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Engineering Services Report

Project

Kishoge/Clonburris, Lot 2, Site 4

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South Dublin County Council

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CS CONSULTING
Civil, Structural & Traffic Engineering

ENGINEERING SERVICES REPORT

KISHOGE/CLONBURRIS, LOT 2, SITE 4

CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by South Dublin County Council (SDCC) to prepare this Engineering Services Report in support of a Part 10 Planning Application for a residential development at Kishoge/Clonburris, County Dublin.

The site forms part of the overall Clonburris Strategic Development Zone (SDZ) lands which encompass 280 hectares located between Lucan, Liffey Valley, Clondalkin and Adamstown, Co. Dublin. Clonburris Infrastructure Limited (CIL) was set up by all landowners within the overall SDZ (including South Dublin County Council) to examine the infrastructural works required to allow the development of individual land parcels in a cohesive manner. This includes the Southern Link Road (SLR) and its associated services. The CIL have produced a series of strategic infrastructural documents, to support the planning application of the infrastructure works and were granted planning permission by SDCC under Plan. Reg Ref. SDZ20A/0021 in August 2021. The CIL are currently at the Construction Stage of the SLR, foul and surface water networks and associated services. CS Consulting have undertaken regular coordination meetings with the SLR construction team to coordinate the foul, surface and water connection points to service the development.

The current proposals for 436 units are a mix of social and affordable single, 2 and 3 storey housing units, apartment, duplex and triplex blocks. In addition, there will be a creche, retail units, pavilion and the existing Grange house included in the development.

1.1 REPORT OVERVIEW

This report details the following aspects of the proposed development:

- Potable Water Supply
- Foul Drainage
- Surface Water Drainage

In preparing this report, CS Consulting has made reference to the following:

- South Dublin County Council Development Plan 2022–2028
- Building Regulations 2010 (Part H)
- Greater Dublin Regional Code of Practice for Drainage Works (Version 6)
- Greater Dublin Strategic Drainage Study (GDSDS) 2005
- The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009 (Flood Risk Management Guidelines)
- Uisce Éireann Code of Practice for Water Infrastructure (2020)
- Uisce Éireann Code of Practice for Wastewater Infrastructure (2020)

- Uisce Éireann Drainage and Supply Records
- Clonburris Strategic Development Zone Planning Scheme 2019
- Clonburris Surface Water Management Plan 2020

The Engineering Services Report is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with all other documentation submitted by other members of the project design team. The following drawings in particular should be referred to:

- 190113B-DBFL-0500-SP-DR-C-1053 Proposed Watermain Layout
- 190113B-DBFL-0500-SP-DR-C-1054 Proposed Watermain Layout
- 190113B-DBFL-0500-SP-DR-C-1004 Proposed Drainage Layout
- 190113B-DBFL-0500-SP-DR-C-1005 Proposed Drainage Layout
- KSG4-CSC-XX-XX-DR-C-0001 Existing Site Layout and Topo Survey
- KSG4-CSC-XX-XX-DR-C-0003 Proposed Watermain Layout
- KSG4-CSC-XX-XX-DR-C-0004 Proposed Drainage Layout
- KSG4-CSC-XX-XX-DR-C-0026 Proposed Watercourse Diversion and Culverting
- KSG4-CSC-XX-XX-DR-C-0034 Flood Compensatory Storage and Culvert Details

2.0 SITE LOCATION, CONTEXT, AND PROPOSED DEVELOPMENT

2.1 Site Location

The application site is situated within the broader Clonburris Strategic Development Zone (SDZ), covering 280 hectares between Lucan, Liffey Valley, Clondalkin, and Adamstown in County Dublin. It is bordered to the north by the Dublin-Kildare railway line, to the south by the Grand Canal, to the east by the Kilmahuddrick Stream, and to the west by the under-construction SLR, Clonburris regional attenuation pond and parklands.

Figure 1 – Location of subject lands
(sources: EPA, OSi, OSM Contributors, Google)

The location of the subject lands is shown in **Figure 1**; their extents and environs are shown in more detail in **Figure 2**.

Figure 2 – Subject lands extents and environs
(sources: NTA, GoCar, Toyota, OSi, OSM Contributors, Microsoft)

2.2 Permitted Clonburris Southern Link Road

The permitted Clonburris Southern Link Road extends across the SDZ Lands, connecting Adamstown and Cappagh. This road has been outlined in the Clonburris Planning Scheme (2019) and is approved under the permission of SDCC Reg. Ref. SDZ20A/0021. The road and drainage infrastructure shall form part of the public roads and drainage networks providing access and services for the future development of the southern half of the overall Strategic Development Zone (SDZ) lands.

The subject development site is located within Sub-Catchment 5 of the SWMP. Refer to **Figure 3** – Extract from DBFL Surface Water Management Plan for an extract showing the site's location in relation to Sub-Catchment 5, with the site indicatively outlined. The Clonburris regional attenuation pond ('ATN-02'), proposed by the CIL, is approximately 100m downstream of the site and is designed to attenuate the Sub-Catchment 5, as shown in red on **Figure 3**. In addition, the pond has been designed to provide treatment volumes for 15mm of rainfall for Sub-Catchment 5.

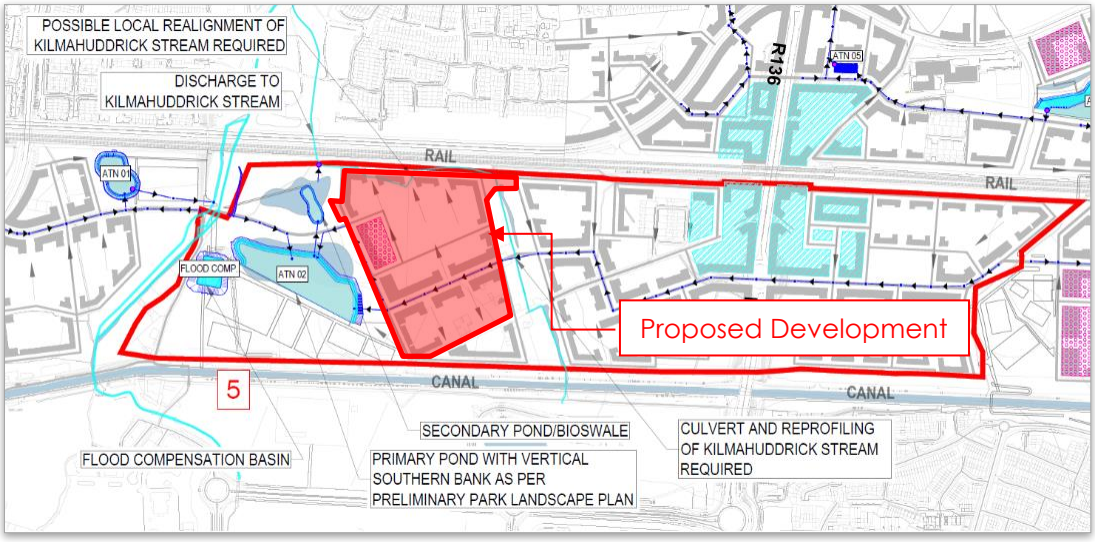


Figure 3 – Extract from DBFL Surface Water Management Plan
(sources: DBFL)

2.3 Existing Subject Site Condition

The development site is primarily greenfield; however, parts of it have been utilised by the SDCC Parks Department as a depot and include existing uses such as traveller accommodation, Lynch's Lane, and the listed Grange House building.

2.4 Surrounding Drainage and Water Supply Infrastructure

DBFL drawings in **Appendix A** show the SLR water supply and drainage in the vicinity of the development site. This identifies elements of the surrounding:

- Under construction water distribution network
- Under construction foul sewer network
- Under construction surface water drainage infrastructure

The surrounding water distribution infrastructure, foul sewer infrastructure, and surface water drainage infrastructure are described in isolation in Sections 3, 4, and 5 of this report, respectively.

2.5 Description of Proposed Development

A Part 10 Planning Application for a primarily residential development located within the Clonburris SDZ lands. The development site extends to c. 11.7ha and is bounded to the north by the Irish Rail Railway Line and to the south, east and west by lands zoned for development. The site is bisected by the permitted South Link Street (PL Reg Ref. SDZ20A/0021) from which vehicular, cycle and pedestrian access shall be provided.

The proposed development comprises 436no. residential units in a mix of house, apartment, duplex and triplex units comprising 141no. houses (133no. 3-bedroom and 8no. 4-bedroom), 124no. apartments units (62no. 1-bedroom and 62no. 2-bedroom), 106no. duplex units (53no. 2-bedroom and 53no. 3-bedroom), 57no. triplex units (57no. 2-bedroom), 3no. age-friendly apartment units (3no. 1-bedroom), and 5no. garden apartment units (5no. 2-bedroom).

Non-residential accommodation proposed (c. 1,550 m2 total) includes: A childcare facility (c. 544sqm), retail unit (c. 150sqm), employment use within the existing Grange House (c. 173 sq m) and a community building/ pavilion (c. 683 sq m) fronting Griffeen Valley Park.

All associated and ancillary site development and infrastructural works including 408no. surface level car parking, 793no. bicycle parking (591no. long term and 202no. short term spaces), hard and soft landscaping and boundary treatment works, including public, communal and private open space, public lighting, substations, bin stores and foul and water services.

3.0 POTABLE WATER SUPPLY

3.1 Existing Water Supply Infrastructure

There is an existing 100mm diameter watermain that runs within Lynch's Lane located along the southern boundary of the subject development site. It currently services the SDCC Parks Depot, Grange House and the existing traveller accommodation. **Figure 4** shows an extract of the relevant local Uisce Éireann water supply records.

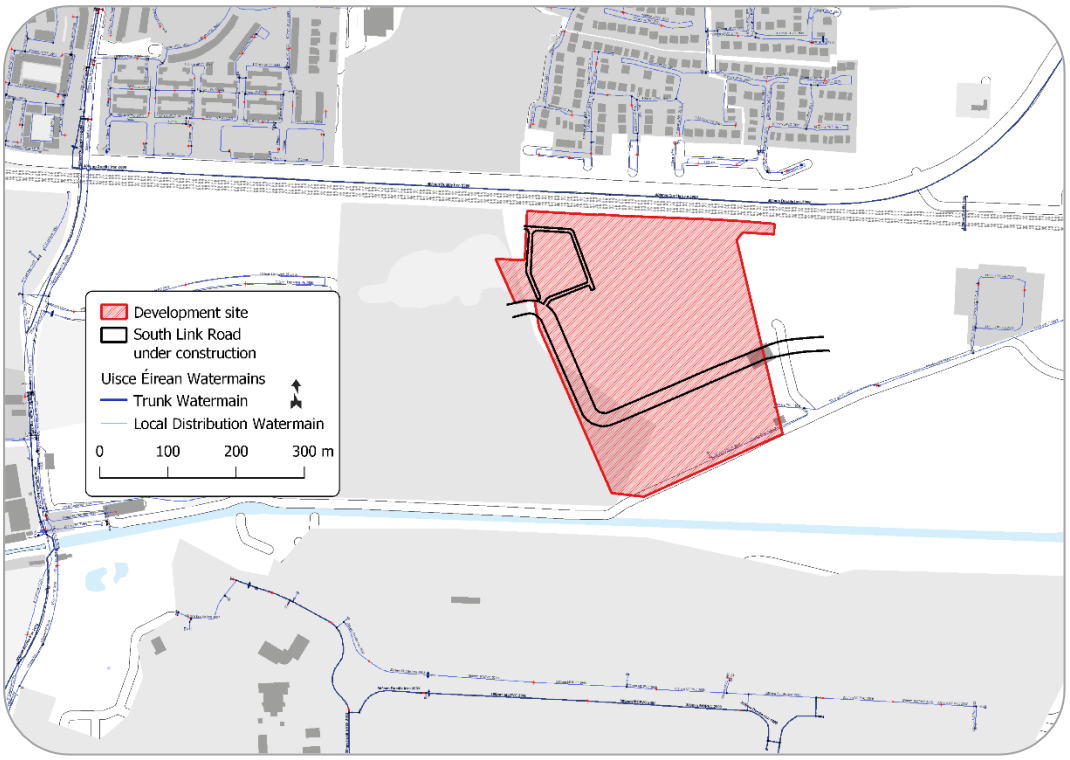


Figure 4 – Existing local water supply network
(map data and imagery: Uisce Éireann, OSM Contributors)

The SLR water supply infrastructure serving this development is currently under construction and was designed by DBFL under planning permission Reg. Ref. SDZ20A/0021. As these works have not yet been taken in charge, they are not reflected in the Uisce Éireann records.

DBFL drawings **190113B-DBFL-0500-SP-DR-C-1053** and **190113B-DBFL-0500-SP-DR-C-1054** show the local watermain network traversing the subject development site within the completed SLR. This network includes:

- 150mm internal diameter distributer mains
- 200mm internal diameter trunk main

150mm diameter and 200mm internal diameter temporary dead-end spurs extend from these watermains into the subject site, at various locations along the extent of the SLR. SLR watermain drawings are provided in **Appendix A**.

3.2 Potable Water Demand

The proposed development comprises a total of 436no. residential units, 1 no. creche, 1no. retail, 1 no. pavilion and 1 no. Grange House (offices).

3.2.1 Residential

The Uisce Éireann *Code of Practice for Water Infrastructure* specifies an average potable water demand of 150 litres per person per day for domestic dwellings, and an average occupancy of 2.7 persons per residential unit. Therefore, has a design population of 1,177 people (1177 pe), and the average potable water demand of the proposed development may be calculated as:

$$Avg.Demand = 1177pe \times 150l/day/pe = 176{,}550l/day = 2.55l/s$$

The peak potable water demand is calculated by applying a domestic peaking factor (Pf_{DOM}) of 5, in accordance with the Uisce Éireann *Code of Practice for Water Infrastructure:*

$$Peak\ Demand = Avg.Demand \times Pf_{DOM} = 2.55l/s \times 5 = 12.77l/s$$

3.2.2 Creche

The Uisce Éireann *Code of Practice for Water Infrastructure* specifies an average potable water demand of 90 litres per person per day for a creche, and an average occupancy of 3.5 persons per m^2. Therefore, has a design population of 166 people (166 pe), and the average potable water demand of the creche may be calculated as:

$$Avg.Demand = 166pe \times 90l/day/pe = 14{,}940l/day = 0.21l/s$$

The peak potable water demand is calculated by applying a domestic peaking factor (Pf_{DOM}) of 5, in accordance with the Uisce Éireann *Code of Practice for Water Infrastructure:*

$$Peak\ Demand = Avg.Demand \times Pf_{DOM} = 0.22l/s \times 5 = 1.05l/s$$

3.2.3 Office and Retail

The Uisce Éireann *Code of Practice for Water Infrastructure* specifies an average potable water demand of 60 litres per person per day for an office or retail, and an average occupancy of 7.5 persons per m^2. Therefore, has a design population of 87 people (87 pe), and the average potable water demand of the office and retail units may be calculated as:

$$Avg.Demand = 87pe \times 60l/day/pe = 5{,}220l/day = 0.06l/s$$

The peak potable water demand is calculated by applying a domestic peaking factor (Pf_{DOM}) of 5, in accordance with the Uisce Éireann *Code of Practice for Water Infrastructure:*

$$Peak\ Demand = Avg.Demand \times Pf_{DOM} = 0.06l/s \times 5 = 0.38l/s$$

3.2.4 Pavilion

The Uisce Éireann *Code of Practice for Water Infrastructure* specifies an average potable water demand of 40 litres per person per day for the pavilion, and an average occupancy of 7.5 persons per m². Therefore, has a design population of 80 people (80 pe), and the average potable water demand of the creche may be calculated as:

$$Avg.Demand = 80pe \times 40l/day/pe = 3{,}200l/day = 0.05l/s$$

The peak potable water demand is calculated by applying a domestic peaking factor (Pf_{DOM}) of 5, in accordance with the Uisce Éireann *Code of Practice for Water Infrastructure:*

$$Peak\ Demand = Avg.Demand \times Pf_{DOM} = 0.05l/s \times 5 = 0.23l/s$$

3.2.5 Total Potable Water Demand

$$Total\ Avg.Demand = 2.87l/s$$

$$Total\ Peak\ Demand = 14.43l/s$$

3.3 Proposed Water Supply Arrangements

It is proposed to provide 100mm and 150mm internal diameter mains to service this development. These mains shall be interconnected and fed by new connections to the 150mm diameter and 200mm diameter spurs provided along in the SLR.

Each apartment block shall have 1no. connection to supply its residential elements. Individual, smaller connections shall be provided to the non-residential elements within each apartment block. The exact details of all connections will be finalised at detailed design stage, through the Uisce Éireann connection application process.

Each individual residential dwelling fronting the SLR will have its own connection to the 180mm diameter distributer main within the SLR. Spurs to service these dwellings will be provided during the SLR construction, having been coordinated through regular meetings with the CIL team.

Refer to CS Consulting drawing nos. **KSG4-CSC-XX-XX-DR-C-0003** for details of the development's proposed watermain arrangements.

3.4 Uisce Éireann Liaison

A Pre-Connection Enquiry (PCE) was submitted to Uisce Éireann on the basis of a 436-unit residential development on the subject site. A Confirmation of Feasibility was received in response on the 12th of August 2024, stating that connection of such a development to the public water supply network (via the existing private water supply infrastructure) would be feasible without infrastructure upgrade by Uisce Éireann. This Confirmation of Feasibility is provided in **Appendix B**. In addition, a Statement of Design Acceptance was received from Uisce Éireann on 26th March 2025, stating that Uisce Éireann have no objections to the proposals. This Statement of Design Acceptance is provided as **Appendix B**.

3.5 Applicable Design Standards

The proposed development's water supply arrangements have been designed in accordance with the Uisce Éireann *Code of Practice for Water Infrastructure* (document IW-CDS-5020-03) and its associated Standard Details (document IW-CDS-5020-01), with respect to watermain layout, pipe diameters, and connection details.

4.0 FOUL DRAINAGE

4.1 Existing Foul Drainage Infrastructure

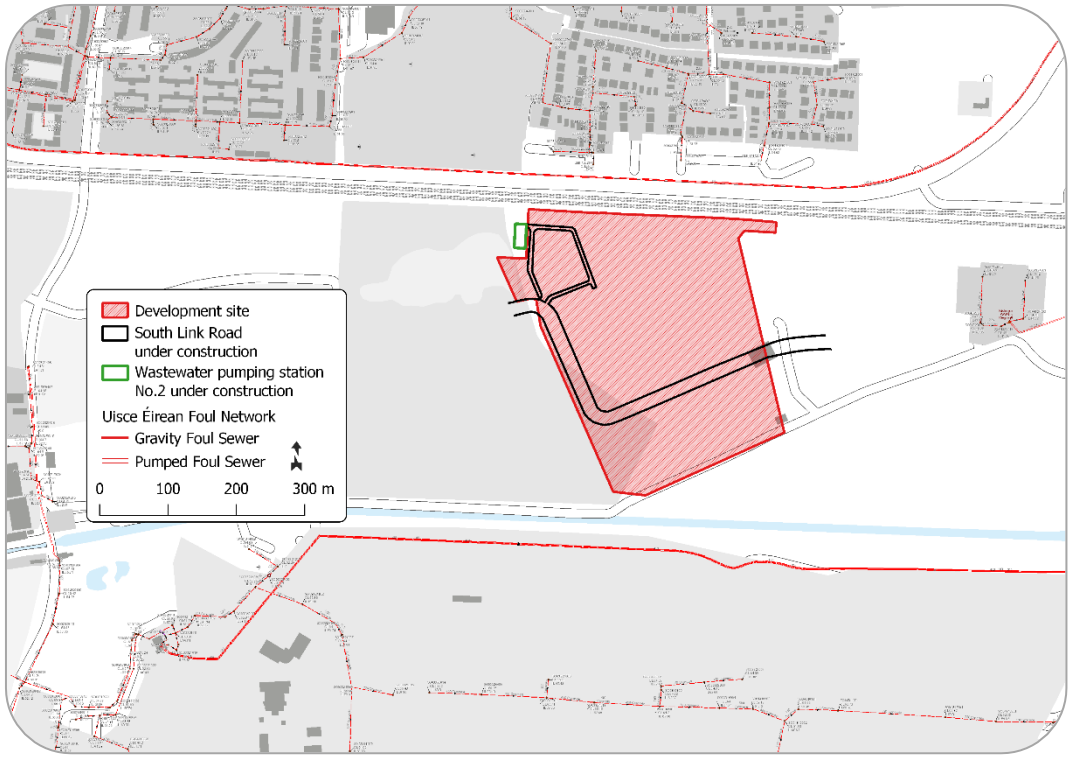


Figure 5 – Uisce Éireann local foul sewer network
(map data and imagery: Uisce Éireann, OSM Contributors)

There are no Uisce Éireann foul sewers within the immediate vicinity of the subject development site. Within the Clonburris masterplan area, a local drainage network has been designed and is under construction under the SLR permission (Reg. Ref. SDZ20A/0021). These local foul sewers are under construction and are not yet shown on Uisce Éireann records. All future foul effluent shall be collected by this network and will drain to the site of Pumping Station No.2 wastewater pumping station (WwPS); this is likewise under construction under the SLR permission and has not yet been transferred to Uisce Éireann's control. A foul rising main, also under construction and not under Uisce Éireann's ownership, shall convey the pumped effluent to an existing Uisce Éireann trunk foul sewer located the east.

DBFL drawing nos. **190113B-DBFL-0500-SP-DR-C-1004** and **190113B-DBFL-0500-SP-DR-C-1005** show the local foul drainage network traversing the subject development site and the foul sewers under construction for the extents of the SLR. Proposed 150mm diameter and 225mm diameter spurs extend from these foul sewers into the subject development site, at various locations along the extent of the SLR.

4.2 Foul Effluent Generation

The proposed development shall comprise 436 no. residential units, 1 no. creche, 1no. retail, 1 no. pavilion and 1 no. Grange House.

4.2.1 Residential

The Uisce Éireann *Code of Practice for Wastewater Infrastructure* specifies an average foul effluent flow rate of 165 litres per person per day for domestic dwellings (150 litres per person per day, plus a 10% allowance for external infiltration) and an average occupancy of 2.7 persons per residential unit. The development's maximum design population is therefore 1,177 people (1177 pe), and the maximum average effluent flow (dry weather flow or DWF) to be generated by the proposed development may be calculated as:

$$\text{DWF} = 1177\text{pe} \times 165\text{l/day/pe} = 194{,}205\text{l/day} = 2.248\text{l/s}$$

For a population of between 1,001 and 5,000 people, the peak effluent flow (Design Flow) is calculated by applying a domestic peaking factor (Pf_{DOM}) of 3:

$$\text{Design Flow} = \text{DWF} \times \text{Pf}_{\text{DOM}} = 2.248\text{l/s} \times 3 = 6.744\text{l/s}$$

4.2.2 Creche

The Uisce Éireann *Code of Practice for Wastewater Infrastructure* specifies an average foul effluent flow rate of 99 litres per person per day for a creche (90 litres per person per day, plus a 10% allowance for external infiltration) and an average occupancy of 3.5 persons per m^2. The creche's maximum design population is therefore 166 people (166 pe), and the maximum average effluent flow (dry weather flow or DWF) to be generated by the creche may be calculated as:

$$\text{DWF} = 166\text{pe} \times 99\text{l/day/pe} = 16{,}434\text{l/day} = 0.190\text{l/s}$$

For a commercial unit, the peak effluent flow (Design Flow) is calculated by applying a peaking factor (Pf_{DOM}) of 4.5:

$$\text{Design Flow} = \text{DWF} \times \text{Pf}_{\text{DOM}} = 0.190\text{l/s} \times 4.5 = 0.855\text{l/s}$$

4.2.3 Office and Retail

The Uisce Éireann *Code of Practice for Wastewater Infrastructure* specifies an average foul effluent flow rate of 66 litres per person per day for an office or retail (60 litres per person per day, plus a 10% allowance for external infiltration) and an average occupancy of 7.5 persons per m^2. The office and retail maximum design population is therefore 161 people (161 pe), and

the maximum average effluent flow (dry weather flow or DWF) to be generated by the office and retail may be calculated as:

$$\text{DWF} = 161\text{pe} \times 66\text{l/day/pe} = 10{,}626\text{l/day} = 0.123\text{l/s}$$

For a commercial unit, the peak effluent flow (Design Flow) is calculated by applying a peaking factor (Pf_{DOM}) of 4.5:

$$\text{Design Flow} = \text{DWF} \times \text{Pf}_{\text{DOM}} = 0.123\text{l/s} \times 4.5 = 0.554\text{l/s}$$

4.2.4 Pavilion

The Uisce Éireann *Code of Practice for Wastewater Infrastructure* specifies an average foul effluent flow rate of 44 litres per person per day for the pavilion (40 litres per person per day, plus a 10% allowance for external infiltration) and an average occupancy of 7.5 persons per m^2. The pavilion's maximum design population is therefore 80 people (80 pe), and the maximum average effluent flow (dry weather flow or DWF) to be generated by the pavilion may be calculated as:

$$\text{DWF} = 80\text{pe} \times 44\text{l/day/pe} = 3{,}520\text{l/day} = 0.041\text{l/s}$$

For a commercial unit, the peak effluent flow (Design Flow) is calculated by applying a peaking factor (Pf_{DOM}) of 4.5:

$$\text{Design Flow} = \text{DWF} \times \text{Pf}_{\text{DOM}} = 0.041\text{l/s} \times 4.5 = 0.183\text{l/s}$$

4.2.5 Total Foul Effluent Generation

$$\text{Total DWF} = 2.602\text{l/s}$$

$$\text{Total Design Flow} = 8.336\text{l/s}$$

4.3 Proposed Foul Drainage Arrangements

It is proposed to discharge all foul effluent from the proposed development by gravity to the foul sewers in the SLR. Throughout the development site and at each connection, the manholes within the site shall be in accordance with SDCC and Uisce Éireann taken in charge requirements, and accessible for maintenance purposes. The final number and specifications of these connections to the external foul drainage network will be finalised at detailed design stage, through the Uisce Éireann connection application process.

Each individual residential dwelling fronting the SLR will have its own connection to the 300mm diameter foul sewer within the SLR. Spurs to service these dwellings shall be provided during the SLR construction, having been coordinated through regular meetings with the CIL team.

Please refer to CS Consulting drawing nos. **KSG-CSC-XX-XX-DR-C-0004** for details of the proposed foul drainage network layout.

4.4 Uisce Éireann Liaison

A Pre-Connection Enquiry (PCE) was submitted to Uisce Éireann on the basis of a 436-unit residential development on the subject site. A Confirmation of Feasibility was received in response on the 12th of August 2024, stating that connection of such a development to the public wastewater network (via the SLR wastewater infrastructure) would be feasible without infrastructure upgrade by Uisce Éireann. This Confirmation of Feasibility is provided as **Appendix B**. In addition, a Statement of Design Acceptance was received from Uisce Éireann on 26th March 2025, stating that Uisce Éireann have no objections to the proposals. This Statement of Design Acceptance is provided as **Appendix B**.

4.5 Applicable Design Standards

The proposed development's foul drainage network, including layout, pipe diameters, pipe gradients, and connection details has been designed in accordance with:

- the Uisce Éireann *Code of Practice for Wastewater Infrastructure* (document IW-CDS-5030-03) and its associated Standard Details (document IW-CDS-5030-01).
- the Greater Dublin Regional Code of Practice for Drainage Works (Version 6).
- Part H of the Building Regulations 2010.

5.0 SURFACE WATER DRAINAGE

5.1 Site Topography

The development site has a general fall to the north. The only topographical variations within the site itself are watercourses and some temporary berms formed by previous site clearance works; these are for the most part less than 3.0m in height. With the exception of these, the highest point within the site (at its south westernmost corner) has an elevation of 60.14m aOD, while its lowest point (at its northern westernmost corner) is at 54.32m aOD. Please refer to CS Consulting drawings nos. **KSG4-CSC-XX-XX-DR-C-0001** for a topographical survey of the development site and environs.

5.2 Existing Land Drainage Features

The Kilmahuddrick Stream flows south to north then east to west along the eastern and northern boundaries of the site. This stream shall be retained, and a Riparian Corridor shall be provided to ensure ecological considerations are maintained. The stream has been referred to and incorporated into the Surface Water Management Plan (SWMP).

Several ditches are present on the site. Ditch A originates at the southwestern corner of the site, flows northward through the site, and exits along the western boundary, eventually discharging into the regional attenuation pond established as part of the SLR CIL works. Ditch C begins at the southern boundary via an existing 500mm culvert, flows north through the development, turns 90 degrees to the right, and exits the site along the eastern boundary, discharging into the Kilmahuddrick Stream. Two additional ditches of lesser significance are located along the southern and northern boundaries. Please refer to CS Consulting drawing nos. **KSG4-CSC-XX-XX-DR-C-0026** for existing ditch locations.

During a site visit in November 2024, CS Consulting observed that the ditches contained no water levels or flow. The catchment areas for these ditches will undergo further investigation during the detailed design phase. As part of the CIL SLR works, similar to other ditches across the SDZ, the drainage paths shall be maintained across the proposed SLR until their upstream catchments are removed as part of the overall development drainage.

5.3 Surface Water Management Plan (Dec 2020)

The DBFL/CIL Surface Water Management Plan (Dec 2020) has been informed by the Surface Water Strategy (undertaken by JBA in Sept 2017) as part of the overall Clonburris SDZ. The report calculated a design discharge rate for the overall SDZ of 3.3 l/s/ha and adopted a

design discharge rate of 3.1 l/s/ha in the design. This supersedes the JBA Surface Water Strategy, which assumed an allowable rate of 2 l/s/ha.

DBFL have used a greenfield run off (QBAR) to design the attenuation volume, which is in line with the GDSDS criterion 4 (river flood protection) for new developments, which states "maximum discharge rate of QBAR or 2 l/s/ha, whichever is greater, for all attenuation storage where separate long-term storage cannot be provided". As the calculated QBAR was greater than 2 l/s/ha and "no long-term" storage will be provided, the QBAR should be used as runoff rate for the design of all attenuation storage.

5.4 Existing Surface Water Drainage Network

Within the Clonburris SDZ masterplan area, a local surface water drainage network was designed and is under construction under the masterplan permission (Reg. Ref. SDZ20A/0021); this is shown on DBFL drawing nos. **190113B-DBFL-0500-SP-DR-C-1004** and **190113B-DBFL-0500-SP-DR-C-1005**. These local surface water sewers are not yet fully constructed. All runoff collected by this network drains to the Clonburris regional attenuation ponds, which are located adjacent to the SLR and approximately 100m from the western boundary of the subject development site. These attenuation ponds discharge to the Kilmahuddrick Stream at a controlled rate of 209 l/s, as permitted under the Clonburris SDZ permission. The regional attenuation pond area was designed and sized to accommodate rainfall events exceeding a 1% Annual Exceedance Probability (i.e. a 1-in-100-year storm event), increased by 20% for predicted climate change effects and limit stormwater discharge to the greenfield discharge rate.

The permitted DBFL drawings found in **Appendix A** show in the immediate vicinity of the subject development site, the local storm drainage network shall include storm sewers along the extents of the SLR. Proposed 300mm diameter to 600mm diameter spurs extend from these storm sewers into the subject development site, at various locations along the extent of the SLR.

5.5 Proposed Surface Water Drainage Arrangements

5.5.1 Proposed surface water drainage layout and connection points

As discussed above, the CIL works, proposed under permission (Reg. Ref. SDZ20A/0021) include the SLR, drainage and its associated services. It is intended to discharge at an unrestricted rate to this surface water network from the development site into the proposed 300mm diameter to 600mm diameter spurs, proposed under the SDZ planning permission. From there it shall continue to the regional attenuation ponds and

outfall to the Kilmahuddrick Stream (as described in sub-section 5.4). Integration of the proposed development with this existing infrastructure ensures that stormwater runoff from the development site shall not flow into neighbouring sites but shall instead be collected and subsequently released in a controlled manner after the peak storm duration has passed.

It is proposed to discharge surface water run-off from the proposed development by gravity via new connections to the 300mm diameter to 600mm diameter surface water spurs along the SLR extent. At each connection, the manholes shall be in accordance with SDCC requirements and standard details, and accessible for maintenance purposes.

The proposed stormwater drainage arrangements have been designed in accordance with Part H of the Building Regulations 2010 (Building Drainage), the Greater Dublin Regional Code of Practice for Drainage Works (Version 6), British Standard BS EN 752:2008 (Drains and Sewer Systems Outside Buildings), and the Greater Dublin Strategic Drainage Study (GDSDS).

Please refer to CS Consulting drawing nos. **KSG-CSC-XX-XX-DR-C-0004** for details of the proposed surface water drainage arrangements.

5.5.2 Summary of Compliance with Criteria 1-4 GDSDS

The GDSDS and the Regional Code of Practice for Drainage Works require that a development's stormwater drainage arrangements satisfy four main criteria:

- Criterion 1: River Water Quality Protection – satisfied by treatment of run-off within SuDS features, e.g., Permeable paving, detention basins, attenuation tanks etc. and hydrocarbon interceptor.
- Criterion 2: River Regime Protection - satisfied by attenuating run-off from the site.
- Criterion 3: Level of Service (flooding) for the site – satisfied by the site being outside the 1000-year coastal and fluvial flood extent areas.
- Criterion 4: River Flood Protection – attenuation provided within the SuDS features.

In accordance with the requirements of South Dublin County Council, the proposed development shall incorporate Sustainable Drainage Systems (SuDS) features. These serve a dual purpose in managing stormwater within new developments.

5.5.3 Surface Water Network Design

In accordance with South Dublin County Council requirements, the stormwater drainage network is designed to ensure that manholes do not surcharge during a 1-in-2-

year storm event and that the network does not flood during a 1-in-100-year storm event, (including a 20% allowance for predicted climate change impacts) before discharging to the SLR network.

A drainage model was developed using Innovyze MicroDrainage, using the rainfall criteria set out in the SWMP which summarised below:

- The SAAR (Standard Annual Average Rainfall) for the area: 773mm/year
- The sliding duration table for the site indicating the 1:100-year rainwater intensities to be used.

Refer to the stormwater calculations in **Appendix C**.

5.6 Sustainable Drainage Systems (SuDS) Design

When rain falls on a natural landscape, it soaks into the ground, evaporates, or is taken up by plants, and some of it eventually find its way into streams and rivers. These stages of the water cycle can be impeded when land is altered by development. In urban areas, there tends to be less permeable ground available for infiltration and less vegetation for evapotranspiration. When rain falls on impermeable surfaces, much more of it turns into surface water runoff, which can cause flooding, pollution, and erosion problems. Additionally, urbanisation has a negative impact on wildlife in urban areas.

Sustainable Drainage Systems (SuDS) is a series of management practices and control structures that aim to mimic the natural drainage in developed areas. The philosophy of sustainable drainage systems is about maximising the benefits and minimising the negative impacts of surface water runoff from developed areas.

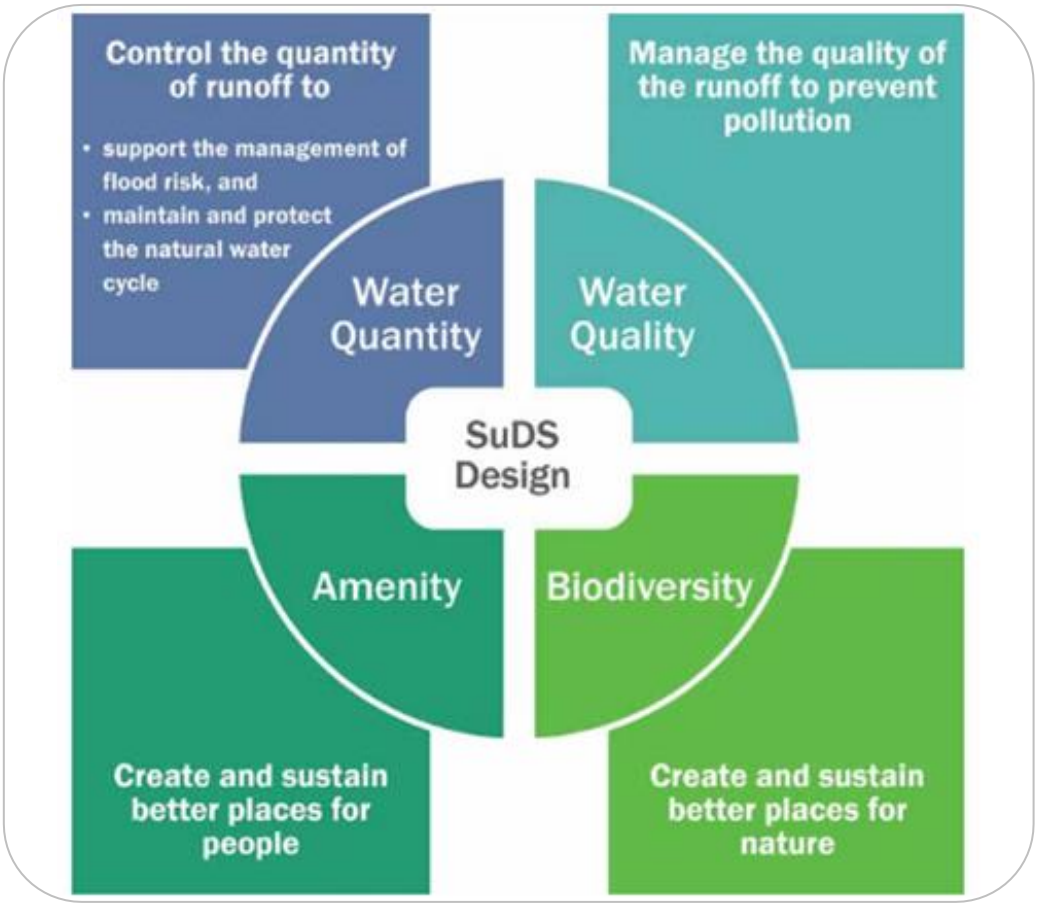


Figure 6 – The four pillars of SuDS design
(source: CIRIA C753 – The SuDS Manual)

The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This can be achieved by harvesting, infiltrating, slowing, storing, conveying, and treating runoff on site, and where possible, on the surface rather than underground.

By adopting this approach, SuDS have the opportunity to deliver and enhance the green spaces within the developments, supporting the provision of habitats and places for wildlife as well as providing a positive impact for the wellbeing of the communities. As stated in CIRIA C753 (The SuDS Manual), there are four main categories of benefits that can be achieved through the implementation of SUDS: water quantity, water quality, amenity, and biodiversity.

These benefits are aligned with the objectives described in Dublin City Development Plan 2022-2028 and in the Greater Dublin Strategic Drainage Study.

The following section outlines the proposed approach for the management of rainfall runoff from the development to ensure that there is no increase in the risk of flooding for the development or the adjacent areas, whilst the development benefits from improvements in water quality, amenity, and biodiversity.

5.7 SuDS Measures

The proposed development includes SuDS measures in accordance with the requirements of South Dublin City Council and Objective GI01 of the South Dublin County Council Development Plan 2022-2028, to provide on-site first stage interception of surface water run-off, improving its overall quality prior to ultimate discharge.

Details of the development's proposed SuDS measures are shown on CS Consulting drawing nos. **KSG4-CSC-XX-XX-DR-C-0027**.

5.7.1 Green roofs

Green roofs will be provided on the proposed buildings' flat roof areas. During typical low-intensity rainfall events, these will collect and retain rainwater until it subsequently evaporates. This will reduce the volumes of rainwater discharging to the public sewer network, as well as mitigating peaks in run-off and reducing the potential for contaminants to be washed from the roof, decreasing the development's impact on the receiving environment. Green roofs also have secondary environmental benefits, providing a temperature control effect by absorbing less solar radiation and improving air quality by trapping airborne particulate matter.

Appendix 11 to the South Dublin County Council Development Plan 2022-2028 requires that new developments with flat or gently sloped roof areas of more than 100m^2 meet the following green roof coverage requirements as a percentage of total roof area:

- 70% extensive green roof coverage, or
- 50% intensive green roof coverage.

As shown in **Table 1**, the proposed development achieves an overall green roof coverage of 3,619m^2, thereby meeting this development plan requirement.

Table 1 – Green Roof Coverage

Building	Total Roof Area	Area of Green Roof	Green Roof Coverage
Block F	1,693m^2	1,185m^2	70%
Block H	1053m^2	819m^2	78%
Block J	1,251m^2	938m^2	75%
Pavillion	801m^2	677m^2	84%
TOTAL	4,798m^2	3,619m^2	75%

5.7.2 Permeable paving

On-street car parking bays are to be finished with a block-constructed permeable paving surface that shall allow rainwater to percolate through the pavement, through layers of grit and coarse aggregate, and into strata below. A perforated filter drain shall collect excess stormwater at the base of the permeable paving system and convey this via overflow connections to the adjacent surface water sewers.

Permeable paving is also to be used for footpaths and other paved areas at podium level on both buildings. Direct infiltration to ground is not possible at these locations but the permeable paving shall provide first stage interception treatment and a degree of stormwater attenuation prior to its discharge to the surface water drainage network.

5.7.3 Tree pits and bio-retention areas

Tree pits and other bio-retention areas are integrated into the landscape design, primarily along the development's street frontages. Surface water runoff from footpaths and road carriageways shall be directed to these SuDS facilities, which allow direct infiltration to ground via layers of engineered topsoil and voided stone.

5.7.4 Rain gardens and planter boxes

Rain gardens and/or planter boxes shall be provided at podium level, at the outlets from downpipes that capture runoff from higher level terraced areas. These shall likewise provide first stage interception treatment and a degree of stormwater attenuation prior to its discharge to the surface water drainage network. The final locations and details of these SuDS facilities shall be determined as part of the development's final landscape design.

5.7.5 Swales

Swales will be integrated throughout the road network to collect rainwater from the internal roadway system. These swales will facilitate infiltration, provide interception treatment, and offer a degree of stormwater attenuation before discharging into the surface water drainage network.

5.8 Stormwater Interception and Treatment

The Greater Dublin Strategic Drainage Study (GDSDS) recommends calculating stormwater interception and treatment volume requirements as follows:

- *Interception storage*: A minimum of 5mm of rainfall must be captured.
- *Treatment storage*: If the interception storage requirement is not met, a minimum of 15mm of rainfall must be treated.

The interception volume requirement to be calculated on the basis of 5mm rainfall is shown in **Table 2** gives the resultant required volume for the proposed development.

The development incorporates 6,011m² of permeable paving, which, will intercept the first 15mm of rainfall and provides an interception storage of 90m³. The green roofs cover an area of 3,619m², which, will intercept the first 10mm of rainfall and provides an interception storage of 36m³. The swales cover an area of 2,048m², which, will intercept the first 50mm of rainfall and provides an interception storage of 102m³. The tree pits and bioretention cover an area of 1,442m², which, will intercept the first 100mm of rainfall and provides an interception storage of 144m³. Together, these measures provide a total stormwater storage volume of 372m³, exceeding the required interception volume for the site.

Table 2 – Interception and Treatment Volume Requirements

Overall Site – Interception & Treatment Provision		
Contributing Area (m2)	Interception	
	Required (m3)	Provided (m3)
53,537	267	372

The GDSDS recommends that if the initial runoff from at least 5 mm of rainfall can be intercepted, additional treatment for runoff (treatment volume) is not required. In this development, the stormwater management measures, including permeable paving, green roofs, swales, bioretention and tree pits successfully intercept runoff from at least 5 mm of rainfall. As a result, there is no requirement to provide treatment for 15 mm of runoff, ensuring

compliance with GDSDS guidelines. However, treatment of 15mm has been provided in the Clonburris regional attenuation pond as described in the SWMP.

5.9 Works to Existing Ditches

There are currently 3no. existing ditches within the proposed development area. To facilitate the new development, all 3no. ditches need to be diverted. The total length of the ditches to be diverted is approximately 450m. For detailed information on the proposed ditch diversions, refer to CS Consulting drawing nos. **D116-CSC-XX-XX-DR-C-0026**.

Based on the topographical survey, the flow capacity of each existing ditch was determined by assessing the cross-sectional area and invert levels along the channel.

- **Existing Ditch A** has a cross-sectional area of 3.46m² and a longitudinal slope of 1.35%, resulting in a maximum flow velocity of 1.47 m/s and a maximum capacity of **5.37 m³/s**.
- **Existing Ditch B** has a cross-sectional area of 1.98m² and a longitudinal slope of 1.65%, providing a flow velocity of 1.38 m/s and a maximum capacity of **3.13 m³/s**.
- **Existing Ditch C** has a cross-sectional area of 3.43m² with a longitudinal slope of 0.4%, generating a flow velocity of 0.80 m/s and a maximum capacity of **2.74 m³/s**.

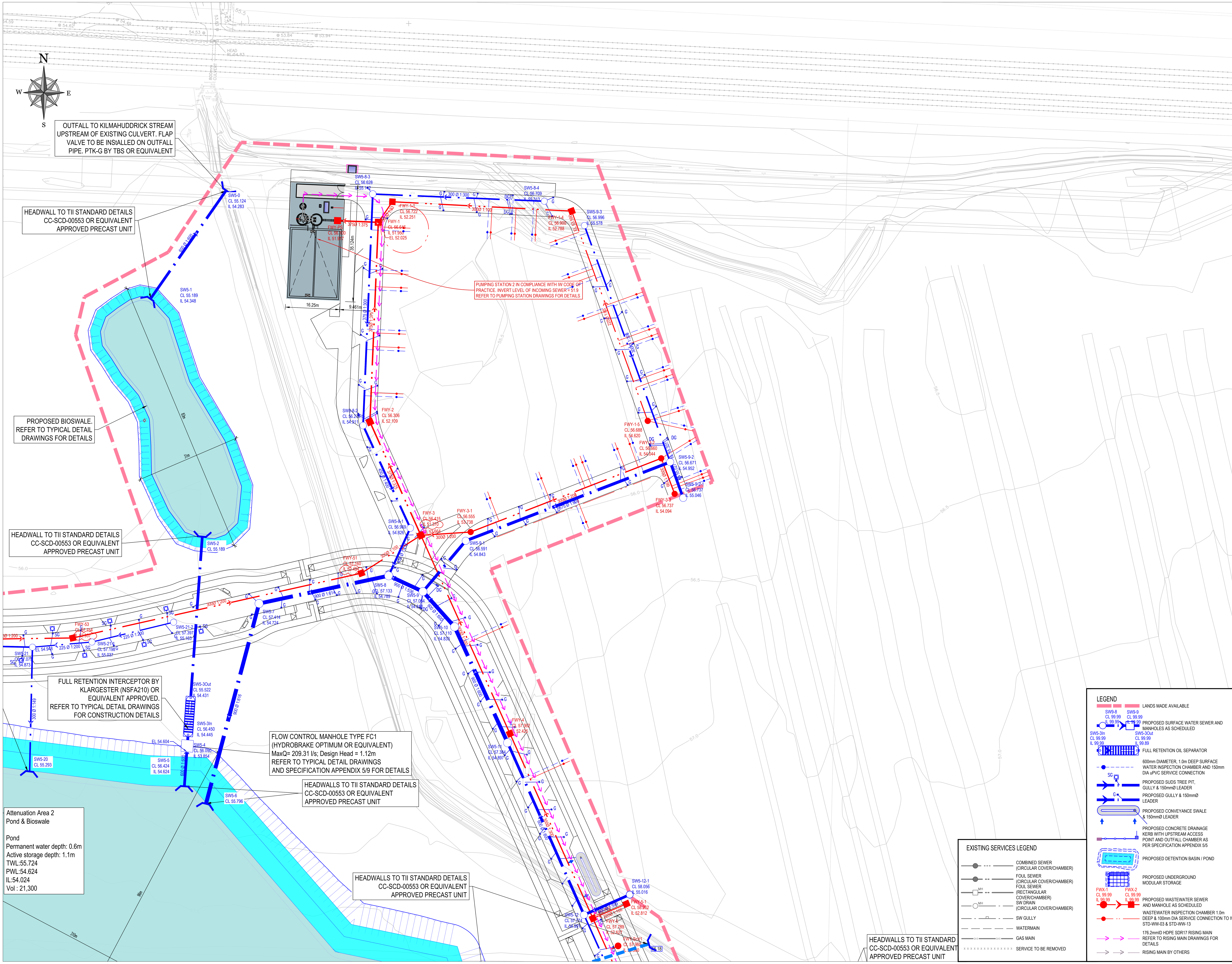
Existing Ditches A and B shall be diverted into **Proposed Ditch D**, which will collect the combined ditch flows and run along the western boundary. This ditch shall discharge into the 1500mm diameter stormwater sewer currently under construction as part of the SLR. The ditch flow will ultimately be conveyed to the regional attenuation pond located to the west. **Proposed Ditch D** is designed to accommodate the combined maximum flow from existing Ditches A and B, totalling 8.5 m³/s. It features a cross-sectional area of 2.97m² with a longitudinal slope of 1.49%, allowing for a flow velocity of 3.50 m/s and a maximum capacity of **8.55 m³/s**.

Existing Ditch C will be diverted into the Kilmahuddrick Stream to the east through a 500mm diameter culvert, discharging via a concrete headwall into the stream, subject to approval by South Dublin County Council (SDCC). Where the proposed road network crosses the diverted ditch, the installation of this 500mm diameter culvert is required. The size of this culvert has been determined based on the existing flow capacity and dimensions of the ditch channel. The detailed specification for the watercourse works and culvert sizing will be finalised in consultation with the OPW during the Section 50 application process.

APPENDIX A
DRAWINGS

CS CONSULTING

Civil, Structural & Traffic Engineering


OUTFALL TO KILMAHUDDRICK STREAM UPSTREAM OF EXISTING CULVERT. FLAP VALVE TO BE INStALLED ON OUTFALL PIPE. PTK-G BY TBS OR EQUIVALENT
HEADWALL TO TII STANDARD DETAILS CC-SCD-00553 OR EQUIVALENT APPROVED PRECAST UNIT
PROPOSED BIOSWALE. REFER TO TYPICAL DETAIL DRAWINGS FOR DETAILS
HEADWALL TO TII STANDARD DETAILS CC-SCD-00553 OR EQUIVALENT APPROVED PRECAST UNIT
PUMPING STATION 2 IN COMPLIANCE WITH IW CODE OF PRACTICE. INVERT LEVEL OF INCOMING SEWER = 51.9 REFER TO PUMPING STATION DRAWINGS FOR DETAILS
FULL RETENTION INTERCEPTOR BY KLARGESTER (NSFA210) OR EQUIVALENT APPROVED. REFER TO TYPICAL DETAIL DRAWINGS FOR CONSTRUCTION DETAILS
FLOW CONTROL MANHOLE TYPE FC1 (HYDROBRAKE OPTIMUM OR EQUIVALENT) MaxQ= 209.31 l/s; Design Head = 1.12m REFER TO TYPICAL DETAIL DRAWINGS AND SPECIFICATION APPENDIX 5/9 FOR DETAILS
HEADWALLS TO TII STANDARD DETAILS CC-SCD-00553 OR EQUIVALENT APPROVED PRECAST UNIT
HEADWALLS TO TII STANDARD DETAILS CC-SCD-00553 OR EQUIVALENT APPROVED PRECAST UNIT
HEADWALLS TO TII STANDARD DETAILS CC-SCD-00553 OR EQUIVALENT APPROVED PRECAST UNIT
Attenuation Area 2
Pond & Bioswale
Pond
Permanent water depth: 0.6m
Active storage depth: 1.1m
TWL:55.724
PWL:54.624
IL:54.024
Vol : 21,300
SW5-0 CL 55.124 IL 54.283
SW5-1 CL 55.189 IL 54.348
SW5-2 CL 55.189
SW5-8-3 CL 56.628 IL 55.142
SW5-8-4 CL 56.709 IL 55.313
SW5-9-3 CL 56.996 IL 55.578
FWY-1-1 CL 56.722 IL 52.251
FWY-1 CL 56.646 IL 51.950 EL 52.025
FWY-PS CL 56.100 IL 51.917
FWY-1-4 CL 56.900 IL 52.788
SW5-8-2 CL 56.278 IL 54.911
FWY-2 CL 56.306 IL 52.109
FWY-1-5 CL 56.688 IL 54.620
FWY-3-2 CL 56.660 IL 54.044
SW5-9-2 CL 56.671 IL 54.952
SW5-9-2-1 CL 56.737 IL 55.046
FWY-3-3 CL 56.737 IL 54.094
FWY-3 CL 56.415 IL 51.370 EL 53.664
FWY-3-1 CL 56.555 IL 53.738
SW5-8-1 CL 56.969 IL 54.826
SW5-9-1 CL 56.591 IL 54.843
FWY-51 CL 57.160 IL 52.494
SW5-8 CL 57.133 IL 54.789
SW5-9 CL 57.064 IL 54.810
SW5-7 CL 57.414 IL 54.724
SW5-10 CL 57.110 IL 54.833
FWY-53 CL 57.154 IL 52.337
SW5-21-2 CL 57.397 IL 55.163
SW5-21-1 CL 57.198 IL 55.037
SW5-21 CL 57.079 IL 54.873
SW5-3Out CL 55.522 IL 54.431
SW5-3In CL 56.450 IL 54.445
SW5-4 CL 56.090 IL 53.854
SW5-20 CL 55.293
SW5-5 CL 56.424 IL 54.624
SW5-6 CL 55.796
FWY-4 CL 57.362 IL 52.425
SW5-11 CL 57.384 IL 54.897
SW5-12-1 CL 58.056 IL 55.016
FWY-5-1 CL 58.262 IL 52.812
SW5-12 CL 57.774 IL 54.991
FWY-5 CL 57.789 IL 52.627
FWY-ScV1 CL 57.960

EXISTING SERVICES LEGEND

- COMBINED SEWER (CIRCULAR COVER/CHAMBER)
- FOUL SEWER (CIRCULAR COVER/CHAMBER)
- FOUL SEWER (RECTANGULAR COVER/CHAMBER)
- SW DRAIN (CIRCULAR COVER/CHAMBER)
- SW GULLY
- WATERMAIN
- GAS MAIN
- SERVICE TO BE REMOVED

LEGEND

- LANDS MADE AVAILABLE
- SW9-8 CL 99.99 IL 99.99 / SW9-9 CL 99.99 IL 99.99 — PROPOSED SURFACE WATER SEWER AND MANHOLES AS SCHEDULED
- SW5-3In CL 99.99 IL 99.99 / SW5-3Out CL 99.99 IL 99.89 — FULL RETENTION OIL SEPARATOR
- 600mm DIAMETER, 1.0m DEEP SURFACE WATER INSPECTION CHAMBER AND 150mm DIA uPVC SERVICE CONNECTION
- SG — PROPOSED SUDS TREE PIT, GULLY & 150mmØ LEADER
- G — PROPOSED GULLY & 150mmØ LEADER
- PROPOSED CONVEYANCE SWALE & 150mmØ LEADER
- PROPOSED CONCRETE DRAINAGE KERB WITH UPSTREAM ACCESS POINT AND OUTFALL CHAMBER AS PER SPECIFICATION APPENDIX 5/5
- PROPOSED DETENTION BASIN / POND
- PROPOSED UNDERGROUND MODULAR STORAGE
- FWX-1 CL 99.99 IL 99.99 / FWX-2 CL 99.99 IL 99.99 — PROPOSED WASTEWATER SEWER AND MANHOLE AS SCHEDULED
- WASTEWATER INSPECTION CHAMBER 1.0m DEEP & 100mm DIA SERVICE CONNECTION TO IW STD-WW-03 & STD-WW-13
- 176.2mmID HDPE SDR17 RISING MAIN REFER TO RISING MAIN DRAWINGS FOR DETAILS
- RISING MAIN BY OTHERS

ON ORIGINAL

0 5 10 15 20 25 30 40 50mm

NOTES:

GENERAL NOTES:

1. ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE WORKS REQUIREMENTS.
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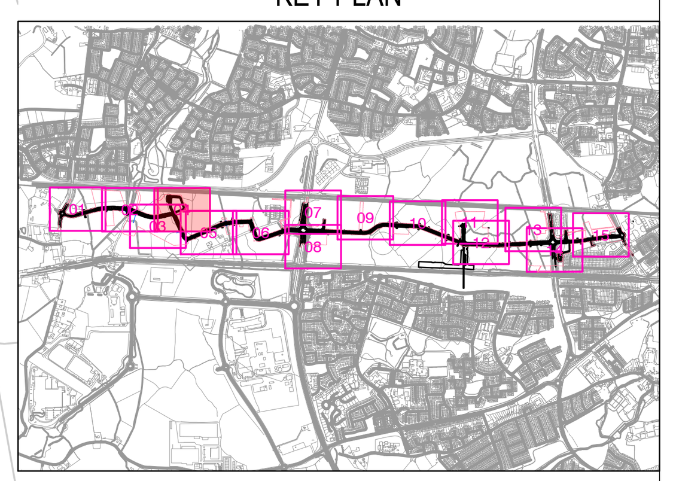
8. ALL VEHICULAR, PEDESTRIAN & CYCLE ROUTES WITHIN AND SURROUNDING THE WORKS EXTENTS MUST BE MAINTAINED THROUGHOUT THE WORKS IN ACCORDANCE WITH THE CONTRACTORS APPROVED TEMPORARY TRAFFIC & OPERATIONS MANAGEMENT PLAN.
9. ALL PERMANENT TRAFFIC MANAGEMENT TO BE CONCEALED/REMOVED OR INCORPORATED INTO THE CONTRACTORS TEMPORARY TRAFFIC MANAGEMENT PLAN THROUGHOUT WORKS AND TRANSFERRED ONLY WHEN AGREED WITH LOCAL AUTHORITY TRAFFIC DEPARTMENT.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE ONGOING MAINTENANCE OF TRAFFIC SIGNALS FROM THE STARTING DATE TO SUBSTANTIAL COMPLETION. THIS INCLUDES ALL TEMPORARY TRAFFIC SIGNALS WHILE IN TRANSITION BETWEEN THE CURRENT TRAFFIC MANAGEMENT REGIME AND THE PROPOSED TRAFFIC MANAGEMENT REGIME.
11. ALL AGGREGATES PROPOSED FOR USE ON THIS SCHEME SHALL MEET FULLY THE REQUIREMENTS OF THE CONTRACT SPECIFICATION AND IN ADDITION THE REQUIREMENTS STATED IN STANDARD RECOMMENDATION S.R. 21:2014 GUIDANCE ON THE USE OF I.S. EN 13242:2002 +A1:2007 - AGGREGATES FOR UNBOUND AND HYDRAULICALLY BOUND MATERIALS FOR USE IN CIVIL ENGINEERING WORK AND ROAD CONSTRUCTION. FURTHER DETAIL IS PROVIDED IN ADDITIONAL CLAUSE 177AR OF THE CONTRACT SPECIFICATION.

DRAWING SPECIFIC NOTES

1. ALL FOUL SEWERS, RISING MAINS, MANHOLES AND CONNECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND IRISH WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS, REFER TO SPECIFICATION APPENDIX 5/1 FOR FURTHER DETAILS.
2. ALL SURFACE WATER SEWERS, CONNECTIONS, MANHOLES AND GULLIES TO BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION APPENDIX 5/1.
3. EXISTING AND PROPOSED DRAINAGE NETWORKS WITHIN LANDS MADE AVAILABLE TO BE JETTED CLEAR FOLLOWING COMPLETION OF DRAINAGE WORKS AND CCTV SURVEY TO BE UNDERTAKEN AND PROVIDED TO THE EMPLOYER'S REPRESENTATIVE.
4. LOCATION AND INVERT LEVELS OF EXISTING MANHOLES OR OUTFALL POINTS, WHERE APPLICABLE TO BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF DRAINAGE WORKS.
5. CONNECTION TO EXISTING DRAINAGE TO BE COORDINATED BY THE CONTRACTOR WITH IRISH WATER AND/OR THE LOCAL AUTHORITY.
6. FUTURE FOUL DRAINAGE EXTENSION PROVISION IS MADE BY MEANS OF PIPES TERMINATING IN "BLIND" MANHOLES, WITHOUT INVERT BENCHING OR INLET CONNECTIONS. TEMPORARY BUNGS SHALL BE INSTALLED IN THE OUTLET PIPE FROM THESE "BLIND" MANHOLES AS PER IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE.
7. REFER TO SPECIFICATION APPENDIX 7/2 FOR DETAILS OF REINSTATEMENT OF EXISTING ROADS.
8. ALL COVERS AND FRAMES TO BE CLASS D400 TO IS EN 124, 100MM MINIMUM FRAME DEPTH. REFER TO SPECIFICATION APPENDIX 5/1 FOR FURTHER DETAILS
9. DRAINAGE DRAWINGS SHOULD BE READ IN CONJUNCTION WITH DRAINAGE LONG SECTIONS AND SCHEDULES.

KEY PLAN



rev	date	description	by	chkd.
T02	08/09/23	DESIGN CHANGES	OC	NCG
T01	08/09/22	TENDER ISSUE	PJC	NCG

client approval: A - Approved; B - Approved with comments; C - Do not use

suitability: D2 - TENDER | issue purpose: TENDER

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WATERFORD OFFICE Unit 2, The Chandlery, 1-2 O' Connell Street, Waterford, Ireland. PHONE +353 51 309 500

project ref.: CLONBURRIS STAGE 1 INFRASTRUCTURE

drawing title: PROPOSED DRAINAGE LAYOUT SHEET 4

client: CLONBURRIS INFRASTRUCTURE LIMITED

designed by	author	scale	sheet size
OC	OC	1:500	A1

drawing no.: 190113B-DBFL-0500-SP-DR-C-1004 | revision: T02

ON ORIGINAL

0 5 10 15 20 25 30 40 50mm

SOUTH LINK STREET

EXISTING REED BED FOR SFCC DEPOT

REGRADE EXISTING STREAM TO TIE INTO PROPOSED CULVERT REFER TO TYPICAL DETAIL DRAWINGS FOR DETAILS

KILMAHUDDRICK STREAM CROSSING - WX03 3.5m WIDE x 1.0m HIGH (INTERNAL) PRECAST BOX CULVERT (SHAY-MURTAGH OR EQUIVALENT APPROVED). REFER TO DRAWING 190113B-DBFL-0500-SP-DR-C-5302 FOR DETAILS

HEADWALLS TO TII STANDARD DETAILS CC-SCD-00553 OR EQUIVALENT APPROVED PRECAST UNIT

HEADWALLS TO TII STANDARD DETAILS CC-SCD-00553 OR EQUIVALENT APPROVED PRECAST UNIT

900mm DIAMETER PIPE CULVERT TO MAINTAIN AGRICULTURAL DRAINAGE DITCH. REFER TO TYPICAL DETAIL DRAWINGS FOR DETAILS

900mm DIAMETER PIPE CULVERT TO MAINTAIN AGRICULTURAL DRAINAGE DITCH. REFER TO TYPICAL DETAIL DRAWINGS FOR DETAILS

EXISTING SDCC DEPOT DRAINAGE. REFER TO SITE CLEARANCE DRAWINGS FOR ENABLING WORKS FOR FOUL OUTFALL TO REED BED.

REGRADE EXISTING STREAM TO TIE INTO PROPOSED CULVERT REFER TO TYPICAL DETAIL DRAWINGS FOR DETAILS

EXISTING CULVERT

2x1050 Ø 1:1000

N

W E

S

NOTES:

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7. REFER TO SPECIFICATION APPENDIX 7/2 FOR DETAILS OF REINSTATEMENT OF EXISTING ROADS.
8. ALL COVERS AND FRAMES TO BE CLASS D400 TO IS EN 124, 100MM MINIMUM FRAME DEPTH. REFER TO SPECIFICATION APPENDIX 5/1 FOR FURTHER DETAILS
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KEY PLAN

LEGEND

- LANDS MADE AVAILABLE
- SW8-8 CL 99.99 IL 99.99 / SW9-9 CL 99.99 IL 99.99 — PROPOSED SURFACE WATER SEWER AND MANHOLES AS SCHEDULED
- SW5-3In CL 99.99 IL 99.99 / SW5-3Out CL 99.99 IL 99.99 — FULL RETENTION OIL SEPARATOR
- 600mm DIAMETER, 1.0m DEEP SURFACE WATER INSPECTION CHAMBER AND 150mm DIA uPVC SERVICE CONNECTION
- SG — PROPOSED SUDS TREE PIT, GULLY & 150mmØ LEADER
- G — PROPOSED GULLY & 150mmØ LEADER
- PROPOSED CONVEYANCE SWALE & 150mmØ LEADER
- PROPOSED CONCRETE DRAINAGE KERB WITH UPSTREAM ACCESS POINT AND OUTFALL CHAMBER AS PER SPECIFICATION APPENDIX 5/5
- PROPOSED DETENTION BASIN / POND
- PROPOSED UNDERGROUND MODULAR STORAGE
- FWX-1 CL 99.99 IL 99.99 / FWX-2 CL 99.99 IL 99.99 — PROPOSED WASTEWATER SEWER AND MANHOLE AS SCHEDULED
- WASTEWATER INSPECTION CHAMBER 1.0m DEEP & 100mm DIA SERVICE CONNECTION TO M STD-WW-03 & STD-WW-13
- 176.2mmID HDPE SDR17 RISING MAIN REFER TO RISING MAIN DRAWINGS FOR DETAILS
- RISING MAIN BY OTHERS

EXISTING SERVICES LEGEND

- COMBINED SEWER (CIRCULAR COVER/CHAMBER)
- FOUL SEWER (CIRCULAR COVER/CHAMBER)
- FOUL SEWER (RECTANGULAR COVER/CHAMBER)
- SW DRAIN (CIRCULAR COVER/CHAMBER)
- SW GULLY
- WATERMAIN
- GAS MAIN
- SERVICE TO BE REMOVED

rev	date	description	by	chkd.
T02	08/09/23	DESIGN CHANGES	OC	NCG
T01	08/09/22	TENDER ISSUE	PJC	NCG

client approval: A - Approved; B - Approved with comments; C - Do not use

suitability: D2 - TENDER

issue purpose: TENDER

DBFL Consulting Engineers
Civil, Structural & Transportation Engineering
www.dbfl.ie

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WATERFORD OFFICE Unit 2, The Chandlery, 1-2 O' Connell Street, Waterford, Ireland. PHONE +353 51 309 800

project ref.
CLONBURRIS STAGE 1 INFRASTRUCTURE

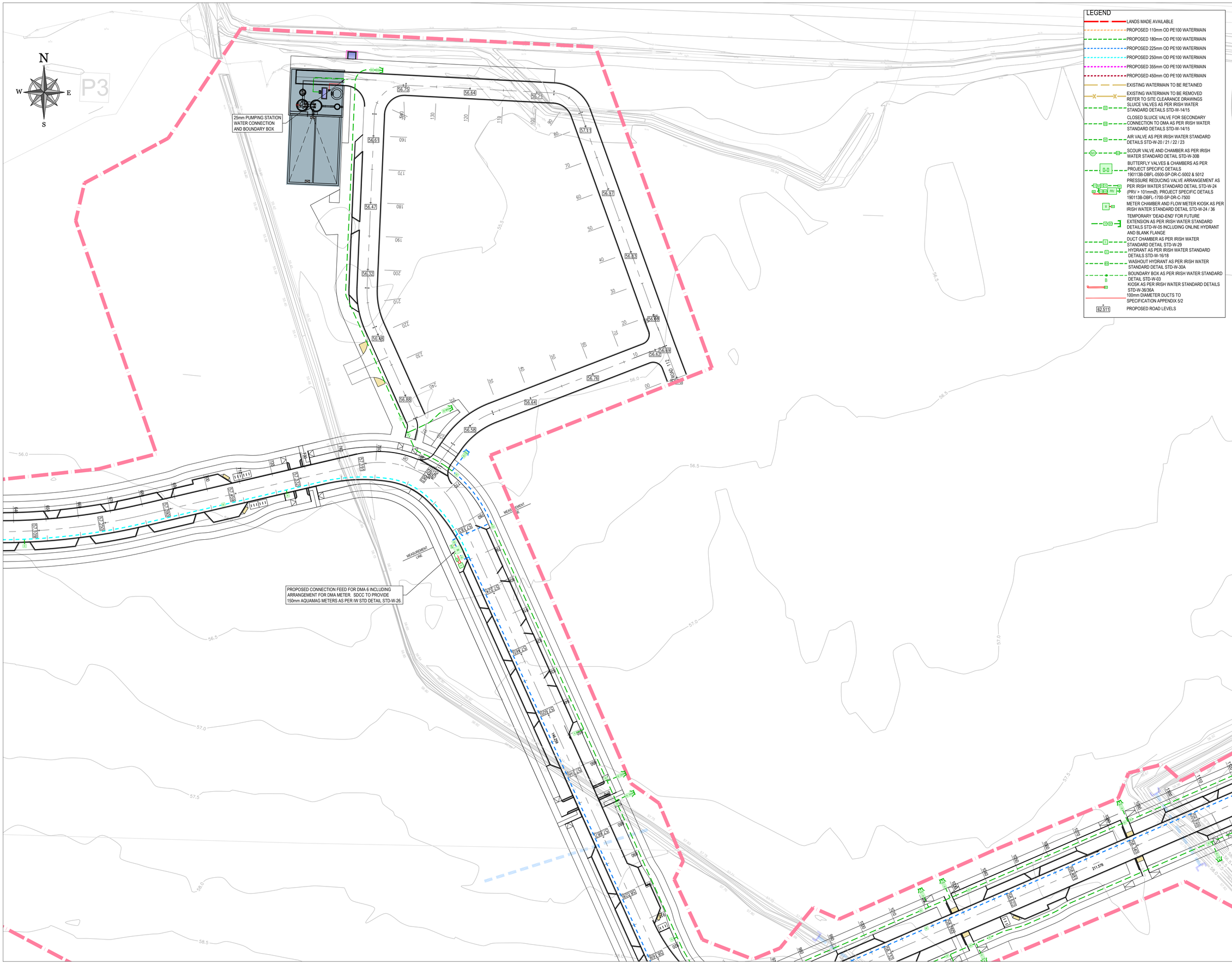
drawing title
PROPOSED DRAINAGE LAYOUT SHEET 5

client
CLONBURRIS INFRASTRUCTURE LIMITED

designed by	author	scale	sheet size
OC	OC	1:500	A1

drawing no. 190113B-DBFL-0500-SP-DR-C-1005

revision T02



LEGEND

- LANDS MADE AVAILABLE
- PROPOSED 110mm OD PE100 WATERMAIN
- PROPOSED 180mm OD PE100 WATERMAIN
- PROPOSED 225mm OD PE100 WATERMAIN
- PROPOSED 250mm OD PE100 WATERMAIN
- PROPOSED 355mm OD PE100 WATERMAIN
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- EXISTING WATERMAIN TO BE RETAINED
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- REFER TO SITE CLEARANCE DRAWINGS
- SLUICE VALVES AS PER IRISH WATER STANDARD DETAILS STD-W-14/15
- CLOSED SLUICE VALVE FOR SECONDARY CONNECTION TO DMA AS PER IRISH WATER STANDARD DETAILS STD-W-14/15
- AIR VALVE AS PER IRISH WATER STANDARD DETAILS STD-W-20 / 21 / 22 / 23
- SCOUR VALVE AND CHAMBER AS PER IRISH WATER STANDARD DETAIL STD-W-30B
- BUTTERFLY VALVES & CHAMBERS AS PER PROJECT SPECIFIC DETAILS 190113B-DBFL-0500-SP-DR-C-5002 & 5012
- PRESSURE REDUCING VALVE ARRANGEMENT AS PER IRISH WATER STANDARD DETAIL STD-W-24 (PRV > 101mm0). PROJECT SPECIFIC DETAILS 190113B-DBFL-1700-SP-DR-C-7500
- METER CHAMBER AND FLOW METER KIOSK AS PER IRISH WATER STANDARD DETAIL STD-W-24 / 36
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- DUCT CHAMBER AS PER IRISH WATER STANDARD DETAIL STD-W-29
- HYDRANT AS PER IRISH WATER STANDARD DETAILS STD-W-16/18
- WASHOUT HYDRANT AS PER IRISH WATER STANDARD DETAIL STD-W-30A
- BOUNDARY BOX AS PER IRISH WATER STANDARD DETAIL STD-W-03
- KIOSK AS PER IRISH WATER STANDARD DETAILS STD-W-36/36A
- 100mm DIAMETER DUCTS TO SPECIFICATION APPENDIX 5/2
- PROPOSED ROAD LEVELS

ON ORIGINAL

0 5 10 15 20 25 30 40 50mm

NOTES:

GENERAL NOTES:

1. ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE WORKS REQUIREMENTS.
2. ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE.
3. ALL COORDINATES ARE TO THE ITM (IRISH TRANSVERSE MERCATOR) GEOGRAPHIC COORDINATE SYSTEM.
4. ALL LEVELS ARE TO ORDNANCE DATUM IRELAND (MALIN HEAD).
5. ALL TEMPORARY TRAFFIC MANAGEMENT SHALL COMPLY FULLY WITH THE WORKS REQUIREMENTS - REFER TO APP 1/17.
6. THE CONTRACTOR MUST LIAISE DIRECTLY WITH LOCAL AUTHORITY DEPARTMENTS AS DIRECTED IN THE WORKS REQUIREMENTS.
7. THE CONTRACTOR SHALL COORDINATE THE WORKS AND ACCESS WITH ADJACENT CONTRACTORS WITHIN THE CLONBURRIS SDZ
8. ALL VEHICULAR, PEDESTRIAN & CYCLE ROUTES WITHIN AND SURROUNDING THE WORKS EXTENTS MUST BE MAINTAINED THROUGHOUT THE WORKS IN ACCORDANCE WITH THE CONTRACTORS APPROVED TEMPORARY TRAFFIC & OPERATIONS MANAGEMENT PLAN.
9. ALL PERMANENT TRAFFIC MANAGEMENT TO BE CONCEALED/REMOVED OR INCORPORATED INTO THE CONTRACTORS TEMPORARY TRAFFIC MANAGEMENT PLAN THROUGHOUT WORKS AND TRANSFERRED ONLY WHEN AGREED WITH LOCAL AUTHORITY TRAFFIC DEPARTMENT.
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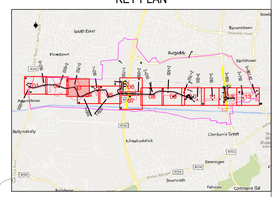
DRAWING SPECIFIC NOTES

1. ALL WATERMAINS VALVES AND FITTINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE IRISH WATER STANDARD DETAILS AND IRISH WATER CODE OF PRACTICE FOR WATER INFRASTRUCTURE. REFER TO APPENDIX 2/1 FOR FURTHER DETAILS.
2. MARKER POSTS AND PLATES ARE TO BE PROVIDED IN ACCORDANCE WITH IRISH WATER STANDARD DETAIL STD-W-27.
3. ANCHOR BLOCKS TO BE POSITIONED AT DEAD ENDS, TEES, BENDS AND AT EACH SIDE OF HYDRANTS AND VALVES IN ACCORDANCE WITH THE REQUIREMENTS OF IRISH WATER STANDARD DETAIL STD-W-28 (WATER MAIN THRUST AND SUPPORT BLOCKS).
4. CONNECTION TO EXISTING WATERMAINS TO BE COORDINATED BY THE CONTRACTOR WITH IRISH WATER AND/OR THE LOCAL AUTHORITY.
5. REFER TO SPECIFICATION APPENDIX 7/2 FOR DETAILS OF REINSTATEMENT OF EXISTING ROADS.
6. WATERMAIN DRAWINGS SHOULD BE READ IN CONJUNCTION WITH DRAINAGE LONG SECTIONS AND SCHEDULES.
7. THE CONTRACTOR SHALL COORDINATE AND UNDERTAKE THE WATERMAIN TESTING IN ACCORDANCE WITH THE IRISH WATER CODE OF PRACTICE FOR WATER INFRASTRUCTURE. THE CONTRACTOR SHALL PREPARE AND MAINTAIN THE RECORDS REQUIRED IN THE IRISH WATER QUALITY ASSURANCE FOLDER.
8. AIR VALVE AND HYDRANTS COVERS, WHERE LOCATED IN GRASS AREAS, SHALL BE SURROUNDED BY CONCRETE PLINTHS AS PER SECTION 3.18 OF WATER CODE OF PRACTICE.
9. KIOSKS, METERS AND PRVs WILL BE PROVIDED BY IRISH WATER AND SDCC

KEY PLAN



rev	date	description	by	chkd.
T02	08/09/23	DESIGN CHANGES	PJC	NCG
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project ref.

CLONBURRIS STAGE 1 INFRASTRUCTURE

drawing title

PROPOSED WATERMAIN LAYOUT SHEET 3

client

CLONBURRIS INFRASTRUCTURE LIMITED

designed by	author	scale	sheet size
OC	PJC	1:500	A1

drawing no.: 190113B-DBFL-0500-SP-DR-C-1053

revision: T02

ON ORIGINAL

0 5 10 15 20 25 30 40 50mm

SOUTH LINK STREET

PROPOSED CLOSED CONNECTION SERVING DMA 5

PROPOSED CLOSED CONNECTION SERVING DMA 6

110mmØ SCOUR VALVE CONNECTION TO FOUL DRAINAGE AS PER IW STD-W-30B

I=1%, 241m, R=300,000

211.576

Grange

38kv

110mm EXISTING WATERMAIN

NOTES:

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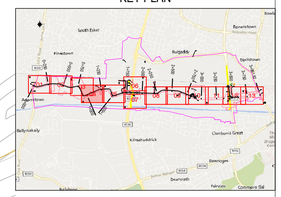

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- 100mm DIAMETER DUCTS TO SPECIFICATION APPENDIX 5/2
- 62.511 PROPOSED ROAD LEVELS

ORDNANCE SURVEY IRELAND LICENCE
No CYAL50276885
© ORDNANCE SURVEY IRELAND
GOVERNMENT OF IRELAND

rev	date	description	by	chkd.
T02	08/09/23	DESIGN CHANGES	PJC	NCG
T01	08/09/22	TENDER ISSUE	PJC	NCG

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project ref.
CLONBURRIS STAGE 1 INFRASTRUCTURE

drawing title
PROPOSED WATERMAIN LAYOUT SHEET 4

client
CLONBURRIS INFRASTRUCTURE LIMITED

designed by	author	scale	sheet size
OC	PJC	1:500	A1

drawing no.: 190113B-DBFL-0500-SP-DR-C-1054

revision: T02

APPENDIX B

IRISH WATER CONFIRMATION OF FEASIBILITY

CS CONSULTING

Civil, Structural & Traffic Engineering

CONFIRMATION OF FEASIBILITY

Owen Sullivan

CS Consulting
1st Floor 19-22
Dame Street
Dublin
D02E267

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

27 May 2024

Our Ref: CDS24003346 Pre-Connection Enquiry
Site 4 Clonburris SDZ, Grange House, Lucan, Dublin

Dear Applicant/Agent,

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

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 432 unit(s) at Site 4 Clonburris SDZ, Grange House, Lucan, 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 Uisce Éireann

- The Development is a part of Clonburris Strategic Development Zone. All relevant core water infrastructure within the Zone must be constructed as per the Clonburris SDZ Infrastructure Master Plan and connected to Uisce Éireann network prior the connection. At a connection application stage, the Applicant should provide confirmation from Clonburris Infrastructure Ltd. that connection application is in line with the Master Plan.

- **Wastewater Connection** - Feasible without infrastructure upgrade by Uisce Éireann

- The Development is a part of Clonburris Strategic Development Zone. All relevant core wastewater infrastructure within the Zone must be constructed as per the Clonburris SDZ Infrastructure Master Plan and

connected to Uisce Éireann network prior the connection. At a connection application stage, the Applicant should provide confirmation from Clonburris Infrastructure Ltd. that connection application is in line with the Master Plan.

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

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

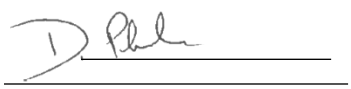
Where can you find more information?

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

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

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

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

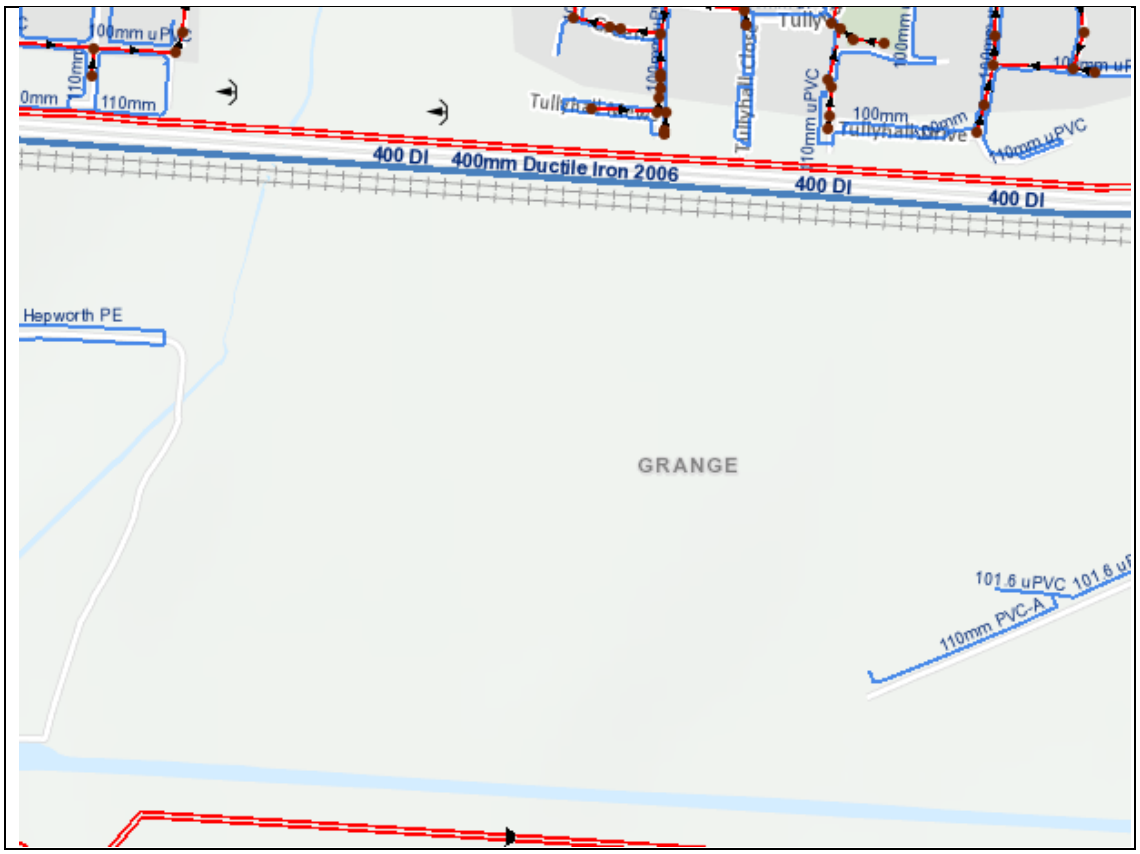
Section A - What is important to know?

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

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

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

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



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

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

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

Owen Sullivan
CS Consulting
1st Floor 19-22
Dame Street
Dublin
D02E267

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

26 March 2025

Re: Design Submission for Site 4 Clonburris SDZ, Grange House, Lucan, Dublin (the "Development")
(the "Design Submission") / Connection Reference No: CDS24003346

Dear Owen Sullivan,

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: Alicia Ros Bernal
Email: ailciarosbernal.bernal@water.ie

Yours sincerely,

Dermot Phelan
Connections Delivery Manager

Appendix A

Document Title & Revision

- KSG4-CSC-XX-XX-DR-C-0003_Proposed Watermain Layout
- KSG4-CSC-XX-XX-DR-C-0004_Proposed Drainage Layout
- KSG4-CSC-XX-XX-DR-C-0029-0033_Foul Longsections

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.

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.

APPENDIX C
STORM DRAINAGE CALCULATIONS

CS CONSULTING

Civil, Structural & Traffic Engineering

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	Add Flow / Climate Change (%)	0
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.000
Ratio R	0.277	Maximum Backdrop Height (m)	6.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.300
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
S1.000	53.194	0.355	149.8	0.180	5.00	0.0	0.600	o	300
S1.001	71.082	0.294	241.8	0.186	0.00	0.0	0.600	o	300
S1.002	61.567	0.269	228.9	0.143	0.00	0.0	0.600	o	300
S1.003	24.963	0.123	203.0	0.060	0.00	0.0	0.600	o	300
S2.000	43.245	0.300	144.2	0.154	5.00	0.0	0.600	o	300
S2.001	45.225	0.226	200.1	0.142	0.00	0.0	0.600	o	375
S2.002	21.213	0.066	321.4	0.028	0.00	0.0	0.600	o	375
S2.003	53.556	0.167	320.7	0.316	0.00	0.0	0.600	o	450
S2.004	49.416	0.334	148.0	0.196	0.00	0.0	0.600	o	450
S3.000	50.716	0.302	167.9	0.171	5.00	0.0	0.600	o	225
S2.005	72.480	0.213	340.3	0.268	0.00	0.0	0.600	o	450
S2.006	21.225	0.043	493.6	0.078	0.00	0.0	0.600	o	525
S4.000	23.940	0.188	127.3	0.325	5.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.69	56.640	0.180	0.0	0.0	0.0	1.28	90.6	24.4
S1.001	50.00	6.87	56.285	0.367	0.0	0.0	0.0	1.01	71.2	49.7
S1.002	50.00	7.86	55.991	0.510	0.0	0.0	0.0	1.04	73.2	69.0
S1.003	50.00	8.24	55.722	0.570	0.0	0.0	0.0	1.10	77.7	77.2
S2.000	50.00	5.55	56.975	0.154	0.0	0.0	0.0	1.31	92.4	20.8
S2.001	50.00	6.14	56.600	0.296	0.0	0.0	0.0	1.28	141.1	40.1
S2.002	50.00	6.49	56.374	0.324	0.0	0.0	0.0	1.01	111.0	43.9
S2.003	50.00	7.28	56.233	0.640	0.0	0.0	0.0	1.13	179.7	86.7
S2.004	50.00	7.78	56.066	0.836	0.0	0.0	0.0	1.67	265.5	113.3
S3.000	50.00	5.84	56.904	0.171	0.0	0.0	0.0	1.01	40.0	23.2
S2.005	50.00	8.88	55.732	1.275	0.0	0.0	0.0	1.10	174.4	172.7
S2.006	49.56	9.23	55.444	1.353	0.0	0.0	0.0	1.00	216.8	181.6
S4.000	50.00	5.34	56.475	0.325	0.0	0.0	0.0	1.16	46.0	44.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
S2.007	31.581	0.073	432.6	0.071	0.00	0.0	0.600	o	525
S2.008	5.378	0.012	448.2	0.000	0.00	0.0	0.600	o	600
S5.000	36.618	0.217	168.7	0.156	5.00	0.0	0.600	o	225
S5.001	3.933	0.023	171.0	0.000	0.00	0.0	0.600	o	225
S6.000	49.797	0.296	168.2	0.183	5.00	0.0	0.600	o	300
S7.000	17.757	0.179	99.2	0.082	5.00	0.0	0.600	o	300
S7.001	9.290	0.038	244.5	0.000	0.00	0.0	0.600	o	300
S7.002	26.962	0.110	245.1	0.100	0.00	0.0	0.600	o	300
S6.001	26.448	0.223	118.6	0.079	0.00	0.0	0.600	o	300
S6.002	14.493	0.176	82.3	0.000	0.00	0.0	0.600	o	300
S6.003	23.288	0.099	235.2	0.082	0.00	0.0	0.600	o	375
S8.000	33.374	0.167	199.8	0.139	5.00	0.0	0.600	o	300
S8.001	9.290	0.046	202.0	0.058	0.00	0.0	0.600	o	300
S8.002	36.662	0.183	200.3	0.095	0.00	0.0	0.600	o	300
S6.004	69.319	0.173	400.7	0.228	0.00	0.0	0.600	o	450
S9.000	55.531	0.278	199.8	0.240	5.00	0.0	0.600	o	300
S6.005	36.673	0.075	489.0	0.276	0.00	0.0	0.600	o	525

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S2.007	48.37	9.72	55.401	1.750	0.0	0.0	0.0	1.07	231.7	229.2
S2.008	48.19	9.80	55.253	1.750	0.0	0.0	0.0	1.14	323.4	229.2
S5.000	50.00	5.61	56.705	0.156	0.0	0.0	0.0	1.00	39.9	21.2
S5.001	50.00	5.67	56.488	0.156	0.0	0.0	0.0	1.00	39.6	21.2
S6.000	50.00	5.69	56.355	0.183	0.0	0.0	0.0	1.21	85.5	24.8
S7.000	50.00	5.19	56.450	0.082	0.0	0.0	0.0	1.58	111.6	11.1
S7.001	50.00	5.34	56.271	0.082	0.0	0.0	0.0	1.00	70.8	11.1
S7.002	50.00	5.79	56.233	0.182	0.0	0.0	0.0	1.00	70.7	24.6
S6.001	50.00	6.10	56.059	0.444	0.0	0.0	0.0	1.44	102.0	60.2
S6.002	50.00	6.24	55.836	0.444	0.0	0.0	0.0	1.73	122.6	60.2
S6.003	50.00	6.57	55.585	0.527	0.0	0.0	0.0	1.18	130.0	71.3
S8.000	50.00	5.50	55.875	0.139	0.0	0.0	0.0	1.11	78.4	18.8
S8.001	50.00	5.64	55.708	0.196	0.0	0.0	0.0	1.10	77.9	26.6
S8.002	50.00	6.19	55.662	0.291	0.0	0.0	0.0	1.11	78.3	39.4
S6.004	50.00	7.71	55.329	1.046	0.0	0.0	0.0	1.01	160.5	141.6
S9.000	50.00	5.83	56.400	0.240	0.0	0.0	0.0	1.11	78.4	32.5
S6.005	50.00	8.32	55.081	1.562	0.0	0.0	0.0	1.01	217.8	211.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
S6.006	2.580	0.005	516.0	0.000	0.00	0.0	0.600	o	525
S10.000	76.413	0.731	104.5	0.302	5.00	0.0	0.600	o	300
S10.001	6.079	0.039	155.9	0.000	0.00	0.0	0.600	o	300
S11.000	80.877	0.481	168.1	0.177	5.00	0.0	0.600	o	300
S11.001	72.904	0.301	242.2	0.165	0.00	0.0	0.600	o	300
S11.002	6.474	0.027	239.8	0.000	0.00	0.0	0.600	o	300
S11.003	48.165	0.212	227.2	0.198	0.00	0.0	0.600	o	375
S11.004	12.993	0.057	227.9	0.000	0.00	0.0	0.600	o	375
S11.005	68.986	0.172	401.1	0.385	0.00	0.0	0.600	o	450
S11.006	5.852	0.015	390.1	0.000	0.00	0.0	0.600	o	450
S12.000	24.065	0.243	99.0	0.095	5.00	0.0	0.600	o	225
S12.001	45.624	0.522	87.4	0.283	0.00	0.0	0.600	o	300
S12.002	6.781	0.028	242.2	0.000	0.00	0.0	0.600	o	300
S13.000	26.917	0.160	168.2	0.173	5.00	0.0	0.600	o	225
S13.001	14.134	0.140	101.0	0.000	0.00	0.0	0.600	o	225
S13.002	27.899	0.300	93.0	0.200	0.00	0.0	0.600	o	300
S13.003	12.125	0.050	242.5	0.000	0.00	0.0	0.600	o	300

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S6.006	50.00	8.36	55.006	1.562	0.0	0.0	0.0	0.98	212.0	211.5
S10.000	50.00	5.83	56.945	0.302	0.0	0.0	0.0	1.54	108.7	40.9
S10.001	50.00	5.91	56.214	0.302	0.0	0.0	0.0	1.26	88.8	40.9
S11.000	50.00	6.11	57.375	0.177	0.0	0.0	0.0	1.21	85.5	24.0
S11.001	50.00	7.32	56.894	0.342	0.0	0.0	0.0	1.01	71.1	46.4
S11.002	50.00	7.43	56.593	0.342	0.0	0.0	0.0	1.01	71.5	46.4
S11.003	50.00	8.10	56.491	0.540	0.0	0.0	0.0	1.20	132.3	73.2
S11.004	50.00	8.28	56.279	0.540	0.0	0.0	0.0	1.20	132.1	73.2
S11.005	49.09	9.42	56.147	0.926	0.0	0.0	0.0	1.01	160.5	123.1
S11.006	48.87	9.52	55.975	0.926	0.0	0.0	0.0	1.02	162.7	123.1
S12.000	50.00	5.31	57.550	0.095	0.0	0.0	0.0	1.31	52.2	12.9
S12.001	50.00	5.76	57.232	0.378	0.0	0.0	0.0	1.68	118.9	51.1
S12.002	50.00	5.87	56.710	0.378	0.0	0.0	0.0	1.01	71.1	51.1
S13.000	50.00	5.45	58.075	0.173	0.0	0.0	0.0	1.01	40.0	23.4
S13.001	50.00	5.63	57.915	0.173	0.0	0.0	0.0	1.30	51.7	23.4
S13.002	50.00	5.91	57.700	0.372	0.0	0.0	0.0	1.63	115.3	50.4
S13.003	50.00	6.11	57.400	0.372	0.0	0.0	0.0	1.01	71.1	50.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	58.394	1.754	Open Manhole	1200	S1.000	56.640	300				
S2	58.234	1.949	Open Manhole	1200	S1.001	56.285	300	S1.000	56.285	300	
S3	57.582	1.591	Open Manhole	1200	S1.002	55.991	300	S1.001	55.991	300	
S4	57.299	1.577	Open Manhole	1200	S1.003	55.722	300	S1.002	55.722	300	
S	57.200	1.601	Open Manhole	0		OUTFALL		S1.003	55.599	300	
S5	58.582	1.607	Open Manhole	1200	S2.000	56.975	300				
S6	58.279	1.679	Open Manhole	1350	S2.001	56.600	375	S2.000	56.675	300	
S7	58.288	1.914	Open Manhole	1350	S2.002	56.374	375	S2.001	56.374	375	
S8	58.440	2.207	Open Manhole	1350	S2.003	56.233	450	S2.002	56.308	375	
S9	58.517	2.451	Open Manhole	1350	S2.004	56.066	450	S2.003	56.066	450	
S10	58.429	1.525	Open Manhole	1200	S3.000	56.904	225				
S11	58.314	2.582	Open Manhole	1350	S2.005	55.732	450	S2.004	55.732	450	
								S3.000	56.602	225	645
S12	57.923	2.479	Open Manhole	1500	S2.006	55.444	525	S2.005	55.519	450	
S13	58.050	1.575	Open Manhole	1200	S4.000	56.475	225				
S14	57.812	2.411	Open Manhole	1500	S2.007	55.401	525	S2.006	55.401	525	
								S4.000	56.287	225	586
S15	58.000	2.747	Open Manhole	1500	S2.008	55.253	600	S2.007	55.328	525	
S	58.100	2.859	Open Manhole	0		OUTFALL		S2.008	55.241	600	
S16	58.230	1.525	Open Manhole	1200	S5.000	56.705	225				
S17	58.050	1.562	Open Manhole	1200	S5.001	56.488	225	S5.000	56.488	225	
S	58.250	1.785	Open Manhole	0		OUTFALL		S5.001	56.465	225	
S18	58.310	1.955	Open Manhole	1200	S6.000	56.355	300				
S19	58.133	1.683	Open Manhole	1200	S7.000	56.450	300				
S20	58.158	1.887	Open Manhole	1200	S7.001	56.271	300	S7.000	56.271	300	
S21	58.058	1.825	Open Manhole	1200	S7.002	56.233	300	S7.001	56.233	300	
S22	57.805	1.746	Open Manhole	1200	S6.001	56.059	300	S6.000	56.059	300	
								S7.002	56.123	300	64
S23	57.436	1.600	Open Manhole	1200	S6.002	55.836	300	S6.001	55.836	300	
S24	57.260	1.675	Open Manhole	1350	S6.003	55.585	375	S6.002	55.660	300	
S25	57.622	1.747	Open Manhole	1200	S8.000	55.875	300				
S26	57.680	1.972	Open Manhole	1200	S8.001	55.708	300	S8.000	55.708	300	
S27	57.582	1.920	Open Manhole	1200	S8.002	55.662	300	S8.001	55.662	300	
S28	57.217	1.888	Open Manhole	1350	S6.004	55.329	450	S6.003	55.486	375	82
								S8.002	55.479	300	
S29	57.800	1.400	Open Manhole	1200	S9.000	56.400	300				
S30	57.028	1.947	Open Manhole	1500	S6.005	55.081	525	S6.004	55.156	450	
								S9.000	56.122	300	816
S31	56.850	1.844	Open Manhole	1500	S6.006	55.006	525	S6.005	55.006	525	
S	56.700	1.699	Open Manhole	0		OUTFALL		S6.006	55.001	525	
S32	58.514	1.569	Open Manhole	1200	S10.000	56.945	300				
S33	58.000	1.786	Open Manhole	1200	S10.001	56.214	300	S10.000	56.214	300	
S	58.100	1.925	Open Manhole	0		OUTFALL		S10.001	56.175	300	
S34	58.965	1.590	Open Manhole	1200	S11.000	57.375	300				
S35	58.985	2.091	Open Manhole	1200	S11.001	56.894	300	S11.000	56.894	300	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S36	59.857	3.264	Open Manhole	1200	S11.002	56.593	300	S11.001	56.593	300	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S37	59.940	3.449	Open Manhole	1350	S11.003	56.491	375	S11.002	56.566	300	
S38	59.555	3.276	Open Manhole	1350	S11.004	56.279	375	S11.003	56.279	375	
S39	59.385	3.238	Open Manhole	1350	S11.005	56.147	450	S11.004	56.222	375	
S40	58.542	2.567	Open Manhole	1350	S11.006	55.975	450	S11.005	55.975	450	
S	58.550	2.590	Open Manhole	0		OUTFALL		S11.006	55.960	450	
S41	58.837	1.287	Open Manhole	1200	S12.000	57.550	225				
S42	58.850	1.618	Open Manhole	1200	S12.001	57.232	300	S12.000	57.307	225	
S43	58.320	1.610	Open Manhole	1200	S12.002	56.710	300	S12.001	56.710	300	
S	58.400	1.718	Open Manhole	0		OUTFALL		S12.002	56.682	300	
S44	59.600	1.525	Open Manhole	1200	S13.000	58.075	225				
S45	59.500	1.585	Open Manhole	1200	S13.001	57.915	225	S13.000	57.915	225	
S46	59.300	1.600	Open Manhole	1200	S13.002	57.700	300	S13.001	57.775	225	
S47	58.950	1.550	Open Manhole	1200	S13.003	57.400	300	S13.002	57.400	300	
S	59.000	1.650	Open Manhole	0		OUTFALL		S13.003	57.350	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	58.394	56.640	1.454	Open Manhole	1200
S1.001	o	300	S2	58.234	56.285	1.649	Open Manhole	1200
S1.002	o	300	S3	57.582	55.991	1.291	Open Manhole	1200
S1.003	o	300	S4	57.299	55.722	1.277	Open Manhole	1200
S2.000	o	300	S5	58.582	56.975	1.307	Open Manhole	1200
S2.001	o	375	S6	58.279	56.600	1.304	Open Manhole	1350
S2.002	o	375	S7	58.288	56.374	1.539	Open Manhole	1350
S2.003	o	450	S8	58.440	56.233	1.757	Open Manhole	1350
S2.004	o	450	S9	58.517	56.066	2.001	Open Manhole	1350
S3.000	o	225	S10	58.429	56.904	1.300	Open Manhole	1200
S2.005	o	450	S11	58.314	55.732	2.132	Open Manhole	1350
S2.006	o	525	S12	57.923	55.444	1.954	Open Manhole	1500
S4.000	o	225	S13	58.050	56.475	1.350	Open Manhole	1200
S2.007	o	525	S14	57.812	55.401	1.886	Open Manhole	1500
S2.008	o	600	S15	58.000	55.253	2.147	Open Manhole	1500
S5.000	o	225	S16	58.230	56.705	1.300	Open Manhole	1200
S5.001	o	225	S17	58.050	56.488	1.337	Open Manhole	1200
S6.000	o	300	S18	58.310	56.355	1.655	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	53.194	149.8	S2	58.234	56.285	1.649	Open Manhole	1200
S1.001	71.082	241.8	S3	57.582	55.991	1.291	Open Manhole	1200
S1.002	61.567	228.9	S4	57.299	55.722	1.277	Open Manhole	1200
S1.003	24.963	203.0	S	57.200	55.599	1.301	Open Manhole	0
S2.000	43.245	144.2	S6	58.279	56.675	1.304	Open Manhole	1350
S2.001	45.225	200.1	S7	58.288	56.374	1.539	Open Manhole	1350
S2.002	21.213	321.4	S8	58.440	56.308	1.757	Open Manhole	1350
S2.003	53.556	320.7	S9	58.517	56.066	2.001	Open Manhole	1350
S2.004	49.416	148.0	S11	58.314	55.732	2.132	Open Manhole	1350
S3.000	50.716	167.9	S11	58.314	56.602	1.487	Open Manhole	1350
S2.005	72.480	340.3	S12	57.923	55.519	1.954	Open Manhole	1500
S2.006	21.225	493.6	S14	57.812	55.401	1.886	Open Manhole	1500
S4.000	23.940	127.3	S14	57.812	56.287	1.300	Open Manhole	1500
S2.007	31.581	432.6	S15	58.000	55.328	2.147	Open Manhole	1500
S2.008	5.378	448.2	S	58.100	55.241	2.259	Open Manhole	0
S5.000	36.618	168.7	S17	58.050	56.488	1.337	Open Manhole	1200
S5.001	3.933	171.0	S	58.250	56.465	1.560	Open Manhole	0
S6.000	49.797	168.2	S22	57.805	56.059	1.446	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S7.000	o	300	S19	58.133	56.450	1.383	Open Manhole	1200
S7.001	o	300	S20	58.158	56.271	1.587	Open Manhole	1200
S7.002	o	300	S21	58.058	56.233	1.525	Open Manhole	1200
S6.001	o	300	S22	57.805	56.059	1.446	Open Manhole	1200
S6.002	o	300	S23	57.436	55.836	1.300	Open Manhole	1200
S6.003	o	375	S24	57.260	55.585	1.300	Open Manhole	1350
S8.000	o	300	S25	57.622	55.875	1.447	Open Manhole	1200
S8.001	o	300	S26	57.680	55.708	1.672	Open Manhole	1200
S8.002	o	300	S27	57.582	55.662	1.620	Open Manhole	1200
S6.004	o	450	S28	57.217	55.329	1.438	Open Manhole	1350
S9.000	o	300	S29	57.800	56.400	1.100	Open Manhole	1200
S6.005	o	525	S30	57.028	55.081	1.422	Open Manhole	1500
S6.006	o	525	S31	56.850	55.006	1.319	Open Manhole	1500
S10.000	o	300	S32	58.514	56.945	1.269	Open Manhole	1200
S10.001	o	300	S33	58.000	56.214	1.486	Open Manhole	1200
S11.000	o	300	S34	58.965	57.375	1.290	Open Manhole	1200
S11.001	o	300	S35	58.985	56.894	1.791	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S7.000	17.757	99.2	S20	58.158	56.271	1.587	Open Manhole	1200
S7.001	9.290	244.5	S21	58.058	56.233	1.525	Open Manhole	1200
S7.002	26.962	245.1	S22	57.805	56.123	1.382	Open Manhole	1200
S6.001	26.448	118.6	S23	57.436	55.836	1.300	Open Manhole	1200
S6.002	14.493	82.3	S24	57.260	55.660	1.300	Open Manhole	1350
S6.003	23.288	235.2	S28	57.217	55.486	1.356	Open Manhole	1350
S8.000	33.374	199.8	S26	57.680	55.708	1.672	Open Manhole	1200
S8.001	9.290	202.0	S27	57.582	55.662	1.620	Open Manhole	1200
S8.002	36.662	200.3	S28	57.217	55.479	1.438	Open Manhole	1350
S6.004	69.319	400.7	S30	57.028	55.156	1.422	Open Manhole	1500
S9.000	55.531	199.8	S30	57.028	56.122	0.606	Open Manhole	1500
S6.005	36.673	489.0	S31	56.850	55.006	1.319	Open Manhole	1500
S6.006	2.580	516.0	S	56.700	55.001	1.174	Open Manhole	0
S10.000	76.413	104.5	S33	58.000	56.214	1.486	Open Manhole	1200
S10.001	6.079	155.9	S	58.100	56.175	1.625	Open Manhole	0
S11.000	80.877	168.1	S35	58.985	56.894	1.791	Open Manhole	1200
S11.001	72.904	242.2	S36	59.857	56.593	2.964	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S11.002	o	300	S36	59.857	56.593	2.964	Open Manhole	1200
S11.003	o	375	S37	59.940	56.491	3.074	Open Manhole	1350
S11.004	o	375	S38	59.555	56.279	2.901	Open Manhole	1350
S11.005	o	450	S39	59.385	56.147	2.788	Open Manhole	1350
S11.006	o	450	S40	58.542	55.975	2.117	Open Manhole	1350
S12.000	o	225	S41	58.837	57.550	1.062	Open Manhole	1200
S12.001	o	300	S42	58.850	57.232	1.318	Open Manhole	1200
S12.002	o	300	S43	58.320	56.710	1.310	Open Manhole	1200
S13.000	o	225	S44	59.600	58.075	1.300	Open Manhole	1200
S13.001	o	225	S45	59.500	57.915	1.360	Open Manhole	1200
S13.002	o	300	S46	59.300	57.700	1.300	Open Manhole	1200
S13.003	o	300	S47	58.950	57.400	1.250	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S11.002	6.474	239.8	S37	59.940	56.566	3.074	Open Manhole	1350
S11.003	48.165	227.2	S38	59.555	56.279	2.901	Open Manhole	1350
S11.004	12.993	227.9	S39	59.385	56.222	2.788	Open Manhole	1350
S11.005	68.986	401.1	S40	58.542	55.975	2.117	Open Manhole	1350
S11.006	5.852	390.1	S	58.550	55.960	2.140	Open Manhole	0
S12.000	24.065	99.0	S42	58.850	57.307	1.318	Open Manhole	1200
S12.001	45.624	87.4	S43	58.320	56.710	1.310	Open Manhole	1200
S12.002	6.781	242.2	S	58.400	56.682	1.418	Open Manhole	0
S13.000	26.917	168.2	S45	59.500	57.915	1.360	Open Manhole	1200
S13.001	14.134	101.0	S46	59.300	57.775	1.300	Open Manhole	1200
S13.002	27.899	93.0	S47	58.950	57.400	1.250	Open Manhole	1200
S13.003	12.125	242.5	S	59.000	57.350	1.350	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.180	0.180	0.180
1.001	User	-	100	0.186	0.186	0.186
1.002	User	-	100	0.143	0.143	0.143
1.003	User	-	100	0.060	0.060	0.060
2.000	User	-	100	0.154	0.154	0.154
2.001	User	-	100	0.142	0.142	0.142
2.002	User	-	100	0.028	0.028	0.028
2.003	User	-	100	0.316	0.316	0.316
2.004	User	-	100	0.196	0.196	0.196
3.000	User	-	100	0.171	0.171	0.171
2.005	User	-	100	0.268	0.268	0.268
2.006	User	-	100	0.078	0.078	0.078
4.000	User	-	100	0.325	0.325	0.325
2.007	User	-	100	0.071	0.071	0.071
2.008	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.156	0.156	0.156
5.001	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.183	0.183	0.183
7.000	User	-	100	0.082	0.082	0.082
7.001	-	-	100	0.000	0.000	0.000
7.002	User	-	100	0.100	0.100	0.100
6.001	User	-	100	0.079	0.079	0.079
6.002	-	-	100	0.000	0.000	0.000
6.003	User	-	100	0.082	0.082	0.082
8.000	User	-	100	0.139	0.139	0.139
8.001	User	-	100	0.058	0.058	0.058
8.002	User	-	100	0.095	0.095	0.095
6.004	User	-	100	0.228	0.228	0.228
9.000	User	-	100	0.240	0.240	0.240
6.005	User	-	100	0.276	0.276	0.276
6.006	-	-	100	0.000	0.000	0.000
10.000	User	-	100	0.302	0.302	0.302
10.001	-	-	100	0.000	0.000	0.000
11.000	User	-	100	0.177	0.177	0.177
11.001	User	-	100	0.165	0.165	0.165
11.002	-	-	100	0.000	0.000	0.000
11.003	User	-	100	0.198	0.198	0.198
11.004	-	-	100	0.000	0.000	0.000
11.005	User	-	100	0.385	0.385	0.385
11.006	-	-	100	0.000	0.000	0.000
12.000	User	-	100	0.095	0.095	0.095
12.001	User	-	100	0.283	0.283	0.283
12.002	-	-	100	0.000	0.000	0.000
13.000	User	-	100	0.173	0.173	0.173
13.001	-	-	100	0.000	0.000	0.000
13.002	User	-	100	0.200	0.200	0.200
13.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				6.016	6.016	6.016

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.003	S	57.200	55.599	55.600	0	0

Datum (m) 54.624 Offset (mins) 0

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S2.008	S	58.100	55.241	55.000	0	0

Datum (m) 54.624 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S5.001	S	58.250	56.465	56.060	0	0

Datum (m) 54.624 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S6.006	S	56.700	55.001	55.010	0	0

Datum (m) 54.624 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S10.001	S	58.100	56.175	56.100	0	0

Datum (m) 54.624 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S11.006	S	58.550	55.960	55.650	0	0

Datum (m) 54.624 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S12.002	S	58.400	56.682	56.000	0	0

Datum (m) 54.624 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S13.003	S	59.000	57.350	55.750	0	0

Datum (m) 54.624 Offset (mins) 0

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.150	3	0.450	5	0.750	7	1.050	9	1.050	11	0.750	13	0.450	15	0.150
2	0.300	4	0.600	6	0.900	8	1.100	10	0.900	12	0.600	14	0.300		

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	5	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.000	Storm Duration (mins)	30
Ratio R	0.320		

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	20

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	+20%	100/15 Summer				
S1.001	15 Winter	100	+20%	100/15 Summer				
S1.002	15 Winter	100	+20%	100/15 Summer				
S1.003	15 Winter	100	+20%	100/15 Summer				
S2.000	15 Winter	100	+20%	100/15 Summer				
S2.001	15 Winter	100	+20%	100/15 Summer				
S2.002	15 Winter	100	+20%	100/15 Summer				
S2.003	15 Winter	100	+20%	100/15 Summer				
S2.004	15 Winter	100	+20%	100/15 Summer				
S3.000	15 Winter	100	+20%	100/15 Summer				
S2.005	15 Winter	100	+20%	100/15 Summer				
S2.006	15 Winter	100	+20%	100/15 Summer				
S4.000	15 Winter	100	+20%	100/15 Summer				
S2.007	15 Winter	100	+20%	100/15 Summer				
S2.008	15 Winter	100	+20%	100/15 Summer				
S5.000	15 Winter	100	+20%	100/15 Summer				
S5.001	15 Winter	100	+20%	100/15 Summer				
S6.000	15 Winter	100	+20%	100/15 Summer				
S7.000	15 Winter	100	+20%	100/15 Summer				
S7.001	15 Winter	100	+20%	100/15 Summer				
S7.002	15 Winter	100	+20%	100/15 Summer				
S6.001	15 Winter	100	+20%	100/15 Summer				
S6.002	15 Winter	100	+20%	100/15 Summer				
S6.003	15 Winter	100	+20%	100/15 Summer				
S8.000	15 Winter	100	+20%	100/15 Summer				
S8.001	15 Winter	100	+20%	100/15 Summer				
S8.002	15 Winter	100	+20%	100/15 Summer				
S6.004	15 Winter	100	+20%	100/15 Summer				
S9.000	15 Winter	100	+20%	100/15 Summer				
S6.005	15 Winter	100	+20%	100/15 Summer				
S6.006	15 Winter	100	+20%	100/15 Summer				
S10.000	15 Winter	100	+20%	100/15 Summer				
S10.001	15 Winter	100	+20%	100/15 Summer				
S11.000	15 Winter	100	+20%	100/15 Summer				
S11.001	15 Winter	100	+20%	100/15 Summer				
S11.002	15 Winter	100	+20%	100/15 Summer				
S11.003	15 Winter	100	+20%	100/15 Summer				
S11.004	15 Winter	100	+20%	100/15 Summer				
S11.005	15 Winter	100	+20%	100/15 Summer				
S11.006	15 Winter	100	+20%	100/15 Summer				
S12.000	15 Winter	100	+20%	100/15 Summer				
S12.001	15 Winter	100	+20%	100/15 Summer				
S12.002	15 Winter	100	+20%	100/15 Summer				
S13.000	15 Winter	100	+20%	100/15 Summer				
S13.001	15 Winter	100	+20%	100/15 Summer				
S13.002	15 Winter	100	+20%	100/15 Summer				

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S13.003	15 Winter	100	+20%	100/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	58.393	1.453	0.000	0.65	0.0	55.9	FLOOD RISK
S1.001	S2	58.232	1.647	0.000	1.50	0.0	102.3	FLOOD RISK
S1.002	S3	57.530	1.239	0.000	1.95	0.0	135.7	FLOOD RISK
S1.003	S4	56.463	0.441	0.000	2.14	0.0	148.4	SURCHARGED
S2.000	S5	58.340	1.065	0.000	0.60	0.0	52.0	FLOOD RISK
S2.001	S6	58.218	1.243	0.000	0.62	0.0	80.1	FLOOD RISK
S2.002	S7	58.114	1.365	0.000	0.95	0.0	89.0	FLOOD RISK
S2.003	S8	58.035	1.352	0.000	1.00	0.0	164.3	SURCHARGED
S2.004	S9	57.867	1.351	0.000	0.89	0.0	214.9	SURCHARGED
S3.000	S10	58.184	1.055	0.000	1.42	0.0	54.5	FLOOD RISK
S2.005	S11	57.599	1.417	0.000	2.03	0.0	330.4	SURCHARGED
S2.006	S12	56.675	0.706	0.000	2.18	0.0	345.7	SURCHARGED
S4.000	S13	58.023	1.323	0.000	2.81	0.0	118.9	FLOOD RISK
S2.007	S14	56.467	0.541	0.000	2.41	0.0	470.9	SURCHARGED
S2.008	S15	56.033	0.180	0.000	2.20	0.0	469.2	SURCHARGED
S5.000	S16	57.435	0.505	0.000	1.59	0.0	59.8	SURCHARGED
S5.001	S17	56.861	0.148	0.000	2.21	0.0	60.1	SURCHARGED
S6.000	S18	57.954	1.299	0.000	0.72	0.0	58.1	SURCHARGED
S7.000	S19	57.966	1.216	0.000	0.25	0.0	23.8	FLOOD RISK
S7.001	S20	57.924	1.353	0.000	0.51	0.0	28.1	FLOOD RISK
S7.002	S21	57.877	1.344	0.000	0.79	0.0	50.6	FLOOD RISK
S6.001	S22	57.800	1.441	0.000	1.35	0.0	124.1	FLOOD RISK
S6.002	S23	57.381	1.245	0.000	1.23	0.0	126.1	FLOOD RISK
S6.003	S24	57.123	1.163	0.000	1.32	0.0	146.6	FLOOD RISK
S8.000	S25	57.416	1.241	0.000	0.64	0.0	46.2	FLOOD RISK
S8.001	S26	57.342	1.334	0.000	1.05	0.0	63.3	SURCHARGED
S8.002	S27	57.268	1.306	0.000	1.27	0.0	91.4	SURCHARGED
S6.004	S28	56.971	1.192	0.000	1.92	0.0	287.0	FLOOD RISK
S9.000	S29	56.903	0.203	0.000	1.31	0.0	96.9	SURCHARGED
S6.005	S30	56.277	0.671	0.000	2.36	0.0	443.2	SURCHARGED
S6.006	S31	55.848	0.317	0.000	2.57	0.0	444.9	SURCHARGED
S10.000	S32	57.598	0.353	0.000	1.10	0.0	114.9	SURCHARGED
S10.001	S33	56.670	0.156	0.000	1.85	0.0	113.8	SURCHARGED
S11.000	S34	58.677	1.002	0.000	0.69	0.0	57.0	FLOOD RISK
S11.001	S35	58.452	1.258	0.000	1.43	0.0	97.3	SURCHARGED
S11.002	S36	57.804	0.911	0.000	2.00	0.0	101.3	SURCHARGED
S11.003	S37	57.684	0.818	0.000	1.22	0.0	149.5	SURCHARGED
S11.004	S38	57.351	0.697	0.000	1.49	0.0	153.4	SURCHARGED
S11.005	S39	57.212	0.615	0.000	1.75	0.0	261.3	SURCHARGED
S11.006	S40	56.603	0.178	0.000	2.32	0.0	260.3	SURCHARGED
S12.000	S41	58.294	0.519	0.000	0.82	0.0	39.2	SURCHARGED
S12.001	S42	58.150	0.618	0.000	1.27	0.0	141.8	SURCHARGED
S12.002	S43	57.290	0.280	0.000	2.77	0.0	141.7	SURCHARGED
S13.000	S44	59.150	0.850	0.000	1.69	0.0	62.5	SURCHARGED
S13.001	S45	58.679	0.539	0.000	1.45	0.0	65.4	SURCHARGED
S13.002	S46	58.422	0.422	0.000	1.27	0.0	132.6	SURCHARGED
S13.003	S47	57.918	0.218	0.000	2.30	0.0	132.2	SURCHARGED