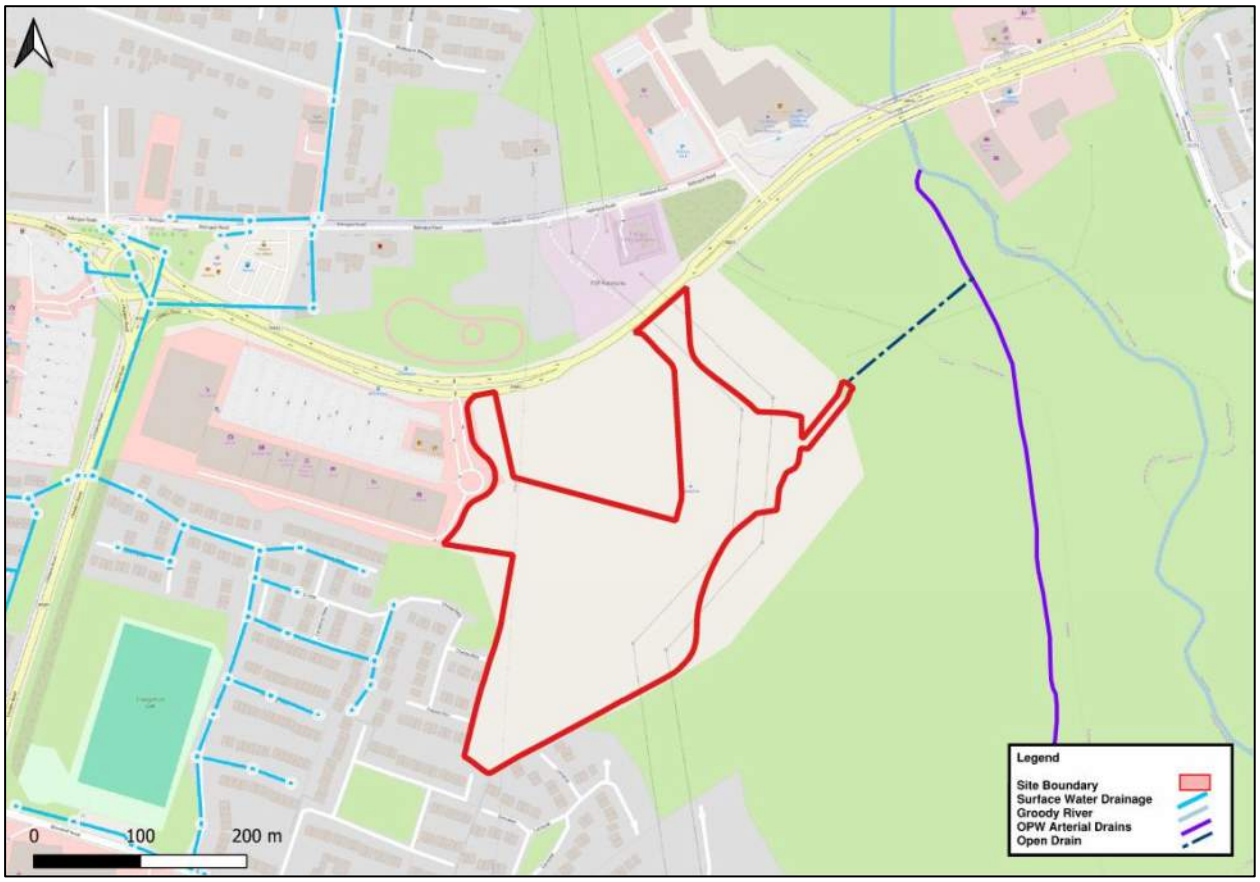


Figure 2-2: Existing Storm Drainage Surrounding the Site (Source: QGIS)

Refer to Appendix A for GPR Survey Drawing illustrating the existing storm water sewer network in the area.

2.2 Proposed Stormwater Drainage

2.2.1 General

A new surface water sewer network shall be provided for the proposed development which will be entirely separated from the foul water sewer network.

The Limerick Development Plan 2022-2028 in conjunction with the Greater Dublin Strategic Drainage Study (GDSDS) requires that the site discharge is limited to 2 l/s/ha or Qbar, whichever is greater. The runoff is to be reduced for the 1% AEP (1:100 year storm return period), with an additional 30% to be added to rainfall to allow for climate change.

For this site, the flow is to be limited through the use of a hydrobrake upstream of a stormwater outfall from the site.

The proposed surface water drainage system has been designed using Causeway Flow software in accordance with the Department of Environment and Local Government's guidance document - "*Recommendations for Site Development Works for Housing Areas*", with guidance taken from the "*Greater Dublin Strategic Drainage Study*" (GDSDS),CIRIA Publications C644 – *"Building Greener"* and the Limerick Development Plan 2022-2028.

The drainage system has been designed with the aim of providing a sustainable drainage solution ensuring, in so far as feasible, that the development has a minimal impact on the existing public surface water sewer system. This is achieved with the incorporation of Sustainable urban Drainage Systems (SuDS) such as porous pavements and bioretention areas.

2.2.2 Proposed Development Drainage Network

All surface water run-off from roof areas and hardstanding areas shall be collected in the gravity pipe network. The proposed storm drainage network will discharge into the open drain within the ownership lands. This drain discharges into the stream running parallel to the Groody River via gravity.

The proposed development has been designed using Causeway Flow software. An M5-60 of 16.3mm and a Ratio (R) of 0.307 was utilised in the model. The model has analysed a range of storms at the 1% AEP (1 in 100 year return period storm), with a 30% additional rainfall to allow for climate change and 10% additional area for urban creep.

All proposed finished floor levels are 500mm above drainage water levels for a 100 year return period.

Table 2-1 describes the stormwater drainage design parameters used and detailed calculations are enclosed in Appendix C and D. Details on the proposed flow control device are included in Appendix F.

Table 2-1: Stormwater Drainage Design Parameters

Description	Value
Total Impervious Site area	7.907ha
Return period target	Pipe Design 1 in 5 year + CC. Network Design 1 in 30 year + CC. Check 1 in 100 year + CC for flooding.
Climate Change	30%
Urban Creep	10%
M5-60	16.3
Ratio R	0.307
SOIL type	2
Soil value	0.47
SAAR	1020mm
Flow reduction parameter	2 l/s/Ha
Controlled Outflow	15.7 l/s

Flow restriction method	Hydrobrake
Detention Pond Storage Volume	5,800m^3

2.3 SUDs Proposals

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

All rainwater collected on the respective SuDS devices won't enter the public sewer network during typical low intensity storms. This is because the proposed SuDS measures will retain rainwater until it is used via evapotranspiration in the green areas or filters through the drainage layers to overflow into the proposed surface water drainage and discharge into the stream adjacent to the Groody River.

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

2.3.1 Green Roofs

A large proportion of the roof space has been allocated to green roof for this development.

Green roofs are areas of living vegetation, installed on the top of buildings, for a range of reasons including visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff. It is proposed to provide a significant extent of green roofs within the development. These shall be provided at roof level in the form of sedum green roofs on all proposed buildings. Green roofs are widely recognised as an effective SuDS solution and an important tool in mitigating the adverse effects of development on rainfall run-off and for managing urban flood risk. The detail of the green roof as well as associated roof drainage and access systems are provided on the architectural drawings by Reddy Architects.

Research in the UK (Kellagher and Lauchlan, 2005, CIRIA, 2007) indicates that green roofs are effective in providing both attenuation and volume reduction in runoff for small rainfall events but suggests that these advantages are reduced (but not completely lost) for larger rainfall events.

2.3.2 Rain Gardens

The proposed rain gardens will serve to provide treatment to pavement runoff for low intensity storms. Rainwater will be treated through evapotranspiration within the filter media of the rain garden structure.

These rain gardens are to comprise a landscape area with high permeability soil in the top 900mm depth. A perforated surface water drain is to be provided at a low level to drain any excess surface water.

The extent and detail of rain gardens is to be as per the landscape architects' drawings.

Any water that drains through the above-mentioned perforated drainage pipe will subsequently discharge to the main stormwater drainage system.

2.3.3 Infiltration trenches

The infiltration trenches will provide an additional level of attenuation storage within the voids in the stone within the trench. The base and sides of the infiltration trenches will be lined and a high level overflow within the build-up will accommodate removal of excess water to the drainage network.

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

2.3.4 Engineered swales

The swales will incorporate an infiltration trench and will provide additional attenuation within the swale. The base of the swale and infiltration trench will be lined and a high level overflow to the drainage network within the build-up will accommodate removal of water.

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

2.3.5 Tree Root Systems

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

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

2.3.6 Detention Pond

The proposed detention pond is sized to reduce the peak runoff from the site. The proposed method of this site is an open pond. It will naturally integrate into the environment around and will be constructed with a 0.5m freeboard above designed flood volume. This pond is designed to store the 100-year flood.

2.4 Calculation of Volume of Interception Storage

Interception storage is provided for the first 5 mm of rainfall.

The following parameters have been used for the calculation of interception storage, for the paved areas (noting these figures are draft / preliminary and will be agreed in full in due course pre-planning):

- Impervious site area: 10,687m2
- 75% of pavement runoff at 80% runoff factor
- 5mm rainfall depth

Calculation of required interception storage is provided below:

$$Interception\ Storage = Site\ area\ \times 0.75 \times 0.005 \times 0.80$$

$$= 10{,}687m^2\ \times 0.75 \times 0.005 \times 0.80$$

$$= 32.1\ m^3$$

The interception storage is provided via a number of SUDS measures. Refer below for a calculation of the provided interception storage volume:

1. Bio-Retention Area

   Total bio-retention area: 2,367 m²

   Thickness of drainage layer: 0.675m

   Voids ratio of drainage layer: 40%

   $$= 2367m^2\ \times 0.675 \times 0.4$$

   Storage provided: 639 m³

2. Green Roof Area

   Total green roof area: 4,800 m²

   Thickness of drainage layer: 0.060m

   Voids ratio of drainage layer: 40%

   $$= 4800m^2\ \times 0.06 \times 0.4$$

   Storage provided: 115 m³

3. Swales

   Total green roof area: 2,653 m²

   Thickness of drainage layer: 0.3m

   Voids ratio of drainage layer: 40%

   $$= 2{,}653m^2\ \times 0.3 \times 0.4$$

   Storage provided: 425 m³

   Total storage provided: 1,179 m³

2.5 Pollution Hazard Indices Based on the Simple Index Approach

In accordance with the SuDS Manual CIRIA C753 the pollution prevention guidelines have been followed to ensure appropriate levels of treatment are provided before run-off from the site is infiltrated to ground. The Pollution Hazard Indices, shown in Table 2-1 below, for the different proposed land uses have been derived from Table 26.2 of CIRIA C753.

Table 2-1: Pollution Hazard Indices for Different Land Uses

Land Use	TSS	Metals	Hydrocarbons
Non-residential car parking with infrequent change	0.5	0.4	0.4
Residential roofs	0.4	0.2	0.1
Residential Street	0.4	0.6	0.6

To ensure the proposed SuDS strategy will appropriately mitigate against the potential pollution derived from these areas the Pollution Mitigation Indices (PMI) in Table 26.3 and 26.15 of CIRIA C753 have been reviewed and laid out in Table 2-2 below.

Table 2-2: Indicative SuDS mitigation indices for the site

SuDS Measures	TSS (PMI)	Metals (PMI)	Hydrocarbons
Bio Retention Area	0.8	0.8	0.8
Green Roofs	0.9	0.9	0.9
Swales	0.7	0.4	0.6
Detention Basin	0.6	0.6	0.7

Table 2-3 below shows the calculations for the total pollution prevention for each type of hard standing on site. The following formula has been used to calculate the total mitigation in line with CIRIA C753. Total SuDS Mitigation Index = Mitigation Index 1 + 0.5 (Mitigation Index 2).

In Table 2-3, the Mitigation Indices for the relevant SuDS feature has been subtracted from the Pollution Hazard Indices for the land use to determine if sufficient treatment has been provided. A negative (or zero) number indicates that enough treatment has been provided, and a positive number indicates that additional forms of treatment are required.

Table 2-3: Pollution Hazard Indices for different Land Uses

Land Use	Mitigation Method 1			Mitigation Method 2			Total SuDS Mitigation		
	TSS	Metals	H-C	TSS	Metals	H-C	TSS	Metals	H-C
Car Parking	Bio Retention Area			N/A					

(Pollution Hazard Table 2.1 – Mitigation Index Table 2.2)	0.5-0.8 = -0.3	0.4-0.8 = -0.4	0.4-0.8 = -0.4				-0.3	-0.4	-0.4
Residential Roof	Green Roof			N/A					
(Pollution Hazard Table 2.1 – Mitigation Index Table 2.2)	0.4-0.9 = -0.5	0.2-0.9 = -0.7	0.1-0.9 = -0.8				-0.5	-0.7	-0.8
Residential Street	Swales			Detention Basin					
(Pollution Hazard Table 2.1 – Mitigation Index Table 2.2)	0.4-0.7 = -0.3	0.6-0.4 = 0.2	0.6-0.6 = 0.0	-0.3-0.3 = -0.6	0.2-0.3 = -0.1	0.0-0.35 = -0.35	-0.6	-0.1	-0.35

As shown in Table 2-3 above, the proposed green roof, swales and bio retention areas will effectively remove pollutants from the runoff prior to discharging into the Groody River.

3 Foul Water Drainage Design

3.1 Existing Foul Water Drainage

A review of record drawings provided by Uisce Éireann shows no evidence of foul drainage within the proposed site.

There is foul drainage in both the residential developments to the west and south. A combined line seems to be discharging into the Groody River from the eastern side also.

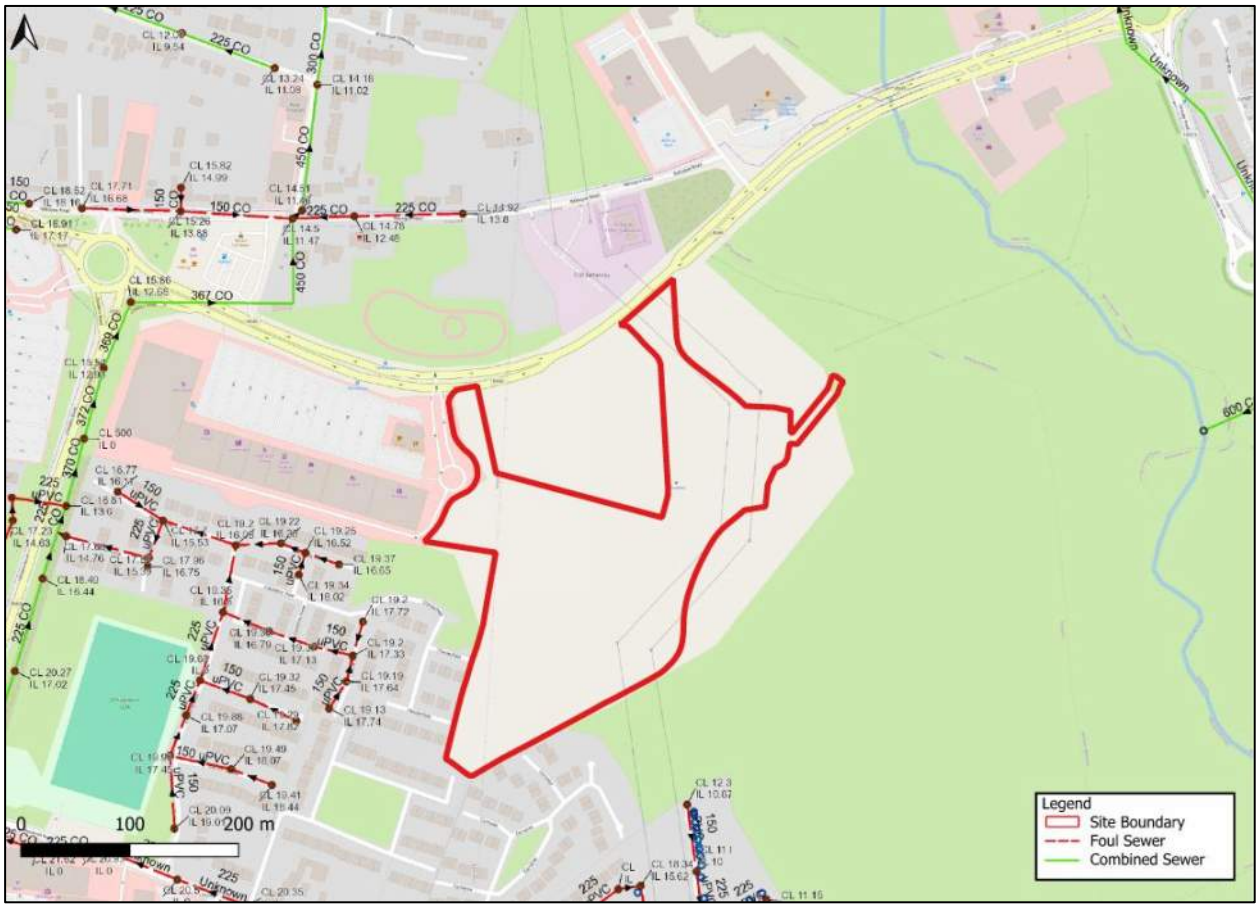


Figure 3-1: Existing foul drainage surrounding the site (Extract from Uisce Eireann records)

3.2 Proposed Foul Water Drainage

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

A new foul sewer network is proposed within the site, completely separate from the storm sewer, and will be collected in a pump on the eastern boundary of the proposed development. The pump has been designed in accordance with Uisce Éireann with the proposed rising main passing through the site and discharging into the existing drainage on the Dublin Road. The final connection location is to be agreed with Uisce Éireann. Table 3-1 describes the foul water drainage design parameters used and detailed calculations are enclosed in Appendix G.

Table 3-4: Foul Water Drainage Design Parameters

Description	Value
Residential Flow Rate	150 l/per/day
Persons per Dwelling	2.7
Medical Flow Rate	250l/per/day
Creche Flow Rate	100 l/per/day
Infiltration	10%
Peaking Factor	6 DWF
Minimum Self Cleansing Velocity	0.75m/s
Minimum Pipe Diameter	150mm

Table 3-2: Foul Water Drainage Design Calculations

Category	Quantity	Rate per litres/person/day	Population	DWF (l/s)	Peak Factor	Peak Factor*Dry Weather Flow l/s
Residential	403	150	1088	1.89	6	11.03
Medical Centre	198	250 l/day	-	0.573	6	3.438
Creche	288sqm	100	92	0.106	6	0.636
Total				**2.569**		**15.104**

A Pre-Connection Enquiry Form was issued to Uisce Éireann on the 9th of June 2025 in relation to the proposed development to determine if a wastewater connection is feasible without any infrastructure upgrade. Please refer to Appendix G for Uisce Éireann correspondence.

4 Watermain Design

4.1 Existing Watermain

A review of record drawings provided by Uisce Éireann indicates existing watermain layout in the vicinity of the site. There is a 300mm diameter Ductile Iron pipe which runs along the northern site boundary in the Dublin Road.

See Figure 4-1 below for information on watermain records in the area.

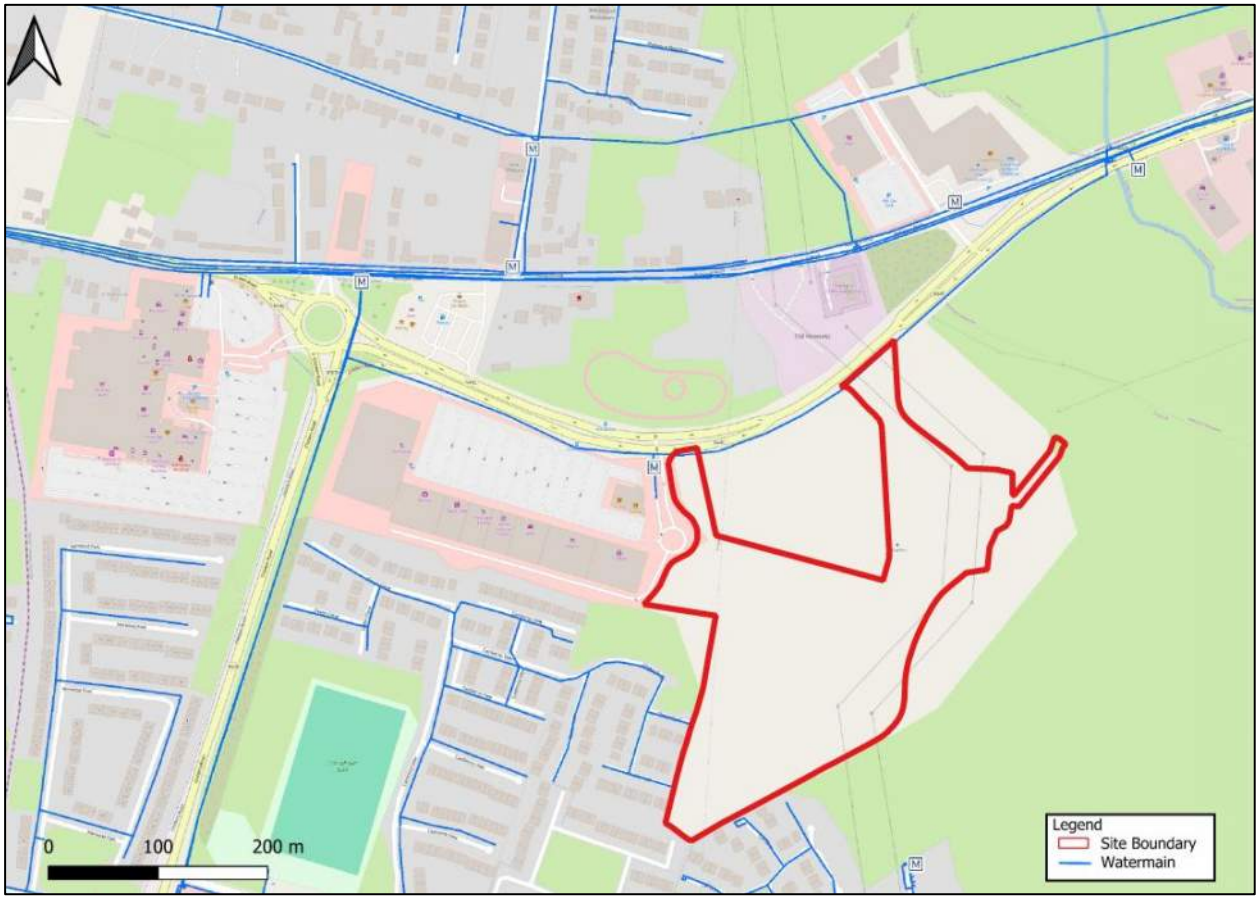


Figure 4-1: Existing Watermain infrastructure within the vicinity of the site

Refer to Appendix A for GPR Survey Drawing illustrating the existing watermain network.

4.2 Proposed Watermain

It is generally accepted that the design loading for foul drainage can be used to evaluate an approximation of the water demand on the site. With reference to Irish Water's Code of Practice for Water Infrastructure, the average daily flow is calculated as the number of persons multiplied by the flow rate per person. The average day peak week flow is taken to be 1.25 x the average flow, and the peak demand is taken to be the average day peak week flow multiplied by a peaking factor of 5.

Table 4-1 describes the watermain design parameters used.

Table 4-5: Watermain Design Parameters

Description	Value
Residential Flow Rate	150 l/per/day
Persons per Dwelling	2.7
Medical Centre Flow Rate	250 l/per/day
Creche	100 l/per/day
Average Demand	1.25 DWF
Peak Demand	5 DWF

Table 4-3: Watermain Design Calculation

Category	Quantity	Rate per Litres/person/day	Population	Average Daily Flow l/s	Average Day Peak Week Flow l/s	Peak Demand l/s
Residential	403	150	1088	1.89	2.363	9.445
Medical Centre	198	250		0.573	0.716	2.865
Creche	220sqm	100	144	0.167	0.208	1.044
Total				**2.63**	**3.287**	**13.354**

On the basis of the above tables, the development will have an increase in average water demand of 3.287 l/s and a peak water demand of 13.354 l/s.

It is proposed to construct a 300 mm diameter watermain to serve the proposed development based on the above calculated demand. The proposed watermain will connect to the existing 300mm Ductile Iron watermain in Dublin Road.

This feed will provide potable water to the proposed development. A bulk water meter shall be provided at the site boundary at the location of the proposed connection to the existing watermain. The watermain layout has been designed in accordance with "Uisce Eireann Code of Practice for Water Infrastructure". All watermains are to be constructed in accordance with Uisce Eireann Code of Practice and the Local Authority's requirements. Flow tests will be carried out to determine the fire water storage tank requirements.

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

A Pre-Connection Enquiry Form was issued to Uisce Éireann on the 9th of June 2025 in relation to the proposed development to advise if a water connection is feasible without any infrastructure upgrade. Please refer to Appendix G for Uisce Éireann correspondence.

5 Flooding

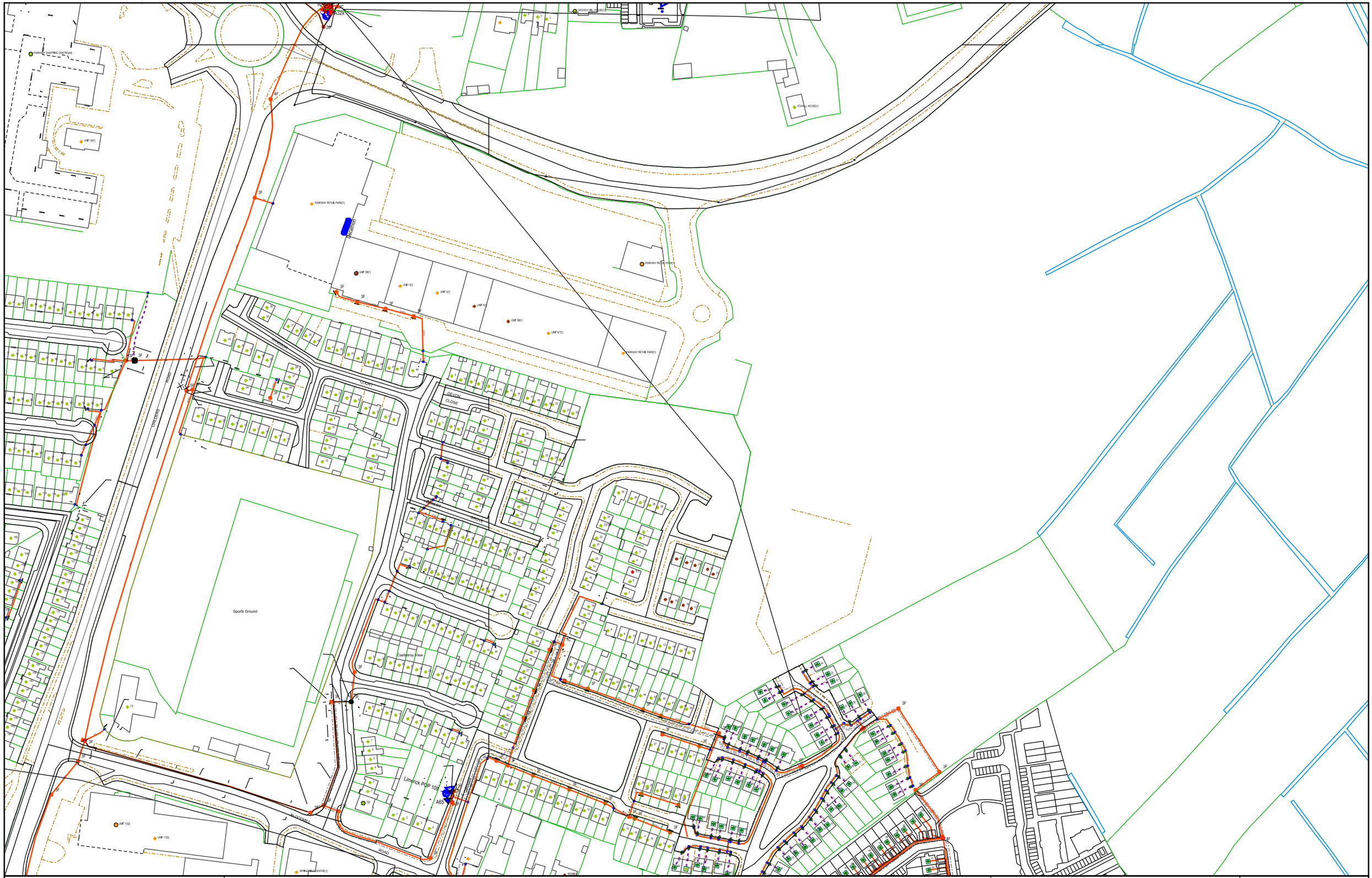
A Site-Specific Flood Risk Assessment has been undertaken by PUNCH Consulting Engineers for the development which accompanies this planning submission.

As noted in the SSFRA, the site is primarily located outside the areas of flood risk with only the surface water outfall located within an area with flood risk.

6 Roads and Access

A Traffic & Transportation Assessment has been completed by PUNCH Consulting Engineers and is included in the planning application documentation which detail the roads and access arrangements for the proposed development.

Appendix A Existing Record Drawings



Unit 7, Westgate Business Park, Ballymount, Dublin 24.	PROJECT NAME DESIGNED BY:	Ordnance Survey Ireland Licence No. EN0023805 (c) Ordnance Survey Ireland and Government of Ireland Produced on: 14/07/2025	@ A3

TITLE: 20250704-078_A3

ESB Networks

COLOUR CODE:

- BLACK - 38KV & HIGHER VOLTAGE OVERHEAD LINES
- GREEN - MV(10KV/20KV) OVERHEAD LINES
- BLUE - LV (400V/230V) OVERHEAD LINES
- CYAN - 38KV & HIGHER VOLTAGE UNDERGROUND CABLE ROUTES
- RED - MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE ROUTES

DATE: 04-Jul-2025

** SCALE: 1:2000

** SCALE WHEN PRINTED ON AN A3 PAGE
XY COORDINATES DISPLAYED IN IRISH GRID COORDINATE SYSTEM

WARNING

THIS MAP INDICATES THE APPROXIMATE LOCATION OF ESB TRANSMISSION (400KV, 220KV, 110KV, 38KV) AND DISTRIBUTION (20KV, 10KV, 230V/400V) UNDERGROUND CABLES AND OVERHEAD LINES IN THE GENERAL AREA OF THE PROPOSED WORKS. ESB NETWORKS TAKES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE MAP. IT IS THE USER'S RESPONSIBILITY TO INDEPENDENTLY VERIFY THE INFORMATION AND THE LOCATION OF UNDERGROUND CABLES AND OVERHEAD LINES. LOW VOLTAGE (230V/400V) SERVICE CABLES (E.G. HOUSE SERVICES, FACTORY/SHOP SERVICES, PUBLIC LIGHTING LAMP SERVICES, ETC) ARE NOT INCLUDED BUT THEIR PRESENCE SHOULD BE ANTICIPATED. THE DEPTHS OF UNDERGROUND CABLES MUST NEVER BE ASSUMED. BEFORE ANY MECHANICAL EXCAVATION IS UNDERTAKEN, THE ACTUAL LOCATION OF ALL UNDERGROUND ELECTRICITY CABLES MUST BE ESTABLISHED AND VERIFIED ON THE SITE USING:

(A) UP-TO-DATE MAP RECORDS;
(B) CABLE LOCATER EQUIPMENT OPERATED IN BOTH POWER AND RADIO MODES;
(C) CAREFUL HAND DIGGING OF TRIAL HOLES USING 'SAFE DIGGING PRACTICE'.

REFER ALSO TO 'HSA CODE OF PRACTICE FOR AVOIDING DANGER FROM UNDERGROUND SERVICES'.
ESB TAKES NO RESPONSIBILITY FOR AND SHALL BEAR NO LIABILITY, HOWSOEVER ARISING, IN RELATION TO ANY DAMAGE, INJURY/DEATH OR LOSS OF SUPPLY AS A RESULT OF DAMAGE OR INTERFERENCE WITH ITS NETWORKS.

X,Y: 159864 , 157093

ESB NETWORKS HAS ISSUED THIS MAP AS A PDF DOCUMENT. IF VIEWING A PAPER VERSION OF THIS MAP, THE VIEWER MUST ENSURE THAT IT HAS BEEN PRINTED IN COLOUR TO FIT TO AN A3 (OR LARGER) PAGESIZE AND THAT EACH OF THE COLOURS INDICATED ON THE COLOUR CODE LEGEND ABOVE ARE CLEAR AND DISTINCT FROM EACH OTHER TO MAINTAIN A CORRECT REPRESENTATION OF THE ELECTRICAL NETWORK INFORMATION.

X,Y: 160680 , 157093

X,Y: 160680 , 156608

PARKWAY U 5A
767Y S 400 DV

PARKWAY U 8

CHESTERFIELD

3X1/185 XLP

4X185 XLP

3X1/400 XLP

W4740

T2662

HIGH VOLTAGE

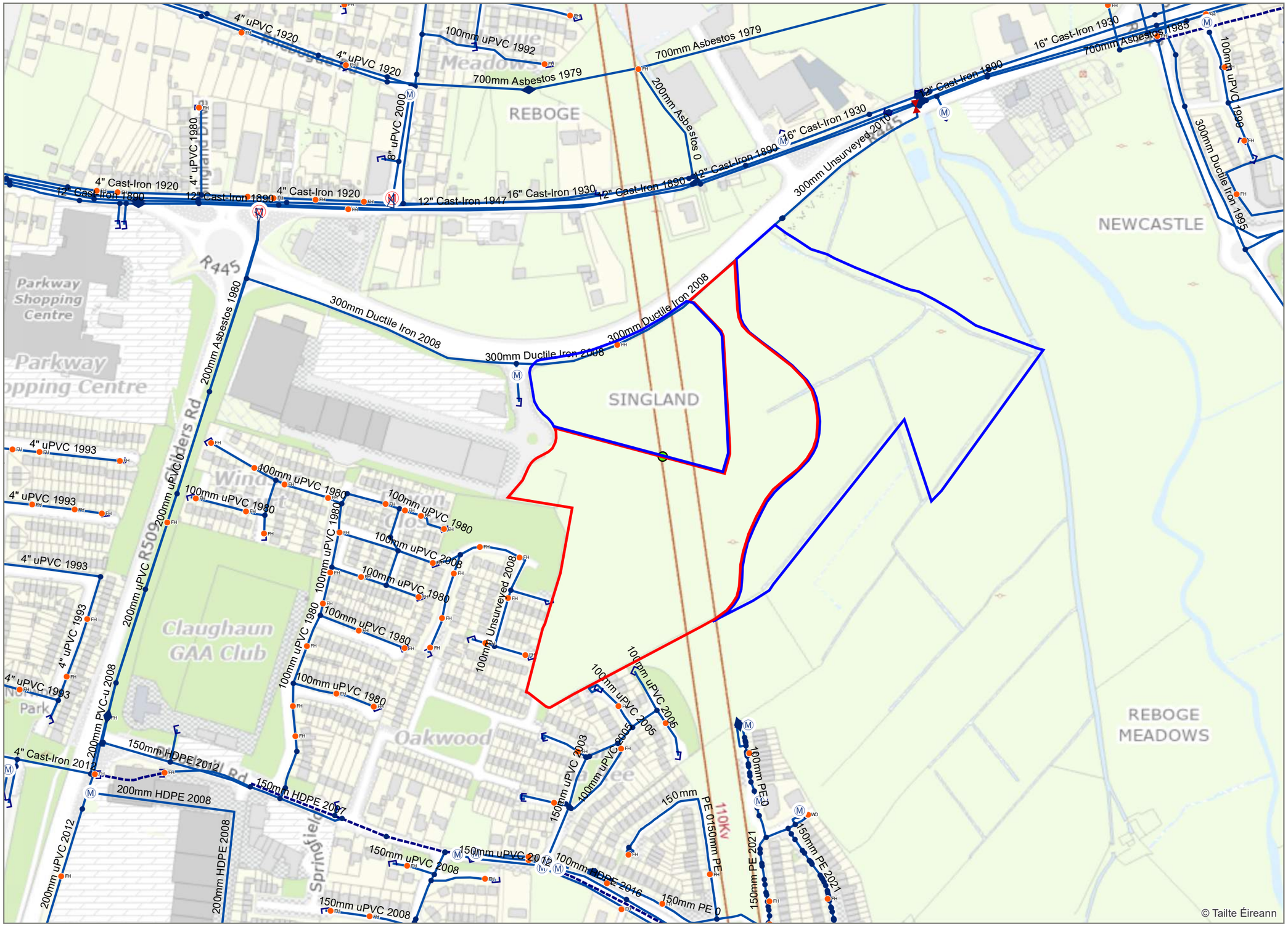
IF YOU INTEND WORKING, OR UNDERTAKING DEVELOPMENT WITHIN A CORRIDOR EXTENDING 40 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE OVERHEAD LINES OR WITHIN A CORRIDOR EXTENDING 5 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE UNDERGROUND CABLES YOU MUST CONTACT ESB NETWORKS IN ADVANCE OF WORKS AT 1800 372 757 OR EMAIL DIG@ESB.IE TO AGREE SAFE WORKING PROCEDURES AND NECESSARY CLEARANCES BETWEEN THE LINES AND THE DEVELOPMENT IN ADVANCE OF ANY EXCAVATION.

A3

open eir Civil Engineering Infrastructure Service

Scale: 1:5000	Irish National Grid Co-Ordinates Centre X,Y: 360357 m, 656746 m
Date 14/07/2025	Smallworld Powered by GE

THE INFORMATION GIVEN IS COMPILED FROM PASSIVE ACCESS RECORDS AND IS BELIEVED TO BE CORRECT. THERE MAY,
HOWEVER, BE DEPARTURES FROM THE COURSE[S] AND DEPTH[S] SHOWN OR INDICATED. THERE MAY ALSO BE ITEMS OF
open eir INFRASTRUCTURE OF WHICH NO RECORDS IS HELD. THE INFORMATION IS GIVEN WITHOUT PREJUDICE TO THE LEGAL RIGHTS OF open eir TO COMPENSATION SHOULD open eir INFRASTRUCTURE BE DAMAGED



N

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

Water Distribution
Parkway, Dublin Road, Limerick City

Uisce Éireann
Irish Water

Legend

Flow Control Valves
- PRV

Boundary Valves
- Closed

Air Control Valves
- Air Control Valves

Non Boundary Meter
- Meter

Boundary Meter
- District (Boundary Meter)

Water Hydrants
- Fire Hydrant
- Washout

Water Fittings
- Cap
- Other Fitting

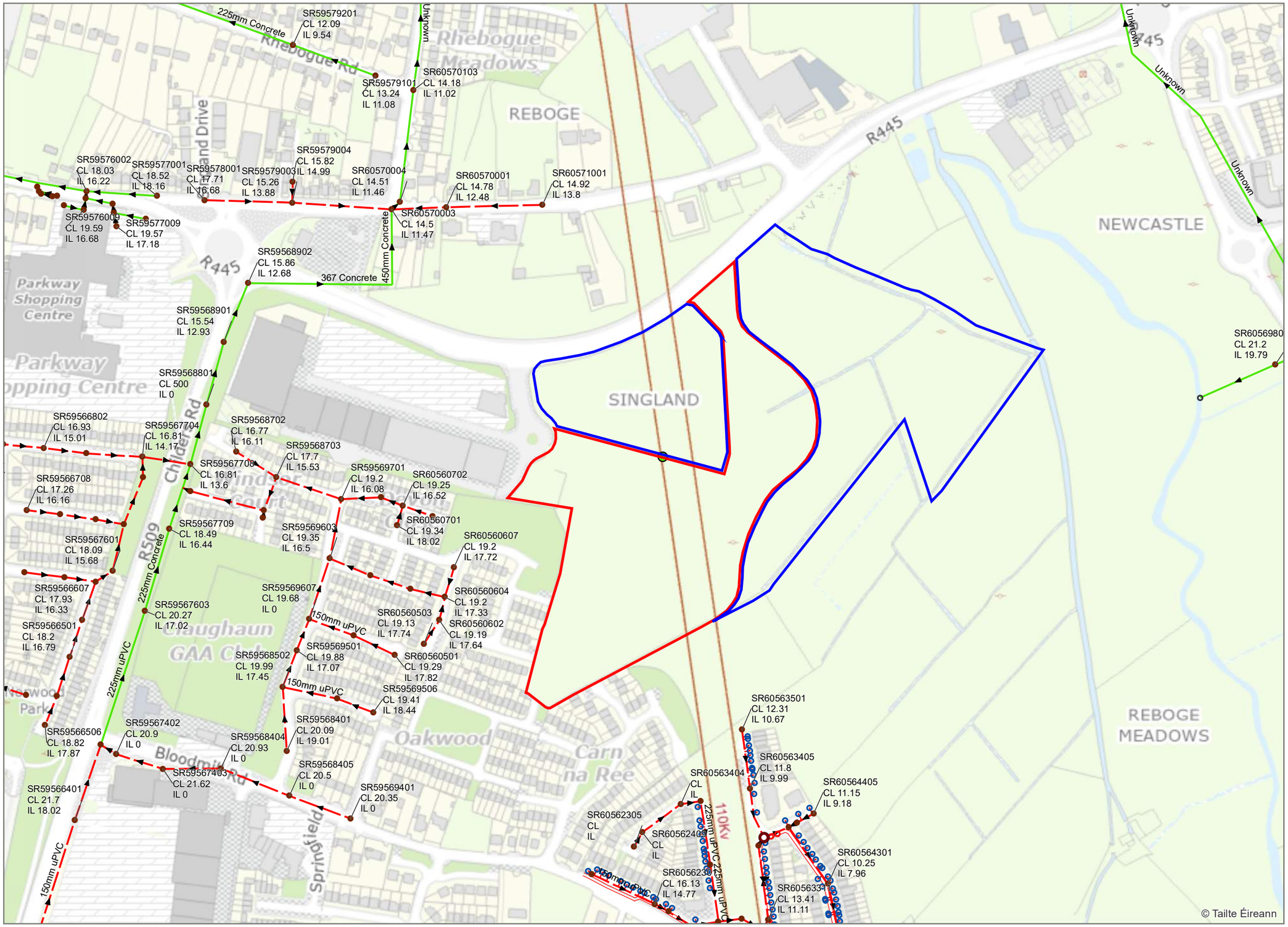
Water Mains(Irish Water Owned)
- Potable Water

Water Abandoned Lines
- Water Abandoned Lines

0 30 60 120 m

Coordinate System: TM65 Irish Grid
Projection: Transverse Mercator

Scale @ A3:	1:3,917
Drawing No.:	IW-AGG-2018-000
Drawn By:	Mo Ismail
Checked By:	<Add Name>
Approved By:	<Add Name>
Drawn Date	17/07/2025
Checked Date:	<dd/mm/yyyy>
Approved Date:	<dd/mm/yyyy>



Sewer Network
Parkway, Dublin Road, Limerick City

Uisce Éireann
Irish Water

Legend

Sewer Manholes
- Standard
- Backdrop

Sewer Discharge Points
- Other; Unknown

Sewer Inlets
- Other; Unknown

Sewer Fittings
- Other; Unknown

Sewer Mains (Irish Water)
- Gravity - Combined
- Gravity - Foul
- Pumping - Foul

Sewer Lateral Lines
- Sewer Lateral Lines

0 30 60 120 m

Coordinate System: TM65 Irish Grid
Projection: Transverse Mercator

Scale @ A3:	1:3,917
Drawing No.:	IW-AGG-2018-000
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Approved By:	<Add Name>
Drawn Date	17/07/2025
Checked Date:	<dd/mm/yyyy>
Approved Date:	<dd/mm/yyyy>

Appendix B Greenfield Runoff Calculation

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

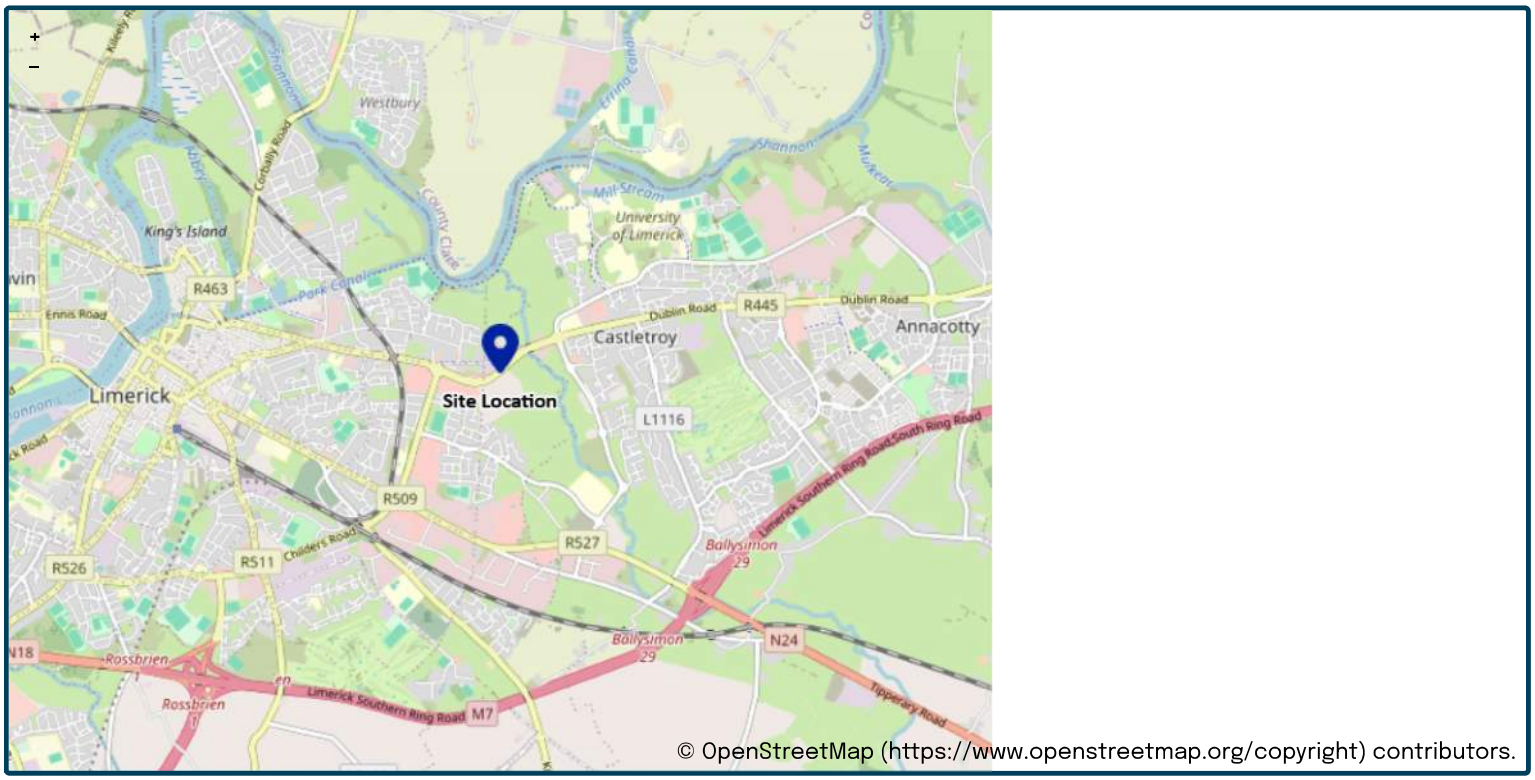
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	06/08/2025
Calculated by	A. Lane
Reference	
Model version	2.1.2

Location

Site name	Horizon
Site location	Parkway Valley



Site easting (Irish Grid)	160328
Site northing (Irish Grid)	156798
Site easting (Irish Transverse Mercator)	560287
Site northing (Irish Transverse Mercator)	656842

Site details

Total site area (ha)	5.541 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	1020 mm		1020
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
QBar (IH124) (l/s)	15.69 l/s		

Growth curve factors

	My value		Map value
Hydrological region	13		13
1 year growth factor	0.85		
2 year growth factor	0.95		
10 year growth factor	1.4		
30 year growth factor	1.65		
100 year growth factor	1.95		
200 year growth factor	2.15		

Results

Method	IH124
Flow rate 1 year (l/s)	13.3 l/s
Flow rate 2 year (l/s)	14.9 l/s
Flow rate 10 years (l/s)	22.0 l/s
Flow rate 30 years (l/s)	25.9 l/s
Flow rate 100 years (l/s)	30.6 l/s
Flow rate 200 years (l/s)	33.7 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

Appendix C Causeway Surface Water Drainage Design Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	60.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Inverts
M5-60 (mm)	16.300	Minimum Backdrop Height (m)	0.200
Ratio-R	0.307	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S10-0		5.00	14.891	1200	560101.977	656795.877	1.425	13.466
S7-2	0.270	5.00	15.200	1350	560150.624	656823.339	2.150	13.050
S7-3			14.636	1350	560140.645	656785.638	2.242	12.394
S7-4			14.636	1350	560160.688	656775.903	2.617	12.019
S7-5			12.600	1350	560142.634	656707.558	2.400	10.200
S7-6			12.180	1350	560123.932	656636.763	2.424	9.756
S7-7	0.072	5.00	11.800	1500	560124.805	656615.229	2.800	9.000
S7-8	0.068	5.00	12.278	1500	560142.244	656605.705	3.778	8.500
S12-0	0.072	5.00	10.200	1200	560150.138	656664.550	1.500	8.700
S13-0	0.064	5.00	10.200	1200	560187.877	656631.265	1.500	8.700
S12-1			10.200	1200	560193.640	656653.035	2.257	7.943
S12-2	0.103	5.00	10.200	1200	560219.677	656646.516	2.525	7.675
S7-9			10.200	1800	560228.608	656643.579	2.683	7.517
S6-0		5.00	10.200	1200	560173.629	656745.050	1.500	8.700
S6-1			10.200	1200	560159.753	656691.662	2.427	7.773
S6-2	0.138	5.00	10.200	1200	560161.984	656678.855	2.646	7.554
S11-0	0.084	5.00	10.200	1200	560193.406	656684.061	1.500	8.700
S6-3	0.092	5.00	10.200	1200	560190.079	656671.493	2.866	7.334
S7-10	0.136	5.00	10.200	1800	560231.894	656660.593	2.974	7.226
S7-11			10.200	1800	560246.185	656715.731	3.083	7.117
S8-0		5.00	10.200	1200	560202.377	656747.719	1.425	8.775
S8-1			10.200	1200	560238.941	656737.735	1.777	8.423
S7-12	0.140	5.00	10.200	1800	560253.919	656731.358	3.117	7.083
S4-0	0.391	5.00	11.000	1200	560203.694	656762.021	1.500	9.500
S4-1	0.057	5.00	10.600	1200	560243.236	656747.862	1.600	9.000
S7-13	0.045	5.00	10.200	1800	560265.271	656742.046	3.156	7.044
S7-14	0.158	5.00	10.200	1800	560293.965	656769.062	3.244	6.956
S3-0	0.102	5.00	14.764	1200	560180.781	656782.087	1.425	13.339
S3-1	0.050	5.00	14.764	1200	560166.292	656785.317	1.623	13.141
S3-2	0.061	5.00	15.130	1200	560168.393	656808.927	2.784	12.346
S3-3	0.066	5.00	12.730	1200	560174.863	656833.075	3.200	9.530
S3-4	0.074	5.00	10.200	1200	560193.216	656828.158	1.575	8.625
S5-0	0.097	5.00	10.200	1200	560216.556	656812.552	1.425	8.775
S3-5	0.215	5.00	10.200	1500	560217.341	656821.273	1.742	8.458
S2-0		5.00	10.200	1200	560251.121	656824.030	1.425	8.775
S3-6	0.371	5.00	10.200	1500	560248.274	656813.405	1.841	8.359
S7-15	0.048	5.00	10.200	1800	560301.899	656799.036	3.306	6.894
S7-16			10.200	1800	560311.941	656836.976	3.406	6.794
S1-0	0.190	5.00	12.700	1200	560279.014	656984.908	1.500	11.200
S1-1	0.405	5.00	12.600	1200	560290.880	656972.321	1.650	10.950
S1-2	0.311	5.00	12.411	1350	560303.655	656955.675	2.511	9.900

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S1-3	0.750	5.00	10.650	1800	560307.021	656896.136	2.650	8.000
S7-17	0.256	5.00	10.200	1800	560310.661	656856.305	4.200	6.000
S7-18 PI			9.500	1800	560318.642	656856.856	3.280	6.220
P1-1			7.500		560328.488	656855.485	1.575	5.925
S7-19		5.00	7.500		560395.962	656879.711	1.575	5.925
S7-20			7.750	1800	560420.861	656883.989	2.404	5.346
S7-21			7.860	1350	560455.114	656926.451	2.224	5.636
S7-22 OUT			6.000	1350	560459.480	656934.337	0.392	5.608
S9-0	0.172	5.00	15.750	1200	560132.896	656844.022	2.350	13.400
S7-0	0.416	5.00	15.000	1350	560155.214	656848.807	1.600	13.400
S7-1	0.054	5.00	15.200	1350	560152.051	656838.271	2.000	13.200
P1-18			8.800		560329.159	656838.093	2.875	5.925
P1-8			7.500		560414.366	656862.120	1.575	5.925
P1-0			7.500		560329.460	656846.318	1.575	5.925
P1-2			7.500		560332.058	656867.987	1.575	5.925
P1-3			7.500		560340.706	656869.869	1.575	5.925
P1-4			7.500		560352.032	656876.169	1.575	5.925
P1-5			7.500		560365.982	656880.295	1.575	5.925
P1-6			7.500		560381.029	656880.284	1.575	5.925
P1-7			7.500		560409.585	656873.008	1.575	5.925
P1-9			7.500		560414.623	656850.578	1.575	5.925
P1-10			7.500		560409.983	656840.948	1.575	5.925
P1-11			7.500		560388.642	656830.145	1.575	5.925
P1-12			7.500		560400.489	656833.221	1.575	5.925
P1-13			7.500		560376.790	656829.780	1.575	5.925
P1-14			7.500		560349.790	656830.286	1.575	5.925
P1-15			7.500		560365.041	656829.677	1.575	5.925
P1-16			7.500		560332.226	656830.005	1.575	5.925
P1-17			7.500		560343.878	656831.373	1.575	5.925

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)
S10.000	S10-0	S7-3	40.001	0.600	13.466	12.793	0.673	59.4	225	5.39	60.0
S7.002	S7-2	S7-3	38.999	0.600	13.050	12.394	0.656	59.5	375	5.69	60.0
S7.003	S7-3	S7-4	22.282	0.600	12.394	12.019	0.375	59.4	375	5.85	60.0
S7.004	S7-4	S7-5	70.689	0.600	12.019	10.605	1.414	50.0	375	6.31	58.9
S7.005	S7-5	S7-6	73.224	0.600	10.200	9.756	0.444	165.0	375	7.17	55.7
S7.006	S7-6	S7-7	21.552	0.600	9.756	9.606	0.150	143.7	375	7.41	54.9
S7.007	S7-7	S7-8	19.870	0.600	9.000	8.699	0.301	66.0	600	7.52	54.6

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
S10.000	1.699	67.6	0.0	1.200	1.618	0.000	0.0	0	0.000
S7.002	2.353	259.9	148.3	1.775	1.867	0.912	0.0	203	2.428
S7.003	2.354	260.0	148.3	1.867	2.242	0.912	0.0	203	2.428
S7.004	2.567	283.5	145.5	2.242	1.620	0.912	0.0	190	2.581
S7.005	1.407	155.5	137.7	2.025	2.049	0.912	0.0	276	1.581
S7.006	1.509	166.7	135.7	2.049	1.819	0.912	0.0	258	1.674
S7.007	3.000	848.2	145.5	2.200	2.979	0.984	0.0	167	2.270

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)
S7.008	S7-8	S7-9	94.304	0.600	8.500	8.297	0.203	465.0	600	8.92	50.5
S12.000	S12-0	S12-1	45.000	0.600	8.700	7.943	0.757	59.4	300	5.37	60.0
S13.000	S13-0	S12-1	22.520	0.600	8.700	8.321	0.379	59.4	300	5.18	60.0
S12.001	S12-1	S12-2	26.841	0.600	7.943	7.675	0.268	100.0	300	5.65	60.0
S12.002	S12-2	S7-9	9.402	0.600	7.675	7.517	0.158	59.5	300	5.73	60.0
S7.009	S7-9	S7-10	17.328	0.600	7.517	7.401	0.116	150.0	750	9.05	50.1
S6.000	S6-0	S6-1	55.162	0.600	8.700	7.773	0.927	59.5	300	5.45	60.0
S6.001	S6-1	S6-2	13.000	0.600	7.773	7.554	0.219	59.4	300	5.56	60.0
S6.002	S6-2	S6-3	29.044	0.600	7.554	7.334	0.220	132.0	300	5.91	60.0
S11.000	S11-0	S6-3	13.001	0.600	8.700	8.446	0.254	51.2	300	5.10	60.0
S6.003	S6-3	S7-10	43.212	0.600	7.334	7.226	0.108	400.0	300	6.83	56.9
S7.010	S7-10	S7-11	56.960	0.600	7.226	7.117	0.109	522.6	750	9.83	48.2
S7.011	S7-11	S7-12	17.436	0.600	7.117	7.083	0.034	512.8	750	10.07	47.6
S8.000	S8-0	S8-1	37.903	0.600	8.775	8.423	0.352	107.7	225	5.50	60.0
S8.001	S8-1	S7-12	16.279	0.600	8.423	8.063	0.360	45.2	225	5.64	60.0
S7.012	S7-12	S7-13	15.592	0.600	7.083	7.044	0.039	400.0	750	10.25	47.2
S4.000	S4-0	S4-1	42.001	0.600	9.500	9.000	0.500	84.0	300	5.41	60.0
S4.001	S4-1	S7-13	22.790	0.600	9.000	8.325	0.675	33.8	300	5.55	60.0
S7.013	S7-13	S7-14	39.411	0.600	7.044	6.956	0.088	450.0	750	10.75	46.1
S7.014	S7-14	S7-15	31.006	0.600	6.956	6.894	0.062	500.0	750	11.17	45.3
S3.000	S3-0	S3-1	14.845	0.600	13.339	13.141	0.198	75.0	225	5.16	60.0
S3.001	S3-1	S3-2	23.703	0.600	13.141	12.746	0.395	60.0	225	5.40	60.0
S3.002	S3-2	S3-3	25.000	0.600	12.346	11.230	1.116	22.4	225	5.55	60.0
S3.003	S3-3	S3-4	19.000	0.600	9.530	8.700	0.830	22.9	225	5.66	60.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
S7.008	1.122	317.4	143.8	3.178	1.303	1.051	0.0	283	1.096
S12.000	2.043	144.4	11.7	1.200	1.957	0.072	0.0	57	1.240
S13.000	2.043	144.4	10.4	1.200	1.579	0.064	0.0	54	1.203
S12.001	1.572	111.1	22.1	1.957	2.225	0.136	0.0	91	1.235
S12.002	2.042	144.3	38.9	2.225	2.383	0.239	0.0	106	1.739
S7.009	2.282	1008.3	175.4	1.933	2.049	1.291	0.0	210	1.735
S6.000	2.042	144.3	0.0	1.200	2.127	0.000	0.0	0	0.000
S6.001	2.044	144.5	0.0	2.127	2.346	0.000	0.0	0	0.000
S6.002	1.366	96.6	22.5	2.346	2.566	0.138	0.0	98	1.120
S11.000	2.202	155.7	13.6	1.200	1.454	0.084	0.0	59	1.369
S6.003	0.780	55.1	48.4	2.566	2.674	0.314	0.0	219	0.876
S7.010	1.217	537.6	227.3	2.224	2.333	1.740	0.0	340	1.169
S7.011	1.229	542.8	224.7	2.333	2.367	1.740	0.0	336	1.173
S8.000	1.259	50.1	0.0	1.200	1.552	0.000	0.0	0	0.000
S8.001	1.950	77.5	0.0	1.552	1.912	0.000	0.0	0	0.000
S7.012	1.393	615.3	240.6	2.367	2.406	1.880	0.0	325	1.311
S4.000	1.716	121.3	63.6	1.200	1.300	0.391	0.0	154	1.736
S4.001	2.715	191.9	72.8	1.300	1.575	0.448	0.0	128	2.535
S7.013	1.312	579.8	296.6	2.406	2.494	2.372	0.0	380	1.320
S7.014	1.244	549.7	310.4	2.494	2.556	2.531	0.0	404	1.280
S3.000	1.511	60.1	16.5	1.200	1.398	0.102	0.0	80	1.294
S3.001	1.691	67.2	24.7	1.398	2.159	0.152	0.0	94	1.566
S3.002	2.776	110.4	34.6	2.559	1.275	0.213	0.0	87	2.467
S3.003	2.746	109.2	45.2	2.975	1.275	0.278	0.0	101	2.618

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)
S3.004	S3-4	S3-5	25.088	0.600	8.625	8.458	0.167	150.0	300	5.99	60.0
S5.000	S5-0	S3-5	8.756	0.600	8.775	8.458	0.317	27.6	225	5.06	60.0
S3.005	S3-5	S3-6	31.918	0.600	8.458	8.359	0.099	322.4	525	6.42	58.4
S2.000	S2-0	S3-6	11.000	0.600	8.775	8.359	0.416	26.4	225	5.07	60.0
S3.006	S3-6	S7-15	55.517	0.600	8.359	8.222	0.137	405.2	525	7.25	55.4
S7.015	S7-15	S7-16	39.246	0.600	6.894	6.794	0.100	392.5	750	11.63	44.3
S7.016	S7-16	S7-17	19.371	0.600	6.794	6.729	0.065	300.0	750	11.83	44.0
S1.000	S1-0	S1-1	17.298	0.600	11.200	11.000	0.200	86.5	225	5.20	60.0
S1.001	S1-1	S1-2	20.983	0.600	10.950	10.500	0.450	46.6	300	5.36	60.0
S1.002	S1-2	S1-3	59.634	0.600	9.900	8.900	1.000	59.6	450	5.73	60.0
S1.003	S1-3	S7-17	39.997	0.600	8.000	7.800	0.200	200.0	750	6.07	59.8
S7.017	S7-17	S7-18 PI	8.000	0.600	6.500	6.420	0.080	100.0	750	11.88	43.9
S7.018	S7-18 PI	P1-1	9.941	0.600	6.220	6.110	0.110	90.0	750	11.94	43.8
S7.019	S7-19	S7-20	25.264	0.600	5.925	5.846	0.079	320.0	375	5.42	60.0
S7.020	S7-20	S7-21	54.555	0.600	5.846	5.636	0.210	259.8	375	6.23	59.2
S7.021	S7-21	S7-22 OUT	9.014	0.600	5.636	5.608	0.028	321.9	375	6.38	58.6
S9.000	S9-0	S7-1	20.000	0.600	13.400	13.200	0.200	100.0	225	5.25	60.0
S7.000	S7-0	S7-1	11.001	0.600	13.400	13.290	0.110	100.0	375	5.10	60.0
S7.001	S7-1	S7-2	15.000	0.600	13.200	13.050	0.150	100.0	300	5.41	60.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
S3.004	1.281	90.6	57.2	1.275	1.442	0.352	0.0	173	1.352
S5.000	2.499	99.3	15.8	1.200	1.517	0.097	0.0	60	1.837
S3.005	1.242	268.8	105.2	1.217	1.316	0.664	0.0	228	1.169
S2.000	2.554	101.6	0.0	1.200	1.616	0.000	0.0	0	0.000
S3.006	1.106	239.5	155.6	1.316	1.453	1.035	0.0	309	1.174
S7.015	1.406	621.2	434.2	2.556	2.656	3.614	0.0	463	1.514
S7.016	1.610	711.3	430.5	2.656	2.721	3.614	0.0	422	1.682
S1.000	1.406	55.9	30.9	1.275	1.375	0.190	0.0	119	1.439
S1.001	2.308	163.1	96.7	1.350	1.611	0.595	0.0	167	2.403
S1.002	2.636	419.3	147.3	2.061	1.300	0.906	0.0	183	2.411
S1.003	1.975	872.5	268.4	1.900	1.650	1.656	0.0	285	1.750
S7.017	2.798	1236.2	656.9	2.950	2.330	5.525	0.0	389	2.839
S7.018	2.950	1303.4	655.3	2.530	0.640	5.525	0.0	376	2.954
S7.019	1.007	111.2	0.0	1.200	1.529	0.000	0.0	0	0.000
S7.020	1.119	123.6	0.0	1.529	1.849	0.000	0.0	0	0.000
S7.021	1.004	110.9	0.0	1.849	0.017	0.000	0.0	0	0.000
S9.000	1.307	52.0	28.0	2.125	1.775	0.172	0.0	117	1.329
S7.000	1.812	200.1	67.6	1.225	1.535	0.416	0.0	150	1.641
S7.001	1.572	111.1	104.4	1.700	1.850	0.642	0.0	232	1.778

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
S10.000	40.001	59.4	225	Circular	14.891	13.466	1.200	14.636	12.793	1.618
S7.002	38.999	59.5	375	Circular	15.200	13.050	1.775	14.636	12.394	1.867
S7.003	22.282	59.4	375	Circular	14.636	12.394	1.867	14.636	12.019	2.242
S7.004	70.689	50.0	375	Circular	14.636	12.019	2.242	12.600	10.605	1.620
S7.005	73.224	165.0	375	Circular	12.600	10.200	2.025	12.180	9.756	2.049
S7.006	21.552	143.7	375	Circular	12.180	9.756	2.049	11.800	9.606	1.819
S7.007	19.870	66.0	600	Circular	11.800	9.000	2.200	12.278	8.699	2.979
S7.008	94.304	465.0	600	Circular	12.278	8.500	3.178	10.200	8.297	1.303
S12.000	45.000	59.4	300	Circular	10.200	8.700	1.200	10.200	7.943	1.957
S13.000	22.520	59.4	300	Circular	10.200	8.700	1.200	10.200	8.321	1.579
S12.001	26.841	100.0	300	Circular	10.200	7.943	1.957	10.200	7.675	2.225
S12.002	9.402	59.5	300	Circular	10.200	7.675	2.225	10.200	7.517	2.383
S7.009	17.328	150.0	750	Circular	10.200	7.517	1.933	10.200	7.401	2.049
S6.000	55.162	59.5	300	Circular	10.200	8.700	1.200	10.200	7.773	2.127
S6.001	13.000	59.4	300	Circular	10.200	7.773	2.127	10.200	7.554	2.346
S6.002	29.044	132.0	300	Circular	10.200	7.554	2.346	10.200	7.334	2.566
S11.000	13.001	51.2	300	Circular	10.200	8.700	1.200	10.200	8.446	1.454
S6.003	43.212	400.0	300	Circular	10.200	7.334	2.566	10.200	7.226	2.674
S7.010	56.960	522.6	750	Circular	10.200	7.226	2.224	10.200	7.117	2.333
S7.011	17.436	512.8	750	Circular	10.200	7.117	2.333	10.200	7.083	2.367
S8.000	37.903	107.7	225	Circular	10.200	8.775	1.200	10.200	8.423	1.552
S8.001	16.279	45.2	225	Circular	10.200	8.423	1.552	10.200	8.063	1.912
S7.012	15.592	400.0	750	Circular	10.200	7.083	2.367	10.200	7.044	2.406
S4.000	42.001	84.0	300	Circular	11.000	9.500	1.200	10.600	9.000	1.300
S4.001	22.790	33.8	300	Circular	10.600	9.000	1.300	10.200	8.325	1.575

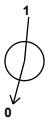
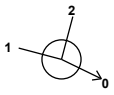
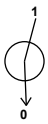
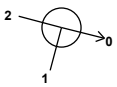
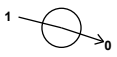
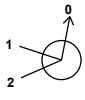
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S10.000	S10-0	1200	Manhole	Adoptable	S7-3	1350	Manhole	Adoptable
S7.002	S7-2	1350	Manhole	Adoptable	S7-3	1350	Manhole	Adoptable
S7.003	S7-3	1350	Manhole	Adoptable	S7-4	1350	Manhole	Adoptable
S7.004	S7-4	1350	Manhole	Adoptable	S7-5	1350	Manhole	Adoptable
S7.005	S7-5	1350	Manhole	Adoptable	S7-6	1350	Manhole	Adoptable
S7.006	S7-6	1350	Manhole	Adoptable	S7-7	1500	Manhole	Adoptable
S7.007	S7-7	1500	Manhole	Adoptable	S7-8	1500	Manhole	Adoptable
S7.008	S7-8	1500	Manhole	Adoptable	S7-9	1800	Manhole	Adoptable
S12.000	S12-0	1200	Manhole	Adoptable	S12-1	1200	Manhole	Adoptable
S13.000	S13-0	1200	Manhole	Adoptable	S12-1	1200	Manhole	Adoptable
S12.001	S12-1	1200	Manhole	Adoptable	S12-2	1200	Manhole	Adoptable
S12.002	S12-2	1200	Manhole	Adoptable	S7-9	1800	Manhole	Adoptable
S7.009	S7-9	1800	Manhole	Adoptable	S7-10	1800	Manhole	Adoptable
S6.000	S6-0	1200	Manhole	Adoptable	S6-1	1200	Manhole	Adoptable
S6.001	S6-1	1200	Manhole	Adoptable	S6-2	1200	Manhole	Adoptable
S6.002	S6-2	1200	Manhole	Adoptable	S6-3	1200	Manhole	Adoptable
S11.000	S11-0	1200	Manhole	Adoptable	S6-3	1200	Manhole	Adoptable
S6.003	S6-3	1200	Manhole	Adoptable	S7-10	1800	Manhole	Adoptable
S7.010	S7-10	1800	Manhole	Adoptable	S7-11	1800	Manhole	Adoptable
S7.011	S7-11	1800	Manhole	Adoptable	S7-12	1800	Manhole	Adoptable
S8.000	S8-0	1200	Manhole	Adoptable	S8-1	1200	Manhole	Adoptable
S8.001	S8-1	1200	Manhole	Adoptable	S7-12	1800	Manhole	Adoptable
S7.012	S7-12	1800	Manhole	Adoptable	S7-13	1800	Manhole	Adoptable
S4.000	S4-0	1200	Manhole	Adoptable	S4-1	1200	Manhole	Adoptable
S4.001	S4-1	1200	Manhole	Adoptable	S7-13	1800	Manhole	Adoptable

Pipeline Schedule

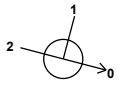
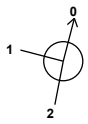
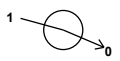
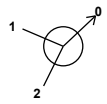
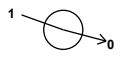
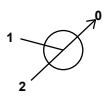
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
S7.013	39.411	450.0	750	Circular	10.200	7.044	2.406	10.200	6.956	2.494
S7.014	31.006	500.0	750	Circular	10.200	6.956	2.494	10.200	6.894	2.556
S3.000	14.845	75.0	225	Circular	14.764	13.339	1.200	14.764	13.141	1.398
S3.001	23.703	60.0	225	Circular	14.764	13.141	1.398	15.130	12.746	2.159
S3.002	25.000	22.4	225	Circular	15.130	12.346	2.559	12.730	11.230	1.275
S3.003	19.000	22.9	225	Circular	12.730	9.530	2.975	10.200	8.700	1.275
S3.004	25.088	150.0	300	Circular	10.200	8.625	1.275	10.200	8.458	1.442
S5.000	8.756	27.6	225	Circular	10.200	8.775	1.200	10.200	8.458	1.517
S3.005	31.918	322.4	525	Circular	10.200	8.458	1.217	10.200	8.359	1.316
S2.000	11.000	26.4	225	Circular	10.200	8.775	1.200	10.200	8.359	1.616
S3.006	55.517	405.2	525	Circular	10.200	8.359	1.316	10.200	8.222	1.453
S7.015	39.246	392.5	750	Circular	10.200	6.894	2.556	10.200	6.794	2.656
S7.016	19.371	300.0	750	Circular	10.200	6.794	2.656	10.200	6.729	2.721
S1.000	17.298	86.5	225	Circular	12.700	11.200	1.275	12.600	11.000	1.375
S1.001	20.983	46.6	300	Circular	12.600	10.950	1.350	12.411	10.500	1.611
S1.002	59.634	59.6	450	Circular	12.411	9.900	2.061	10.650	8.900	1.300
S1.003	39.997	200.0	750	Circular	10.650	8.000	1.900	10.200	7.800	1.650
S7.017	8.000	100.0	750	Circular	10.200	6.500	2.950	9.500	6.420	2.330
S7.018	9.941	90.0	750	Circular	9.500	6.220	2.530	7.500	6.110	0.640
S7.019	25.264	320.0	375	Circular	7.500	5.925	1.200	7.750	5.846	1.529
S7.020	54.555	259.8	375	Circular	7.750	5.846	1.529	7.860	5.636	1.849
S7.021	9.014	321.9	375	Circular	7.860	5.636	1.849	6.000	5.608	0.017
S9.000	20.000	100.0	225	Circular	15.750	13.400	2.125	15.200	13.200	1.775
S7.000	11.001	100.0	375	Circular	15.000	13.400	1.225	15.200	13.290	1.535
S7.001	15.000	100.0	300	Circular	15.200	13.200	1.700	15.200	13.050	1.850

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S7.013	S7-13	1800	Manhole	Adoptable	S7-14	1800	Manhole	Adoptable
S7.014	S7-14	1800	Manhole	Adoptable	S7-15	1800	Manhole	Adoptable
S3.000	S3-0	1200	Manhole	Adoptable	S3-1	1200	Manhole	Adoptable
S3.001	S3-1	1200	Manhole	Adoptable	S3-2	1200	Manhole	Adoptable
S3.002	S3-2	1200	Manhole	Adoptable	S3-3	1200	Manhole	Adoptable
S3.003	S3-3	1200	Manhole	Adoptable	S3-4	1200	Manhole	Adoptable
S3.004	S3-4	1200	Manhole	Adoptable	S3-5	1500	Manhole	Adoptable
S5.000	S5-0	1200	Manhole	Adoptable	S3-5	1500	Manhole	Adoptable
S3.005	S3-5	1500	Manhole	Adoptable	S3-6	1500	Manhole	Adoptable
S2.000	S2-0	1200	Manhole	Adoptable	S3-6	1500	Manhole	Adoptable
S3.006	S3-6	1500	Manhole	Adoptable	S7-15	1800	Manhole	Adoptable
S7.015	S7-15	1800	Manhole	Adoptable	S7-16	1800	Manhole	Adoptable
S7.016	S7-16	1800	Manhole	Adoptable	S7-17	1800	Manhole	Adoptable
S1.000	S1-0	1200	Manhole	Adoptable	S1-1	1200	Manhole	Adoptable
S1.001	S1-1	1200	Manhole	Adoptable	S1-2	1350	Manhole	Adoptable
S1.002	S1-2	1350	Manhole	Adoptable	S1-3	1800	Manhole	Adoptable
S1.003	S1-3	1800	Manhole	Adoptable	S7-17	1800	Manhole	Adoptable
S7.017	S7-17	1800	Manhole	Adoptable	S7-18 PI	1800	Manhole	Adoptable
S7.018	S7-18 PI	1800	Manhole	Adoptable	P1-1		Junction	
S7.019	S7-19		Junction		S7-20	1800	Manhole	Adoptable
S7.020	S7-20	1800	Manhole	Adoptable	S7-21	1350	Manhole	Adoptable
S7.021	S7-21	1350	Manhole	Adoptable	S7-22 OUT	1350	Manhole	Adoptable
S9.000	S9-0	1200	Manhole	Adoptable	S7-1	1350	Manhole	Adoptable
S7.000	S7-0	1350	Manhole	Adoptable	S7-1	1350	Manhole	Adoptable
S7.001	S7-1	1350	Manhole	Adoptable	S7-2	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10-0	560101.977	656795.877	14.891	1.425	1200				
						0	S10.000	13.466	225
S7-2	560150.624	656823.339	15.200	2.150	1350		1	S7.001	13.050	300
							0	S7.002	13.050	375
S7-3	560140.645	656785.638	14.636	2.242	1350		1	S10.000	12.793	225
							2	S7.002	12.394	375
							0	S7.003	12.394	375
S7-4	560160.688	656775.903	14.636	2.617	1350		1	S7.003	12.019	375
							0	S7.004	12.019	375
S7-5	560142.634	656707.558	12.600	2.400	1350		1	S7.004	10.605	375
							0	S7.005	10.200	375
S7-6	560123.932	656636.763	12.180	2.424	1350		1	S7.005	9.756	375
							0	S7.006	9.756	375
S7-7	560124.805	656615.229	11.800	2.800	1500		1	S7.006	9.606	375
							0	S7.007	9.000	600
S7-8	560142.244	656605.705	12.278	3.778	1500		1	S7.007	8.699	600
							0	S7.008	8.500	600
S12-0	560150.138	656664.550	10.200	1.500	1200				
						0	S12.000	8.700	300
S13-0	560187.877	656631.265	10.200	1.500	1200				
						0	S13.000	8.700	300
S12-1	560193.640	656653.035	10.200	2.257	1200		1	S13.000	8.321	300
							2	S12.000	7.943	300
							0	S12.001	7.943	300
S12-2	560219.677	656646.516	10.200	2.525	1200		1	S12.001	7.675	300
							0	S12.002	7.675	300
S7-9	560228.608	656643.579	10.200	2.683	1800		1	S12.002	7.517	300
							2	S7.008	8.297	600
							0	S7.009	7.517	750

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S6-0	560173.629	656745.050	10.200	1.500	1200				
						0	S6.000	8.700	300
S6-1	560159.753	656691.662	10.200	2.427	1200				
						1	S6.000	7.773	300
						0	S6.001	7.773	300
S6-2	560161.984	656678.855	10.200	2.646	1200				
						1	S6.001	7.554	300
						0	S6.002	7.554	300
S11-0	560193.406	656684.061	10.200	1.500	1200				
						0	S11.000	8.700	300
S6-3	560190.079	656671.493	10.200	2.866	1200				
						1	S11.000	8.446	300
						2	S6.002	7.334	300
						0	S6.003	7.334	300
S7-10	560231.894	656660.593	10.200	2.974	1800				
						1	S6.003	7.226	300
						2	S7.009	7.401	750
						0	S7.010	7.226	750
S7-11	560246.185	656715.731	10.200	3.083	1800				
						1	S7.010	7.117	750
						0	S7.011	7.117	750
S8-0	560202.377	656747.719	10.200	1.425	1200				
						0	S8.000	8.775	225
S8-1	560238.941	656737.735	10.200	1.777	1200				
						1	S8.000	8.423	225
						0	S8.001	8.423	225
S7-12	560253.919	656731.358	10.200	3.117	1800				
						1	S8.001	8.063	225
						2	S7.011	7.083	750
						0	S7.012	7.083	750
S4-0	560203.694	656762.021	11.000	1.500	1200				
						0	S4.000	9.500	300
S4-1	560243.236	656747.862	10.600	1.600	1200				
						1	S4.000	9.000	300
						0	S4.001	9.000	300
S7-13	560265.271	656742.046	10.200	3.156	1800				
						1	S4.001	8.325	300
						2	S7.012	7.044	750
						0	S7.013	7.044	750

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S7-14	560293.965	656769.062	10.200	3.244	1800	1	S7.013	6.956	750
						0	S7.014	6.956	750
S3-0	560180.781	656782.087	14.764	1.425	1200				
						0	S3.000	13.339	225
S3-1	560166.292	656785.317	14.764	1.623	1200	1	S3.000	13.141	225
						0	S3.001	13.141	225
S3-2	560168.393	656808.927	15.130	2.784	1200	1	S3.001	12.746	225
						0	S3.002	12.346	225
S3-3	560174.863	656833.075	12.730	3.200	1200	1	S3.002	11.230	225
						0	S3.003	9.530	225
S3-4	560193.216	656828.158	10.200	1.575	1200	1	S3.003	8.700	225
						0	S3.004	8.625	300
S5-0	560216.556	656812.552	10.200	1.425	1200				
						0	S5.000	8.775	225
S3-5	560217.341	656821.273	10.200	1.742	1500	1	S5.000	8.458	225
						2	S3.004	8.458	300
						0	S3.005	8.458	525
S2-0	560251.121	656824.030	10.200	1.425	1200				
						0	S2.000	8.775	225
S3-6	560248.274	656813.405	10.200	1.841	1500	1	S2.000	8.359	225
						2	S3.005	8.359	525
						0	S3.006	8.359	525
S7-15	560301.899	656799.036	10.200	3.306	1800	1	S3.006	8.222	525
						2	S7.014	6.894	750
						0	S7.015	6.894	750
S7-16	560311.941	656836.976	10.200	3.406	1800	1	S7.015	6.794	750
						0	S7.016	6.794	750
S1-0	560279.014	656984.908	12.700	1.500	1200				
						0	S1.000	11.200	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1-1	560290.880	656972.321	12.600	1.650	1200	1	S1.000	11.000	225
						0	S1.001	10.950	300
S1-2	560303.655	656955.675	12.411	2.511	1350	1	S1.001	10.500	300
						0	S1.002	9.900	450
S1-3	560307.021	656896.136	10.650	2.650	1800	1	S1.002	8.900	450
						0	S1.003	8.000	750
S7-17	560310.661	656856.305	10.200	4.200	1800	1	S1.003	7.800	750
						2	S7.016	6.729	750
						0	S7.017	6.500	750
S7-18 PI	560318.642	656856.856	9.500	3.280	1800	1	S7.017	6.420	750
						0	S7.018	6.220	750
P1-1	560328.488	656855.485	7.500	1.575		1	S7.018	6.110	750
S7-19	560395.962	656879.711	7.500	1.575		0	S7.019	5.925	375
S7-20	560420.861	656883.989	7.750	2.404	1800	1	S7.019	5.846	375
						0	S7.020	5.846	375
S7-21	560455.114	656926.451	7.860	2.224	1350	1	S7.020	5.636	375
						0	S7.021	5.636	375
S7-22 OUT	560459.480	656934.337	6.000	0.392	1350	1	S7.021	5.608	375
S9-0	560132.896	656844.022	15.750	2.350	1200	0	S9.000	13.400	225
S7-0	560155.214	656848.807	15.000	1.600	1350	0	S7.000	13.400	375
S7-1	560152.051	656838.271	15.200	2.000	1350	1	S7.000	13.290	375
						2	S9.000	13.200	225
						0	S7.001	13.200	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
P1-18	560329.159	656838.093	8.800	2.875		◦			
P1-8	560414.366	656862.120	7.500	1.575		◦			
P1-0	560329.460	656846.318	7.500	1.575		◦			
P1-2	560332.058	656867.987	7.500	1.575		◦			
P1-3	560340.706	656869.869	7.500	1.575		◦			
P1-4	560352.032	656876.169	7.500	1.575		◦			
P1-5	560365.982	656880.295	7.500	1.575		◦			
P1-6	560381.029	656880.284	7.500	1.575		◦			
P1-7	560409.585	656873.008	7.500	1.575		◦			
P1-9	560414.623	656850.578	7.500	1.575		◦			
P1-10	560409.983	656840.948	7.500	1.575		◦			
P1-11	560388.642	656830.145	7.500	1.575		◦			
P1-12	560400.489	656833.221	7.500	1.575		◦			

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
P1-13	560376.790	656829.780	7.500	1.575		◦			
P1-14	560349.790	656830.286	7.500	1.575		◦			
P1-15	560365.041	656829.677	7.500	1.575		◦			
P1-16	560332.226	656830.005	7.500	1.575		◦			
P1-17	560343.878	656831.373	7.500	1.575		◦			

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
Rainfall Events	Singular	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	1000
M5-60 (mm)	16.300	Additional Storage (m³/ha)	20.0
Ratio-R	0.307	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
5	30	10	0
30	30	10	0
100	30	10	0

Node S7-20 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	5.846	Product Number	CTL-SHE-0164-1570-2000-1570
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	15.7	Min Node Diameter (mm)	1800

Node S7-19 Pond Storage Structure

Invert Level (m)	5.925	Time to half empty (mins)		Analyse flow through structure	x

Inlets

P1-16	P1-0	P1-17	P1-2	P1-3	P1-11	P1-4	P1-9	P1-8	P1-6
P1-18	P1-1	P1-14	P1-15	P1-13	P1-12	P1-10	P1-5	P1-7	

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1920.0	1.575	3840.0

Results for 5 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S10-0	1	13.466	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S7-2	11	13.330	0.280	213.4	1.1741	0.0000	OK
15 minute winter	S7-3	11	12.691	0.297	213.2	0.4246	0.0000	OK
15 minute summer	S7-4	11	12.263	0.244	205.1	0.3488	0.0000	OK
15 minute winter	S7-5	12	11.114	0.914	218.9	1.3082	0.0000	SURCHARGED
15 minute winter	S7-6	12	10.243	0.487	203.9	0.6969	0.0000	SURCHARGED
15 minute winter	S7-7	12	9.232	0.232	217.5	0.5408	0.0000	OK
15 minute winter	S7-8	13	8.880	0.380	230.2	0.8215	0.0000	OK
15 minute winter	S12-0	10	8.771	0.071	18.2	0.1547	0.0000	OK
15 minute winter	S13-0	10	8.769	0.069	16.2	0.1436	0.0000	OK
15 minute winter	S12-1	11	8.059	0.116	33.8	0.1310	0.0000	OK
15 minute winter	S12-2	13	7.862	0.187	58.8	0.3801	0.0000	OK
15 minute winter	S7-9	13	7.857	0.340	264.7	0.8664	0.0000	OK
15 minute summer	S6-0	1	8.700	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S6-1	13	7.913	0.140	10.7	0.1579	0.0000	OK
15 minute winter	S6-2	13	7.910	0.356	34.9	0.8131	0.0000	SURCHARGED
15 minute winter	S11-0	10	8.779	0.079	21.1	0.1857	0.0000	OK
15 minute winter	S6-3	13	7.896	0.562	67.7	1.0341	0.0000	SURCHARGED
15 minute winter	S7-10	13	7.809	0.583	339.6	2.0677	0.0000	OK
15 minute winter	S7-11	13	7.763	0.646	325.1	1.6450	0.0000	OK
15 minute summer	S8-0	1	8.775	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S8-1	1	8.423	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S7-12	13	7.737	0.654	349.2	2.3102	0.0000	OK
15 minute winter	S4-0	10	9.718	0.218	98.7	1.4937	0.0000	OK
15 minute winter	S4-1	11	9.178	0.178	111.0	0.3408	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S10-0	S10.000	S7-3	0.0	0.000	0.000	0.0000	
15 minute winter	S7-2	S7.002	S7-3	213.2	2.345	0.820	3.5440	
15 minute winter	S7-3	S7.003	S7-4	212.6	2.512	0.818	1.8854	
15 minute summer	S7-4	S7.004	S7-5	207.7	2.689	0.732	6.4029	
15 minute winter	S7-5	S7.005	S7-6	203.9	1.849	1.312	8.0764	
15 minute winter	S7-6	S7.006	S7-7	204.2	1.857	1.225	2.2883	
15 minute winter	S7-7	S7.007	S7-8	216.9	2.365	0.256	1.8270	
15 minute winter	S7-8	S7.008	S7-9	226.0	1.359	0.712	15.7525	
15 minute winter	S12-0	S12.000	S12-1	17.9	0.962	0.124	0.8456	
15 minute winter	S13-0	S13.000	S12-1	15.9	1.330	0.110	0.2695	
15 minute winter	S12-1	S12.001	S12-2	33.6	1.057	0.303	0.8772	
15 minute winter	S12-2	S12.002	S7-9	58.1	1.282	0.402	0.5487	
15 minute winter	S7-9	S7.009	S7-10	263.5	1.610	0.261	3.8031	
15 minute summer	S6-0	S6.000	S6-1	0.0	0.000	0.000	0.4021	
15 minute winter	S6-1	S6.001	S6-2	-10.7	-0.236	-0.074	0.6664	
15 minute winter	S6-2	S6.002	S6-3	26.7	0.622	0.276	2.0453	
15 minute winter	S11-0	S11.000	S6-3	20.8	1.484	0.134	0.1827	
15 minute winter	S6-3	S6.003	S7-10	60.1	0.854	1.090	3.0430	
15 minute winter	S7-10	S7.010	S7-11	325.1	0.989	0.605	21.9521	
15 minute winter	S7-11	S7.011	S7-12	335.0	0.885	0.617	7.0718	
15 minute summer	S8-0	S8.000	S8-1	0.0	0.000	0.000	0.0000	
15 minute summer	S8-1	S8.001	S7-12	0.0	0.000	0.000	0.0000	
15 minute winter	S7-12	S7.012	S7-13	355.0	0.938	0.577	6.4009	
15 minute winter	S4-0	S4.000	S4-1	96.7	1.963	0.797	2.0634	
15 minute winter	S4-1	S4.001	S7-13	110.4	2.683	0.575	0.9377	

Results for 5 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S7-13	13	7.710	0.666	420.8	1.9039	0.0000	OK
15 minute winter	S7-14	13	7.649	0.693	442.8	2.5102	0.0000	OK
15 minute winter	S3-0	10	13.448	0.109	25.7	0.2954	0.0000	OK
15 minute winter	S3-1	10	13.268	0.127	38.0	0.2299	0.0000	OK
15 minute winter	S3-2	10	12.461	0.115	52.6	0.1852	0.0000	OK
15 minute winter	S3-3	11	9.665	0.135	68.6	0.2128	0.0000	OK
15 minute winter	S3-4	11	9.026	0.401	86.4	0.8654	0.0000	SURCHARGED
15 minute winter	S5-0	10	8.851	0.076	24.6	0.1992	0.0000	OK
15 minute winter	S3-5	11	8.832	0.374	161.8	1.6785	0.0000	OK
15 minute winter	S2-0	11	8.789	0.014	1.0	0.0156	0.0000	OK
15 minute winter	S3-6	11	8.788	0.429	247.8	2.6599	0.0000	OK
15 minute winter	S7-15	13	7.588	0.694	663.6	1.9855	0.0000	OK
15 minute winter	S7-16	13	7.404	0.610	665.4	1.5515	0.0000	OK
15 minute winter	S1-0	10	11.380	0.180	48.0	0.7048	0.0000	OK
15 minute winter	S1-1	10	11.208	0.258	149.2	1.6843	0.0000	OK
15 minute winter	S1-2	11	10.143	0.243	223.8	1.0111	0.0000	OK
15 minute winter	S1-3	11	8.385	0.385	407.6	3.3766	0.0000	OK
15 minute winter	S7-17	12	7.174	0.674	1059.3	2.7389	0.0000	OK
1440 minute winter	S7-18 PI	1050	6.806	0.586	132.8	1.4920	0.0000	OK
1440 minute winter	P1-1	1290	6.780	0.855	89.2	0.0000	0.0000	OK
1440 minute winter	S7-19	1320	6.771	0.846	85.4	2061.2650	0.0000	SURCHARGED
1440 minute winter	S7-20	1320	6.769	0.923	15.7	2.3497	0.0000	SURCHARGED
180 minute winter	S7-21	148	5.736	0.100	15.7	0.1426	0.0000	OK
180 minute winter	S7-22 OUT	148	5.697	0.089	15.7	0.0000	0.0000	OK
15 minute winter	S9-0	11	13.874	0.474	43.4	1.2997	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S7-13	S7.013	S7-14	425.4	1.051	0.734	16.5262	
15 minute winter	S7-14	S7.014	S7-15	451.7	1.119	0.822	13.1882	
15 minute winter	S3-0	S3.000	S3-1	25.4	1.202	0.422	0.3134	
15 minute winter	S3-1	S3.001	S3-2	37.2	1.687	0.554	0.5253	
15 minute winter	S3-2	S3.002	S3-3	52.1	2.662	0.472	0.4904	
15 minute winter	S3-3	S3.003	S3-4	68.1	2.425	0.623	0.6131	
15 minute winter	S3-4	S3.004	S3-5	86.1	1.222	0.950	1.7667	
15 minute winter	S5-0	S5.000	S3-5	24.4	0.799	0.246	0.2254	
15 minute winter	S3-5	S3.005	S3-6	159.5	0.920	0.593	5.6422	
15 minute winter	S2-0	S2.000	S3-6	-1.0	-0.044	-0.010	0.2242	
15 minute winter	S3-6	S3.006	S7-15	241.9	1.452	1.010	9.2494	
15 minute winter	S7-15	S7.015	S7-16	665.4	1.638	1.071	15.8711	
15 minute winter	S7-16	S7.016	S7-17	665.1	1.894	0.935	6.7737	
15 minute winter	S1-0	S1.000	S1-1	47.0	1.308	0.841	0.6263	
15 minute winter	S1-1	S1.001	S1-2	145.6	2.442	0.893	1.2497	
15 minute winter	S1-2	S1.002	S1-3	223.0	2.648	0.532	5.0226	
15 minute winter	S1-3	S1.003	S7-17	407.8	1.905	0.467	8.5651	
15 minute winter	S7-17	S7.017	S7-18 PI	1059.2	2.836	0.857	2.9502	
1440 minute winter	S7-18 PI	S7.018	P1-1	89.2	1.486	0.068	3.8599	
1440 minute winter	S7-19	S7.019	S7-20	15.7	0.208	0.142	2.7865	
1440 minute winter	S7-20	S7.020	S7-21	15.7	0.724	0.127	1.1826	
180 minute winter	S7-21	S7.021	S7-22 OUT	15.7	0.725	0.141	0.1951	1027.5
15 minute winter	S9-0	S9.000	S7-1	40.2	1.010	0.773	0.7954	

Results for 5 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S7-0	11	13.768	0.368	105.0	2.6305	0.0000	OK
15 minute winter	S7-1	11	13.723	0.523	149.6	1.0584	0.0000	SURCHARGED
1440 minute winter	P1-18	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-8	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-0	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-2	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-3	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-4	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-5	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-6	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-7	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-9	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-10	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-11	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-12	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-13	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-14	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-15	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-16	1350	6.771	0.846	3.7	0.0000	0.0000	OK
1440 minute winter	P1-17	1350	6.771	0.846	3.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S7-0	S7.000	S7-1	96.7	1.433	0.483	1.2104	
15 minute winter	S7-1	S7.001	S7-2	149.0	2.117	1.341	1.0412	

Results for 30 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S10-0	1	13.466	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S7-2	12	13.970	0.920	279.2	3.8601	0.0000	SURCHARGED
15 minute winter	S7-3	13	13.258	0.864	264.5	1.2357	0.0000	SURCHARGED
15 minute winter	S7-4	13	12.803	0.784	247.5	1.1213	0.0000	SURCHARGED
15 minute winter	S7-5	13	11.618	1.418	242.6	2.0298	0.0000	SURCHARGED
15 minute winter	S7-6	13	10.395	0.639	242.5	0.9141	0.0000	SURCHARGED
15 minute winter	S7-7	12	9.257	0.257	258.7	0.6003	0.0000	OK
15 minute winter	S7-8	13	8.932	0.432	279.4	0.9340	0.0000	OK
15 minute winter	S12-0	10	8.786	0.086	26.7	0.1880	0.0000	OK
15 minute winter	S13-0	10	8.785	0.085	23.8	0.1759	0.0000	OK
15 minute winter	S12-1	13	8.730	0.787	49.7	0.8906	0.0000	SURCHARGED
15 minute winter	S12-2	13	8.700	1.025	97.8	2.0791	0.0000	SURCHARGED
15 minute winter	S7-9	13	8.655	1.138	337.0	2.8951	0.0000	SURCHARGED
15 minute winter	S6-0	14	8.801	0.101	12.1	0.1137	0.0000	OK
15 minute winter	S6-1	13	8.802	1.029	28.5	1.1641	0.0000	SURCHARGED
15 minute winter	S6-2	13	8.793	1.239	51.2	2.8263	0.0000	SURCHARGED
15 minute winter	S11-0	10	8.797	0.097	31.0	0.2295	0.0000	OK
15 minute winter	S6-3	13	8.762	1.428	79.8	2.6267	0.0000	SURCHARGED
15 minute winter	S7-10	13	8.628	1.402	442.1	4.9729	0.0000	SURCHARGED
15 minute winter	S7-11	13	8.522	1.405	458.7	3.5754	0.0000	SURCHARGED
15 minute summer	S8-0	1	8.775	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S8-1	13	8.483	0.060	5.9	0.0677	0.0000	OK
15 minute winter	S7-12	13	8.472	1.389	487.1	4.9034	0.0000	SURCHARGED
15 minute winter	S4-0	11	9.975	0.475	144.7	3.2617	0.0000	SURCHARGED
15 minute winter	S4-1	11	9.230	0.230	154.0	0.4398	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S10-0	S10.000	S7-3	0.0	0.000	0.000	0.7955	
15 minute winter	S7-2	S7.002	S7-3	264.5	2.398	1.018	4.3015	
15 minute winter	S7-3	S7.003	S7-4	247.5	2.487	0.952	2.4576	
15 minute winter	S7-4	S7.004	S7-5	242.6	2.673	0.855	7.7968	
15 minute winter	S7-5	S7.005	S7-6	242.5	2.198	1.560	8.0764	
15 minute winter	S7-6	S7.006	S7-7	242.4	2.198	1.454	2.3344	
15 minute winter	S7-7	S7.007	S7-8	258.5	2.457	0.305	2.1504	
15 minute winter	S7-8	S7.008	S7-9	275.0	1.427	0.867	18.5040	
15 minute winter	S12-0	S12.000	S12-1	26.3	1.081	0.182	1.9130	
15 minute winter	S13-0	S13.000	S12-1	23.4	1.478	0.162	0.9434	
15 minute winter	S12-1	S12.001	S12-2	50.8	1.073	0.457	1.8901	
15 minute winter	S12-2	S12.002	S7-9	80.4	1.350	0.557	0.6621	
15 minute winter	S7-9	S7.009	S7-10	345.9	1.500	0.343	7.6264	
15 minute winter	S6-0	S6.000	S6-1	-12.1	-0.276	-0.084	2.5126	
15 minute winter	S6-1	S6.001	S6-2	30.1	-0.530	0.208	0.9155	
15 minute winter	S6-2	S6.002	S6-3	51.2	0.728	0.530	2.0453	
15 minute winter	S11-0	S11.000	S6-3	30.7	1.640	0.197	0.5381	
15 minute winter	S6-3	S6.003	S7-10	82.5	1.172	1.497	3.0430	
15 minute winter	S7-10	S7.010	S7-11	458.7	1.042	0.853	25.0693	
15 minute winter	S7-11	S7.011	S7-12	472.6	1.074	0.871	7.6739	
15 minute summer	S8-0	S8.000	S8-1	0.0	0.000	0.000	0.0000	
15 minute winter	S8-1	S8.001	S7-12	-5.9	0.541	-0.076	0.3925	
15 minute winter	S7-12	S7.012	S7-13	505.8	1.149	0.822	6.8624	
15 minute winter	S4-0	S4.000	S4-1	134.1	2.070	1.106	2.6962	
15 minute winter	S4-1	S4.001	S7-13	153.2	2.837	0.798	1.2295	

Results for 30 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S7-13	13	8.417	1.373	597.1	3.9225	0.0000	SURCHARGED
15 minute winter	S7-14	13	8.275	1.319	637.0	4.7749	0.0000	SURCHARGED
15 minute winter	S3-0	10	13.482	0.143	37.7	0.3861	0.0000	OK
15 minute winter	S3-1	10	13.308	0.167	55.7	0.3028	0.0000	OK
15 minute winter	S3-2	10	12.494	0.148	77.0	0.2390	0.0000	OK
15 minute winter	S3-3	11	10.323	0.793	100.5	1.2543	0.0000	SURCHARGED
15 minute winter	S3-4	11	9.475	0.850	122.7	1.8338	0.0000	SURCHARGED
15 minute winter	S5-0	11	9.141	0.366	36.0	0.9632	0.0000	SURCHARGED
15 minute winter	S3-5	11	9.088	0.630	228.2	2.8278	0.0000	SURCHARGED
15 minute winter	S2-0	11	8.987	0.212	5.6	0.2398	0.0000	OK
15 minute winter	S3-6	11	8.989	0.630	355.0	3.9097	0.0000	SURCHARGED
15 minute winter	S7-15	13	8.137	1.243	958.5	3.5558	0.0000	SURCHARGED
15 minute winter	S7-16	12	7.800	1.006	963.4	2.5600	0.0000	SURCHARGED
15 minute winter	S1-0	11	11.987	0.787	70.2	3.0818	0.0000	SURCHARGED
15 minute winter	S1-1	11	11.669	0.719	205.2	4.6950	0.0000	SURCHARGED
15 minute winter	S1-2	11	10.204	0.304	307.7	1.2651	0.0000	OK
15 minute winter	S1-3	11	8.480	0.480	569.7	4.2081	0.0000	OK
15 minute winter	S7-17	12	7.590	1.090	1541.0	4.4301	0.0000	SURCHARGED
2160 minute winter	S7-18 PI	1740	7.153	0.933	136.0	2.3748	0.0000	SURCHARGED
2160 minute winter	P1-1	2040	7.147	1.222	123.0	0.0000	0.0000	OK
2160 minute winter	S7-19	2040	7.138	1.213	86.9	3227.8230	0.0000	SURCHARGED
2160 minute winter	S7-20	2040	7.137	1.291	15.7	3.2854	0.0000	SURCHARGED
60 minute summer	S7-21	61	5.736	0.100	15.7	0.1426	0.0000	OK
60 minute summer	S7-22 OUT	61	5.697	0.089	15.7	0.0000	0.0000	OK
15 minute winter	S9-0	12	14.763	1.363	63.6	3.7347	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S7-13	S7.013	S7-14	605.2	1.375	1.044	17.3456	
15 minute winter	S7-14	S7.014	S7-15	646.1	1.468	1.175	13.6464	
15 minute winter	S3-0	S3.000	S3-1	37.2	1.274	0.619	0.4324	
15 minute winter	S3-1	S3.001	S3-2	54.6	1.818	0.811	0.7142	
15 minute winter	S3-2	S3.002	S3-3	76.4	2.889	0.692	0.6620	
15 minute winter	S3-3	S3.003	S3-4	97.1	2.441	0.889	0.7557	
15 minute winter	S3-4	S3.004	S3-5	120.7	1.714	1.332	1.7667	
15 minute winter	S5-0	S5.000	S3-5	32.3	0.880	0.325	0.3482	
15 minute winter	S3-5	S3.005	S3-6	225.6	1.044	0.839	6.8953	
15 minute winter	S2-0	S2.000	S3-6	-5.6	-0.205	-0.055	0.4323	
15 minute winter	S3-6	S3.006	S7-15	349.7	1.668	1.460	10.9081	
15 minute winter	S7-15	S7.015	S7-16	963.4	2.189	1.551	17.2730	
15 minute winter	S7-16	S7.016	S7-17	966.7	2.197	1.359	8.5256	
15 minute winter	S1-0	S1.000	S1-1	63.6	1.599	1.137	0.6880	
15 minute winter	S1-1	S1.001	S1-2	199.1	2.828	1.220	1.4767	
15 minute winter	S1-2	S1.002	S1-3	307.8	2.824	0.734	6.4975	
15 minute winter	S1-3	S1.003	S7-17	574.4	2.060	0.658	11.1461	
15 minute winter	S7-17	S7.017	S7-18 PI	1550.2	3.523	1.254	3.5087	
2160 minute winter	S7-18 PI	S7.018	P1-1	123.0	1.392	0.094	4.3752	
2160 minute winter	S7-19	S7.019	S7-20	15.7	0.208	0.142	2.7865	
2160 minute winter	S7-20	S7.020	S7-21	15.7	0.724	0.127	1.1824	
60 minute summer	S7-21	S7.021	S7-22 OUT	15.7	0.725	0.141	0.1951	942.5
15 minute winter	S9-0	S9.000	S7-1	50.7	1.276	0.976	0.7954	

Results for 30 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S7-0	12	14.605	1.205	153.9	8.6166	0.0000	SURCHARGED
15 minute winter	S7-1	12	14.540	1.340	191.6	2.7107	0.0000	SURCHARGED
2160 minute winter	P1-18	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-8	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-0	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-2	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-3	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-4	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-5	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-6	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-7	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-9	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-10	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-11	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-12	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-13	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-14	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-15	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-16	2100	7.138	1.213	3.8	0.0000	0.0000	OK
2160 minute winter	P1-17	2100	7.138	1.213	3.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S7-0	S7.000	S7-1	122.1	1.436	0.610	1.2134	
15 minute winter	S7-1	S7.001	S7-2	184.9	2.626	1.664	1.0563	

Results for 100 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S10-0	12	13.663	0.197	12.5	0.2231	0.0000	OK
15 minute winter	S7-2	11	14.517	1.467	325.7	6.1574	0.0000	SURCHARGED
15 minute winter	S7-3	13	13.670	1.276	284.5	1.8266	0.0000	SURCHARGED
15 minute winter	S7-4	13	13.164	1.145	259.7	1.6386	0.0000	SURCHARGED
15 minute winter	S7-5	13	11.836	1.636	257.2	2.3414	0.0000	SURCHARGED
15 minute winter	S7-6	13	10.455	0.699	257.7	1.0006	0.0000	SURCHARGED
15 minute winter	S7-7	13	9.587	0.587	282.9	1.3699	0.0000	OK
15 minute winter	S7-8	13	9.525	1.025	312.5	2.2160	0.0000	SURCHARGED
15 minute winter	S12-0	13	9.415	0.715	37.3	1.5633	0.0000	SURCHARGED
15 minute winter	S13-0	13	9.384	0.684	50.9	1.4163	0.0000	SURCHARGED
15 minute winter	S12-1	13	9.384	1.441	64.5	1.6296	0.0000	SURCHARGED
15 minute winter	S12-2	13	9.361	1.686	140.9	3.4201	0.0000	SURCHARGED
15 minute winter	S7-9	13	9.315	1.798	397.4	4.5756	0.0000	SURCHARGED
15 minute winter	S6-0	13	9.614	0.914	26.2	1.0339	0.0000	SURCHARGED
15 minute winter	S6-1	13	9.562	1.789	44.6	2.0236	0.0000	SURCHARGED
15 minute winter	S6-2	13	9.558	2.004	71.5	4.5719	0.0000	SURCHARGED
15 minute winter	S11-0	13	9.539	0.839	40.2	1.9790	0.0000	SURCHARGED
15 minute winter	S6-3	13	9.533	2.199	88.3	4.0448	0.0000	SURCHARGED
15 minute winter	S7-10	13	9.285	2.059	566.7	7.3034	0.0000	SURCHARGED
15 minute winter	S7-11	13	9.168	2.051	581.4	5.2193	0.0000	SURCHARGED
15 minute winter	S8-0	13	9.203	0.428	19.4	0.4841	0.0000	SURCHARGED
15 minute winter	S8-1	13	9.154	0.731	44.1	0.8273	0.0000	SURCHARGED
15 minute winter	S7-12	13	9.111	2.028	629.3	7.1584	0.0000	SURCHARGED
15 minute winter	S4-0	12	10.576	1.076	187.7	7.3842	0.0000	SURCHARGED
15 minute winter	S4-1	12	9.667	0.667	186.6	1.2756	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S10-0	S10.000	S7-3	-12.5	0.347	-0.184	1.5332	
15 minute winter	S7-2	S7.002	S7-3	284.5	2.580	1.095	4.3015	
15 minute winter	S7-3	S7.003	S7-4	259.7	2.515	0.999	2.4576	
15 minute winter	S7-4	S7.004	S7-5	257.2	2.741	0.907	7.7968	
15 minute winter	S7-5	S7.005	S7-6	257.7	2.337	1.658	8.0764	
15 minute winter	S7-6	S7.006	S7-7	257.7	2.337	1.546	2.3430	
15 minute winter	S7-7	S7.007	S7-8	292.7	2.457	0.345	5.5816	
15 minute winter	S7-8	S7.008	S7-9	326.1	1.476	1.028	26.5633	
15 minute winter	S12-0	S12.000	S12-1	36.5	1.144	0.253	3.1689	
15 minute winter	S13-0	S13.000	S12-1	30.3	1.583	0.210	1.5858	
15 minute winter	S12-1	S12.001	S12-2	77.4	1.100	0.697	1.8901	
15 minute winter	S12-2	S12.002	S7-9	102.3	1.453	0.709	0.6621	
15 minute winter	S7-9	S7.009	S7-10	477.9	1.544	0.474	7.6264	
15 minute winter	S6-0	S6.000	S6-1	-26.2	-0.566	-0.181	3.8845	
15 minute winter	S6-1	S6.001	S6-2	45.0	0.638	0.311	0.9155	
15 minute winter	S6-2	S6.002	S6-3	64.7	0.919	0.670	2.0453	
15 minute winter	S11-0	S11.000	S6-3	39.8	1.750	0.255	0.9155	
15 minute winter	S6-3	S6.003	S7-10	91.8	1.304	1.666	3.0430	
15 minute winter	S7-10	S7.010	S7-11	581.4	1.321	1.081	25.0693	
15 minute winter	S7-11	S7.011	S7-12	599.5	1.362	1.105	7.6739	
15 minute winter	S8-0	S8.000	S8-1	-19.4	-0.593	-0.388	1.5074	
15 minute winter	S8-1	S8.001	S7-12	-44.1	-1.108	-0.568	0.6474	
15 minute winter	S7-12	S7.012	S7-13	645.4	1.467	1.049	6.8624	
15 minute winter	S4-0	S4.000	S4-1	159.3	2.263	1.313	2.9577	
15 minute winter	S4-1	S4.001	S7-13	180.1	2.821	0.939	1.6049	

Results for 100 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S7-13	13	9.044	2.000	729.3	5.7150	0.0000	SURCHARGED
15 minute winter	S7-14	13	8.852	1.896	771.9	6.8619	0.0000	SURCHARGED
15 minute winter	S3-0	11	13.571	0.232	48.9	0.6270	0.0000	SURCHARGED
15 minute winter	S3-1	11	13.423	0.282	71.2	0.5105	0.0000	SURCHARGED
15 minute winter	S3-2	10	12.523	0.177	95.0	0.2857	0.0000	OK
15 minute winter	S3-3	11	11.306	1.776	126.4	2.8094	0.0000	SURCHARGED
15 minute winter	S3-4	11	10.000	1.375	153.7	2.9669	0.0000	FLOOD RISK
15 minute winter	S5-0	11	9.488	0.713	46.7	1.8765	0.0000	SURCHARGED
15 minute winter	S3-5	11	9.397	0.939	290.6	4.2117	0.0000	SURCHARGED
15 minute winter	S2-0	11	9.238	0.463	5.7	0.5240	0.0000	SURCHARGED
15 minute winter	S3-6	11	9.236	0.877	456.6	5.4396	0.0000	SURCHARGED
15 minute winter	S7-15	12	8.688	1.794	1122.7	5.1313	0.0000	SURCHARGED
15 minute winter	S7-16	12	8.237	1.443	1129.0	3.6737	0.0000	SURCHARGED
15 minute winter	S1-0	12	12.668	1.468	91.1	5.7487	0.0000	FLOOD RISK
15 minute winter	S1-1	11	12.176	1.225	261.9	8.0037	0.0000	SURCHARGED
15 minute winter	S1-2	11	10.274	0.374	390.5	1.5547	0.0000	OK
15 minute winter	S1-3	11	8.575	0.575	728.6	5.0433	0.0000	OK
15 minute winter	S7-17	12	7.939	1.439	1869.9	5.8477	0.0000	SURCHARGED
2160 minute winter	S7-18 PI	2100	7.430	1.210	112.2	3.0794	0.0000	SURCHARGED
2160 minute winter	P1-1	2100	7.430	1.505	120.7	0.0000	0.0000	OK
2160 minute winter	S7-19	2100	7.421	1.496	107.0	4236.5850	0.0000	FLOOD RISK
2160 minute winter	S7-20	2100	7.419	1.573	15.8	4.0045	0.0000	SURCHARGED
30 minute summer	S7-21	112	5.736	0.100	15.7	0.1426	0.0000	OK
30 minute summer	S7-22 OUT	112	5.697	0.089	15.7	0.0000	0.0000	OK
15 minute winter	S9-0	11	15.497	2.097	82.5	5.7487	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S7-13	S7.013	S7-14	751.3	1.707	1.296	17.3456	
15 minute winter	S7-14	S7.014	S7-15	788.3	1.791	1.434	13.6464	
15 minute winter	S3-0	S3.000	S3-1	47.1	1.305	0.784	0.5904	
15 minute winter	S3-1	S3.001	S3-2	67.3	1.855	1.000	0.9251	
15 minute winter	S3-2	S3.002	S3-3	95.0	2.981	0.861	0.7959	
15 minute winter	S3-3	S3.003	S3-4	120.8	3.037	1.106	0.7557	
15 minute winter	S3-4	S3.004	S3-5	153.6	2.182	1.696	1.7667	
15 minute winter	S5-0	S5.000	S3-5	42.4	1.067	0.427	0.3482	
15 minute winter	S3-5	S3.005	S3-6	288.4	1.335	1.073	6.8953	
15 minute winter	S2-0	S2.000	S3-6	-5.7	-0.194	-0.056	0.4375	
15 minute winter	S3-6	S3.006	S7-15	451.5	2.102	1.886	11.6175	
15 minute winter	S7-15	S7.015	S7-16	1129.0	2.566	1.817	17.2730	
15 minute winter	S7-16	S7.016	S7-17	1132.7	2.574	1.592	8.5256	
15 minute winter	S1-0	S1.000	S1-1	79.7	2.004	1.425	0.6880	
15 minute winter	S1-1	S1.001	S1-2	249.6	3.545	1.530	1.4775	
15 minute winter	S1-2	S1.002	S1-3	388.9	2.926	0.928	7.9509	
15 minute winter	S1-3	S1.003	S7-17	733.2	2.161	0.840	13.5487	
15 minute winter	S7-17	S7.017	S7-18 PI	1877.2	4.266	1.519	3.5210	
2160 minute winter	S7-18 PI	S7.018	P1-1	120.7	1.316	0.093	4.3752	
2160 minute winter	S7-19	S7.019	S7-20	15.8	0.206	0.142	2.7865	
2160 minute winter	S7-20	S7.020	S7-21	15.7	0.724	0.127	1.1826	
30 minute summer	S7-21	S7.021	S7-22 OUT	15.7	0.725	0.141	0.1951	927.9
15 minute winter	S9-0	S9.000	S7-1	73.5	1.849	1.415	0.7954	

Results for 100 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S7-0	11	15.000	1.600	199.7	11.4400	13.7527	FLOOD
15 minute winter	S7-1	11	14.984	1.784	215.0	3.6097	0.0000	FLOOD RISK
2160 minute winter	P1-18	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-8	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-0	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-2	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-3	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-4	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-5	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-6	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-7	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-9	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-10	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-11	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-12	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-13	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-14	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-15	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-16	2100	7.421	1.496	4.8	0.0000	0.0000	OK
2160 minute winter	P1-17	2100	7.421	1.496	4.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S7-0	S7.000	S7-1	133.4	1.382	0.667	1.2134	
15 minute winter	S7-1	S7.001	S7-2	195.9	2.782	1.763	1.0563	

Appendix D SuDS Maintenance Plan

TABLE 32.1 Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 11–23)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management[1]	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

■ will be required

□ may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

TABLE 12.5 Operation and maintenance requirements for green roofs

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

TABLE 18.3 Operation and maintenance requirements for bioretention systems

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

TABLE 17.1 Operation and maintenance requirements for swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

TABLE 23.1 **Operation and maintenance requirements for ponds and wetlands**

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

Appendix E Flow Control Device

Technical Specification

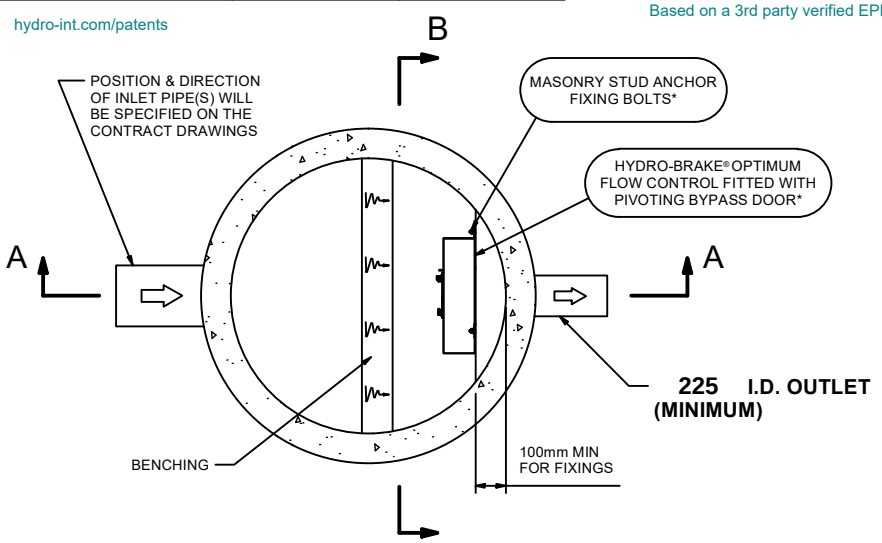
Control Point	Head (m)	Flow (l/s)
Primary Design	2.000	15.700
Flush-Flo™	0.586	15.681
Kick-Flo®	1.223	12.434
Mean Flow		13.708

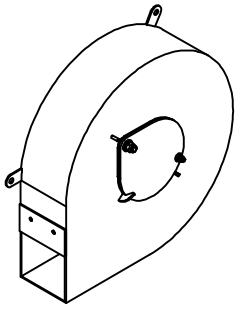
This Hydro-Brake® Optimum includes:

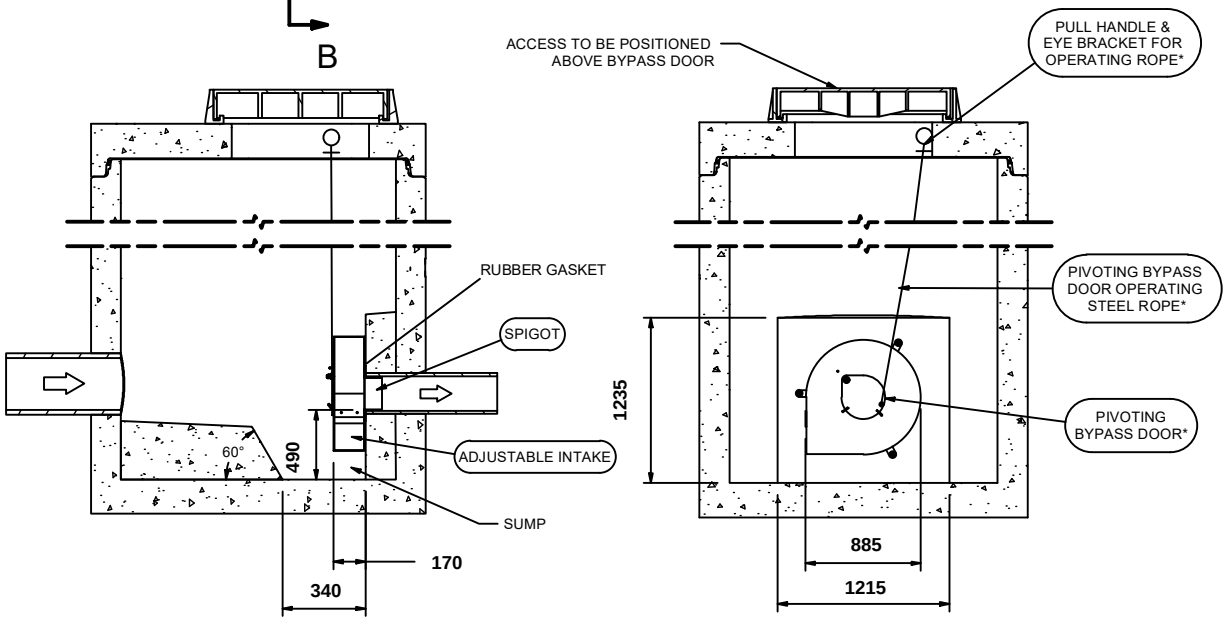
- •All in 5 mm Grade 304L stainless steel
- • Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- • Media blasted for corrosion resistance
- • Variable flow rate post installation via adjustable inlet (if necessary)
- • Indicative Weight: 70 kg
- • Product Carbon Footprint: 311.88 kgCO2e

Based on a 3rd party verified EPD: hydro-int.com/epd

hydro-int.com/patents







SECTION A-A

SECTION B-B

IMPORTANT:
LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0164-1570-2000-1570 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International
A CRH COMPANY

DATE	29/10/2025 14:18
SITE	Parkway Valley
DESIGNER	Tracey O'Connell
REF	231171

SHE-0164-1570-2000-1570
Hydro-Brake® Optimum

toconnell@punchconsulting.com

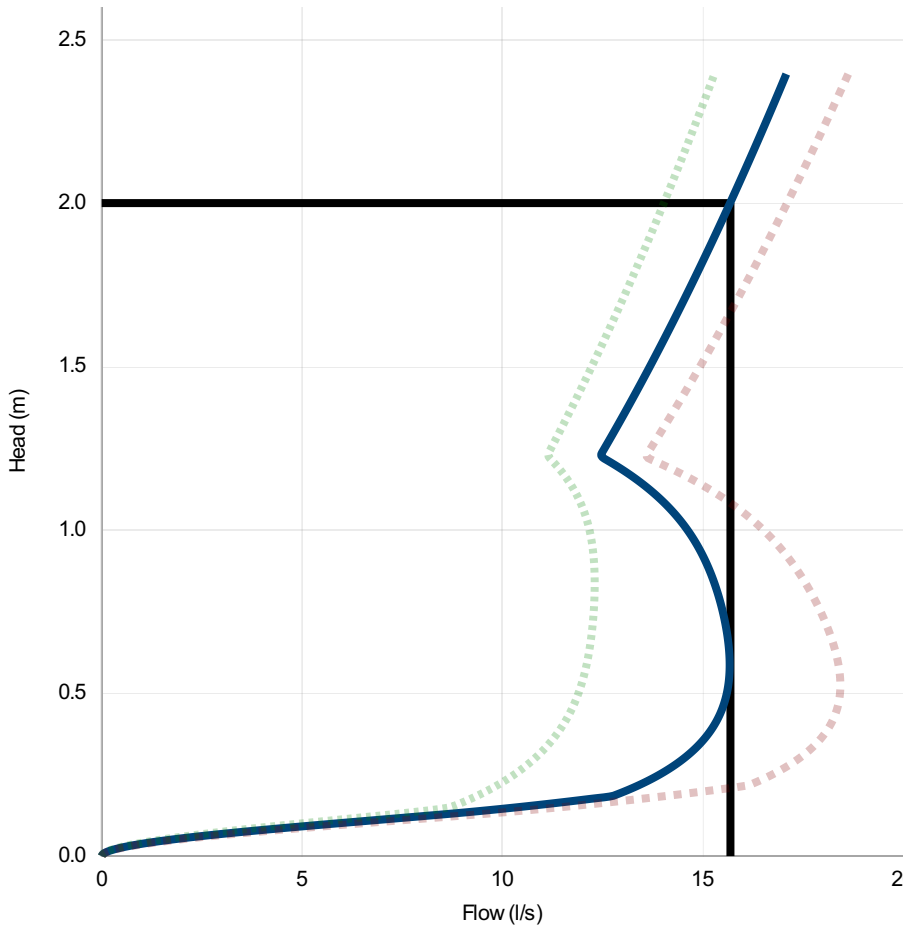
Technical Specification

	Original Setting		Minimum Setting		Maximum Setting	
Control Point	**Head (m)**	**Flow (l/s)**	**Head (m)**	**Flow (l/s)**	**Head (m)**	**Flow (l/s)**
Primary Design	2.000	15.700	2.000	14.037	2.000	17.115
Flush-Flo™	0.586	15.681	0.834	12.310	0.524	18.445
Kick-Flo®	1.223	12.434	1.224	11.116	1.221	13.565
Mean Flow		13.708		11.443		15.478

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE No 08/4596

wrc approved PT/503/0422

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.069	3.074
0.138	9.428
0.207	13.225
0.276	14.274
0.345	14.945
0.414	15.354
0.483	15.578
0.552	15.671
0.621	15.671
0.690	15.605
0.759	15.488
0.828	15.323
0.897	15.102
0.966	14.805
1.034	14.404
1.103	13.862
1.172	13.138
1.241	12.520
1.310	12.843
1.379	13.158
1.448	13.465
1.517	13.765
1.586	14.057
1.655	14.343
1.724	14.623
1.793	14.898
1.862	15.167
1.931	15.431
2.000	15.690

DESIGN ADVICE

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SHE-0164-1570-2000-1570

Hydro-Brake® Optimum

Appendix F Causeway Foul Water Drainage Design Calculations

Design Settings

Frequency of use (kDU)	0.00	Minimum Velocity (m/s)	0.70
Flow per dwelling per day (l/day)	446	Connection Type	Level Inverts
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Dwellings	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
F1-0	50	10.200	1200	560179.175	656654.257	1.425
F1-1	50	10.200	1200	560189.179	656688.825	1.600
F1-2	50	10.200	1200	560206.570	656714.741	1.700
F1-3		10.200	1200	560200.197	656755.069	2.100
F4-0	10	15.400	1200	560144.357	656815.283	2.300
F3-1		15.500	1200	560155.497	656833.500	3.200
F3-2		12.800	1200	560172.828	656824.492	2.300
F3-4	50	10.250	1200	560216.050	656811.252	1.650
F1-4		10.200	1200	560235.307	656805.874	2.300
F1-5	50	10.200	1200	560246.509	656807.407	2.400
F1-6		10.200	1200	560297.955	656802.276	2.830
F3-0	30	15.300	1200	560154.408	656861.844	1.675
F2-0	15	15.000	1200	560194.177	656891.831	0.650
F3-3	15	10.200	1200	560200.431	656829.333	1.500
F2-1	15	14.000	1200	560253.948	656896.281	1.500
F2-2		11.000	750	560309.028	656876.297	1.450
F2-3	15	10.200	1200	560311.647	656837.662	1.500
F1-7		10.200	1200	560305.340	656810.776	2.990
F1-8		10.200	1200	560312.261	656807.910	3.070
F1-9		10.200	1200	560315.314	656801.170	3.130

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F1.000	F1-0	F1-1	35.986	1.500	8.775	8.600	0.175	205.6	225
F1.001	F1-1	F1-2	31.211	1.500	8.600	8.500	0.100	312.1	225
F1.002	F1-2	F1-3	40.829	1.500	8.500	8.100	0.400	102.1	225
F1.003	F1-3	F1-4	61.756	1.500	8.100	7.900	0.200	308.8	225
F1.004	F1-4	F1-5	11.307	1.500	7.900	7.800	0.100	113.1	225
F1.005	F1-5	F1-6	51.701	1.500	7.800	7.370	0.430	120.2	225
F1.006	F1-6	F1-7	11.260	1.500	7.370	7.210	0.160	70.4	225

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
F1.000	0.165	0.799	31.8	0.3	1.200	1.375	0.000	50	0.0	0.0	15	0.230
F1.001	0.178	0.647	25.7	0.5	1.375	1.475	0.000	100	0.0	0.0	22	0.252
F1.002	0.300	1.136	45.2	0.8	1.475	1.875	0.000	150	0.0	0.0	21	0.420
F1.003	0.203	0.651	25.9	0.8	1.875	2.075	0.000	150	0.0	0.0	27	0.286
F1.004	0.338	1.079	42.9	1.3	2.075	2.175	0.000	255	0.0	0.0	28	0.485
F1.005	0.352	1.046	41.6	1.6	2.175	2.605	0.000	305	0.0	0.0	30	0.499
F1.006	0.430	1.369	54.4	1.6	2.605	2.765	0.000	305	0.0	0.0	27	0.604

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F1.007	F1-7	F1-8	7.491	1.500	7.210	7.130	0.080	93.6	225
F1.008	F1-8	F1-9	7.399	1.500	7.130	7.070	0.060	123.3	225
F3.000	F3-0	F3-1	28.365	1.500	13.625	12.300	1.325	21.4	225
F4.000	F4-0	F3-1	21.353	1.500	13.100	12.300	0.800	26.7	225
F3.001	F3-1	F3-2	19.532	1.500	12.300	11.350	0.950	20.6	225
F3.002	F3-2	F3-3	28.024	1.500	10.500	8.700	1.800	15.6	225
F3.003	F3-3	F3-4	23.893	1.500	8.700	8.600	0.100	238.9	225
F3.004	F3-4	F1-4	19.994	1.500	8.600	8.400	0.200	100.0	225
F2.000	F2-0	F2-1	59.936	1.500	14.350	13.100	1.250	47.9	225
F2.001	F2-1	F2-2	58.593	1.500	12.500	9.550	2.950	19.9	225
F2.002	F2-2	F2-3	38.724	1.500	9.550	8.700	0.850	45.6	225
F2.003	F2-3	F1-7	27.616	1.500	8.700	8.300	0.400	69.0	225

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
F1.007	0.400	1.186	47.2	1.8	2.765	2.845	0.000	350	0.0	0.0	30	0.567
F1.008	0.359	1.033	41.1	1.8	2.845	2.905	0.000	350	0.0	0.0	32	0.511
F3.000	0.271	2.487	98.9	0.2	1.450	2.975	0.000	30	0.0	0.0	7	0.406
F4.000	0.197	2.226	88.5	0.1	2.075	2.975	0.000	10	0.0	0.0	5	0.285
F3.001	0.325	2.537	100.9	0.2	2.975	1.225	0.000	40	0.0	0.0	7	0.456
F3.002	0.375	2.917	116.0	0.2	2.075	1.275	0.000	40	0.0	0.0	7	0.524
F3.003	0.164	0.741	29.4	0.3	1.275	1.425	0.000	55	0.0	0.0	16	0.231
F3.004	0.272	1.148	45.6	0.5	1.425	1.575	0.000	105	0.0	0.0	17	0.373
F2.000	0.180	1.660	66.0	0.1	0.425	0.675	0.000	15	0.0	0.0	7	0.270
F2.001	0.282	2.582	102.7	0.2	1.275	1.225	0.000	30	0.0	0.0	7	0.422
F2.002	0.217	1.703	67.7	0.2	1.225	1.275	0.000	30	0.0	0.0	8	0.331
F2.003	0.224	1.382	55.0	0.2	1.275	1.675	0.000	45	0.0	0.0	11	0.328

Simulation Settings

Analysis Speed	Normal	Drain Down Time (mins)	240
Skip Steady State	x	Foul Event Duration (mins)	60

Results for Foul Event Critical Storm Duration. Lowest mass balance: 87.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
Foul Event	F1-0	22	8.791	0.016	0.3	0.0178	0.0000	OK
Foul Event	F1-1	19	8.625	0.025	0.6	0.0282	0.0000	OK
Foul Event	F1-2	23	8.522	0.022	0.9	0.0251	0.0000	OK
Foul Event	F1-3	44	8.129	0.029	0.9	0.0327	0.0000	OK
Foul Event	F4-0	16	13.106	0.006	0.1	0.0068	0.0000	OK
Foul Event	F3-1	21	12.309	0.009	0.3	0.0105	0.0000	OK
Foul Event	F3-2	23	10.509	0.009	0.3	0.0098	0.0000	OK
Foul Event	F3-4	31	8.620	0.020	0.7	0.0224	0.0000	OK
Foul Event	F1-4	237	7.951	0.051	1.6	0.0580	0.0000	OK
Foul Event	F1-5	275	7.951	0.151	1.9	0.1709	0.0000	OK
Foul Event	F1-6	259	7.951	0.581	2.7	0.6576	0.0000	SURCHARGED
Foul Event	F3-0	4	13.633	0.008	0.2	0.0092	0.0000	OK
Foul Event	F2-0	38	14.357	0.007	0.1	0.0078	0.0000	OK
Foul Event	F3-3	31	8.719	0.019	0.4	0.0210	0.0000	OK
Foul Event	F2-1	42	12.508	0.008	0.2	0.0086	0.0000	OK
Foul Event	F2-2	41	9.559	0.009	0.2	0.0041	0.0000	OK
Foul Event	F2-3	44	8.712	0.012	0.3	0.0138	0.0000	OK
Foul Event	F1-7	200	7.951	0.741	2.6	0.8385	0.0000	SURCHARGED
Foul Event	F1-8	150	7.951	0.821	2.2	0.9291	0.0000	SURCHARGED
Foul Event	F1-9	203	7.951	0.881	1.8	0.9970	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)
Foul Event	F1-0	F1.000	F1-1	0.3	0.210	0.009	0.0644	
Foul Event	F1-1	F1.001	F1-2	0.6	0.273	0.023	0.0686	
Foul Event	F1-2	F1.002	F1-3	0.9	0.472	0.020	0.1016	
Foul Event	F1-3	F1.003	F1-4	0.9	0.296	0.035	0.2103	
Foul Event	F4-0	F4.000	F3-1	0.1	0.370	0.001	0.0087	
Foul Event	F3-1	F3.001	F3-2	0.3	0.562	0.003	0.0104	
Foul Event	F3-2	F3.002	F3-3	0.3	0.392	0.003	0.0284	
Foul Event	F3-4	F3.004	F1-4	0.7	0.416	0.015	0.0336	
Foul Event	F1-4	F1.004	F1-5	1.6	0.475	0.038	0.1986	
Foul Event	F1-5	F1.005	F1-6	1.9	0.566	0.047	1.7611	
Foul Event	F1-6	F1.006	F1-7	2.1	0.553	0.039	0.4478	
Foul Event	F3-0	F3.000	F3-1	0.2	0.617	0.002	0.0134	
Foul Event	F2-0	F2.000	F2-1	0.1	0.307	0.002	0.0197	
Foul Event	F3-3	F3.003	F3-4	0.4	0.251	0.014	0.0386	
Foul Event	F2-1	F2.001	F2-2	0.2	0.568	0.002	0.0273	
Foul Event	F2-2	F2.002	F2-3	0.2	0.302	0.003	0.0263	
Foul Event	F2-3	F2.003	F1-7	0.3	0.364	0.005	0.0228	
Foul Event	F1-7	F1.007	F1-8	2.2	0.467	0.047	0.2979	
Foul Event	F1-8	F1.008	F1-9	1.8	0.387	0.043	0.2943	0.0

Design Settings

Frequency of use (kDU)	0.00	Minimum Velocity (m/s)	0.70
Flow per dwelling per day (l/day)	446	Connection Type	Level Inverts
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Dwellings	Cover Level (m)	Diameter (mm)	Depth (m)
F1-9	57	10.200	1200	2.881
F1-10	50	10.200	1200	2.981
F1-11	50	10.200	1200	3.054
F1-12		10.200	1200	3.112
F4-0	20	10.200	1200	1.350
F3-1	18	10.200	1200	1.450
F3-2	18	10.200	1200	1.527
F3-4	50	10.250	1200	1.807
F1-13		10.200	1200	3.180
F1-14	50	10.200	1200	3.260
F1-15		10.200	1200	3.396
F3-0	18	10.200	1200	1.350
F3-3	18	10.200	1200	1.631
F2-0		12.130	1200	2.500
F2-1	15	10.200	1200	1.500
F1-16		10.200	1200	3.516
F1-17		10.200	1200	3.566
F1-18		10.200	1200	3.626
F5-0		10.200	1200	1.350
F1-8	57	10.200	1200	2.781
F1-7	57	10.200	1200	2.496
F1-6		10.200	1200	2.388
F1-5		10.200	1200	2.118
F1-4	14	10.200	1200	2.018
F1-3	12	10.200	1200	1.825
F1-2	12	10.200	1200	1.659
F1-1	12	10.200	1200	1.567
F1-0	12	10.200	1200	1.350
F6-0		10.200	1200	1.350
F6-1		10.200	1200	1.417
F8-0		10.200	1200	1.350
F7-0		10.200	1200	1.350
F7-1		10.200	1200	1.833
F7-2		10.200	1200	2.105
F9-0		10.200	1200	1.350
F10-0		10.200	1200	1.350
F14-0		10.200	1200	1.350
F13-0		10.200	1200	1.350
F12-0		10.200	1200	1.350
F11-0		10.200	1200	1.350
F16-0		10.200	1200	1.350
F16-1		10.200	1200	1.933
F16-2		10.200	1200	2.171
F15-0		10.200	1200	1.350

Nodes

Name	Dwellings	Cover Level (m)	Diameter (mm)	Depth (m)
F18-0		10.200	1200	1.350
F18-1		10.200	1200	1.567
F17-0		10.200	1200	1.350
F19-0		10.200	1200	1.350
F20-0		10.200	1200	1.350
F22-0		10.200	1200	1.350
F21-0		10.200	1200	1.350
F26-0		10.200	1200	1.350
F24-0		10.200	1200	1.350
F23-0		10.200	1200	1.350
F25-0		10.200	1200	1.350
F27-0		10.200	1200	1.350
F27-2		10.200	1200	1.700
F27-1		10.200	1200	1.483
F28-0		15.394	1200	1.350
F28-1		15.394	1200	1.512
F28-2 SURGE		14.764	1200	1.518
F28-3		14.764	1200	1.734
EX FMH		14.764	1200	1.798

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F1.009	F1-9	F1-10	22.500	7.319	7.219	0.100	225.0	225
F1.010	F1-10	F1-11	16.499	7.219	7.146	0.073	225.0	225
F1.011	F1-11	F1-12	13.000	7.146	7.088	0.058	225.0	225
F1.012	F1-12	F1-13	15.401	7.088	7.020	0.068	225.0	225
F1.013	F1-13	F1-14	17.897	7.020	6.940	0.080	225.0	225
F1.014	F1-14	F1-15	30.693	6.940	6.804	0.136	225.0	225
F1.015	F1-15	F1-16	26.912	6.804	6.684	0.120	225.0	225
F1.0016	F1-16	F1-17	11.231	6.684	6.634	0.050	225.0	225
F1.017	F1-17	F1-18	7.399	6.634	6.574	0.060	123.3	225
F5.000	F5-0	F3-4	15.500	8.850	8.592	0.258	60.0	150
F3.000	F3-0	F3-1	6.000	8.850	8.750	0.100	60.0	150
F4.000	F4-0	F3-3	10.502	8.850	8.675	0.175	60.0	150

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
F1.009	F1-9	F1-10	0.763	30.4	1.2	2.656	2.756	0.000
F1.010	F1-10	F1-11	0.763	30.4	1.5	2.756	2.829	0.000
F1.011	F1-11	F1-12	0.763	30.4	1.7	2.829	2.887	0.000
F1.012	F1-12	F1-13	0.763	30.4	1.7	2.887	2.955	0.000
F1.013	F1-13	F1-14	0.763	30.4	2.5	2.955	3.035	0.000
F1.014	F1-14	F1-15	0.763	30.4	2.7	3.035	3.171	0.000
F1.015	F1-15	F1-16	0.763	30.4	2.7	3.171	3.291	0.000
F1.0016	F1-16	F1-17	0.763	30.4	2.8	3.291	3.341	0.000
F1.017	F1-17	F1-18	1.033	41.1	2.8	3.341	3.401	0.000
F5.000	F5-0	F3-4	1.132	20.0	0.0	1.200	1.508	0.000
F3.000	F3-0	F3-1	1.132	20.0	0.1	1.200	1.300	0.000
F4.000	F4-0	F3-3	1.132	20.0	0.1	1.200	1.375	0.000

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F3.001	F3-1	F3-2	10.000	8.750	8.673	0.077	130.0	150
F3.002	F3-2	F3-3	13.551	8.673	8.569	0.104	130.0	150
F3.003	F3-3	F3-4	16.390	8.569	8.443	0.126	130.0	150
F3.004	F3-4	F1-13	41.131	8.443	8.127	0.316	130.0	150
F1.000	F1-0	F1-1	13.001	8.850	8.633	0.217	60.0	150
F1.001	F1-1	F1-2	11.999	8.633	8.541	0.092	130.0	150
F1.002	F1-2	F1-3	21.528	8.541	8.375	0.166	130.0	150
F2.000	F2-0	F2-1	65.902	9.630	8.700	0.930	70.9	225
F2.001	F2-1	F1-16	32.508	8.700	8.300	0.400	81.3	225
F1.003	F1-3	F1-4	25.029	8.375	8.182	0.193	130.0	150
F1.004	F1-4	F1-5	13.000	8.182	8.082	0.100	130.0	150
F1.005	F1-5	F1-6	17.205	8.082	7.950	0.132	130.0	150
F1.006	F1-6	F1-7	14.000	7.812	7.704	0.108	130.0	150
F1.007	F1-7	F1-8	37.001	7.704	7.419	0.285	130.0	150
F1.008	F1-8	F1-9	13.000	7.419	7.319	0.100	130.0	150
F6.000	F6-0	F6-1	4.000	8.850	8.783	0.067	60.0	150
F6.001	F6-1	F1-4	28.296	8.783	8.311	0.472	60.0	150
F7.000	F7-0	F7-1	29.000	8.850	8.367	0.483	60.0	150
F7.001	F7-1	F7-2	16.294	8.367	8.095	0.272	60.0	150
F7.002	F7-2	F1-6	17.000	8.095	7.812	0.283	60.0	150
F8.000	F8-0	F1-6	17.000	8.850	8.567	0.283	60.0	150
F9.000	F9-0	F1-7	6.083	8.850	8.749	0.101	60.0	150
F10.000	F10-0	F1-7	6.082	8.850	8.749	0.101	60.0	150
F11.000	F11-0	F1-8	10.000	8.850	8.683	0.167	60.0	150

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
F3.001	F3-1	F3-2	0.767	13.6	0.2	1.300	1.377	0.000
F3.002	F3-2	F3-3	0.767	13.6	0.3	1.377	1.481	0.000
F3.003	F3-3	F3-4	0.767	13.6	0.5	1.481	1.657	0.000
F3.004	F3-4	F1-13	0.767	13.6	0.7	1.657	1.923	0.000
F1.000	F1-0	F1-1	1.132	20.0	0.1	1.200	1.417	0.000
F1.001	F1-1	F1-2	0.767	13.6	0.1	1.417	1.509	0.000
F1.002	F1-2	F1-3	0.767	13.6	0.2	1.509	1.675	0.000
F2.000	F2-0	F2-1	1.364	54.2	0.0	2.275	1.275	0.000
F2.001	F2-1	F1-16	1.274	50.6	0.1	1.275	1.675	0.000
F1.003	F1-3	F1-4	0.767	13.6	0.2	1.675	1.868	0.000
F1.004	F1-4	F1-5	0.767	13.6	0.3	1.868	1.968	0.000
F1.005	F1-5	F1-6	0.767	13.6	0.3	1.968	2.100	0.000
F1.006	F1-6	F1-7	0.767	13.6	0.3	2.238	2.346	0.000
F1.007	F1-7	F1-8	0.767	13.6	0.6	2.346	2.631	0.000
F1.008	F1-8	F1-9	0.767	13.6	0.9	2.631	2.731	0.000
F6.000	F6-0	F6-1	1.132	20.0	0.0	1.200	1.267	0.000
F6.001	F6-1	F1-4	1.132	20.0	0.0	1.267	1.739	0.000
F7.000	F7-0	F7-1	1.132	20.0	0.0	1.200	1.683	0.000
F7.001	F7-1	F7-2	1.132	20.0	0.0	1.683	1.955	0.000
F7.002	F7-2	F1-6	1.132	20.0	0.0	1.955	2.238	0.000
F8.000	F8-0	F1-6	1.132	20.0	0.0	1.200	1.483	0.000
F9.000	F9-0	F1-7	1.132	20.0	0.0	1.200	1.301	0.000
F10.000	F10-0	F1-7	1.132	20.0	0.0	1.200	1.301	0.000
F11.000	F11-0	F1-8	1.132	20.0	0.0	1.200	1.367	0.000

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F13.000	F13-0	F1-8	10.000	8.850	8.683	0.167	60.0	150
F14.000	F14-0	F1-8	6.001	8.850	8.750	0.100	60.0	150
F12.000	F12-0	F1-8	6.000	8.850	8.750	0.100	60.0	150
F16.000	F16-0	F16-1	35.000	8.850	8.267	0.583	60.0	150
F16.001	F16-1	F16-2	14.287	8.267	8.029	0.238	60.0	150
F16.002	F16-2	F1-9	19.000	8.029	7.712	0.317	60.0	150
F15.000	F15-0	F1-9	16.000	8.850	8.583	0.267	60.0	150
F18.000	F18-0	F18-1	12.997	8.850	8.633	0.217	60.0	150
F18.001	F18-1	F1-10	9.158	8.633	8.480	0.153	60.0	150
F17.000	F17-0	F1-10	11.291	8.850	8.662	0.188	60.0	150
F19.000	F19-0	F1-11	15.888	8.850	8.585	0.265	60.0	150
F21.000	F21-0	F1-11	11.540	8.850	8.658	0.192	60.0	150
F20.000	F20-0	F1-11	11.271	8.850	8.662	0.188	60.0	150
F22.000	F22-0	F1-11	7.513	8.850	8.725	0.125	60.0	150
F23.000	F23-0	F1-12	12.411	8.850	8.643	0.207	60.0	150
F25-.000	F25-0	F1-12	9.157	8.850	8.697	0.153	60.0	150
F24.000	F24-0	F1-12	11.295	8.850	8.662	0.188	60.0	150
F26.000	F26-0	F1-12	7.513	8.850	8.725	0.125	60.0	150
F27.000	F27-0	F27-1	7.999	8.850	8.717	0.133	60.0	150
F27.001	F27-1	F27-2	13.001	8.717	8.500	0.217	60.0	150
F27.002	F27-2	F1-15	30.994	8.500	7.983	0.517	60.0	150
F28.000	F28-0	F28-1	9.742	14.044	13.882	0.162	60.0	150
F28.001	F28-1	F28-2 SURGE	38.180	13.882	13.246	0.636	60.0	150
F28.002	F28-2 SURGE	F28-3	37.734	13.246	13.030	0.216	175.0	225

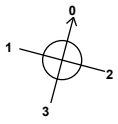
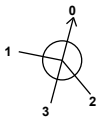
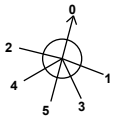
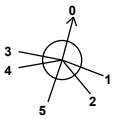
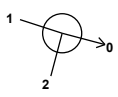
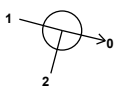
Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
F13.000	F13-0	F1-8	1.132	20.0	0.0	1.200	1.367	0.000
F14.000	F14-0	F1-8	1.132	20.0	0.0	1.200	1.300	0.000
F12.000	F12-0	F1-8	1.132	20.0	0.0	1.200	1.300	0.000
F16.000	F16-0	F16-1	1.132	20.0	0.0	1.200	1.783	0.000
F16.001	F16-1	F16-2	1.132	20.0	0.0	1.783	2.021	0.000
F16.002	F16-2	F1-9	1.132	20.0	0.0	2.021	2.338	0.000
F15.000	F15-0	F1-9	1.132	20.0	0.0	1.200	1.467	0.000
F18.000	F18-0	F18-1	1.132	20.0	0.0	1.200	1.417	0.000
F18.001	F18-1	F1-10	1.132	20.0	0.0	1.417	1.570	0.000
F17.000	F17-0	F1-10	1.132	20.0	0.0	1.200	1.388	0.000
F19.000	F19-0	F1-11	1.132	20.0	0.0	1.200	1.465	0.000
F21.000	F21-0	F1-11	1.132	20.0	0.0	1.200	1.392	0.000
F20.000	F20-0	F1-11	1.132	20.0	0.0	1.200	1.388	0.000
F22.000	F22-0	F1-11	1.132	20.0	0.0	1.200	1.325	0.000
F23.000	F23-0	F1-12	1.132	20.0	0.0	1.200	1.407	0.000
F25-.000	F25-0	F1-12	1.132	20.0	0.0	1.200	1.353	0.000
F24.000	F24-0	F1-12	1.132	20.0	0.0	1.200	1.388	0.000
F26.000	F26-0	F1-12	1.132	20.0	0.0	1.200	1.325	0.000
F27.000	F27-0	F27-1	1.132	20.0	0.0	1.200	1.333	0.000
F27.001	F27-1	F27-2	1.132	20.0	0.0	1.333	1.550	0.000
F27.002	F27-2	F1-15	1.132	20.0	0.0	1.550	2.067	0.000
F28.000	F28-0	F28-1	1.132	20.0	0.0	1.200	1.362	0.000
F28.001	F28-1	F28-2 SURGE	1.132	20.0	0.0	1.362	1.368	0.000
F28.002	F28-2 SURGE	F28-3	0.866	34.4	0.0	1.293	1.509	0.000

Links

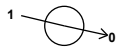
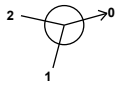
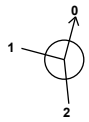
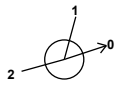
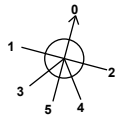
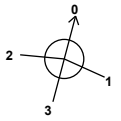
Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F28.003	F28-3	EX FMH	11.201	13.030	12.966	0.064	175.0	225

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
F28.003	F28-3	EX FMH	0.866	34.4	0.0	1.509	1.573	0.000

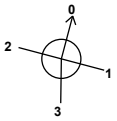
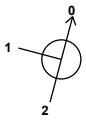
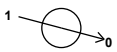
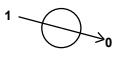
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
F1-9	560211.010	656742.751	10.200	2.881	1200		1	F15.000	8.583	150
							2	F16.002	7.712	150
							3	F1.008	7.319	150
							0	F1.009	7.319	225
F1-10	560216.767	656764.502	10.200	2.981	1200		1	F17.000	8.662	150
							2	F18.001	8.480	150
							3	F1.009	7.219	225
							0	F1.010	7.219	225
F1-11	560220.989	656780.452	10.200	3.054	1200		1	F22.000	8.725	150
							2	F20.000	8.662	150
							3	F21.000	8.658	150
							4	F19.000	8.585	150
							5	F1.010	7.146	225
							0	F1.011	7.146	225
F1-12	560224.316	656793.019	10.200	3.112	1200		1	F26.000	8.725	150
							2	F25-.000	8.697	150
							3	F24.000	8.662	150
							4	F23.000	8.643	150
							5	F1.011	7.088	225
							0	F1.012	7.088	225
F4-0	560174.148	656805.275	10.200	1.350	1200		0	F4.000	8.850	150
F3-1	560183.145	656779.443	10.200	1.450	1200		1	F3.000	8.750	150
							0	F3.001	8.750	150
F3-2	560185.704	656789.110	10.200	1.527	1200		1	F3.001	8.673	150
							0	F3.002	8.673	150
F3-4	560188.495	656818.432	10.250	1.807	1200		1	F5.000	8.592	150
							2	F3.003	8.443	150
							0	F3.004	8.443	150
F1-13	560228.257	656807.907	10.200	3.180	1200		1	F3.004	8.127	150
							2	F1.012	7.020	225
							0	F1.013	7.020	225

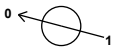
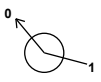
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1-14	560245.669	656803.767	10.200	3.260	1200	1	F1.013	6.940	225
									
						0	F1.014	6.940	225
F1-15	560275.656	656797.221	10.200	3.396	1200	1	F27.002	7.983	150
							2	F1.014	6.804	225
						0	F1.015	6.804	225
F3-0	560181.609	656773.643	10.200	1.350	1200				
						0	F3.000	8.850	150
F3-3	560184.300	656802.588	10.200	1.631	1200		1	F4.000	8.675	150
							2	F3.002	8.569	150
						0	F3.003	8.569	150
F2-0	560306.038	656901.558	12.130	2.500	1200				
						0	F2.000	9.630	225
F2-1	560310.073	656835.780	10.200	1.500	1200		1	F2.000	8.700	225
						0	F2.001	8.700	225
F1-16	560301.594	656804.397	10.200	3.516	1200		1	F2.001	8.300	225
							2	F1.015	6.684	225
						0	F1.0016	6.684	225
F1-17	560312.261	656807.910	10.200	3.566	1200	1	F1.0016	6.634	225
									
						0	F1.017	6.634	225
F1-18	560315.314	656801.170	10.200	3.626	1200		1	F1.017	6.574	225
F5-0	560173.748	656823.205	10.200	1.350	1200				
						0	F5.000	8.850	150
F1-8	560207.683	656730.184	10.200	2.781	1200		1	F12.000	8.750	150
							2	F14.000	8.750	150
							3	F11.000	8.683	150
							4	F13.000	8.683	150
							5	F1.007	7.419	150
						0	F1.008	7.419	150
F1-7	560198.216	656694.415	10.200	2.496	1200		1	F10.000	8.749	150
							2	F9.000	8.749	150
							3	F1.006	7.704	150
						0	F1.007	7.704	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1-6	560194.633	656680.881	10.200	2.388	1200		1 F8.000	8.567	150
							2 F7.002	7.812	150
							3 F1.005	7.950	150
							0 F1.006	7.812	150
F1-5	560194.388	656663.678	10.200	2.118	1200		1 F1.004	8.082	150
							0 F1.005	8.082	150
F1-4	560191.062	656651.111	10.200	2.018	1200		1 F6.001	8.311	150
							2 F1.003	8.182	150
							0 F1.004	8.182	150
F1-3	560184.657	656626.915	10.200	1.825	1200		1 F1.002	8.375	150
							0 F1.003	8.375	150
F1-2	560163.134	656627.372	10.200	1.659	1200		1 F1.001	8.541	150
							0 F1.002	8.541	150
F1-1	560160.064	656615.772	10.200	1.567	1200		1 F1.000	8.633	150
							0 F1.001	8.633	150
F1-0	560147.496	656619.098	10.200	1.350	1200		0 F1.000	8.850	150
F6-0	560159.841	656659.375	10.200	1.350	1200		0 F6.000	8.850	150
F6-1	560163.708	656658.351	10.200	1.417	1200		1 F6.000	8.783	150
							0 F6.001	8.783	150
F8-0	560211.067	656676.531	10.200	1.350	1200		0 F8.000	8.850	150
F7-0	560169.862	656717.437	10.200	1.350	1200		0 F7.000	8.850	150
F7-1	560162.448	656689.401	10.200	1.833	1200		1 F7.000	8.367	150
							0 F7.001	8.367	150
F7-2	560178.199	656685.231	10.200	2.105	1200		1 F7.001	8.095	150
							0 F7.002	8.095	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F9-0	560192.160	656694.984	10.200	1.350	1200	 0	F9.000	8.850	150
F10-0	560203.760	656691.913	10.200	1.350	1200	 0	F10.000	8.850	150
F14-0	560213.484	656728.648	10.200	1.350	1200	 0	F14.000	8.850	150
F13-0	560211.437	656720.915	10.200	1.350	1200	 0	F13.000	8.850	150
F12-0	560201.883	656731.719	10.200	1.350	1200	 0	F12.000	8.850	150
F11-0	560199.836	656723.985	10.200	1.350	1200	 0	F11.000	8.850	150
F16-0	560234.232	656700.398	10.200	1.350	1200	 0	F16.000	8.850	150
F16-1	560243.188	656734.233	10.200	1.933	1200	1  0	F16.000	8.267	150
							F16.001	8.267	150
F16-2	560229.377	656737.889	10.200	2.171	1200	1  0	F16.001	8.029	150
							F16.002	8.029	150
F15-0	560195.543	656746.845	10.200	1.350	1200	 0	F15.000	8.850	150
F18-0	560235.199	656754.145	10.200	1.350	1200	 0	F18.000	8.850	150
F18-1	560222.635	656757.471	10.200	1.567	1200	1  0	F18.000	8.633	150
							F18.001	8.633	150
F17-0	560205.694	656766.710	10.200	1.350	1200	 0	F17.000	8.850	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F19-0	560207.229	656772.510	10.200	1.350	1200	 0	F19.000	8.850	150
F20-0	560210.044	656783.144	10.200	1.350	1200	 0	F20.000	8.850	150
F22-0	560228.008	656777.772	10.200	1.350	1200	 0	F22.000	8.850	150
F21-0	560225.961	656770.038	10.200	1.350	1200	 0	F21.000	8.850	150
F26-0	560231.335	656790.339	10.200	1.350	1200	 0	F26.000	8.850	150
F24-0	560213.227	656795.167	10.200	1.350	1200	 0	F24.000	8.850	150
F23-0	560212.091	656790.878	10.200	1.350	1200	 0	F23.000	8.850	150
F25-0	560230.183	656785.989	10.200	1.350	1200	 0	F25-.000	8.850	150
F27-0	560253.132	656762.846	10.200	1.350	1200	 0	F27.000	8.850	150
F27-2	560267.747	656767.253	10.200	1.700	1200	 1	F27.001	8.500	150
						0	F27.002	8.500	150
F27-1	560255.179	656770.579	10.200	1.483	1200	 1	F27.000	8.717	150
						0	F27.001	8.717	150
F28-0	560131.811	656829.003	15.394	1.350	1200	 0	F28.000	14.044	150
F28-1	560141.243	656826.565	15.394	1.512	1200	 1	F28.000	13.882	150
						0	F28.001	13.882	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F28-2 SURGE	560131.433	656789.667	14.764	1.518	1200	 1	F28.001	13.246	150
						0	F28.002	13.246	225
F28-3	560095.041	656799.641	14.764	1.734	1200	 1	F28.002	13.030	225
						0	F28.003	13.030	225
EX FMH	560097.976	656810.450	14.764	1.798	1200	 1	F28.003	12.966	225

Simulation Settings

Analysis Speed	Normal	Drain Down Time (mins)	240
Skip Steady State	x	Foul Event Duration (mins)	60

Appendix G Uisce Éireann Pre-connection Correspondence

Tracey O Connell | PUNCH

From: newconnections <newconnections@water.ie>
Sent: Thursday 12 June 2025 16:28
To: Tracey O Connell | PUNCH
Subject: CDS25004266 Uisce Éireann Pre-Connection Enquiry EMAIL:0624548 [Filed 16 Jun 2025 08:41]

Categories: Filed by Mail Manager

Uisce Éireann Pre Connection Enquiry Ref Number: CDS25004266

Dear Customer,

Thank you for submitting your Pre-connection Enquiry Form for Parkway Valley, Singland, Limerick, Limerick . Your Uisce Éireann reference number for your application is CDS25004266, which you can keep for your records.

Next steps in your enquiry:

Assessment of Enquiry: Your enquiry is currently being assessed to confirm it is technically feasible; we will be in touch once this assessment has been completed. A significant level of analysis is required before we can provide a response. Two of a number of considerations are:

- A review of the available capacity in Uisce Éireann infrastructure versus your requirements.
- The location for connection versus the distance to/from our network.

Where your requirements are of a significant nature for example, multiple properties or commercial/industrial developments, this work may take a period of time to complete.

Getting a Confirmation of Feasibility: If your application is technically feasible, we will issue you with a letter of "Confirmation of Feasibility". This will outline what capital works if any, may be required to upgrade the public infrastructure to cater for your development.
From receipt of your Pre-connection Enquiry, it takes on average 16 weeks to issue a Confirmation of Feasibility.

Design Layout Approval: Where you are proposing to apply for a housing development (two or more properties), a **Statement of Design Acceptance** to your proposal will be required from Uisce Éireann before applying for Planning Permission. Please therefore submit your designs for assessment to Uisce Éireann to ensure they comply with our requirements, in advance of applying for Planning Permission.

Connection Application: Your Confirmation of Feasibility; which is a specific requirement to apply for Planning Permission through the Strategic Housing Development process, will assist you in obtaining your Planning Permission following which you may apply for your connection immediately.

If you have any further queries please contact us on **1800 278 278** or **+353 1 707 2828;** alternatively, you can visit www.water.ie/connections for more information.
Please note that the rates charged for 1850 numbers may vary across different service providers. Calls from mobiles may be more expensive.

Please do not amend this subject line as it will help us deal with your response.

Yours sincerely,

Customer Service Advisor

Callsave 1800 278 278 | +353 1 707 2828
www.water.ie/connections

Is don duine amháin nó don eintiteas amháin ainmnithe ar an seoladh an fhaisnéis agus d'fhéadfadh ábhar faoi rún, faoi phribhléid nó ábhar atá íogair ó thaobh na tráchtála de a bheith mar chuid den fhaisnéis. Tá toirmeasc ar aon daoine nó aon eititis; nach dóibh siúd an fhaisnéis- aon athbhreithniú a dhéanamh, aon atarchur a dhéanamh nó aon athdháileadh a dhéanamh, nó aon úsáid eile a bhaint as an bhfaisnéis, nó aon ghníomh a bhraithfeadh ar an bhfaisnéis seo a dhéanamh agus d'fhéadfaí an dlí a shárú dá ndéanfaí sin. Séanann Uisce Éireann dliteanas as aon ghníomh agus as aon iarmhairt bunaithe ar úsáid neamhúdaraithe na faisnéise seo. Séanann Uisce Éireann dliteanas maidir le seachadadh iomlán agus ceart na faisnéise sa chumarsáid seo agus séanann Uisce Éireann dliteanas maidir le haon mhoill a bhaineann leis an bhfaisnéis a fháil. Má tá an ríomh-phost seo faighte agat trí dhearmad, déan teagmháil leis an seoltóir más é do thoil é agus scrios an t-ábhar ó gach aon ríomhaire. D'fhéadfadh ríomhphost a bheith so-ghabhálach i leith truaillithe, idircheaptha agus i leith leasuithe neamhúdaraithe. Séanann Uisce Éireann aon fhreagracht as athruithe nó as idircheapadh a rinneadh ar an ríomhphost seo nó as aon dochar do chórais na bhfaighteoirí déanta ag an teachtaireacht seo nó ag a ceangaltáin tar éis a sheolta. Tabhair faoi deara go bhféadfadh monatóireacht a bheith á dhéanamh ar theachtaireachtaí chuig Uisce Éireann agus ó Uisce Éireann d'fhonn ár ngnó a chosaint agus chun a chinntiú go bhfuiltear ag teacht le beartais agus le caighdeáin Uisce Éireann. Is cuideachta gníomhaíochta ainmnithe é Uisce Éireann atá faoi theorainn scaireanna, a bunaíodh de bhun fhorálacha na n-Achtanna um Sheirbhísí Uisce 2007-2022, a bhfuil a bpríomh-ionad gnó ag Teach Colvill, 24-26 Sráid na Talbóide, BÁC 1.

Go raibh maith agat as d'aird a thabhairt.

Thank you for your attention.

Go raibh maith agat as d'aird a thabhairt.

The information transmitted is intended only for the person or entity to which it is addressed and may contain confidential, commercially sensitive and/or privileged material. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient is prohibited and may be unlawful. Uisce Éireann accepts

Thank you for your attention.

Appendix B Surface Water Audit Feedback Form

Scheme Title: Parkway Valley LRD

Audit Stage: 1 **Audit Completed:** 21/04/2026 **Project Ref:** 231171

Paragraph No. in Audit Report	Issue Accepted (Yes/No)	Recommended Measure Accepted (Yes/No)	Alternative Measures (described) [or reason problem not accepted]	Alternative Measures Accepted by Auditors (Yes/No)
2.3	Yes	Yes	Drawing to be generated showing overland flow routes.	Yes
2.4	Yes	Yes	All drainage and watermain to be installed in accordance with Uisce Éireann code of practice.	Yes
2.5	Yes	Yes	Hydrobrake set to 15.7l/s as full site area 7.907ha therefore restricting the site to 2l/s/ha.	Yes
2.6	Yes	Yes	Infiltration tests to be carried out at detailed design stage.	Yes
2.7	Yes	Yes	Pipe diameter increased to achieve minimum of 1.0m/s velocity.	Yes
2.8	Yes	Yes	Drainage drawings have been updated to include manhole names, link names and flow direction. Cover levels, invert levels and pipe gradients will be included on the drainage longsections. Flow control and attenuation details added to drainage layout drawing.	Yes
2.9	Yes	Yes	Drainage drawing has been updated to show overflows from swales.	Yes
2.10	Yes	Yes	SuDS drawing to be coordinated with landscape architect to identify locations for rain gardens, infiltration trenches and tree root systems.	Yes

Signed: ..... *Design Team Project Manager* **Date:** 21/04/2026

Please complete and return to the auditor

Auditor Signed Off: .....

Auditor **Date:** 21/04/2026