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00	10/11/26	Planning Issue	Chamindu Goonewardena	Grant Humphrey	Grant Humphrey

1. Introduction

DBFL Consulting Engineers (DBFL) have been commissioned by Dún Laoghaire Rathdown County Council (DLRCC) to provide consulting engineering services for the design and development of the Dundrum Living Streets Scheme (referred to herein as 'Proposed Scheme'). The Proposed Scheme represents Phase 1 of the wider Dundrum Living Streets project and comprises works along Main Street and Sandyford Road being brought forward through the current Part 8 process.

The overall purpose of the scheme is to support the implementation of the Dundrum Local Area Plan by delivering permanent public realm, urban greening and accessibility improvements along Main Street and Sandyford Road, creating a more attractive and people focused environment within Dundrum Village.

The purpose of this report is to provide supporting information about the proposed scheme with regards to sustainable surface water drainage strategies.

2. Site Topography

The majority of Main Street falls in a North Westerly direction from a local high spot of 54.5 MOD at the Holy Cross Church towards the main street intersection with the Dundrum Bypass. A portion of the main street falls from the Holy Cross Church in a south easterly direction towards the "Dundrum Cross Roads" towards a local low spot (52.5mOD) along Ballinteer Road.

In addition, the majority of the scheme extents along Sandyford Road fall in a north westerly direction from the scheme's high point towards the "Dundrum Cross Roads", as well as towards a local low point (52.5mOD) along Ballinteer Road.

The general flow paths of captured surface water within the scheme extents are indicated below.

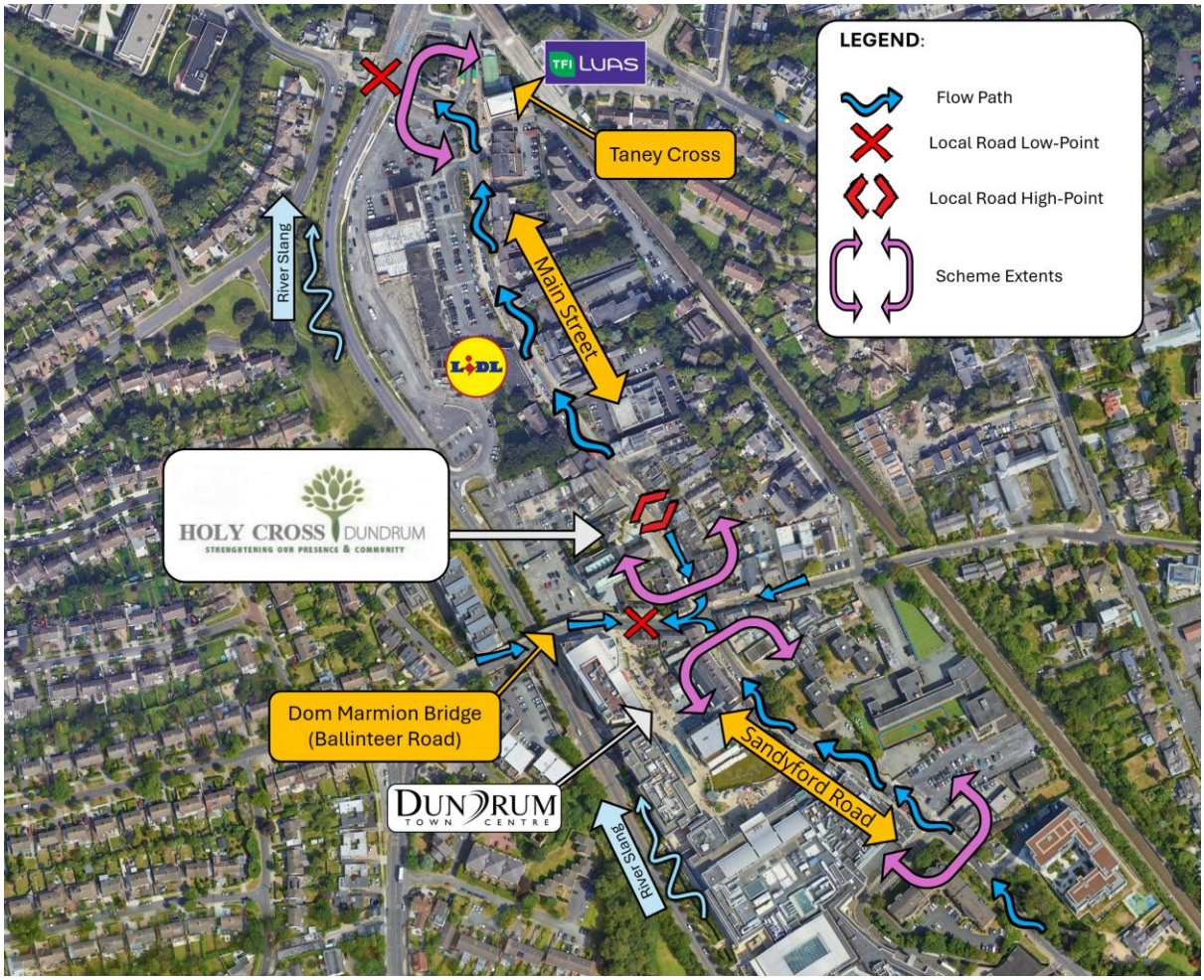

Figure 2-1 : Site Topography

3. Existing Drainage

Overview

The extent of additional existing services within Main Street discussed is based on the combination of existing service records, a recent Topographical and Utility Survey completed by Apex Surveys in February 2026. All surface infrastructure ultimately drains into the River Slang System, which is a combination of natural earth channels, concrete channels and culvert sections. An overview of existing drainage infrastructure is provided in Figure 3-1 below.

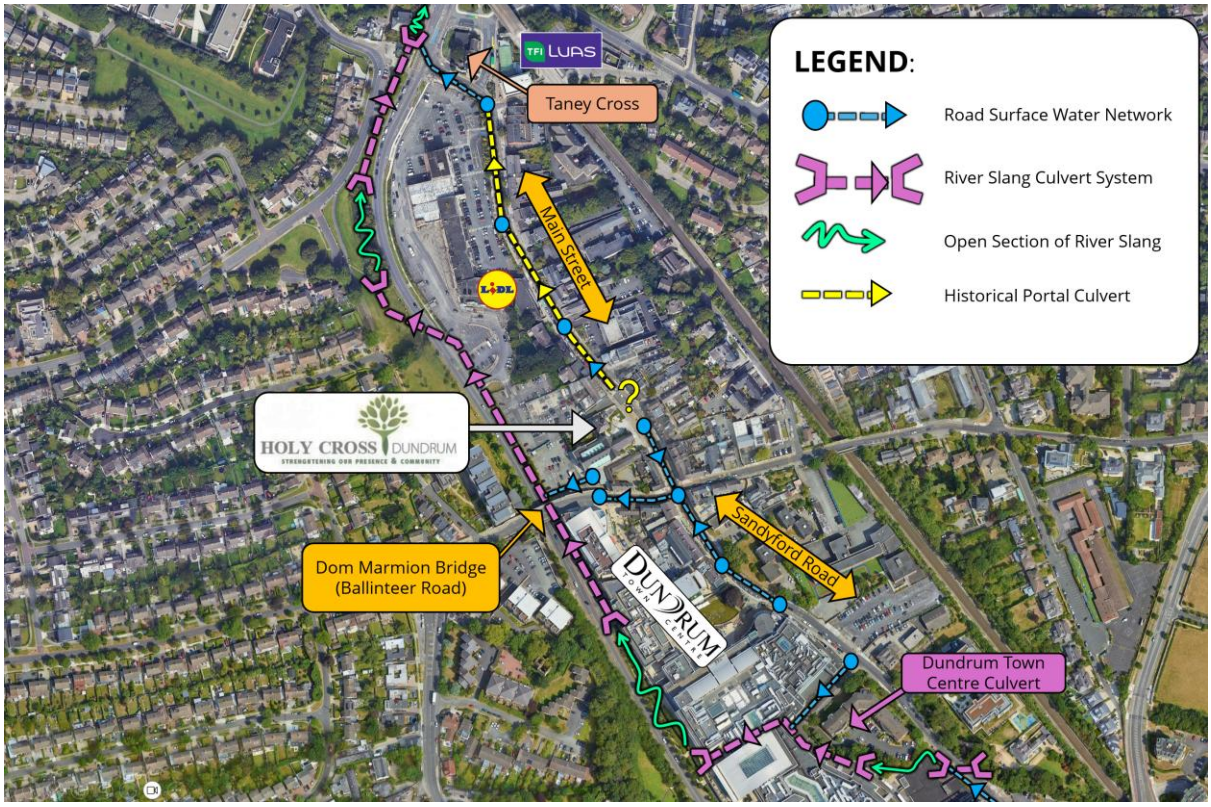

Figure 3-1 : Existing Surface Water Infrastructure

Main Street

Two principal drainage areas were noted along Dundrum Main Street. The northern area drains towards the Dundrum Main Street / Bypass Junction, while the southern area drains towards Dundrum Crossroads and Ballinteer Road as indicated both in Figure 2-1 and Figure 3-1. Existing infrastructure is constrained, comprises sections of historic construction, and requires further investigation before the surface water strategy can be finalised.

Within the northern drainage area, the principal outfall includes a historic stone culvert, approximately 540 mm wide, draining towards the 600 mm outfall at the Main Street / Bypass Junction. Its upstream extent and condition remain unconfirmed because the utility survey could not trace it beyond the last accessible manhole. Subject to confirmation of its condition and alignment via an ongoing CCTV Survey facilitated by Cahir Environmental Services , extending this culvert upstream should be considered to increase the area captured by the surface water network.

Several trapped gullies appear to discharge to the existing vitrified clay combined sewer, indicating locations where a dedicated surface water outfall is not currently available. Given the sewer's

reported condition, limited capacity and connection costs, new connections to combined sewer should be avoided where possible and new drainage should preferentially discharge to existing or extended surface water infrastructure.

Within the southern drainage area of Main Street, surface water drains towards Dundrum Crossroads through a 225mm surface network into a 600 mm culvert draining to the west towards the River Slang System; however, site information indicates that this may ultimately discharge through a 225 mm outfall mounted near the Ballinteer Road bridge

Drainage records also indicate that runoff from the low-lying section of Ballinteer Road is conveyed via the Holy Cross Church and Dundrum Village parking areas before discharging to the River Slang Culvert. A separate 450 mm overflow pipe associated with Dundrum Town Centre may provide an alternative outfall, but its ownership, condition and suitability remain uncertain. This facility is currently being investigated in coordination with DLRCoCo Drainage through an appointed CCTV Survey including dye-testing facilitated by Cahir Environmental Services and shall be concluded during further stages of detailed design.

Sandyford Road

Drainage records also indicate that runoff generated within Sandyford road drain into a 225mm surface water outfall, also drainage towards the Dundrum Crossroads through a recorded 600 mm culvert. There is evidence of trapped gulleys used within Sandyford Road, evident of connections to the adjacent combined sewer system. As with surface water infrastructure within Main Street, the verification of surface water records is currently being investigated in coordination with DLRCoCo Drainage through an appointed CCTV Survey including dye-testing facilitated by Cahir Environmental Services and shall be concluded during further stages of detailed design.

4. Drainage Strategy

4.1. Overview

Please refer to Proposed Drainage Layouts, *250116-X-0500-Z00-DTM-DR-DBFL-CE-1301 to 1303* for drainage proposals. The scheme's drainage strategy at it's core is intended as an exemplarily example of a Sustainable Drainage Retrofit Design.

The management of surface water for the proposed development has been designed to comply with the policies and guidelines outlined in the Greater Dublin Strategic Drainage Study (GDSDS), the Ciria C753 Report '*The SuDS Manual*' and with the requirements of the "*Dún Laoghaire-Rathdown County Development Plan 2022-2028.*"

The primary management of surface water runoff will be through the utilisation of nature-based solutions, promoting the four 'pillars' of sustainable urban drainage as summarised in Figure 4-1.

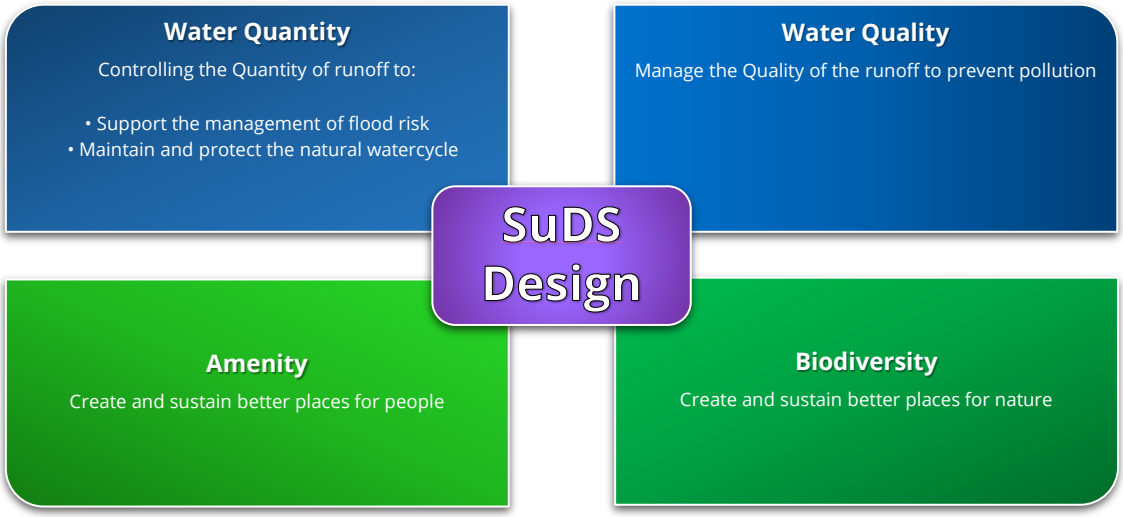

Figure 4-1: Four fundamentals of sustainable urban drainage (Source: Ciria C753)

The aim of the SuDS strategy for the site will be to;

- Reduce storm-water runoff,
- Reduce the likelihood of flooding,
- Promote infiltration where feasible,
- Reduce pollution impact,
- Replicate the natural characteristics of rainfall runoff for the site,
- Promote biodiversity, providing wildlife connectivity throughout the development.

4.2. SuDS Selection

The intention of SuDS selection hierarchy within the development was to implement a management train strategy, optimally replicating natural drainage paths with the sequential design and placement of various drainage elements to progressively control surface water pollution, flow, and volumes.

The seamless integration of SuDS elements where possible into the urban landscape was thoughtfully planned and designed through coordination with the entire design team.

The selection of SuDS ensures a well-organized network of SuDS elements intended on minimising and controlling runoff and pollution where possible. The goal of the development's SuDS selection is to ensure that low to average rainfall events are rather intercepted at the source at locations with proposed SuDS thus reducing the reliance and over design of conventional piped systems. The development has promoted the reduction of impermeable areas and ensured that SuDS features present in the inception of the management train, ensuring SuDS elements are not relegated to token visual features.

4.3. Sustainable Surface Water Management

Refer to Proposed Drainage Layout, 250116-X-0500-Z00-DTM-DR-DBFL-CE-1301, 1302 & 1303 for drainage proposals. The scheme's strategy at it's core is intended as an exemplarily example of a Sustainable Drainage Retrofit Design.

Identified measures have been provided in order to improve the performance of the existing network and provide temporary surface water storage where possible, with the objective of reducing peak overall discharge rates during critical storm events. It shall be noted that public space is constrained within Main Street, and that the delivery of considerable open area SuDS structures that would significantly alleviate flooding volumes is not feasible.

However, the SuDS strategy, at a minimum, intends to mirror the natural drained environment by considering and recognising natural flow paths, with the proposed infrastructure emulating and optimising the management of surface water through detailed site layout design and drainage infrastructure.

Proposed Nature Based SuDS include a combination of :

- Tree Pits
- Filter Drains
- Rain Gardens
- Permeable Paving

Road adjacent SuDS elements have been provided where possible allow impermeable paved areas to positively drain into proposed nature-based SuDS solutions providing direct treatment to

received contaminated surface water. Remaining surface water runoff will drain conventionally where there is no location for a nature based SuDS element. Following the runoff being treated by SuDS elements, it will also discharge into proposed conventional piped surface water networks that discharge ultimately into the River Slang.

SuDS features typically promote a reduction of velocity which slows the run-off at source, changing the input hydrograph which will ultimately reduce the peak inflow the surface water network, and reduce the flood flow volumes to downstream infrastructure.

In addition, rainfall will 'wet' the initial surface of SuDS elements allowing water to be stored in the micro and macrotexture of the surfacing and will be lost to evapotranspiration, giving a reduction in volume. As run-off drains to these SuDS elements and through the build-up, the aggregate/soil surface area will also 'wet' giving another reduction of volume due to evapotranspiration and natural storage within the SuDS feature.

In support of this, the SUDS Manual (CIRIA C753) also outlines that the use of SUDS "can help reduce flow rates from a site by providing some attenuation storage and can reduce storage volume requirements where infiltration occurs".

4.3.1. Surface Water Outfall Strategy

The existing surface water network of the Northern Section of Main Streets includes historical drainage infrastructure, namely the stone culvert draining towards the Dundrum Bypass / Main Street Junction. The precise extent and condition of sections of this infrastructure has not yet been fully established and further investigation is currently underway in coordination with DLRCC Drainage through an appointed CCTV Survey facilitated by Cahir Environmental Services.

The proposed drainage infrastructure shown on DBFL Drainage Layouts 250116-X-0500-Z00-DTM-DR-DBFL-CE-1301 and 1302 indicates that the northern section of the surface water network shall be extended upstream along Main Street to capture additional surface water runoff while avoiding connections to the combined sewer.

In addition, where multiple connections from SuDS structures and gullies to the stone portal culvert are required, the affected sections of the historic culvert will be replaced with suitable concrete surface water pipes and rebuilt manholes. The proposed surface water infrastructure will involve the "lift and replace" of the existing stone portal culvert along its current alignment. The preliminary drainage strategy provides for localised upgrading or replacement of existing

surface water infrastructure where required, subject to confirmation through ongoing investigations and detailed design. An extract of the outfall strategy is illustrated in Figure 4-2 and Figure 4-3, respectively.

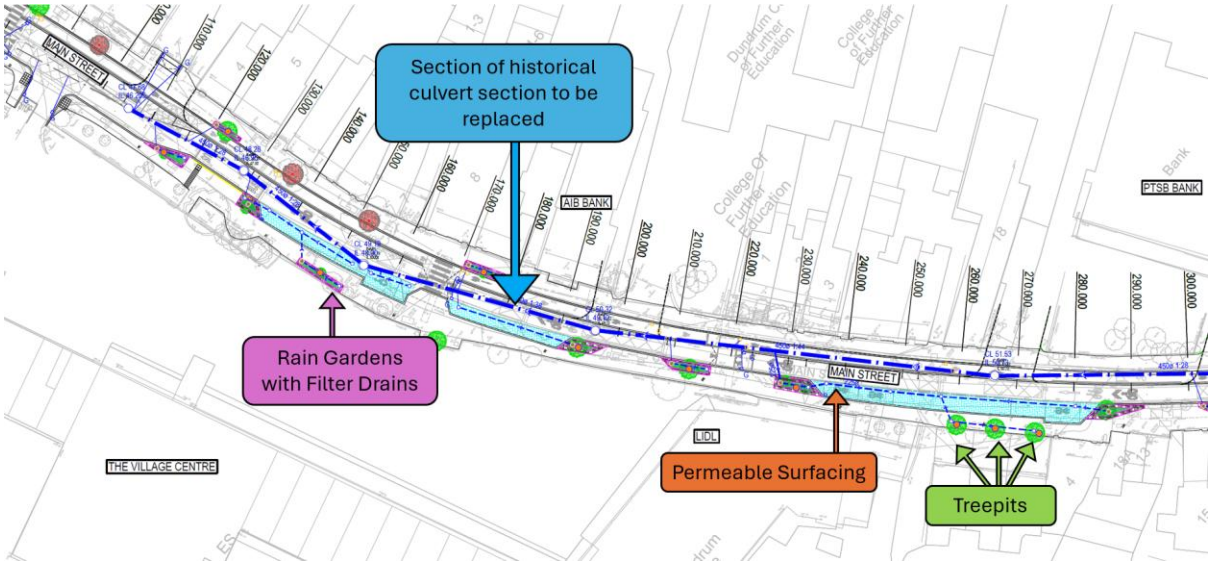

Figure 4-2 : Outfall Strategy 1

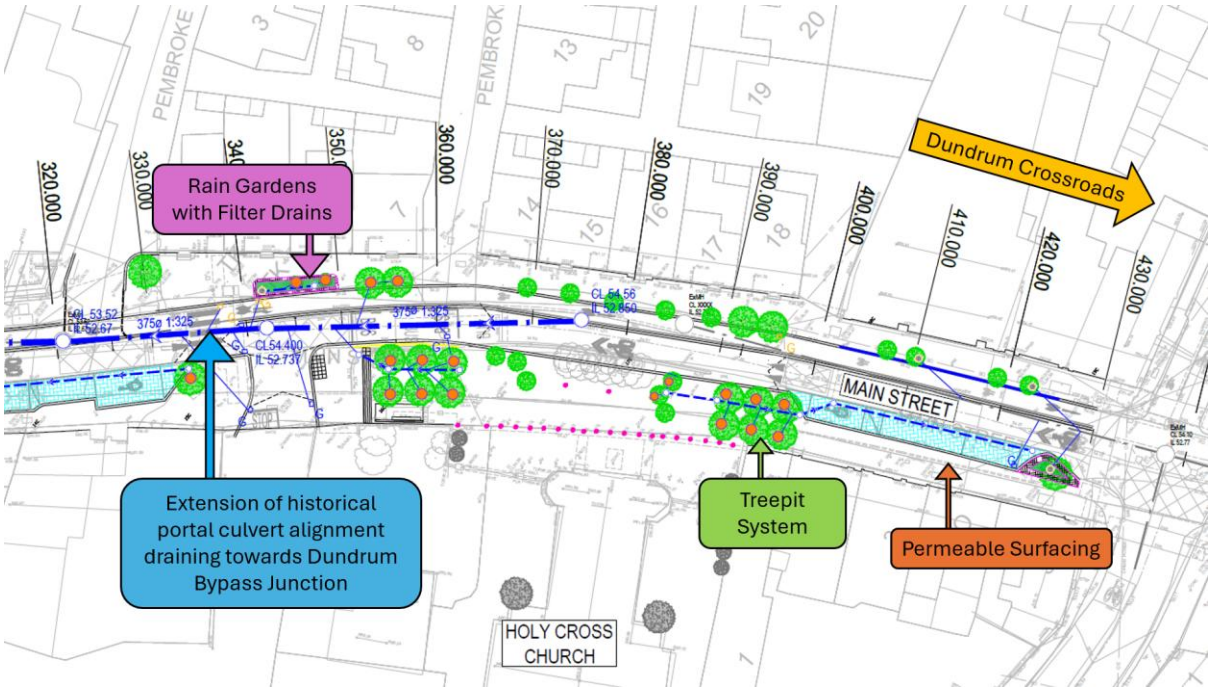

Figure 4-3: Outfall Strategy 2

4.4. Site Runoff Management

The runoff coefficients considered are in line with the local authority guidelines as well as industry standards for specific elements and surfaces. The following runoff coefficients shall be applied to the development, namely:

- Roads (draining into SuDS Structures): 85%
- Footpaths (draining into SuDS Structures: Swales/bioretention facilities): 75%
- Permeable Surfacing: 70%
- Green areas: 30%

4.5. Climate Change and Creep

In line with the requirements of Appendix 7 of the DLRCC Development Plan, the site shall be designed to accommodate climate change by increasing rainfall intensities by 20%.

However, with regards to urban creep, applied urban creep factors are considered inappropriate for a public scheme of this nature, in which maximising green areas in already constraint road reserve has been highlighted as a critical goal in the development proposals of this scheme and shall be maintained as such by the DLRCoCo.

4.6. Network Design

The surface water pipe networks and SuDS elements such as the biofiltration areas and filter drains will be modelled within the Causeway Design Software.

Table 4-1: Proposed surface water design parameters

Design Rainfall Frequency **IS EN 752:2017 : 5.3.2.2 Table 2**	5 Years (20% AEP): Public Schemes
Time of entry:	5 minutes
Pipe Friction (Ks):	0.6 mm (Concrete) 0.15 mm (uPVC)
Minimum Full Bore Velocity:	1.0 m/s
Standard Average Annual Rainfall (SAAR):	833
M5-60:	17.50 mm

Ratio r (M5-60):	0.277
Climate Change:	20% for rainfall intensities
Urban Creep:	10%
Volumetric Coefficient (C_v)	1.0
Main Sewer minimum pipe diameter:	225mm
Private drain minimum pipe diameter:	100mm
Attenuation Storm Return Event:	GDSDS Volume 2: Criterion 3 (pg. 61) ▪ 30 year no flooding on site ▪ 100-year check no internal property flooding ▪ Flood routing plan. ▪ Finished Floor Levels (FFL) 500mm freeboard above 100-year flood level plus climate change. ▪ No flooding to adjacent areas.

4.7. Flood Risk

The Site-Specific Flood Risk Assessment of the proposed development, 250116-X-00-X-XXX-RP-DBFL-CE-0002, as part of the planning package was undertaken with the requirements of the "Planning System and Flood Risk management Guidelines for Planning Authorities", November 2009. The proposed public realm and active travel scheme would be classified as a 'water compatible development' according to Table 3.1 of the Guidelines, in which the Sequential Approach mechanism enables this type of development to be located within any Flood Zone including Flood Zone A, where the probability of flooding from rivers and the sea is highest, exceeding a 1% or 1 in 100 year for river flooding and 0.5% or 1 in 200 for coastal flooding.

The SSFRA concludes that:

- The development proposed is appropriate for the Site's flood zone category
- The Planning System and Flood Risk Management Guidelines Sequential Approach is met and the 'Avoid' principal achieved
- A Justification Test is not required

4.8. Exceedance Flood Provision

During an exceedance event, defined as a storm event greater than the 1% AEP design event, the proposed development has been designed to direct overland flow away from buildings and other vulnerable receptors. Existing overland flow routes are retained within the site layout to ensure that exceedance flows can be safely conveyed without increasing flood risk elsewhere.

Flooding associated with surcharging of the River Slang culvert system is expected to follow established overland flow paths along Sandyford Road and Main Street. The proposed rain gardens, tree pits and other SuDS features provide additional temporary storage and attenuation, helping to manage exceedance flows while maintaining the existing drainage regime.

A high-level plan illustrating the existing flood flow paths is presented in Figure 4-4. These flow paths will be maintained as part of the proposed development strategy. The incorporation of SuDS measures will further reduce runoff rates and volumes and provide additional resilience during extreme rainfall events.

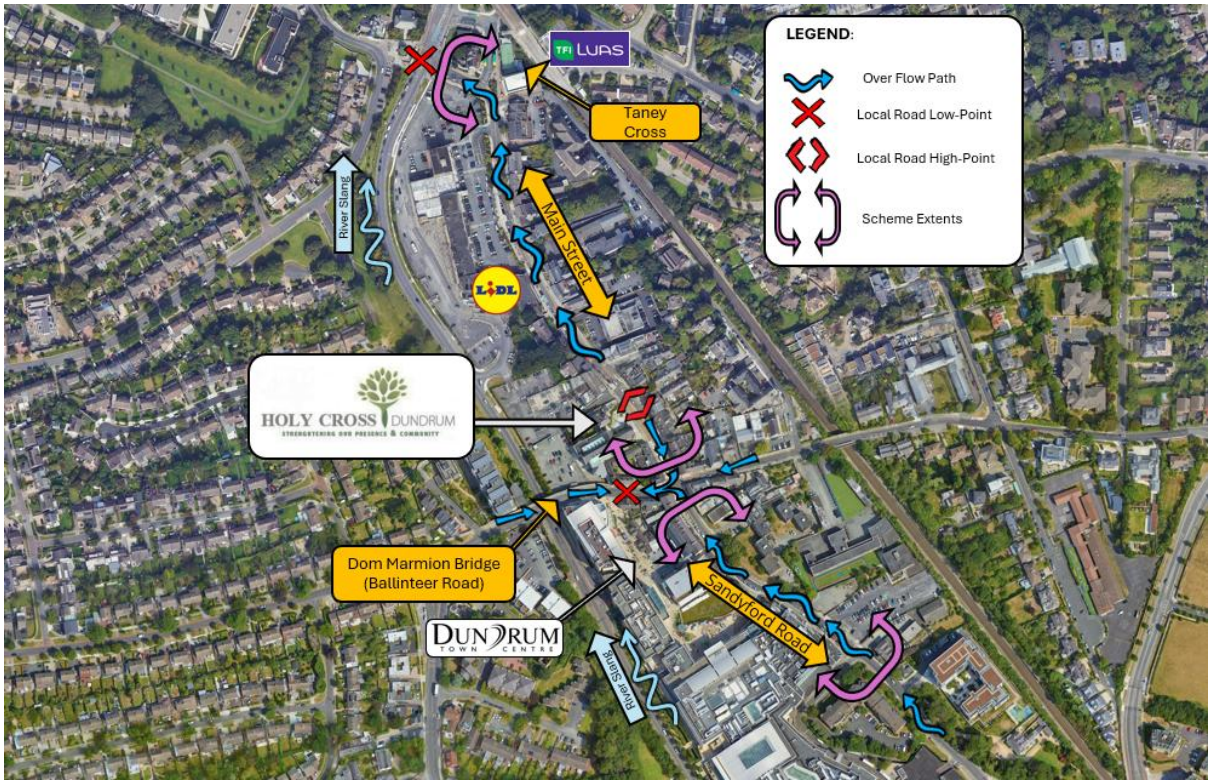

Figure 4-4: Flood Flow Paths

4.8.1. Maintenance of Surface Water & SuDS features

Part of ensuring sustainable drainage elements is ensuring that they operate optimally in both reducing run-off volumes and treatment capacity within their design life, without regular

maintenance this is not possible. Regular maintenance of the storm network reduces the chance of flooding, ponding and contamination of surrounding water courses.

Typical maintenance procedures should ensure at minimum that there is any:

- ✓ Evidence of any accidental damage to the system
- ✓ Abnormal surface clogging visible within SuDS elements
- ✓ Evidence of cross connections or other unauthorised inflows
- ✓ Evidence of tampering with the flow controls

Chapter 32 of the CIRIA SuDS Manual (C753: 2015) will be used as the general overarching guideline for the implementation of maintenance guidelines of proposed SuDS elements. It is intended that the following elements which are to be inspected regularly as part of the maintenance routine. Guidelines referenced within the SuDS Manual are not intended to be exhaustive, and respective indicated additional requirements/amendments may still apply where applicable.

The SuDS features proposed above for the site will require the following maintenance:

Table 4-2: SuDS Maintenance Plan

SuDS Element	**Typical Maintenance Procedures**
Permeable Paving	<u>Annually</u> ✓ Brushing and vacuuming (standard cosmetic sweep over whole surface) ✓ Removal of weeds or management using glyphosate (or similar approved) applied directly into the weeds by an applicator rather than spraying ✓ Monitor Inspection Chambers <u>Occasional (or as required)</u> ✓ Quarterly inspection for evidence of poor operation and/or weed growth If structural damage is present, repair any depressions, rutting, cracked or broken Cells considered detrimental to the structural performance or a hazard to users
Tree Pits	<u>Monthly:</u> ✓ Remove litter and debris

	✓ Manage other vegetation and remove nuisance plants ✓ Inspect inlets and outlets <u>Annually</u> ✓ Check tree health and manage tree appropriately <u>Occasional (or as required)</u> ✓ Biannual inspection of silt accumulation rates and establish appropriate removal frequencies
Bioretention Basins, Dry Swales and Rain Gardens	<u>Monthly:</u> ✓ Remove litter and debris ✓ Cut grass – for spillways and access routes ✓ Manage other vegetation and remove nuisance plants ✓ Inspect inlets, outlets and overflows for blockages and silt accumulation. <u>Annually</u> ✓ Check integrity of any penstocks and other mechanical devices including flow control devices ✓ Tidy all dead growth before start of growing season ✓ Manage wetland plants in outlet pool where provided <u>Occasional (or as required)</u> ✓ Reseed areas of poor vegetation growth ✓ Prune and trim any trees and remove cuttings

5. Conclusion

In summary, due to the nature of site are constrained within Main Street and Sandyford Road, the delivery of considerable open area SuDS structures that would significantly alleviate flooding volumes is not feasible.

However, the effective drained area of the proposed development in comparison to its existing state, as described, has been significantly reduced and therefore any pluvial flood risk has been well-mitigated within the site when compliant to relevant guidance documents. This includes well-

designed Sustainable Drainage Systems (SuDS) further reducing pluvial risk and greatly improving water quality parameters of collected surface water including the reducing pollution impact and recharging the groundwater profile