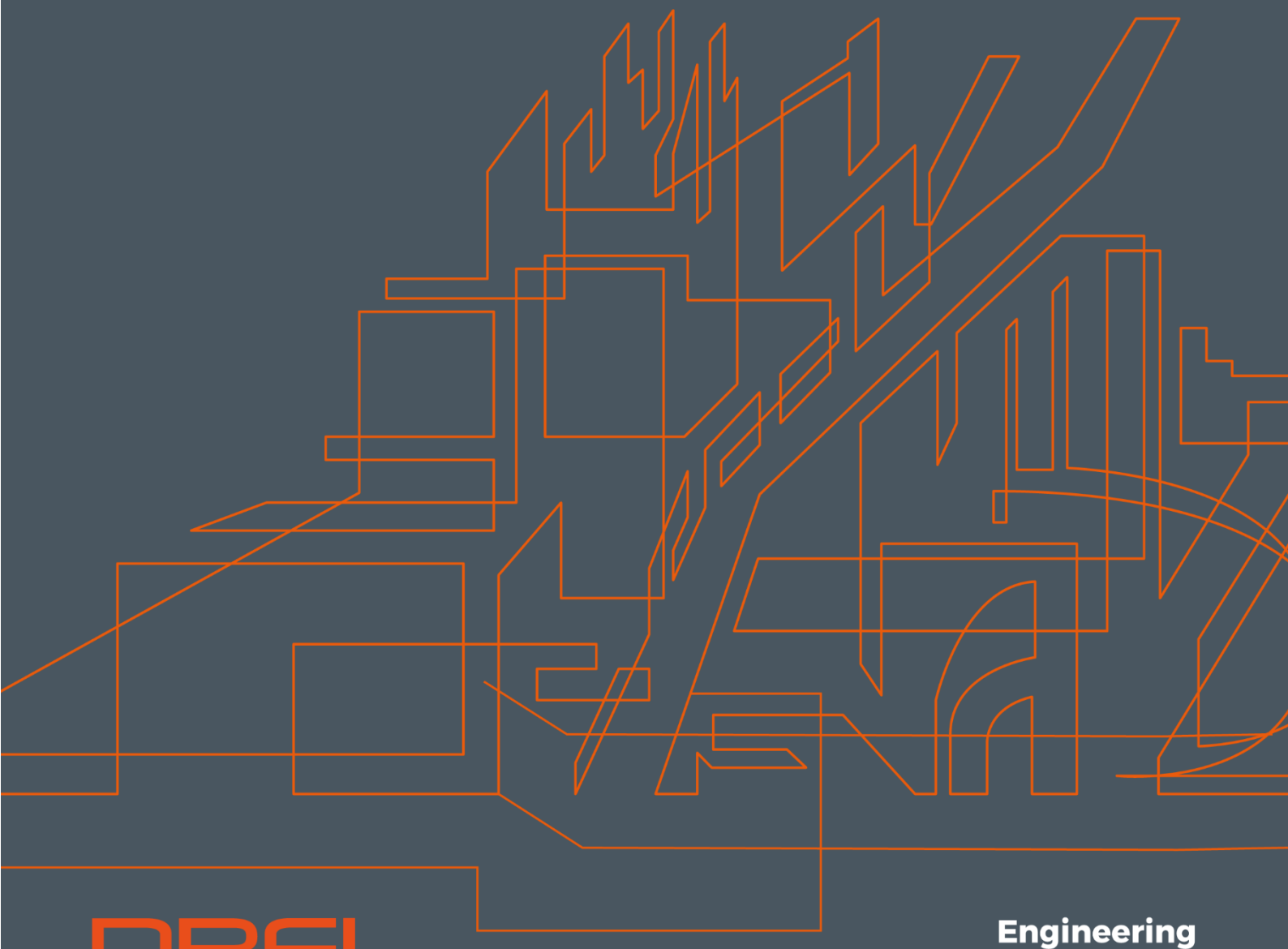
Proposed Residential-Led Mixed-Use Development, Sandford Road, Dublin 6

Infrastructure Design Report

190226-X-X-X-XXX-RP-DBFL-CE-0002

December 2025



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Project Title:	**Proposed Residential-Led Mixed-Use Development, Sandford Road, Dublin 6**		
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P3	0	28/11/22	Draft	Brendan Keogh	Seán Byrne	
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P3	5	14/07/25	LRD Application Draft	Susan Mwaniki	Emma Daly	
P3	6	02/12/25	LRD Application Final	Susan Mwaniki	Emma Daly	

Contents

Figures

Tables

1 Introduction

1.1 Background

DBFL have been instructed to prepare an Infrastructure Design Report to accompany a planning application for a Large-Scale Residential Development at a c. 4.26-hectare site at Milltown Park, Sandford Road, Dublin 6, D06 V9K7. Works are also proposed on Milltown Road and Sandford Road to facilitate access to the development including improvements to pedestrian facilities on an area of c. 0.16 hectares. The development's surface water drainage network shall discharge from the site via a proposed 300mm diameter pipe along Milltown Road through the junction of Milltown Road / Sandford Road prior to outfalling to the existing drainage network on Eglinton Road (approximately 200 metres from the Sandford Road / Eglinton Road junction), with these works incorporating an area of c. 0.32 hectares. The development site area, road works and drainage works areas will provide a total application site area of c. 4.74 hectares.

The development will principally consist of: the demolition of c. 4,847.5 sq. m of existing structures on site including Milltown Park House (880 sq. m), Milltown Park House Rear Extension (2,031 sq. m), the Finlay Wing (622 sq. m), the Archive (1,240 sq. m) and the Link Building between Tabor House and Milltown Park House Rear Extension to the front of the Chapel (74.5 sq. m); the refurbishment and reuse of Tabor House (1,575 sq. m) and the Chapel (768 sq. m) and the provision of a single storey glass entrance lobby to the front and side of the Chapel (52 sq. m); and the provision of 562 No. residential units comprising 6 No. three-bed courtyard houses and 556 No. apartment units (70 No. studios, 176 No. one-bed units, 267 No. two-bed units and 43 No. three-bed units).

1.2 Objectives

This report provides information regarding the existing site and addresses the infrastructural demands of the proposed development including the following:

- Site Access and Road Layout
- Surface Water Drainage
- Flood Risk
- Foul Drainage
- Water Supply

1.3 Location

The subject site is located at the corner of Sandford Road and Milltown Road (refer to Figure 1-1 below). The site is currently occupied by vacant buildings, two of which are to be retained within the proposed development (The Chapel and Tabor House).

Sandford Road is located along the site's north-eastern boundary and Milltown Road is located along the site's south-eastern boundary. Existing residential developments are located to the north-west and west of the site while lands in the ownership of the Jesuit Order are located to the south of the site.

Figure 1-1 Site Location Plan (Site Boundary Indicative Only)

1.4 Topography and Site Characteristics

The site generally falls from south to north at a gradient of approx. 1:45. Surface gradients become flatter (approx. 1:100) on approach to the existing site access off Sandford Road.

Existing topographical survey of the site is shown in the background of the Proposed Road Layout Plan and the Proposed Site Services Layout Plan (refer to DBFL's drawing nos. 190226-X-04-Z00-DTM-DR-DBFL-CE-1201 and 190226-X-05-Z00-DTM-DR-DBFL-CE-1301).

Existing surface gradients across the site have been a key factor in the design of road levels, finished floor levels, the surface water drainage network and the foul drainage network.

Existing trees and vegetation are located along the site's western, eastern and northern boundaries. These trees and vegetation have also been considered in the design of the surface water drainage network and foul drainage network.

1.5 Ground Conditions

Ground Investigations Ireland carried out site investigations between January and June 2020. A second phase of investigation was undertaken in October 2020.

The site is generally overlain by a 0.2m to 0.4 m thick topsoil layer. An asphalt layer was observed at some locations (existing access road / carpark) and is typically 100mm thick.

Made ground deposits were encountered under topsoil/surfacing at some locations at depths between 0.5 and 1.0m BGL. These deposits were described generally as brown, slightly sandy, slightly gravelly clay with occasional cobbles or grey sandy angular gravel. In some locations the made ground contained occasional fragments of brick.

The site is generally underlain by cohesive deposits comprising of slightly sandy / slightly gravelly clay with occasional cobbles overlying a stiff or very stiff dark grey/black slightly sandy slightly gravelly clay with occasional cobbles. The strength of the cohesive deposits typically increases with depth. Granular deposits were encountered in Borehole 16 (BH16) within the cohesive deposits and were typically grey, brown slightly clayey sandy sub angular sub rounded fine to coarse gravel with occasional cobbles.

The rotary core boreholes recovered weak to strong grey/dark grey fines to medium grained limestone with calcite veining. Residual weather mudstone also found in some locations. Depths to rock varies from 9.0m to 18.45m BGL.

Standpipes were installed at 7 no. boreholes locations to determine the equilibrium groundwater level over time. Ground water measurements taken in June 2020 and October 2020 indicated ground water depths of 0.77m to 7.74m BGL.

Soakaway testing was carried out at three locations (in the vicinity of the proposed attenuation facility). Infiltration was not observed at any of the test locations; therefore, infiltration has not been allowed for in surface water design and calculations for the proposed development. Infiltration test results are included in the Appendix F (Site Investigations) of this report.

1.6 Proposed Development

As noted in Section 1.1, the proposed development will principally consist of:

- the demolition of c. 4,847.5 sq. m of existing structures on site including Milltown Park House (880 sq. m), Milltown Park House Rear Extension (2,031 sq. m), the Finlay Wing (622 sq. m), the Archive (1,240 sq. m) and the Link Building between Tabor House and Milltown Park House Rear Extension to the front of the Chapel (74.5 sq. m)
- the refurbishment and reuse of Tabor House (1,575 sq. m) and the Chapel (768 sq. m) and the provision of a single storey glass entrance lobby to the front and side of the Chapel (52 sq. m);
- and the provision of 562 No. residential units comprising 6 No. three-bed courtyard houses and 556 No. apartment units (70 No. studios, 176 No. one-bed units, 267 No. two-bed units and 43 No. three-bed units).

Block A1 will range in height from 5 No. storeys to 8 No. storeys and will comprise 81 No. apartment units; Block A2 will range in height from 6 No. storeys to 8 No. storeys and will comprise 139 No. apartment units; Block B will range in height from 3 No. to 7 No. storeys and will comprise 74 No. apartment units; Block C will range in height from 4 No. storeys to 7 No. storeys and will comprise 151 No. apartment units; Block D will range in height from 3 No. storeys to 5 No. storeys and will comprise 30 No. apartment units; Block E will be 2 No. storeys in height and will comprise 6 No. courtyard type houses; and Block F will range in height from 5 No. storeys to 7 No. storeys and will comprise 81 No. apartment units.

The development also includes the provision of: cultural/community space within Tabor House (4 No. storeys including lower ground floor level) and the Chapel (2 No. storeys including lower ground floor level and mezzanine level) (1,698 sq. m) with associated outdoor space (248 sq. m); a café/restaurant (179 sq. m) and a creche (375 sq. m) within Block F with associated outdoor creche play area; ancillary residents' amenities and facilities (324 sq. m) within Blocks B & C; and a single storey bin store and substation adjacent to Block F (101 sq. m).

The development also provides a new access from Milltown Road (which will be the principal vehicular entrance to the site) in addition to utilising and upgrading the existing access from Sandford Road as a secondary access principally for deliveries, emergencies and taxis; new pedestrian access points; pedestrian/bicycle connections through the site; 319 No. car parking spaces (288 No. at basement level and 31 No. at surface level); set down area for deliveries; bicycle

parking; 22 No. motorcycle spaces; bin storage; boundary treatments; private balconies and terraces facing all directions; hard and soft landscaping including public open space and communal open space; green/blue roofs; PV panels; substations; lighting; plant; lift cores and overruns; and all other associated site works above and below ground.

The proposed development has a gross floor space of c.50,196 sq. m above ground level over a partial basement (under part of Blocks A1 and A2 and under Blocks B and C) measuring c. 10,550 sq. m, which includes parking spaces, bin storage, bike storage and plant.

The proposed development will also include the following associated engineering infrastructure:

- Provision of surface water drainage, foul drainage and water supply infrastructure and connections.
- Construction of a surface water outfall which exits the site along its south-eastern boundary, continues along Milltown Road, through the junction of Milltown Road / Sandford Road prior to discharging to the existing public surface water drainage network in Eglinton Road. The surface water outfall extends approximately 300m from the developable site boundary to the outfall location.
- Provision of a new vehicle access off Milltown Road (principal vehicle access to the proposed development facilitating access to the basement carpark, the forecourt area adjacent to Tabor House and the courtyard houses along the western boundary). This new site access shall be a priority junction and also serves pedestrians and cyclists.
- The existing entrance on Sandford Road will be retained and upgraded. It facilitates pedestrian and cycle access as well as limited vehicle access (deliveries, taxis and emergency vehicles) to the area adjacent to Block A1. The on-site cycle facilities tie-in to the existing active travel infrastructure along Sandford Road and Belmont Avenue (no access from Sandford Road to Belmont Avenue except for cyclists), which forms part of the Sandyford Clonskeagh to Charlemont Pedestrian and Cyclist Improvement Scheme. As part of the same active travel scheme, it is proposed to upgrade the pedestrian facilities adjacent to the Sandford Road entrance from a pedestrian-only crossing to a Toucan crossing (see Figure 2-2 below).
- Provision of additional access point for pedestrians adjacent to the junction of Sandford Road / Milltown Road and pedestrian/cyclist connections through the site.

2 Access Roads

2.1 Vehicular Site Access

Vehicular Access – Milltown Road

The principal access point for vehicles is off Milltown Road (see Figure 2-1 below) facilitating access to the basement carpark, the forecourt area adjacent to Tabor House, the creche and café/restaurant/restaurant in Block F, and the courtyard houses along the western boundary. This access point also serves pedestrians and cyclists.

This proposed site access shall operate as a priority junction with associated signage and line marking in accordance with the Department of Transport's Traffic Signs Manual.

A Toucan Crossing is also proposed in vicinity of the Milltown Road access to improve facilities for vulnerable road users.

Milltown Road has a posted speed limit of 50km/hour. The site entrance complies with minimum visibility splays as required by DMURS (Y Distance = 49m, X Distance = 2.4m).

Refer to DBFL drawing no. 190226-X-04-Z00-DTM-DR-DBFL-CE-1201 for the proposed site access layout at Milltown Road.

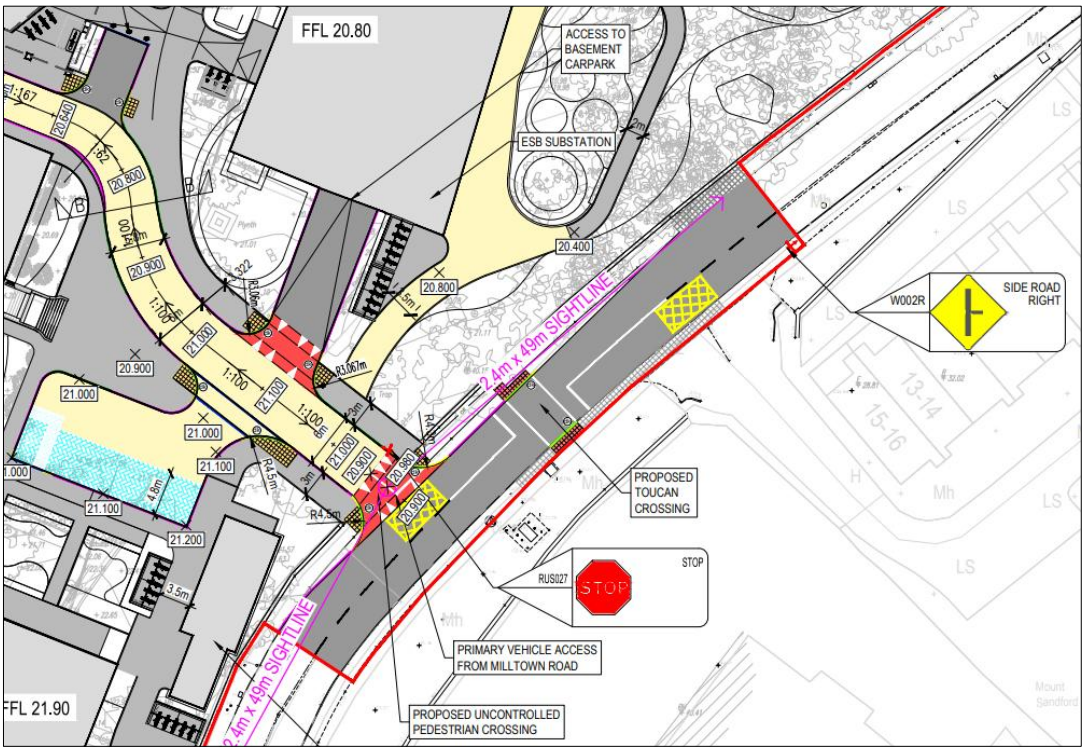

Figure 2-1 Site Access off Milltown Road

Vehicular Access – Sandford Road

A secondary access point for vehicles is located at the existing entrance from Sandford Road which facilitates access to the area adjacent to Block A for deliveries, emergency vehicle access, taxi set-down areas and disabled parking bays.

This access point also serves pedestrians and cyclists. The on-site cycle facilities tie-in to the existing active travel infrastructure along Sandford Road and Belmont Avenue (no access from Sandford Road to Belmont Avenue except for cyclists), which forms part of the Sandyford Clonskeagh to Charlemont Pedestrian and Cyclist Improvement Scheme. As part of the same scheme, it is proposed to upgrade the pedestrian facilities adjacent to the Sandford Road entrance from a pedestrian-only crossing to a Toucan crossing (see Figure 2-2 below). The Sandyford Clonskeagh to Charlemont Street Pedestrian & Cyclist Improvement Scheme (SC2C) is currently being progressed by Dublin City Council's Active Travel Office.

There is no vehicular access from Sandford Road to the basement carpark, the forecourt area adjacent to Tabor House, the creche and café/restaurant in Block F and the courtyard houses along the western boundary (which are all accessed exclusively from Milltown Road).

Refer to DBFL drawing no. 190226-X-04-Z00-DTM-DR-DBFL-CE-1201 for the proposed site access layout at Sandford Road.

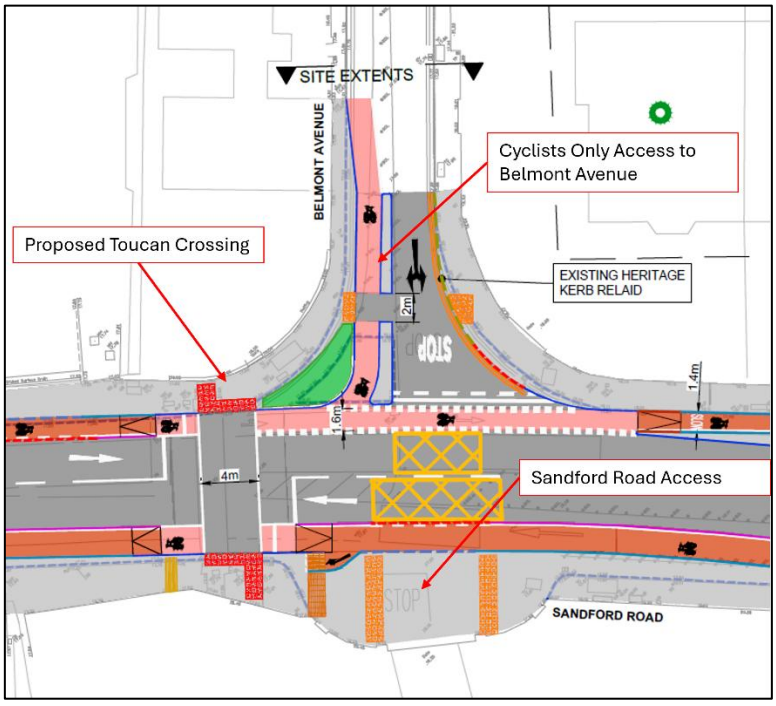

Figure 2-2 Extract from Sandyford Clonskeagh to Charlemont Street Pedestrian & Cyclist Improvement Scheme

2.2 Pedestrian and Cycle Access

With reference to DBFL drawing no. 190226-X-04-Z00-DTM-DR-DBFL-CE-1201 (Roads Layout), the site layout facilitates high levels of cycle and pedestrian connectivity as noted below:

- As noted above in Section 2.1, pedestrian and cycle access is provided from the Milltown Road and Sandford Road entrances.
- An additional access point for pedestrians is proposed adjacent to the junction of Sandford Road / Milltown Road (at the north-east corner of the site) into the public open space.
- Provision for a dedicated 3.0m wide cycle access to the basement.
- Provision of a lift with sufficient capacity and layout to facilitate bicycle access to the basement.
- The site layout also facilitates potential future pedestrian connectivity to the Jesuit lands south-west of the site.
- A Toucan Crossing is proposed in the vicinity of the Milltown Road access to improve facilities for vulnerable road users.
- Improved facilities for vulnerable road users are also proposed at the Sandford Road access (at present there is a push button pedestrian crossing at Sandford Road which is to be upgraded to a Toucan Crossing).
- The scheme proposals for the subject site will ensure pedestrians are given priority within the internal site layout arranged to ensure pedestrian desire lines are accommodated within the development.

2.3 Street Layout Design

DMURS Street Design guidelines have been incorporated into the site's street layout and are detailed further in DBFL's DMURS Design Statement (190226-X-X-X-XXX-TN-DBFL-CE-0001).

2.4 Vehicle Tracking

The proposed site layout has been tracked (using AutoTrack software) to demonstrate that large vehicles such as fire tenders, refuse vehicles and ESB Appliances can access and circulate around the site (refer to DBFL's drawing nos. 190226-X-04-Z00-DTM-DR-DBFL-CE-1205 to 190226-X-04-Z00-DTM-DR-DBFL-CE-1209).

2.5 Pavement Design Standards

Pavement design at site access points from Milltown Road and Sandford Road and local streets within the development are to be designed in accordance with the Design Manual for Urban Roads and Streets (DMURS) and Local Authority requirements.

Actual CBR (California Bearing Ratio) values and ground conditions are to be confirmed by site specific investigations prior to road construction.

3 Surface Water Drainage

3.1 Existing Surface Water Drainage Infrastructure

As noted in Section 1.4, Topography and Site Characteristics, the site generally falls from south to north at a gradient of approx. 1:45 with surface gradients becoming flatter on approach to the existing site access off Sandford Road.

An existing 225mm diameter surface water drain is located approximately 80m from the eastern corner of the site on Eglinton Road. Refer to Figure 3-1 below and Uisce Eireann's Network Plan as included in Appendix A of this report.

Existing surface water drains on site discharge to the existing combined sewer network along Sandford Road and Milltown Road rather than the existing surface water drain in Eglinton Road / Dodder River.

It is proposed to discharge attenuated flows from the site to the existing drainage network on Eglinton Road (approximately 200m from the Sandford Road / Eglinton Road junction where the public line increases to a 300mm diameter pipe).

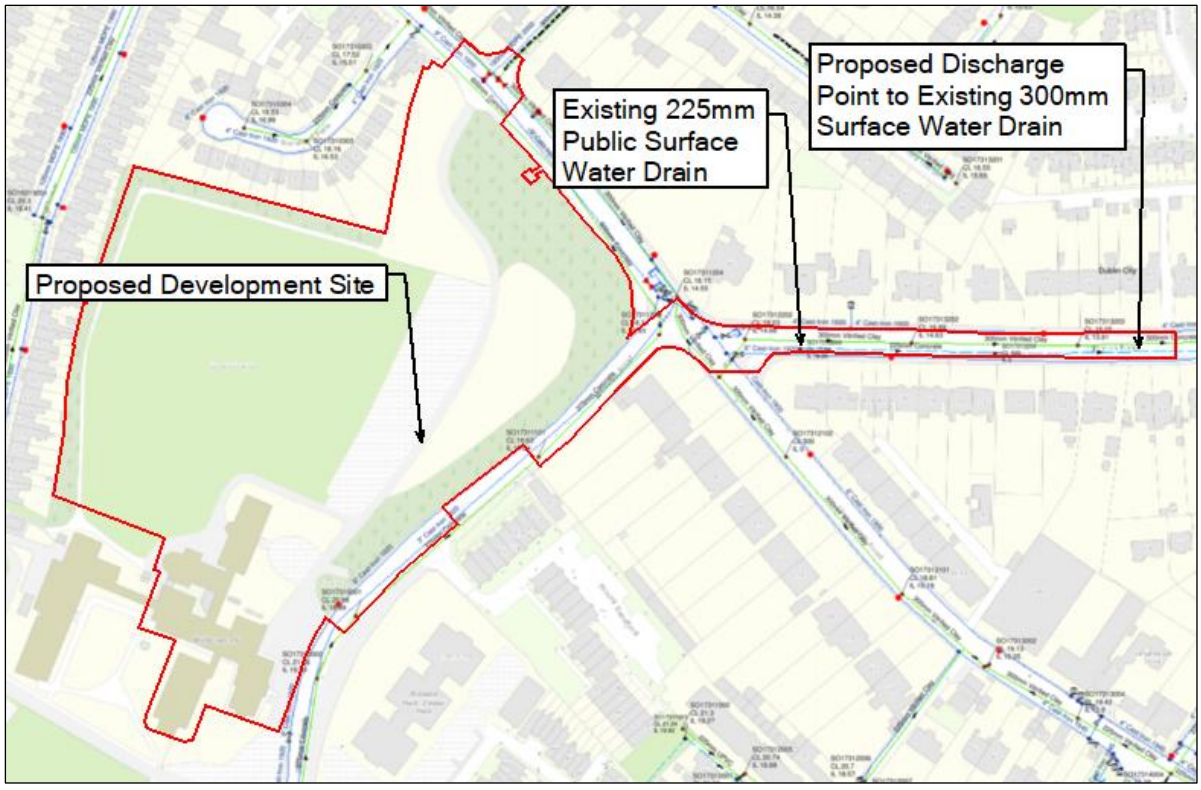

Figure 3-1 Extract from Uisce Eireann's Network Plan (Site Boundary Indicative Only)

3.2 Basis of Design

3.2.1 General Description of Surface Water Design

The public surface water network on Eglinton Road (as described above in Section 3.1) will provide a suitable surface water discharge point for the proposed development. However, in order to achieve the required drainage invert levels on site, approximately 160m of the existing drainage network along Eglinton Road will need to be replaced with a 300mm pipe running at a flatter gradient. The total length of the surface water outfall from the point it crosses the development site boundary at Milltown Road to the discharge point on Eglinton Road is approximately 300m.

A detailed GPR and topographical survey was carried out on the proposed outfall route to identify existing services, from where the line exits the site on Milltown Road to the junction at Sandford Road and Eglinton Road. The surface water outfall has been designed to achieve a self -cleansing velocity of 1.0 m/sec and has been coordinated with the existing infrastructure identified along the route. The outfall route can be seen on DBFL's Drainage Outfall drawing (ref. no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1303).

Surface water discharge rates from the proposed surface water drainage network will be controlled by a vortex flow control device (Hydrobrake or equivalent) and associated attenuation systems (Stormtech Chambers /Attenuation Basins at ground level, blue /green roof type systems on apartment roofs and at podium level). Surface water discharge will also pass via a full retention fuel / oil separator - sized in accordance with permitted discharge rate from the site.

The surface water strategy for the proposed development will incorporate SUDS features to reduce run-off and provide biodiversity benefits. It should be noted that most of the apartment roofs and the podium areas incorporate blue and green roof systems, accounting for a significant portion of the onsite SUDS strategy as well as the first part of the treatment train for managing on site surface water.

Green roof system will capture surface water runoff from apartment roofs prior to being routed to the piped surface water drainage network. This strategy also provides biodiversity benefits.

Blue roof system (drainage reservoir / drainage board) will be used to capture surface water runoff from podium areas, roof-top terraces and roof areas where plant and PV panels are located, prior to being routed to the piped surface water drainage network.

The proposed extent of green/blue roof drainage systems is shown on DBFL's Site Services Layout (ref. no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1301).

Surface water runoff from the roofs of the courtyard houses located along the western boundary will be routed to the proposed surface water pipe network via soakaway pits in the back gardens with overflows routed to main drainage network.

Surface water runoff from all on-street parking within the development will be captured by permeable paving before entering the surface water network.

Surface water runoff from the majority of site's internal street network will be directed to the proposed pipe network via tree pits or other SUDS features such as bioretention areas and permeable paving (with overflows to the network.) In limited instances, surface water runoff from paved areas will be directed to the proposed pipe network via conventional road gullies.

Any incidental surface water runoff generated from the basement carpark would drain through a separate system beneath the basement slab (out falling to the proposed foul drainage network via a petrol interceptor).

3.2.2 Compliance with Surface Water Policy

The site's surface water management infrastructure has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS), DCC's Development Plan 2022-2028 Appendix 11 (Blue / Green Rood Guide), Appendix 12 (SUDS Design & Evaluation Guide 2021) and Appendix 13 (Surface Water Management Guide).

The GDSDS (Vol. 2, Chapter 6.3.4) and DCC's Development Plan 2022-2028 Appendix 12 (SUDS Design & Evaluation Guide 2021) requires that the following design criteria are applied to all sites:

- Criterion 1:

River Water Quality Protection – Satisfied by providing interception storage and treatment of surface water run-off by SUDS features such as permeable paving, green/blue roofs, tree pits, bioretention areas, on site attenuation and full retention fuel / oil separators at surface water discharge points.

- Criterion 2:

River Regime Protection – Satisfied by attenuating surface water run-off in association with flow control devices prior to discharge off site at greenfield runoff rate. Site critical duration storm used to assess attenuation volume.

- Criterion 3:

Level of Service (Flooding) for the Site – Satisfied by reviewing available flood hazard information (e.g. Eastern CFRAM Study) relating to the site's proximity to fluvial flood plains (up to 1 in 100-year flood event).

Also refer to DBFL's Site-Specific Flood Risk Assessment (ref. no. 190226-X-X-X-XXX-RP-DBFL-CE-0003).

- Criterion 4:

River Flood Protection – Satisfied by attenuating surface water discharge to greenfield runoff rates, addressing pluvial flood risk associated with the 1 in 100-year storm and avoiding development in flood plains.

3.2.3 Allowable Run-Off Rate

The total site area positively draining into the network is 2.39 ha, which has been divided into 4 sub-catchments. The breakdown of the hardstand areas positively draining into the network is given in Table 3-1. Existing areas around tree root protection zones will not be modified and will continue to drain via natural means. Each catchment is broken down into two categories, areas being captured by blue/green systems at roof/podium level and areas of the site being positively drained to the proposed surface water network at ground level.

Refer to DBFL's drawing no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1304 (Surface Water Catchment and Phasing Layout) for the location of the sub-catchments noted in Table 3-1.

Table 3-1: Breakdown of positively drained areas per catchment

	Area captured by Green/Blue Roof & Podium	**Areas draining to network at ground level**	**Total Area**
	Ha	Ha	Ha
Catchment 1	0.377	0.612	0.989
Catchment 2	0.550	0.378	0.928
Catchment 3	0.037	0.208	0.245
Catchment 4	0.115	0.110	0.225
	1.079	**1.308**	**2.387**

Allowable Runoff Rate

Qbar has been assessed based on GDSDS requirements (Section 6.6.1.2/IHR 124)

i.e. Qbar (m^3/s) = 0.00108 x (Area) $^{0.89}$(SAAR)$^{1.17}$(SOIL)$^{2.17}$

Area – 2.39 ha (for purposes of total surface water catchment area, being positively drained to surface water network)

SAAR – 770mm (based on local information from Met Eireann)

SOIL – Soil Type 3 (Soil Value 0.40)

Qbar = 9.1 l/sec

Note: SOIL is the soil index, referenced in GDSDS Section 6.3.1.2.2. Soil Type 3 (as determined below) equates to an SPR value of 0.40.

Assessment of Soil Type (see Figure 3-2 below)

- **Drainage Group** – 1 (Commonly waterlogged within 60cm during winter (imperfect and poor))
- **Depth to Impermeable Layer** - 2 (40-80cm)
- **Permeability Group** - 3 (Slow)
- **Slope** - 2 (2-8 deg.)

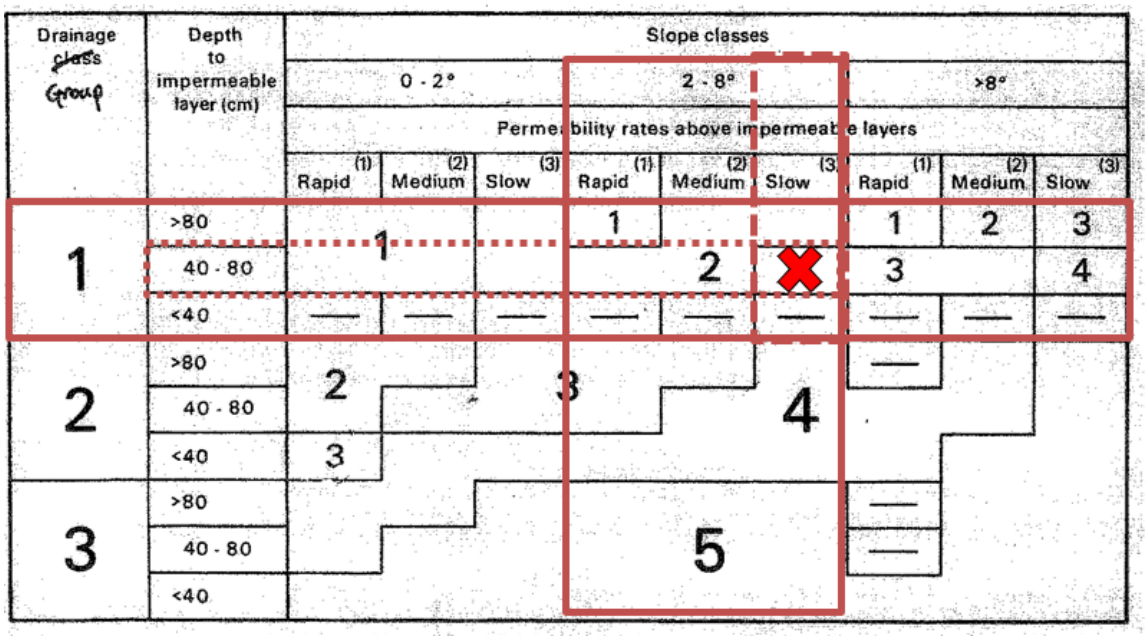

Figure 3-2: Classification of Soils Type (by winter rain acceptance rate from soil survey data)

3.2.4 Design Standards

Proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the Department of the Environment's Recommendations for Site Development Works for Housing Areas, the Department of the Environment's Building Regulations "Technical Guidance Document Part H Drainage and Waste Water Disposal" and BS EN 752: 2008 Drain and Sewer Systems Outside Buildings.

Design Criteria:

- Return period for pipe work design — 5 years
- Return period for attenuation design — 100 years
- Allowable Outflow (Qbar) — 9.1 l/sec
- Time of entry — 4 minutes
- M5 - 60 (based on site specific rainfall data) — 16.6 mm
- Ratio "r" (based on site specific rainfall data) — 0.278
- Pipe Friction (Ks) — 0.6 mm
- Minimum Velocity (based on pipe flowing full) — 1.0 m/s
- Rainfall Depth Factored for Climate Change — 20%

Climate Change Category	Characteristics
River flows	20% increase in flows for all return periods up to 100 years
Sea level	400+mm rise (see Climate Change policy document for sea levels as a function of return period)
Rainfall	10% increase in depth (factor all intensities by 1.1)
	Modify time series rainfall in accordance with the GDSDS climate change policy document

Table 6.2 Climate Change Factors to be Applied to Drainage Design

- Urban Creep Factor — 10% and 0%

An urban creep factor of 10% has been applied to the impermeable areas of the 6 no. courtyard houses and a factor of 0% has been applied to the impermeable areas of the apartment buildings, as per Dublin City Council's SuDS Design and Evaluation Guide 2021 (see table below).

Residential development density (dwellings per hectare)	less than 25	30	35	45	more than 50	flats & apartments
Percentage area increase applied as percentage of proposed impermeable area within curtilage of private lands.	10%	8%	6%	4%	2%	0%

Figure 3-3: Extract from DCC SuDS and Evaluation Guide 2021

Refer to Appendix B for Attenuation Design Calculations and Appendix C for Surface Water Network Design Calculations which have been carried out using Microdrainage WinDes analysis software.

3.2.5 SUDS at Roof and Podium Level

Outlined below is a description of the SUDS methodologies proposed at roof and podium level. The use of green/blue roof systems at roof and podium level have been maximised to include all apartment block roofs and the landscaped podium areas between the Block A buildings.

Green / Blue roof systems considered for roof areas over apartments and podium areas are described below:

- **Green/Blue Roof Systems (ABG Blueroof System Range C)**
  The proposed build up will be an extensive/biodiverse type with a supplier-agreed and specified surface finishes. The growing media will partially absorb some of the initial run-off and once saturated, the drainage board beneath it will attenuate the run-off. The attenuated flows will be released at controlled rates from the roof outlets before discharging into the pipe network, culminating into the proposed underground attenuation areas. Refer to Appendix G for the proposed build-up of the green/blue roof system.

- **Blue Roof Systems (ABG Blueroof System Range D)**

  Soft landscaped podium/roof areas will have with a supplier-agreed and specified surface finishes to facilitate grassed areas, plants, shrubs and trees i.e. similar to a deep intensive green roof build up. Paved areas over the podium/roof will have a free draining material within the build-up and associated drainage board which will reduce the flow rate from these areas slowing the run-off at source. Refer to Appendix G for the proposed build-up of the blue roof system.

The incorporation of green/blue systems as noted above aligns with DCC's Development Plan 2022-2028 Appendix 11 (Blue / Green Roof Guide), Section 2.2, as summarised below.

- Total new roof area across the site (9,238.8 m^2) and the total podium area (4,439 m^2) are considered suitable for green / blue roof coverage i.e. total hardstand area of 13,677.8 m^2 considered for green / blue roof coverage.
- Proposed green / blue roof and podium provision (refer to Table 3-4 to 3-7) of 10,072 m^2
- Therefore, proposed green / blue roof coverage of 73.7% (exceeding DCC's minimum coverage of 70%).

3.2.6 SUDS at Ground Level

Noted below are the proposed SUDS features at ground level. The incorporation of SUDS at ground level aligns with DCC's Development Plan 2022-2028 Appendix 13 i.e. "*softer engineered or nature-based approach to be used to manage surface water at source*".

The following methodologies are being implemented as part of a SuDS treatment train approach:

- Roof Areas Draining Via SuDS – Courtyard houses (located along the site's western boundary) drain via soakaway pits in the back garden with overflows discharging into the main drainage network.
- Surface water runoff from the site's internal street network will be directed to the proposed pipe network via tree pits or other SUDS features like bioretention areas with overflows to main drainage network.
- Surface water runoff from on-street and curtilage parking will be captured by permeable paving.
- Soft Landscaped/Grassed Areas – Slows runoff at source.
- Attenuation of the 30 and 100-year return period storms by way of attenuation basin / Stormtech chambers at ground level.
- Installation of a vortex flow control device (Hydrobrake or equivalent), limiting surface water discharge from the site to 9.1 l/sec.
- Surface water discharge will also pass via a Class 1 full retention fuel / oil separator (sized in accordance with permitted discharge from the site).

3.2.7 Proposed Runoff Coefficients and Factored Permeable Areas

While areas utilising Blue/Green roof and podium systems will be dealt with separately within the analyses and Microdrainage model the remainder of the site areas will be analysed using runoff factors, a list of the runoff factors applied can be found below.

Proposed Runoff Coefficients

Noted below are the proposed reduction factors for the proposed development.

- **Hardstand Draining via SuDs – 10% Reduction Factor**

  Typically, road gullies discharge to tree pits (with high level overflow to the piped surface water network). Also takes account of run-off stored within the micro and macro texture of the surfacing (i.e. runoff not collected by piped network).

- **Landscaped/Open Space – 60% reduction factor**

  Based on the soil type determined in Section 3.2.3, Soil Type 3, the standard percentage runoff (SPR/soil value) is 0.40, according to the WRAP (Winter Rainfall Acceptance Potential) soil classification of the Flood Studies Report (1975). The use of this soil classification method is in accordance with the GDSDS.

- **Permeable Paving – 50% reduction factor**

  Reduction of velocity as the aggregate/filter material used in the SuDS feature (permeable paving) slows the run-off at source ultimately reduce the peak inflow for attenuation calculations.

- **Green/Blue Roof – 7% reduction factor**

  The effective area of the proposed green/blue roofs was determined by omitting areas of the roof that are for maintenance purposes and the areas of the proposed PV panels. At a podium level, the entire podium area is the effective area, as the proposed surface finishes for the podium will be permeable.

Refer to Table 3-2 below for the total area and the factored areas for the different surfaces across the site.

Table 3-2: Factored Hardstand Areas Across the Site

Surface	Area (m^2)	Runoff Coeff.	Effective Area (m^2)
Roof Areas	10,790	0.93	10,075
Roads/Footpaths (Draining to Network)	6,110	0.95	5,760
Roads/Footpaths (Draining to SUDS)	1,530	0.80	1,230
Permeable Paving	700	0.50	340
Landscape	4,740	0.40	1,880
Total	**23,870**		**19,285**

The total area and the factored area for each catchment is provided in Table 3-3 Below

Table 3-3: Factored Area in each Catchment

Catchment	Gross Area	Factored Area
Catchment 1	0.989	0.801
Catchment 2	0.928	0.787
Catchment 3	0.245	0.189
Catchment 4	0.225	0.151
Total	2.387	1.928

Refer to DBFL's drawing no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1304 (Surface Water and SUDS Strategy) for the location of the site's sub-catchments.

3.2.8 Attenuation Calculation

Attenuation volumes have been calculated based on an allowable outflow / greenfield runoff rate. This results in a permitted discharge from the site of 9.1 l/sec. For ease of management, the site has been divided into 4 individual surface water catchments which discharge individually to the surface water network.

Given that this is a higher-density development and there are onsite constraints due to the root protection zones around existing trees, there is limited space for attenuation of surface water at or below ground level. Therefore, a combination of ground level attenuation was used along with additional attenuation being provided at roof and podium level by green and blue roof systems. All attenuation systems were designed for a 1-in-100-year return period and according to the GDSDS.

- **Green/Blue Roof Attenuation**

  The green/blue roof systems were sized and specified by an accredited green/blue roof supplier, ABG Limited, for a 100-year return period. The calculation sheets and specifications for the green/blue roof storage volumes are provided in Appendix G. The volumetric storage required was also checked using Microdrainage for a 100-year return period and checked against the storage provided. These volumes were used in the sizing of the surface and underground attenuation storage discussed below. The discharge from these green/blue roof systems will be released at controlled flow rates to maximize attenuation prior to being routed to the surface and underground storage.

- **Ground Level Attenuation**

  2 no. attenuation storage ponds have been provided at surface level as part of the attenuation strategy. Surface water run-off not captured at roof level will be attenuated by these ponds. These storage ponds are provided in two of the catchments to attenuate the flow upstream of the underground storage tanks they ultimately discharge to. The flow from these storage systems is released at a controlled flow rate using control devices (1 no. v-notch weir and 1 no. Hydrobrake or equivalent).

- **Underground Attenuation Storage Tanks**

  The 3 no. underground attenuation tanks have been sized according to the upstream attenuation storage structures and their controlled outflows into the pipe network. Surface water run-off not captured at roof level and in the ponds will be attenuated by these attenuation tanks. These underground tanks are provided for each catchment, except one whose flows are attenuated by a surface level attenuation pond. Flows from the attenuation tanks are controlled using vortex type flow control devices (Hydrobrake or equivalent).

The resultant storage system types, discharge limits and storage volumes for each catchment are indicated in Table 3-4: SUDs Management and Treatment Train below.

Table 3-4: SUDs Management and Treatment Train

Catchment Attenuation Area	Green/Blue Roof			Underground Attenuation and Flow Control			
	Discharge (l/s)	Storage Volume Provided (m3)	Storage Volume Required (100-Yr) m3	Storage System	Catchment Allowable Outflow (l/sec) (Max.)	Storage Volume Provided (100-Yr) m3	Storage Volume Required (100-Yr) m3
Catchment 1 (discharging to Catchment 4)	3.68	356.53	248.60	Attenuation Basin	0.2	65.6	56.5
				Stormtech MC3500	6.4	261.2	243.2
Catchment 2 (discharging to Catchment 3)	4.73	565.18	385.10	Stormtech MC3500	4.7	214.3	201.6
Catchment 3 (discharging to Catchment 4)	0.39	39.57	23.60	Attenuation Basin	4.5	209.0	155.6
Catchment 4	1.87	83.93	62.70	Stormtech MC3500	9.1	295.1	270.4

The locations of the proposed surface water catchment areas and attenuation systems are shown on DBFL's Site Services layout (ref. no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1304).

Refer to Appendix B for Attenuation Design Calculations (attenuation volumes have been calculated using Microdrainage WinDes analysis software).

The total volume of storage provided on site by all systems is 2,090.40m^3.

A breakdown of the types of storage system at roof and podium level for each catchment are detailed in Tables 3-3 to 3-6 below.

Table 3-5: Catchment 1 Roof Attenuation & Discharge Summary

Catchment 1							
Roof Area	Roof Type	Total Roof Catchment Area (m^2)	Total Attenuation Area (m^2)	Volume Provided (m^3)	Volume Required (Microdrainage) (m^3)	System	Discharge (l/s)
Roof F1	Blue Roof	432	301	29.19	25.2	VF/HD/108	0.55
Roof F2	Green Roof	374	370	42.18	25.6	VF/HD/129	0.32
Roof D1	Blue Roof	335	242	23.47	20.2	VF/HD/108	0.41
Roof D2	Green Roof	137	134	15.27	8	VF/HD/129	0.19
Roof B1	Green Roof	153	152	17.32	8.9	VF/HD/129	0.19
Roof B2	Green Roof	132	131	14.93	7.4	VF/HD/129	0.19
Podium B	Blue Roof	2208	2208	214.17	153.3	VF/HD/108	1.83
Total Areas and Volumes		**3771**	**3538**	**356.53**	**248.60**	Total Outflow	**3.68**

Table 3-6: Catchment 2 Roof Attenuation & Discharge Summary

Catchment 2							
Roof Area	Roof Type	Total Catchment Area (m^2)	Total Attenuation Area (m^2)	Volume Provided (m^3)	Volume Required (Microdrainage) (m3)	System	Discharge (l/s)
Roof C1	Green Roof	416	404	46.05	29.9	VF/HD/129	0.33
Roof C2	Green Roof	429	428	48.79	31.1	VF/HD/129	0.33
Roof C3	Green Roof	245	234	26.67	17.2	VF/HD/129	0.21
Roof C4	Green Roof	99	98	11.17	5.2	VF/HD/129	0.18
Roof C5	Green Roof	294	293	33.4	19.9	VF/HD/129	0.25
Roof C7	Green Roof	80	79	9	3.8	VF/HD/129	0.17
Roof B3	Blue Roof	456	330	32.01	27.5	VF/HD/108	0.55
Roof B4	Green Roof	379	379	43.2	30.3	VF/HD/129	0.22
Roof A2	Green Roof	877	864	98.49	64.2	VF/HD/129	0.65
Podium A	Blue Roof	2008	2008	194.77	141.2	VF/HD/108	1.64
Podium C	Blue Roof	223	223	21.63	14.8	VF/HD/108	0.20
Total Areas and Volumes		**5506**	**5340**	**565.18**	**385.10**	Total Outflow	**4.73**

Table 3-7: Catchment 3 Roof Attenuation & Discharge Summary

Catchment 3							
Roof Area	Roof Type	Total Catchment Area (m^2)	Total Attenuation Area (m^2)	Volume Provided (m^3)	Volume Required (Microdrainage) (m^3)	System	Discharge (l/s)
Block A6	Blue Roof	160	160	15.52	9.7	VF/HD/108	0.19
Block A7	Green Roof	211	211	24.05	13.9	VF/HD/129	0.20
Total Areas and Volumes		**371**	**371**	**39.57**	**23.60**	Total Outflow	**0.39**

Table 3-8: Catchment 4 Roof Attenuation & Discharge Summary

Catchment 4							
Roof Area	Roof Type	Total Catchment Area (m^2)	Total Attenuation Area (m^2)	Volume Provided (m^3)	Volume Required (Microdrainage) (m^3)	System	Discharge (l/s)
Block A1	Blue Roof	542	348	33.75	29.1	VF/HD/108	0.85
Block A3	Green Roof	115	115	13.11	6.6	VF/HD/129	0.18
Block A4	Green Roof	127	127	14.47	7.3	VF/HD/129	0.18
Block A5	Blue Roof	366	233	22.6	19.7	VF/HD/108	0.66
Total Areas and Volumes		**1150**	**823**	**83.93**	**62.70**	Total Outflow	**1.87**

The location of proposed attenuation systems is shown on DBFL drawing no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1301.

Refer to Appendix B for Attenuation Design Calculations (attenuation volumes have been calculated using Microdrainage WinDes analysis software), for Catchment 1 to 4.

Refer to Appendix G for green/ blue roof calculation and detail sheets for Catchment 1 to 4.

3.2.9 Assessment of Surface Water Outfall Route

As indicated in Section 3.2.1 above, in order to achieve the required drainage invert levels on site, approximately 160m of existing surface water network along Eglinton Road needs to be upgraded. In addition, approximately 140m of new surface water drainage is required along Milltown Road to the junction of Milltown Road / Sandford Road.

To facilitate the design of this line a detailed GPR and topographical survey was carried out to identify existing services. Supplementary CCTV surveys were also carried out at selected locations.

The proposed outfall route has been designed to achieve a self-cleansing velocity of 1.0 m/sec (300mm diameter @ min. gradient of 1/252) and has been coordinated with the existing services.

The interaction between existing services and the alignment / level of the outfall route is shown on DBFL drawing no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1303.

Eglinton Road Upgrade Works

Based on survey data, the existing surface water drain on Eglinton Road was modelled in WINDES. The capacity of the existing network along Eglinton Road has been calculated as 67.4l/s (225mm diameter). The predicted flow for the 1-in-5-year rainfall event has been calculated as 56.9l/s (refer to Surface Water Outfall Calculations Appendix H).

The proposed upgraded network (300mm diameter) along Eglinton Road has a capacity which ranges between 70 to 145 l/s and a flowrate between 10.9 to 37.8l/s, including the 9.1l/s discharge from the development.

Milltown Road

There is currently no surface water network along Milltown Road at the proposed discharge point. Therefore, it is also proposed to install 140m of new surface water drainage from the developments discharge point on Milltown Road to the upgraded network on Eglinton Road. This has also been coordinated with the existing services.

The proposed upgraded network (300mm diameter) along Milltown Road has a capacity of approximately 70.4 l/s to 73.6 l/s, with attenuated flow from the proposed development of 9.1 l/s.

3.2.10 Interception Volume

The GDSDS (Vol. 2, Table 6.3) requires interception storage to be incorporated into surface water drainage design in order to limit discharge of sediment and pollutants into the downstream surface water drainage network and receiving water courses.

This interception storage is designed to capture surface water run-off from rainfall depths of 5mm (and up to 10mm if possible).

The SuDS features included in the development (refer to Section 3.2.5 &3.2.6) will provide the necessary interception volume required by the GDSDS (i.e. green roofs, permeable paving, tree pits, bioretention areas, landscaped areas, stone backfill associated with attenuation tank).

3.3 Flood Risk

A separate Site-Specific Flood Risk Assessment has been prepared as part of this planning application (refer to DBFL Report No. 190226-X-X-X-XXX-RP-DBFL-CE-0003).

This flood risk assessment has been undertaken by reviewing information from the Office of Public Works (OPW) National Flood Hazard Mapping (www.floodmaps.ie) and the Dodder CFRAM Study and has been carried out in accordance with the OPW's Guidelines for Planning Authorities – The Planning System and Flood Risk Management (November 2009).

3.4 Surface Water Quality Impact

Run-off rates from the site are controlled by flow control devices.

Surface water management proposals for the development also incorporate the following impact reduction measures:

- Surface water network designed in accordance with GDSDS requirements.
- Incorporates SUDS features e.g. green/blue roofs, drainage reservoir (drainage board) on the podium slab over basement, permeable paving in on-street parking areas, soakaways to treat the runoff from the roof of the courtyard houses and tree pits/bioretention areas taking runoff from internal streets and footpaths with overflows to main drainage network.
- Surface water attenuation (i.e. treatment / filtration provided within the granular surround of the Stormtech Chambers) in conjunction with a final Class 1 fuel / oil separator prior to discharge to the downstream surface water network.

4 Foul Drainage

4.1 Existing Foul Drainage Infrastructure

An existing 600mm diameter combined sewer is located adjacent to the site's north-eastern boundary (Sandford Road). An existing 375mm diameter combined sewer is also located adjacent to the site's south-eastern boundary (Milltown Road) which outfalls to the 600mm diameter combined sewer on Sandford Road. Refer to Figure 4-1 and Uisce Eireann's Network Plan as included in Appendix A of this report.

An existing private foul drainage network is located within the site (typically 150mm diameter) which outfalls to the combined sewer on the Sandford Road via a combined connection with the private surface water drainage network.

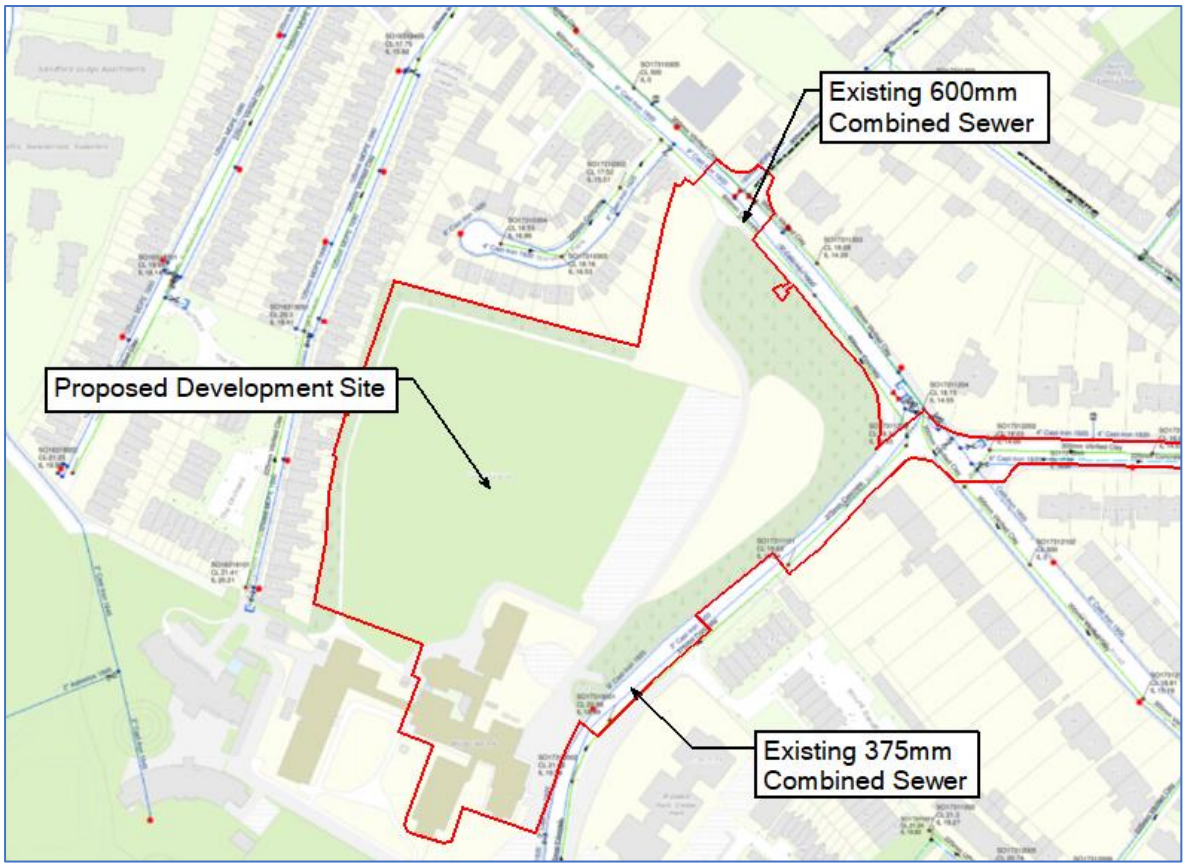

Figure 4-1 Extract from Uisce Eireann's Network Plan (Site Boundary Indicative Only)

4.2 Design Strategy

As noted in Section 4.1 above, an existing combined sewer network is located in Sandford Road and Milltown Road.

Two foul drainage discharge points are proposed for the site (in the vicinity of the proposed access off Milltown Road and the existing access of Sandford Road). This facilitates a gravity drainage solution for the site. Refer to DBFL drawing no. 190226-X-05-Z00-DTM-DR-DBFL-CE-1301 for the proposed foul drainage layout.

The proposed foul drainage network within the site comprises of a series of 225mm diameter pipes. Courtyard houses (located along the western boundary) will be serviced by individual 100mm diameter connections.

A Statement of Design Acceptance has been received from Uisce Eireann in November 2025 for the proposed foul drainage layout (refer to Appendix D).

4.3 Pre-Connection Feedback from Uisce Eireann

A pre-connection enquiry was submitted in June 2025 (ref. no. CDS25004037) and a confirmation of feasibility was received in September 2025. Uisce Eireann have advised that provision of a wastewater connection is "*Feasible without infrastructure upgrade by Uisce Eireann*".

Please refer to Appendix D for the confirmation of feasibility received from Uisce Eireann.

4.4 Design Calculations

The foul drainage network for the proposed development has been designed in accordance with the following guidelines:

- Uisce Eireann Code of Practice for Wastewater Infrastructure (July 2020)
- Department of the Environment's Building Regulations "Technical Guidance Document Part H Drainage and Waste Water Disposal" (2016)
- BS EN 752: 2008 Drain and Sewer Systems Outside Buildings

Foul drainage network calculations for the proposed development have been carried out using Microdrainage WinDes analysis software (refer to Appendix E).

Design Criteria:

Demand	446 l/dwelling/day
Discharge units	14 units per dwelling (as BS8301)
Pipe Friction (Ks)	1.5 mm
Minimum Velocity	0.75 m/s (self-cleansing velocity)
Maximum Velocity	3.0 m/s (1:18 maximum pipe gradient)
Frequency Factor	0.5 for domestic use

4.5 Foul Discharge

Residential Wastewater Discharge

RESIDENTIAL - PREDICTED DEVELOPMENT FOUL FLOWS						
Unit Type	**No.**	**Loading**	**Occupancy**	**Occupancy**	**Daily Loading**	**Daily Loading**
		l/person/day	**person/unit**		**l/day**	**l/s**
Residential	562	150	2.7	1,517	227,610	2.63
					Residential Daily Loading	**2.63**
					Growth Factor	1
					Infiltration @ 10% (as CoP App B 2.2.4)	0.26
					Dry Weather Flow l/s	**2.90**
					Residential Peak Factor (as CoP App B 2.2.5)	6.0
					Design Foul Flow l/s	**17.39**
***Flow rates calculated using IW CoP for Wastewater Infrastructure Appendix C**						

Non-Residential Wastewater Discharge

NON-RESIDENTIAL - PREDICTED DEVELOPMENT FOUL FLOWS						
Unit Type	**Floor Area m^2**	**Occupancy Load m^2 /person**	**Occupancy**	**Loading l/Person/day**	**Daily Loading l/day**	**Daily Loading l/s**
Creche	375	4.17	90	90	8,100	0.09
Café/Restaurant	179	3.58	50	25	1,250	0.01
Community Space	1,698	5.66	300	10	3,000	0.03
Residential Amenity Space	324	6.48	50	10	500	0.006
					Non - Residential Daily Loading	**0.15**
					Growth Factor	1
					Infiltration @ 10% (as CoP App B 2.2.4)	0.015
					Dry Weather Flow l/s	**0.1636**
					Commercial Peak Factor (as CoP App B 2.2.7)	4.5
					Peak Discharge (Design Foul Flow) l/s	**0.736**
***Flow rates calculated using UE CoP for Wastewater Infrastructure Appendix D**						

Total Predicted Development Average Foul Flows:

TOTAL PREDICTED DEVELOPMENT AVERAGE DAILY FOUL FLOWS l/s	**3.06**
TOTAL PREDICTED DEVELOPMENT PEAK FOUL FLOWS l/s	**18.12**
24 Hour Emergency Storage Requirement (if required) = DWF x 24 x 60 x 60 m^3	12.3
***Flow rates calculated using UE CoP for Wastewater Infrastructure Appendix D**	

5 Water Supply

5.1 Existing Public Water Mains

Existing public water supply infrastructure (9" Cast Iron Water Main) is located along the site's north-eastern boundary (Sandford Road) and south-eastern boundary (Milltown Road) as identified in Figure 5-1 and Uisce Eireann's Network Plan as included in Appendix A of this report.

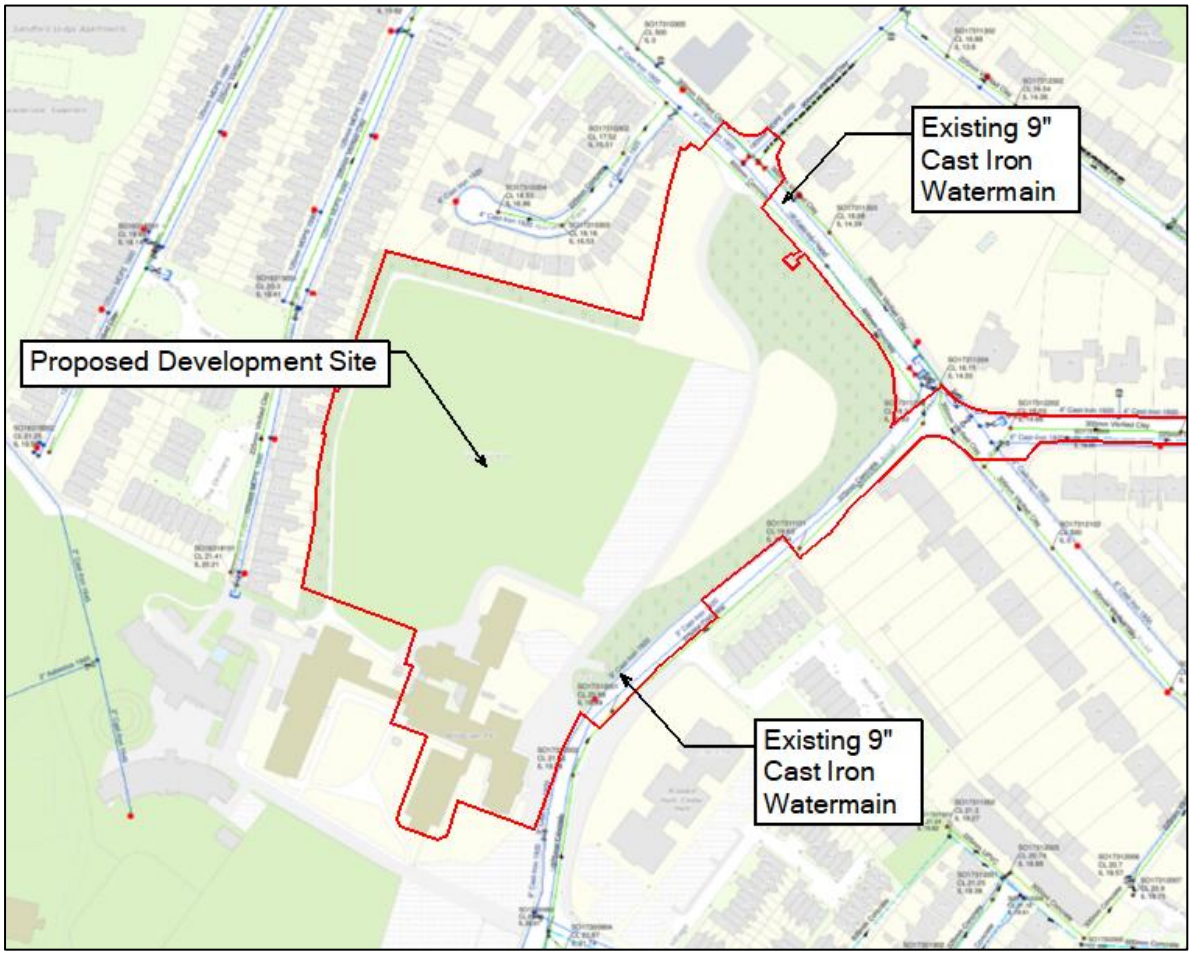

Figure 5-1 Extract from Uisce Eireann's Network Plan (Site Boundary Indicative Only)

5.2 Proposed Watermain Layout

The site's proposed water main layout is shown on DBFL's Site Watermain Layout (drawing no. 190226-X-93-Z00-DTM-DR-DBFL-CE-1311).

It is proposed to take 2 no. 200mm diameter connections off the existing 9" water mains located along Sandford Road and Milltown Road. These connections will link within the site.

Bulk flow meters and sluice valves will be installed at connection points to the public water main in accordance with the Uisce Eireann Code of Practice and Standard Details.

Courtyard houses (located along the western boundary) will have their own connections (25mm O.D. PE pipe) to distribution water mains via service connections and boundary boxes. Individual connections are to be installed in accordance with Uisce Eireann Standard Detail STD-W-03.

A Statement of Design Acceptance has been received from Uisce Eireann in November 2025 for the proposed foul drainage layout (refer to Appendix D).

5.3 Pre-Connection Feedback from Uisce Eireann

A pre-connection enquiry was submitted in June 2025 (ref. no. CDS25004037) and a confirmation of feasibility was received in September 2025. Uisce Eireann have advised that provision of a watermain connection is "*Feasible without infrastructure upgrade by Uisce Eireann*".

Please refer to Appendix D for the confirmation of feasibility received from Uisce Eireann.

5.4 Hydrants

The proposed watermain layout is arranged such that all buildings are a maximum of 46.0m from a hydrant in accordance with the Department of the Environment's Building Regulations "Technical Guidance Document Part B Fire Safety".

Hydrants shall comply with the requirements of BS 750:2012 and shall be installed in accordance with Uisce Eireann's Code of Practice and Standard Details.

5.5 Materials

Proposed water mains and connections to the courtyard houses are to be PE100 SDR17.

5.6 Water Demand

Residential Water Demand

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**
Residential	562	2.7	1517	150	227,610	2.63
					Total Average Daily Loading l/s	**2.63**
					Average Day/Week Domestic Demand	1.25
					Average Day/Peak Week Demand l/s	**3.29**
					Peak Demand Factor	5
					Peak Hour Water Demand l/s	**16.46**
***Flow rates calculated using UE CoP for Water Infrastructure**						

Non-Residential Water Demand

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	375	4.17	90	90	8,100	0.094
Café/Restaurant	179	3.58	50	25	1,250	0.014
Community Space	1,698	5.66	300	10	3,000	0.035
Residential Amenity Space	324	6.48	50	10	500	0.006
					Total Average Daily Loading l/s	**0.149**
					Average Day/Week Demand Factor	1.25
					Average Day/Peak Week Demand l/s	**0.19**
					Peak Demand Factor	5
					Peak Hour Water Demand l/s	**0.93**
***Flow rates calculated using UE CoP for Water Infrastructure**						

Total Water Demand

TOTAL AVERAGE DAILY LOADING l/s	2.783
AVERAGE DAY/PEAK WEEK DEMAND l/s	3.479
PEAK HOUR WATER DEMAND	17.39
*Flow rates calculated using UE CoP for Wastewater Infrastructure Appendix D	

Appendix A : Uisce Eireann Network Plans

Appendix B : Attenuation Calculations

Appendix C : Surface Water Drainage Calculations

Appendix D : Correspondence with Uisce Eireann

Appendix E : Foul Drainage Calculations

Appendix F : Extracts from Site Investigation Report

Appendix G : Green/Blue Roof Calculations

Appendix H : Surface Water Outfall Calculations

ENVIRONMENT
ISO 14001:2015
NSAI Certified

HEALTH
& SAFETY
ISO 45001:2018
NSAI Certified

QUALITY
I.S. EN ISO 9001:2015
NSAI Certified

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