Engineering Assessment Report

Cherry Orchard Point – Proposed Development at Sites 4 and 5, Park West Avenue, Dublin 10

October 2023

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Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015 and BS EN ISO 14001: 2015)

Issue	Date	Prepared by	Checked by	Approved by
1	19 October 2023	Robert Walpole	Ian Worrell	Ian Worrell

Comments

Disclaimer

This report has been prepared by Waterman Moylan, with all reasonable skill, care, and diligence within the terms of the Contract with the Client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the Client.

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Content

Figures

Tables

Appendices

1. Introduction

1.1 Background of Report

This engineering assessment report has been prepared by Waterman Moylan as part of the planning documentation for a proposed development at Sites 4 and 5, Park West Avenue, Dublin 10.

The report has been prepared by Robert Walpole HCEng, B Eng BEng MIEI (B Eng in both Environmental Engineering and Biological and Environmental Engineering) with over 4 years experience working on similar schemes in scale and nature, and checked by Ian Worrell BScEng DipEng CEng DipPhysPlg MIEI, Chartered Engineer and Associate with Waterman Moylan with over 27 years post-graduate experience working on similar projects.

This report assesses wastewater and surface water drainage, water supply infrastructure, and details the criteria used to design the proposed wastewater and surface water drainage, and for water supply.

The design of the above noted infrastructure has been undertaken in accordance with, and cognisant of, the following documents:

- Dublin City Council Development Plan (2022-2028).
- Park West & Cherry Orchard LAP.
- Ground investigation details as per the Site Investigation Report.
- Site Specific Topographic Survey.
- Archer Heritage & Planning: Archaeological Testing Report.
- Uisce Eireann existing foul infrastructure maps.
- Uisce Eireann existing watermain infrastructure maps.
- Uisce Eireann Confirmation of Feasibility Letter.
- Uisce Eireann Statement of Design Acceptance.
- Uisce Eireann Code of Practice for Wastewater.
- Uisce Eireann Code of Practice for Water,
- Uisce Eireann Wastewater Standard Details.
- Uisce Eireann Water Standard Details.
- Uisce Eireann QA Field Inspection Requirements Manual.
- Building Regulations Technical Guidance Document Part H.
- Dublin City Council's SuDS Design and Evaluation Guide.
- Dublin City Council's Green and Blue Roof Guide.
- The SuDS Manual.
- Greater Dublin Strategic Drainage Study.
- Green Roofs Over Dublin: A Green Roof Policy Guidance Paper for Dublin.

- DEHLG/OPW Guidelines on the Planning Process and Flood Risk Management.
- Greater Dublin Regional Code of Practice for Drainage Works.

Road network design, transport, and mobility are discussed in separate reports under the titles: DMURS Report including Statement of Design Consistency, Traffic and Transport Assessment, and the Mobility Management and Travel Plan, respectively, submitted as part of the planning package.

1.2 Site Location and Description

The subject masterplan development is comprised of 2 No. sites. Site 4 & Site 5 are bisected by Park West Avenue and lie to the west and east of this roadway respectively, as per the blue boundary lines indicated on *Figure 1* overleaf.

The Site Investigation Report undertaken by Ground Investigations Ireland (GII) is included as an appendix to the Preliminary Construction Environmental Management Plan, submitted under a separate cover, has determined that Site 4 is combination of Greenfield and Brownfield, with evidence of fill material in the area of the site previously used as a construction compound. Site 5 is predominantly a brownfield site, with fill material found for the same reason.

Site 4 is bound to the west by the M50, to the south by the Dublin-Kildare rail line and the Park West & Cherry Orchard station, and to the east and north by Park West Avenue. Site 5 is bound to the west by Park West Avenue, the northwest by Cedar Brook Way, the northeast and east by Barnville Park, and to the south by the Dublin-Kildare rail line and the residential unit of 62 Barnville Park.

Site 4 is currently accessed via a secured gate from Park West Avenue. Site 5 is accessed via a similar arrangement from Cedar Brook Way.

The area of the subject application is indicated by the red boundary line, also on *Figure 1* overleaf. A letter of consent has been obtained from Dublin City Council for the area of public works required.

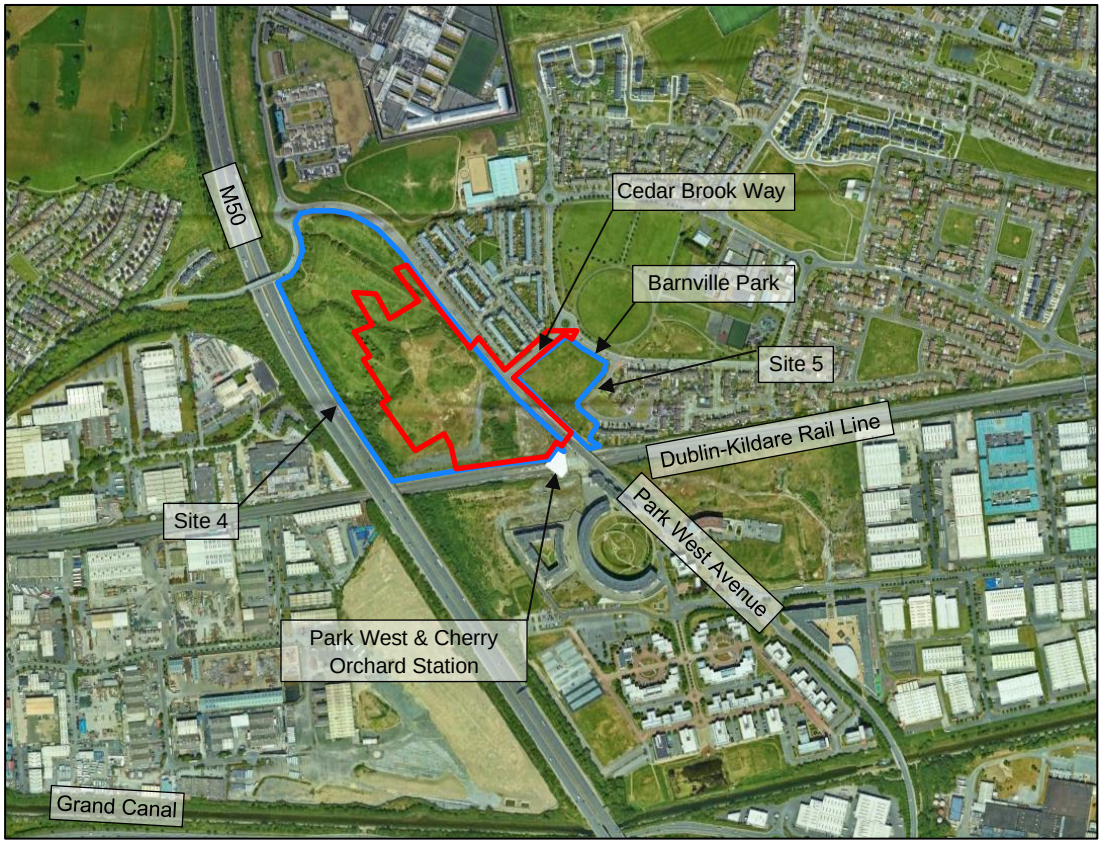


Figure 1 | *Site Location (Source: Google Earth)*

The overall masterplan development area as per the blue line boundaries is c. 13.02ha, with Site 4 being c. 11.41 ha and Site 5 being c. 1.61ha. The area of the subject application indicated by the redline boundary, including for works in the public domain, is 6.16ha (61,648m²).

For Site 4, the topographic survey of the area indicates that the low point of the site has a level of 55.72m OD. This is located on the eastern site boundary approximately 140m north of the junction of Park West Avenue and Cedar Brook Way. The remainder of the site generally slopes to this location owing to the embankments and subsequent site grading from the Dublin-Kildare Rail line to the south, M50 to the west, and approach road to the overpass on the M50 to the north.

Site 5 has a central high point with a level of 58.05m OD, and slopes outwards to all boundaries. The boundaries of Site 5 typically have levels between 54.80m and 56.00m, with the higher of these levels being located to the south of the site, adjacent to the retaining wall of the Park West Avenue Bridge over the rail lines.

Ordnance survey and topographic survey mapping indicates that Site 4 contains static ditches with no outfall. These ditches previously had hydrological connectivity and flow, which has been cut-off by the construction of the M50 to the east and the Cedar Brook housing development to the west, as discussed in Chapter 11 of the EIAR report. These ditches normally remain dry except in heavy rainfall events where water that is not percolated via the site's naturally grassed landscaping, would collect locally in these static ditches for infiltration to the groundwater table. Site 5 does not have any form of surface drainage network and conveys rainfall directly to the soils via its grassed landscape. There is potential during heavy rainfall

events, that the ground may become saturated and unable to further infiltrate rainfall, which would then run from the surface, over the boundary and to the adjacent road networks to outfall to the storm drainage networks serving these roads. The sites are located in the catchment of the Blackditch stream, a tributary of the Camac River which has an ultimate outfall to the River Liffey at Heuston Station.

The project archaeologist, Archer Heritage Planning Ltd., have identified the ploughed out remains of a Fulacht Fia located centrally on site 4, adjacent to the convergence of 2 No. static ditches on their southern side. The archaeologist has recommended that the remains of the Fulacht Fia be preserved by record prior to further works being undertaken on site.

1.3 Proposed Subject Development

The subject application is for Phase 1 of a 4-phase masterplan development as per *Figure 2* below.

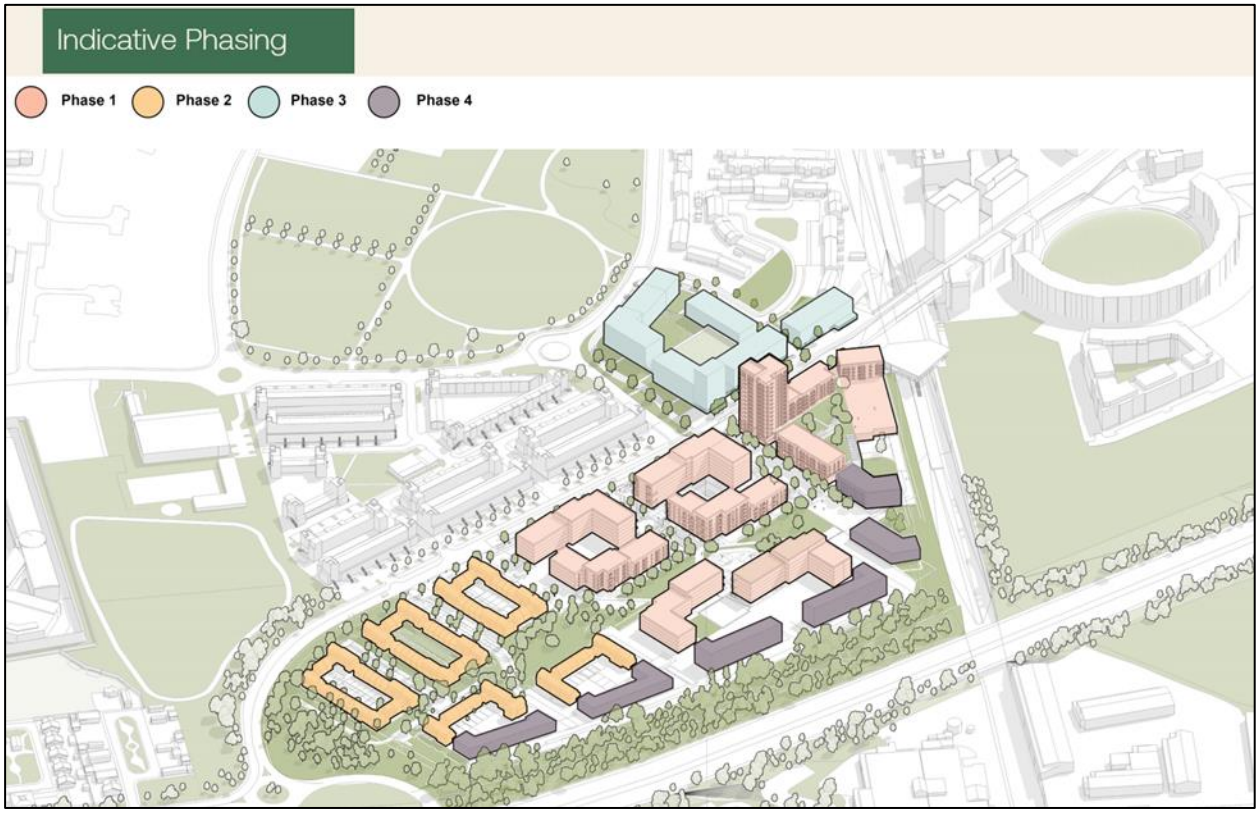


Figure 2 | *Phasing Layout*

Phase 1 is the medium and high-density area and the subject application area, which will provide a total of 708 residential units ranging in size from studio to 3-bed apartments, a 2,523m² supermarket, a combined area of 373m² for retail over 7 units, a 672m² creche, and 1,222m² of community spaces over 13 buildings.

The proposed buildings frame a multipurpose central green corridor which provides attenuation areas, both above and underground, to serve the development. The above ground attenuation areas are designed to be used as formal and informal play and recreational areas or as landscaped areas, providing enhanced social, recreational, amenity, aesthetic, & biodiversity aspects to the proposed development. The central

green corridor further provides pedestrian and cyclist routes along desire lines and away from vehicular traffic. For further details please refer to the Landscape Architect's reports and drawings.

A breakdown of the schedule of accommodation for the subject application is provided in *Table 1* below.

Block	Studio	1-bed Apt	2-bed Apt	3-bed Apt	Total	Total Area
1	-	13	-	11	24	-
2A	-	8	14	5	27	-
2B	1	43	66	-	110	-
3	-	12	23	-	35	-
5A	10	16	28	-	54	-
5B	-	10	14	5	29	-
6A	-	20	32	6	58	-
6B	-	8	12	4	24	-
7A	6	35	40	-	81	-
7B	-	5	25	-	30	-
8A	6	17	34	6	63	-
8B	5	13	10	5	33	-
9A	-	29	13	5	47	-
9B	-	8	10	4	22	-
10A	-	16	22	4	42	-
10B	-	10	14	5	29	-
Supermarket					1	2,523m²
Retail					7	373m²
Community					13	1,222m²
Creche					1	672m²

Table 1 | *Phase 1 Schedule of Accommodation*

The development includes all associated site works, undergrounding of overhead lines, boundary treatments, drainage, and service connections.

1.4 Proposed Masterplan Development

The remainder of phases as per *Figure 2* will be subject to their own planning permission applications, however their preliminary details are outlined below so that the subject development may be assessed as part of the full masterplan development in its full context. It should be noted that the trunk foul and surface water drainage, including attenuation storage, to serve phases 2, 3, & 4 are part-provided under the subject application for Phase 1.

Phase 2: This is the low-density housing area located to the north of Site 4 and contains 153 residential units comprising 100 apartment/duplex units and 53 houses.

Phase 3: This will be the development of Site 5, and comprises 254 residential units, 1,200m² of retail space, with community facilities to be confirmed.

Phase 4: This will be the construction of commercial office space over 6 blocks with a total area of c. 16,310m².

2. Foul Water Network

2.1 Existing Foul Water Network

The sites are generally greenfield in nature in terms of foul water infrastructure, with no connection to the foul water network. Uisce Éireann network maps for the locality have been obtained and are extracted to *Figure 3* below.

Figure 3 | *Foul Water Network Map Extract*

The nearest existing foul network to the sites is the 225mmØ foul network adjacent Site 5 in Cedar Brook Way. Cedar Brook Way is named as Cherry Orchard Green on Uisce Éireann maps. This network flows east then north, to join the 375mmØ foul network in Cherry Orchard Avenue. The foul water section of the Park West-Cherry Orchard Local Area Plan (LAP), as per consultations with Uisce Éireann and Dublin City Council, advises that the sites are within the catchment of the 9B trunk sewer which has an ultimate outfall to Ringsend Wastewater Treatment Plant (WWTP).

A 225mm Ø pipe typically has a capacity for up to 330 units, as per the Uisce Éireann Code of Practice for Wastewater, while a 300mm Ø pipe can typically serve up to 830 units.

Figure 4 overleaf is extracted from the LAP and shows the foul drainage network in the extended vicinity of the sites.

Figure 4 | *Foul Water Network Map as Extracted from the LAP*

2.2 Proposed Foul Water Network

A pre-connection enquiry was submitted to Uisce Éireann and received a reference number of: CDS22004824. Owing to the quantum of units for the proposed development, correspondence took place and meetings were held between representatives of Uisce Éireann and Waterman Moylan to ensure the foul design for the proposed development would be in-line with Uisce Éireann's strategy for public upgrades in the locality. Subsequently, a Confirmation of Feasibility letter was issued and is included as Appendix A to this report.

Uisce Éireann, as part of their Confirmation of Feasibility Letter, have instructed that both Sites 4 & 5 must connect to the foul water infrastructure on Cherry Orchard Green (Cedar Brook Way). Uisce Éireann further advised it has a project underway which will provide the necessary upgrades and capacity. A part of this is to upsize the existing 225mm Ø on Barnville Park to a 1050mm Ø tank sewer, in order to act as a storage tank during peak flow periods. It is currently expected that the upgrade project will be completed by Q1 2026, and the proposed connection from the development can be completed as soon as practicably possible after this date. It is currently estimated that the subject proposed Phase 1 development will achieve completion towards the end of 2028.

In order to meet the above strategy, Uisce Éireann have confirmed that it is acceptable for Site 4 to be served by a 300mm Ø trunk sewer at a gradient of 1/300. This trunk sewer will minimise the required depth of fill at the north of Site 4. Existing ground levels will need to be raised by a maximum of c. 1m at the northernmost part of Site 4. The raising of these levels' ties-in well to the existing topography of the steep rise on Park West Avenue as it approaches the roundabout of the Cloverhill Road, Park West Avenue and M50 overpass immediately adjacent the north of Site 4.

It is proposed for the masterplan development, that Site 4 be drained via a series of 150mm and 225mm Ø sewers which will connect to the aforementioned 300mm Ø trunk sewer. This trunk sewer will exit Site 4, running south-easterly to the junction of Park West Avenue and Cedar Brook Way. It will proceed along Cedar Brook Way to connect to the existing foul network. The south of Site 4 (high-density), will similarly be served by a network of 225mm and 300mm Ø pipes. This network will exit Site 4 at the proposed

southern access road and proceed north to connect to the 300mmØ trunk sewer. Site 5 will be the subject of a separate future detailed planning application, but for the purpose of the masterplan application is currently envisaged to be drained via a network of 150mm and 225mm Ø pipes and will connect to the existing foul network at the connection point as specified by Uisce Éireann. All networks are proposed to drain by gravity and there is no requirement for pumping of the proposed foul networks.

The proposed internal foul drainage network has been designed and sized in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure and Standard Details with one deviation that the 300mmØ trunk sewer to be laid at a gradient of 1/300, which as previously noted has been approved by Uisce Éireann.

Please refer to Drawing numbers: 22-010-P200 to P203 for the foul drainage layout, which are included as part of the planning submission.

A Statement of Design Acceptance has been received from Uisce Éireann and is included as Appendix B.

2.3 Foul Water Drainage – Generated Flows

The calculated foul water flows at the subject and masterplan development are set out in *Table 2*, overleaf. The table has been sub-divided into sections to show the subject application (Phase1), and also the remainder of the masterplan development (Phases 2-4, inclusive). The foul water flows from the masterplan development are based upon their current Schedule of Accommodation, these details will be finalised as part of their future planning application submission.

Domestic wastewater loads for all phases has been calculated based on 2.7 persons per unit with a per capita wastewater flow of 150 litres per head per day.

The supermarket has a floor area of 2,523m², with an expected staff rate of 1 person per 25m², for a total estimated staff number of 101 staff, will have a foul flow rate of 90 litres per head per day, as per Appendix C of the Code of Practice.

The retail areas, 373m² over 7 No. units, with an expected staff rate of 1 person per 50m², for a total estimated staff number of 8 staff, will have a foul flow rate of 90 litres per head per day, as per Appendix C of the Code of Practice.

It is anticipated that the community buildings will be utilised by local residents and that for any community meetings or events it would be utilised by a maximum of 300 persons at any one time. As per Appendix C of the Code of Practice it is considered that the most similar type of flow rate would be that of a Public House Patron with a specified rate of 12 litres per head.

It is calculated that the creche (672m²) will generate flow for 129 persons (25 staff and 104 children), with a wastewater volume of 90 litres per head per day, based on the figure for the most similar type of usage: a non-residential school with canteen facilities, as per Appendix C of the Code of Practice.

The Phase 3 retail areas, c, 1,200m², with an expected staff rate of 1 person per 50m², for a total estimated staff number of 24 staff, will have a foul flow rate of 90 litres per head per day, as per Appendix C of the Code of Practice.

The Phase 4 office/commercial space has a total floor area of c. 16,310m², with an expected staff rate of 1 person per 15m², for a total estimated staff number of 1,087 staff, will have a foul flow rate of 100 litres per head per day, as per the Uisce Éireann Code of Practice, Appendix C, for an Office/Factory with Canteen.

The residential, commercial, and creche flows have also incorporated a 10% unit allowance, in line with Section 3.6 of the Uisce Éireann Code of Practice for Wastewater Infrastructure.

Based on the total population of 4,361, a peak flow multiplier of 3 has been used, as per Section 2.2.5 of Appendix B of the Code of Practice.

	Description	Total Population	Load per Capita	Daily Load	Total DWF	Peak Flow
		No. People	*l/day*	*l/day*	*l/s*	*l/s*
Subject Application	708 Apartments	1,912	150	315,480	3.651	10.953
	Supermarket (2,523m²)	101	90	9,999	0.116	0.348
	Retail (373m²)	8	90	792	0.009	0.027
	Community space (1,222m²)	300	12	3,960	0.046	0.138
	Creche (672m²)	129	90	12,771	0.148	0.444
Phase 2*	153 units	413	150	68,145	0.789	2.367
Phase 3*	254 units	686	150	113,190	1.310	3.930
	Retail (1,200m²)	24	90	2,376	0.028	0.084
Phase 4*	Office/Commercial (c. 16,310m²)	1,087	100	119,570	1.384	4.152
	Total	**4,660**		**646,283**	**7.481**	**22.443**

Table 2 *| Calculation of Total Foul Water Flow from the Development*

** Denotes units as part of the masterplan development design, outside the area of the subject application*

The total dry weather flow from the masterplan development has been calculated as: 7.481 l/s, with a peak flow of 22.443 l/s.

2.4 Foul Water Drainage – General

Foul water sewers will be constructed strictly in accordance with Uisce Éireann's Code of Practice & Standard Details requirements as noted above. No private drainage will be located within public areas.

Drains will be laid to comply with the requirements of the latest Building Regulations, and in accordance with the recommendations contained in the Technical Guidance Document H.

3. Surface Water Network

3.1 Site Conditions and Existing Surface Water Network

The Site Investigation Report by GII, which is included as an appendix to the Preliminary Construction Environmental Management Plan submitted under a separate cover, advises for ground conditions that:

"Infiltration rates of f = 7.303 x 10^{-6} *m/s, 6.95 x* 10^{-6} *m/s and 7.262 x* 10^{-6} *m/s respectively were calculated for the soakaway locations ST06, ST10, and ST11. At the locations of ST01, ST02, ST03, ST04, ST05, ST07, ST08, & ST09, the water level dropped too slowly to allow calculation of "f", the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction."*

This is generally in line with the reports finding of predominantly clay-based subsoils.

Of the 14 No. Trial Pits undertaken with a maximum depth of 3.2m, Trial Pit (TP) 04 showed signed of slow seepage from groundwater at 2.6m BGL (Below Ground level).

Of the 11 No. Soakaway Tests undertaken, Soakaway Test (ST) 06 encountered groundwater at 1.8m BGL, which rose to a level of 1.6m BGL within 5 minutes.

Topographically, Site 4 slopes down to the centre of its eastern boundary from the north (Cloverhill Road roundabout), the west (M50) and the south (rail lines). There is no evidence that drainage networks from any of the roads or rail lines enters the site. The site itself contains a static ditch system which has no natural or constructed outfall, and percolates rain from heavy rainfall events locally. The historic origins of this static ditch, cut-off by development of the M50 to the east & residential developments to the west is discussed in full in Chapter 11 of the EIAR, submitted under a separate cover. The Ground Penetrating Radar (GPR) survey of the site further confirmed there are no surface water networks exiting the site. Site 5 slopes outwards from a central high point. Similar to Site 4, there are no natural or artificial watercourses exiting the site. It is believed that for heavy rainfall events, where the volume of rainfall exceeds the infiltration capacity of the sites, that water flows off the surface of the sites to enter the existing surface water networks via the road gullies located on Park West Avenue, Cedar Brook Way, and Barnville Park roads.

The aforementioned surface water gullies connect to a 300mm Ø Surface Water (SW) network in Park West Avenue, with 300mm and 1,050mm Ø networks in Cedar Brook Way. These networks connect to a 900mm Ø SW network in Cherry Orchard Park, which has an offline detention basin as part of the area's surface water attenuation system.

3.2 SuDS

Sustainable Drainage System (SuDS) are a collection of water management practices that aim to align modern drainage systems with natural water processes.

SuDS facilities are designed to prevent pollution of streams and rivers and to slow down runoff from sites, therefore helping to prevent downstream flooding and improve water quality. This closely mimics natural catchment behaviour where rainfall either infiltrates through the soil or runs off slowly over the ground surface to the nearest watercourse. This is known as the "treatment train" approach. SuDS devices should be placed at source, site, and regional levels. SuDS can also provide amenity benefits to local communities and benefits for biodiversity simultaneously.

Dublin City Council's Development Plan (2022-2028) has identified SuDS as the preferred method of managing rainfall from new developments. The proposed SuDS for the subject application have been incorporated and designed in accordance with Dublin City Council's SuDS Design and Evaluation Guide and also in accordance with their Green and Blue Roof Guide.

In the following sections of the surface water chapter, it will be outlined in detail how SuDS devices have been utilised and incorporated as an integral part of the overall plan for the proposed development, and how their inclusion will mitigate the risk of localised and downstream flooding, while also promoting residential amenity and biodiversity.

3.3 Proposed Surface Water Network and SuDS Strategy

It is proposed to construct a surface water drainage network that will service and attenuate the development internally before discharging at the current greenfield (or allowable) rates to the local Surface Water network. It is proposed that Site 4 will connect to the existing 1,050mm Ø network in Cedar Brook Way, while Site 5 will outfall to the 900mm Ø Network in Barnville Park.

Meetings were held with Dublin City Council in 2022 & 2023 in order to agree the principles of the surface water and SuDS strategy. These meetings outlined the preliminary surface water strategy, SuDS strategy, and connection points. The overall preliminary proposal was deemed acceptable and suitable for further detailed design progression. It was agreed that the outflow rate be set at a maximum of 2 l/s/ha as per Dublin City Council requirements. This is in accordance with Dublin City Council's "SuDS Design and Evaluation Guide", which instructs in their Flow Control Discharge Limits Table (page 43), that the 1-in-100 year maximum outflow rate shall be limited to 2 l/s/ha for discharge to a combined sewer or location where there is a known capacity issues/flood risk. The Flood Risk Assessment, submitted under a separate cover, notes that the River Camac downstream of the subject development has been identified as at potential risk of flooding, thus the outflow limit of 2 l/s/ha is applicable to the subject development and future development of the masterplan site.

Based on the details presented by the Site Investigation Report, included as an appendix to the Preliminary Construction Environmental Management Plan, the sites have properties equivalent of a Type 5 soil, which has a runoff rate of 8.66 l/s/ha. However, in line with Dublin City Council requirements noted above, the attenuation calculations undertaken and included as Appendix C, have limited the outflow rate to 1.991 l/s/ha, by using a soil type 2 for progression of the calculations.

The proposed drainage and attenuation strategy drawings are submitted as part of the planning package, and can be seen on drawing numbers:

- 22-010 -P200-P203 and P205.
- Surface water catchments on 22-010-P210.
- The SuDS layout drawing is 22-010-P240.
- A cross section of the central attenuation corridor is provided on 22-010-P250.
- Ancillary details drawings for the Typical Surface Water Details are on 22-010-P230.
- The Typical SuDS Details are provided on 22-010-P241.

Site 4 will be served by a surface water network with pipes ranging in size from 150mm to 450mm and will outfall to the existing surface water network in Cedar Brook Way.

Site 5 will be served by a surface water network with pipes ranging in size from 150mm to 300mm and will outfall to the existing surface water network in Barnville Park.

For storm water management purposes, it is proposed to divide the sites into four separate sub-catchments, as shown in *Figure 5* below.

Figure 5 | *Sketch of Catchments Template*

Storm water from each catchment will be attenuated and discharge at a controlled rate, limited to a maximum of 2 l/s/ha (as per Dublin City Council requirements), to ultimately outfall to the existing surface water network at Cedar Brook Way and Barnville Walk. The proposed development will be designed to incorporate best drainage practice. Section 3.4, below, sets out the methodology used in determining the existing greenfield runoff rates, and calculating attenuation storage requirements for the site using the maximum of 2 l/s/ha outflow rate as permitted by DCC.

It is proposed to incorporate a Storm Water Management Plan using various SuDS techniques to treat and minimise surface water runoff from the site. The methodology involved in developing a Storm Water Management Plan for the subject site is based on recommendations set out in the Greater Dublin Strategic Drainage Study (GDSDS), DCC's Sustainable Drainage Design & Evaluation Guide 2021, and in the SuDS

Manual. Based on four key elements – Water Quantity, Water Quality, Amenity, & Biodiversity – the targets of the SuDS train concept have been implemented in the design. The SuDS Management Train describes the use of a sequence of components that collectively provide the necessary processes to control the frequency of runoff, the flow rates and the volumes of runoff, and to reduce concentrations of contaminants to acceptable levels, and the design has provided SuDS devices for each of the following:

- Source Control
- Site Control
- Regional Control

Section 3.1 of the Technical Summary of Sustainable Drainage Design & Evaluation Guide provides the following order of preference for run-off utilisation methods:

i. Use surface water run-off as a resource.

ii. Provide interception of rainfall through the use of nature-based SuDS approaches.

iii. Where appropriate, infiltrate run-off into the ground.

iv. Discharge to an open surface water drainage system.

v. Discharge to a piped surface water drainage system.

vi. Discharge to a combined sewer.

As detailed in Section 3.3.1, it is intended to incorporate SuDS addressing item i (Roadside Bio-retention Tree Pits & Raingardens), item ii (Green Roofs), item iii (Permeable Paving, Filter Drains, Swales & detention Basins), Item iv is not feasible as there are no nearby watercourses to discharge to, item v is proposed, and item vi is not proposed as item v negates this requirement and is preferential.

3.3.1 Source Control

Permeable Paving:

It is proposed to introduce permeable paving at all private driveways and parking courts throughout the development. Downpipes from the front of the houses and apartments will drain to filter drains beneath the permeable paving to facilitate maximum infiltration of surface water from driveways and roof areas.

The goal of permeable paving is to control stormwater at the source to reduce runoff. In addition to reducing surface runoff, permeable paving has the dual benefit of improving water quality by trapping suspended solids and filtering pollutants in the substrata layers.

Filter Drains:

It is proposed to install filter drains, consisting of perforated pipes surrounded in filter stone around the perimeter of each apartment block. The filter drains will provide infiltration, optimise the retention time, and provide quality improvement to the storm water runoff, in particular the first flush from hardstanding areas. The proposed perforated pipes connect to the proposed surface water sewer network.

Green / Sedum Roof:

As per the Dublin City Council Green & Blue Roof Guide (2021), it is proposed to introduce a green sedum roofing as a source control device on the roofs of all apartment blocks and commercial buildings on Phases 1, 3, & 4. Phase 2 comprises residential house and duplex type units which are not considered suitable for the incorporation of green or blue roofing measures.

Green roofs have been selected over blue roofs for the following reasons:

- There is ample open space onsite to allow for attenuation at surface level.
- The majority of attenuated surface water will be generated by hardstanding areas at surface level, such as parking bays/courts, roads, and footpaths.
- Utilisation of green roofing ties in well to the overall SuDS strategy and central green corridor and adds increased biodiversity and amenity value.
- The project ecologist has noted that while there is no evidence of bat roosts on-site, evidence of bat foraging has been found. A suitable planting scheme on the green roofs will attract aphid and invertebrate species which will provide a food source for urban birds and bats.
- Green roofs were proposed to be utilised on-site as part of our strategy discussions with Dublin City Council.

The quantum of sedum roofing proposed has been coordinated with the M&E designers as photovoltaic (PV) cells will also be required to be installed at roof level on these buildings. The M&E designers have specified that 30% of the roof area is required for the installation of the PV cells. A further 10% has been afforded to allow for the circulation/access routes and roof level plant/fittings. As such it is proposed that 60% of the total quantum of roof area will be dedicated to intensive green roofing. This in accordance with the Dublin City Council Green & Blue Roof Guide 2021, Section 2.0, Green blue Roof Requirements 2 – area coverage, which specifies a minimum of 50% coverage for intensive green roofs.

Intensive green roofs are defined as having a 200mm minimum substrate depth and are suitable for providing planting with habitat complexity which is suitable for encouraging biodiversity.

In summary, it is proposed to cover 60% of the total suitable roof space with an intensive green roof with a substrate depth of 200mm minimum, totalling a cumulative green roof area of 14,909m^2. This measurement is based upon the full masterplan layout. The indicative roof plan for the green roofs and PV cells is shown on Drawing Number: 22-010-P240.

The substrate and the plant layers in a green roof absorb large amounts of rainwater and release it back into the atmosphere by transpiration and evaporation. They also filter water as it passes through the layers, so the run-off, when it is produced, has fewer pollutants. Rainfall not retained by green roofs is detained, effectively increasing the time to peak, and slowing peak flows.

A green roof can reduce annual percentage runoff by between 40% and 80% through this retention and evapotranspiration, with the impact dependent on a range of factors including the depth of substrate, the saturation of substrate at the onset of a rain event, the angle of the roof, the range of vegetation growing, intensity of rainfall and the time of year.

A paper entitled *Green Roofs Over Dublin: A Green Roof Policy Guidance Paper for Dublin* was published in August 2008 with guidelines for Dublin City Council to develop planning directives for the incorporation

of green roofs in new development. The table overleaf is taken from this document and shows the percentage of total rainfall retention over a 14-month period for different green roof treatments.

Slope	Media Depth	Light Rain *<2mm*	Medium Rain *2mm-6mm*	Heavy Rain *>6mm*	Overall
2.0%	25mm	95.1%	82.9%	64.7%	69.8%
2.0%	40mm	97.1%	85.5%	65.1%	70.1%
6.5%	40mm	94.9%	83.1%	59.5%	65.9%
6.5%	60mm	95.8%	84.6%	62.0%	68.1%

Table 3 | *Percentage of Total Rainfall Retention Over a 14-Month Period (Aug 2002-Oct 2003)*

The proposed green roofing shall be on flat roofs with 2% slope with a media depth of 200mm minimum, exceeding the depths shown above. Thus, the percentage of total rainfall retention can be expected to exceed the tabulated figures.

3.3.2 Site Control

Roadside Bio-retention Tree Pits:

It is proposed to provide roadside trees throughout the development. Trees can help control storm water runoff because their leaves, stems, and roots slow rain from reaching the ground and capture and store rainfall to be released later. Trees help to attenuate flows, trap silts and pollutants, promote infiltration and prevent erosion. Incorporating tree planting offers multiple benefits, including attractive planting features, improved air quality and increased biodiversity whilst helping to ensure adaptation to climate change.

Swales:

Swales are grassed channels proposed to run parallel and adjacent to selected roads throughout the site. Rainfall from the road surface will be directed to gaps in the road kerbing and will flow to the swales. The swales will be linked back to the drainage network to prevent flooding in extreme weather events, where the volume of rainfall exceeds the infiltration capacity of the swales.

Grassed swales enhance surface water runoff quality as they slow down water flow, allowing suspended particles to filter and settle out of suspension.

362 linear metres of swales are proposed as part of the development.

Bio-retention Systems (Raingardens):

Bio-retention planted areas will be provided within the private domain around apartment blocks. Planted boxes will intercept down pipes from the apartment blocks.

3.3.3 Regional Control

Detention Basin

Detention basins are proposed to be utilised for attenuation of Surface water. These basins can be utilised during regular weather conditions and will only fill with water during heavier rainfall events. Detention basins are engineered depressions in the ground and are typical seeded with grass and may also be suitable for planting.

Attenuation tanks:

Underground attenuation tanks are also proposed to be utilised for the attenuation of surface water. These will attenuate water volumes underground and will be located in private areas and as such will remain under private management. Each attenuation tank/system has been sized to accommodate attenuation from catchments for rainfall events greater than the 1-in-100-year event.

The basement level attenuation tank will remain under private management.

Flow Control:

A flow control device (Hydrobrake or similar approved) is proposed at each sub-catchment attenuation feature, which will limit exiting flows to a maximum rate of 2l/s/ha as permitted by DCC. This is further in accordance with DCC's guidance on Site Control, Section 8.4.4 of the SuDS Design and Evaluation Guide 2021.

Petrol interceptor:

Class 1 petrol interceptors will be provided before the surface water outfalls to the local surface water networks.

Rainwater butts are not considered suitable due to the scale of the development (large residential and commercial blocks). The site investigation report results indicate that the subsoil infiltration rates are not conducive to successful integration of soakaways to the design.

3.4 Interception or Treatment Storage and Attenuation Storage

As noted above, the methodology involved in developing the Storm Water Management Plan for the subject site is based on recommendations set out in the Greater Dublin Strategic Drainage Study (GDSDS). DCC's SuDS Design and Evaluation Guide 2021, and in the SuDS Manual. Appendix E of the Greater Dublin Strategic Drainage Study (GDSDS) sets out criteria for determining the provision of interception or treatment storage, attenuation storage and long-term storage at a development site. These calculations are summarised below. Please note that for the following calculations:

- The calculations have been progressed for the full masterplan development comprising Sites 4 & 5, unless specified otherwise.
- The site area measurement is deemed to be the blueline boundary (ownership boundary as per *Figure 1*) and excludes the public domain area. The reason for this exclusion is that the existing roads and footpaths are already served by the existing road gullies and surface water network infrastructure.
- Green roofs have been considered as paved surfaces (hardstanding areas) for the progression of these calculations.

3.4.1 Criterion 1: River Water Quality Protection

Water Quality Standard 1: Interception

The Greater Dublin Strategic Drainage Study (GDSDS) states that approximately 30% to 40% of rainfall events are sufficiently small that there is no measurable runoff from greenfield areas into the receiving waters. These events are generally considered as the first 5mm of rainfall. Assuming 80% runoff from paved surfaces and 0% from pervious surfaces for the first 5mm of rainfall yields the following:

Paved surfaces connected to drainage system	*138,311m² x 0.62 x 0.75 =* 64,315m²	*138,311m² site area* *62% of the site is paved* *75% of the paved area*
Volume of Interception Storage	*64,315m² x 5mm x 0.8 =* **257.26m³**	*Paved area directly drained* *5mm rainfall depth* *80% paved runoff factor*

Table 4 | *Interception Calculation*

This is further in line with Section 4.2.2 of the SuDS manual which identifies Water Quality Criterion 1 as required to "*Support the management of water quality in receiving waters and groundwaters*". The section further lists methods whereby this can be achieved: Pollution Prevention, Interception, Treatment, & Maintenance and remedial work. Section 4.3.1 of the same document discusses the requirements for provided sufficient interception methods via the introduction of Green Roofs, Pervious Surfaces, & Vegetated SuDS.

It has been calculated that the interception volume as noted above will be provided through the introduction of nature-based SuDS to the design as follows:

Permeable paving is proposed in private driveways and parking courts and accounts for a total cumulative area of C. 6,684m^2. Assuming a subbase depth of 0.4m with 33% voids, this yields a treatment volume of 882m^3. The permeable paving locations can be seen on drawing number 22-010-P010 Surfacing Layout. These figures are based on the masterplan layout for Site 4 but does not include any permeable paving which may be later proposed as part of the detailed design of Site 5, which will be the subject of a later planning application.

As noted above, the green roofing amounts to a cumulative area of approximately 14,909m^2 and shall consist of 200mm substrate minimum. Assuming a 30% water volume retention, this amounts to approximately 894m^3 of treatment storage volume.

Filter drains, swales, raingardens, and roadside trees around the site provide further treatment volume.

These SuDS features provide ample treatment volume to meet the volumetric interception requirements.

SuDS features are identified on the SuDS Layout Drawing, refer to 22-010-P240, submitted as part of the planning package.

3.4.2 Criterion 2: River Regime Protection

Attenuation storage is provided to limit the discharge rate from the site into receiving waters. As per the GDSDS, the required attenuation volume is calculated assuming 80% runoff from paved areas (20% assumed as permeable paved parking bays, excludes calculations for apartment blocks which have been calculated as 100%), and has been calculated for the 1-year, 30-year and 100-year return periods, identifying the critical storm for each – refer to calculations included in Appendix C.

The calculations included in Appendix C have been based on the usage of an outflow rate of 1.991 l/s/ha for a Soil Type 2, in line with DCC's requirement for a max permitted value of 2 l/s/ha.

As noted above, Site 4 has been divided in to 3 sub-catchments, with Site 5 its own catchment. However, 2 of the sub-catchments for Site 4, catchments 1 & 2, will run in a chain-like system to outfall to the public SW water network. This means that Catchment 1 will flow through Catchment 2 before outfalling to the

public surface water network. Subsequently, the hydrobrake limit for Catchment 2 will be the sum of the permitted outflow rate for Catchments 1 & 2.

Based on the calculations, included as Appendix C, the required attenuation storage volume for each sub-catchment is set out in *Table 5* below, as well as the permitted outflow rate per catchment, and the actual outflow rate of the catchments running in the chain system.

Catchment	Area	Allowable Discharge Rate (Per Catchment)	Allowable Discharge Rate (accounting for Chain System)	Required Attenuation Volume
	m^2	l/s	l/s	m^3
Catchment 1: Site 4 North	60,290	11.82	11.82	1,800
Catchment 2: Site 4 Central	33,711	7.54	19.36	800
Catchment 3: Site 4 South	16,868	3.36	3.36	1,100
Catchment 4: Site 5	18,166	3.20	3.20	1,000
Total	**129,035**	**25.92**	**-**	**4,700**

Table 5 | *Attenuation Volume requirement for Each Sub-Catchment*

It should be noted that the figures provided in the table above, and the calculations in Appendix C for Sites 4 & 5 are based on the current masterplan layout. Phases 2, 3, & 4 will be subject to their own separate future planning applications.

In order to cater for the full attenuation requirement, detention basins and tanks have been incorporated into the design. There is an attenuation tank located in the basement of the southern blocks complex, with detention basins and further attenuation tanks located in the central green corridor. Site 5 will provide an attenuation basin in its central open space. The attenuation volumes provided in the detention basins and tanks are recorded to *Table 6* below.

Location	Attenuation volume provided
	m^3
Catchment 1	1,918
Catchment 2	813
Catchment 3	1,122
Catchment 4	1,000
Total	**4,853**

Table 6 | *Attenuation Volume Provision*

As per *Tables 5 & 6*, the required attenuation volume is 4,700m^3 with 4,853m^3 of attenuation volume actually provided.

We would further note that Tank 1 and Tank 4 have been conservatively sized on the basis of a maximised direct run-off from their catchments, which are predominantly subject to future detailed design / provision, i.e. within the masterplan lands subject to future planning. It is expected that these tanks will reduce in scale

following the detailed design of these areas with appropriate nature based suds provision and green / green blue roof provision.

Please note that given the subject development is comprised of apartment, and commercial blocks with their associated private green spaces to be controlled by a management company, there is limited to no scope for urban creep, and as such these have not been factors to the attenuation calculations previously discussed.

3.4.3 Criterion 3: Levels of Service

There are four criteria for levels of service. These are:

Criterion 3.1: No external flooding except where specifically planned (30-year high intensity rainfall event).

Criterion 3.2: No internal flooding (100-year high intensity rainfall event).

Criterion 3.3: No internal flooding (100-year river event and critical duration for site storage).

Criterion 3.4: No flood routing off site except where specifically planned (100-year high intensity rainfall event).

Both internal and external flooding have been assessed in the Flood Risk Assessment report which accompanies this Engineering Assessment Report. The Flood Risk Assessment has been carried out in accordance with the *DEHLG/OPW Guidelines on the Planning Process and Flood Risk Management* published in November 2009.

This report has identified that the site lies within Flood Zone C and is separated from sites identified as being in Flood zone A & B both topographically and with sufficient separation distance. The subject site is a suitable location for the proposed development. Thusly, justification tests are not required to be undertaken.

The assessment identifies the risk of both internal and external flooding at the site from various sources and sets out mitigation measures against the potential risks of flooding. The sources of possible flooding assessed in the report include coastal, fluvial, pluvial (direct heavy rain), groundwater and human/mechanical errors.

As a result of the flood risk management and mitigation measures proposed, the residual risk of internal or external flooding for the 30-year and 100-year flood events is low, and accordingly all four of the above criteria have been met. Please refer to the accompanying Flood Risk Assessment report for the full analysis of the flood risk at the subject site.

3.4.4 Criterion 4: River Flood Protection

The long-term storage volume is a comparison of pre- and post-development runoff volumes. The objective is to limit the runoff discharged after development to the same as that which occurred prior to development.

Of the three methods described in the GDSDS for establishing River Flood Protection by comparison of the pre- and post-development runoff volumes, (Criteria 4.1, 4.2 and 4.3 respectively), Criteria 4.3 is selected for use as the most practical criteria at this stage in the design.

The Criteria 4.3 approach is for all runoff to be limited to either Q_{BAR} or to 2 l/s/Ha, whichever is the greater. However, DCC policy instructs that a max outflow rate of 2 l/s/ha is permitted. The proposed drainage

system includes flow control devices at the outfall for each catchment to ensure that the discharge rate is limited to the permitted outflow rate, and ample attenuation is provided for the 1-in-100 year storm, accounting for a 20% increase due to climate change.

The extra runoff volume of the development runoff over greenfield runoff, Vol_{xs}, is calculated in Appendix C for each of the sub-catchments. Note that as stated in the GDSDS, this volume is not additional to the attenuation storage volume but is effectively an element of it.

3.5 Surface Water – General

Surface water sewers will generally consist of PVC (to IS 123) or concrete socket and spigot pipes (to IS 6) and laid strictly in accordance with Dublin City Council requirements for taking in charge. It is intended that all sewers within the public domain will be handed over to Dublin City Council for taking in charge.

All private outfall manholes will be built in accordance with the Greater Dublin Regional Code of Practice for Drainage Works. No private drainage will be located within public areas.

Drains will be laid in accordance with the requirements of the Building Regulations, Technical Guidance Document H.

3.6 Flood Risk Assessment

A site-specific Flood Risk Assessment has been carried out for the proposed development and accompanies this submission under separate cover.

4. Water Supply

4.1 Existing Water Supply

Uisce Éireann records for the surrounding area have been obtained and are extracted to *Figure 6* below.

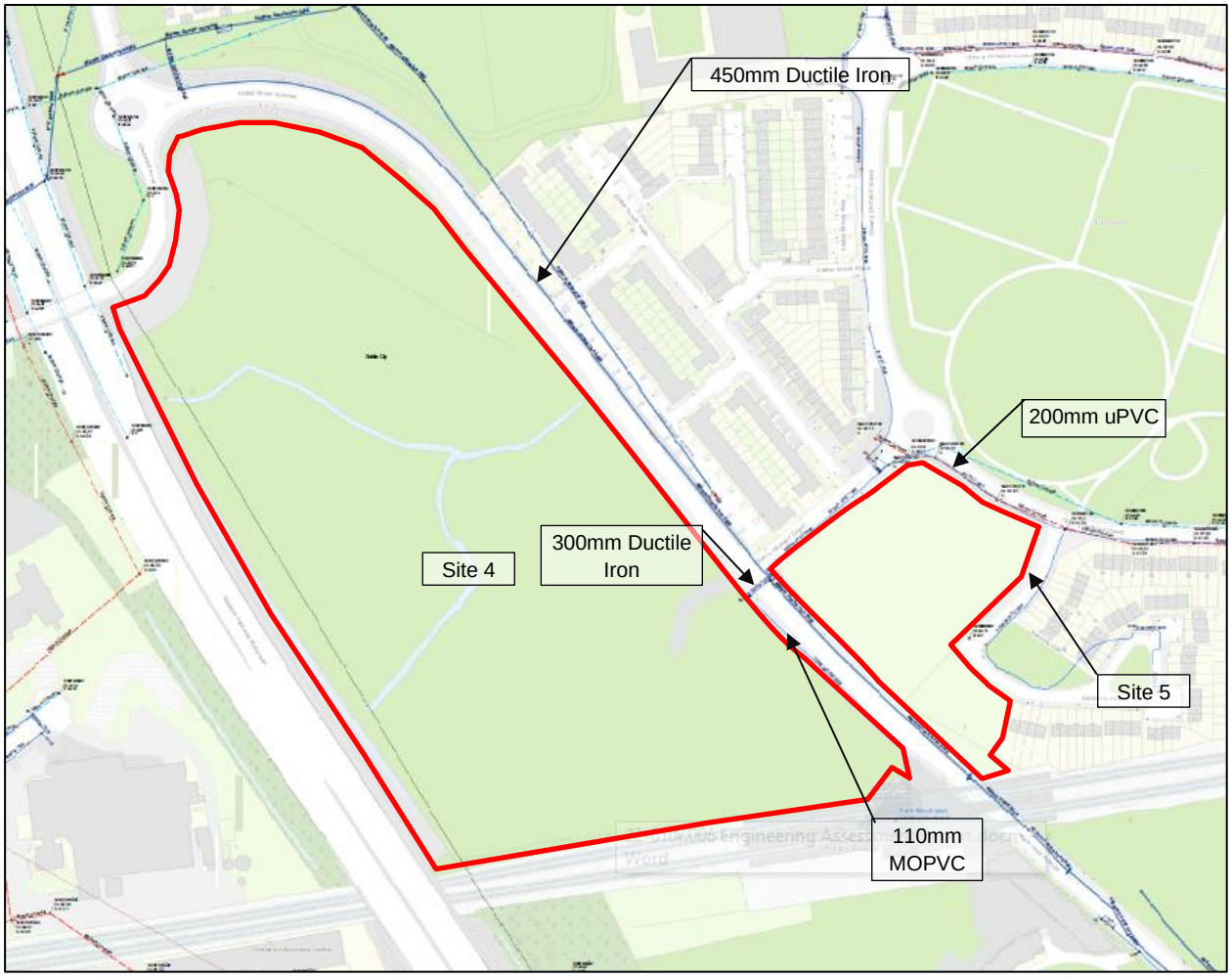


***Figure 6** | Uisce Éireann Watermain Network Map Extract*

The watermain network map advises that a 450mm Ductile Iron (DI) network runs the length of Park West Avenue on the eastern side, between Sites 4 & 5. There is a branch from this watermain crossing to the west side of Park West Avenue, just south of the T-junction with Cedar Brook Way, and is a 300mm DI. It then proceeds south for approx. 130m as a 110mm MOPVC network. To the northwest and northeast of Site 5 there is a 200mm uPVC network. Cedar Brook Way is named as Cherry Orchard Green in Uisce Éireann correspondence and maps.

4.2 Proposed Water Supply

A Pre-Connection Enquiry was submitted to Uisce Éireann. The subsequent Confirmation of Feasibility Letter, included as Appendix A, advises that no upgrade works are required to the public watermain

networks. The letter further advises that Site 4 is to be served by a connection to the existing 300mm DI spur crossing Park West Avenue, and Site 5 is to be served by a connection to the 200mm uPVC network at Cherry Orchard Park (Cedar Brook Way). Metering/telemetry facilities are to be installed at both connection points.

Site 4 is proposed be served by a 200mm connection to the 300mm DI as instructed by Uisce Éireann. The proposed 200mm watermain will follow the main vehicular circulation route of the site and will be further supplemented by 150mm and 100mm loops. A second connection to the existing watermain is proposed at the junction entrance to Road 4 at the northeast of the site, however, it is intended that the sluice valve will remain closed at this connection point under normal operating conditions.

Site 5 is proposed to be connected via a 150mm watermain to the existing 200mm uPVC network as instructed by Uisce Éireann.

Meters will be installed at connection points for both sites in line with Uisce Éireann requirements.

The proposed watermain layouts are shown on drawing numbers: 22-010-P300 to P303, with the ancillary construction detail drawings 22-010-P310 to P313. These drawings are submitted as part of the planning package.

A Statement of Design Acceptance has been received from Uisce Éireann and is included as Appendix B.

4.3 Water Supply Calculations

The calculated water demand at the subject development is set out in the table overleaf. The table has been sub-divided into sections to show the subject application (Phase1), and also the remainder of the masterplan development (Phases 2-4, inclusive). The water demand from the masterplan development is based on their current Schedules of Accommodation, these details will be finalised as part of their future planning application submissions.

The average domestic demand has been established based on an average occupancy ratio of 2.7 persons per dwelling with a daily domestic per capita consumption of 150 litres per head per day.

The supermarket has a floor area of 2,523m², with an expected staff rate of 1 person per 25m², for a total estimated staff number of 101 staff, with a consumption rate of 90 litres per head per day. This consumption rate is based on the rate of foul water expected to be generated as per the Uisce Éireann Wastewater Code of Practice Appendix C.

The retail areas, 373m³ over 7 No. units, with an expected staff rate of 1 person per 50m², for a total estimated staff number of 8 staff, will have a consumption rate of 90 litres per head per day. This consumption rate is based on the rate of foul water expected to be generated as per the Uisce Éireann Wastewater Code of Practice Appendix C.

It is anticipated that the community buildings will be utilised by local residents and that for any community meetings or events it would be utilised by a maximum of 300 persons at any one time. As per Appendix C of the Wastewater Code of Practice it is considered that the most similar type of flow rate would be that of a Public House Patron with a specified rate of 12 litres per head. This output figure is further used as the projected consumption figure.

It is calculated that the creche (672m²) will generate demand for 129 persons (25 staff and 104 children), with a water demand of 90 litres per head per day. This volume is based on the figure for the foul volume

generated by the most similar type of usage: a non-residential school with canteen facilities, also as per Appendix C of the Code of Practice.

The Phase 3 retail areas, c, 1,200m², with an expected staff rate of 1 person per 50m², for a total estimated staff number of 24 staff, will have a water demand of 90 litres per head per day. This volume is based upon the generated foul flows as per Appendix C of Uisce Éireann's Wastewater Code of Practice.

The Phase 4 office/commercial space has a total floor area of c. 16,310m², with an expected staff rate of 1 person per 15m², for a total estimated staff number of 1,087 staff. The foul flow rate of 100 litres per head per day, as per the Uisce Éireann Code of Practice, Appendix C, for an Office/Factory with Canteen, is presumed to be equal to the water consumption demand.

The residential, commercial, and creche water demands have also incorporated a 10% consumption allowance. The average day/peak week demand has been taken as 1.25 times the average daily domestic demand, while the peak demand has been taken as 5 times the average day/peak week demand, as per Section 3.7.2 of the Uisce Éireann Code of Practice for Water Infrastructure.

	Description	Total Population	Water demand	Average Demand	Average Peak Demand	Peak Demand
		No. People	*l/day*	*l/s*	*l/s*	*l/s*
Subject Application	708 Apartments	1,912	315,480	3.651	4.564	22.820
	Supermarket (2,523m²)	101	9,999	0.116	0.145	0.725
	Retail (373m²)	8	792	0.009	0.011	0.055
	Community space (1,222m²)	300	3,960	0.046	0.058	0.290
	Creche (672m²)	129	12,771	0.148	0.185	0.925
Phase 2*	153 units	413	68,145	0.789	0.986	4.930
Phase 3*	254 units	686	113,190	1.310	1.638	8.190
	Retail (1,200m²)	24	2,376	0.028	0.035	0.175
Phase 4*	Office/Commercial (c. 16,310m²)	1,087	119,570	1.384	1.730	8.650
	Total	**4,660**	**638,283**	**7.481**	**9.352**	**46.760**

Table 7 | *Calculation of Water Demand for the Development*
** Denotes units as part of the masterplan development design, outside the area of the subject application*

The average demand for the development is 7.481 l/s, with a peak demand of 46.760 l/s.

4.4 Water Supply – General

All watermains will be laid strictly in accordance with Uisce Éireann requirements for taking in charge as per their Code of Practice and Standard Details documents.

Valves, hydrants, scour and sluice valves, and bulk water meters will be provided in accordance with the requirements of Uisce Éireann.

APPENDICES

A. Uisce Éireann Confirmation of Feasibility Letter

CONFIRMATION OF FEASIBILITY

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

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

www.water.ie

Robert Walpole

Waterman Moylan,
Block S, Eastpoint Business Park
Alfie Byrne Road
East Wall,
Dublin 3
D03H3F4

21 October 2022

Our Ref: CDS22004824 Pre-Connection Enquiry
Cherry Orchard Sites 4 and 5, Park West Avenue, Cherry Orchard, Dublin 10, Co. Dublin

Dear Applicant/Agent,

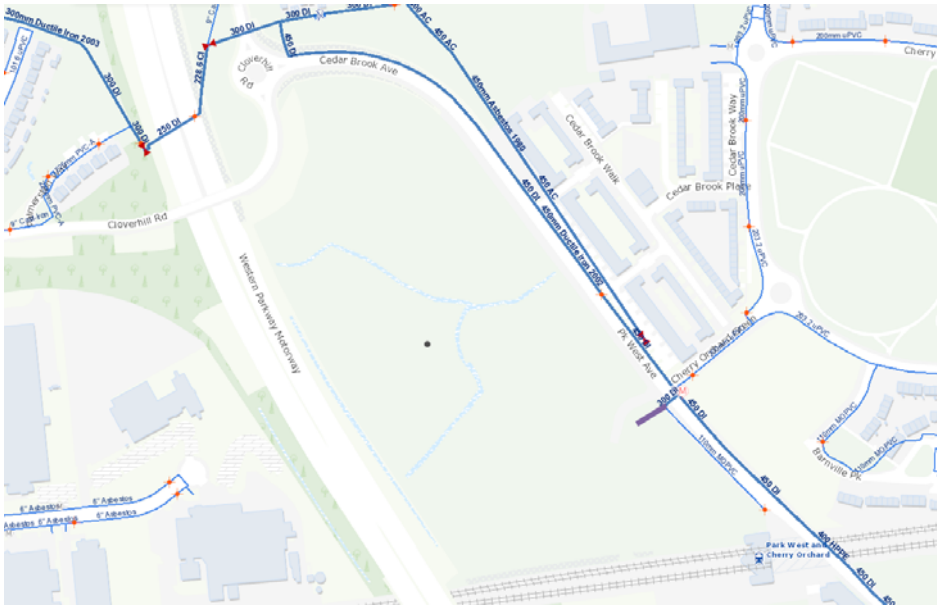
We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 1,293 unit(s) at Cherry Orchard Sites 4 and 5, Park West Avenue, Cherry Orchard, Dublin 10, Co. Dublin, (the **Development)**.

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

- **Water Connection** - Feasible without infrastructure upgrade by Irish Water

- Site 4 is be connected (Via a new 200mm connection main) to the existing 300mm ductile iron spur off of the 450mm DI Trunk Main in Park West Avenue opposite the Cherry orchard Green junction (Purple line in mapping below). A new DMA will be required here with a minimum 200mm spine main within the development. Metering and telemetry will be required at this new connection.



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- Site 5 is to be connected to the existing 200mm uPVC main adjacent on Cherry Orchard Green. A bulk meter will be required on the connection main

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- **Wastewater Connection** - Feasible Subject to upgrades

- Site 4 and 5 are both to connect to the wastewater network on Cherry Orchard Green in line with the masterplan for the area.
- In order to accommodate the proposed connection at the Premises, upgrade works are required to increase the capacity of the Irish Water wastewater network. These works detail upsizing approximately 106m of gravity network from 225mm to 1050mm diameter (Yellow shaded area on below mapping). Irish Water currently has a project underway which will provide the necessary upgrade and capacity. This upgrade project is scheduled to be completed by Q1 2026 (this may be subject to change) and the proposed connection could be completed as soon as possibly practicable after this date.

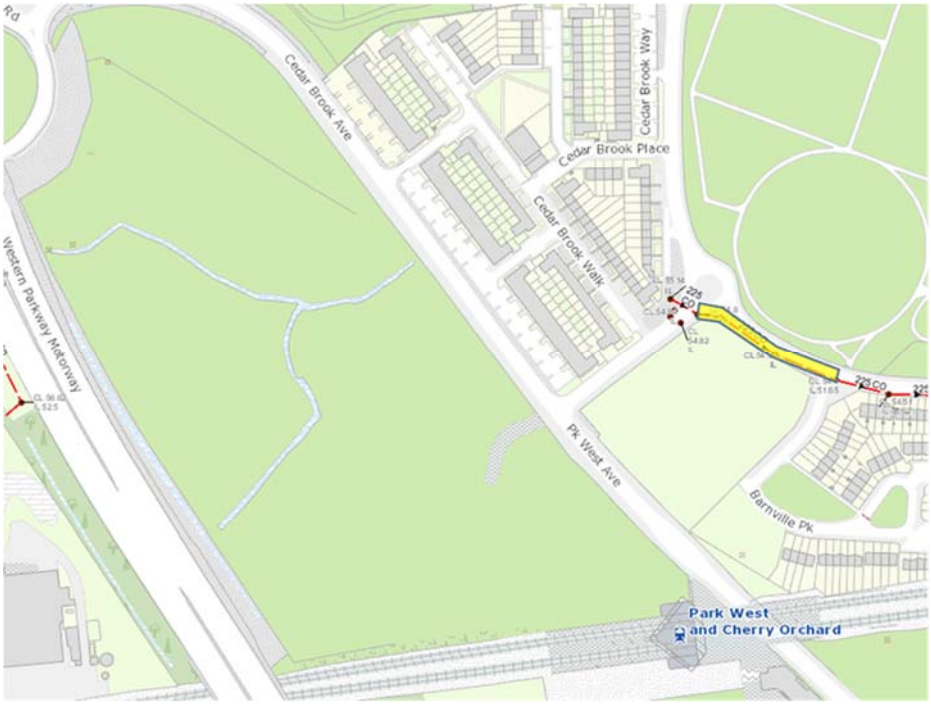


Figure 1 -Wastewater upgrades

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

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

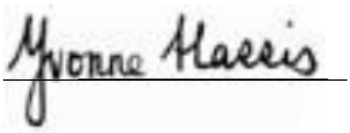
Where can you find more information?

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

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

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

Yours sincerely,



Yvonne Harris
Head of Customer Operations

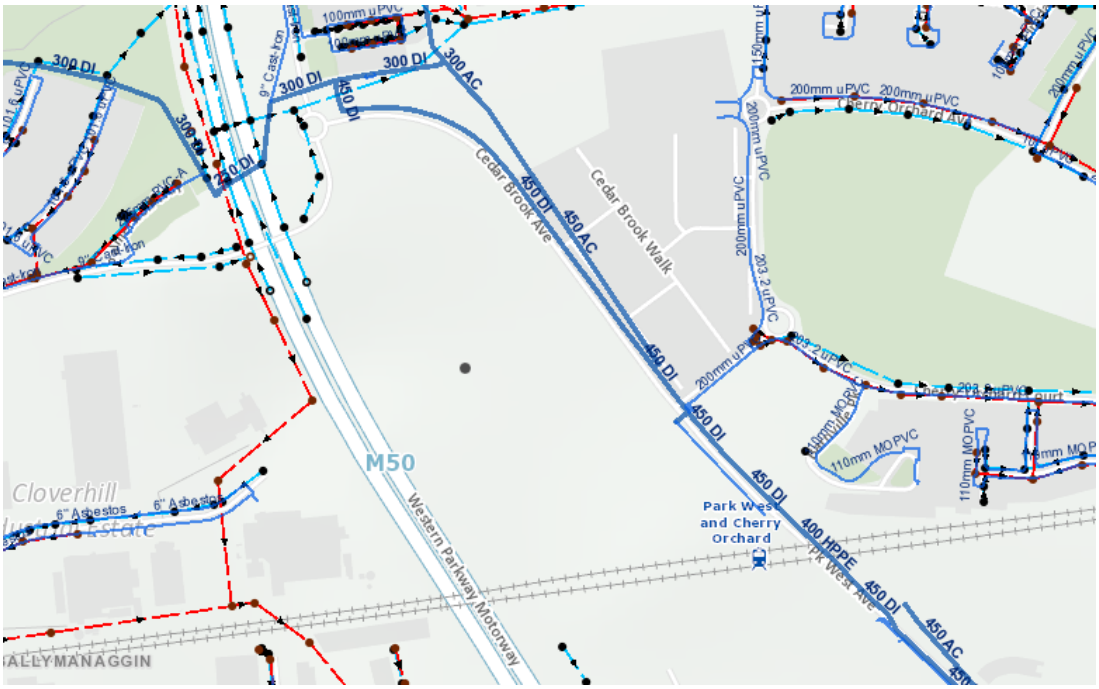
Section A - What is important to know?

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

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

Section B – Details of Irish Water's Network(s)

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



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

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

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water's underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

B. Uisce Éireann Statement of Design Acceptance

Robert Walpole
Waterman Moylan
Block S Eastpoint Business Park
Alfie Byrne Road
East Wall
Dublin
D03H3F4

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

17 October 2023

Re: Design Submission for Cherry Orchard Sites 4 and 5, Park West Avenue, Dublin 10, Co. Dublin (the "Development")
(the "Design Submission") / Connection Reference No: CDS22004824

Dear Robert Walpole,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Uisce Éireann has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before you can connect to our network you must sign a connection agreement with Uisce Éireann. This can be applied for by completing the connection application form at www.water.ie/connections. Uisce Éireann's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Uisce Éireann's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Uisce Éireann does not, in any way, render Uisce Éireann liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Uisce Éireann representative:
Name: Antonio Garzón Mielgo
Phone: 0874750587
Email: antonio.garzonmielgo@water.ie

Yours sincerely,

Dermot Phelan
Connections Delivery Manager

Appendix A

Document Title & Revision

- 22-010-P201 Drainage Layout Sheet 1 to 3
- 22-010-P202 Drainage Layout Sheet 2 to 3
- 22-010-P203 Drainage Layout Sheet 3 to 3
- 22-010-P215 Foul Drainage Longitudinal Sections Sheet 1 of 2
- 22-010-P216 Foul Drainage Longitudinal Sections Sheet 2 of 2
- 22-010-P301 Proposed Watermain Layout Sheet 1 of 3
- 22-010-P302 Proposed Watermain Layout Sheet 2 of 3
- 22-010-P303 Proposed Watermain Layout Sheet 3 of 3

Additional Comments

The design submission will be subject to further technical review at connection application stage.

Uisce Éireann cannot guarantee that its Network in any location will have the capacity to deliver a particular flow rate and associated residual pressure to meet the requirements of the relevant Fire Authority, see Section 1.17 of Water Code of Practice.

While Uisce Éireann notes that there are sections of the water and wastewater services infrastructure that will remain private and not be vested, we have the following comments: It is recommended that the watermain and foul sewer shall have 3 m clearance from proposed or existing structures.

Note: revised due to alterations to the road layout. The 4-way staggered Junction has now become a 4-way intersection, and internal to the proposed site the cycle/pedestrian paths and the road surface have swapped position to facilitate this alignment. There has been a slight shift of the drainage network (approx. 1.5m) to ensure it stays centred underneath the road.

*For further information, visit **www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Uisce Éireann will not, in any way, render Uisce Éireann liable for any elements of the design and/or construction of the Self-Lay Works.

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.

NOTE:
WHERE DEPTH OF COVER IS LOWER THAN 1.2m IN TRAFFICKED AREAS, PIPES TO BE SURROUNDED WITH 100mm OF CONCRETE

NOTE:
WHERE PUBLIC FOUL MANHOLES ARE LOCATED IN LANDSCAPED AREAS, MANHOLES ARE TO BE IDENTIFIABLE, ACCESSIBLE AND PREVENTED FROM BEING OVERGROWN. COVERS ARE TO BE SET IN CONCRETE SURROUND PLINTH, 200MM ALL ROUND AND 100MM DEEP FORMED BY C20/25N CONCRETE, 20MM NOMINAL AGGREGATE SIZE, AND BEDDED IN CLAUS 804

INDICATIVE MASTERPLAN LAYOUT ONLY SUBJECT TO SEPARATE FUTURE PLANNING APPLICATION

BELOW GROUND ATTENUATION 1391m²x1.2m DEEP STORAGE PROVIDED 1671m3 TWL 55.65

ATTENUATION BASIN 1 (WITH 1/5 SLOPES)
TOP OF BANK AREA = 242m²
BOTTOM OF BANK AREA = 75m²
AREA WITH IN BANK SLOPE = 41m²
TOP WATER LEVEL 55.65m/0.5m DEEP
37.5m² + 41m² = 78m² ABOVE GROUND STORAGE

242m² x 0.5m DEEP UNDERLYING STONE (40% VOIDS) = 48.4m³ BELOW GROUND STORAGE

TOTAL ATTENUATION PROVIDED = 126m³

ATTENUATION BASIN 2 (WITH 1/5 SLOPES)
TOP OF BANK AREA = 632m²
BOTTOM OF BANK AREA = 289m²
AREA WITH IN BANK SLOPE = 85m²
TOP WATER LEVEL 55.65m/0.5m DEEP
144m² + 85m² = 229m² ABOVE GROUND STORAGE

632m² x 0.5m DEEP UNDERLYING STONE (40% VOIDS) = 126m³ BELOW GROUND STORAGE

TOTAL ATTENUATION PROVIDED = 355m³

BASIN 2 – ABOVE GROUND ATTENUATION STORAGE PROVIDED 415m³ TWL 55.65m

HYDROBRAKE MH S49 FOR CATCHMENT 1 CL56.00

OPEN GRATED MH S26 CL55.15 IL54.03

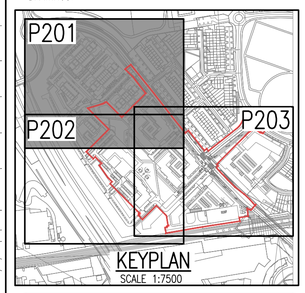
OPEN GRATED MH S27 CL55.15 IL53.96

OPEN GRATED MH S29 CL55.15 IL53.91 EIL54.38

OPEN GRATED MH S39 CL55.15 IL53.82 EIL53.97

FFL 56.50

FFL 56.50



LEGEND:

- EXISTING FOUL WATER SEWER
- EXISTING SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER NETWORK
- PROPOSED FOUL INSPECTION CHAMBER AND CONNECTION
- PROPOSED SURFACE WATER INSPECTION CHAMBER AND CONNECTION
- PROPOSED 225ø FILTER DRAIN
- PROPOSED GULLY AND CONNECTION
- PROPOSED PERMEABLE PAVING
- PROPOSED STORMTECH ATTENUATION STORAGE
- PROPOSED ABOVE GROUND STORAGE
- PROPOSED GREEN ROOF
- PROPOSED RAIN GARDEN
- PROPOSED TREE PIT

12:44
17 October 2023
- - DRAFT - -
Paul Donoghue

Rev	Date	Description	By	Chk

Amendments

Project
CHERRY ORCHARD POINT

Title
DRAINAGE LAYOUT
SHEET 1 OF 3

Client
LAND DEVELOPMENT AGENCY

BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD,
DUBLIN D03 H3F4 IRELAND. Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status
PLANNING

Designed By	Approved	Waterman Ref
PJD	IW	22-010
Drawn By	Date	Scales @ A1
PJD	OCT 2023	1:500

Project - Originator - Volume - Level - Type - Role - Number
COP-WMC-PH1 -00-DR-C-P201

Revision

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Date: Oct 17, 2023 - 12:44pm

ATTENUATION BASIN 1 (WITH 1/5 SLOPES)
TOP OF BANK AREA = 242m²
BOTTOM OF BANK AREA = 75m²
AREA WITH IN BANK SLOPE = 41m²
TOP WATER LEVEL 55.65m/0.5m DEEP
37.5m² + 41m² = 78m² ABOVE GROUND STORAGE

242m² x 0.5m DEEP UNDERLYING STONE (40% VOIDS) = 48.4m³ BELOW GROUND STORAGE

TOTAL ATTENUATION PROVIDED = 126m³

BASIN 2 – ABOVE GROUND ATTENUATION
STORAGE PROVIDED 415m³
TWL 55.65m

ATTENUATION BASIN 2 (WITH 1/5 SLOPES)
TOP OF BANK AREA = 632m²
BOTTOM OF BANK AREA = 289m²
AREA WITH IN BANK SLOPE = 85m²
TOP WATER LEVEL 55.65m/0.5m DEEP
144m² + 85m² = 229m² ABOVE GROUND STORAGE

632m² x 0.5m DEEP UNDERLYING STONE (40% VOIDS) = 126m³ BELOW GROUND STORAGE

TOTAL ATTENUATION PROVIDED = 355m³

ATTENUATION BASIN 3 (WITH 1/5 SLOPES)
TOP OF BANK AREA = 429m²
BOTTOM OF BANK AREA = 181m²
AREA WITH IN BANK SLOPE = 62m²
TOP WATER LEVEL 56.25m/0.5m DEEP
90m² + 62m² = 152m² ABOVE GROUND STORAGE

429m² x 0.5m DEEP UNDERLYING STONE (40% VOIDS) = 85m³ BELOW GROUND STORAGE

TOTAL ATTENUATION PROVIDED = 237m³

HYDROBRAKE MH S49
FOR CATCHMENT 1
CL56.00
IL53.77
DESIGN FLOW
10.58m³ l/s

HYDROBRAKE FOR CATCHMENT 2
MH S84
CL56.58
IL54.21
DESIGN FLOW
19.36m³ l/s

ABOVE GROUND 'ATTENUATION IN BASKET BALL COURT'
AREA = 665m²
TWL 56.25/0.25m DEEP
STORAGE PROVIDED 166m³

BELOW GROUND ATTENUATION STORAGE.
614.4m²x1.6m DEEP
STORAGE PROVIDED 983m3
TWL 56.25

NOTE:
WHERE DEPTH OF COVER IS LOWER THAN 1.2m IN TRAFFICKED AREAS, PIPES TO BE SURROUNDED WITH 100mm OF CONCRETE

NOTE:
WHERE PUBLIC FOUL MANHOLES ARE LOCATED IN LANDSCAPED AREAS, MANHOLES ARE TO BE IDENTIFIABLE, ACCESSIBLE AND PREVENTED FROM BEING OVERGROWN. COVERS ARE TO BE SET IN CONCRETE SURROUND PLINTH, 200MM ALL ROUND AND 100MM DEEP FORMED BY C20/25N CONCRETE, 20MM NOMINAL AGGREGATE SIZE, AND BEDDED IN CLAUS 804

NOTES:

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KEYPLAN
SCALE 1:7500

LEGEND:

- EXISTING FOUL WATER SEWER
- EXISTING SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER NETWORK
- PROPOSED FOUL INSPECTION CHAMBER AND CONNECTION
- PROPOSED SURFACE WATER INSPECTION CHAMBER AND CONNECTION
- PROPOSED 225ø FILTER DRAIN
- PROPOSED GULLY AND CONNECTION
- PROPOSED PERMEABLE PAVING
- PROPOSED STORMTECH ATTENUATION STORAGE
- PROPOSED ABOVE GROUND STORAGE
- PROPOSED GREEN ROOF
- PROPOSED RAIN GARDEN
- PROPOSED TREE PIT

- - DRAFT - -
17 October 2023
Paul Donoghue
12:44

Rev	Date	Description	By	Chk
		Amendments		

Project
CHERRY ORCHARD POINT

Title
DRAINAGE LAYOUT
SHEET 2 OF 3

Client
LAND DEVELOPMENT AGENCY

waterman moylan
BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD, DUBLIN D03 H3F4 IRELAND. Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status
PLANNING

Designed By	Approved	Waterman Ref
PJD	IW	22-010
Drawn By	Date	Scales @ A1
PJD	OCT 2023	1:500

Project - Originator - Volume - Level - Type - Role - Number: COP-WMC-PH1-00-DR-C-P202
Revision: -

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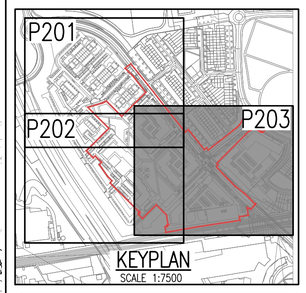
Date: Oct 17, 2023 - 12:44pm

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.



LEGEND:

- EXISTING FOUL WATER SEWER
- EXISTING SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER NETWORK
- PROPOSED FOUL INSPECTION CHAMBER AND CONNECTION
- PROPOSED SURFACE WATER INSPECTION CHAMBER AND CONNECTION
- PROPOSED 225ø FILTER DRAIN
- PROPOSED GULLY AND CONNECTION
- PROPOSED PERMEABLE PAVING
- PROPOSED STORMTECH ATTENUATION STORAGE
- PROPOSED ABOVE GROUND STORAGE
- PROPOSED GREEN ROOF
- PROPOSED RAIN GARDEN
- PROPOSED TREE PIT

ATTENUATION BASIN 2 (WITH 1/5 SLOPES)
TOP OF BANK AREA = 632m²
BOTTOM OF BANK AREA = 289m²
AREA WITH IN BANK SLOPE = 85m²
TOP WATER LEVEL 55.65m/0.5m DEEP
144m² + 85m² = 229m³ ABOVE GROUND STORAGE

632m² x 0.5m DEEP UNDERLYING STONE (40% VOIDS) = 126m³ BELOW GROUND STORAGE

TOTAL ATTENUATION PROVIDED = 355m³

HYDROBRAKE FOR CATCHMENT 2
MH S84
CL56.58
IL54.21
DESIGN FLOW
19.36m³ l/s

ABOVE GROUND ATTENUATION IN BASKET BALL COURT.
AREA = 665m²
TWL 56.25/0.25m DEEP
STORAGE PROVIDED 166m³

BELOW GROUND ATTENUATION STORAGE.
614.4m²x1.6m DEEP
STORAGE PROVIDED 983m3
TWL 56.25

PETROL INTERCEPTOR

HYDROBAKE MH S106
FOR CATCHMENT 3
CL56.74
IL53.71
DESIGN FLOW 3.36l/s

HYDROBAKE MH S34
CL56.00
IL52.04

STORMTECH ATTENUATION SYSTEM. STORAGE PROVIDED 408m3

CONNECTION TO EXISTING FOUL MH
CL54.58
IL52.62

CONNECT TO EXISTING SW MH EXS
CL56.00
IL52.46
EIL53.41

EXS
CL 55.97
IL 51.75
EIL51.83

INDICATIVE MASTERPLAN LAYOUT ONLY SUBJECT TO SEPARATE FUTURE PLANNING APPLICATION

FOR BASEMENT DRAINAGE REFER TO DRAWING P205

PODIUM FFL 64.00 & 64.50
UPPER GROUND BASEMENT FFL 60.00
LOWER GROUND BASEMENT FFL 56.00/57.00

NOTE:
WHERE DEPTH OF COVER IS LOWER THAN 1.2m IN TRAFFICKED AREAS, PIPES TO BE SURROUNDED WITH 100mm OF CONCRETE

NOTE:
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Rev	Date	Description	By	Chk

Amendments

Project: CHERRY ORCHARD POINT

Title: DRAINAGE LAYOUT SHEET 3 OF 3

Client: LAND DEVELOPMENT AGENCY

waterman moylan
BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD, DUBLIN D03 H3F4 IRELAND. Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status: PLANNING

Designed By	Approved	Waterman Ref
PJD	IW	22-010
Drawn By	Date	Scales @ A1
PJD	OCT 2023	1:500

Project - Originator - Volume - Level - Type - Role - Number: COP-WMC-PH1 -00-DR-C-P203

Revision: -

17 October 2023 12:45 - - DRAFT - - Paul Donaghue

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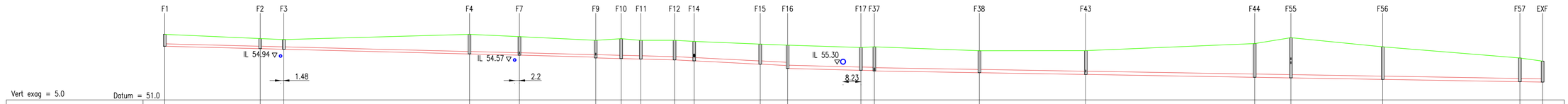
Date: Oct 17, 2023 - 12:45pm

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.



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Invert Level		55.950	55.730 55.730 55.676 55.670		55.242 55.242	55.127 55.127	54.951 54.876	54.817 54.817 54.772 54.772		54.694 54.694 54.604 54.604		54.300 54.300	54.174 53.900	53.731 53.731 53.710 53.673		53.512 53.512	53.349 53.349	53.090 53.090 53.034 53.034		52.893 52.893	52.682 52.682 52.647	
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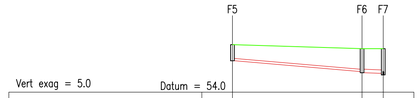

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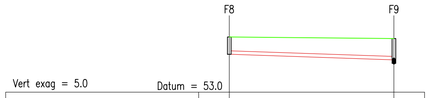

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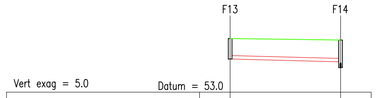

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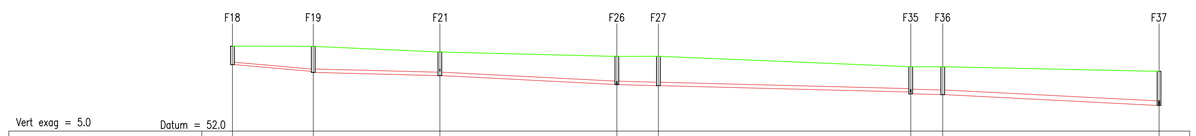
NOTE:
WHERE DEPTH OF COVER TO PIPE IS LOWER THAN 1.2m IN TRAFFICKED AREAS, PIPES TO BE SURROUNDED WITH 100ø OF CONCRETE

LEGEND:

- PROPOSED GROUND LEVEL
- PROPOSED FOUL PIPE
- PROPOSED SURFACE WATER PIPE CROSSING



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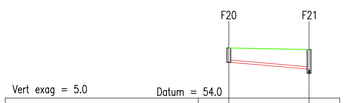

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17 October 2023 12:43
- - DRAFT - -
Paul Donoghue

Rev	Date	Description	By	Chk

Amendments

Project
CHERRY ORCHARD POINT

Title
FOUL DRAINAGE
LONGITUDINAL SECTIONS
SHEET 1 OF 2

Client
LAND DEVELOPMENT AGENCY

waterman moylan
BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD,
DUBLIN D03 H3F4 IRELAND, Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status
PLANNING

Designed By	Approved	Waterman Ref
PJD	IW	22-010
Drawn By	Date	Scales @ A1
PJD	OCT 2023	1000H, 1:200V

Project - Originator - Volume - Level - Type - Role - Number | Revision
COP-WMC-PH1-00-DR-C-P215

Drawing Location: M:\Projects\2022\010 Cherry Orchard - Sites 4 & 5 - C&S\Drawings\Waterman Moylan\Civil\Planning\Autocad Drawings\22-010-P215 & P216 Foul Drainage Longitudinal Sections.dwg
Date: Oct 17, 2023 - 12:43pm

NOTES:

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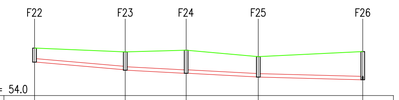

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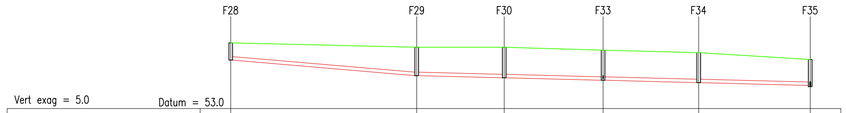
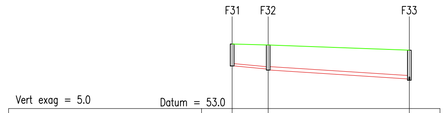
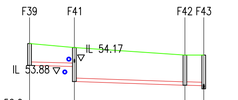


Link Name		8.000	8.001	8.002	8.003	8.004	
Section Type		225ø	225ø	225ø	225ø	225ø	
Slope		1:60.0	1:200.0	1:200.0	1:200.0	1:200.0	
Cover Level	57.290		57.000	57.000	56.810	56.650	56.200
Invert Level	56.160	55.148 55.148		55.005 55.005	54.844 54.844	54.688 54.688	54.506
Length		60.719	28.558	32.282	31.225	36.391	

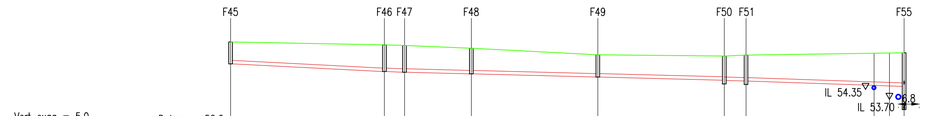


Link Name		9.000	9.001	
Section Type		150ø	225ø	
Slope		1:60.0	1:80.0	
Cover Level	57.210	57.150		56.810
Invert Level	55.780 55.584	55.509		54.933
Length		11.756	46.084	

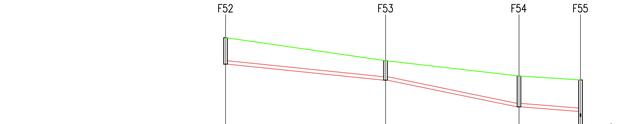


Link Name		10.000	10.001	10.002	
Section Type		225ø	225ø	225ø	
Slope		1:200.0	1:150.0	1:198.5	
Cover Level	56.300	56.040		55.550	55.550
Invert Level	54.875	54.802 53.820		53.579 53.548	53.548 53.548
Length		14.630	36.092	6.153	

Link Name		11.000	
Section Type		225ø	
Slope		1:200.0	
Cover Level	56.110		56.040
Invert Level	55.100	53.570	
Length		9.067	



Link Name		12.000	12.001	12.002	12.003	12.004	12.005	12.006		
Section Type		225ø	225ø	225ø	225ø	225ø	225ø	225ø		
Slope		1:100.0	1:150.0	1:200.0	1:200.1	1:200.0	1:200.0	1:150.0		
Cover Level	57.450		57.260 57.220		57.040		56.610		56.530 56.590		56.740
Invert Level	56.020		55.518 55.518 55.474		55.365 55.365		55.159 55.159		54.953 54.710 54.675 54.670	54.550	
Length		50.218	6.569	21.809	41.294	41.293	7.097	51.610		



Link Name		13.000	13.001	13.002	
Section Type		225ø	225ø	225ø	
Slope		1:50.0	1:25.0	1:67.0	
Cover Level	59.500		58.000	57.000	56.740
Invert Level	57.770		56.725 56.725	54.982 54.982	54.682
Length		52.239	43.569	20.074	

NOTE:
WHERE DEPTH OF COVER TO PIPE IS LOWER THAN 1.2m IN TRAFFICKED AREAS, PIPES TO BE SURROUNDED WITH 100ø OF CONCRETE

LEGEND:

- PROPOSED GROUND LEVEL
- PROPOSED FOUL PIPE
- PROPOSED SURFACE WATER PIPE CROSSING

1:1000 0 20.0 40.0 60.0 80.0 100.0m
1:1 0 10 20 30 40 50 60 70 80 90 100

1:500 0 10.0 20.0 30.0 40.0 50.0m
1:1 0 10 20 30 40 50 60 70 80 90 100

17 October 2023 12:42
- - DRAFT - -
Paul Donoghue

Rev	Date	Description	By	Chk

Amendments

Project
CHERRY ORCHARD POINT

Title
FOUL DRAINAGE
LONGITUDINAL SECTIONS
SHEET 2 OF 2

Client
LAND DEVELOPMENT AGENCY

waterman moylan
BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD,
DUBLIN D03 H3F4 IRELAND. Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status
PLANNING

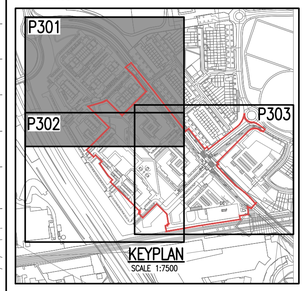
Designed By	PJD	Approved	IW	Waterman Ref	22-010
Drawn By	PJD	Date	OCT 2023	Scales @ A1	1000H, 1:200V

Project - Originator - Volume - Level - Type - Role - Number: COP-WMC-PH1-00-DR-C-P216
Revision

Drawing Location: M:\Projects\22\22-010 Cherry Orchard - Sites 4 & 5 - C&S\Drawings\Waterman Moylan\Civil\Planning\Autocad Drawings\22-010-P215 & P216 Foul Drainage Longitudinal Sections.dwg
Date: Oct 17, 2023 - 12:42pm

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.



LEGEND:

- 100ø — PROPOSED 100ø HDPE WATERMAIN WITH PIPE SIZE
- 150ø — PROPOSED 150ø HDPE WATERMAIN WITH PIPE SIZE
- 200ø — PROPOSED 200ø HDPE WATERMAIN WITH PIPE SIZE
- XXXø (WM) — EXISTING WATERMAIN WITH PIPE SIZE
- SV — PROPOSED SLUICE VALVE
- H — PROPOSED HYDRANT
- ScV — PROPOSED SCOUR VALVE
- AV — PROPOSED AIR VALVE
- NRV — PROPOSED NON-RETURN VALVE
- WM — PROPOSED WATER METER
- SWMH — SURFACE WATER MANHOLE
- WATERMAIN ScVNRV SWMH NRV — TYPICAL SCHEMATIC CONFIGURATION OF OFFLINE SCOUR VALVE AT ROAD LOW POINTS
- PROPOSED BOUNDARY

28 September 2023 DRAFT Paul Donoghue

Rev	Date	Description	By	Chk

Amendments

Project: CHERRY ORCHARD POINT

Title: WATERMAIN LAYOUT SHEET 1 OF 3

Client: LAND DEVELOPMENT AGENCY

waterman moylan
BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD, DUBLIN D03 H3F4 IRELAND. Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status: PLANNING

Designed By	PJD	Approved	IW	Waterman Ref	22-010
Drawn By	PJD	Date	JULY 2023	Scales @ A1	1:500

Project - Originator - Volume - Level - Type - Role - Number: COP-WMC-PH1 -00-DR-C-301

Revision:

1:500 0 10.0 20.0 30.0 40.0 50.0m

1:1 0 10 20 30 40 50 60 70 80 90 100

INDICATIVE MASTERPLAN LAYOUT ONLY SUBJECT TO SEPARATE FUTURE PLANNING APPLICATION

450ø DUCTILE IRON 2002

PROPOSED CONNECTION TO EXISTING 450ø DUCTILE IRON WATERMAIN

TEMPORARY DEAD END FOR FUTURE CONNECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-05

TEMPORARY DEAD END FOR FUTURE CONNECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-05

TEMPORARY DEAD END FOR FUTURE CONNECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-05

450ø ASBESTOS 1980

450ø DUCTILE IRON 2002

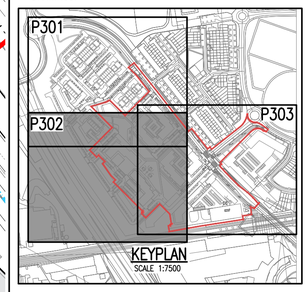
FFL 56.50

FFL 56.50

ROAD 1 ROAD 2 ROAD 3 ROAD 4 ROAD 5 ROAD 6 ROAD 7 ROAD 8 ROAD 9 ROAD 10

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.



TEMPORARY DEAD END FOR FUTURE CONNECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-05

TEMPORARY DEAD END FOR FUTURE CONNECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-05

WATERMAIN LOOP DETAIL IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-39

TEMPORARY DEAD END FOR FUTURE CONNECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-05

FFL 56.50

FFL 56.50

FFL 57.10

FFL 57.30

FFL 57.40

FFL 57.80

ROAD 4

ROAD 1

ROAD 9

ROAD 10

ROAD 11

ROAD 12

ROAD 13

ROAD 14

ROAD 15

ROAD 16

ROAD 17

ROAD 18

ROAD 2A

ROAD 2B

LEGEND:

100ø	PROPOSED 100ø HDPE WATERMAIN WITH PIPE SIZE
150ø	PROPOSED 150ø HDPE WATERMAIN WITH PIPE SIZE
200ø	PROPOSED 200ø HDPE WATERMAIN WITH PIPE SIZE
WM XXXø WM	EXISTING WATERMAIN WITH PIPE SIZE
SV	PROPOSED SLUICE VALVE
H	PROPOSED HYDRANT
ScV	PROPOSED SCOUR VALVE
AV	PROPOSED AIR VALVE
NRV	PROPOSED NON-RETURN VALVE
WM	PROPOSED WATER METER
SWMH	SURFACE WATER MANHOLE
WATERMAIN ScV NRV SWMH	TYPICAL SCHEMATIC CONNECTION OF ORIEL SCOUR VALVE AT ROAD LOW POINTS
	PROPOSED BOUNDARY TREATMENT CONNECTION

28 September 2023 Paul Donoghue

DRAFT

Rev	Date	Description	By	Chk

Amendments

Project
CHERRY ORCHARD POINT

Title
PROPOSED WATERMAIN
SHEET 2 OF 3

Client
LAND DEVELOPMENT AGENCY

waterman moylan

BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD,
DUBLIN D03 H3F4 IRELAND. Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status
PLANNING

Designed By PJD	Approved IW	Waterman Ref	22-010
Drawn By PJD	Date JULY 2023	Scales @ A1	1:500

Project - Originator - Volume - Level - Type - Role - Number
COP-WMC-PH1-00-DR-C-302

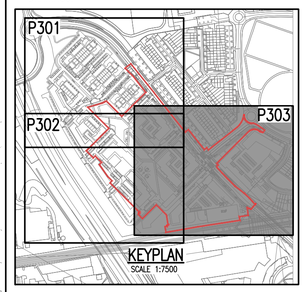
Revision

1:500 0 10.0 20.0 30.0 40.0 50.0m

1:1 0 10 20 30 40 50 60 70 80 90 100

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.



INDICATIVE MASTERPLAN
LAYOUT ONLY
SUBJECT TO SEPARATE FUTURE
PLANNING APPLICATION

PODIUM FFL 64.00 & 64.50
UPPER GROUND BASEMENT FFL 60.00
LOWER GROUND BASEMENT FFL 56.00/57.00

PROPOSED CONNECTION TO EXISTING 300ø DUCTILE IRON WATERMAIN

PROPOSED CONNECTION TO EXISTING 300ø DUCTILE IRON WATERMAIN

WATERMAIN LOOP DETAIL IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-39

TEMPORARY DEAD END FOR FUTURE CONNECTION IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-05

WATERMAIN LOOP DETAIL IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-39

1:500 0 10.0 20.0 30.0 40.0 50.0m
1:1 0 10 20 30 40 50 60 70 80 90 100

LEGEND:

- 100ø — PROPOSED 100ø HDPE WATERMAIN WITH PIPE SIZE
- 150ø — PROPOSED 150ø HDPE WATERMAIN WITH PIPE SIZE
- 200ø — PROPOSED 200ø HDPE WATERMAIN WITH PIPE SIZE
- XXXø — EXISTING WATERMAIN WITH PIPE SIZE
- SV — PROPOSED SLUICE VALVE
- H — PROPOSED HYDRANT
- ScV — PROPOSED SCOUR VALVE
- AV — PROPOSED AIR VALVE
- NRV — PROPOSED NON-RETURN VALVE
- WM — PROPOSED WATER METER
- SWMH — SURFACE WATER MANHOLE
- TYPICAL SCHEMATIC ARRANGEMENT OF OFFLINE SCOUR VALVE AT ROAD LOW POINTS
- PROPOSED BOUNDARY TREATMENT CONNECTION

17 October 2023
Paul Donoghue

Rev	Date	Description	By	Chk
		Amendments		

Project
CHERRY ORCHARD POINT

Title
PROPOSED WATERMAIN LAYOUT
SHEET 3 OF 3

Client
LAND DEVELOPMENT AGENCY

BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD,
DUBLIN D03 H3F4 IRELAND. Tel: (01) 664 8900
Email: info@waterman-moylan.ie www.waterman-moylan.ie

Status
PLANNING

Designed By	Approved	Waterman Ref
PJD	IW	22-010
Drawn By	Date	Scales @ A1
PJD	OCT 2023	1:500

Project - Originator - Volume - Level - Type - Role - Number
COP-WMC-PH1-00-DR-C-P303

Revision

Drawing Location: M:\Projects\2022\22-010 Cherry Orchard - Sites 4 & 5 - C&S\Drawings\Waterman Moylan\Civil\Planning\Autocad Drawings\22-010-P301-P302-P303 Proposed Watermain Layout Sheets 1 to 3.dwg
Date: Oct 17, 2023 - 9:15am

C. GDSDS Attenuation Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	16.800	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	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)
1	0.090	4.00	57.320	1200	707582.615	733130.913	1.120
2	0.094	4.00	57.300	1200	707631.554	733179.070	1.558
3	0.118	4.00	57.160	1200	707646.088	733103.044	1.230
4	0.143	4.00	56.800	1200	707686.346	733143.264	1.535
5	0.186	4.00	56.680	1200	707678.677	733040.140	1.240
6	0.186	4.00	56.180	1200	707731.036	733092.449	1.253
7	0.060	4.00	56.000	1350	707766.868	733047.149	1.575
8	0.058	4.00	55.830	1200	707795.011	733011.704	1.125
9	0.058	4.00	56.050	1200	707776.870	733035.010	1.493
10	0.060	4.00	55.830	1200	707767.760	733033.825	1.530
11	0.060	4.00	56.020	1200	707753.222	733019.219	1.864
12	0.057	4.00	56.080	1200	707748.849	733007.619	1.790
13	0.098	4.00	56.170	1200	707739.264	733008.337	2.100
14	0.824	4.00	57.220	1200	707552.358	733030.718	1.450
15	0.082	4.00	56.810	1200	707580.419	732974.310	1.535
16			56.900	1200	707583.499	732975.911	1.814
17	0.020	4.00	56.900	1200	707588.629	733018.388	1.500
18	0.085	4.00	56.750	1200	707607.207	732999.605	1.832
19	0.848	4.00	56.550	1200	707623.498	733015.910	1.799
20	0.022	4.00	57.600	1200	707557.536	733073.568	1.425
21	0.080	4.00	57.450	1200	707582.693	733098.703	1.986
22	0.118	4.00	57.240	1200	707639.436	733091.309	1.425
23	0.212	4.00	57.140	1200	707614.894	733066.788	2.279
24	0.215	4.00	56.860	1200	707655.360	733026.683	2.670
25			57.000	1200	707667.633	733023.067	2.853
26			55.150	1200	707672.207	732986.631	1.117
27			55.150	1200	707691.305	732984.076	1.181
28	0.057	4.00	57.000	1200	707712.245	732992.966	1.925
29	0.057	4.00	55.150	1200	707708.670	732977.575	1.243
30	0.083	4.00	56.830	1200	707590.871	732955.923	0.930
31	0.832	4.00	57.450	1200	707627.313	732896.089	2.242
32			57.600	1200	707635.462	732901.380	2.441
33	0.040	4.00	57.050	1200	707651.237	732917.100	2.336
34	0.028	4.00	57.020	1200	707638.572	732948.769	1.370
35	0.028	4.00	56.830	1200	707654.753	732932.519	1.295
36	0.090	4.00	56.860	1200	707662.206	732933.154	2.431
37	0.054	4.00	56.700	1200	707647.642	733001.609	1.491
38	0.061	4.00	56.410	1200	707689.219	732960.032	2.108
39			55.150	1200	707709.094	732954.197	1.335
40	0.058	4.00	55.750	1200	707809.077	732993.635	0.925
41	0.058	4.00	55.750	1200	707830.504	732966.107	1.425

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
42	0.029	4.00	56.050	1200	707830.561	732959.010	1.760
43	0.029	4.00	56.060	1200	707808.187	732936.671	1.928
44	0.046	4.00	56.240	1200	707793.010	732925.360	2.278
45	0.056	4.00	56.630	1200	707773.973	732906.324	2.776
46	0.058	4.00	56.400	1200	707731.229	732948.695	2.787
47	0.058	4.00	56.300	1200	707726.510	732973.051	1.425
48			56.450	1200	707725.039	732949.075	2.862
49			56.570	1500	707719.676	732942.481	2.808
50	0.078	4.00	56.790	1200	707667.288	732838.488	1.425
51	0.078	4.00	57.200	1200	707633.852	732886.667	2.128
52	0.055	4.00	56.690	1200	707690.123	732872.909	1.540
53	0.048	4.00	57.030	1200	707655.169	732907.984	2.234
54	0.085	4.00	56.600	1200	707697.549	732950.364	2.004
55	0.085	4.00	56.700	1200	707747.278	732900.622	1.425
56	0.085	4.00	56.700	1200	707715.184	732932.724	2.262
57			56.720	1200	707722.058	732940.127	2.961
58			55.740	1200	707731.855	732931.029	2.025
59			55.750	1200	707758.967	732903.921	1.065
60			56.900	1350	707765.933	732896.955	2.300
61	0.058	4.00	57.410	1200	707734.942	732764.697	1.425
62	0.093	4.00	57.400	1200	707770.349	732800.111	1.230
63	0.093	4.00	57.610	1200	707754.555	732784.314	1.839
64	0.043	4.00	57.170	1200	707733.946	732804.922	1.863
65	0.043	4.00	57.180	1200	707731.572	732816.684	1.933
66	0.078	4.00	57.110	1200	707713.370	732772.930	1.400
67	0.078	4.00	56.800	1200	707679.556	732820.801	1.556
68	0.081	4.00	56.750	1200	707703.518	732844.753	1.776
69	0.043	4.00	56.800	1200	707715.962	732866.502	1.951
70	0.085	4.00	56.800	1200	707729.757	732880.144	2.091
71	0.043	4.00	57.100	1200	707785.360	732827.871	1.425
72	0.043	4.00	57.100	1200	707775.426	732843.654	1.611
73	0.043	4.00	56.700	1200	707740.545	732878.534	2.027
74			56.700	1350	707749.441	732887.430	2.069
75	0.119	4.00	56.520	1200	707859.264	732852.421	1.430
76	0.046	4.00	57.020	1200	707804.877	732798.070	1.250
77	0.085	4.00	57.620	1350	707829.427	732822.604	2.750
78			57.000	1350	707791.921	732860.029	2.370
79	0.030	4.00	56.000	1350	707779.375	732862.434	1.413
80	0.030	4.00	56.000	1350	707766.010	732884.373	1.574
81	0.073	4.00	57.000	1200	707824.072	732839.343	1.125
82	0.078	4.00	57.000	1200	707793.051	732870.402	2.003
83	0.078	4.00	56.860	1350	707777.022	732896.708	2.595
84			56.580	1800	707777.981	732907.503	2.370
85			56.240	1200	707797.658	732927.180	2.130
86			56.020	1200	707807.268	732934.340	1.950
87			56.900	1200	707834.498	732961.081	2.957
88			55.630	1200	707841.014	732964.358	1.711
89	0.025	4.00	57.380	1200	707813.378	732773.344	1.425
90	0.025	4.00	57.900	1200	707816.530	732753.705	2.044
91	0.029	4.00	58.850	1200	707874.700	732763.043	1.425
92	0.045	4.00	58.240	1200	707849.689	732759.028	2.552
93	0.128	4.00	57.840	1200	707845.749	732783.568	2.330

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
94		4.00	56.000	1200	707885.570	732824.307	0.430
95	0.133	4.00	56.000	1200	707873.258	732811.989	1.530
96	0.053	4.00	56.000	1200	707892.179	732793.068	1.619
97	0.156	4.00	56.000	1200	707922.702	732797.973	1.722
98	0.118	4.00	56.000	1200	707925.756	732801.027	1.736
99			56.000	1200	707890.793	732835.990	1.901
100	0.138	4.00	56.590	1200	707868.297	732858.585	2.597
101	0.188	4.00	59.200	1200	707962.141	732812.736	1.425
102	0.237	4.00	56.820	1200	707892.325	732882.596	3.015
103	0.083	4.00	56.000	1200	707845.472	732946.315	1.125
104	0.083	4.00	56.550	1200	707881.315	732901.600	2.057
105			56.000	1500	707896.317	732886.586	2.214
106			56.740	1200	707899.695	732889.962	2.970
107			56.600	1200	707892.284	732899.924	2.955
107_OUT			56.000	1200	707907.707	732912.208	2.421

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	68.660	0.600	56.200	55.742	0.458	150.0	225	5.07	50.0
1.001	2	4	65.454	0.600	55.742	55.415	0.327	200.0	225	6.26	50.0
2.000	3	4	56.907	0.600	55.930	55.551	0.379	150.0	225	4.89	50.0
1.002	4	6	67.671	0.600	55.265	54.927	0.338	200.0	375	7.14	50.0
3.000	5	6	74.011	0.600	55.440	55.070	0.370	200.0	225	5.34	50.0
1.003	6	7	57.761	0.600	54.927	54.514	0.413	140.0	375	7.77	50.0
1.004	7	10	13.354	0.600	54.425	54.358	0.067	200.0	450	7.93	50.0
4.000	8	9	29.534	0.600	54.705	54.557	0.148	200.0	225	4.53	50.0
4.001	9	10	9.187	0.600	54.557	54.511	0.046	200.0	225	4.70	50.0
1.005	10	11	20.608	0.600	54.300	54.231	0.069	300.0	450	8.22	50.0
1.006	11	13	17.699	0.600	54.156	54.097	0.059	300.0	525	8.45	50.0
5.000	12	13	9.612	0.600	54.290	54.226	0.064	150.0	225	4.15	50.0
1.007	13	29	43.385	0.600	54.070	53.925	0.145	300.0	525	9.01	50.0
6.000	14	15	63.002	0.600	55.770	55.350	0.420	150.0	225	4.99	50.0

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)
1.000	1.065	42.3	16.3	0.895	1.333	0.090	0.0	96	0.995
1.001	0.921	36.6	33.2	1.333	1.160	0.184	0.0	169	1.040
2.000	1.065	42.3	21.3	1.005	1.024	0.118	0.0	113	1.067
1.002	1.277	141.1	80.4	1.160	0.878	0.445	0.0	203	1.318
3.000	0.921	36.6	33.6	1.015	0.885	0.186	0.0	170	1.040
1.003	1.529	168.9	147.6	0.878	1.111	0.817	0.0	273	1.714
1.004	1.434	228.0	158.5	1.125	1.022	0.877	0.0	277	1.544
4.000	0.921	36.6	10.5	0.900	1.268	0.058	0.0	82	0.796
4.001	0.921	36.6	21.0	1.268	1.094	0.116	0.0	122	0.950
1.005	1.168	185.8	190.3	1.080	1.339	1.053	0.0	383	1.320
1.006	1.288	278.8	201.1	1.339	1.548	1.113	0.0	331	1.397
5.000	1.065	42.3	10.3	1.565	1.719	0.057	0.0	75	0.880
1.007	1.288	278.8	229.1	1.575	0.700	1.268	0.0	364	1.430
6.000	1.065	42.3	148.9	1.225	1.235	0.824	0.0	225	1.085

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)
6.001	15	16	3.471	0.600	55.275	55.236	0.039	89.0	300	5.02	50.0
6.002	16	18	33.518	0.600	55.086	54.918	0.168	199.5	450	5.41	50.0
7.000	17	18	26.419	0.600	55.400	55.106	0.294	90.0	225	4.32	50.0
6.003	18	19	23.049	0.600	54.918	54.826	0.092	250.5	375	5.75	50.0
6.004	19	24	33.634	0.600	54.751	54.639	0.112	300.0	450	6.23	50.0
8.000	20	21	35.562	0.600	56.175	55.464	0.711	50.0	225	4.32	50.0
8.001	21	23	45.337	0.600	55.464	55.011	0.453	100.0	225	4.90	50.0
9.000	22	23	34.693	0.600	55.815	55.642	0.173	200.0	300	4.52	50.0
8.002	23	24	56.973	0.600	54.861	54.576	0.285	200.0	375	5.64	50.0
6.005	24	25	12.795	0.600	54.190	54.147	0.043	300.0	450	6.41	50.0
6.006	25	26	36.722	0.600	54.155	54.033	0.122	300.0	450	6.93	50.0
6.007	26	27	19.268	0.600	54.033	53.969	0.064	300.0	375	7.24	50.0
6.008	27	29	18.542	0.600	53.969	53.907	0.062	300.0	450	7.51	50.0
10.000	28	29	15.801	0.600	55.075	54.285	0.790	20.0	225	4.09	50.0
1.008	29	39	23.382	0.600	53.910	53.832	0.078	300.0	375	9.39	50.0
11.000	30	31	70.058	0.600	55.900	55.433	0.467	150.0	225	5.10	50.0
11.001	31	32	9.716	0.600	55.208	55.159	0.049	200.0	450	5.21	50.0
11.002	32	33	22.270	0.600	55.159	54.714	0.445	50.0	450	5.34	50.0
11.003	33	36	19.444	0.600	54.714	54.617	0.097	200.0	450	5.56	50.0
12.000	34	35	22.932	0.600	55.650	55.535	0.115	200.0	225	4.42	50.0
12.001	35	36	7.480	0.600	55.535	55.498	0.037	202.2	225	4.55	50.0
11.004	36	38	38.107	0.600	54.429	54.302	0.127	300.1	525	6.06	50.0
13.000	37	38	58.799	0.600	55.209	54.493	0.716	82.1	225	4.68	50.0
11.005	38	39	20.714	0.600	54.302	54.233	0.069	300.0	450	6.35	50.0

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)
6.001	1.667	117.8	163.7	1.235	1.364	0.906	0.0	300	1.688
6.002	1.435	228.3	163.7	1.364	1.382	0.906	0.0	283	1.555
7.000	1.379	54.8	3.6	1.275	1.419	0.020	0.0	39	0.787
6.003	1.140	125.9	182.7	1.457	1.349	1.011	0.0	375	1.155
6.004	1.168	185.8	335.9	1.349	1.771	1.859	0.0	450	1.183
8.000	1.854	73.7	4.0	1.200	1.761	0.022	0.0	36	1.002
8.001	1.307	52.0	18.4	1.761	1.904	0.102	0.0	93	1.200
9.000	1.108	78.3	21.3	1.125	1.198	0.118	0.0	106	0.946
8.002	1.277	141.1	78.1	1.904	1.909	0.432	0.0	200	1.309
6.005	1.168	185.8	452.8	2.220	2.403	2.506	0.0	450	1.183
6.006	1.168	185.8	452.8	2.395	0.667	2.506	0.0	450	1.183
6.007	1.041	114.9	452.8	0.742	0.806	2.506	0.0	375	1.054
6.008	1.168	185.8	452.8	0.731	0.793	2.506	0.0	450	1.183
10.000	2.939	116.8	10.3	1.700	0.640	0.057	0.0	45	1.837
1.008	1.041	114.9	702.6	0.865	0.943	3.888	0.0	375	1.054
11.000	1.065	42.3	15.0	0.705	1.792	0.083	0.0	93	0.977
11.001	1.434	228.0	165.3	1.792	1.991	0.915	0.0	285	1.557
11.002	2.880	458.1	165.3	1.991	1.886	0.915	0.0	187	2.658
11.003	1.434	228.0	172.6	1.886	1.793	0.955	0.0	294	1.570
12.000	0.921	36.6	5.1	1.145	1.070	0.028	0.0	57	0.652
12.001	0.916	36.4	10.1	1.070	1.137	0.056	0.0	81	0.788
11.004	1.288	278.7	199.0	1.906	1.583	1.101	0.0	329	1.393
13.000	1.444	57.4	9.8	1.266	1.692	0.054	0.0	63	1.085
11.005	1.168	185.8	219.7	1.658	0.467	1.216	0.0	450	1.183

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.009	39	49	15.787	0.600	53.815	53.762	0.053	300.0	450	9.61	49.8
14.000	40	41	34.884	0.600	54.825	54.651	0.174	200.0	225	4.63	50.0
14.001	41	42	7.097	0.600	54.325	54.290	0.035	200.0	225	4.76	50.0
14.002	42	43	31.617	0.600	54.290	54.132	0.158	200.0	225	5.33	50.0
14.003	43	44	18.928	0.600	54.132	54.037	0.095	200.0	225	5.67	50.0
14.004	44	45	26.922	0.600	53.962	53.854	0.108	250.0	300	6.13	50.0
14.005	45	46	60.186	0.600	53.854	53.613	0.241	250.0	300	7.14	50.0
14.006	46	48	6.202	0.600	53.613	53.588	0.025	250.0	300	7.25	50.0
15.000	47	48	24.021	0.600	54.875	54.395	0.480	50.0	225	4.22	50.0
14.007	48	49	8.500	0.600	53.839	53.805	0.034	250.0	375	7.37	50.0
1.010	49	57	3.349	0.600	53.770	53.759	0.011	300.0	450	9.66	49.6
16.000	50	51	58.645	0.600	55.365	55.072	0.293	200.0	225	5.06	50.0
16.001	51	53	30.147	0.600	55.072	54.871	0.201	150.0	225	5.53	50.0
17.000	52	53	49.518	0.600	55.150	54.902	0.248	200.0	225	4.90	50.0
16.002	53	54	59.934	0.600	54.796	54.596	0.200	300.0	300	6.64	50.0
16.003	54	56	24.943	0.600	54.596	54.513	0.083	300.0	300	7.10	50.0
18.000	55	56	45.393	0.600	55.275	55.048	0.227	200.0	225	4.82	50.0
16.004	56	57	10.102	0.600	54.438	54.387	0.051	200.0	375	7.23	50.0
1.011	57	58	13.370	0.600	53.760	53.715	0.045	300.0	450	9.85	49.2
1.012	58	59	38.339	0.600	54.825	54.697	0.128	300.0	375	10.46	47.8
1.013	59	60	9.851	0.600	54.685	54.652	0.033	300.0	450	10.60	47.4
1.014	60	84	16.013	0.600	54.600	54.210	0.390	41.1	450	10.69	47.3
19.000	61	63	27.740	0.600	55.985	55.846	0.139	200.0	225	4.50	50.0
20.000	62	63	22.338	0.600	56.170	55.771	0.399	56.0	225	4.21	50.0

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)
1.009	1.168	185.8	917.8	0.885	2.358	5.104	0.0	450	1.183
14.000	0.921	36.6	10.5	0.700	0.874	0.058	0.0	82	0.796
14.001	0.921	36.6	21.0	1.200	1.535	0.116	0.0	122	0.950
14.002	0.921	36.6	26.2	1.535	1.703	0.145	0.0	141	0.999
14.003	0.921	36.6	31.4	1.703	1.978	0.174	0.0	161	1.032
14.004	0.990	70.0	39.8	1.978	2.476	0.220	0.0	162	1.020
14.005	0.990	70.0	49.9	2.476	2.487	0.276	0.0	188	1.072
14.006	0.990	70.0	60.4	2.487	2.562	0.334	0.0	216	1.109
15.000	1.854	73.7	10.5	1.200	1.830	0.058	0.0	57	1.317
14.007	1.141	126.0	70.8	2.236	2.390	0.392	0.0	201	1.173
1.010	1.168	185.8	986.0	2.350	2.511	5.496	0.0	450	1.183
16.000	0.921	36.6	14.1	1.200	1.903	0.078	0.0	97	0.863
16.001	1.065	42.3	28.2	1.903	1.934	0.156	0.0	134	1.137
17.000	0.921	36.6	9.9	1.315	1.903	0.055	0.0	80	0.783
16.002	0.902	63.8	46.8	1.934	1.704	0.259	0.0	191	0.983
16.003	0.902	63.8	62.2	1.704	1.887	0.344	0.0	241	1.023
18.000	0.921	36.6	15.4	1.200	1.427	0.085	0.0	102	0.881
16.004	1.277	141.1	92.9	1.887	1.958	0.514	0.0	222	1.360
1.011	1.168	185.8	1068.1	2.510	1.575	6.010	0.0	450	1.183
1.012	1.041	114.9	1037.4	0.540	0.678	6.010	0.0	375	1.054
1.013	1.168	185.8	1030.6	0.615	1.798	6.010	0.0	450	1.183
1.014	3.180	505.7	1026.6	1.850	1.920	6.010	0.0	450	3.220
19.000	0.921	36.6	10.5	1.200	1.539	0.058	0.0	82	0.796
20.000	1.751	69.6	16.8	1.005	1.614	0.093	0.0	75	1.449

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)
19.001	63	64	29.145	0.600	55.771	55.382	0.389	75.0	225	4.82	50.0
19.002	64	65	11.999	0.600	55.307	55.247	0.060	200.0	300	5.00	50.0
19.003	65	68	39.685	0.600	55.247	55.049	0.198	200.0	300	5.60	50.0
21.000	66	67	58.609	0.600	55.710	55.319	0.391	150.0	225	4.92	50.0
21.001	67	68	33.880	0.600	55.244	55.075	0.169	200.5	300	5.43	50.0
19.004	68	69	25.057	0.600	54.974	54.849	0.125	200.0	375	5.93	50.0
19.005	69	70	19.401	0.600	54.849	54.784	0.065	300.0	375	6.24	50.0
19.006	70	73	10.907	0.600	54.709	54.673	0.036	300.0	450	6.39	50.0
22.000	71	72	18.649	0.600	55.675	55.489	0.186	100.0	225	4.24	50.0
22.001	72	73	49.328	0.600	55.489	54.996	0.493	100.0	225	4.87	50.0
19.007	73	74	12.581	0.600	54.673	54.631	0.042	300.0	450	6.57	50.0
19.008	74	80	16.849	0.600	54.631	54.575	0.056	300.0	450	6.81	50.0
23.000	75	77	42.182	0.600	55.090	54.879	0.211	200.0	300	4.63	50.0
24.000	76	77	34.708	0.600	55.770	55.596	0.174	200.0	225	4.63	50.0
23.001	77	78	52.984	0.600	54.870	54.693	0.177	300.0	375	5.48	50.0
23.002	78	79	12.774	0.600	54.630	54.587	0.043	300.0	375	5.69	50.0
23.003	79	80	25.689	0.600	54.587	54.501	0.086	298.7	375	6.10	50.0
19.009	80	83	16.535	0.600	54.426	54.371	0.055	300.6	450	7.05	50.0
25.000	81	82	43.897	0.600	55.875	54.997	0.878	50.0	225	4.39	50.0
25.001	82	83	30.805	0.600	54.997	54.843	0.154	200.0	225	4.95	50.0
19.010	83	84	10.838	0.600	54.265	54.229	0.036	300.0	450	7.21	50.0
1.015	84	85	27.827	0.600	54.210	54.117	0.093	300.0	300	11.20	46.2
1.016	85	86	11.984	0.600	54.110	54.070	0.040	300.0	300	11.42	45.7
1.017	86	87	38.165	0.600	54.070	53.943	0.127	300.0	300	12.13	44.4

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)
19.001	1.511	60.1	44.1	1.614	1.563	0.244	0.0	144	1.648
19.002	1.108	78.3	51.9	1.563	1.633	0.287	0.0	178	1.181
19.003	1.108	78.3	59.6	1.633	1.401	0.330	0.0	197	1.216
21.000	1.065	42.3	14.1	1.175	1.256	0.078	0.0	89	0.960
21.001	1.106	78.2	28.2	1.256	1.375	0.156	0.0	125	1.020
19.004	1.277	141.1	102.5	1.401	1.576	0.567	0.0	238	1.388
19.005	1.041	114.9	110.2	1.576	1.641	0.610	0.0	296	1.178
19.006	1.168	185.8	125.6	1.641	1.577	0.695	0.0	272	1.251
22.000	1.307	52.0	7.8	1.200	1.386	0.043	0.0	58	0.944
22.001	1.307	52.0	15.5	1.386	1.479	0.086	0.0	84	1.143
19.007	1.168	185.8	148.9	1.577	1.619	0.824	0.0	306	1.293
19.008	1.168	185.8	148.9	1.619	0.975	0.824	0.0	306	1.293
23.000	1.108	78.3	21.5	1.130	2.441	0.119	0.0	107	0.948
24.000	0.921	36.6	8.3	1.025	1.799	0.046	0.0	73	0.747
23.001	1.041	114.9	45.2	2.375	1.932	0.250	0.0	163	0.980
23.002	1.041	114.9	45.2	1.995	1.038	0.250	0.0	163	0.980
23.003	1.043	115.2	50.6	1.038	1.124	0.280	0.0	174	1.011
19.009	1.167	185.6	204.9	1.124	2.039	1.134	0.0	450	1.182
25.000	1.854	73.7	13.2	0.900	1.778	0.073	0.0	65	1.416
25.001	0.921	36.6	27.3	1.778	1.792	0.151	0.0	145	1.008
19.010	1.168	185.8	246.3	2.145	1.901	1.363	0.0	450	1.183
1.015	0.902	63.8	1230.6	2.070	1.823	7.373	0.0	300	0.914
1.016	0.902	63.8	1218.7	1.830	1.650	7.373	0.0	300	0.914
1.017	0.902	63.8	1182.5	1.650	2.657	7.373	0.0	300	0.914

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.018	87	88	7.294	0.600	53.943	53.919	0.024	300.0	300	12.26	44.1
1.019	88	107	82.343	0.600	53.919	53.645	0.274	300.0	300	13.78	41.5
26.000	89	90	19.890	0.600	55.955	55.856	0.099	200.0	225	4.36	50.0
26.001	90	92	33.584	0.600	55.856	55.688	0.168	200.0	225	4.97	50.0
27.000	91	92	25.331	0.600	57.425	56.792	0.633	40.0	225	4.20	50.0
26.002	92	93	24.854	0.600	55.688	55.510	0.178	140.0	225	5.34	50.0
26.003	93	95	39.554	0.600	55.510	55.114	0.396	100.0	225	5.85	50.0
28.000	94	95	17.416	0.600	55.570	55.483	0.087	200.0	225	4.32	50.0
26.004	95	96	26.758	0.600	54.470	54.381	0.089	300.7	450	6.23	50.0
26.005	96	97	30.915	0.600	54.381	54.278	0.103	300.1	450	6.67	50.0
26.006	97	98	4.319	0.600	54.278	54.264	0.014	300.0	450	6.73	50.0
26.007	98	99	49.445	0.600	54.264	54.099	0.165	300.0	450	7.44	50.0
26.008	99	100	31.884	0.600	54.099	53.993	0.106	300.0	450	7.89	50.0
26.009	100	102	33.969	0.600	53.993	53.880	0.113	300.0	450	8.38	50.0
29.000	101	102	98.766	0.600	57.775	54.483	3.292	30.0	225	4.69	50.0
26.010	102	105	5.644	0.600	53.805	53.786	0.019	300.0	525	8.45	50.0
30.000	103	104	57.308	0.600	54.875	54.493	0.382	150.0	225	4.90	50.0
30.001	104	105	21.225	0.600	54.493	54.352	0.141	150.0	225	5.23	50.0
26.011	105	106	4.776	0.600	53.786	53.770	0.016	300.0	525	8.51	50.0
26.012	106	107	12.416	0.600	53.770	53.729	0.041	300.0	525	8.67	50.0
1.020	107	107_OUT	19.717	0.600	53.645	53.579	0.066	300.0	300	14.15	41.0

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)
1.018	0.902	63.8	1175.9	2.657	1.411	7.373	0.0	300	0.914
1.019	0.902	63.8	1107.1	1.411	2.655	7.373	0.0	300	0.914
26.000	0.921	36.6	4.5	1.200	1.819	0.025	0.0	53	0.629
26.001	0.921	36.6	9.0	1.819	2.327	0.050	0.0	76	0.765
27.000	2.074	82.5	5.2	1.200	1.223	0.029	0.0	38	1.171
26.002	1.103	43.8	22.4	2.327	2.105	0.124	0.0	114	1.108
26.003	1.307	52.0	45.5	2.105	0.661	0.252	0.0	164	1.469
28.000	0.921	36.6	0.0	0.205	0.292	0.000	0.0	0	0.000
26.004	1.167	185.6	69.6	1.080	1.169	0.385	0.0	190	1.086
26.005	1.168	185.8	79.1	1.169	1.272	0.438	0.0	205	1.124
26.006	1.168	185.8	107.3	1.272	1.286	0.594	0.0	246	1.208
26.007	1.168	185.8	128.7	1.286	1.451	0.712	0.0	276	1.257
26.008	1.168	185.8	128.7	1.451	2.147	0.712	0.0	276	1.257
26.009	1.168	185.8	153.6	2.147	2.490	0.850	0.0	313	1.299
29.000	2.397	95.3	34.0	1.200	2.112	0.188	0.0	93	2.201
26.010	1.288	278.8	230.4	2.490	1.689	1.275	0.0	366	1.431
30.000	1.065	42.3	15.0	0.900	1.832	0.083	0.0	93	0.977
30.001	1.065	42.3	30.0	1.832	1.423	0.166	0.0	140	1.153
26.011	1.288	278.8	260.4	1.689	2.445	1.441	0.0	405	1.453
26.012	1.288	278.8	260.4	2.445	2.346	1.441	0.0	405	1.453
1.020	0.902	63.8	1305.5	2.655	2.121	8.814	0.0	300	0.914

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	68.660	150.0	225	Circular	57.320	56.200	0.895	57.300	55.742	1.333
1.001	65.454	200.0	225	Circular	57.300	55.742	1.333	56.800	55.415	1.160
2.000	56.907	150.0	225	Circular	57.160	55.930	1.005	56.800	55.551	1.024
1.002	67.671	200.0	375	Circular	56.800	55.265	1.160	56.180	54.927	0.878
3.000	74.011	200.0	225	Circular	56.680	55.440	1.015	56.180	55.070	0.885
1.003	57.761	140.0	375	Circular	56.180	54.927	0.878	56.000	54.514	1.111
1.004	13.354	200.0	450	Circular	56.000	54.425	1.125	55.830	54.358	1.022
4.000	29.534	200.0	225	Circular	55.830	54.705	0.900	56.050	54.557	1.268
4.001	9.187	200.0	225	Circular	56.050	54.557	1.268	55.830	54.511	1.094
1.005	20.608	300.0	450	Circular	55.830	54.300	1.080	56.020	54.231	1.339
1.006	17.699	300.0	525	Circular	56.020	54.156	1.339	56.170	54.097	1.548
5.000	9.612	150.0	225	Circular	56.080	54.290	1.565	56.170	54.226	1.719
1.007	43.385	300.0	525	Circular	56.170	54.070	1.575	55.150	53.925	0.700
6.000	63.002	150.0	225	Circular	57.220	55.770	1.225	56.810	55.350	1.235
6.001	3.471	89.0	300	Circular	56.810	55.275	1.235	56.900	55.236	1.364
6.002	33.518	199.5	450	Circular	56.900	55.086	1.364	56.750	54.918	1.382
7.000	26.419	90.0	225	Circular	56.900	55.400	1.275	56.750	55.106	1.419
6.003	23.049	250.5	375	Circular	56.750	54.918	1.457	56.550	54.826	1.349
6.004	33.634	300.0	450	Circular	56.550	54.751	1.349	56.860	54.639	1.771
8.000	35.562	50.0	225	Circular	57.600	56.175	1.200	57.450	55.464	1.761
8.001	45.337	100.0	225	Circular	57.450	55.464	1.761	57.140	55.011	1.904
9.000	34.693	200.0	300	Circular	57.240	55.815	1.125	57.140	55.642	1.198
8.002	56.973	200.0	375	Circular	57.140	54.861	1.904	56.860	54.576	1.909
6.005	12.795	300.0	450	Circular	56.860	54.190	2.220	57.000	54.147	2.403
6.006	36.722	300.0	450	Circular	57.000	54.155	2.395	55.150	54.033	0.667

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
2.000	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.002	4	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
3.000	5	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
1.003	6	1200	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.004	7	1350	Manhole	Adoptable	10	1200	Manhole	Adoptable
4.000	8	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
4.001	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
1.005	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
1.006	11	1200	Manhole	Adoptable	13	1200	Manhole	Adoptable
5.000	12	1200	Manhole	Adoptable	13	1200	Manhole	Adoptable
1.007	13	1200	Manhole	Adoptable	29	1200	Manhole	Adoptable
6.000	14	1200	Manhole	Adoptable	15	1200	Manhole	Adoptable
6.001	15	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
6.002	16	1200	Manhole	Adoptable	18	1200	Manhole	Adoptable
7.000	17	1200	Manhole	Adoptable	18	1200	Manhole	Adoptable
6.003	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
6.004	19	1200	Manhole	Adoptable	24	1200	Manhole	Adoptable
8.000	20	1200	Manhole	Adoptable	21	1200	Manhole	Adoptable
8.001	21	1200	Manhole	Adoptable	23	1200	Manhole	Adoptable
9.000	22	1200	Manhole	Adoptable	23	1200	Manhole	Adoptable
8.002	23	1200	Manhole	Adoptable	24	1200	Manhole	Adoptable
6.005	24	1200	Manhole	Adoptable	25	1200	Manhole	Adoptable
6.006	25	1200	Manhole	Adoptable	26	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
6.007	19.268	300.0	375	Circular	55.150	54.033	0.742	55.150	53.969	0.806
6.008	18.542	300.0	450	Circular	55.150	53.969	0.731	55.150	53.907	0.793
10.000	15.801	20.0	225	Circular	57.000	55.075	1.700	55.150	54.285	0.640
1.008	23.382	300.0	375	Circular	55.150	53.910	0.865	55.150	53.832	0.943
11.000	70.058	150.0	225	Circular	56.830	55.900	0.705	57.450	55.433	1.792
11.001	9.716	200.0	450	Circular	57.450	55.208	1.792	57.600	55.159	1.991
11.002	22.270	50.0	450	Circular	57.600	55.159	1.991	57.050	54.714	1.886
11.003	19.444	200.0	450	Circular	57.050	54.714	1.886	56.860	54.617	1.793
12.000	22.932	200.0	225	Circular	57.020	55.650	1.145	56.830	55.535	1.070
12.001	7.480	202.2	225	Circular	56.830	55.535	1.070	56.860	55.498	1.137
11.004	38.107	300.1	525	Circular	56.860	54.429	1.906	56.410	54.302	1.583
13.000	58.799	82.1	225	Circular	56.700	55.209	1.266	56.410	54.493	1.692
11.005	20.714	300.0	450	Circular	56.410	54.302	1.658	55.150	54.233	0.467
1.009	15.787	300.0	450	Circular	55.150	53.815	0.885	56.570	53.762	2.358
14.000	34.884	200.0	225	Circular	55.750	54.825	0.700	55.750	54.651	0.874
14.001	7.097	200.0	225	Circular	55.750	54.325	1.200	56.050	54.290	1.535
14.002	31.617	200.0	225	Circular	56.050	54.290	1.535	56.060	54.132	1.703
14.003	18.928	200.0	225	Circular	56.060	54.132	1.703	56.240	54.037	1.978
14.004	26.922	250.0	300	Circular	56.240	53.962	1.978	56.630	53.854	2.476
14.005	60.186	250.0	300	Circular	56.630	53.854	2.476	56.400	53.613	2.487
14.006	6.202	250.0	300	Circular	56.400	53.613	2.487	56.450	53.588	2.562
15.000	24.021	50.0	225	Circular	56.300	54.875	1.200	56.450	54.395	1.830
14.007	8.500	250.0	375	Circular	56.450	53.839	2.236	56.570	53.805	2.390
1.010	3.349	300.0	450	Circular	56.570	53.770	2.350	56.720	53.759	2.511
16.000	58.645	200.0	225	Circular	56.790	55.365	1.200	57.200	55.072	1.903

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
6.007	26	1200	Manhole	Adoptable	27	1200	Manhole	Adoptable
6.008	27	1200	Manhole	Adoptable	29	1200	Manhole	Adoptable
10.000	28	1200	Manhole	Adoptable	29	1200	Manhole	Adoptable
1.008	29	1200	Manhole	Adoptable	39	1200	Manhole	Adoptable
11.000	30	1200	Manhole	Adoptable	31	1200	Manhole	Adoptable
11.001	31	1200	Manhole	Adoptable	32	1200	Manhole	Adoptable
11.002	32	1200	Manhole	Adoptable	33	1200	Manhole	Adoptable
11.003	33	1200	Manhole	Adoptable	36	1200	Manhole	Adoptable
12.000	34	1200	Manhole	Adoptable	35	1200	Manhole	Adoptable
12.001	35	1200	Manhole	Adoptable	36	1200	Manhole	Adoptable
11.004	36	1200	Manhole	Adoptable	38	1200	Manhole	Adoptable
13.000	37	1200	Manhole	Adoptable	38	1200	Manhole	Adoptable
11.005	38	1200	Manhole	Adoptable	39	1200	Manhole	Adoptable
1.009	39	1200	Manhole	Adoptable	49	1500	Manhole	Adoptable
14.000	40	1200	Manhole	Adoptable	41	1200	Manhole	Adoptable
14.001	41	1200	Manhole	Adoptable	42	1200	Manhole	Adoptable
14.002	42	1200	Manhole	Adoptable	43	1200	Manhole	Adoptable
14.003	43	1200	Manhole	Adoptable	44	1200	Manhole	Adoptable
14.004	44	1200	Manhole	Adoptable	45	1200	Manhole	Adoptable
14.005	45	1200	Manhole	Adoptable	46	1200	Manhole	Adoptable
14.006	46	1200	Manhole	Adoptable	48	1200	Manhole	Adoptable
15.000	47	1200	Manhole	Adoptable	48	1200	Manhole	Adoptable
14.007	48	1200	Manhole	Adoptable	49	1500	Manhole	Adoptable
1.010	49	1500	Manhole	Adoptable	57	1200	Manhole	Adoptable
16.000	50	1200	Manhole	Adoptable	51	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
16.001	30.147	150.0	225	Circular	57.200	55.072	1.903	57.030	54.871	1.934
17.000	49.518	200.0	225	Circular	56.690	55.150	1.315	57.030	54.902	1.903
16.002	59.934	300.0	300	Circular	57.030	54.796	1.934	56.600	54.596	1.704
16.003	24.943	300.0	300	Circular	56.600	54.596	1.704	56.700	54.513	1.887
18.000	45.393	200.0	225	Circular	56.700	55.275	1.200	56.700	55.048	1.427
16.004	10.102	200.0	375	Circular	56.700	54.438	1.887	56.720	54.387	1.958
1.011	13.370	300.0	450	Circular	56.720	53.760	2.510	55.740	53.715	1.575
1.012	38.339	300.0	375	Circular	55.740	54.825	0.540	55.750	54.697	0.678
1.013	9.851	300.0	450	Circular	55.750	54.685	0.615	56.900	54.652	1.798
1.014	16.013	41.1	450	Circular	56.900	54.600	1.850	56.580	54.210	1.920
19.000	27.740	200.0	225	Circular	57.410	55.985	1.200	57.610	55.846	1.539
20.000	22.338	56.0	225	Circular	57.400	56.170	1.005	57.610	55.771	1.614
19.001	29.145	75.0	225	Circular	57.610	55.771	1.614	57.170	55.382	1.563
19.002	11.999	200.0	300	Circular	57.170	55.307	1.563	57.180	55.247	1.633
19.003	39.685	200.0	300	Circular	57.180	55.247	1.633	56.750	55.049	1.401
21.000	58.609	150.0	225	Circular	57.110	55.710	1.175	56.800	55.319	1.256
21.001	33.880	200.5	300	Circular	56.800	55.244	1.256	56.750	55.075	1.375
19.004	25.057	200.0	375	Circular	56.750	54.974	1.401	56.800	54.849	1.576
19.005	19.401	300.0	375	Circular	56.800	54.849	1.576	56.800	54.784	1.641
19.006	10.907	300.0	450	Circular	56.800	54.709	1.641	56.700	54.673	1.577
22.000	18.649	100.0	225	Circular	57.100	55.675	1.200	57.100	55.489	1.386
22.001	49.328	100.0	225	Circular	57.100	55.489	1.386	56.700	54.996	1.479
19.007	12.581	300.0	450	Circular	56.700	54.673	1.577	56.700	54.631	1.619
19.008	16.849	300.0	450	Circular	56.700	54.631	1.619	56.000	54.575	0.975
23.000	42.182	200.0	300	Circular	56.520	55.090	1.130	57.620	54.879	2.441

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
16.001	51	1200	Manhole	Adoptable	53	1200	Manhole	Adoptable
17.000	52	1200	Manhole	Adoptable	53	1200	Manhole	Adoptable
16.002	53	1200	Manhole	Adoptable	54	1200	Manhole	Adoptable
16.003	54	1200	Manhole	Adoptable	56	1200	Manhole	Adoptable
18.000	55	1200	Manhole	Adoptable	56	1200	Manhole	Adoptable
16.004	56	1200	Manhole	Adoptable	57	1200	Manhole	Adoptable
1.011	57	1200	Manhole	Adoptable	58	1200	Manhole	Adoptable
1.012	58	1200	Manhole	Adoptable	59	1200	Manhole	Adoptable
1.013	59	1200	Manhole	Adoptable	60	1350	Manhole	Adoptable
1.014	60	1350	Manhole	Adoptable	84	1800	Manhole	Adoptable
19.000	61	1200	Manhole	Adoptable	63	1200	Manhole	Adoptable
20.000	62	1200	Manhole	Adoptable	63	1200	Manhole	Adoptable
19.001	63	1200	Manhole	Adoptable	64	1200	Manhole	Adoptable
19.002	64	1200	Manhole	Adoptable	65	1200	Manhole	Adoptable
19.003	65	1200	Manhole	Adoptable	68	1200	Manhole	Adoptable
21.000	66	1200	Manhole	Adoptable	67	1200	Manhole	Adoptable
21.001	67	1200	Manhole	Adoptable	68	1200	Manhole	Adoptable
19.004	68	1200	Manhole	Adoptable	69	1200	Manhole	Adoptable
19.005	69	1200	Manhole	Adoptable	70	1200	Manhole	Adoptable
19.006	70	1200	Manhole	Adoptable	73	1200	Manhole	Adoptable
22.000	71	1200	Manhole	Adoptable	72	1200	Manhole	Adoptable
22.001	72	1200	Manhole	Adoptable	73	1200	Manhole	Adoptable
19.007	73	1200	Manhole	Adoptable	74	1350	Manhole	Adoptable
19.008	74	1350	Manhole	Adoptable	80	1350	Manhole	Adoptable
23.000	75	1200	Manhole	Adoptable	77	1350	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
24.000	34.708	200.0	225	Circular	57.020	55.770	1.025	57.620	55.596	1.799
23.001	52.984	300.0	375	Circular	57.620	54.870	2.375	57.000	54.693	1.932
23.002	12.774	300.0	375	Circular	57.000	54.630	1.995	56.000	54.587	1.038
23.003	25.689	298.7	375	Circular	56.000	54.587	1.038	56.000	54.501	1.124
19.009	16.535	300.6	450	Circular	56.000	54.426	1.124	56.860	54.371	2.039
25.000	43.897	50.0	225	Circular	57.000	55.875	0.900	57.000	54.997	1.778
25.001	30.805	200.0	225	Circular	57.000	54.997	1.778	56.860	54.843	1.792
19.010	10.838	300.0	450	Circular	56.860	54.265	2.145	56.580	54.229	1.901
1.015	27.827	300.0	300	Circular	56.580	54.210	2.070	56.240	54.117	1.823
1.016	11.984	300.0	300	Circular	56.240	54.110	1.830	56.020	54.070	1.650
1.017	38.165	300.0	300	Circular	56.020	54.070	1.650	56.900	53.943	2.657
1.018	7.294	300.0	300	Circular	56.900	53.943	2.657	55.630	53.919	1.411
1.019	82.343	300.0	300	Circular	55.630	53.919	1.411	56.600	53.645	2.655
26.000	19.890	200.0	225	Circular	57.380	55.955	1.200	57.900	55.856	1.819
26.001	33.584	200.0	225	Circular	57.900	55.856	1.819	58.240	55.688	2.327
27.000	25.331	40.0	225	Circular	58.850	57.425	1.200	58.240	56.792	1.223
26.002	24.854	140.0	225	Circular	58.240	55.688	2.327	57.840	55.510	2.105
26.003	39.554	100.0	225	Circular	57.840	55.510	2.105	56.000	55.114	0.661
28.000	17.416	200.0	225	Circular	56.000	55.570	0.205	56.000	55.483	0.292
26.004	26.758	300.7	450	Circular	56.000	54.470	1.080	56.000	54.381	1.169
26.005	30.915	300.1	450	Circular	56.000	54.381	1.169	56.000	54.278	1.272
26.006	4.319	300.0	450	Circular	56.000	54.278	1.272	56.000	54.264	1.286
26.007	49.445	300.0	450	Circular	56.000	54.264	1.286	56.000	54.099	1.451
26.008	31.884	300.0	450	Circular	56.000	54.099	1.451	56.590	53.993	2.147
26.009	33.969	300.0	450	Circular	56.590	53.993	2.147	56.820	53.880	2.490

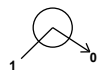
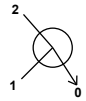
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
24.000	76	1200	Manhole	Adoptable	77	1350	Manhole	Adoptable
23.001	77	1350	Manhole	Adoptable	78	1350	Manhole	Adoptable
23.002	78	1350	Manhole	Adoptable	79	1350	Manhole	Adoptable
23.003	79	1350	Manhole	Adoptable	80	1350	Manhole	Adoptable
19.009	80	1350	Manhole	Adoptable	83	1350	Manhole	Adoptable
25.000	81	1200	Manhole	Adoptable	82	1200	Manhole	Adoptable
25.001	82	1200	Manhole	Adoptable	83	1350	Manhole	Adoptable
19.010	83	1350	Manhole	Adoptable	84	1800	Manhole	Adoptable
1.015	84	1800	Manhole	Adoptable	85	1200	Manhole	Adoptable
1.016	85	1200	Manhole	Adoptable	86	1200	Manhole	Adoptable
1.017	86	1200	Manhole	Adoptable	87	1200	Manhole	Adoptable
1.018	87	1200	Manhole	Adoptable	88	1200	Manhole	Adoptable
1.019	88	1200	Manhole	Adoptable	107	1200	Manhole	Adoptable
26.000	89	1200	Manhole	Adoptable	90	1200	Manhole	Adoptable
26.001	90	1200	Manhole	Adoptable	92	1200	Manhole	Adoptable
27.000	91	1200	Manhole	Adoptable	92	1200	Manhole	Adoptable
26.002	92	1200	Manhole	Adoptable	93	1200	Manhole	Adoptable
26.003	93	1200	Manhole	Adoptable	95	1200	Manhole	Adoptable
28.000	94	1200	Manhole	Adoptable	95	1200	Manhole	Adoptable
26.004	95	1200	Manhole	Adoptable	96	1200	Manhole	Adoptable
26.005	96	1200	Manhole	Adoptable	97	1200	Manhole	Adoptable
26.006	97	1200	Manhole	Adoptable	98	1200	Manhole	Adoptable
26.007	98	1200	Manhole	Adoptable	99	1200	Manhole	Adoptable
26.008	99	1200	Manhole	Adoptable	100	1200	Manhole	Adoptable
26.009	100	1200	Manhole	Adoptable	102	1200	Manhole	Adoptable

Pipeline Schedule

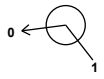
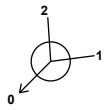
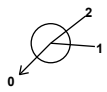
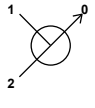
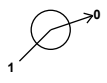
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
29.000	98.766	30.0	225	Circular	59.200	57.775	1.200	56.820	54.483	2.112
26.010	5.644	300.0	525	Circular	56.820	53.805	2.490	56.000	53.786	1.689
30.000	57.308	150.0	225	Circular	56.000	54.875	0.900	56.550	54.493	1.832
30.001	21.225	150.0	225	Circular	56.550	54.493	1.832	56.000	54.352	1.423
26.011	4.776	300.0	525	Circular	56.000	53.786	1.689	56.740	53.770	2.445
26.012	12.416	300.0	525	Circular	56.740	53.770	2.445	56.600	53.729	2.346
1.020	19.717	300.0	300	Circular	56.600	53.645	2.655	56.000	53.579	2.121

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
29.000	101	1200	Manhole	Adoptable	102	1200	Manhole	Adoptable
26.010	102	1200	Manhole	Adoptable	105	1500	Manhole	Adoptable
30.000	103	1200	Manhole	Adoptable	104	1200	Manhole	Adoptable
30.001	104	1200	Manhole	Adoptable	105	1500	Manhole	Adoptable
26.011	105	1500	Manhole	Adoptable	106	1200	Manhole	Adoptable
26.012	106	1200	Manhole	Adoptable	107	1200	Manhole	Adoptable
1.020	107	1200	Manhole	Adoptable	107_OUT	1200	Manhole	Adoptable

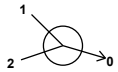
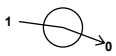
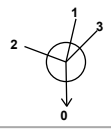
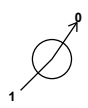
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	707582.615	733130.913	57.320	1.120	1200				
						0	1.000	56.200	225
2	707631.554	733179.070	57.300	1.558	1200		1	1.000	55.742	225
									
						0	1.001	55.742	225
3	707646.088	733103.044	57.160	1.230	1200				
						0	2.000	55.930	225
4	707686.346	733143.264	56.800	1.535	1200		1	2.000	55.551	225
							2	1.001	55.415	225
									
						0	1.002	55.265	375
5	707678.677	733040.140	56.680	1.240	1200				
						0	3.000	55.440	225
6	707731.036	733092.449	56.180	1.253	1200		1	3.000	55.070	225
							2	1.002	54.927	375
									
						0	1.003	54.927	375
7	707766.868	733047.149	56.000	1.575	1350		1	1.003	54.514	375
									
						0	1.004	54.425	450

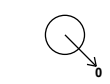
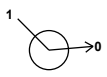
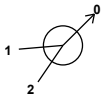
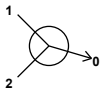
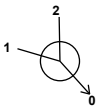
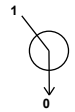
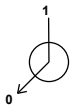
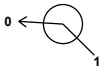
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	707795.011	733011.704	55.830	1.125	1200				
						0	4.000	54.705	225
9	707776.870	733035.010	56.050	1.493	1200		1	4.000	54.557	225
									
						0	4.001	54.557	225
10	707767.760	733033.825	55.830	1.530	1200		1	4.001	54.511	225
							2	1.004	54.358	450
						0	1.005	54.300	450
11	707753.222	733019.219	56.020	1.864	1200		1	1.005	54.231	450
									
						0	1.006	54.156	525
12	707748.849	733007.619	56.080	1.790	1200				
									
						0	5.000	54.290	225
13	707739.264	733008.337	56.170	2.100	1200		1	5.000	54.226	225
							2	1.006	54.097	525
						0	1.007	54.070	525
14	707552.358	733030.718	57.220	1.450	1200				
									
						0	6.000	55.770	225
15	707580.419	732974.310	56.810	1.535	1200		1	6.000	55.350	225
									
						0	6.001	55.275	300
16	707583.499	732975.911	56.900	1.814	1200		1	6.001	55.236	300
									
						0	6.002	55.086	450
17	707588.629	733018.388	56.900	1.500	1200				
									
						0	7.000	55.400	225
18	707607.207	732999.605	56.750	1.832	1200		1	7.000	55.106	225
							2	6.002	54.918	450
						0	6.003	54.918	375
19	707623.498	733015.910	56.550	1.799	1200		1	6.003	54.826	375
									
						0	6.004	54.751	450
20	707557.536	733073.568	57.600	1.425	1200				
									
						0	8.000	56.175	225

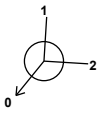
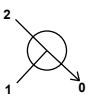
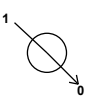
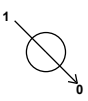
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
21	707582.693	733098.703	57.450	1.986	1200	1	8.000	55.464	225
									
						0	8.001	55.464	225
22	707639.436	733091.309	57.240	1.425	1200				
						0	9.000	55.815	300
23	707614.894	733066.788	57.140	2.279	1200	1	9.000	55.642	300
									
						2	8.001	55.011	225
						0	8.002	54.861	375
24	707655.360	733026.683	56.860	2.670	1200	1	8.002	54.576	375
									
						2	6.004	54.639	450
						0	6.005	54.190	450
25	707667.633	733023.067	57.000	2.853	1200	1	6.005	54.147	450
									
						0	6.006	54.155	450
26	707672.207	732986.631	55.150	1.117	1200	1	6.006	54.033	450
									
						0	6.007	54.033	375
27	707691.305	732984.076	55.150	1.181	1200	1	6.007	53.969	375
									
						0	6.008	53.969	450
28	707712.245	732992.966	57.000	1.925	1200				
						0	10.000	55.075	225
29	707708.670	732977.575	55.150	1.243	1200	1	10.000	54.285	225
									
						2	6.008	53.907	450
						3	1.007	53.925	525
						0	1.008	53.910	375
30	707590.871	732955.923	56.830	0.930	1200				
						0	11.000	55.900	225
31	707627.313	732896.089	57.450	2.242	1200	1	11.000	55.433	225
									
						0	11.001	55.208	450
32	707635.462	732901.380	57.600	2.441	1200	1	11.001	55.159	450
									
						0	11.002	55.159	450
33	707651.237	732917.100	57.050	2.336	1200	1	11.002	54.714	450
									
						0	11.003	54.714	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
34	707638.572	732948.769	57.020	1.370	1200				
						0	12.000	55.650	225
35	707654.753	732932.519	56.830	1.295	1200		1	12.000	55.535	225
						0	12.001	55.535	225
36	707662.206	732933.154	56.860	2.431	1200		1	12.001	55.498	225
							2	11.003	54.617	450
						0	11.004	54.429	525
37	707647.642	733001.609	56.700	1.491	1200				
						0	13.000	55.209	225
38	707689.219	732960.032	56.410	2.108	1200		1	13.000	54.493	225
							2	11.004	54.302	525
						0	11.005	54.302	450
39	707709.094	732954.197	55.150	1.335	1200		1	11.005	54.233	450
							2	1.008	53.832	375
						0	1.009	53.815	450
40	707809.077	732993.635	55.750	0.925	1200				
						0	14.000	54.825	225
41	707830.504	732966.107	55.750	1.425	1200		1	14.000	54.651	225
						0	14.001	54.325	225
42	707830.561	732959.010	56.050	1.760	1200		1	14.001	54.290	225
						0	14.002	54.290	225
43	707808.187	732936.671	56.060	1.928	1200		1	14.002	54.132	225
						0	14.003	54.132	225
44	707793.010	732925.360	56.240	2.278	1200		1	14.003	54.037	225
						0	14.004	53.962	300
45	707773.973	732906.324	56.630	2.776	1200		1	14.004	53.854	300
						0	14.005	53.854	300
46	707731.229	732948.695	56.400	2.787	1200		1	14.005	53.613	300
						0	14.006	53.613	300

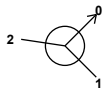
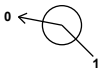
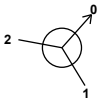
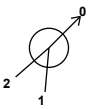
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
47	707726.510	732973.051	56.300	1.425	1200				
						0	15.000	54.875	225
48	707725.039	732949.075	56.450	2.862	1200				
						1	15.000	54.395	225
						2	14.006	53.588	300
						0	14.007	53.839	375
49	707719.676	732942.481	56.570	2.808	1500				
						1	14.007	53.805	375
						2	1.009	53.762	450
						0	1.010	53.770	450
50	707667.288	732838.488	56.790	1.425	1200				
						0	16.000	55.365	225
51	707633.852	732886.667	57.200	2.128	1200				
						1	16.000	55.072	225
						0	16.001	55.072	225
52	707690.123	732872.909	56.690	1.540	1200				
						0	17.000	55.150	225
53	707655.169	732907.984	57.030	2.234	1200				
						1	17.000	54.902	225
						2	16.001	54.871	225
						0	16.002	54.796	300
54	707697.549	732950.364	56.600	2.004	1200				
						1	16.002	54.596	300
						0	16.003	54.596	300
55	707747.278	732900.622	56.700	1.425	1200				
						0	18.000	55.275	225
56	707715.184	732932.724	56.700	2.262	1200				
						1	18.000	55.048	225
						2	16.003	54.513	300
						0	16.004	54.438	375
57	707722.058	732940.127	56.720	2.961	1200				
						1	16.004	54.387	375
						2	1.010	53.759	450
						0	1.011	53.760	450
58	707731.855	732931.029	55.740	2.025	1200				
						1	1.011	53.715	450
						0	1.012	54.825	375
59	707758.967	732903.921	55.750	1.065	1200				
						1	1.012	54.697	375
						0	1.013	54.685	450

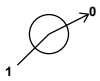
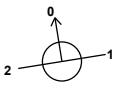
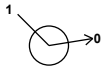
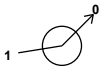
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
60	707765.933	732896.955	56.900	2.300	1350	1	1.013	54.652	450
						0	1.014	54.600	450
61	707734.942	732764.697	57.410	1.425	1200	0	19.000	55.985	225
62	707770.349	732800.111	57.400	1.230	1200	0	20.000	56.170	225
63	707754.555	732784.314	57.610	1.839	1200	1	20.000	55.771	225
						2	19.000	55.846	225
						0	19.001	55.771	225
64	707733.946	732804.922	57.170	1.863	1200	1	19.001	55.382	225
						0	19.002	55.307	300
65	707731.572	732816.684	57.180	1.933	1200	1	19.002	55.247	300
						0	19.003	55.247	300
66	707713.370	732772.930	57.110	1.400	1200	0	21.000	55.710	225
67	707679.556	732820.801	56.800	1.556	1200	1	21.000	55.319	225
						0	21.001	55.244	300
68	707703.518	732844.753	56.750	1.776	1200	1	21.001	55.075	300
						2	19.003	55.049	300
						0	19.004	54.974	375
69	707715.962	732866.502	56.800	1.951	1200	1	19.004	54.849	375
						0	19.005	54.849	375
70	707729.757	732880.144	56.800	2.091	1200	1	19.005	54.784	375
						0	19.006	54.709	450
71	707785.360	732827.871	57.100	1.425	1200	0	22.000	55.675	225
72	707775.426	732843.654	57.100	1.611	1200	1	22.000	55.489	225
						0	22.001	55.489	225

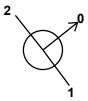
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
73	707740.545	732878.534	56.700	2.027	1200		1	22.001	54.996	225
							2	19.006	54.673	450
							0	19.007	54.673	450
74	707749.441	732887.430	56.700	2.069	1350		1	19.007	54.631	450
							0	19.008	54.631	450
75	707859.264	732852.421	56.520	1.430	1200		0	23.000	55.090	300
76	707804.877	732798.070	57.020	1.250	1200		0	24.000	55.770	225
77	707829.427	732822.604	57.620	2.750	1350		1	24.000	55.596	225
							2	23.000	54.879	300
							0	23.001	54.870	375
78	707791.921	732860.029	57.000	2.370	1350		1	23.001	54.693	375
							0	23.002	54.630	375
79	707779.375	732862.434	56.000	1.413	1350		1	23.002	54.587	375
							0	23.003	54.587	375
80	707766.010	732884.373	56.000	1.574	1350		1	23.003	54.501	375
							2	19.008	54.575	450
							0	19.009	54.426	450
81	707824.072	732839.343	57.000	1.125	1200		0	25.000	55.875	225
82	707793.051	732870.402	57.000	2.003	1200		1	25.000	54.997	225
							0	25.001	54.997	225
83	707777.022	732896.708	56.860	2.595	1350		1	25.001	54.843	225
							2	19.009	54.371	450
							0	19.010	54.265	450
84	707777.981	732907.503	56.580	2.370	1800		1	19.010	54.229	450
							2	1.014	54.210	450
							0	1.015	54.210	300
85	707797.658	732927.180	56.240	2.130	1200		1	1.015	54.117	300
							0	1.016	54.110	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
86	707807.268	732934.340	56.020	1.950	1200	1  0	1.016 1.017	54.070 54.070	300 300
87	707834.498	732961.081	56.900	2.957	1200	1  0	1.017 1.018	53.943 53.943	300 300
88	707841.014	732964.358	55.630	1.711	1200	1  0	1.018 1.019	53.919 53.919	300 300
89	707813.378	732773.344	57.380	1.425	1200	 0	26.000	55.955	225
90	707816.530	732753.705	57.900	2.044	1200	1  0	26.000 26.001	55.856 55.856	225 225
91	707874.700	732763.043	58.850	1.425	1200	 0	27.000	57.425	225
92	707849.689	732759.028	58.240	2.552	1200	1 2  0	27.000 26.001 26.002	56.792 55.688 55.688	225 225 225
93	707845.749	732783.568	57.840	2.330	1200	1  0	26.002 26.003	55.510 55.510	225 225
94	707885.570	732824.307	56.000	0.430	1200	 0	28.000	55.570	225
95	707873.258	732811.989	56.000	1.530	1200	1 2  0	28.000 26.003 26.004	55.483 55.114 54.470	225 225 450
96	707892.179	732793.068	56.000	1.619	1200	1  0	26.004 26.005	54.381 54.381	450 450
97	707922.702	732797.973	56.000	1.722	1200	1  0	26.005 26.006	54.278 54.278	450 450
98	707925.756	732801.027	56.000	1.736	1200	1  0	26.006 26.007	54.264 54.264	450 450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
99	707890.793	732835.990	56.000	1.901	1200	 1	26.007	54.099	450
						0	26.008	54.099	450
100	707868.297	732858.585	56.590	2.597	1200	 1	26.008	53.993	450
						0	26.009	53.993	450
101	707962.141	732812.736	59.200	1.425	1200				
						0	29.000	57.775	225
102	707892.325	732882.596	56.820	3.015	1200	 1	29.000	54.483	225
						2	26.009	53.880	450
						0	26.010	53.805	525
103	707845.472	732946.315	56.000	1.125	1200				
						0	30.000	54.875	225
104	707881.315	732901.600	56.550	2.057	1200	 1	30.000	54.493	225
						0	30.001	54.493	225
105	707896.317	732886.586	56.000	2.214	1500	 1	30.001	54.352	225
						2	26.010	53.786	525
						0	26.011	53.786	525
106	707899.695	732889.962	56.740	2.970	1200	 1	26.011	53.770	525
						0	26.012	53.770	525
107	707892.284	732899.924	56.600	2.955	1200	 1	26.012	53.729	525
						2	1.019	53.645	300
						0	1.020	53.645	300
107_OUT	707907.707	732912.208	56.000	2.421	1200	 1	1.020	53.579	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	Scotland and Ireland	Skip Steady State	x
M5-60 (mm)	17.300	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

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

Node 49 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	53.770	Product Number	CTL-SHE-0135-1180-2500-1180
Design Depth (m)	2.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	11.8	Min Node Diameter (mm)	1500

Node 84 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	54.210	Product Number	CTL-SHE-0181-1940-2000-1940
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	19.4	Min Node Diameter (mm)	1800

Node 106 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	53.770	Product Number	CTL-SHE-0075-3400-2000-3400
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.4	Min Node Diameter (mm)	1200

Node 26 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.033
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1198.0	0.0	1.200	1198.0	0.0	1.201	0.0	0.0

Node 27 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	53.969
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	105.0	0.0	1.200	105.0	0.0	1.201	0.0	0.0

Node 49 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	53.762
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	295.0	0.0	1.200	295.0	0.0	1.201	0.0	0.0

Node 59 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.685
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	429.0	0.0	0.550	429.0	0.0	0.551	0.0	0.0

Node 78 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.630
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	120

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	250.0	0.0	1.600	250.0	0.0	1.601	0.0	0.0

Node 80 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.426
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	665.0	0.0	0.250	665.0	0.0	0.251	0.0	0.0

Node 99 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.099
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	680.0	0.0	1.650	680.0	0.0	1.651	0.0	0.0

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	57.320	1.120	40.6	3.0666	1.3030	FLOOD
15 minute winter	2	11	57.221	1.479	70.5	3.4579	0.0000	FLOOD RISK
15 minute winter	3	11	56.982	1.052	53.1	3.2081	0.0000	FLOOD RISK
15 minute winter	4	11	56.580	1.315	143.3	3.9384	0.0000	FLOOD RISK
15 minute winter	5	10	56.680	1.240	83.8	5.1224	5.1497	FLOOD
15 minute winter	6	10	56.180	1.253	253.7	5.1373	9.4476	FLOOD
15 minute winter	7	11	55.618	1.193	223.0	2.6169	0.0000	SURCHARGED
15 minute winter	8	11	55.686	0.981	26.2	2.1208	0.0000	FLOOD RISK
15 minute winter	9	11	55.621	1.064	44.3	2.0306	0.0000	SURCHARGED
15 minute winter	10	11	55.521	1.221	277.5	2.3383	0.0000	SURCHARGED
15 minute winter	11	11	55.298	1.142	299.0	2.0272	0.0000	SURCHARGED
60 minute winter	12	39	55.250	0.960	13.4	1.6969	0.0000	SURCHARGED
60 minute winter	13	39	55.246	1.176	247.9	2.4275	0.0000	SURCHARGED
30 minute winter	14	13	57.220	1.450	291.3	18.1192	116.3607	FLOOD
15 minute summer	15	9	56.763	1.488	80.9	3.2732	0.0000	FLOOD RISK
15 minute winter	16	8	56.722	1.636	88.5	1.8499	0.0000	FLOOD RISK
15 minute winter	17	8	56.757	1.357	26.6	1.8973	0.0000	FLOOD RISK
15 minute winter	18	8	56.722	1.804	126.6	3.7151	0.0000	FLOOD RISK
15 minute winter	19	8	56.550	1.799	546.3	18.9938	110.0247	FLOOD
15 minute winter	20	10	57.476	1.301	41.4	1.8733	0.0000	FLOOD RISK
15 minute summer	21	10	57.450	1.986	62.7	3.8469	0.2864	FLOOD
15 minute winter	22	10	57.209	1.394	53.1	3.8847	0.0000	FLOOD RISK
15 minute winter	23	10	57.117	2.256	188.2	6.7464	0.0000	FLOOD RISK
15 minute summer	24	9	56.615	2.425	411.3	6.6481	0.0000	FLOOD RISK
15 minute winter	25	8	56.526	2.379	448.4	2.6908	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	1	1.000	2	30.1	0.854	0.710	2.7307	
15 minute winter	2	1.001	4	50.0	1.257	1.365	2.6032	
15 minute winter	3	2.000	4	41.8	1.159	0.987	2.2633	
15 minute winter	4	1.002	6	141.6	1.284	1.003	7.4639	
15 minute winter	5	3.000	6	42.8	1.076	1.169	2.9435	
15 minute winter	6	1.003	7	196.0	1.777	1.160	6.3709	
15 minute winter	7	1.004	10	217.3	1.372	0.953	2.1159	
15 minute winter	8	4.000	9	22.0	0.603	0.600	1.1746	
15 minute winter	9	4.001	10	43.9	1.104	1.200	0.3654	
15 minute winter	10	1.005	11	272.5	1.720	1.466	3.2652	
15 minute winter	11	1.006	13	294.9	1.365	1.058	3.8236	
60 minute winter	12	5.000	13	11.9	0.680	0.282	0.3823	
60 minute winter	13	1.007	29	246.3	1.140	0.884	9.3726	
30 minute winter	14	6.000	15	80.2	2.017	1.895	2.5057	
15 minute summer	15	6.001	16	92.3	1.598	0.783	0.2444	
15 minute winter	16	6.002	18	104.5	0.999	0.458	5.3107	
15 minute winter	17	7.000	18	-21.0	0.662	-0.383	1.0507	
15 minute winter	18	6.003	19	139.1	1.301	1.105	2.5422	
15 minute winter	19	6.004	24	278.1	1.756	1.497	5.3291	
15 minute winter	20	8.000	21	-32.9	-0.879	-0.446	1.4143	
15 minute summer	21	8.001	23	46.1	1.159	0.886	1.8031	
15 minute winter	22	9.000	23	53.1	0.876	0.678	2.4431	
15 minute winter	23	8.002	24	187.9	1.703	1.332	6.2840	
15 minute summer	24	6.005	25	425.4	2.685	2.290	2.0273	
15 minute winter	25	6.006	26	461.3	4.057	2.482	5.1273	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute winter	26	4080	55.150	1.117	15.0	1339.4290	2097.4730	FLOOD
4320 minute winter	27	1860	55.150	1.181	15.4	125.3407	13.1771	FLOOD
120 minute summer	28	132	55.151	0.076	11.4	0.1305	0.0000	OK
5760 minute winter	29	2460	55.150	1.243	12.7	2.5457	899.9350	FLOOD
15 minute winter	30	11	56.830	0.930	37.4	2.7119	0.9265	FLOOD
15 minute winter	31	11	56.760	1.552	389.6	13.2747	0.0000	SURCHARGED
15 minute winter	32	11	56.532	1.373	342.2	1.5529	0.0000	SURCHARGED
15 minute winter	33	11	56.160	1.446	358.2	2.1298	0.0000	SURCHARGED
15 minute winter	34	12	55.814	0.164	12.6	0.2530	0.0000	OK
15 minute winter	35	12	55.792	0.257	25.2	0.4016	0.0000	SURCHARGED
15 minute winter	36	11	55.785	1.356	407.5	2.5379	0.0000	SURCHARGED
15 minute winter	37	12	55.530	0.321	24.4	0.5957	0.0000	SURCHARGED
15 minute winter	38	12	55.451	1.149	442.5	1.9649	0.0000	SURCHARGED
1440 minute winter	39	690	55.150	1.335	34.9	1.5099	727.5891	FLOOD
15 minute winter	40	12	55.579	0.754	26.2	1.7973	0.0000	FLOOD RISK
15 minute winter	41	12	55.532	1.207	43.8	2.3472	0.0000	FLOOD RISK
15 minute winter	42	12	55.479	1.189	45.4	1.7377	0.0000	SURCHARGED
60 minute winter	43	38	55.437	1.305	32.2	1.8681	0.0000	SURCHARGED
60 minute winter	44	38	55.342	1.380	40.8	2.1178	0.0000	SURCHARGED
60 minute winter	45	39	55.299	1.445	51.8	2.2165	0.0000	SURCHARGED
60 minute summer	46	39	55.283	1.670	75.4	2.5838	0.0000	SURCHARGED
60 minute winter	47	38	55.296	0.421	13.6	0.8189	0.0000	SURCHARGED
60 minute summer	48	39	55.242	1.654	90.1	1.8703	0.0000	SURCHARGED
60 minute winter	49	38	55.206	1.444	323.8	356.6983	0.0000	SURCHARGED
15 minute winter	50	12	56.757	1.392	35.2	3.0985	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)
10080 minute winter	26	6.007	27	5.1	0.394	0.044	2.1252	
4320 minute winter	27	6.008	29	-15.4	0.223	-0.083	2.9379	
120 minute summer	28	10.000	29	11.4	1.352	0.097	0.4068	
5760 minute winter	29	1.008	39	8.1	0.420	0.071	2.5790	
15 minute winter	30	11.000	31	38.3	1.060	0.906	2.7863	
15 minute winter	31	11.001	32	342.2	2.160	1.501	1.5394	
15 minute winter	32	11.002	33	342.8	2.164	0.748	3.5285	
15 minute winter	33	11.003	36	358.9	2.265	1.574	3.0808	
15 minute winter	34	12.000	35	12.6	0.584	0.344	0.8121	
15 minute winter	35	12.001	36	24.8	0.973	0.681	0.2975	
15 minute winter	36	11.004	38	405.7	1.878	1.456	8.2324	
15 minute winter	37	13.000	38	23.2	0.817	0.404	2.3385	
15 minute winter	38	11.005	39	436.1	2.752	2.347	3.2820	
1440 minute winter	39	1.009	49	13.3	0.917	0.071	2.5013	
15 minute winter	40	14.000	41	18.3	0.895	0.501	1.3874	
15 minute winter	41	14.001	42	34.7	0.873	0.948	0.2823	
15 minute winter	42	14.002	43	43.5	1.094	1.189	1.2574	
60 minute winter	43	14.003	44	30.9	0.876	0.844	0.7528	
60 minute winter	44	14.004	45	39.4	0.639	0.563	1.8958	
60 minute winter	45	14.005	46	50.1	0.712	0.717	4.2383	
60 minute summer	46	14.006	48	73.2	1.040	1.046	0.4367	
60 minute winter	47	15.000	48	30.3	1.331	0.411	0.9553	
60 minute summer	48	14.007	49	86.9	0.788	0.690	0.9375	
60 minute winter	49	Hydro-Brake®	57	4.2				
15 minute winter	50	16.000	51	25.9	0.760	0.709	2.3324	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	51	12	56.599	1.527	55.9	2.8471	0.0000	SURCHARGED
15 minute winter	52	12	56.338	1.188	24.8	2.1913	0.0000	SURCHARGED
15 minute winter	53	12	56.264	1.468	83.5	2.2919	0.0000	SURCHARGED
15 minute winter	54	11	55.891	1.295	113.1	2.5623	0.0000	SURCHARGED
15 minute winter	55	11	55.761	0.486	38.3	1.1293	0.0000	SURCHARGED
360 minute winter	56	344	55.739	1.301	33.9	2.4498	0.0000	SURCHARGED
360 minute winter	57	344	55.739	1.980	37.3	2.2393	0.0000	SURCHARGED
360 minute winter	58	344	55.739	2.024	37.1	2.2890	0.0000	FLOOD RISK
360 minute winter	59	344	55.739	1.054	63.4	237.3561	0.0000	FLOOD RISK
360 minute winter	60	344	55.739	1.139	29.8	1.6293	0.0000	SURCHARGED
15 minute winter	61	12	57.281	1.296	26.2	2.5198	0.0000	FLOOD RISK
15 minute winter	62	12	57.322	1.152	41.9	3.0442	0.0000	FLOOD RISK
15 minute winter	63	12	57.239	1.468	87.0	3.1443	0.0000	SURCHARGED
15 minute winter	64	12	56.528	1.221	87.1	1.9457	0.0000	SURCHARGED
15 minute winter	65	11	56.409	1.162	100.7	1.8311	0.0000	SURCHARGED
15 minute winter	66	11	56.325	0.615	35.2	1.3813	0.0000	SURCHARGED
15 minute winter	67	11	56.138	0.894	65.3	1.9077	0.0000	SURCHARGED
15 minute winter	68	11	56.032	1.058	184.1	2.1624	0.0000	SURCHARGED
15 minute winter	69	11	55.746	0.897	198.9	1.4103	0.0000	SURCHARGED
360 minute winter	70	344	55.739	1.030	46.8	2.0033	0.0000	SURCHARGED
15 minute winter	71	10	55.772	0.097	19.4	0.1684	0.0000	OK
360 minute winter	72	344	55.740	0.251	5.8	0.4171	0.0000	SURCHARGED
360 minute winter	73	344	55.739	1.066	54.5	1.6583	0.0000	SURCHARGED
360 minute winter	74	344	55.739	1.108	53.7	1.5859	0.0000	SURCHARGED
360 minute winter	75	344	55.739	0.649	8.1	1.8150	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	51	16.001	53	50.1	1.260	1.184	1.1990	
15 minute winter	52	17.000	53	18.6	0.767	0.509	1.9694	
15 minute winter	53	16.002	54	85.0	1.207	1.332	4.2205	
15 minute winter	54	16.003	56	112.4	1.596	1.762	1.7565	
15 minute winter	55	18.000	56	33.8	0.985	0.922	1.8053	
360 minute winter	56	16.004	57	33.8	0.569	0.240	1.1142	
360 minute winter	57	1.011	58	37.1	0.234	0.200	2.1184	
360 minute winter	58	1.012	59	36.1	0.884	0.314	4.2287	
360 minute winter	59	1.013	60	-29.0	0.732	-0.156	1.5608	
360 minute winter	60	1.014	84	-29.8	0.196	-0.059	2.5372	
15 minute winter	61	19.000	63	19.4	0.787	0.531	1.1032	
15 minute winter	62	20.000	63	34.1	1.005	0.490	0.8884	
15 minute winter	63	19.001	64	75.0	1.886	1.248	1.1591	
15 minute winter	64	19.002	65	89.5	1.272	1.143	0.8450	
15 minute winter	65	19.003	68	103.9	1.475	1.327	2.7946	
15 minute winter	66	21.000	67	30.1	1.067	0.711	2.3309	
15 minute winter	67	21.001	68	55.3	0.909	0.707	2.3858	
15 minute winter	68	19.004	69	185.1	1.678	1.312	2.7637	
15 minute winter	69	19.005	70	199.9	1.813	1.739	2.1399	
360 minute winter	70	19.006	73	45.8	0.721	0.247	1.7281	
15 minute winter	71	22.000	72	19.4	0.901	0.374	0.4016	
360 minute winter	72	22.001	73	5.9	0.867	0.113	1.9618	
360 minute winter	73	19.007	74	53.7	0.859	0.289	1.9934	
360 minute winter	74	19.008	80	52.7	0.935	0.284	2.6696	
360 minute winter	75	23.000	77	8.1	0.579	0.103	2.9704	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	76	10	55.894	0.124	20.7	0.2319	0.0000	OK
360 minute winter	77	344	55.739	0.869	17.0	1.7821	0.0000	SURCHARGED
360 minute winter	78	344	55.739	1.109	56.2	278.9014	0.0000	SURCHARGED
360 minute winter	79	344	55.739	1.152	46.2	2.1385	0.0000	FLOOD RISK
360 minute winter	80	344	55.739	1.313	63.0	168.9632	0.0000	FLOOD RISK
15 minute winter	81	10	55.980	0.105	32.9	0.2541	0.0000	OK
360 minute winter	82	344	55.739	0.742	10.3	1.4175	0.0000	SURCHARGED
360 minute winter	83	344	55.739	1.474	50.1	2.9963	0.0000	SURCHARGED
360 minute winter	84	344	55.739	1.529	49.4	3.8901	0.0000	SURCHARGED
360 minute winter	85	160	54.232	0.122	19.4	0.1377	0.0000	OK
360 minute winter	86	160	54.185	0.115	19.4	0.1298	0.0000	OK
15 minute summer	87	37	54.066	0.123	19.4	0.1396	0.0000	OK
15 minute summer	88	37	54.031	0.112	19.4	0.1266	0.0000	OK
15 minute winter	89	11	56.900	0.945	34.1	1.3999	0.0000	SURCHARGED
15 minute winter	90	11	56.875	1.019	20.7	1.4027	0.0000	SURCHARGED
15 minute winter	91	10	57.487	0.062	13.1	0.0955	0.0000	OK
15 minute winter	92	11	56.844	1.156	43.7	1.7151	0.0000	SURCHARGED
15 minute winter	93	11	56.647	1.137	91.7	2.5348	0.0000	SURCHARGED
15 minute summer	94	1	55.570	0.000	0.0	0.0000	0.0000	OK
15 minute winter	95	9	55.522	1.052	141.1	3.0180	0.0000	SURCHARGED
2880 minute winter	96	2760	55.518	1.137	6.5	2.0306	0.0000	SURCHARGED
2880 minute winter	97	2760	55.518	1.240	8.7	3.6491	0.0000	SURCHARGED
2880 minute winter	98	2760	55.518	1.254	10.4	3.1223	0.0000	SURCHARGED
2880 minute winter	99	2760	55.518	1.419	18.1	966.4634	0.0000	SURCHARGED
2880 minute winter	100	2760	55.518	1.525	7.9	3.3456	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	76	24.000	77	20.5	0.938	0.560	0.7588	
360 minute winter	77	23.001	78	16.5	0.731	0.143	5.8440	
360 minute winter	78	23.002	79	-47.4	-0.751	-0.412	1.4089	
360 minute winter	79	23.003	80	-44.8	0.588	-0.389	2.8334	
360 minute winter	80	19.009	83	34.6	0.633	0.186	2.6199	
15 minute winter	81	25.000	82	32.9	0.985	0.446	1.2693	
360 minute winter	82	25.001	83	10.3	0.779	0.280	1.2251	
360 minute winter	83	19.010	84	49.4	0.410	0.266	1.7172	
360 minute winter	84	Hydro-Brake®	85	19.4				
360 minute winter	85	1.016	86	19.4	0.751	0.304	0.3091	
360 minute winter	86	1.017	87	19.4	0.744	0.303	0.9934	
15 minute summer	87	1.018	88	19.4	1.008	0.304	0.1869	
15 minute summer	88	1.019	107	19.4	0.754	0.304	2.1255	
15 minute winter	89	26.000	90	-22.8	0.606	-0.622	0.7910	
15 minute winter	90	26.001	92	24.4	0.614	0.666	1.3357	
15 minute winter	91	27.000	92	13.1	1.502	0.159	0.2210	
15 minute winter	92	26.002	93	45.5	1.144	1.038	0.9885	
15 minute winter	93	26.003	95	89.9	2.261	1.730	1.5731	
15 minute summer	94	28.000	95	0.0	0.000	0.000	0.0273	
15 minute winter	95	26.004	96	149.7	0.945	0.806	4.2396	
2880 minute winter	96	26.005	97	6.4	0.378	0.035	4.8983	
2880 minute winter	97	26.006	98	8.6	0.439	0.047	0.6843	
2880 minute winter	98	26.007	99	10.4	0.582	0.056	7.8342	
2880 minute winter	99	26.008	100	-7.8	0.268	-0.042	5.0518	
2880 minute winter	100	26.009	102	-5.8	0.320	-0.031	5.3822	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	101	10	57.956	0.181	84.7	0.6810	0.0000	OK
15 minute summer	102	10	55.566	1.761	241.7	4.7595	0.0000	SURCHARGED
15 minute summer	103	10	56.000	1.125	37.4	2.9329	1.1315	FLOOD
15 minute summer	104	10	55.892	1.399	60.1	2.7110	0.0000	SURCHARGED
15 minute summer	105	10	55.568	1.782	76.1	3.1482	0.0000	SURCHARGED
15 minute summer	106	10	55.567	1.797	15.5	2.0326	0.0000	SURCHARGED
2880 minute winter	107	2700	53.773	0.128	22.6	0.1447	0.0000	OK
2880 minute winter	107_OUT	2700	53.693	0.114	22.6	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	101	29.000	102	84.0	2.151	0.882	3.6516	
15 minute summer	102	26.010	105	-89.1	0.598	-0.320	1.2193	
15 minute summer	103	30.000	104	36.4	0.916	0.860	2.2792	
15 minute summer	104	30.001	105	70.1	1.762	1.654	0.8441	
15 minute summer	105	26.011	106	15.5	0.680	0.056	1.0318	
15 minute summer	106	Hydro-Brake®	107	3.2				
2880 minute winter	107	1.020	107_OUT	22.6	0.847	0.354	0.5254	3107.1

UK and Ireland Office Locations