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Project

Clongriffin Wider Lands – Phase 2

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SURFACE WATER MANAGEMENT PLAN

CLONGRIFFIN WIDER LANDS – PHASE 2

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by the Land Development Agency (LDA) to prepare Surface Water Management Report for the masterplan-led development of LDA lands at Clongriffin, Dublin 13.

1.1 Report Overview

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

- Dublin City Development Plan 2022–2028 (including Strategic Flood Risk Assessment)
- Greater Dublin Strategic Drainage Study (GDSDS) 2005
- The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009 (Flood Risk Management Guidelines)
- Greater Dublin Regional Code of Practice for Drainage Works (Version 6)
- Uisce Éireann Drainage and Supply Records
- Office of Public Works Flood Maps [last accessed: 25/01/2023]
- British Standard BS EN 752:2008 (Drains and Sewer Systems Outside Buildings)
- Part H of the Building Regulations (Building Drainage).
- Nature based solutions to the management of rainwater and surface water runoff in urban areas by the Department of Housing Local Government and Heritage 2022.
- Dublin City Council Sustainable Drainage Design & Evaluation Guide 2021.
- Dublin City Council Green & Blue Roof Guide 2021

The Surface Water Management Plan is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with all other relevant documentation submitted by other members of the project design team.

2.0 SITE LOCATION, CONTEXT, AND PROPOSED DEVELOPMENT

2.1 Site Location

The overall site comprises zoned development lands in Dublin 13 located to the west of Clongriffin railway station; the development site has a total area of 3.47ha. The subject development lands are bounded to the east by Clongriffin Road and Station Square, to the north by development lands and Park Street, and to the south by Clongriffin Main Street. The subject site is in the administrative jurisdiction of Dublin City Council (DCC), adjacent to the City Council's boundary with Fingal County Council.



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

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



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

2.2 Existing Clongriffin Development

Development of the wider Clongriffin area has thus far been carried out largely in accordance with a 10-year masterplan planning permission granted to Gannon Homes on the 27th of June 2003 under DCC Reg. Ref. 1302/02 (An Bord Pleanála ref. PL29N.131058). This provided for development consisting of a total of 3,576no. dwellings and 80,600m^2 of mixed retail, commercial, leisure, and community uses, associated car parking and engineering works, and provision for a new railway station.

These previously permitted development proposals (referred to hereafter as the 'masterplan parent permission') comprised:

- Services infrastructure including water supply, foul drainage, surface water drainage, and internal roads.
- A new access road to the development from the Hole in the Wall Road through Father Collins Park [Main Street] and a new east-west access road parallel to the Mayne River [Marrsfield Avenue].
- An underground town carpark and park and ride carpark (420no. spaces), taxi rank, drop off points, and a bus interchange associated with the railway station.

- Civic town squares and spaces, and a linear park along the south side of the Mayne River with attenuation pond.

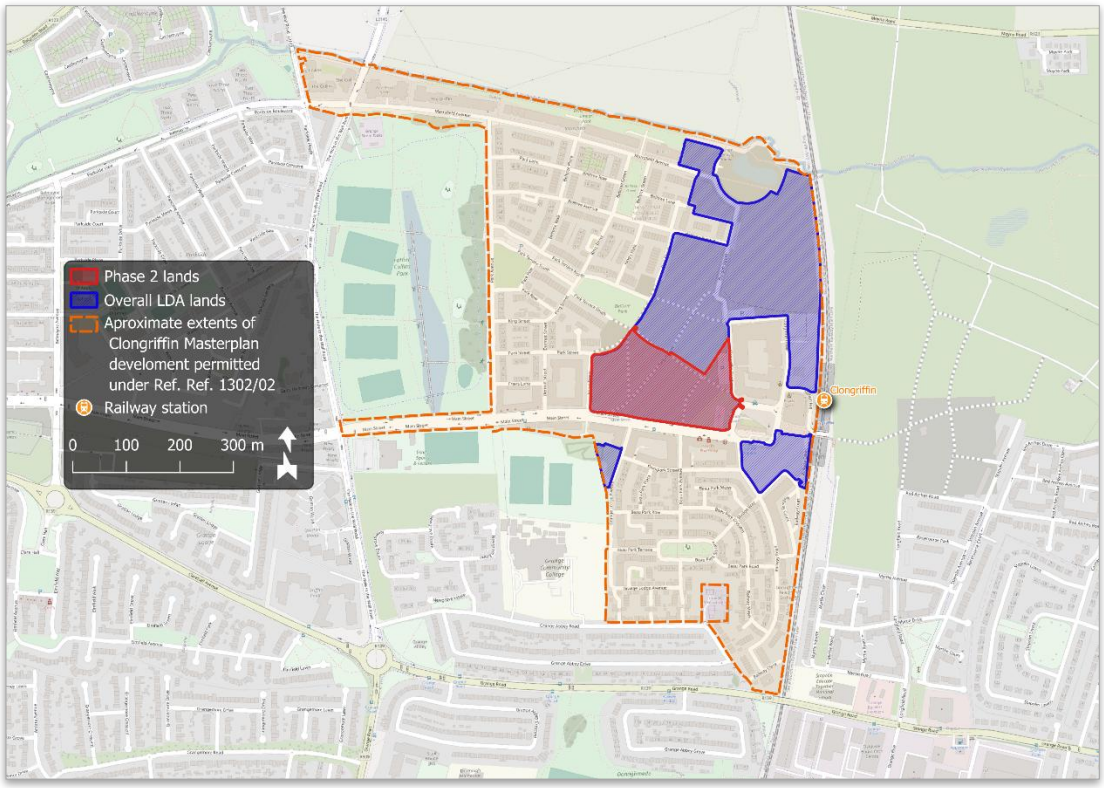


Figure 3 – Clongriffin masterplan extents and neighbourhoods
(sources: OSi, OSM Contributors)

2.3 Description of Proposed Development

The proposed development will consist of:

1. The construction of a residential development with a gross floor area (GFA) of c. 69,364 sq.m set out in 3 no. residential blocks, ranging in height from 5 to 10 storeys, to accommodate 711 no. apartments, with associated ground floor commercial and community/cultural uses and a standalone creche. The site will accommodate a total of 335 no. car parking spaces and 1,430 no. bicycle parking spaces. Landscaping will include new public realm and communal courtyards, podiums and roof terraces. The proposed development sits as part of a Masterplan for a wider Clongriffin landbank which includes the under-construction Blocks 5 & 6 to the north of Market Street (as permitted under LRD6064/24-S3).
2. The 3 no. residential buildings range in height from 5 to 10 storeys, accommodating 711 no. apartments comprising 50 no. studios, 304 no. 1-bed units, 351 no. 2-bed units (68 no. 2-

bed (3P) & 283 no. 2-bed (4P)) and 6 no. 3-bed (5P) units. The breakdown of residential accommodation is as follows:

- Zone 7 is a 5 to 7 storey building, including setbacks and balconies, accommodating 280 no. units (5 no. studios, 117 no. 1-bed units, 16 no. 2-bed (3P), 136 no. 2-bed (4P) and 6 no. 3-bed (5P) units). Communal Amenity Space of c.2,202 sq.m is provided at podium level. The ground floor includes for 1 no. community/cultural/arts unit of c.781 sq.m, ground floor own door residential units, cycle parking, waste stores and plant areas. It includes for podium parking under Zone 7 containing 130 no. car spaces.
- Zone 8 is a 6 to 8 storey building, including setbacks and balconies, accommodating 263 no. units (29 no. studios, 106 no. 1-bed units, 21 no. 2-bed (3P) and 107 no. 2-bed (4P)). Communal Amenity Space of c.1,600 sq.m is provided at podium level. The ground floor includes for 2 no. community/cultural/arts units of c.199 sq.m and c.346 sq.m, ground floor own door residential units, cycle parking, waste stores and plant areas. It includes for podium parking under Zone 8 containing 82 no. car spaces.
- Zone 9 is a 6 to 10 storey building, including setbacks and balconies, accommodating 168 no. units (16 no. studios, 81 no. 1-bed units, 31 no. 2-bed (3P), and 40 no. 2-bed (4P)). Communal Amenity Space of c.969 sq.m is provided at podium level. The ground floor includes for 2 no. retail/restaurant/café units of c. 140 sq.m and c.482 sq.m, ground floor own door residential units, cycle parking, waste stores and plant areas. It includes for podium parking under Zone 9 containing 40 no. car spaces.

3. A standalone two-storey crèche of c. 895 sq.m (with an external play area of c. 509 sq.m) is provided to the north of Zone 9 along Market Street and Clongriffin Road.
4. The proposed development also includes for the completion of the eastern section of Market St, which is currently under construction, to where it meets Clongriffin Road/Station Square. The remainder of Market St, north of Zone 8 and 9, will be a landscaped pedestrianised/cycle route, containing seating, external community/cultural space, cycle parking and planting.
5. The site will accommodate a total of 335 no. car parking spaces (317 no. for residents and 18 no. for visitors/crèche) and 1,430 no. bicycle parking spaces including cargo bikes, EV charging and shared bikes (1,074 for residents and 356 no. for visitor/staff) in separate secure below podium areas and at surface level. A total of 317 residents car parking spaces are provided with 252 spaces located below podium and 65 spaces provided at surface level. A total of 1,074 no. resident's bicycle stores including cargo spaces are provided at below podium/ground level within the blocks. In addition, 18 no. car parking

spaces are located at surface level to include visitor, creche parking, accessible and car club as well as 356 no. short stay bicycle parking spaces.

6. The proposed application includes all site landscaping works, green and blue roofs, lighting, servicing, signage, junction upgrades, ESB Substations, solar PV panels at roof level and all associated and ancillary works, including site development works above and below ground including site drainage and infrastructure.

3.0 SURFACE WATER MANAGEMENT PLAN

3.1 Existing Surface Water Drainage Network

Within the Clongriffin masterplan area, a local surface water drainage network was designed and constructed under the masterplan parent permission (Reg. Ref. 0132/02). These local surface water sewers remain under private ownership. All runoff collected by this network drains to the Clongriffin attenuation pond, which is located adjacent to the Mayne River, at the northern boundary of the masterplan area. From a review of the planning applications on the site the attenuation pond discharges to the Mayne River and at a controlled rate of 249 l/s, as permitted under the masterplan parent permission. The attenuation pond was designed and sized to accommodate rainfall events exceeding a 1% Annual Exceedance Probability (i.e. a 1-in-100-year storm event) and has over 6,400m^3 of attenuation storage on top of a permanent volume of approximately 2,500m^3.

In the immediate vicinity of the subject development site, the local surface water drainage network includes surface water sewers along the existing extents of Belltree Avenue, Lake Street, and Park Street, as well as along the intended future alignment of these streets' as yet incomplete sections.

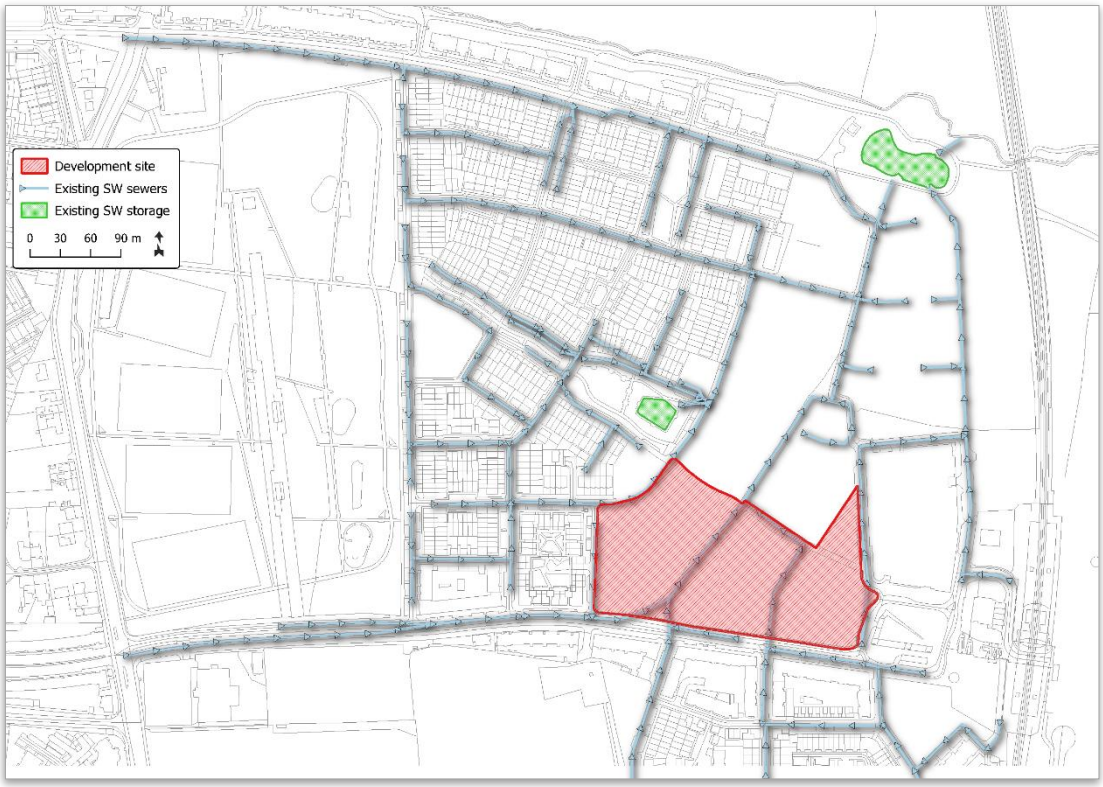


Figure 4 – Existing Private Surface Water Drainage network
(sources: Waterman Moylan, OSi)

3.2 Flood Risk

Under the Flood Risk Management Guidelines, a proposed development site has first to be assessed to determine the flood zone category it falls under. The guidelines define three distinct areas of combined flood risk: Zones A, B, and C. These are described below.

- **Zone A** – High Probability of Flooding.
  Where the average probability of flooding from rivers and sea is highest (greater than 1% AEP for fluvial flooding or 0.5% AEP for tidal flooding).
- **Zone B** – Moderate Probability of Flooding.
  Where the average probability of flooding from rivers and sea is moderate (between 0.1% AEP and 1% AEP for fluvial flooding, and between 0.1% AEP and 0.5% AEP for tidal flooding).
- **Zone C** – Low Probability of Flooding.
  All areas outside Zones A and B. Where the probability of flooding from rivers and sea is lowest (less than 0.1% AEP for both fluvial and coastal flooding).

Combined flood risk zone extents throughout Dublin City Council have been defined through modelling in the preparation of the Dublin City Council 2022-2028 Strategic Flood Risk Assessment (SFRA). A review of flood risk mapping contained within the *Dublin City Council 2022–2028 Strategic Flood Risk Assessment*, an extract of which is shown in **Figure 5**, indicates that the proposed development site is located within **Flood Zone C.** Please refer to A**ppendix A** for detailed Dublin City Council Composite Flood Map.

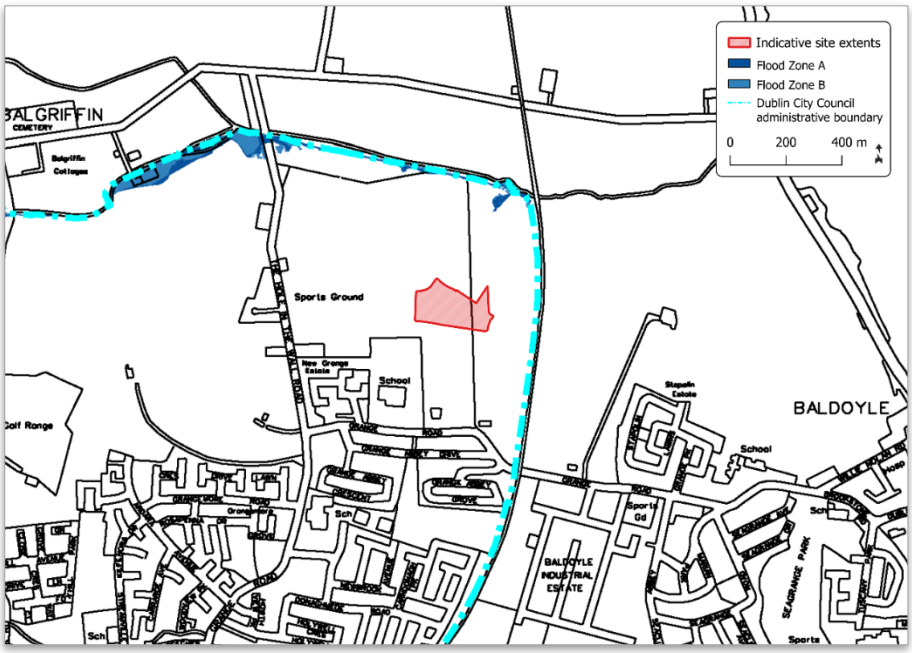


Figure 5 – Extract of DCC 2022-2028 SFRA Flood Risk Mapping

(sources: Dublin City Council)

3.3 Construction Phase Wastewater Discharge License

The lead Contractor will be required to secure a Trade Effluent Licence from Uisce Éireann, permitting the discharge of pumped groundwater to the public drainage network.

3.4 Proposed Surface Water Drainage Arrangements

As part of this proposal, it is proposed to increase the permissible discharge rate from the existing pond to the river from 249 l/s to 268 l/s, based on the HR Wallingford Greenfield Runoff Rate Estimation Tool, as presented in the Appendix B of this report

Runoff from the building sites and plots shall be managed at source, limited to a rate of 4.6l/s/ha in accordance with QBAR. All new building plots shall be designed to attenuate runoff from a 1-in-100-Year storm event, with an additional 20% allowance for Climate Change in accordance with Dublin City Council Sustainable Drainage Design & Evaluation Guide 2021.

Green roofs shall be incorporated in line with DCC policy standards, while blue roofs shall be implemented at podium level to provide source attenuation at a rate of 4.6 l/s/ha. Localised SuDS features will be introduced within individual plots to facilitate interception, treatment, and storage of runoff from parking areas, pavements, and internal roads. Refer to CS Consulting drawings No L106-CSC-XX-XX-DR-C-0104 and L106-CCSC-XX-XX-DR-C-0121 for details on developments proposed surface water drainage.

Additional SuDS elements shall be integrated into new roads and pavement areas to provide interception storage. Roads and pavements located outside the individual building plots will discharge directly into the existing stormwater network, which will subsequently outfall into the existing pond. Refer to CS Consulting drawings No L106-CSC-XX-XX-DR-C-0104 for details on developments proposed surface water drainage.

The above proposal was based on the principles that the existing pond size and outfall has been agreed and is sized for the 1 in 100-year return period for the existing developed lands. The new development sites will utilise the existing storm network and provide attenuation for the undeveloped lands to cater for the 1 in 100-year return period plus 20% Climate Change

3.5 Sustainable Drainage Systems (SuDS) Design

When rain falls on a natural landscape, it soaks into the ground, evaporates, or is taken up by plants, and some of it eventually find its way into streams and rivers. These stages of the water cycle can be impeded when land is altered by development. In urban areas, there tends to be less permeable ground available for infiltration and less vegetation for evapotranspiration.

When rain falls on impermeable surfaces, much more of it turns into surface water runoff, which can cause flooding, pollution, and erosion problems. Additionally, urbanisation has a negative impact on wildlife in urban areas.

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

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

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

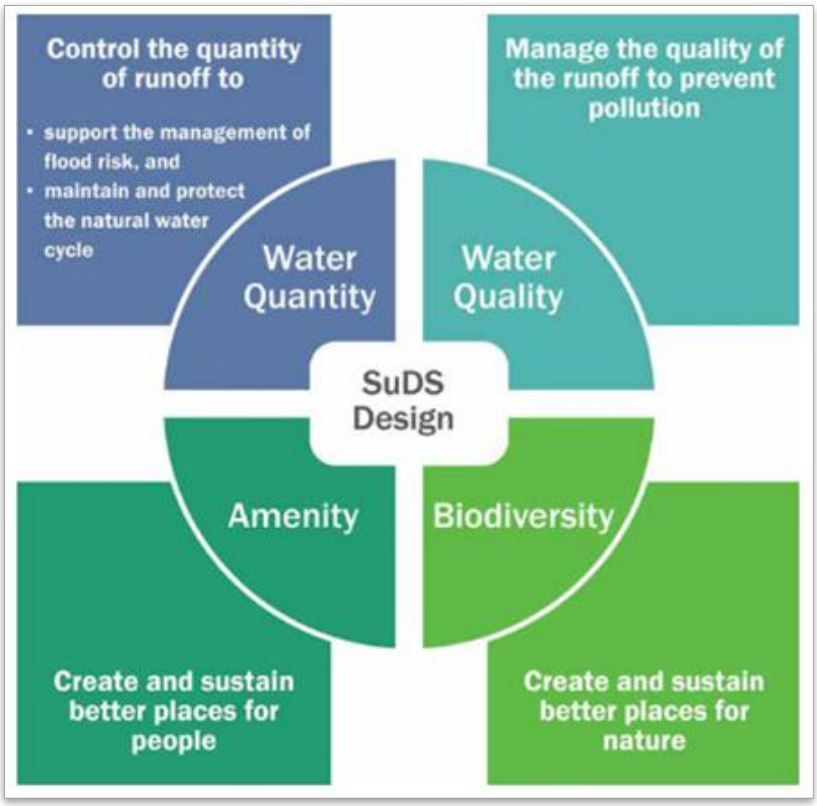


Figure 6 – The four pillars of SuDS design
(source: CIRIA C753 – The SuDS Manual)

The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff

causing pollution. This can be achieved by harvesting, infiltrating, slowing, storing, conveying, and treating runoff on site, and where possible, on the surface rather than underground.

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

3.6 SuDS Measures

Based on the adopted attenuation storage strategy the proposed development shall include the following proposed Sustainable Drainage Systems (SuDS) measures. The proposed Sustainable Drainage Systems (SuDS) measures have been designed in accordance with the requirements of Dublin City Council and the Dublin City Development Plan objectives, to provide on-site first stage interception of surface water run-off, improving its overall quality prior to ultimate discharge.

3.6.1 Blue Roof

It is proposed to provide blue roofs at podium level in Zone 7, 8 and 9. These shall retain and attenuate rainfall at source prior to out falling to the public network (in accordance with Technical Summary of Dublin City Council Green and Blue Roof Guide (2021)). The Blue Roofs at podium level shall have a total volume of 1697m3 as per the specialist design calculations.

3.6.2 Green roofs

Extensive green roofs will be provided on the proposed buildings' flat roof areas. During typical low-intensity rainfall events, these will collect and retain rainwater until it subsequently evaporates. This will reduce the volumes of rainwater discharging to the public sewer network, as well as mitigating peaks in run-off and reducing the potential for contaminants to be washed from the roof, decreasing the development's impact on the receiving environment. Green roofs also have secondary environmental benefits, providing a temperature control effect by absorbing less solar radiation and improving air quality by trapping airborne particulate matter. Appendix 11 to the *Dublin City Development Plan 2022-2028* requires that new developments with flat or gently sloped roof areas of more than 100m^2 meet the following green roof coverage requirements as a percentage of total roof area; these minimum roof coverage requirements will have to be designed into each sector / tile / individual planning application:

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

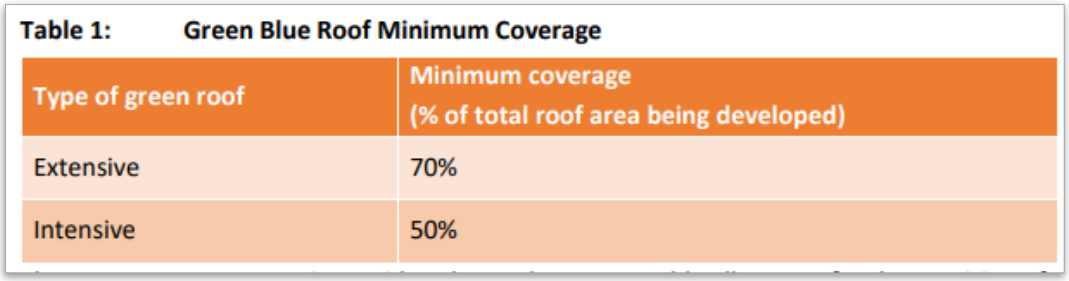


Table 1: Green Blue Roof Minimum Coverage

Type of green roof	Minimum coverage (% of total roof area being developed)
Extensive	70%
Intensive	50%

Figure 7 – Extract from DCC Development Plan 2022-2028, Appendix 11
(source: Dublin City Council)

The subject development shall incorporate extensive green roof at roof level and intensive green roof and a blue roof drainage layer at podium level. The development incorporates the following provision of green roof shown in Table 1.

Table 1 - Green Roof Provision

Level	Areas	Zone 7	Zone 8	Zone 9	Total
Roof Level	Roof Area	4,886m^2	3,736m^2	1,952m^2	10,574m^2
	Extensive Green Roof	2,730m^2	1,585m^2	686m^2	5,001m^2
	Green roof %	56%	42%	35%	47.2%
Podium	Podium Area	3,180m^2	2,233m^2	1,385m^2	6,798m^2
	Intensive Green Roof	1,928m^2	1,403m^2	834m^2	4,165m^2
	Green Roof %	60%	63%	60%	61%

It should be noted that the subject development requires plant and PV panel areas at roof level. Due to fire considerations, it is not possible to provide green roof below the PV panel areas. Similarly, roof areas above cores have not been considered for provision of green roof due to fire safety advice which recommended that these areas not be provided with green roof. The area of extensive green roof has been maximised insofar as possible.

A shortfall relative to the minimum provision of extensive green roof is envisaged, due in part to the provision of PV panels at roof level for which an exemption is outlined in Appendix 11 to the *Dublin City Development Plan 2022-2028*. Additionally, it is proposed to exceed the minimum provision of intensive green roof at podium level which shall mitigate this shortfall.

3.6.3 Permeable paving

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

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

3.6.4 Tree pits and bio-retention areas

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

3.6.5 Rain gardens and planter boxes

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

3.7 Surface Water Treatment

Land use is the primary influencing factor in the quality of urban surface water runoff and can therefore be used to represent the significance of the expected pollutant concentrations generated during rainfall events.

The Simple Index Approach (SIA) described in chapter 26 of C753 -The SuDS Manual will be applied in the stormwater treatment analysis of the proposed development, which is residential in nature. To implement this method effectively, the steps described below have been followed.

- Step 1: Define SuDS Treatment Areas for the proposed development.

• Step 2: Produce a SuDS Treatment Train table with the total areas for each hardstanding and soft landscaping surface type present on the proposed development, outlining the proposed SuDS feature and end recipient for each of the surfaces.

• Step 3: Allocate pollution hazard indices to the development's proposed land use for the following types of pollutants: suspended solids, metals, and hydrocarbons.

• Step 4: Allocate pollution mitigation indices to each proposed SuDS component for the following types of pollutants: suspended solids, metals, and hydrocarbons.

• Step 5: Using the Simple Index Approach, compare the aggregated surface water pollution mitigation indices determined in Step 4 to the pollution hazard indices. determined in Step 3. The aggregated surface water pollution mitigation indices should be greater than the pollution hazard indices.

STEP 1: The proposed development SuDS Treatment Areas are identified in **Figure 8**:

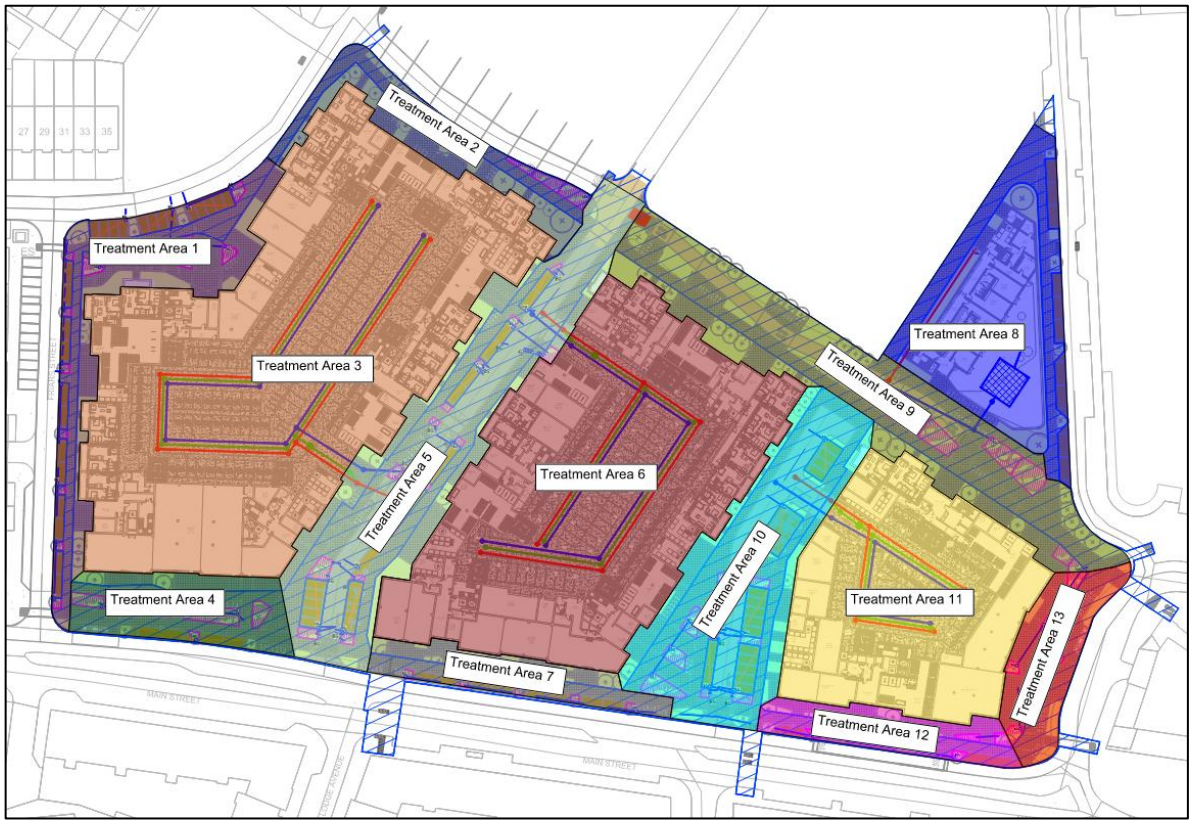


Figure 8 – Proposed SuDS Treatment Areas

STEP 2: Table 2 outlines the proposed SuDS Treatment Train for each individual surface type present on site.

Table 2 – SuDS Treatment Train

Runoff Origin	Area (m2)	SuDS Feature 1	SuDS Feature 2	SuDS Feature 3	End Recipient
Road	1490	Bioretention Area/Tree Pits	Petrol Interceptor	Pond	River
Footpath	10710	Bioretention Area/Tree pits	Petrol Interceptor	Pond	River
Roof/Podium	17755	Green Roof/Blue Roof	Petrol Interceptor	Pond	River
Permeable Car Parking & Curtilages	1375	Permeable Paving	Petrol Interceptor	Pond	River
Soft Landscape	2760	-	-	-	Ground
TOTAL	**34090**				

STEP 3: The pollution hazard indices for the proposed development, based on a runoff area land use of 'Residential Parking/Roads', are shown in **Table 3** below:

Table 3 – Pollution Hazard generated from Residential Parking/Roads

Total Suspended Solids	Metals	Hydrocarbons
0.5	0.4	0.4

STEP 4: The pollution mitigation indices for each SuDS component proposed across the Treatment Areas are shown in **Table 4** below.

Table 4 – Pollution Mitigation Indices for each SuDS Component

SuDS Component	Total Suspended Solids	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
Pond	0.7	0.7	0.5
Bioretention Areas	0.8	0.8	0.8

STEP 5: Using the Simple Index Approach, the aggregated surface water pollution mitigation indices are determined based on the selected SuDS Components and compared to the pollution hazard indices.

For all SuDS Treatment Areas, where the active SuDS Components are permeable paving, infiltration trenches, bioretention areas, and detention basins, the aggregated surface water pollution mitigation indices add up to 0.95 for Total Suspended Solids, 0.95 for Metals and over 0.95 for Hydrocarbons. As shown previously in Step 3, the pollution hazard indices based on the site-specific land use of 'Residential Parking/Roads' equals 0.5 for Total Suspended Solids and 0.4 for both Metals and Hydrocarbons. Therefore, the proposed SuDS elements in all Treatment Areas are sufficient to effectively mitigate the surface water pollution risk in these areas.

In conclusion and taking all the above into consideration, the proposed development is deemed to adequately deal with surface water pollution risk. Refer to **Appendix C** for summary tables of the Simple Index Approach analysis for Road and Permeable Paving Treatment Area.

3.8 Interception Storage Calculations

It is proposed to incorporate localised SuDS measures throughout the development to facilitate the interception, treatment, and attenuation of surface water runoff arising from roofs, parking areas, pavements, and internal roads, in accordance with the preferred drainage strategy agreed with DCC.

The proposed development has been divided into several sub catchments, each designed to provide adequate interception and treatment storage. The identified sub catchments, or treatment areas, are illustrated in **Figure 8**, with the associated calculations for each treatment area provided in **Appendix D**.

The total area considered for interception storage calculations is 34,090 m². The required interception storage volume has been calculated in accordance with GDSDS criteria as follows:

34,090 m² × 5 mm = 170.45 m³

In accordance with the recommendations of the GDSDS, where the initial runoff from a minimum of 5 mm rainfall can be intercepted, additional treatment volume is not required. The proposed SuDS measures, including extensive green roofs, intensive green roofs, blue roofs, permeable paving, detention basins, bioretention areas/tree pits, and soft landscaping, are designed to intercept runoff from at least the first 5 mm of rainfall.

Furthermore, the proposed detention basins, in conjunction with the aforementioned SuDS measures, will provide additional treatment and attenuation of surface water runoff, where required, prior to discharge to the public surface water network.

3.9 SuDS Outline Management Plan

For the SUDS strategy to work as designed, it is important that the entire drainage system is well maintained. It shall be the responsibility of the site management team to ensure the drainage system is maintained. Maintenance and clearing of gullies, drains and manholes shall ensure adequate performance.

3.9.1 Permeable Paving

Regular inspection and maintenance are important for the effective operation of pervious pavements. Maintenance responsibility for a pervious pavement and its surrounding area shall

be placed with an appropriate responsible organisation. Before handing over the pavement to the client, it will be inspected for clogging, litter, weeds and water ponding, and all failures shall be rectified.

If the surface has clogged then a more specialist sweeper with water jetting and oscillating and rotating brushes will be required, especially for porous asphalt surfaces, to restore the surface infiltration rate to an acceptable level. The specialist equipment must be adjusted so that it does not strip binder from the aggregate in the asphalt.

For concrete block permeable paving the design life shall be no different from standard paving. An effective maintenance regime shall be in place to minimise risks of infiltration clogging.

Materials removed from the voids or the layers below the surface are likely to contain heavy metals and hydrocarbons which need to be disposed of as controlled waste. Sediment testing shall be carried out before disposal to confirm its classification and appropriate disposal methods.

Operation & Maintenance Requirements for Pervious Pavements		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.9.2 Bioretention Areas and Raingardens

Bioretention and raingarden systems will require regular maintenance to ensure continuing operation to design performance standards. Adequate access has been provided for all bioretention areas and raingardens for inspection and maintenance, including for the appropriate equipment and vehicles.

All vegetation management activities shall take account of the need to maximise biosecurity and prevent the spread of invasive species.

In the majority of cases, it will be acceptable to distribute the sediment on site, if there is an appropriate safe and acceptable location to do so. Proper disposal of sediment and debris

removed must be ensured, and the environmental regulator should be approached for advice where there are any doubts concerning disposal options.

In general, the maintenance for bioretention areas and raingardens can often be undertaken as part of routine landscape maintenance.

Maintenance responsibility for all systems shall be placed with an appropriate organisation, and Maintenance Plans and schedules have been developed during the design phase. The following table provides guidance on the type of operation and maintenance schedule that is appropriate. The list of actions is not exhaustive, and some actions may not always be required. The most intensive maintenance is required during the establishment period. Herbicides and pesticides (such as Roundup) and fertilizers shall not be used on bioretention and raingarden systems. This is because these pollutants will wash through the system quite easily.

Operation & Maintenance Requirements for Bioretention Systems		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility, and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary.	Quarterly
	Check operation of underdrains by inspection of flows after rain.	Annually
	Assess plants for disease infection, poor growth, invasive species etc. and replace, as necessary.	Quarterly
	Inspect inlets and outlets for blockage.	Quarterly
Regular Maintenance	Remove litter and surface debris and weeds.	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density.	As required
	Remove sediment, litter, and debris build-up from around inlets or from forebays.	Quarterly to biannually
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required.	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch.	As required
Remedial Actions	Remove and replace filter medium and vegetation above.	As required but likely to be > 20 years

3.9.3 Blue-Green Roof

Intensive green roofs are likely to require regular inspection and maintenance. Grassed areas shall require mowing weekly or fortnightly, it is likely that plant beds require weeding on a weekly or fortnightly basis during the growing season, and wildflower

meadows may require annual mowing with the cuttings removed. It is likely that extensive green roofs will require biannual or annual visits to remove litter, check fire breaks and drains and, in some cases, remove unwanted invasive plants. The most maintenance is generally required during the establishment stage (12 to 15 months), and this will be made the responsibility of the green roof provider. Maintenance contractors with specialist training in green roof care shall be used, where possible.

The following table provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required. Actual requirements will depend on the planting, the desired aesthetic and visual effect and the biodiversity objectives for the system. Maintenance specifications and schedules must therefore be specified for any individual green roof.

If mechanical systems are located on the roof, then spill prevention measures shall be exercised to ensure that roof runoff is not contaminated. The mechanical system area should be bunded and provided with separate drainage.

All maintenance actions carried out at roof level must be in full compliance with the appropriate health and safety regulations, and particularly those specifically dealing with working at height. Training and guidance information on operating and maintaining the roof shall be provided to all property owners and tenants. Safety fastenings will be required for personnel working on the roof. Specific maintenance needs of the green roof will be monitored, and maintenance schedules adjusted to suit requirements.

Access routes to the roof have been designed and maintained to be safe and efficient, and walkways must always be kept clear of obstructions. Secure points for harness attachments will be provided when access near to the roof edges is required.

Operation & Maintenance Requirements for Green Roofs		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (i.e., year one), replace dead plants as required	Monthly (Usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked, or moved, investigate and repair as appropriate	As required

3.9.4 Tree Pits

Maintenance requirements of trees will be greatest during the first few years, when the tree is becoming established. Early maintenance will involve regular inspection, removal of invasive vegetation and possibly irrigation during long dry periods, particularly in soils with high void ratios. Tree roots need to establish good root–soil contact before they can efficiently extract water from the soil. The expertise of an arboriculturist/landscape architect with local knowledge shall be sought regarding appropriate irrigation schedules. Maintenance responsibility for a tree pit or planter should always be placed with an appropriate organisation.

The following table provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required.

Operation & Maintenance Requirements for Trees		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Sediments excavated from a tree pit or planter that receive runoff from residential or standard road and roof areas are generally not toxic or hazardous material and can therefore be safely disposed of by either land application or landfilling. However, consultation will take place with the environmental regulator to confirm appropriate protocols. Sediment testing may be required before sediment excavation to determine its classification and appropriate disposal methods. For runoff, from busy streets with high vehicle traffic sediment testing will be essential.

Many of the specific maintenance activities for trees can be undertaken as part of a general landscaping or specific tree maintenance contracts.

3.10 Design Standards

i) The Greater Dublin Strategic Drainage Study (GDSDS), Volume 2
ii) The Greater Dublin Regional Code of Practice for Drainage Works
iii) British Standard BS EN 752:2008 (Drains and Sewer Systems Outside Buildings)
iv) Part H of the Building Regulations (Building Drainage).
v) Nature based solutions to the management of rainwater and surface water runoff in urban areas by the Department of Housing Local Government and Heritage
vi) Dublin City Council Sustainable Drainage Design & Evaluation Guide 2021
vii) Dublin City Council Green & Blue Roof Guide 2021 by DCC

APPENDIX A

UISCE ÉIREANN DRAINAGE AND WATER SUPPLY RECORDS

Uisce Éireann
Irish Water

Legend

- Boundary Meter
- Bulk Meter
- Unknown Meter ; Other Meter
- PRV
- Sluice Valve Open
- Sluice Valve Closed
- Butterfly Valve Open
- Butterfly Valve Closed
- Single Air Control Valve
- Double Air Control Valve

Water Hydrants

Hydrant Function

- Fire Hydrant
- Water Kiosk
- Boundary Box
- Cap
- Other Fittings
- Tap

Water Distribution Mains

Owned By

- Irish Water
- Private
- Irish Water
- Irish Water

Sewer Manholes

Manhole Type

- Standard
- Other; Unknown
- Waste Water Pump station
- Gravity - Foul
- Gravity - Overflow
- Pumping - Foul
- Surface Gravity Mains
- Surface Gravity Mains Private

Storm Manholes

Manhole Type

- Standard
- Other; Unknown

Storm Discharge Points

Discharge Type

- Outfall
- Storm Detention Areas

0 15 30 60 90 Meters

Print Date: 16/07/2024

Tá toirmeasc ar aon chuid den líníocht seo a aithdhearadh nó a sheoladh ar aghaidh in aon slí, nó aon chuid den líníocht a stóráil ar aon chóras aisghabhála ann sin gan cead i scríbhinn ó úinéirí(bh)e an chóipchirt de chuid Uisce Éireann seachas mar a aontófar an doiciméad a úsáid i ndáil leis an tionscadal dá n-eisíodh an doiciméad chuige ar dtús.

© Cé go ndéanaimid gach cúis iomchuí cúram a dhéanamh ina iomlán, tugann Uisce Éireann an fhaisnéis seo i ndáil le bhfad a líonra faoi thalamh mar fhaisnéis ghinearálta amháin agus ní féidir leis an bhfaisnéis seo a thaispeáint go cruinn ná iomlán cá bhfuil Uisce Éireann i gceist leis féin ná ag daoine eile. Séanann Uisce Éireann freagracht as cruinneas, comhlánú, nó nádúr chun dáta na faisnéise a tugadh agus ní thabharfaidh Uisce Éireann aon ráthaíocht gealltanais ná barántaí maidir leis an bhfaisnéis agus séanann Uisce Éireann gach aon dliteanas a d'fhéadfadh a eascairt as aon earráidí nó as aon fhaisnéis ar bith.Níor cheart brath ar an bhfaisnéis seo má bhíonn bothaití nó aon oibreacha eile ar siúl i gcóngar an líonra faoi thalamh de chuid Uisce Éireann. Is faoi na páirtithe ag déanamh na dtochailtí nó aon oibreacha eile atá sé deimhin a dhéanamh go gcanathreoidar láthair chruinn an líonra faoi thalamh de chuid Uisce Éireann. Ní thabharfar faoi thús a chur le haon tochailt nó oibreacha eile.Ní leirítear naisc sheirbhíse de ghnáth ach tá ar an aonball go bhfaidhbdis a bheith ann.

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APPENDIX B

SURFACE WATER NETWORK CALCULATIONS & MODELLING ANALYSIS



CS CONSULTING

Civil, Structural & Traffic Engineering

Project:	Date:		
L106 Clongriffin Phase 2	07/11/2025		
	Designed by: AC	Checked by: NA	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase 2 Stormwater Network	Company Address: CS Consulting 1st Floor, 19-22 Dame Street D02 E267, Dublin		



Zone 7 Blue Roof

Type : Tank

Dimensions

Exceedance Elevation (m)	11.900
Depth (m)	0.200
Base Elevation (m)	11.700
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	0.00
Total Volume (m³)	526.600

Depth (m)	Area (m²)	Volume (m³)
0.000	2633.00	0.000
0.200	2633.00	526.600

Outlets

Outlet

Outgoing Connection	No Delay
Outlet Type	Depth / Flow
Invert Elevation (m)	11.700

Depth (m)	Outflow (L/s)
0.100	3.77
0.200	3.77
0.300	3.77

Advanced

Perimeter	Circular
Length (m)	105.304

Project:	Date:		
L106 Clongriffin Phase 2	07/11/2025		
	Designed by: AC	Checked by: NA	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase 2 Stormwater Network	Company Address: CS Consulting 1st Floor, 19-22 Dame Street D02 E267, Dublin		



Zone 8 Blue Roof

Type : Tank

Dimensions

Exceedance Elevation (m)	11.900
Depth (m)	0.200
Base Elevation (m)	11.700
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	0.00
Total Volume (m³)	369.800

Depth (m)	Area (m²)	Volume (m³)
0.000	1849.00	0.000
0.200	1849.00	369.800

Outlets

Outlet

Outgoing Connection	No Delay (1)
Outlet Type	Depth / Flow
Invert Elevation (m)	11.700

Depth (m)	Outflow (L/s)
0.100	2.81
0.200	2.81
0.300	2.81

Advanced

Perimeter	Circular
Length (m)	83.271

Project:	Date:		
L106 Clongriffin Phase 2	07/11/2025		
	Designed by: AC	Checked by: NA	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase 2 Stormwater Network	Company Address: CS Consulting 1st Floor, 19-22 Dame Street D02 E267, Dublin		



Zone 9 Blue Roof

Type : Tank

Dimensions

Exceedance Elevation (m)	11.900
Depth (m)	0.200
Base Elevation (m)	11.700
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	0.00
Total Volume (m³)	235.600

Depth (m)	Area (m²)	Volume (m³)
0.000	1178.00	0.000
0.200	1178.00	235.600

Outlets

Outlet

Outgoing Connection	No Delay (2)
Outlet Type	Depth / Flow
Invert Elevation (m)	11.700

Depth (m)	Outflow (L/s)
0.100	1.56
0.200	1.56
0.300	1.56

Advanced

Perimeter	Circular
Length (m)	60.609

Project:	Date:		
L106 Clongriffin Phase 2	07/11/2025		
	Designed by: AC	Checked by: NA	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase 2 Stormwater Network	Company Address: CS Consulting 1st Floor, 19-22 Dame Street D02 E267, Dublin		



Creche Tank

Type : Tank

Dimensions

Exceedance Elevation (m)	7.025
Depth (m)	0.705
Base Elevation (m)	6.320
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	60
Average Slope (1:x)	0.00
Total Volume (m³)	33.840

Depth (m)	Area (m²)	Volume (m³)
0.000	80.00	0.000
0.705	80.00	33.840

Outlets

Outlet

Outgoing Connection	Pipe (14)
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	8.468

Project:	Date:		
L106 Clongriffin Phase 2	07/11/2025		
	Designed by: AC	Checked by: NA	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase 2 Stormwater Network	Company Address: CS Consulting 1st Floor, 19-22 Dame Street D02 E267, Dublin		

FSR 1:100 +20%CC: 100 years: Increase Rainfall (%): +20: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Elevation (m)	Max. DS Elevation (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Zone 7 Blue Roof	FSR 1:100 +20%CC: 100 years: +20 %: 2160 mins: Summer	11.874	11.874	0.174	0.174	21.8	457.445	0.000	0.000	3.8	651.461	13.132	OK
Zone 8 Blue Roof	FSR 1:100 +20%CC: 100 years: +20 %: 2160 mins: Summer	11.882	11.882	0.182	0.182	16.2	335.928	0.000	0.000	2.8	487.599	9.160	OK
Zone 9 Blue Roof	FSR 1:100 +20%CC: 100 years: +20 %: 2160 mins: Summer	11.863	11.863	0.163	0.163	9.1	191.536	0.000	0.000	1.6	266.426	18.703	OK
Creche Tank	FSR 1:100 +20%CC: 100 years: +20 %: 360 mins: Winter	7.007	7.007	0.687	0.687	5.8	32.953	0.000	0.000	1.1	36.415	2.620	OK

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

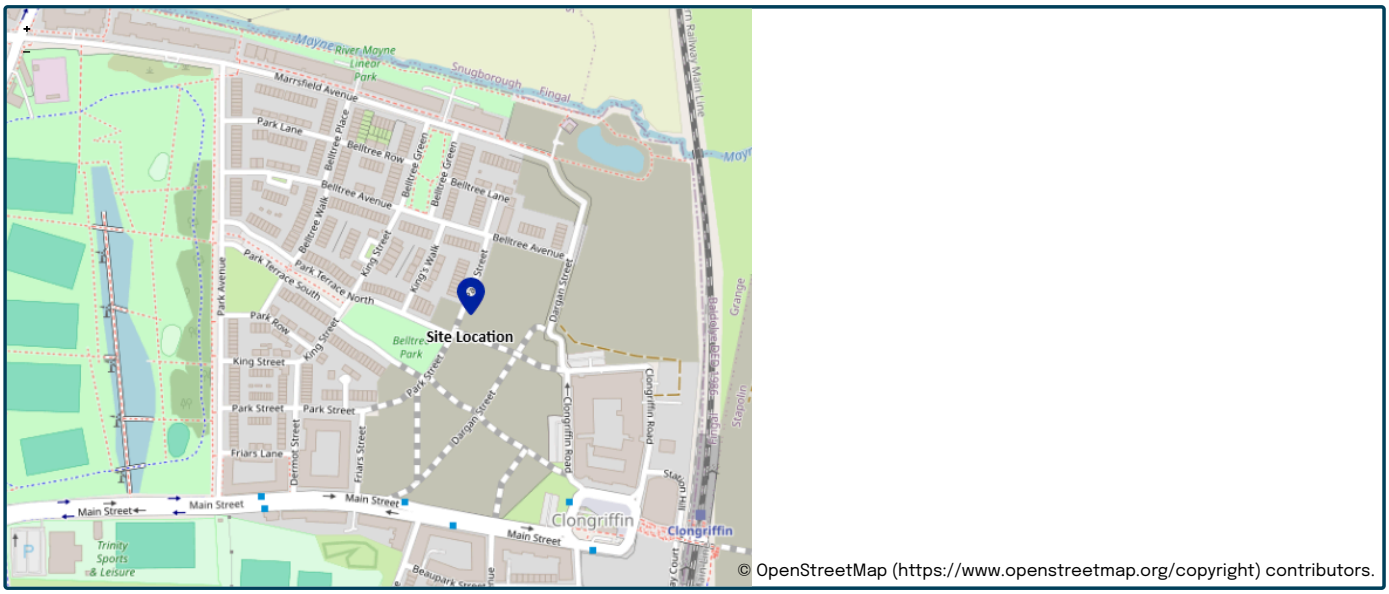
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	30/09/2025
Calculated by	NA
Reference	L106-CWL
Model version	2.1.2

Location

Site name	Clongriffin Wider Lands
Site location	Clongriffin, Dublin



Site easting (Irish Grid)	322863
Site northing (Irish Grid)	240969
Site easting (Irish Transverse Mercator)	722788
Site northing (Irish Transverse Mercator)	740994

Site details

Total site area (ha)	53.21 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	739 mm		947
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
QBar (IH124) (l/s)	102.62 l/s		

Growth curve factors

	My value		Map value
Hydrological region	12		12
1 year growth factor	0.85		
2 year growth factor	0.95		
10 year growth factor	1.72		
30 year growth factor	2.13		
100 year growth factor	2.61		
200 year growth factor	2.86		

Results

Method	IH124
Flow rate 1 year (l/s)	87.2 l/s
Flow rate 2 year (l/s)	97.5 l/s
Flow rate 10 years (l/s)	176.5 l/s
Flow rate 30 years (l/s)	218.6 l/s
Flow rate 100 years (l/s)	267.8 l/s
Flow rate 200 years (l/s)	293.5 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.1.2) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

APPENDIX C

SIMPLE INDEX APPROACH ANALYSIS

SIMPLE INDEX APPROACH: TOOL

HRW shall not be liable for any direct or indirect damage claim, loss, cost, expense or liability howsoever arising out of the use or impossibility to use the tools, even when HRW has been informed of the possibility of the same. The user hereby indemnifies HRW from and against any damage claim, loss, expense or liability resulting from any action taken against HRW that is related in any way to the use of the tool or any reliance made in respect of the output of such use by any person whatsoever. HRW does not guarantee that the tool's functions meet the requirements of any person, nor that the tool is free from errors.

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).

2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.

3. Relevant design examples are included in the SuDS Manual Appendix C.

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

DROP DOWN LIST — RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

USER ENTRY — USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

L106 - Clongriffin Wider Lands
SuDS Treatment Permeable Paving

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the 'runoff area', either:

- use the land use type with the highest Pollution Hazard Index

- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

	Runoff Area Land Use Description	*Hazard Level*	*Pollution Hazard Indices* Total Suspended	Metals	Hydrocarbons
Select land use type from the drop down list (or 'Other' if none applicable): →	Residential parking	Low	0.5	0.4	0.4
If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:					
Landuse Pollution Hazard Index		**Low**	**0.5**	**0.4**	**0.4**

DESIGN CONDITIONS

1	2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generically described by the suggested components, then 'Proprietary treatment system' or 'User defined indices' should be selected and a description of the component and agreed user defined indices should be entered in the rows below the drop down lists

	SuDS Component Description	*Pollution Mitigation Indices* Suspended Solids	Metals	Hydrocarbons
Select SuDS Component 1 (i.e. the upstream SuDS component) from the drop down list: →	Pervious pavement (where the pavement is not designed as an infiltration component)	0.7	0.6	0.7
Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list: →	Pond or wetland	0.7	0.7	0.5
Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list: →	None			
If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component descriptions and agreed user defined indices in these rows:				
Aggregated Surface Water Pollution Mitigation Index		**>0.95**	**0.95**	**0.95**

DESIGN CONDITIONS

1	2	3
SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B		
SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Ponds/wetlands should be preceded by an upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? Go to Step 2B

No ? Go to Step 2C

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

This step should be applied where a SuDS component is specifically designed to infiltrate runoff (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

'Groundwater protection' describes the proposed depth of soil or other material through which runoff will flow between the runoff surface and the underlying groundwater.

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

If the proposed groundwater protection is bespoke and/or a proprietary product and not generically described by the suggested measures, then a description of the protection and agreed user defined indices should be entered in the row below the drop down list

	Pollution Mitigation Indices Total Suspended Solids	Metals	Hydrocarbons
Select type of groundwater protection from the drop down list: → None			
If the proposed groundwater protection is bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row:			
Groundwater Protection Pollution Mitigation Index	**0**	**0**	**0**

DESIGN CONDITIONS

1	2	3	4

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

	Combined Pollution Mitigation Indices Total Suseonded	Metals	Hydrocarbons
Combined Pollution Mitigation Indices for the Runoff Area	**>0.95**	**0.95**	**0.95**

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

Sufficiency of Pollution Mitigation Indices Total Suspended	Metals	Hydrocarbons
Sufficient	**Sufficient**	**Sufficient**

DESIGN CONDITIONS

1
Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see *Chapter 7 The SuDS design process*). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

SIMPLE INDEX APPROACH: TOOL

HRW shall not be liable for any direct or indirect damage claim, loss, cost, expense or liability howsoever arising out of the use or impossibility to use the tools, even when HRW has been informed of the possibility of the same. The user hereby indemnifies HRW from and against any damage claim, loss, expense or liability resulting from any action taken against HRW that is related in any way to the use of the tool or any reliance made in respect of the output of such use by any person whatsoever. HRW does not guarantee that the tool's functions meet the requirements of any person, nor that the tool is free from errors.

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).

2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.

3. Relevant design examples are included in the SuDS Manual Appendix C.

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

DROP DOWN LIST — RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

USER ENTRY — USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

L106 - Clongriffin Wider Lands SuDS Treatment Residential Road

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the 'runoff area', either:

- use the land use type with the highest Pollution Hazard Index

- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

	Runoff Area Land Use Description	*Hazard Level*	*Pollution Hazard Indices* Total Suspended	Metals	Hydrocarbons	*DESIGN CONDITIONS* 1	2
Select land use type from the drop down list (or 'Other' if none applicable): →	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)	Medium	0.7	0.6	0.7		
If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:							
Landuse Pollution Hazard Index		**Medium**	**0.7**	**0.6**	**0.7**		

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generically described by the suggested components, then 'Proprietary treatment system' or 'User defined indices' should be selected and a description of the component and agreed user defined indices should be entered in the rows below the drop down lists

	SuDS Component Description	*Pollution Mitigation Indices* Suspended Solids	Metals	Hydrocarbons	*DESIGN CONDITIONS* 1	2	3
Select SuDS Component 1 (i.e. the upstream SuDS component) from the drop down list: →	Bioretention system (where the system is not designed as an infiltration component)	0.8	0.8	0.8	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B		
Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list: →	Pond or wetland	0.7	0.7	0.5	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Ponds/wetlands should be preceded by an upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	
Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list: →	None						
If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component descriptions and agreed user defined indices in these rows:							
Aggregated Surface Water Pollution Mitigation Index		**>0.95**	**>0.95**	**>0.95**			

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? Go to Step 2B
No ? Go to Step 2C

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

This step should be applied where a SuDS component is specifically designed to infiltrate runoff (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

'Groundwater protection' describes the proposed depth of soil or other material through which runoff will flow between the runoff surface and the underlying groundwater.

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

If the proposed groundwater protection is bespoke and/or a proprietary product and not generically described by the suggested measures, then a description of the protection and agreed user defined indices should be entered in the row below the drop down list

	Pollution Mitigation Indices Total Suspended Solids	Metals	Hydrocarbons	*DESIGN CONDITIONS* 1	2	3	4
Select type of groundwater protection from the drop down list: →							
None							
If the proposed groundwater protection is bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row:							
Groundwater Protection Pollution Mitigation Index	**0**	**0**	**0**				

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

	Combined Pollution Mitigation Indices Total Suseonded	Metals	Hydrocarbons
Combined Pollution Mitigation Indices for the Runoff Area	**>0.95**	**>0.95**	**>0.95**

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

Sufficiency of Pollution Mitigation Indices Total Suspended	Metals	Hydrocarbons	*DESIGN CONDITIONS* 1
Sufficient	**Sufficient**	**Sufficient**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see *Chapter 7 The SuDS design process*). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

APPENDIX D

INTERCEPTION / TREATMENT STORAGE CALCULATIONS



Treatment Area 1

Intreception

	m2	mm	∑	
Interception Area (5mm)	1738.00	0.005	8.69	m3 of storage required for interception
Permeable Paving Area (5mm)	345.50	0.005	1.73	m3
Bioretention Area (5mm x 5)	145.54	0.025	3.64	m3
Green Area (intercept inself - 5mm)	237.20	0.005	1.19	m3
			2.14	m3
			427.60	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	427.60	0.015	6.41	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	345.50	0.050	5.18	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	145.54	0.050	2.18	m3 to be provided in the subgrade
			0.95	m3 in excess

Treatment Area 2

Intreception

	m2	mm	∑	
Interception Area (5mm)	963.31	0.005	4.82	m3 of storage required for interception
Permeable Paving Area (5mm)	0.00	0.005	0.00	m3
Bioretention Area (5mm x 5)	105.10	0.025	2.63	m3
Green Area (intercept inself - 5mm)	273.52	0.005	1.37	m3
			0.82	m3
			164.29	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	164.29	0.015	2.46	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	0.00	0.000	0.00	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	105.10	0.100	3.15	m3 to be provided in the subgrade
			0.69	m3 in excess

Treatment Area 3

Intreception

	m2	mm	∑	
Interception Area (5mm)	8270.00	0.005	41.35	m3 of storage required for interception
Green Roof Extensive (5mm)	2730.00	0.005	13.65	m3
Green Roof Intensive (10mm)	1926.00	0.010	19.26	m3
Blue Roof (5mm)	3180.00	0.005	15.90	m3
			7.46	m3 in excess

Treatment Area 4

Intreception

	m2	mm	∑	
Interception Area (5mm)	968.38	0.005	4.84	m3 of storage required for interception
Permeable Paving Area (5mm)	69.04	0.005	0.35	m3
Bioretention Area (5mm x 5)	133.26	0.025	3.33	m3
Green Area (intercept inself - 5mm)	53.52	0.005	0.27	m3
			0.90	m3
			179.52	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	179.52	0.015	2.69	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	69.04	0.050	1.04	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	133.26	0.050	2.00	m3 to be provided in the subgrade
			0.34	m3 in excess

Treatment Area 5

Intreception

	m2	mm	∑	
Interception Area (5mm)	3017.01	0.005	15.09	m3 of storage required for interception
Permeable Paving Area (5mm)	304.39	0.005	1.52	m3
Bioretention Area (5mm x 5)	103.51	0.025	2.59	m3
Green Area (intercept inself - 5mm)	208.02	0.005	1.04	m3
			9.94	m3
			1,987.05	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	1987.05	0.015	29.81	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	304.39	0.250	22.83	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	103.51	0.250	7.76	m3 to be provided in the subgrade
			0.79	m3 in excess

Treatment Area 6

Intreception

	m2	mm	∑	
Interception Area (5mm)	6097.00	0.005	30.49	m3 of storage required for interception
Green Roof Extensive (5mm)	1585.00	0.005	7.93	m3
Green Roof Intensive (10mm)	1403.00	0.010	14.03	m3
Blue Roof (5mm)	2234.00	0.005	11.17	m3
			2.64	m3 in excess

Treatment Area 7

Intreception

	m2	mm	∑	
Interception Area (5mm)	696.90	0.005	3.48	m3 of storage required for interception
Permeable Paving Area (5mm)	110.00	0.005	0.55	m3
Bioretention Area (5mm x 5)	22.00	0.025	0.55	m3
Green Area (intercept inself - 5mm)	76.80	0.005	0.38	m3
			2.00	m3
			400.10	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	400.10	0.015	6.00	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	110.00	0.165	5.45	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	22.00	0.100	0.66	m3 to be provided in the subgrade
			0.10	m3 in excess

Treatment Area 8

Intreception

	m2	mm	∑	
Interception Area (5mm)	2314.40	0.005	11.57	m3 of storage required for interception
Permeable Paving Area (5mm)	190.10	0.005	0.95	m3
Underground Storage (5mm)	81.00	0.100	8.10	m3
Green Area (intercept inself - 5mm)	313.30	0.005	1.57	m3
			0.96	m3
			191.00	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	191.00	0.015	2.87	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	190.10	0.050	2.85	m3 to be provided in the subgrade
Underground Storage (30 % stone porosity)	81.00	0.050	1.22	m3 to be provided in the subgrade
			1.20	m3 in excess

Treatment Area 9

Intreception

	m2	mm	∑	
Interception Area (5mm)	2679.30	0.005	13.40	m3 of storage required for interception
Permeable Paving Area (5mm)	0.00	0.005	0.00	m3
Bioretention Area (5mm x 5)	224.40	0.025	5.61	m3
Green Area (intercept inself - 5mm)	1779.20	0.005	8.90	m3
			-1.11	m3
			1.11	m3 in excess (no treatment needed)

Treatment Area 10

Intreception

	m2	mm	∑	
Interception Area (5mm)	2469.20	0.005	12.35	m3 of storage required for interception
Permeable Paving Area (5mm)	338.00	0.005	1.69	m3
Bioretention Area (5mm x 5)	136.80	0.025	3.42	m3
Green Area (intercept inself - 5mm)	215.10	0.005	1.08	m3
			6.16	m3
			1,232.10	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	1232.10	0.015	18.48	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	338.00	0.150	15.21	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	136.80	0.100	4.10	m3 to be provided in the subgrade
			0.83	m3 in excess

Treatment Area 11

Intreception

	m2	mm	∑	
Interception Area (5mm)	3385.00	0.005	16.93	m3 of storage required for interception
Green Roof Extensive (5mm)	686.00	0.005	3.43	m3
Green Roof Intensive (10mm)	834.00	0.010	8.34	m3
Blue Roof (5mm)	1385.00	0.005	6.93	m3
			1.77	m3 in excess

Treatment Area 12

Intreception

	m2	mm	∑	
Interception Area (5mm)	664.20	0.005	3.32	m3 of storage required for interception
Permeable Paving Area (5mm)	43.40	0.005	0.22	m3
Bioretention Area (5mm x 5)	38.27	0.025	0.96	m3
Green Area (intercept inself - 5mm)	61.50	0.005	0.31	m3
			1.84	m3
			367.95	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	367.95	0.015	5.52	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	43.40	0.250	3.26	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	38.27	0.200	2.30	m3 to be provided in the subgrade
			0.03	m3 in excess

Treatment Area 13

Intreception

	m2	mm	∑	
Interception Area (5mm)	827.30	0.005	4.14	m3 of storage required for interception
Permeable Paving Area (5mm)	0.00	0.005	0.00	m3
Bioretention Area (5mm x 5)	87.90	0.025	2.20	m3
Green Area (intercept inself - 5mm)	88.50	0.005	0.44	m3
			1.50	m3
			299.30	m2 of area not intercepted require treatment

Treeatment

	m2	mm	∑	
Ramaining Area to be Treated (15mm)	299.30	0.015	4.49	m3 of storage required for treatment
Pearmeble Paving (30 % stone porosity)	0.00	0.000	0.00	m3 to be provided in the subgrade
Bioretention Area (30 % stone porosity)	87.90	0.175	4.61	m3 to be provided in the subgrade
			0.13	m3 in excess