Project

Clonburris Phase 1a

Report Title

Infrastructure Design Report

Client

Cairn Homes Properties Ltd

INFRASTRUCTURE

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DBFL CONSULTING ENGINEERS

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APPENDICES

1.0 INTRODUCTION

1.1 Background

This infrastructure design report has been prepared by DBFL Consulting Engineers for the planning application for the Clonburris Phase 1a development. The proposed development is part of the Clonburris Strategic Development Zone (SDZ) within the administrative area of South Dublin County Council (SDCC).

The proposed development is located within development area Clonburris South West (CSW) within the SDZ. The CSW comprises of 4 sub sectors that will be mixed-use development areas with medium density residential developments. The subject site spans across the Sector 3 (CSW S3) and Sector 4 (CSW S4).

This application comprises 569 residential units, 540m^2 of creche/employment area with 623m^2 of community/civic space above with associated roads/footpaths, surface water drainage, foul drainage and watermain infrastructure. Additionally, 2no. temporary haul routes are to being proposed to provide access to the subject site.

The proposed site will benefit from trunk infrastructure proposed as part of the Clonburris Infrastructure Development for which planning has been granted in August 2021 under planning reference SDZ20A/0021. The CSLS includes trunk road, drainage, watermain and utility infrastructure to serve the Clonburris Strategic Development Zone lands to the south of the Kildare/Cork Railway Line which includes the subject site.

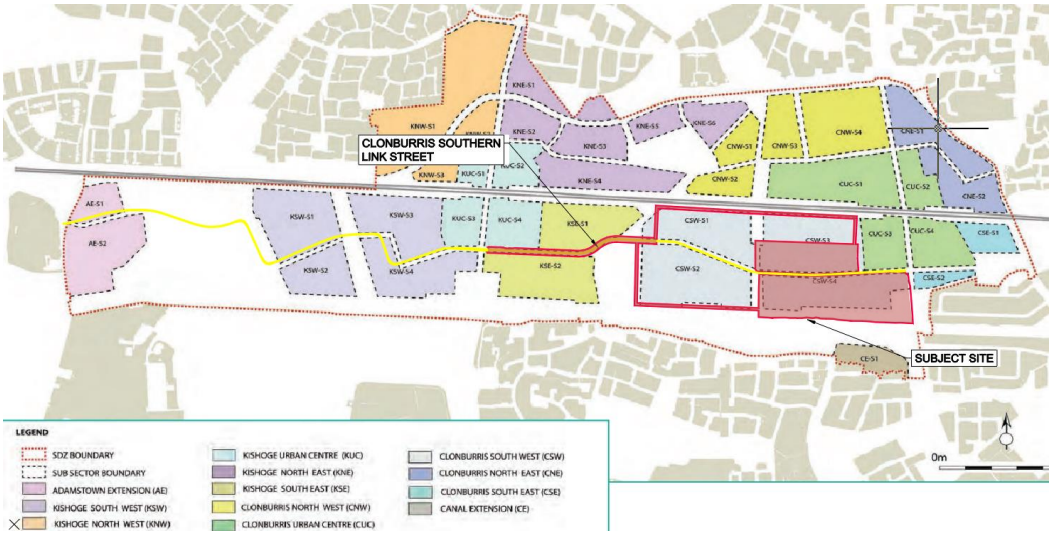

Figure 1-1 Subject site within SDZ (Boundary Indicative)

1.2 Objectives

This report aims to consider the proposed development main infrastructure elements, including the following;

- Road Layout/Site access.
- Surface water strategy and servicing.
- Foul sewer strategy and servicing.
- Water supply and servicing
- Flood Risk.

1.3 Location

The overall Clonburris SDZ lands, of approximately 280 Ha, are located to the west of Dublin City Centre and the M50, between the N4 and N7 national primary routes. The Kildare/Cork railway line bisects the lands centrally and the Grand Canal forms the southern boundary.

The subject site for this planning application is situated in the southern area of the SDZ lands to the south of the Kildare/Cork railway adjacent to the R113, the R136 Grange Castle Road is situated approximately 1.2km west of the subject site. The Clonburris South Link Street which links the R113 to the R136 will provide access to the subject site. The Adamstown SDZ is located to the north-west of the subject site.

The future Clonburris Southern Link Street bisects the proposed development. North of the CSLS the site is within sub sector CSW S3 while the south is within sub sector CSW S4 of the Clonburris South West Development Area.

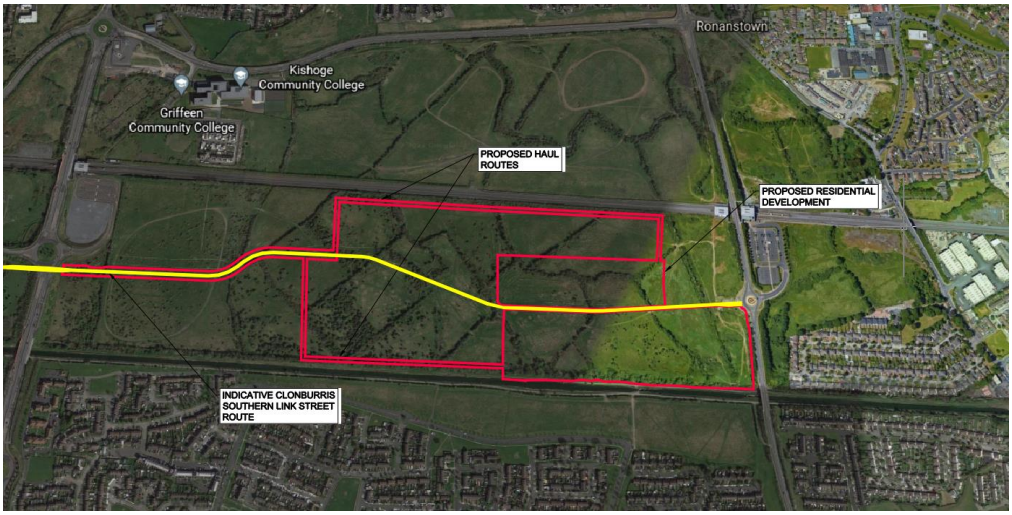

Figure 1-2 Site Location. (Boundary Indicative)

1.3.1 Topography

Overall, the topography of the site is relatively flat. There is a slight fall with a gradient of approximately 0.5% from east to west over the majority of the site. A number of drainage ditches are located throughout the site. There are 2no. high points on site. One located to the southwest and another to the east north of the future Link Road as shown in Figure 1-3. A topographical survey of the Site is provided as a background to the layout drawings issued with this report.

Figure 1-1 Site Topography (Boundary Indicative)

1.4 Proposed Development

This application comprises 569 residential units, consisting of 248 apartments, 173 Houses & 148 Duplexes, and a 540m^2 of creche/employment area with 623m^2 of community/civic space above. The application also includes infrastructure comprising a road layout, surface water drainage, foul drainage and the watermain infrastructure. Additionally, 2no. temporary haul routes are being proposed to provide access to the subject site. Portions of the haul route coincide with the permitted Clonburris Southern Link Street (CSLS) to be constructed as part of the Clonburris Joint Infrastructure Works (JIW) under planning permission SDZ20A/0021.

1.5 Existing Ground Conditions

- A site investigation was undertaken by Ground Investigations Ireland to ascertain the existing ground conditions. This detailed investigation included the following.
    - 211 No. Trial Pits to a maximum depth of 3.10m BGL
    - 32 No. Plate Bearing Test to ascertain constrained modulus and equivalent CBR
    - 10 No. Soakaways to determine a soil infiltration value to BRE digest 365
    - 215 No. Dynamic Probes to determine soil strength/density characteristics
    - 32 No. Rotary Core Boreholes to a maximum depth of 6.80m BGL
    - 12 No. Groundwater monitoring wells
    - Geotechnical & Environmental Laboratory testing

  The sequence of strata encountered were consistent across the site and are generally comprised;

  - Topsoil: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.40m BGL.
  - Made Ground: Made Ground deposits were encountered beneath the Topsoil and were present between 0.5m and 1.4m BGL. These deposits were described generally as brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders and contained occasional fragments red brick.
  - Cohesive Deposits: Cohesive deposits were encountered beneath the Made Ground and were described typically as brown or grey brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders overlying a stiff dark grey slightly sandy slightly gravelly CLAY with occasional cobbles and boulders.
  - Granular Deposits: The granular deposits were generally encountered below or within the cohesive deposits and were typically described as Grey brown or brown very clayey sandy sub rounded to sub angular fine to coarse GRAVEL with occasional cobbles and rare boulders or grey brown very clayey very gravelly fine to coarse SAND.
  - Weathered Bedrock: In the majority of exploratory holes weathered rock was encountered which was digable with the large excavator to a depth of up to 1.0m below the top of the stratum. The trial pits were terminated upon encountering the more competent bedrock, in which further excavation became more difficult.
  - Bedrock The rotary core boreholes recovered weak to strong grey/dark grey fine to medium grained laminated limestone interbedded with weak black fine grained laminated Mudstone. The depth to rock varies from 1.15m BGL to the west of the site in RC06 to a maximum of 3.60m BGL in RC28 to the east of the site

2.0 ACCESS AND ROADS

2.1 Overall Road and Access Layout

The overall road and access layout is accordance with the requirements defined in the Clonburris SDZ planning scheme.

The proposed development will be accessed from the Clonburris Southern Link Street (CSLS) which has been granted permission in August 2021 under planning reference SDZ20A/0021.

The CSLS includes minor priority-controlled junctions along the street alignment to provide access to future development cells within the Clonburris SDZ including the subject site.

The subject site's internal road layout has been designed with a number of junctions and a meandering alignment through the development to promote traffic calming and discourage "rat running" through the development.

The proposed road hierarchy and typologies are generally consistent with those set out in section 2.2.4 of Clonburris SDZ.

The proposed Local streets will be 5.5m wide with a 2m wide footpath on the side of residential units. Intimate Scale/Home-Zone Streets are 4.8m wide with a 1.5m vulnerable user / service strip on each side. This design allows enough room for perpendicular parking, accommodates utility infrastructure utilities while creating a safe shared use area for all road users. The development's internal layout has been designed with speed reduction bends to provide traffic calming together with a combination of road vertical and horizontal deflections to reduce speeds. Flat top table ramps have been provided at strategic locations to calm traffic at junctions in particular at Homezone /vehicular interfaces. Design speed limits of 30km/hr are applied throughout the development as per Design Manual for Urban Roads and Streets (DMURS).

It is intended that the roads and footpaths of the proposed development are designed to accommodate pedestrian and cycle links to future infrastructure to be constructed as part of the overall Clonburris SDZ. There are number of vehicular and pedestrian/cycle bridges proposed within the SDZ boundary. It is intended that the road, pedestrian and cycle infrastructure of the proposed development will be extended in the future to provide links to these locations as shown in Figure 2-1.

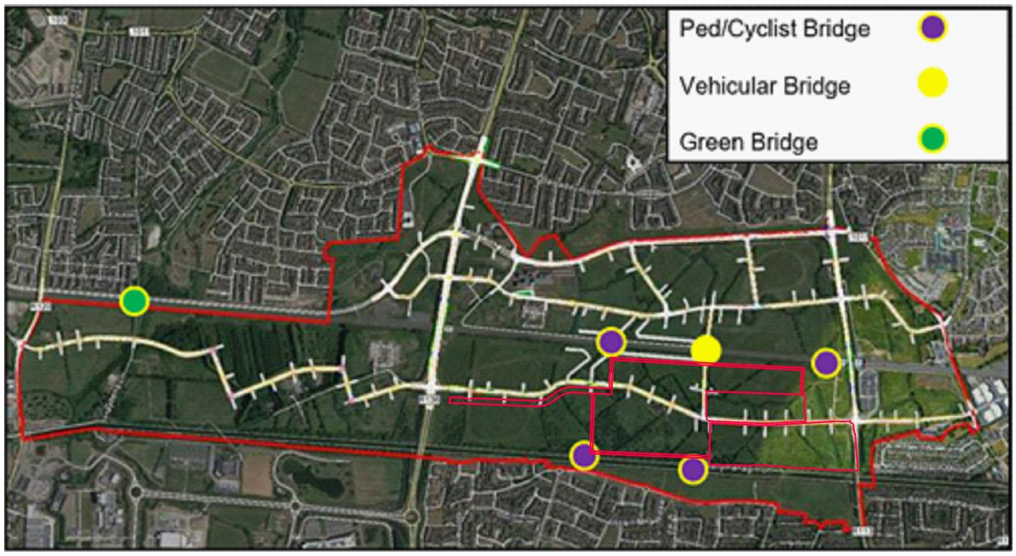

Figure 2-1 Indicative Bridge Location Plan

The proposed development's road layout is shown on drawings 162119-DBFL-RD-SP-DR-C-1201,1202, & 1203. The standard road cross-sections and construction details are shown on drawings 162119-DBFL-RD-SP-DR-C-5201,5202, 5202 & 5204 and comprise the following;

- Local Streets – typically 5m to 5.5m wide carriageway with 2m footways and intermittent 2.4m wide private parking bays. Where required to accommodate perpendicular parking either the parking bay width has been increased or the road width increased.
- Intimate Scale / Home-Zone Streets – 4.8m wide home zone with 1.5m vulnerable user strip each side. Road surfaces are to be in a different colour contrast and texture to Local Streets. Vulnerable user strips will be concrete with an exposed aggregate finish.

Maximum road corner radii of 4.5m are provided within the local streets, with the exception of certain turning heads which have corner radii 6m to accommodate refuse vehicles.

Figure 2-2: Schematic Roads Hierarchy

2.2 Haul Roads

The proposed haul routes being proposed will be approximately 6.0m wide. These will consist of a temporary road build up as shown on drawing 162119-DBFL-RD-SP-DR-C-1210. Generally the haul routes follow the route of proposed local streets as set out in the overall SDZ. All construction materials, debris, temporary hardstands involved in the construction of these roads will be removed off-site on completion of the works or else will be incorporated as capping material into the future local street network (subject to planning permission.

2.3 Pavement Design Standards

The main internal access roads are designed in accordance with the Design Manual for Urban Roads and Streets (DMURS) and Local Authority taking in charge requirements. A 125mm high kerb separation is proposed between typical roads and footpaths. In the case of the homezone areas a 25mm kerb separation is intended between the roads and the vulnerable user strips. Refer to drawings 162119-DBFL-RD-SP-DR-C-5201 to 5204 for the proposed road construction thicknesses based on an assumed existing ground minimum design CBR of 3%. Actual CBRs and ground conditions will be confirmed by detailed site investigations prior to construction.

2.4 Vehicle Tracking

The proposed development has been tracked to show that the development's proposed streets and turning heads will accommodate a large refuse vehicle as shown on drawings 162119-DBFL-RD-SP-DR-C-1201, 1202 & 1203.

2.5 Driveway Access

Access driveways are set to accommodate a targeted maximum 1:20 driveway gradient. All driveways are permeable paving within private curtilage. Entrances to driveways in public footpaths comprise drop kerbs with 150mm deep concrete pavement. Parking bays will be minimum 5m in length to allow enough space for parking.

3.0 SURFACE WATER DRAINAGE

3.1 Existing Drainage

The existing site has a gradient towards the northeast as shown in Figure 1-3. There are a number of existing interconnected field drains on the site. These have extremely flat gradients but are understood to drain to existing drainage networks to the east of the site and ultimately to the Camac River. Additional detail on existing drainage within the SDZ is provided in the SWMP. Existing agricultural drainage on site will be maintained as required until it is replaced by drainage networks for the developed site

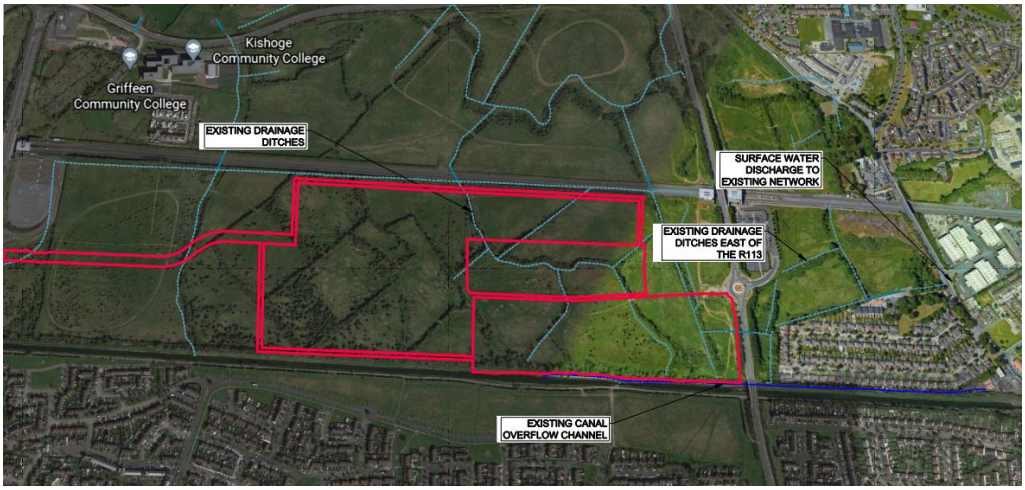

Figure 3-1 Existing Drainage (Boundary Indicative)

The south boundary of the subject site is bounded by an overflow channel for the Grand Canal. This channel runs alongside the canal towpath north of the canal before re-entering the canal downstream, it does not appear that local drainage connects to this overflow channel. In order to preserve the Grand Canal ecological corridor development setbacks as defined in the SDZ documents are implemented. These allow for the maintenance of an ecological corroder along the canal, see figure 3.2 below.

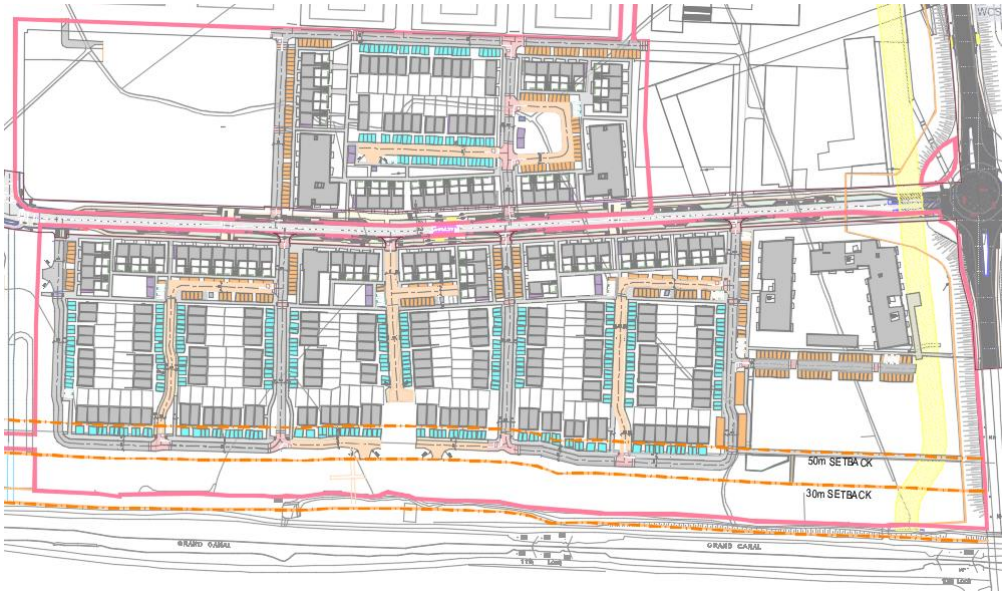

Figure 3-2: Grand Canal ecological corridor and gas main wayleave

3.2 Surface Water Drainage Strategy

3.2.1 Compliance With SWMP

DBFL Consulting Engineers have undertaken a "Surface Water Management Plan" (SWMP) for the overall Clonburris Strategic Development Zone (SDZ). The SWMP for the SDZ been submitted to SDCC and agreed with SDCC. The SWMP outlines the surface water strategy for the overall SDZ lands and the requirements for each individual site within the SDZ which includes the subject site. The SWMP includes the strategy for attenuation design, SUDS features, run off rates and trunk infrastructure layout. The subject site has been designed in accordance the strategy agreed upon in the SWMP.

The proposed site will benefit from trunk surface water infrastructure proposed as part of the Clonburris Infrastructure Development for which planning was granted under reference SDZ20A/0021. The planning application included trunk surface water sewers and regional attenuation to serve the subject site, this strategic infrastructure aligns with the SWMP proposals and allows for a treatment train of Suds measures within individual sites and within the regional features.

It is intended that the stormwater run-off generated from the proposed development will be collected in a new gravity sewer and discharged to the regional attenuation systems constructed as part of the CSLS. The subject site spans across two separate catchments within the SWMP. The portion of the site to the north of the CSLS is within Catchment 4B and will be served by attenuation ATN 07, south of the Link Street the

proposed development is designated as Catchment 4BB and will discharge to attenuation ATN 08 as shown in Figure 3-3. Both attenuation systems will consist of modular underground storage with over ground detention basins. Outflow from each attenuation structure within the SDZ limit flow to a rate of 3.1 l/s/ha as detailed in the SWMP for the SDZ.

The subject development application has been coordinated with the Clonburris CSLS application and therefore no significant alterations are proposed to the layout or design of the surface water infrastructure under planning reference SDZ20A/0021. Minor modifications to the footprints of the attenuation areas are proposed as part of this application however the general arrangement and attenuation volumes are to be maintained as per those permitted as part of the CSLS application.

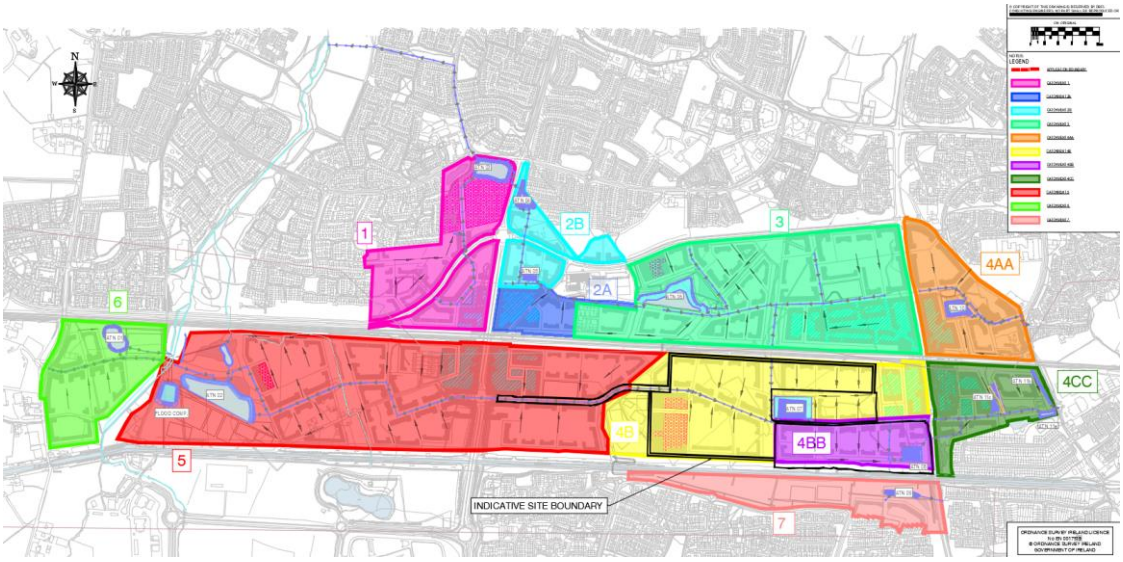

Figure 3-3: SDZ Catchment breakdown

The below table documents the site design compliance with the SWMP Requirements & Objectives

SDZ Requirements/ Objectives	Proposed Development Compliance
O1. It is an objective of the Surface Water Management Plan that proposals for all development cells include provision for at least two separate SuDS features	The proposed objective is met and exceeded in the subject design. Suds features in the site design (prior to discharge to regional SuDS features) include • Permeable Paving • Bioretention areas • Swales
O2. It is an objective of the Surface Water Management Plan that green roofs are provided to any suitable buildings with area >300m² within Urban Centre sub sectors. Green roof coverage should be minimum of 60% of building area	The proposed site is not within an Urban Centre sub sector therefore objective is not applicable.
O3. It is an objective of the Surface Water Management Plan that runoff from roads adjacent to suitable parkland or landscape strips should be conveyed in vegetated open channel SuDS features	The proposed objective is met in the subject design. Swales are provided to collect and convey road runoff along western and southern boundaries where adjacent to open space
O4. It is an objective of the Surface Water Management Plan that new link streets incorporate drainage discharges from carriageway runoff to tree pits or similar features.	Link street design is provided separately to this development under planning reference SDZ20A/0021. Drainage discharges to suds features are noted to incorporated into this separate application
O5. It is an objective of the Surface Water Management Plan that all private parking areas are surfaced with pervious paving.	The proposed objective is met in the subject design. All Private parking areas are proposed to be surfaced with pervious paving.

3.2.2 Compliance with Surface Water Policy

Surface water management for the proposed development is designed to comply with the Greater Dublin Strategic Drainage Study (GDSDS) policies and guidelines and the requirements of South Dublin County Council. The guidelines require the following four main criteria to be provided by the development's surface water design;

- Criterion 1: River Water Quality Protection – satisfied by providing interception storage using permeable paving in driveways, treatment of run-off within the SUDS features e.g. permeable paving for driveways/parking bays, swales, bioretention areas and within the attenuation storage system and oil separators on the main surface water outfalls from the development.
- Criterion 2: River Regime Protection – satisfied by attenuating run-off with flow control devices prior to discharge to the outfall.
- Criterion 3: Level of Service (flooding) for the site – satisfied by the Site being outside the 1000 year coastal and fluvial flood zones, (See Flood Risk Assessment). Pluvial flood risk addressed by development designed to accommodate a 100 year storm as per GDSDS. Planned flood routing for storms greater than 100 year level, considered in design, the development has been designed to provide an overland flood route from the development towards the surface water outfall.
- Criterion 4: River flood protection – attenuation and long term storage provided within the SUDS features e.g. permeable paving construction, swales and attenuation facility.

3.3 SUDS

In accordance with the GDSDS it is proposed to use Sustainable Urban Drainage systems (SUDS) for managing storm-water for the proposed development. The aim of the SUDS strategy for the site will be to;

- Attenuate storm-water runoff.
- Reduce storm-water runoff.
- Reduce pollution impact.
- Replicate the natural characteristics of rainfall runoff for the site.
- Recharge the groundwater profile

The proposed layout of the drainage and SUDS is detailed on drawings 162119-DBFL-CS-SP-DR-C-1301 to 1304.

The Surface Water Management Plan agreed with SDCC includes a number of potential SUDs feature to be implemented on individual sites within the SDZ. The following SUDs features are incorporated into the design for the subject site:

1. Swales/Bioretention Areas - Where possible Swales and Bioretention areas have been implemented into the design as shown on drawings 162119-DBFL-CS-SP-C-1301 to 1304. Surface water generated from the adjacent roads and footpaths will discharge directly to these SuDS features via inlet kerbs detailed on drawing 162119-DBFL-CS-SP-C-5004.
2. Permeable Paving – The proposed design includes permeable finishes on all private driveways and parking bays within the development as shown on drawings 162119-DBFL-CS-SP-C-1201 to 162119-DBFL-CS-SP-C-1203.
3. Regional Attenuation [delivered as part of CSLS works] - Including Detention Basin and ponds and petrol interceptors

The incorporation of the above SuDS elements will provide a sustainable manner in which to disperse surface water from the site, encourage groundwater recharge and provide a treatment train of run-off and subsequent improvement of discharge quality.

3.4 Attenuation

As set out in the SWMP and the Infrastructure Design Report for SDZ20A/0021, attenuation volumes for the SDZ are generally provided on a regional basis (with the exception of urban centre and school sites).

The attenuation that will serve the subject site is to be constructed as part of the Clonburris Southern Link Street (CSLS) in advance of the proposed development. As mentioned in Section 3.2.1 the proposed development spans across two separate catchments, 4B and 4BB, within the Clonburris SDZ.

These discharge to separate attenuation zones, ATN 07 and ATN 08, with an allowable discharge rate of 3.1l/s/ha, detailed below:

- Attenuation ATN 07 comprises of underground modular storage with a maximum storage capacity of 6,900m^3. Above this structure is a detention basin that will provide 3,100m^3. Overall, the structure provides 10,000m^3 of storage required for a 100 year storm for the subject site north of the CSLS and other lands within Catchment 4B and the overall SDZ.
- Attenuation ATN 08 comprises of underground modular storage with a maximum storage capacity of 3,140 m^3 with an above ground detention basin that will provide 1,350m^3 providing a total of 4,490m^3 storage required for a 100 year storm for Catchment 4BB.

Surface water discharge from ATN08 will continue to flow through the surface water sewers constructed as part of the CSLS will pass through downstream attenuation pond designated ATN 11a before discharging to the existing surface water network on Ninth Lock Road.

The attenuation systems for the CSLS have been approved under planning reference SDZ20A/0021. Minor amendments to the plan footprints permitted under SDZ20A/0021 are proposed as part of the current application however the overall general arrangement and attenuation volumes are to be maintained as per the permitted application.

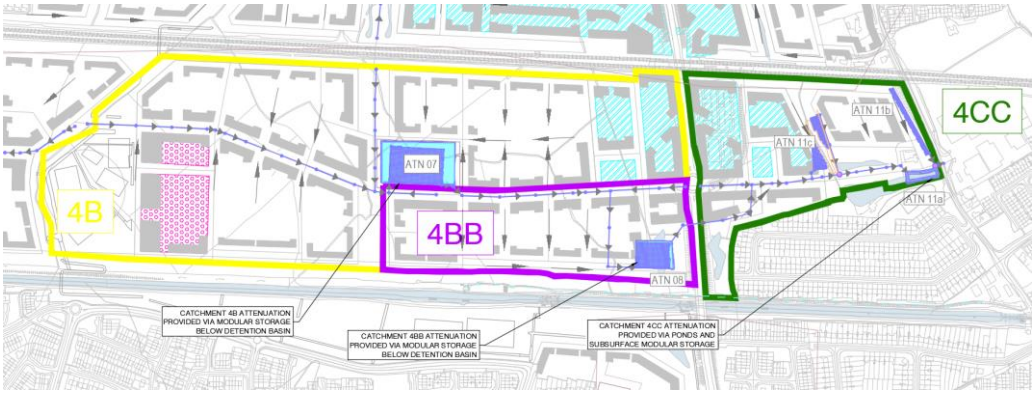

Figure 3-4: Regional Attenuation and Outfall

3.4.1 Compliance with Attenuation Design

Calculation of regional attenuation volumes is included within the SWMP and within the CSLS infrastructure application. These regional features cater for the attenuation volumes required for individual developments such as Phase 1A.

In the absence of development plans for individual development parcels, the attenuation volumes required in the regional features were based on an assumed % Impermeable for each parcel. This section documents the proposed development's characteristics against those assumed for regional attenuation volume calculations to ensure the development falls within the design allowances.

Table 3-1 Extract from Clonburris SWMP Summary Table

Sub-Catchment	Attenuation Ref	Catchment Area (ha)	Assumed Impermeable Area [from Runoff Factors]	Assumed % Impermeable [from Runoff Factors]	Storage Type	Allowable Outflow (l/s) [Sub-catchment]	Allowable Outflow (l/s) [Catchment]	Storage Volume Required (100 years, m3)
1	ATN03	18.9	9.28	49.1%	Pond	58.59	58.59	5,100
2A	ATN05	5.2	2.47	47.5%	Modular	16.12	149.11	1,250
2B	ATN04	6.8	4.56	67.1%	Pond	21.8	170.19	3,000
3	ATN06	42.9	23.52	54.8%	Pond	132.99	132.99	14,500
4AA	ATN10	13.5	7.12	52.7%	Pond	41.85	41.85	4,000
4B	ATN07	33.08	17.93	54.2%	Modular & Basin	102.55	102.55	10,000
4BB	ATN08	9.02	7.02	77.8%	Modular & Basin	27.98	130.53	4,430
4CCc	ATN11c	7.29	3.21	44.0%	Modular	22.60	155.00	2,200
4CCb	ATN11b	1.60	1.04	65.0%	Modular	4.97	158.11	715
4CCa	ATN11a	1.76	1.15	65.3%	Pond	5.46	163.56	785
5	ATN02	67.52	35.49	52.6%	Pond	209.31	209.31	21,300
6	ATN01	14.43	8.46	58.6%	Pond	44.74	44.74	4,930
7	ATN09	11.8	2.94	24.9%	Pond	36.58	36.58	1,250

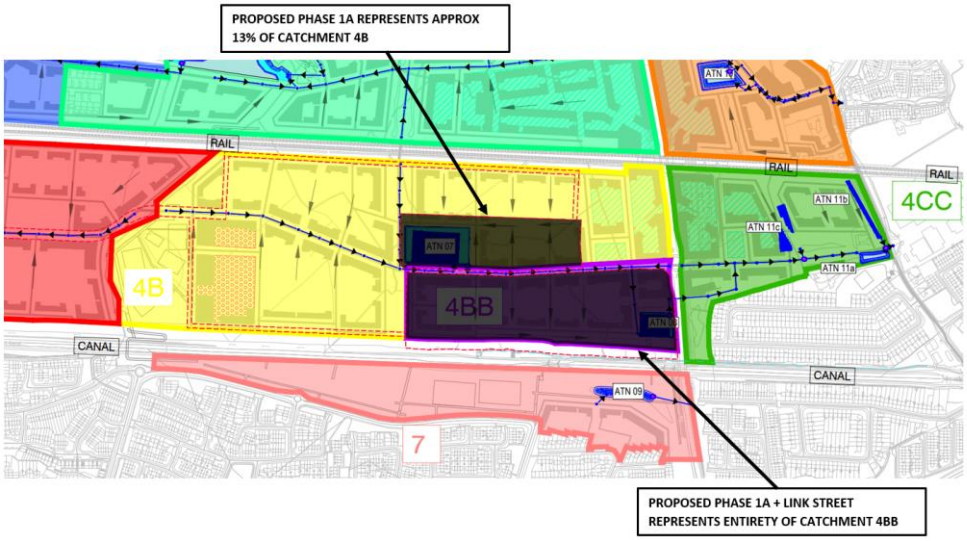

Figure 3-5: Phase 1A Development Areas [shown black] overlaid on SWMP Catchment Plan

Catchment 4B has an overall area of 33.08ha with an assumed impermeable area of 17.93ha as detailed in the Surface Water Management Plan, shown in Table 3-1. Phase 1A areas within Catchment 4b span approximately 13% of the overall catchment. Therefore the impermeable area contribution for the subject site assumed for regional attenuation sizing would be approximately 13% of 17.930ha = 2.330ha. Calculated impermeable areas from Phase 1A contributing to ATN 07 are 1.745ha (see table 3-2 below). The calculated contribution is therefore 1.745ha versus an allowance of 2.330ha, therefore the development falls within the design allowances made in the regional attenuation sizing.

Table 3-2: Impermeable Areas – Phase 1A – Catchment 4B

Type	Area (ha)	Runoff Coeff.	Effective Area (ha)
Roofs	0.552	0.95	0.524
Roads and Footpaths	0.808	1.00	0.808
Permeable Paving (Driveways & Parking Bays)	0.229	0.70	0.161
Grassed Areas	2.531	0.10	0.253
Total	**4.120**		**1.745**

Catchment 4BB has an overall area of 9.02ha with an assumed impermeable area of 7.02ha as detailed in the Surface Water Management Plan, shown in Table 3-1. The southern development portion of Phase 1A plus a portion of the proposed CSLS represent the entirety of Catchment 4BB. Calculated impermeable areas from Phase 1A contributing to ATN 08 are 3.922ha and the calculated area from the portion of link street is 0.818ha (see table 3-3 below). The calculated contribution is therefore 4.740ha versus an allowance of 7.020ha, therefore the development falls within the design allowances made in the regional attenuation sizing.

Table 3-3: Impermeable Areas – Phase 1A – Catchment 4BB

Type	Area (ha)	Runoff Coeff.	Effective Area (ha)
Roofs	1.513	0.95	1.438
Roads and Footpaths	1.483	1.00	1.483
Roads and Footpaths (CSLS)	0.818	1.00	0.818
Permeable Paving (Driveways & Parking Bays)	0.684	0.70	0.479
Grassed Areas	5.222	0.10	0.522
Total	**9.720**		**4.740**

3.5 Temporary Haul Roads

The finished surface of the proposed haul roads is intended to be an open graded granular material providing a permeable surface. Additionally, a crossfall will be provided to allow surface water to flow off these roads into the surrounding vegetated areas. Therefore the temporary roads are not positively drained and drainage discharge will be via infiltration as per current greenfield arrangements. Where these roads cross the existing drainage ditches, culverts/pipes will be installed to allow natural flow through the road and limit impacts on the existing drainage. The haul roads will wither be completely removed off site or incorporated as sub base material for future development roads (subject to planning permission).

3.6 Design Standards

Drainage is designed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works and the agreed Clonburris Joint Infrastructure Works. Surface water pipe-work was sized using the Microdrainage Windes drainage modelling software. The following parameters apply to the design:

- Return period for pipe network 30 years
- Return period for attenuation 100 years
- Time of entry 4 minutes
- Allowable Outflow for the SDZ 3.1 l/s/ha
- Pipe Friction (Ks) 0.6 mm
- Minimum Velocity 1.0 m/s
- Standard Average Annual Rainfall 765mm (Met Eireann)
- M5-60 16.9mm (Met Eireann)
- Ratio r (M5-60/M5-2D) 0.276 (Met Eireann)
- Storage System Storm Return Event GDSDS Volume 2, Criterion 3
    - 30-year no flooding on site;
    - 100-year check no internal property flooding. Flood routing plan. FFL freeboard above 100-year flood level.
- Climate Change 20% for rainfall intensities.
- Runoff Factors

Surface water sewers have been designed in accordance with IS EN 752 and the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS).

Standard drainage details, as outlined on DBFL drawings 162119-DBFL-CS-SP-DR-C-5201,5202, 5203 & 5204 are in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

The minimum pipe diameter for public surface water sewers is 225mm. Private drains within the proposed development will comply with Irish Water/ GDSDS minuimum requirements.

Surface water sewer modelling results for the main drainage networks included in Appendix B.

3.7 Climate Change

Rainfall values for the proposed development are sourced from Met Eireann to calculate the FSR input hydrograph for the drainage design as required by the GDSDS. The design rainfall intensities were increased by a factor of 20% to take account of climate change, as required by the GDSDS for attenuation storage design.

3.8 Pluvial Flooding Provision

The surface water network, attenuation storage and site levels are designed to accommodate a 100 year storm event and includes climate change provision. Floor levels of houses are set above the 100 year flood levels by a minimum of 0.5m for protection. For storms in excess of 100 years, the development has been designed to provide overland flood routes along the various development roads without affecting building floor levels.

3.9 Surface Water Quality Impact

Run-off rates from the attenuation systems are controlled by vortex flow control devices. Surface water management proposals for the development also incorporate the following to reduce its impact;

- Designed in accordance with the 'Greater Dublin Strategic Drainage Study' GDSDS and the Clonburris joint infrastructure works surface water management plan requirements;
- Incorporates SUDS features e.g. permeable paving in high risk parking areas at the front of houses;
- On-line attenuation/infiltration facilities with an oil separator prior to discharge to a public surface water sewer has been included in the trunk infrastructure under planning reference SDZ20A/0021.

3.10 Flood Risk Assessment

As part of the Clonburris SDZ Draft Planning Scheme, South Dublin Co Council commissioned a Strategic Flood Risk Assessment SFRA for the lands which was completed by JBA Consulting and is listed as a supporting document to the planning scheme (http://www.clonburris.ie/Documentation/Clonburris-SDZ-SFRA.pdf). The subject sites land was accounted for in the Clonburris SDZ Strategic Flood Risk Assessment. It was predicted that the subject site was at low risk of flooding (Flood Zone C) for events up to the Q1000 event. The study also found there is no existing development within the subject site that is at potential risk of flooding.

As part of the flood risk assessment, historic and predicted flood risk mapping published by the OPW on the Flood Hazard Mapping Website http://www.floodinfo.ie/ was reviewed.

Historical flood maps/data indicate there are no recorded flood events within the proposed site boundary. There are to recorded recurring flood events within 1km of the proposed site. The first is a recurring flood event at the Cappaghmore Culvert located approximately 500m to the east of the site. The Second is located at the Beech Row Bungalows approximately 380m to the east of the site.

The Eastern CFRAM (Catchment Flood Risk Assessment and Management) study details the predicted risk for a variety of fluvial and coastal flood scenarios. The mapping does not include the watercourse reaches affected by the proposed scheme and only maps downstream flooding. The proposed development is therefore outside of the Q100 and Q1000 flood extents and is therefore in within Flood Zone C (low risk of flooding).

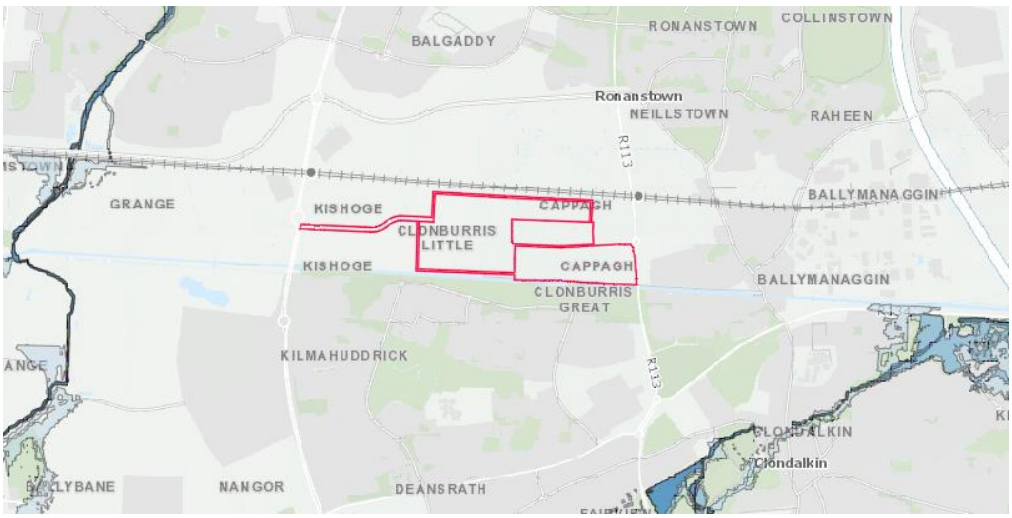

Figure 3-6 Extract of CFRAMS Data from OPW FloodInfo.ie

The OPW undertook an Irish Coastal Protection Strategy Study (ICPSS) which produced coastal/tidal flood extents maps for the Irish coastline for a 0.5% AEP tidal

flood level. This map indicates that the Site is far outside the extents of the coastal/tidal flood zone.

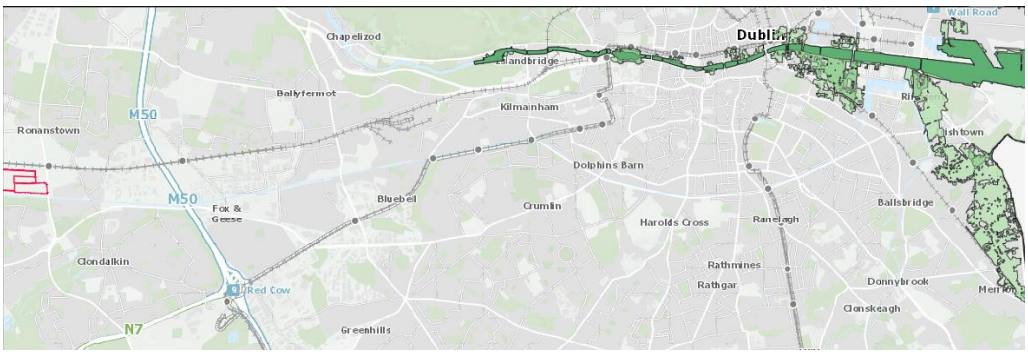

Figure 3-7 Extract of ICPSS Data from OPW FloodInfo.ie

3.11 Flood Exceedance

For storms greater than the 1%AEP pluvial event, the development's drainage network design may be exceeded and run-off may flow above ground along the main roads. The development has been designed without low areas/depressions where possible and run-off will generally make its way along the proposed roads north towards the CSLS or south east towards the detention basin at ATN08. House floor levels have been set to make allowance for any possible areas of surface ponding during exceedance events.

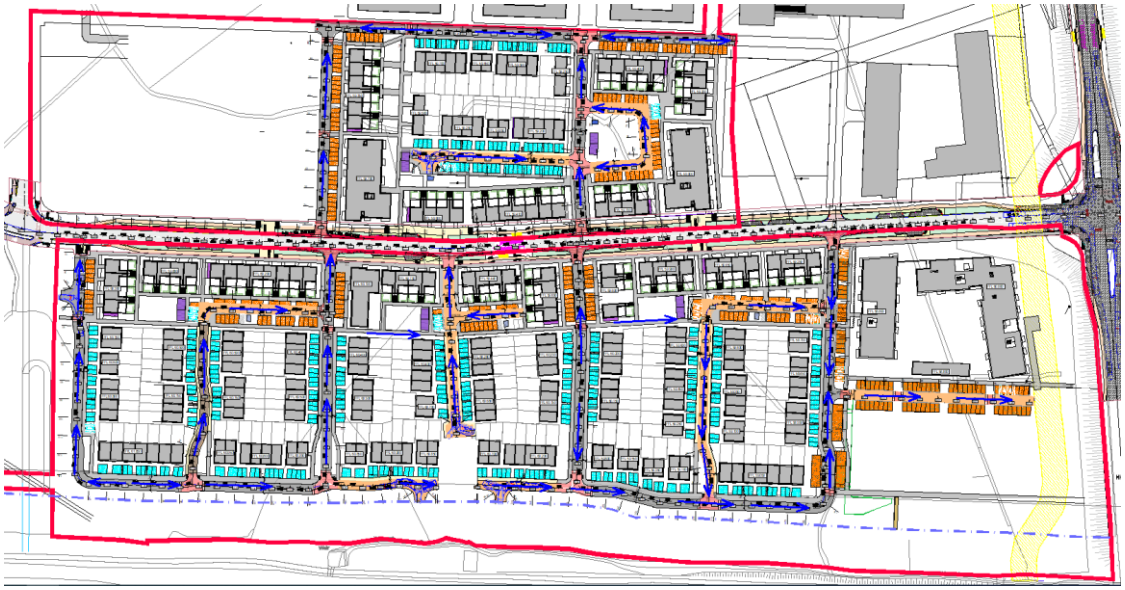

Figure 3-8 Flood Exceedance Allowance

3.12 Allowance for Future Development

Certain portions of Stormwater infrastructure installed as part of Phase1A have been upsized so that they are suitable to receive future development phases. These areas are detailed in Figure 3-9 below and are included within stormwater calculations in Appendix A.

Impermeable areas have been calculated based on anticipated road area contributions and a development density of 55units/ha with a 60% run off. The urban centre area will have its own local attenuation as per the SWMP and the assumed restricted outflow has been allowed for. Full details of the impermeable areas from Phase 1b are detailed on drawing 162119-DBFL-SW-SP-SK-C-1002 in Appendix B.

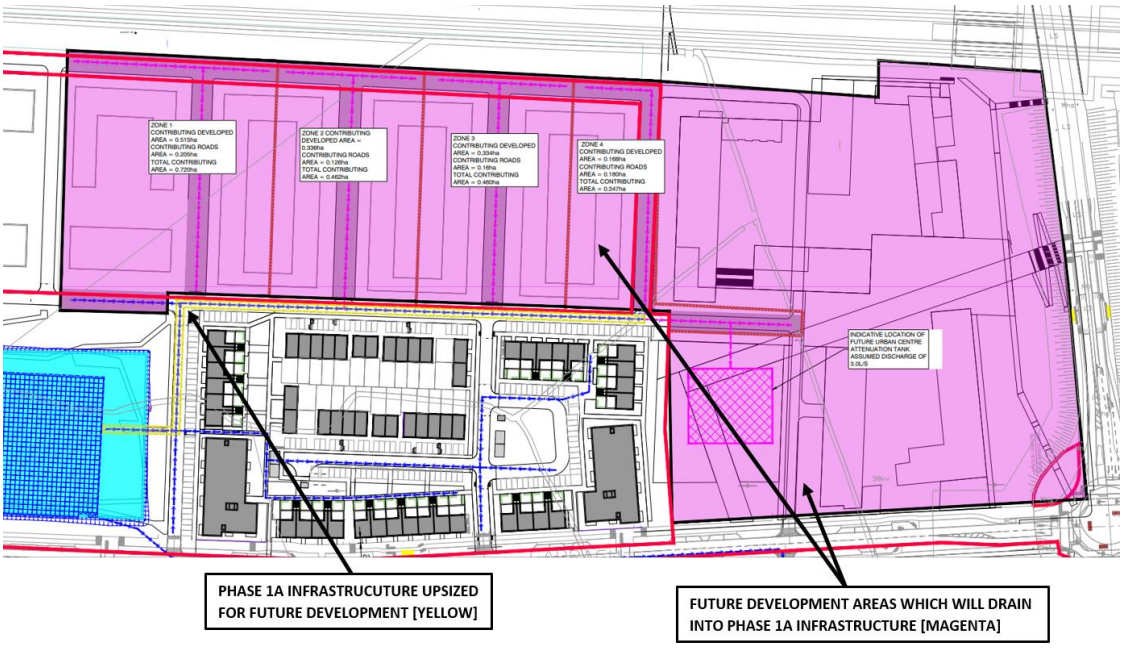

Figure 3-9 Surface Water Network Allowance for Future Development

4.0 FOUL DRAINAGE

4.1 Existing Foul Drainage

The existing site is predominantly greenfield and therefore has no foul loading at present. The planning application SDZ20A/0021 includes the trunk foul sewers which the subject site will connect into. The subject sites foul layout will be designed to connect into the trunk foul sewers.

4.2 Design Strategy

The overall SDZ site has been divided into 7 separate wastewater catchments (refer to Figures 4.1 & 4.2) the subject site is within Catchment X. The proposed site will benefit from foul infrastructure proposed as part of the CSLS. Trunk Foul sewer network has been designed as part of the CSLS to serve the subject based on the average net density for catchment X, ranging from the “Low margin” to a “High Margin”.

Table 4-1 Development Figures for Each Catchment

Catchment	Residential Dwellings Low Margin	Residential Dwellings Target	Residential Dwellings High Margin	Retail GFA (m^2)	Employment GFA (m^2)	Community/Civic Building GFA (m^2)	Number of Schools
Catchment 1	1236	1466	1705	600	4800	0	2 & 1 (Existing)
Catchment 5	0	0	0	0	0	0	0
Catchment U	2035	2615	3198	14370	9215	3100	2
Catchment Y	1521	1760	1991	850	2600	600	1
Catchment X	2680	3293	3896	5400	14100	1500	2
Catchment 7	148	162	175	0	0	0	
Catchment Z	110	121	133	0	0	0	

The overall SDZ lands are relatively flat therefore the pumping of wastewater is required. It is proposed that the wastewater generated from the new houses and apartments for this application will be collected by new gravity sewers that discharges to the trunk sewer within the new Link Road. This in turn discharges to a future Irish Water pumping station (Pumping Station #1 as shown in Figure 4.2) adjacent to the R113 Fonthill Road. This future pumping station and its rising main connection to the existing 9B trunk sewer on Fonthill Road is being delivered by Irish Water as part of the Irish Water Clonburris Local Infrastructure Housing Activation Fund (LIHAF) Scheme. The pump station is currently at planning application stage with SDCC under planning reference SDZ21A/0006.

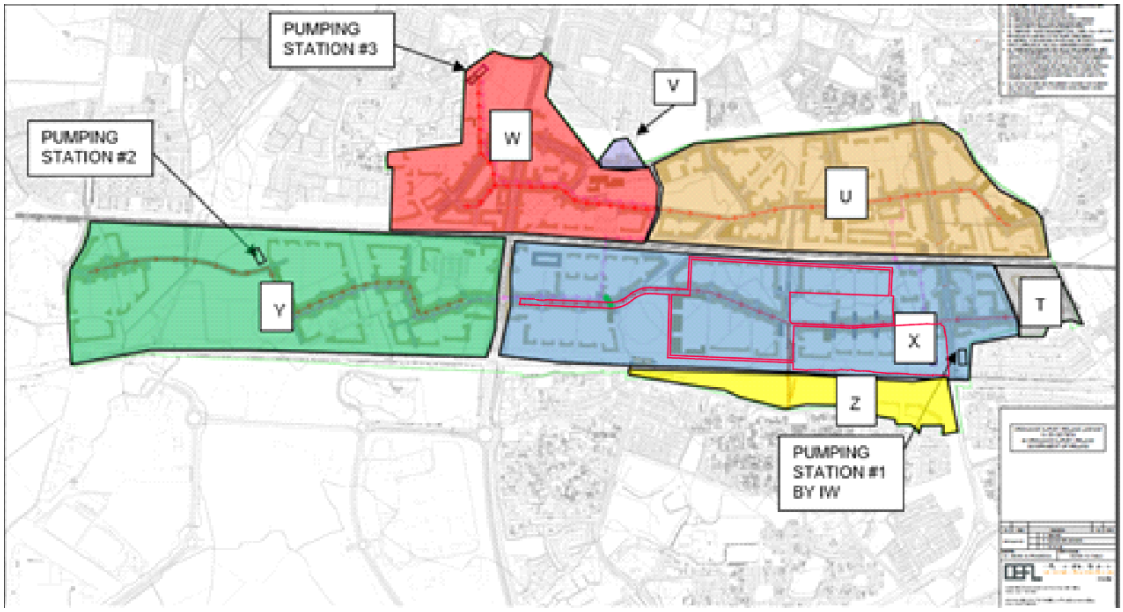

Figure 4-1: Wastewater Catchment Plan

4.3 Design Criteria

Foul sewers have been designed in accordance with the Building Regulations and specifically in accordance with the principles and methods set out in the Irish Water Design and Construction Requirements for Self-Lay Developments July 2020 (Revision 2) and the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS).

The following criteria have been applied:

Demand	446l/dwelling/day (based on 2.7 persons per house, a per capita wastewater flow of 150 litres per head per day and a 10% allowance for infiltration)
	60l per person per day for Community/civic building
	50l per person per day for Retail
Discharge units	14 units per house (as BS8301)
Pipe Friction (Ks)	1.5 mm
Minimum Velocity	0.75 m/s (self-cleansing velocity)
Maximum Velocity	2.5 m/s
Frequency Factor	0.5 for domestic use
Manhole Depths	< 5.0m

Foul sewer design calculations from Windes are provided in Appendix C.

All foul sewers and manholes will be constructed in accordance with the Irish Water Standard Details and the Irish Water Code of Practice for Wastewater.

Longitudinal sections for the proposed foul sewers are detailed on drawings 162119-DBFL-FW-SP-DR-C-3311 to 162119-DBFL-FW-SP-DR-C-3314.

4.4 Compliance with Irish Water Standards

The proposed foul sewer design and layout is in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water Wastewater Infrastructure Standard Details. The design also complies with the agreed

4.5 Compliance with Clonburris Water and Wastewater Report

The proposed foul sewer design and layout complies with the Clonburris Water and Wastewater Report as agreed with SDCC and Irish Water.

4.6 Design Calculations

This application comprises 569 residential units, 540m^2 of creche/employment area with 623m^2 of community/civic space above. The development will discharge to Pumping Station 1. The estimated average daily load from the development is 236m^3. See below for calculations. Full network calculations are contained in Appendix C.

Table 4-2 Predicted Clonburris Phase 1A Foul Flow Calculations

RESIDENTIAL - PREDICTED DEVELOPMENT FOUL FLOWS						
Unit Type	No.	Loading l/person/day	Occupancy person/unit	Occupancy	Daily Loading l/day	Daily Loading l/s
Apartments	248	150	2.7	670	100,440	1.16
Houses	173	150	2.7	467	70,065	0.81
Duplexes	148	150	2.7	400	59,940	0.69
					Residential Daily Loading	2.67
					Growth Factor	1
					Infiltration @ 10% (as CoP App C 1.2.4)	0.27
					Dry Weather Flow l/s	2.93
					Residential Peak Factor (as CoP App C 1.2.5)	6.0
					Design Foul Flow l/s	17.60
*Flow rates calculated using IW CoP for Wastewater Infrastructure Appendix C						

NON-RESIDENTIAL - PREDICTED DEVELOPMENT FOUL FLOWS						
Unit Type	Floor Area m2	Occupancy Load m2 /person	Occupancy	Loading l/Person/day	Daily Loading l/day	Daily Loading l/day
Creche	540	7	77	50	3,857	0.04
Community Facilities	623	30	21	50	1,038	0.01
					Non - Residential Daily Loading	0.06
					Growth Factor	1
					Infiltration @ 10% (as CoP App C 1.2.4)	0.01
					Dry Weather Flow l/s	0.06
					Commercial Peak Factor (as CoP App C 1.2.7)	6
					Design Foul Flow l/s	0.37

PREDICTED DEVELOPMENT FOUL FLOWS SUMMARY				
Unit Type	Average Daily Loading l/day	Average Daily Loading m3	Average Daily Loading l/s	Design Foul Flows l/s
Residential	230,445	230	2.93	17.60
Non-Residntial	4,895	5	0.06	0.37
Total	235,340	235	3.00	17.98

4.7 Allowance for Future Development

Allowance for future development discharging to the foul sewers constructed as part of Clonburris Phase 1A has been incorporated into this design. These flows were assumed based on the “High Level” net development density set out in the SDZ documents as per Table 4.1 below.

Table 4-3 Predicted Dwelling Contribution from Future Development

Development Area	Sub-Sector	Net Area (Ha)	Target Dwellings (High Level)	Density (Units/ha)	Contributing Area (Ha)	Contributing Dwellings
Clonburris South West	CSW-S3	8.27	504	61	3.01	183

Table 4-4 Predicted Foul Contribution from Future Development

PREDICTED FUTURE DEVELOPMENT CONTRIBUTING FLOWS						
Unit Type	No.	Loading l/person/day	Occupancy person/unit	Occupancy	Daily Loading l/day	Daily Loading l/s
Dwellings	183	150	2.7	494	74,115	0.86
					Residential Daily Loading	**0.86**
					Growth Factor	1
					Infiltration @ 10% (as CoP App C 1.2.4)	0.09
					Dry Weather Flow l/s	**0.94**
					Residential Peak Factor (as CoP App C 1.2.5)	6.0
					Design Foul Flow l/s	**5.66**
*Flow rates calculated using IW CoP for Wastewater Infrastructure Appendix C						

These area assumed to discharge into the foul sewers constructed as part of Phase 1A are shown in Figure 4-2. Full details of the impermeable areas from Phase 1b are detailed on drawing 162119-DBFL-FW-SP-SK-C-1002 in Appendix D.

Figure 4-2 Foul Network Allowance for Future Development

5.0 WATER SUPPLY AND DISTRIBUTION

5.1 Existing Water supply

The proposed site will benefit from trunk watermain infrastructure proposed as part of the Clonburris Infrastructure Development for which was granted permission under planning reference SDZ20A/0021. The planning application includes a 400mm diameter watermain running along the Proposed CSLS at the north of the subject site.

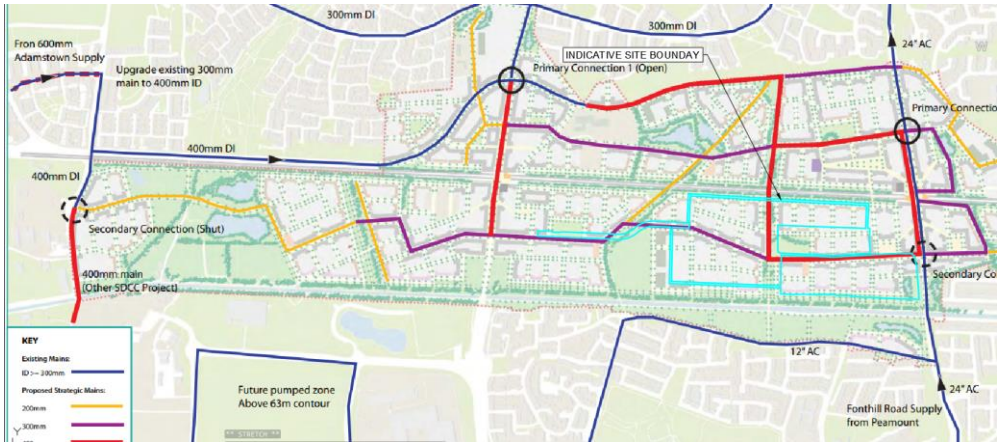

Figure 5-1 Irish Water Strategic Watermain Plan

5.2 Development Water Main Layout

The subject section of the site will connect into the CLSL trunk watermain infrastructure at two locations creating a two separate 150mm watermain loops serving the north and south sections of the site. The 150mm loops within the subject site will then feed smaller 100mm distribution watermains.

The connection to the public water main will include a metered connection with sluice valve arrangement in accordance with the requirements of Irish Water.

Individual houses will have their own connections to the distribution main via service connections and boundary boxes. Individual service boundary boxes will be of the type to suit Irish Water and to facilitate domestic meter installation.

Hydrants are provided for fire-fighting at locations to ensure that each dwelling is within the required Building Regulations distance of a hydrant.

The development's proposed water-main distribution system is shown on drawings 162119-DBFL-WM-SP-DR-C-1351,1352, 1353 & 1354.

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5.3 Compliance with Irish Water Standards

The proposed watermain design and layout is in accordance with the Irish Water Code of Practice for Water Infrastructure and The Irish Water, Water Infrastructure Standard Details.

5.4 Compliance with Clonburris Water and Wastewater Report

A confirmation of feasibility for the overall SDZ lands has been received from Irish Water (ref: 2512559856). The proposed watermain design and layout complies with the Clonburris Water and Wastewater Report as agreed with SDCC and Irish Water. Refer to Appendix E for further details.

5.5 Design Calculations

The water demand is designed in accordance with the principles and methods set out in Irish Water's Code of Practice for Water Infrastructure Connections and Developer Services Design & Construction Requirements for Self-Lay Developments JULY 2020:

Overall water demand is calculated using IW CoP for Water Infrastructure section 3.7.2, as outlined below:

Per-capita consumption 150l/person/day

Average day/week demand factor 1.25

Peak demand factor 5.0

Average daily domestic demand = Total occupancy * Per-capita consumption

Average day/peak week demand = Average daily domestic demand * Average day/week demand factor

Peak hour water demand = Average day/peak week demand * Peak demand factor

Estimated water demand for the proposed development is provided in Table 5.1

Table 5-1 Predicted Water Calculations

RESIDENTIAL - WATER DEMAND						
Unit Type	No. Dwellings	Occupancy Rate /dwelling	Occupancy	Per Capita Consumption l/Person/day	Average Daily Domestic Demand l/day	Average Daily Domestic Demand l/s
Apartments	248	2.7	670	150	100,440	1.16
Houses	173	2.7	467	149	69,598	0.81
Duplexes	148	2.7	400	150	59,940	0.69
					Total Average Daily Loading l/s	**2.66**
					Average Day/Week Domestic Demand	1.25
					Average Day/Peak Week Demand l/s	**3.33**
					Peak Demand Factor	5
					Peak Hour Water Demand l/s	**16.64**
*Flow rates calculated using IW CoP for Water Infrastructure						

NON-RESIDENTIAL WATER DEMAND						
Unit Type	Floor Area m^2	Occupancy Rate m^2/person	Occupancy	Per Capita Consumption l/Person/day	Average Daily Demand l/day	Average Daily Demand l/s
Creche	540	7	77	150	11,571	0.13
Community Facilities	623	30	21	150	3,115	0.04
					Total Average Daily Loading l/s	**0.17**
					Average Day/Week Demand	1.25
					Average Day/Peak Week Demand l/s	**0.21**
					Peak Demand Factor	5
					Peak Hour Water Demand l/s	**1.06**
*Flow rates calculated using IW CoP for Water Infrastructure						

PREDICTED DEVELOPMENT WATER DEMAND SUMMARY		
Unit Type	Average Daily Demand l/day	Design Foul Flows l/s
Residential	229,978	2.66
Non-Residntial	14,686	0.17
Total	244,664	2.83

Appendix A

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW_1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	16.900	Add Flow / Climate Change (%)	0
Ratio R	0.276	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for SW_1

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.521	4-8	2.638	8-12	3.192	12-16	2.080	16-20	0.002

Total Area Contributing (ha) = 8.434

Total Pipe Volume (m³) = 812.335

Network Design Table for SW_1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	33.883	0.240	141.2	0.347	4.00	0.0	0.600	o	450	Pipe/Conduit	
1.001	68.373	0.283	241.6	0.095	0.00	0.0	0.600	o	525	Pipe/Conduit	
2.000	38.442	0.598	64.3	0.478	4.00	0.0	0.600	o	450	Pipe/Conduit	
1.002	67.807	0.281	241.3	0.090	0.00	0.0	0.600	o	600	Pipe/Conduit	
3.000	37.437	0.804	46.6	0.476	4.00	0.0	0.600	o	450	Pipe/Conduit	

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)
1.000	50.00	4.33	58.000	0.347	0.0	0.0	0.0	1.71	271.8	47.0
1.001	50.00	5.12	57.685	0.442	0.0	0.0	0.0	1.44	311.0	59.9
2.000	50.00	4.25	58.000	0.478	0.0	0.0	0.0	2.54	403.8	64.7
1.002	50.00	5.85	57.327	1.010	0.0	0.0	0.0	1.56	442.0	136.8
3.000	50.00	4.21	58.000	0.476	0.0	0.0	0.0	2.99	474.8	64.5

Network Design Table for SW_1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	75.800	0.314	241.4	0.099	0.00	0.0	0.600	o	600	Pipe/Conduit	
4.000	35.026	1.193	29.4	0.720	4.00	0.0	0.600	o	525	Pipe/Conduit	
1.004	58.154	0.240	242.3	0.077	0.00	0.0	0.600	o	600	Pipe/Conduit	
5.000	16.799	0.112	150.0	0.085	4.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	12.686	0.085	149.2	0.039	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	36.559	0.146	250.4	0.083	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.003	32.044	0.083	386.1	0.079	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.000	28.903	0.644	44.9	0.201	4.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	34.978	0.517	67.7	0.042	4.00	0.0	0.600	o	225	Pipe/Conduit	
5.004	97.491	0.325	300.0	0.195	0.00	0.0	0.600	o	450	Pipe/Conduit	
8.000	49.665	0.357	139.1	0.087	4.00	0.0	0.600	o	225	Pipe/Conduit	
8.001	37.803	0.272	139.0	0.088	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.002	17.157	0.123	139.5	0.112	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.005	12.217	0.041	298.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
9.000	33.998	1.268	26.8	0.116	4.00	0.0	0.600	o	225	Pipe/Conduit	
5.006	41.891	0.140	299.2	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	

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)
1.003	50.00	6.65	57.046	1.585	0.0	0.0	0.0	1.56	441.9	214.6
4.000	50.00	4.14	58.000	0.720	0.0	0.0	0.0	4.15	897.3	97.5
1.004	50.00	7.28	56.732	2.382	0.0	0.0	0.0	1.56	441.1	322.6
5.000	50.00	4.26	57.800	0.085	0.0	0.0	0.0	1.07	42.4	11.5
5.001	50.00	4.46	57.688	0.124	0.0	0.0	0.0	1.07	42.5	16.8
5.002	50.00	5.08	57.528	0.207	0.0	0.0	0.0	0.99	69.9	28.0
5.003	50.00	5.66	57.307	0.286	0.0	0.0	0.0	0.92	101.2	38.7
6.000	50.00	4.25	57.867	0.201	0.0	0.0	0.0	1.96	77.8	27.2
7.000	50.00	4.37	57.740	0.042	0.0	0.0	0.0	1.59	63.3	5.7
5.004	50.00	7.05	57.073	0.724	0.0	0.0	0.0	1.17	185.9	98.0
8.000	50.00	4.75	57.725	0.087	0.0	0.0	0.0	1.11	44.0	11.8
8.001	50.00	5.32	57.368	0.175	0.0	0.0	0.0	1.11	44.0	23.7
8.002	50.00	5.58	57.096	0.287	0.0	0.0	0.0	1.11	43.9	38.9
5.005	50.00	7.21	56.673	1.011	0.0	0.0	0.0	1.29	279.8	136.9
9.000	50.00	4.22	57.900	0.116	0.0	0.0	0.0	2.54	100.9	15.7
5.006	50.00	7.75	56.632	1.127	0.0	0.0	0.0	1.29	279.2	152.6

Network Design Table for SW_1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
10.000	46.618	1.547	30.1	0.062	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	26.047	0.122	213.5	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.006	38.358	0.011	3487.1	0.123	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.007	14.611	0.072	202.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.008	25.603	0.043	595.4	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
11.000	29.831	0.160	186.0	0.098	4.00	0.0	0.600	o	225	Pipe/Conduit	
12.000	39.153	0.370	105.8	0.108	4.00	0.0	0.600	o	225	Pipe/Conduit	
12.001	6.354	0.060	105.9	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
12.002	2.988	0.103	29.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
11.001	71.217	0.387	184.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
13.000	8.366	0.076	110.1	0.009	4.00	0.0	0.600	o	225	Pipe/Conduit	
13.001	15.019	0.257	58.4	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	
13.002	18.753	0.318	59.0	0.056	0.00	0.0	0.600	o	225	Pipe/Conduit	
13.003	10.941	0.332	33.0	0.032	0.00	0.0	0.600	o	225	Pipe/Conduit	
13.004	27.164	0.480	56.6	0.081	0.00	0.0	0.600	o	225	Pipe/Conduit	
11.002	8.086	0.122	66.3	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
14.000	36.235	0.454	79.8	0.042	4.00	0.0	0.600	o	225	Pipe/Conduit	
14.001	7.502	0.096	78.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

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)
10.000	50.00	4.32	58.418	0.062	0.0	0.0	0.0	2.39	95.1	8.4
1.005	50.00	8.01	56.492	3.571	0.0	0.0	0.0	1.66	470.1«	483.6
1.006	50.00	9.04	56.370	3.694	0.0	0.0	0.0	0.62	705.2	500.2
1.007	50.00	9.18	56.359	3.694	0.0	0.0	0.0	1.71	482.3«	500.2
1.008	50.00	9.61	56.287	3.694	0.0	0.0	0.0	0.99	280.1«	500.2
11.000	50.00	4.52	58.545	0.098	0.0	0.0	0.0	0.96	38.0	13.3
12.000	50.00	4.51	58.918	0.108	0.0	0.0	0.0	1.27	50.5	14.6
12.001	50.00	4.60	58.548	0.128	0.0	0.0	0.0	1.27	50.5	17.3
12.002	50.00	4.62	58.488	0.128	0.0	0.0	0.0	2.44	97.0	17.3
11.001	50.00	5.85	58.385	0.226	0.0	0.0	0.0	0.96	38.2	30.6
13.000	50.00	4.11	59.460	0.009	0.0	0.0	0.0	1.25	49.5	1.2
13.001	50.00	4.26	59.384	0.011	0.0	0.0	0.0	1.71	68.2	1.5
13.002	50.00	4.44	59.127	0.067	0.0	0.0	0.0	1.71	67.8	9.1
13.003	50.00	4.52	58.809	0.099	0.0	0.0	0.0	2.29	90.9	13.4
13.004	50.00	4.78	58.477	0.180	0.0	0.0	0.0	1.74	69.3	24.4
11.002	50.00	5.92	57.922	0.430	0.0	0.0	0.0	1.93	136.7	58.2
14.000	50.00	4.41	58.500	0.042	0.0	0.0	0.0	1.46	58.2	5.7
14.001	50.00	4.50	58.046	0.042	0.0	0.0	0.0	1.48	58.9	5.7

Network Design Table for SW_1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
11.003	65.796	0.325	202.4	0.175	0.00	0.0	0.600	o	450	Pipe/Conduit	
15.000	64.919	1.200	54.1	0.189	4.00	0.0	0.600	o	225	Pipe/Conduit	
11.004	23.237	0.246	94.5	0.029	0.00	0.0	0.600	o	450	Pipe/Conduit	
11.005	12.829	0.610	21.0	0.014	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	67.214	0.112	600.1	0.142	0.00	0.0	0.600	o	900	Pipe/Conduit	
16.000	60.567	1.770	34.2	0.204	4.00	0.0	0.600	o	225	Pipe/Conduit	
17.000	37.176	0.695	53.5	0.097	4.00	0.0	0.600	o	225	Pipe/Conduit	
18.000	37.799	1.076	35.1	0.110	4.00	0.0	0.600	o	225	Pipe/Conduit	
16.001	24.512	0.633	38.7	0.029	0.00	0.0	0.600	o	225	Pipe/Conduit	
16.002	11.736	0.350	33.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.010	69.651	0.116	600.4	0.123	0.00	0.0	0.600	o	900	Pipe/Conduit	
19.000	73.934	0.812	91.1	0.219	4.00	0.0	0.600	o	225	Pipe/Conduit	
19.001	35.593	0.391	91.0	0.144	0.00	0.0	0.600	o	300	Pipe/Conduit	
19.002	12.308	0.135	91.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.011	70.702	0.118	599.2	0.126	0.00	0.0	0.600	o	900	Pipe/Conduit	

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)
11.003	50.00	6.69	57.725	0.647	0.0	0.0	0.0	1.43	226.7	87.6
15.000	50.00	4.61	58.900	0.189	0.0	0.0	0.0	1.78	70.9	25.6
11.004	50.00	6.88	57.400	0.865	0.0	0.0	0.0	2.09	332.8	117.1
11.005	50.00	6.93	57.154	0.879	0.0	0.0	0.0	4.45	707.5	119.0
1.009	50.00	10.49	56.244	4.715	0.0	0.0	0.0	1.27	809.0	638.5
16.000	50.00	4.45	59.260	0.204	0.0	0.0	0.0	2.24	89.2	27.6
17.000	50.00	4.35	58.185	0.097	0.0	0.0	0.0	1.79	71.3	13.1
18.000	50.00	4.28	58.566	0.110	0.0	0.0	0.0	2.21	88.1	14.9
16.001	50.00	4.64	57.490	0.440	0.0	0.0	0.0	2.11	83.8	59.6
16.002	50.00	4.72	56.782	0.440	0.0	0.0	0.0	2.72	192.6	59.6
1.010	50.00	11.40	56.132	5.278	0.0	0.0	0.0	1.27	808.8	714.7
19.000	50.00	4.90	58.028	0.219	0.0	0.0	0.0	1.37	54.5	29.7
19.001	50.00	5.26	57.141	0.363	0.0	0.0	0.0	1.65	116.5	49.2
19.002	50.00	5.38	56.750	0.363	0.0	0.0	0.0	1.65	116.4	49.2
1.011	50.00	12.33	56.016	5.767	0.0	0.0	0.0	1.27	809.7	780.9

Network Design Table for SW_1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.012	66.883	0.111	602.5	0.108	0.00	0.0	0.600	o	1200	Pipe/Conduit	
20.000	48.726	1.882	25.9	0.162	4.00	0.0	0.600	o	300	Pipe/Conduit	
20.001	87.791	1.310	67.0	0.157	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.013	12.753	0.021	607.3	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.014	30.254	0.051	593.2	0.071	0.00	0.0	0.600	o	1200	Pipe/Conduit	
21.000	58.657	1.376	42.6	0.180	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.015	59.346	0.099	599.5	0.121	0.00	0.0	0.600	o	1200	Pipe/Conduit	
22.000	12.473	0.213	58.6	0.094	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.016	15.896	0.026	611.4	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
23.000	16.478	0.214	77.0	0.078	4.00	0.0	0.600	o	225	Pipe/Conduit	
24.000	32.941	0.444	74.2	0.114	4.00	0.0	0.600	o	225	Pipe/Conduit	
23.001	29.710	0.386	77.0	0.092	0.00	0.0	0.600	o	300	Pipe/Conduit	
25.000	25.112	0.294	85.4	0.124	4.00	0.0	0.600	o	225	Pipe/Conduit	
25.001	34.655	0.406	85.4	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit	
23.002	23.759	0.315	75.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

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)
1.012	50.00	13.06	55.898	5.875	0.0	0.0	0.0	1.52	1715.4	795.5
20.000	50.00	4.26	59.896	0.162	0.0	0.0	0.0	3.10	219.3	21.9
20.001	50.00	5.02	58.014	0.319	0.0	0.0	0.0	1.92	136.0	43.2
1.013	50.00	13.20	55.786	6.194	0.0	0.0	0.0	1.51	1708.6	838.7
1.014	50.00	13.53	55.765	6.265	0.0	0.0	0.0	1.53	1728.9	848.4
21.000	50.00	4.49	57.990	0.180	0.0	0.0	0.0	2.01	79.9	24.4
1.015	50.00	14.18	55.714	6.566	0.0	0.0	0.0	1.52	1719.8	889.1
22.000	50.00	4.12	56.471	0.094	0.0	0.0	0.0	1.71	68.1	12.7
1.016	50.00	14.36	55.615	6.660	0.0	0.0	0.0	1.51	1702.8	901.8
23.000	50.00	4.18	57.370	0.078	0.0	0.0	0.0	1.49	59.3	10.6
24.000	50.00	4.36	57.600	0.114	0.0	0.0	0.0	1.52	60.4	15.4
23.001	50.00	4.64	57.081	0.284	0.0	0.0	0.0	1.79	126.8	38.5
25.000	50.00	4.30	57.471	0.124	0.0	0.0	0.0	1.42	56.3	16.8
25.001	50.00	4.70	57.177	0.146	0.0	0.0	0.0	1.42	56.3	19.8
23.002	50.00	4.92	56.695	0.430	0.0	0.0	0.0	1.81	128.1	58.2

Network Design Table for SW_1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
26.000	65.302	0.485	134.6	0.083	4.00	0.0	0.600	o	300	Pipe/Conduit	
23.003	26.144	0.138	189.4	0.037	0.00	0.0	0.600	o	300	Pipe/Conduit	
23.004	12.890	0.068	189.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.017	34.964	0.058	602.8	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
27.000	58.586	0.439	133.5	0.127	4.00	0.0	0.600	o	225	Pipe/Conduit	
27.001	61.202	0.471	129.9	0.121	0.00	0.0	0.600	o	225	Pipe/Conduit	
27.002	12.151	0.068	178.7	0.011	0.00	0.0	0.600	o	225	Pipe/Conduit	
27.003	22.831	0.133	171.7	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.004	12.107	0.071	170.5	0.028	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.005	31.760	0.166	191.3	0.054	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.006	64.885	0.301	215.6	0.095	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.007	25.125	0.357	70.4	0.045	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.008	22.657	0.304	74.5	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.009	29.790	0.177	168.3	0.052	0.00	0.0	0.600	o	300	Pipe/Conduit	
28.000	37.468	0.250	149.9	0.052	4.00	0.0	0.600	o	225	Pipe/Conduit	
28.001	7.680	0.051	150.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
28.002	76.002	0.561	135.5	0.254	0.00	0.0	0.600	o	300	Pipe/Conduit	
28.003	13.173	0.094	140.1	0.012	0.00	0.0	0.600	o	300	Pipe/Conduit	
28.004	21.792	0.153	142.4	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit	
27.010	66.166	0.338	195.8	0.102	0.00	0.0	0.600	o	450	Pipe/Conduit	

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)
26.000	50.00	4.80	56.865	0.083	0.0	0.0	0.0	1.35	95.7	11.2
23.003	50.00	5.30	56.380	0.550	0.0	0.0	0.0	1.14	80.5	74.5
23.004	50.00	5.49	56.350	0.550	0.0	0.0	0.0	1.14	80.5	74.5
1.017	50.00	14.75	55.574	7.210	0.0	0.0	0.0	1.52	1715.0	976.3
27.000	50.00	4.86	59.553	0.127	0.0	0.0	0.0	1.13	44.9	17.2
27.001	50.00	5.75	59.114	0.248	0.0	0.0	0.0	1.15	45.5	33.6
27.002	50.00	5.96	58.643	0.259	0.0	0.0	0.0	0.97	38.8	35.1
27.003	50.00	6.28	58.500	0.290	0.0	0.0	0.0	1.20	84.6	39.3
27.004	50.00	6.45	58.367	0.318	0.0	0.0	0.0	1.20	84.9	43.1
27.005	50.00	6.92	58.296	0.372	0.0	0.0	0.0	1.13	80.1	50.4
27.006	50.00	7.93	58.130	0.467	0.0	0.0	0.0	1.07	75.4	63.2
27.007	50.00	8.15	57.829	0.512	0.0	0.0	0.0	1.88	132.6	69.3
27.008	50.00	8.36	57.472	0.555	0.0	0.0	0.0	1.82	128.9	75.2
27.009	50.00	8.77	57.168	0.607	0.0	0.0	0.0	1.21	85.5	82.2
28.000	50.00	4.59	58.250	0.052	0.0	0.0	0.0	1.07	42.4	7.0
28.001	50.00	4.71	58.000	0.052	0.0	0.0	0.0	1.06	42.3	7.0
28.002	50.00	5.65	57.874	0.306	0.0	0.0	0.0	1.35	95.4	41.4
28.003	50.00	5.81	57.313	0.318	0.0	0.0	0.0	1.33	93.7	43.1
28.004	50.00	6.09	57.219	0.327	0.0	0.0	0.0	1.32	93.0	44.3
27.010	50.00	9.53	56.916	1.036	0.0	0.0	0.0	1.45	230.5	140.3

Network Design Table for SW_1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
27.011	18.391	0.061	301.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.018	10.605	0.022	482.0	0.168	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.019	83.606	0.277	301.8	0.020	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.020	5.941	0.011	540.1	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.021	24.323	0.032	760.1	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	

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)
27.011	50.00	9.79	56.578	1.036	0.0	0.0	0.0	1.17	185.4	140.3
1.018	50.00	14.85	55.531	8.414	0.0	0.0	0.0	1.70	1919.5	1139.4
1.019	50.00	15.50	55.509	8.434	0.0	0.0	0.0	2.15	2429.6	1142.1
1.020	50.00	15.60	55.232	8.434	0.0	0.0	0.0	0.96	207.1«	1142.1
1.021	50.00	16.11	55.221	8.434	0.0	0.0	0.0	0.80	174.2«	1142.1

Area Summary for SW_1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.347	0.347	0.347
1.001	-	-	100	0.095	0.095	0.095
2.000	-	-	100	0.478	0.478	0.478
1.002	-	-	100	0.090	0.090	0.090
3.000	-	-	100	0.476	0.476	0.476
1.003	-	-	100	0.099	0.099	0.099
4.000	-	-	100	0.720	0.720	0.720
1.004	-	-	100	0.077	0.077	0.077
5.000	-	-	100	0.085	0.085	0.085
5.001	-	-	100	0.039	0.039	0.039
5.002	-	-	100	0.083	0.083	0.083
5.003	-	-	100	0.079	0.079	0.079
6.000	-	-	100	0.201	0.201	0.201
7.000	-	-	100	0.042	0.042	0.042
5.004	-	-	100	0.195	0.195	0.195
8.000	-	-	100	0.087	0.087	0.087
8.001	-	-	100	0.088	0.088	0.088
8.002	-	-	100	0.112	0.112	0.112
5.005	-	-	100	0.000	0.000	0.000
9.000	-	-	100	0.116	0.116	0.116
5.006	-	-	100	0.000	0.000	0.000
10.000	-	-	100	0.062	0.062	0.062
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.123	0.123	0.123
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
11.000	-	-	100	0.098	0.098	0.098
12.000	-	-	100	0.108	0.108	0.108
12.001	-	-	100	0.020	0.020	0.020
12.002	-	-	100	0.000	0.000	0.000
11.001	-	-	100	0.000	0.000	0.000
13.000	-	-	100	0.009	0.009	0.009
13.001	-	-	100	0.002	0.002	0.002
13.002	-	-	100	0.056	0.056	0.056
13.003	-	-	100	0.032	0.032	0.032
13.004	-	-	100	0.081	0.081	0.081
11.002	-	-	100	0.024	0.024	0.024
14.000	-	-	100	0.042	0.042	0.042
14.001	-	-	100	0.000	0.000	0.000
11.003	-	-	100	0.175	0.175	0.175
15.000	-	-	100	0.189	0.189	0.189
11.004	-	-	100	0.029	0.029	0.029
11.005	-	-	100	0.014	0.014	0.014
1.009	-	-	100	0.142	0.142	0.142
16.000	-	-	100	0.204	0.204	0.204
17.000	-	-	100	0.097	0.097	0.097
18.000	-	-	100	0.110	0.110	0.110
16.001	-	-	100	0.029	0.029	0.029
16.002	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.123	0.123	0.123
19.000	-	-	100	0.219	0.219	0.219
19.001	-	-	100	0.144	0.144	0.144
19.002	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.126	0.126	0.126
1.012	-	-	100	0.108	0.108	0.108
20.000	-	-	100	0.162	0.162	0.162
20.001	-	-	100	0.157	0.157	0.157
1.013	-	-	100	0.000	0.000	0.000

Area Summary for SW_1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.014	-	-	100	0.071	0.071	0.071
21.000	-	-	100	0.180	0.180	0.180
1.015	-	-	100	0.121	0.121	0.121
22.000	-	-	100	0.094	0.094	0.094
1.016	-	-	100	0.000	0.000	0.000
23.000	-	-	100	0.078	0.078	0.078
24.000	-	-	100	0.114	0.114	0.114
23.001	-	-	100	0.092	0.092	0.092
25.000	-	-	100	0.124	0.124	0.124
25.001	-	-	100	0.022	0.022	0.022
23.002	-	-	100	0.000	0.000	0.000
26.000	-	-	100	0.083	0.083	0.083
23.003	-	-	100	0.037	0.037	0.037
23.004	-	-	100	0.000	0.000	0.000
1.017	-	-	100	0.000	0.000	0.000
27.000	-	-	100	0.127	0.127	0.127
27.001	-	-	100	0.121	0.121	0.121
27.002	-	-	100	0.011	0.011	0.011
27.003	-	-	100	0.031	0.031	0.031
27.004	-	-	100	0.028	0.028	0.028
27.005	-	-	100	0.054	0.054	0.054
27.006	-	-	100	0.095	0.095	0.095
27.007	-	-	100	0.045	0.045	0.045
27.008	-	-	100	0.043	0.043	0.043
27.009	-	-	100	0.052	0.052	0.052
28.000	-	-	100	0.052	0.052	0.052
28.001	-	-	100	0.000	0.000	0.000
28.002	-	-	100	0.254	0.254	0.254
28.003	-	-	100	0.012	0.012	0.012
28.004	-	-	100	0.009	0.009	0.009
27.010	-	-	100	0.102	0.102	0.102
27.011	-	-	100	0.000	0.000	0.000
1.018	-	-	100	0.168	0.168	0.168
1.019	-	-	100	0.020	0.020	0.020
1.020	-	-	100	0.000	0.000	0.000
1.021	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				8.434	8.434	8.434

Free Flowing Outfall Details for SW_1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.021	S0	58.887	55.189	55.188	0	0

Online Controls for SW_1

Hydro-Brake® Optimum Manhole: S15, DS/PN: 1.007, Volume (m³): 46.6

Unit Reference	MD-SHE-0387-1026-1955-1026
Design Head (m)	1.955
Design Flow (l/s)	102.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	387
Invert Level (m)	56.359
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.955	102.5	Kick-Flo®	1.393	87.0
Flush-Flo™	0.664	102.5	Mean Flow over Head Range	-	86.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.8	0.800	102.0	2.000	103.7	4.000	145.3	7.000	191.0
0.200	38.4	1.000	99.8	2.200	108.6	4.500	153.9	7.500	197.6
0.300	73.4	1.200	95.8	2.400	113.3	5.000	162.0	8.000	203.9
0.400	98.1	1.400	87.2	2.600	117.8	5.500	169.8	8.500	210.1
0.500	101.1	1.600	93.0	3.000	126.3	6.000	177.1	9.000	216.1
0.600	102.4	1.800	98.5	3.500	136.1	6.500	184.2	9.500	221.9

Hydro-Brake® Optimum Manhole: S2, DS/PN: 1.020, Volume (m³): 102.1

Unit Reference	MD-SHE-0425-1305-2317-1305
Design Head (m)	2.317
Design Flow (l/s)	130.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	425
Invert Level (m)	55.232
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.317	130.5	Kick-Flo®	1.620	109.6
Flush-Flo™	0.759	130.4	Mean Flow over Head Range	-	110.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	11.4	0.300	80.8	0.500	126.5	0.800	130.3	1.200	126.0
0.200	41.2	0.400	117.7	0.600	129.1	1.000	128.7	1.400	121.2

Hydro-Brake® Optimum Manhole: S2, DS/PN: 1.020, Volume (m³): 102.1

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.600	111.3	2.400	132.7	4.000	170.2	6.000	207.6	8.000	239.0
1.800	115.4	2.600	138.0	4.500	180.3	6.500	215.9	8.500	246.2
2.000	121.4	3.000	147.9	5.000	189.9	7.000	223.9	9.000	253.2
2.200	127.2	3.500	159.5	5.500	198.9	7.500	231.6	9.500	260.0

Storage Structures for SW_1

Tank or Pond Manhole: S15, DS/PN: 1.007

Invert Level (m) 56.359

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	6900.0	1.001	0.0	1.955	9687.5
1.000	6900.0	1.954	0.0	2.275	9687.5

Tank or Pond Manhole: S2, DS/PN: 1.020

Invert Level (m) 55.509

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3140.0	1.001	0.1	1.590	9977.7	2.041	0.0
1.000	3140.0	1.589	0.1	2.040	9977.7		

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 16.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.276 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS 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) 1, 30, 100
Climate Change (%) 20, 20, 20

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
1.000	Phase 1b	15 minute 100 year Winter I+20%	60.000	58.999	0.549	0.000	0.56	
1.001	S17-4	15 minute 100 year Winter I+20%	59.460	58.960	0.750	0.000	0.48	
2.000	Phase 1b	15 minute 100 year Winter I+20%	60.000	58.980	0.530	0.000	0.52	
1.002	S17-3	15 minute 100 year Winter I+20%	59.250	58.914	0.987	0.000	0.62	
3.000	Phase 1b	15 minute 100 year Winter I+20%	60.000	58.866	0.416	0.000	0.46	
1.003	S17-2	15 minute 100 year Winter I+20%	59.481	58.804	1.158	0.000	0.94	
4.000	Phase 1b	15 minute 100 year Winter I+20%	60.000	58.573	0.048	0.000	0.38	
1.004	S17-1	15 minute 100 year Winter I+20%	58.960	58.511	1.179	0.000	1.43	
5.000	S24	15 minute 100 year Winter I+20%	59.300	58.753	0.728	0.000	0.80	
5.001	S23	15 minute 100 year Winter I+20%	59.300	58.715	0.802	0.000	1.11	
5.002	S22	15 minute 100 year Winter I+20%	59.115	58.664	0.836	0.000	0.96	
5.003	S21	15 minute 100 year Winter I+20%	58.910	58.583	0.901	0.000	0.73	
6.000	S20-1A	15 minute 100 year Winter I+20%	59.367	58.848	0.756	0.000	0.94	
7.000	S20-1	15 minute 100 year Winter I+20%	59.224	58.562	0.597	0.000	0.27	
5.004	S20	15 minute 100 year Winter I+20%	59.096	58.536	1.013	0.000	0.97	
8.000	S19-3	15 minute 100 year Winter I+20%	59.260	58.948	0.998	0.000	0.62	
8.001	S19-2	15 minute 100 year Winter I+20%	59.355	58.864	1.271	0.000	0.98	
8.002	S19-1	15 minute 100 year Winter I+20%	59.450	58.598	1.277	0.000	1.77	
5.005	S19	15 minute 100 year Winter I+20%	59.500	58.226	1.028	0.000	1.22	
9.000	S18-1	15 minute 100 year Winter I+20%	59.400	58.271	0.146	0.000	0.49	
5.006	S18	15 minute 100 year Winter I+20%	59.600	58.165	1.008	0.000	1.08	
10.000	S17-1-1A	15 minute 100 year Winter I+20%	59.918	58.499	-0.144	0.000	0.28	
1.005	S17	15 minute 100 year Winter I+20%	59.205	58.001	0.909	0.000	2.40	
1.006	S16	15 minute 100 year Winter I+20%	58.505	57.292	-0.278	0.000	1.03	
1.007	S15	1440 minute 100 year Winter I+20%	59.158	56.683	-0.276	0.000	0.11	
1.008	S14	30 minute 100 year Winter I+20%	59.390	56.680	-0.207	0.000	0.06	
11.000	S13-5-1A	15 minute 100 year Winter I+20%	59.923	59.449	0.679	0.000	0.84	
12.000	S13-5-3	15 minute 100 year Winter I+20%	60.504	59.623	0.480	0.000	0.78	
12.001	S13-5-2	15 minute 100 year Winter I+20%	60.073	59.485	0.712	0.000	1.02	
12.002	S13-5-1	15 minute 100 year Winter I+20%	60.020	59.427	0.714	0.000	0.77	
11.001	S13-5	15 minute 100 year Winter I+20%	59.996	59.366	0.756	0.000	1.59	

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

PN	US/MH Name	Maximum Vol (m³)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
1.000	Phase 1b	1.423	62.813	133.9	SURCHARGED
1.001	S17-4	7.406	80.044	138.3	SURCHARGED
2.000	Phase 1b	1.395	86.500	187.5	SURCHARGED
1.002	S17-3	23.160	182.900	247.8	SURCHARGED
3.000	Phase 1b	1.232	86.151	190.9	SURCHARGED
1.003	S17-2	27.573	286.931	380.5	SURCHARGED
4.000	Phase 1b	1.004	130.314	288.9	SURCHARGED
1.004	S17-1	31.378	431.199	563.6	SURCHARGED
5.000	S24	1.073	15.383	30.1	SURCHARGED
5.001	S23	1.777	22.441	40.8	SURCHARGED
5.002	S22	1.736	37.465	61.7	SURCHARGED
5.003	S21	4.314	51.752	65.9	SURCHARGED
6.000	S20-1A	1.104	36.378	68.5	SURCHARGED
7.000	S20-1	0.925	7.595	16.3	SURCHARGED
5.004	S20	7.916	131.024	170.8	SURCHARGED
8.000	S19-3	1.378	15.744	26.1	SURCHARGED
8.001	S19-2	3.613	31.669	40.9	SURCHARGED
8.002	S19-1	3.149	51.941	69.5	SURCHARGED
5.005	S19	18.643	182.964	237.4	SURCHARGED
9.000	S18-1	0.414	20.995	46.6	SURCHARGED
5.006	S18	6.312	203.960	262.6	SURCHARGED
10.000	S17-1-1A	0.086	11.222	25.7	OK
1.005	S17	28.597	646.349	841.2	SURCHARGED
1.006	S16	8.561	668.167	861.3	OK
1.007	S15	2239.292	2865.539	38.2	OK
1.008	S14	2.761	-33.363	12.0	OK
11.000	S13-5-1A	1.017	17.739	29.7	SURCHARGED
12.000	S13-5-3	0.792	19.544	37.3	SURCHARGED
12.001	S13-5-2	2.564	23.163	35.2	SURCHARGED
12.002	S13-5-1	1.261	23.163	34.8	SURCHARGED
11.001	S13-5	2.314	40.901	59.0	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
13.000	S13-3-5	15 minute 100 year Summer I+20%	60.953	59.507	-0.178	0.000	0.10	
13.001	S13-3-4	15 minute 100 year Summer I+20%	60.868	59.425	-0.184	0.000	0.08	
13.002	S13-4-3	15 minute 100 year Winter I+20%	60.709	59.233	-0.119	0.000	0.46	
13.003	S13-4-2	15 minute 100 year Winter I+20%	60.525	58.968	-0.066	0.000	0.51	
13.004	S13-4-1	15 minute 100 year Winter I+20%	60.410	58.884	0.182	0.000	1.07	
11.002	S13-4	15 minute 100 year Winter I+20%	60.051	58.344	0.122	0.000	1.45	
14.000	S13-3-2	15 minute 100 year Winter I+20%	59.623	58.587	-0.138	0.000	0.32	
14.001	S13-3-1	15 minute 100 year Winter I+20%	59.753	58.144	-0.127	0.000	0.40	
11.003	S13-3	15 minute 100 year Winter I+20%	59.968	58.081	-0.094	0.000	0.94	
15.000	S13-2-1	15 minute 100 year Winter I+20%	60.404	59.287	0.162	0.000	1.06	
11.004	S13-2	15 minute 100 year Winter I+20%	60.150	57.770	-0.080	0.000	1.00	
11.005	S13-1	15 minute 100 year Winter I+20%	59.659	57.415	-0.189	0.000	0.63	
1.009	S13	30 minute 100 year Winter I+20%	59.630	56.805	-0.339	0.000	0.33	
16.000	S12-3	15 minute 100 year Winter I+20%	60.696	59.997	0.512	0.000	0.79	
17.000	S12-2-1A	15 minute 100 year Winter I+20%	59.551	59.125	0.715	0.000	0.44	
18.000	S12-2-1	15 minute 100 year Winter I+20%	60.065	59.171	0.380	0.000	0.47	
16.001	S12-2	15 minute 100 year Winter I+20%	59.643	58.990	1.275	0.000	1.74	
16.002	S12-1	15 minute 100 year Winter I+20%	59.352	57.013	-0.069	0.000	0.90	
1.010	S12	30 minute 100 year Winter I+20%	59.152	56.775	-0.257	0.000	0.51	
19.000	S11-3	15 minute 100 year Winter I+20%	59.528	59.145	0.892	0.000	1.35	
19.001	S11-2	15 minute 100 year Winter I+20%	59.632	57.602	0.161	0.000	1.09	
19.002	S11-1	15 minute 100 year Winter I+20%	59.091	57.121	0.071	0.000	1.28	
1.011	S11	30 minute 100 year Winter I+20%	58.854	56.716	-0.200	0.000	0.66	
1.012	S10	30 minute 100 year Winter I+20%	59.362	56.637	-0.461	0.000	0.32	
20.000	S9-2	15 minute 100 year Winter I+20%	61.332	60.013	-0.183	0.000	0.33	
20.001	S9-1	15 minute 100 year Winter I+20%	60.106	58.269	-0.045	0.000	1.00	
1.013	S9	30 minute 100 year Winter I+20%	58.588	56.597	-0.389	0.000	0.79	
1.014	S8	30 minute 100 year Winter I+20%	58.320	56.576	-0.389	0.000	0.42	
21.000	S7-1	15 minute 100 year Winter I+20%	59.490	58.166	-0.049	0.000	0.97	
1.015	S7	30 minute 100 year Winter I+20%	58.500	56.548	-0.366	0.000	0.38	
22.000	S6-1	15 minute 100 year Winter I+20%	58.616	56.605	-0.091	0.000	0.67	
1.016	S6	30 minute 100 year Winter I+20%	58.480	56.508	-0.307	0.000	0.77	
23.000	S5-2-3	15 minute 100 year Winter I+20%	58.650	58.097	0.502	0.000	0.51	
24.000	S5-2-2-1	15 minute 100 year Winter I+20%	58.850	58.200	0.375	0.000	0.76	
23.001	S5-2-2	15 minute 100 year Winter I+20%	58.650	58.056	0.675	0.000	0.70	
25.000	S5-2-1-2	15 minute 100 year Winter I+20%	58.850	58.234	0.538	0.000	0.84	
25.001	S5-2-1-1	15 minute 100 year Winter I+20%	58.700	58.094	0.692	0.000	0.75	
23.002	S5-2-1	15 minute 100 year Winter I+20%	58.650	57.865	0.870	0.000	1.04	
26.000	S5-4	15 minute 100 year Winter I+20%	58.115	57.573	0.408	0.000	0.27	
23.003	S5-2	15 minute 100 year Winter I+20%	58.425	57.529	0.849	0.000	2.08	
23.004	S5-1	15 minute 100 year Winter I+20%	58.215	56.930	0.280	0.000	2.29	
1.017	S5	30 minute 100 year Winter I+20%	58.184	56.485	-0.289	0.000	0.53	
27.000	S4-12	15 minute 100 year Winter I+20%	61.273	60.840	1.062	0.000	0.80	
27.001	S4-11	15 minute 100 year Winter I+20%	61.090	60.597	1.258	0.000	1.48	
27.002	S4-10	30 minute 100 year Winter I+20%	60.718	59.669	0.801	0.000	1.82	
27.003	S4-9	30 minute 100 year Winter I+20%	60.735	59.457	0.657	0.000	0.87	
27.004	S4-8	30 minute 100 year Winter I+20%	60.616	59.359	0.692	0.000	1.05	
27.005	S4-7	30 minute 100 year Winter I+20%	60.695	59.282	0.686	0.000	1.10	
27.006	S4-6	30 minute 100 year Winter I+20%	60.874	59.089	0.659	0.000	1.38	
27.007	S4-5	30 minute 100 year Winter I+20%	59.621	58.540	0.411	0.000	0.89	
27.008	S4-4	30 minute 100 year Winter I+20%	59.305	58.255	0.483	0.000	1.00	
27.009	S4-3	30 minute 100 year Winter I+20%	58.964	57.949	0.481	0.000	1.59	
28.000	S4-2-5	15 minute 100 year Winter I+20%	59.750	58.548	0.073	0.000	0.48	
28.001	S4-2-4	15 minute 100 year Winter I+20%	60.500	58.501	0.276	0.000	0.82	
28.002	S4-2-3	15 minute 100 year Winter I+20%	59.561	58.484	0.310	0.000	1.11	
28.003	S4-2-2	15 minute 100 year Winter I+20%	58.865	57.844	0.231	0.000	1.24	

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

PN	US/MH Name	Maximum Vol (m³)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
13.000	S13-3-5	0.047	1.454	3.7	OK
13.001	S13-3-4	0.065	1.778	4.6	OK
13.002	S13-4-3	0.155	12.126	27.8	OK
13.003	S13-4-2	0.298	17.918	39.2	OK
13.004	S13-4-1	0.783	32.578	68.5	SURCHARGED
11.002	S13-4	2.609	77.823	126.9	SURCHARGED
14.000	S13-3-2	0.092	7.602	17.3	OK
14.001	S13-3-1	0.158	7.602	17.3	OK
11.003	S13-3	0.941	117.099	198.2	OK
15.000	S13-2-1	0.432	34.202	72.4	SURCHARGED
11.004	S13-2	5.128	156.550	275.6	OK
11.005	S13-1	1.321	159.084	279.5	OK
1.009	S13	7.521	225.030	228.2	OK
16.000	S12-3	0.828	36.916	67.7	SURCHARGED
17.000	S12-2-1A	1.057	17.557	29.7	SURCHARGED
18.000	S12-2-1	0.679	19.910	38.9	SURCHARGED
16.001	S12-2	6.426	79.630	134.1	SURCHARGED
16.002	S12-1	0.331	79.630	133.9	OK
1.010	S12	28.491	366.663	355.3	OK
19.000	S11-3	1.258	39.638	71.5	SURCHARGED
19.001	S11-2	1.474	65.693	117.4	SURCHARGED
19.002	S11-1	1.755	65.693	117.6	SURCHARGED
1.011	S11	32.606	489.402	456.8	OK
1.012	S10	35.868	515.435	449.7	OK
20.000	S9-2	0.127	29.321	67.1	OK
20.001	S9-1	0.472	57.734	131.0	OK
1.013	S9	45.957	595.060	484.5	OK
1.014	S8	9.898	612.201	488.0	OK
21.000	S7-1	0.193	32.578	74.7	OK
1.015	S7	22.432	687.078	515.4	OK
22.000	S6-1	0.146	17.013	39.0	OK
1.016	S6	46.983	707.548	523.4	OK
23.000	S5-2-3	0.817	14.117	26.6	SURCHARGED
24.000	S5-2-2-1	0.673	20.629	42.9	SURCHARGED
23.001	S5-2-2	2.966	51.398	80.9	SURCHARGED
25.000	S5-2-1-2	0.858	22.443	43.8	SURCHARGED
25.001	S5-2-1-1	1.982	26.422	39.7	SURCHARGED
23.002	S5-2-1	4.663	77.820	118.0	SURCHARGED
26.000	S5-4	0.795	15.021	24.7	SURCHARGED
23.003	S5-2	7.420	99.532	150.4	SURCHARGED
23.004	S5-1	2.536	99.246	149.7	SURCHARGED
1.017	S5	14.161	845.027	633.3	OK
27.000	S4-12	1.450	22.983	34.7	SURCHARGED
27.001	S4-11	3.953	44.880	65.0	SURCHARGED
27.002	S4-10	3.540	65.867	60.5	SURCHARGED
27.003	S4-9	1.512	73.757	65.3	SURCHARGED
27.004	S4-8	2.645	80.877	70.3	SURCHARGED
27.005	S4-7	1.881	94.608	80.1	SURCHARGED
27.006	S4-6	3.239	118.770	99.2	SURCHARGED
27.007	S4-5	5.300	130.214	105.9	SURCHARGED
27.008	S4-4	2.571	141.149	113.9	SURCHARGED
27.009	S4-3	2.395	154.377	123.0	SURCHARGED
28.000	S4-2-5	0.331	9.413	19.1	SURCHARGED
28.001	S4-2-4	2.001	9.413	26.1	SURCHARGED
28.002	S4-2-3	0.942	55.379	101.9	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

PN	US/MH Name	Maximum Vol (m³)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
28.003	S4-2-2	4.135	57.551	95.4	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
28.004	S4-2-1	15 minute 100 year Winter I+20%	58.736	57.702	0.183	0.000	1.18		1.387
27.010	S4-2	30 minute 100 year Winter I+20%	58.592	57.498	0.132	0.000	1.07		4.258
27.011	S4-1	30 minute 100 year Winter I+20%	58.708	57.108	0.080	0.000	1.54		8.886
1.018	S4	30 minute 100 year Winter I+20%	58.429	56.448	-0.283	0.000	1.19		29.725
1.019	S3	360 minute 100 year Winter I+20%	58.223	56.059	-0.650	0.000	0.17		4.962
1.020	S2	360 minute 100 year Winter I+20%	58.085	56.053	0.296	0.000	0.72		1764.449
1.021	S1	600 minute 100 year Winter I+20%	58.458	55.676	-0.070	0.000	1.00		1.514

PN	US/MH Name	Discharge Vol (m³)	Pipe Flow (l/s)	Status
28.004	S4-2-1	59.180	96.9	SURCHARGED
27.010	S4-2	263.472	228.3	SURCHARGED
27.011	S4-1	263.474	227.9	SURCHARGED
1.018	S4	1146.274	859.4	OK
1.019	S3	3837.464	341.5	OK
1.020	S2	3196.403	112.9	SURCHARGED
1.021	S1	4640.384	112.8	OK

Appendix B

ON ORIGINAL

0 5 10 15 20 25 30 40 50mm

NOTES:

LEGEND

- APPLICATION BOUNDARY
- CATCHMENT 1
- CATCHMENT 2A
- CATCHMENT 2B
- CATCHMENT 3
- CATCHMENT 4AA
- CATCHMENT 4B
- CATCHMENT 4BB
- CATCHMENT 4CC
- CATCHMENT 5
- CATCHMENT 6
- CATCHMENT 7

EXTENTS OF FUTURE DEVELOPMENT CONTRIBUTING TO ATN 07
TOTAL AREA = 3.01ha
CONTRIBUTING IMPERMEABLE AREA = 1.949ha

INDICATIVE EXTENTS OF FUTURE URBAN CENTER DRAINIGN TO SEPERATE ATTENUATION SYSTEM

ZONE 1
TOTAL CONTRIBUTING IMPERMEABLE AREA = 0.720ha

ZONE 2
TOTAL CONTRIBUTING IMPERMEABLE AREA = 0.462ha

ZONE 3
TOTAL CONTRIBUTING IMPERMEABLE AREA = 0.460ha

ZONE 4
TOTAL CONTRIBUTING IMPERMEABLE AREA = 0.347ha

INDICATIVE LOCATION OF ATTENUATION TANK SERVING FUTURE URBAN CENTER WITH ASSUMED DISCHARGE OF 3.0L/S

CATCHMENT 4B
TOTAL CONTRIBUTING AREA = 33.080ha
AREA OF PROPOSED PHASE 1A WITHIN CATCHMENT = 4.120ha
IMPERMEABLE AREA CONTRIBUTION FROM PROPOSED PHASE 1A - 1.745ha

CATCHMENT 4BB
TOTAL CONTRIBUTING AREA = 9.020ha
AREA OF PROPOSED PHASE 1A WITHIN CATCHMENT = 8.450ha
IMPERMEABLE AREA CONTRIBUTION FROM PROPOSED PHASE 1A - 3.922ha

ATN 07

ATN 08

Car Park

GRAND CANAL

BM 62.21

BM 62.75

BM 59.63

Weir

38kV

10kV

LEGEND

- PROPOSED ATTENUATION TANK
- PROPOSED BASIN/POND
- PROPOSED SURFACE WATER DISCHARGE ROUTES
- PROPOSED SURFACE WATER DRAINAGE UPSIZED TO ACCOMMODATE FUTURE DEVELOPMENT
- FUTURE DEVELOPMENT CONTRIBUTING CATCHMENT BOUNDARY
- FUTURE DEVELOPMENT CONTRIBUTING SUBCATCHMENT BOUNDARY
- INDICATIVE PROPOSED FUTURE ROAD
- INDICATIVE FUTURE DEVELOPMENT AREAS DRAINING TO 1A INFRASTRUCTURE
- INDICATIVE FUTURE DRAINGE

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OS SHEET REFERENCE:
3260-14, 3260-15, 3260-19, 3260-20, 3260-24, 3260-25, 3261-11, 3261-12, 3261-13, 3261-14, 3261-16, 3261-17, 3261-18, 3261-19, 3261-21, 3261-22, 3261-23, 3261-24, 3325-04, 3325-05, 3325-09, 3325-10, 3326-01, 3326-02, 3326-03, 3326-04, 3326-06, 3326-07, 3326-08, 3326-09

rev	date	description	by	chkd.
		A - Approved		
client approval		B - Approved with comments		
		C - Do not use		

suitability: S2 - INFORMATION
issue purpose: PLANNING

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project ref.
CLONBURRIS PHASE 1A

drawing title
PHASE 1A SCHEMATIC CATCHMENT LAYOUT

client
CAIRN HOMES LTD

designed by	author	scale	sheet size
TCA	TCA	1:1000	A1

drawing no.: 162119-DBFL-SW-SP-SK-C-1002
revision: -

Appendix C

FOUL SEWERAGE DESIGN

Design Criteria for FS_1

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	6.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	165.00	Maximum Backdrop Height (m)	1.500
Persons per House	2.70	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for FS_1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	39.653	0.106	374.1	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
1.001	33.680	0.090	374.2	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
2.000	39.411	0.800	49.3	0.000	6	0.0	0.600	o	225	Pipe/Conduit	
2.001	6.116	0.152	40.2	0.000	2	0.0	0.600	o	225	Pipe/Conduit	
2.002	37.992	1.823	20.8	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
2.003	15.073	0.407	37.0	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
1.002	62.055	0.165	376.1	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
1.003	72.379	0.196	369.3	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
3.000	13.783	0.150	91.9	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
3.001	8.844	0.088	100.5	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
3.002	38.323	0.624	61.4	0.000	9	0.0	0.600	o	225	Pipe/Conduit	
4.000	14.356	0.239	60.1	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
4.001	35.643	0.238	149.8	0.000	8	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	53.627	0.000	0.0	0	0.0	0	0.00	0.93	102.8	0.0
1.001	53.521	0.000	0.0	0	0.0	0	0.00	0.93	102.8	0.0
2.000	58.275	0.000	0.0	6	0.0	8	0.39	1.87	74.3	0.2
2.001	57.475	0.000	0.0	8	0.0	9	0.45	2.07	82.2	0.2
2.002	57.323	0.000	0.0	8	0.0	8	0.57	2.88	114.5	0.2
2.003	55.500	0.000	0.0	8	0.0	9	0.47	2.16	85.7	0.2
1.002	53.431	0.000	0.0	8	0.0	14	0.19	0.93	102.5	0.2
1.003	53.266	0.000	0.0	8	0.0	14	0.19	0.94	103.5	0.2
3.000	59.160	0.000	0.0	8	0.0	11	0.34	1.36	54.3	0.2
3.001	59.010	0.000	0.0	8	0.0	11	0.33	1.30	51.9	0.2
3.002	58.922	0.000	0.0	17	0.0	14	0.50	1.67	66.5	0.5
4.000	58.800	0.000	0.0	8	0.0	10	0.39	1.69	67.2	0.2
4.001	58.561	0.000	0.0	16	0.0	17	0.36	1.07	42.4	0.5

Network Design Table for FS_1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.002	3.817	0.025	152.7	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
3.003	70.162	1.400	50.1	0.000	16	0.0	0.600	o	225	Pipe/Conduit	
5.000	65.810	1.681	39.1	0.000	16	0.0	0.600	o	225	Pipe/Conduit	
3.004	22.601	0.226	100.0	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
3.005	13.099	0.130	100.8	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
6.000	48.637	0.600	81.1	0.000	63	0.0	0.600	o	225	Pipe/Conduit	
6.001	54.937	0.613	89.6	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
6.002	7.117	0.072	98.8	0.000	38	0.0	0.600	o	225	Pipe/Conduit	
6.003	7.693	0.077	99.9	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
1.004	62.640	0.163	384.3	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
7.000	60.859	1.552	39.2	0.000	15	0.0	0.600	o	225	Pipe/Conduit	
8.000	18.495	0.308	60.0	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
8.001	42.033	0.595	70.6	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
7.001	4.907	0.067	73.2	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
9.000	34.181	0.569	60.1	0.000	8	0.4	0.600	o	225	Pipe/Conduit	
7.002	19.592	0.196	100.0	0.000	0	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.002	58.323	0.000	0.0	16	0.0	17	0.35	1.06	42.0	0.5
3.003	58.298	0.000	0.0	49	0.0	22	0.74	1.85	73.6	1.5
5.000	58.600	0.000	0.0	16	0.0	12	0.57	2.10	83.4	0.5
3.004	56.898	0.000	0.0	65	0.0	30	0.64	1.31	52.0	2.0
3.005	56.672	0.000	0.0	65	0.0	30	0.63	1.30	51.8	2.0
6.000	56.213	0.000	0.0	63	0.0	28	0.68	1.45	57.8	1.9
6.001	55.613	0.000	0.0	63	0.0	29	0.65	1.38	54.9	1.9
6.002	55.000	0.000	0.0	101	0.0	37	0.73	1.32	52.3	3.1
6.003	54.928	0.000	0.0	101	0.0	37	0.73	1.31	52.0	3.1
1.004	53.070	0.000	0.0	174	0.0	58	0.49	0.92	101.4	5.4
7.000	58.500	0.000	0.0	15	0.0	12	0.56	2.10	83.3	0.5
8.000	57.851	0.000	0.0	8	0.0	10	0.39	1.69	67.2	0.2
8.001	57.543	0.000	0.0	16	0.0	14	0.47	1.56	61.9	0.5
7.001	56.948	0.000	0.0	31	0.0	20	0.57	1.53	60.8	1.0
9.000	57.450	0.000	0.4	8	0.0	16	0.54	1.69	67.2	0.6
7.002	56.881	0.000	0.4	39	0.0	27	0.59	1.31	52.0	1.6

Network Design Table for FS_1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
7.003	12.105	0.121	100.0	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
1.005	74.643	0.200	373.2	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
10.000	46.395	0.450	103.1	0.000	16	0.0	0.600	o	225	Pipe/Conduit	
10.001	42.720	0.432	98.9	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
10.002	9.658	0.097	99.6	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
11.000	65.721	0.400	164.3	0.000	30	0.0	0.600	o	225	Pipe/Conduit	
12.000	91.445	0.735	124.4	0.000	62	0.0	0.600	o	225	Pipe/Conduit	
11.001	39.380	0.498	79.1	0.000	53	0.0	0.600	o	225	Pipe/Conduit	
13.000	19.438	0.373	52.1	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
13.001	15.449	0.498	31.0	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
13.002	33.548	0.501	67.0	0.000	10	0.0	0.600	o	225	Pipe/Conduit	
11.002	25.902	0.301	86.1	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
14.000	49.818	0.828	60.2	0.000	2	0.0	0.600	o	225	Pipe/Conduit	
14.001	51.094	0.319	160.2	0.000	5	0.0	0.600	o	225	Pipe/Conduit	
14.002	46.238	1.038	44.5	0.000	6	0.0	0.600	o	225	Pipe/Conduit	
11.003	14.605	0.195	74.9	0.000	0	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.003	55.634	0.000	0.4	39	0.0	27	0.59	1.31	52.0	1.6
1.005	52.907	0.000	0.4	213	0.0	66	0.54	0.93	102.9	7.0
10.000	58.270	0.000	0.0	16	0.0	16	0.41	1.29	51.2	0.5
10.001	57.820	0.000	0.0	16	0.0	16	0.41	1.31	52.3	0.5
10.002	57.388	0.000	0.0	16	0.0	16	0.41	1.31	52.1	0.5
11.000	57.400	0.000	0.0	30	0.0	23	0.42	1.02	40.4	0.9
12.000	57.735	0.000	0.0	62	0.0	31	0.58	1.17	46.6	1.9
11.001	57.000	0.000	0.0	145	0.0	42	0.88	1.47	58.5	4.5
13.000	57.873	0.000	0.0	8	0.0	10	0.42	1.82	72.2	0.2
13.001	57.500	0.000	0.0	8	0.0	9	0.50	2.36	93.7	0.2
13.002	57.002	0.000	0.0	18	0.0	15	0.49	1.60	63.6	0.6
11.002	56.501	0.000	0.0	163	0.0	45	0.88	1.41	56.1	5.0
14.000	58.385	0.000	0.0	2	0.0	5	0.25	1.69	67.2	0.1
14.001	57.557	0.000	0.0	7	0.0	12	0.27	1.03	41.0	0.2
14.002	57.238	0.000	0.0	13	0.0	12	0.51	1.97	78.1	0.4
11.003	56.200	0.000	0.0	176	0.0	45	0.95	1.51	60.1	5.4

Network Design Table for FS_1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
15.000	39.421	0.788	50.0	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
16.000	23.833	0.530	45.0	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
16.001	56.089	1.246	45.0	0.000	14	0.0	0.600	o	225	Pipe/Conduit	
16.002	5.559	0.124	44.8	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
11.004	17.930	0.299	60.0	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
11.005	12.934	0.129	100.3	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
1.006	61.793	0.165	374.5	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
1.007	8.218	0.022	373.5	0.000	0	0.0	0.600	o	375	Pipe/Conduit	
1.008	67.536	0.180	375.2	0.000	38	0.0	0.600	o	375	Pipe/Conduit	
1.009	11.629	0.026	447.3	0.000	0	0.0	0.600	o	450	Pipe/Conduit	
1.010	31.618	0.070	451.7	0.000	0	0.0	0.600	o	450	Pipe/Conduit	
17.000	73.433	0.837	87.7	0.000	20	0.0	0.600	o	225	Pipe/Conduit	
18.000	15.011	0.250	60.0	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
18.001	37.203	0.248	150.0	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
18.002	3.501	0.117	29.9	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
17.001	70.501	0.705	100.0	0.000	16	0.0	0.600	o	225	Pipe/Conduit	
1.011	39.197	0.087	450.5	0.000	4	0.0	0.600	o	450	Pipe/Conduit	
19.000	40.215	0.381	105.6	0.000	7	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
15.000	58.000	0.000	0.0	8	0.0	10	0.42	1.85	73.7	0.2
16.000	57.950	0.000	0.0	8	0.0	9	0.44	1.96	77.8	0.2
16.001	57.420	0.000	0.0	22	0.0	15	0.60	1.95	77.7	0.7
16.002	56.174	0.000	0.0	22	0.0	15	0.60	1.96	77.9	0.7
11.004	56.005	0.000	0.0	206	0.0	46	1.07	1.69	67.3	6.4
11.005	55.706	0.000	0.0	206	0.0	53	0.89	1.31	51.9	6.4
1.006	52.707	0.000	0.4	435	0.0	93	0.66	0.93	102.7	13.9
1.007	52.542	0.000	0.4	435	0.0	93	0.66	0.93	102.9	13.9
1.008	52.520	0.000	0.4	473	0.0	96	0.67	0.93	102.7	15.0
1.009	52.340	0.000	0.4	473	0.0	95	0.62	0.95	151.9	15.0
1.010	52.314	0.000	0.4	473	0.0	95	0.61	0.95	151.1	15.0
17.000	57.400	0.000	0.0	20	0.0	17	0.46	1.40	55.5	0.6
18.000	56.813	0.000	0.0	8	0.0	10	0.39	1.69	67.2	0.2
18.001	56.563	0.000	0.0	16	0.0	17	0.36	1.07	42.4	0.5
18.002	56.315	0.000	0.0	16	0.0	12	0.63	2.40	95.5	0.5
17.001	56.198	0.000	0.0	52	0.0	27	0.59	1.31	52.0	1.6
1.011	52.244	0.000	0.4	529	0.0	100	0.63	0.95	151.3	16.8
19.000	59.920	0.000	0.0	7	0.0	11	0.31	1.27	50.6	0.2

Network Design Table for FS_1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
19.001	60.946	0.646	94.3	0.000	8	0.0	0.600	o	225	Pipe/Conduit	
19.002	14.683	0.081	181.3	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
19.003	20.457	0.292	70.1	0.000	2	0.0	0.600	o	225	Pipe/Conduit	
19.004	12.150	0.122	99.6	0.000	2	0.0	0.600	o	225	Pipe/Conduit	
19.005	35.177	0.342	102.9	0.000	4	0.0	0.600	o	225	Pipe/Conduit	
19.006	67.416	0.824	81.8	0.000	7	0.0	0.600	o	225	Pipe/Conduit	
19.007	18.004	0.129	139.6	0.000	2	0.0	0.600	o	225	Pipe/Conduit	
19.008	22.044	0.138	159.7	0.000	3	0.0	0.600	o	225	Pipe/Conduit	
19.009	25.299	0.183	138.2	0.000	3	0.0	0.600	o	225	Pipe/Conduit	
19.010	69.985	0.456	153.5	0.000	7	0.0	0.600	o	225	Pipe/Conduit	
19.011	70.059	1.252	56.0	0.000	6	0.0	0.600	o	225	Pipe/Conduit	
1.012	36.971	0.082	450.9	0.000	0	0.0	0.600	o	450	Pipe/Conduit	
20.000	58.384	1.460	40.0	0.000	57	0.0	0.600	o	225	Pipe/Conduit	
1.013	46.146	0.103	448.0	0.000	0	0.0	0.600	o	450	Pipe/Conduit	
21.000	26.232	0.416	63.1	0.000	115	0.0	0.600	o	225	Pipe/Conduit	
21.001	37.278	0.525	71.0	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
22.000	37.037	0.599	61.8	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
21.002	12.897	0.322	40.1	0.000	0	0.0	0.600	o	225	Pipe/Conduit	
1.014	49.438	0.110	449.4	0.000	0	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
19.001	59.539	0.000	0.0	15	0.0	15	0.41	1.35	53.5	0.5
19.002	58.893	0.000	0.0	15	0.0	17	0.33	0.97	38.5	0.5
19.003	58.812	0.000	0.0	17	0.0	15	0.48	1.56	62.2	0.5
19.004	58.520	0.000	0.0	19	0.0	17	0.43	1.31	52.1	0.6
19.005	58.398	0.000	0.0	23	0.0	18	0.46	1.29	51.3	0.7
19.006	58.056	0.000	0.0	30	0.0	20	0.54	1.45	57.5	0.9
19.007	57.232	0.000	0.0	32	0.0	23	0.45	1.10	43.9	1.0
19.008	57.103	0.000	0.0	35	0.0	25	0.45	1.03	41.0	1.1
19.009	56.965	0.000	0.0	38	0.0	25	0.48	1.11	44.1	1.2
19.010	56.782	0.000	0.0	45	0.0	28	0.49	1.05	41.9	1.4
19.011	56.326	0.000	0.0	51	0.0	23	0.73	1.75	69.7	1.6
1.012	52.157	0.000	0.4	580	0.0	105	0.65	0.95	151.2	18.3
20.000	57.000	0.000	0.0	57	0.0	23	0.84	2.07	82.5	1.8
1.013	52.075	0.000	0.4	637	0.0	110	0.67	0.95	151.7	20.1
21.000	57.000	0.000	0.0	115	0.0	35	0.89	1.65	65.6	3.6
21.001	56.584	0.000	0.0	115	0.0	36	0.85	1.55	61.8	3.6
22.000	56.668	0.000	0.0	0	0.0	0	0.00	1.67	66.2	0.0
21.002	56.059	0.000	0.0	115	0.0	32	1.04	2.07	82.4	3.6
1.014	51.972	0.000	0.4	752	0.0	120	0.70	0.95	151.5	23.7

Network Design Table for FS_1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.015	46.203	0.102	453.0	0.000	0	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.015	51.862	0.000	0.4	752	0.0	120	0.70	0.95	150.9	23.7

Appendix D

ON ORIGINAL

0 5 10 15 20 25 30 40 50mm

NOTES:

LEGEND

- TRUNK FOUL SEWER TO BE CONSTRUCTED AS PART OF CSLS [SDZ20A/0021]
- PROPOSED FOUL SEWER AND MANHOLE
- PROPOSED FOUL DISCHARGE ROUTES FROM FUTURE DEVELOPMENT
- FUTURE DEVELOPMENT CONTRIBUTING CATCHMENT BOUNDARY
- FUTURE DEVELOPMENT CONTRIBUTING SUBCATCHMENT BOUNDARY
- INDICATIVE PROPOSED PHASE 1B ROAD
- INDICATIVE FUTURE DEVELOPMENT AREAS DRAINING TO 1A INFRASTRUCTURE

EXTENTS OF FUTURE DEVELOPMENT CONTRIBUTING TO PHASE 1A SEWER
TOTAL AREA = 3.01ha
CONTRIBUTING DWELLINGS = 183units

ZONE 1
TOTAL CONTRIBUTING DWELLINGS = 51units

ZONE 2
TOTAL CONTRIBUTING DWELLINGS = 51units

ZONE 2
TOTAL CONTRIBUTING DWELLINGS = 51units

ZONE 3
TOTAL CONTRIBUTING DWELLINGS = 30units

CLONBURRIS PHASE1A

ATN 07

ATN 08

GRAND CANAL

11th Lock

10th Lock

Car Park

38kv

10kv

Weir

BM 62.21

BM 62.75

BM 59.63

OS SHEET REFERENCE:
3260-14, 3260-15, 3260-19, 3260-20, 3260-24, 3260-25, 3261-11, 3261-12, 3261-13, 3261-14, 3261-16, 3261-17, 3261-18, 3261-19, 3261-21, 3261-22, 3261-23, 3261-24, 3325-04, 3325-05, 3325-09, 3325-10, 3326-01, 3326-02, 3326-03, 3326-04, 3326-06, 3326-07, 3326-08, 3326-09

rev	date	description	by	chkd.
client approval		A - Approved		
		B - Approved with comments		
		C - Do not use		

suitability	issue purpose
S2 - INFORMATION	PLANNING

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project ref.
CLONBURRIS PHASE 1A

drawing title
PHASE 1A SCHEMATIC FOUL SEWER STRATEGY

client
CAIRN HOMES LTD

designed by	author	scale	sheet size
TCA	TCA	1:1000	A1

drawing no. 162119-DBFL-FW-SP-SK-C-1002

revision -

Appendix E

Carin Homes PLC C/O John Carr
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Upper Ormond Quay,
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Dublin

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www.water.ie

04 February 2020

Dear Sir/Madam,

Re: Customer Reference No 2512559856 pre-connection enquiry - Subject to contract | Contract denied
Connection for Housing Development of 1500 Units at Clonburris Little, Clondalkin, Co Dublin

Irish Water has reviewed your pre-connection enquiry in relation to water and wastewater connections at Clonburris Little, Clondalkin, Co Dublin
. Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network(s) can be facilitated.

In the case of wastewater connections this assessment does not confirm that a gravity connection is achievable. Therefore a suitably sized pumping station may be required to be installed on your site. All infrastructure should be designed and installed in accordance with the Irish Water Code of Practice.

All infrastructure should be designed and installed in accordance with
- the Clonburris Master Plan approved by Irish Water
- the Development phasing and connection timelines of each phase agreed with Irish Water
- the Irish Water Codes of Practice and Standard Details.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details. A design proposal for the water and/or wastewater infrastructure should be submitted to Irish Water for assessment. Prior to submitting your planning application, you are required to submit these detailed design proposals to Irish Water for review.

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water'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.

If you have any further questions, please contact James O'Sullivan from the design team on 022 52269 or email jameosull@water.ie. For further information, visit **www.water.ie/connections**

Yours sincerely,

Maria O'Dwyer
Connections and Developer Services