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# SuDS Management Plan

## Unit 1, M50 Business Park

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Client: Creighton Properties LLC

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## Document Control Sheet

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# 1 Introduction

## 1.1 Overview

This SuDS Strategy and Management Plan has been prepared by Clifton Scannell Emerson Associates (CSEA) on behalf of Creighton Properties LLC in response to Further Information Request No. 3 as issued by South Dublin County Council in response to application for planning permission submitted for development at Unit 1, M50 Business Park, Ballymount, Dublin 12 (Reg Ref SD22A/0460).

This report has been revised as South Dublin County Council has requested a Clarification of Additional Information on the submitted Further Information Request. South Dublin County Council has requested additional SUDS measures such as rain gardens, green walls, detention basins, filter drains, swales etc be implemented across the site. This report outlines and details the additional SUDS measures which have been incorporated into the design in response to this Clarification of Additional Information.

The site is currently subject to the provisions of the South Dublin County Council (SDCC) Development Plan 2022-2028 and the requirements as outlined in the SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide (2022).

The above Plans and requirements emphasise the necessity for a SuDS type approach by providing an interconnected drainage system to manage and treat surface water from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site.

The surface water runoff from the proposed development will follow the SuDS and surface water management strategy to provide the necessary processes to control runoff frequency, flow rates and volumes prior to out falling to the Robinhood Stream. (See Figure 1 Extract from EPA Mapping indicating Robinhood Stream located northeast of the site.)







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Title: SuDS Management Plan Report

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- 22\_112-CSE-00-XX-DR-C-2112 Proposed Surface Water Attenuation System General Arrangement 1
  - 22\_112-CSE-00-XX-DR-C-2113 Proposed Surface Water Attenuation System General Arrangement 2
  - 22\_112-CSE-00-XX-DR-C-2114 Proposed Surface Water Attenuation System General Arrangement 3
  - Appendix G of this report
  - Appendix H of this report
-



## 2 Existing Site Characteristics

### 2.1 Existing Land Use

The existing site is a brownfield site with a total area of approximately 0.86 hectares, located within the M50 Business Park, Ballymount, Dublin 12. The existing site is currently being developed and is in use as a warehouse facility.

### 2.2 Geology

The Site Investigation of the existing ground conditions was undertaken Arup as the engineer and carried out by Site Investigations Ltd as the contractor.

Made ground comprising of grey silty sandy gravel was generally observed 0.90 metres below ground or less. Overburden comprising of brown sandy gravelly silty clay with cobbles extend to a maximum of 2.00 mbgl in trial pits and window sample logs, but a maximum of 8.10 mbgl in boreholes. Bedrock was recorded at depths ranging from 7.30 mbgl at RC02 to 8.10 mbgl RC01. See **Appendix A** for Borehole, Trial Pit and Window Sample Logs.

A soakaway test was proposed but had to be abandoned as the pit encountered boulder obstructions at 0.60 mbgl. See **Appendix B** for the Soakaway Test.

### 2.3 Topography

The site generally falls from southwestern boundary to northeastern boundary with existing ground levels varying between 68.14 m OD to 66.49 m OD. The existing site topography is shown in Figure 2.

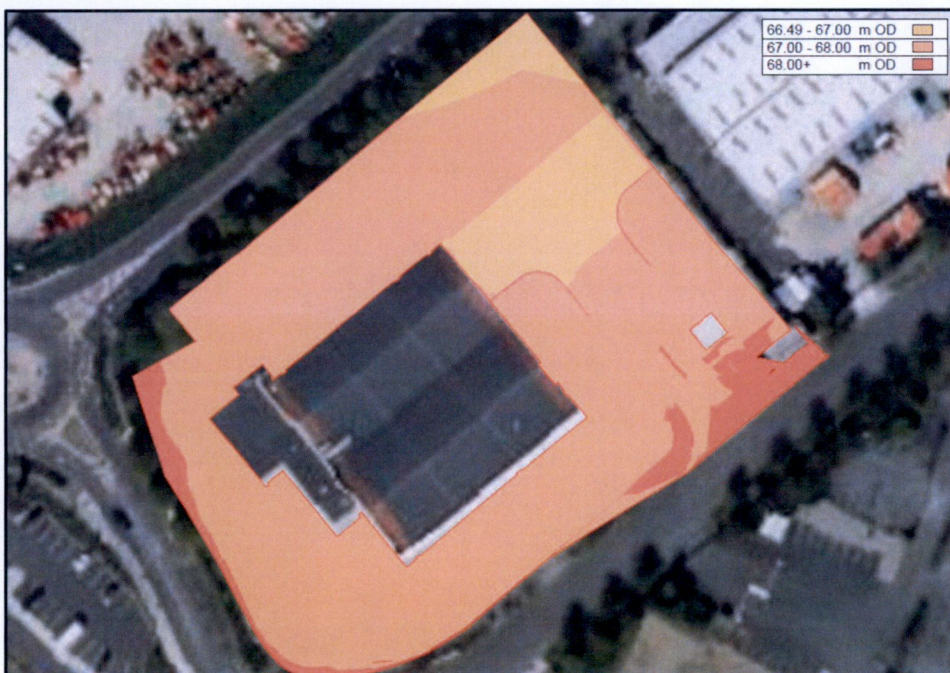


Figure 2 Existing Site Topography.



## **2.4 Flood Risk**

As outlined in report no. 22\_112-CSE-00-XX-RP-C-002 Site Specific Flood Risk Assessment, the site is within Flood Zone C with a low probability of flooding in accordance with the OPW Guidelines, 2009, "The Planning System and Flood Risk Management Guidelines for Planning Authorities".

## **2.5 Utilities**

The existing utilities within the site have been identified through Ground-Penetrating Radar (GPR) Survey carried out jointly by PCA and Precision Utility Mapping (refer to **Appendix C**). For the existing surface water drainage network refer to Section 2.3 of report no. 22\_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services; and drawing no. 22\_112-CSE-00-XX-DR-C-2100 Existing Surface Water Drainage Layout Plan.

## **2.6 Planning Requirements**

The following planning requirements constrain SuDS design:

- In the Confirmation of Feasibility (CoF), reference no. CDS22003496, Irish Water stipulated Proposed Option 1 for a 100mmØ metered pipe to connect existing fire flow mains to the fire flow tank was feasible without the requirement for upgrades to the Irish Water network (refer to **Appendix D** for the CoF). As a result, a pumphouse and sprinkler tanks to the total storage volume of 250.72 m<sup>3</sup> have been provisioned (refer to Section 2.3 of report no. 22\_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
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### 3 Flow Route Analysis

#### 3.1 Existing Flow Route Analysis

The existing flow route analysis is shown in Figure 3 below, which demonstrates how the existing site behaves. It depicts the existing flow conveyance, overflow arrangements and exceedance routes.



Figure 3 Existing Flow Route Analysis.



### 3.2 Modified Flow Route Analysis

The modified flow route analysis has been conducted in conjunction with the proposed development layout levels and inform the overall SuDS and surface water management strategy by predicting the flow of runoff within the site area. Figure 4 below, which demonstrates the modified flow route.

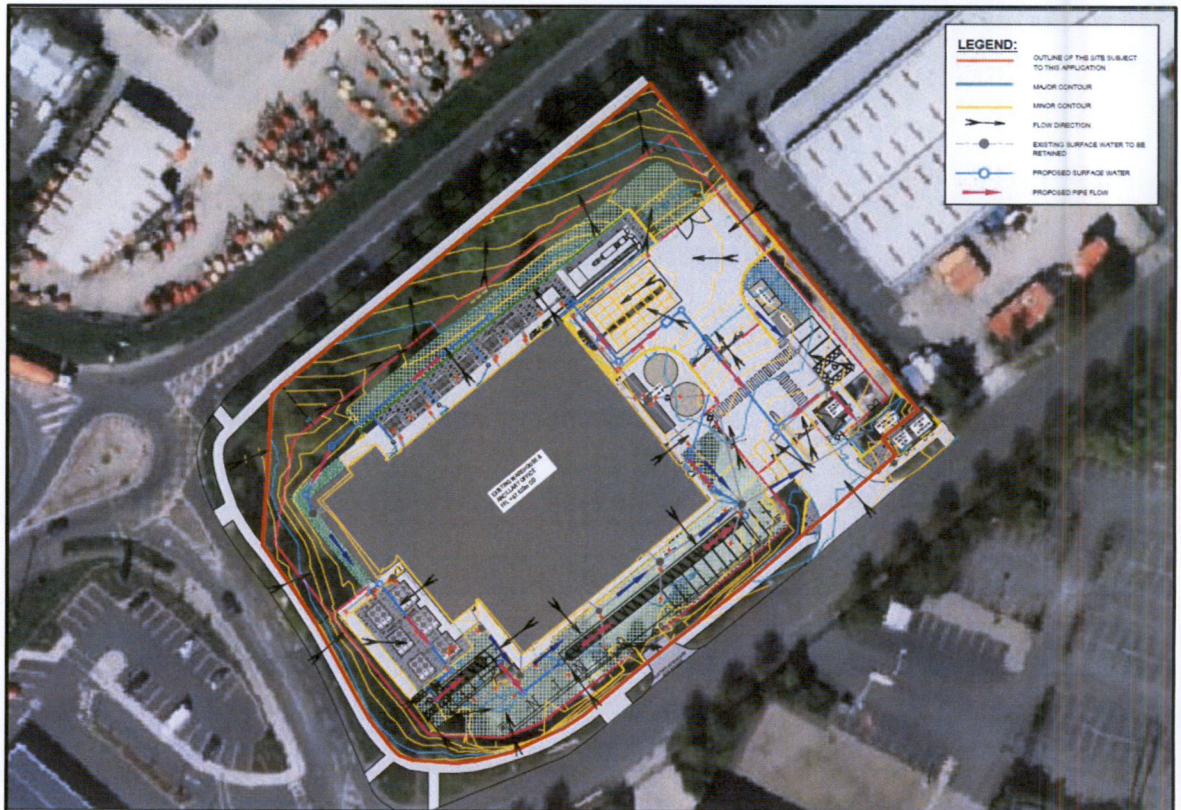


Figure 4 Modified Flow Route Analysis.



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## 4 Overview of Sustainable Urban Drainage Systems (SuDS)

The SuDS Manual C753 (2015) published by CIRIA defines sustainable drainage or SuDS is a way of managing rainfall that minimises the negative impacts on the quantity and quality of runoff whilst maximising the benefits of amenity and biodiversity for people and the environment.

In this section of the report site specific SuDS components are proposed, and the impacts on the quantity and quality of runoff and its associated benefits of amenity and biodiversity are discussed.

### 4.1 Proposed SuDS Components

SuDS should not be thought of as an individual component, but as an interconnected system designed to manage, treat and make best use of surface water, from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site (The SuDS Manual C753 (2015) published by CIRIA).

The selection of SuDS components are restricted by spatial constraints and existing services congestion. Spatial constraints are attributed to the planning requirements identified in Section 2.6, the existing building footprints to be retained, the design loadings of the existing building, the provision for surface water attenuation and the requirement for services are to be contained within the security perimeter.

As a result, the following SuDS components are provided:

#### 4.1.1 Green Roofs

Green roofs provide a living surface on top of buildings which intercepts and reduces surface water runoff by storing water in their substrate and supporting root uptake and evapotranspiration. Green roofs provide a means of attenuating and treating surface water runoff at the source. It is proposed to provide this solution at the proposed bike shelter, bin store and existing security hut.

#### 4.1.2 Rain Garden

Rain Gardens allow collect runoff, allowing it to pond temporarily on the surface before filtering through vegetation and underlying soils. Rain gardens provide a means of attenuating and treating surface water runoff at the source. In addition, it adds positive amenity value to the scheme.

#### 4.1.3 Permeable Paving (Grasscrete)

Permeable paving promotes the infiltration of rainwater through the surface and into to the underground storage void system before infiltrating into the ground. This offers an efficient means of intercepting runoff, reducing the volume and frequency of runoff and providing a treatment medium close to its source. For the proposed grasscrete areas, refer to Appendix G for the Proposed Permeable and Impermeable Areas.

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#### **4.1.4 Attenuation Tanks**

Attenuation storage tanks are used to create large below ground voided space to be used to temporarily store surface water runoff before infiltration, controlled release, or use.

Refer to the following planning drawings in relation to the provision of surface water attenuation tanks:

- 22\_112-CSE-00-XX-DR-C-2112 Proposed Surface Water Attenuation System General Arrangement 1
- 22\_112-CSE-00-XX-DR-C-2113 Proposed Surface Water Attenuation System General Arrangement 2
- 22\_112-CSE-00-XX-DR-C-2114 Proposed Surface Water Attenuation System General Arrangement 3.
- Appendix G
- Appendix H
- Appendix I

## **4.2 Water Quantity**

As discussed in Section 2.3 of report no. 22\_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services, existing site's internal network has no provision for surface water attenuation. Thus, unmanaged surface water runoff generated within the site increases flood risk within the site and is likely to increase flood risk elsewhere during critical storm events.

As outlined in RPT-22\_112-005 Proposed Surface Water Attenuation Overview, surface water attenuation is to be provided to manage the volumes of surface water runoff generated within the proposed development such that flood risk is managed. The discharge from the site is reduced from 332.78 l/s to 1.73 l/s in the 1 in 100 year event; a reduction of 99%. As a result, there is no resultant increase in flood risk downstream of the site.

## **4.3 Water Quality**

### **4.3.1 Source Control and Management Trains**

In order to satisfy the Water Quality SuDS Design criterion, a source control and management train approach is adopted. This requires several SuDS systems in series in order to have sufficient pollutant removal efficiency to treat runoff prior to discharging to the surface water network. This is in accordance with CIRIA SuDS Manual C753.

The volume and frequency of surface water runoff is delayed and attenuated at or near its source through the provision of the following source control SuDS components: green roofs and permeable paving. In addition to this, site control (i.e. attenuation storage tanks) have been provided to ensure that surface water runoff from the site, up to 1 in 100 year rainfall return period with 20% climate change allowance, does not exceed the permitted discharge rate of 1.73 l/s.

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The following SuDS management trains have been provided for roof and road runoff:

#### Road Runoff:

Within the permeable paving areas (i.e. grasscrete areas), road runoff is subjected to a minimum of 2-Stage treatment: Stage 1 – treatment within grasscrete permeable paving and Stage 2 – treatment within the bypass interceptor. Whereas in the hardstanding areas, road runoff is subjected to a minimum of 1-Stage treatment within the bypass petrol interceptor.

#### Roof Runoff:

Within the green roofed areas and rain garden, roof runoff is subjected to a minimum of 2-Stage treatment: Stage 1 – treatment within the green roof and Stage 2 – treatment within the bypass interceptor. The existing buildings to be retained have not be designed for green or blue roof loadings and as a result, roof runoff is subjected to a minimum of 1-Stage treatment within the bypass petrol interceptor. The exception to this is the Bike Shelter, the bin store and the security hut which are provided with green roofs and will be subject to 2-Stage treatment.

Refer to Appendix F for the Proposed Permeable and Impermeable Areas.

#### **4.3.2 Pollution Prevention Measures**

Petrol and oil interceptors are proposed in areas where there is risk of pollution by petrol, oil, silt, or other suspended materials. In accordance with European Standards pr EN 858: Parts 1 & 2 and Pollution Prevention Guidelines PPG3, all surface car parks shall be fitted with a Class I Light Liquid Separator before discharging to the surface water network.

#### **4.4 Amenity and Biodiversity**

Amenity relates to the usefulness and appearance of SuDS features and considers multi-functionality and visual quality. Key amenity elements include:

- Legibility – The proposed SuDS components are on the surface and are easy to understand how the surface water management system works. Blockages and other performance risks are easy to rectify through the provision of a surface water operations and maintenance plan (see **Appendix E**).
- Accessibility – all parts of the proposed SuDS scheme can be easily reached as there is no demarcation requirement.
- Multi-functionality and visual character – The proposed SuDS components are multifunctional as they do not only function as SuDS but have been incorporated into the overall landscape and site layout levels to provide visual characteristics.

Biodiversity considerations provide habitat and connectivity within and around the proposed development. In conjunction with the overall landscape of the site, green roofs provide topographical diversity and implicitly provide connectivity and habitat opportunities.



## 5 South Dublin County Council SuDS Checklist

Table 1 – SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide Designer's Checklist

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
<b>1. Data gathering</b>				
1.1	Information to understand site parameters including geology, topography, flood risk, utilities, landscape context, community and wildlife.	To understand site constraints that inform Concept Design.	Yes	The following were conducted: - Site Investigation (See Appendix A for Borehole and Trial Pit Logs and Appendix B for Infiltration Test Results.) - Topographical Survey (See Appendix F for Topographical Survey) - Flood Risk Assessment (See report no. RPT-22_112-CSE-00-XX-RP-C-002 Site Specific Flood Risk Assessment )
1.2	Planning requirements that influence SuDS design.	To be aware of planning constraints that impact SuDS design.	Yes	In Section 2.6 of this report, the following planning constraints were identified: - The provision of a pumphouse and sprinkler tanks to the total storage volume of 250.72 m <sup>3</sup> (refer to Section 2.3 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
<b>2. Flow route analysis</b>				
2.1	Existing flow routes	To understand site hydrology.	Yes	The site generally falls from southwestern boundary to northeastern boundary with existing ground levels varying between 68.14 to 66.49 metres Ordnance Datum (m OD).
2.2	Modified flow routes	To understand the impact of development.	Yes	The modified flow route provides the necessary conveyance, overflow arrangements and exceedance criteria based on the proposed development layout whilst ensuring the natural hydrology of the site is maintained.
<b>3. General SuDS design elements</b>				
3.1	Collection of rainfall runoff	Runoff retained at or near the surface.	Yes	Taking into account the inconclusive infiltration results outlined in the Site Investigation (See Appendix B) and the planning constraints listed in <b>Checklist Reference 1.2</b> , surface water runoff is retained at or near the surface where practicably possible.



Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
3.2	Source control	Primary treatment stage to protect the development.	Yes	Permeable surfaces (i.e. grasscrete roads), rain garden and green roofs at the Bike Shelter, Bin Store and the Security Hut have been provided.
3.3	Conveyance	At or near the surface.	Yes	Surface conveyance is used where practicably possible given the planning constraints listed in <b>Checklist Reference 1.2</b> .
3.4	Management train	SuDS components in series to manage quantity and quality.	Yes	<p>Where practicably possible, road runoff is subjected to no less than a 2-stage treatment process: stage 1 – treatment within the permeable paving and stage 2 – treatment within the bypass petrol inceptor. Whereas existing roof runoff is subjected to a minimum of 1-stage treatment within the hydrodynamic separator.</p> <p>A portion of the new building will to subject to 2-stage treatment – rain garden and bypass interceptor.</p> <p>Roof drainage from the bike shelter, security hut and bin store will be subject to 2-stage treatment – green roof and bypass interceptor.</p> <p>For certain sections of the existing hard standing area at the loadings bays areas it is only feasible to provide 1-stage treatment due to the nature of the operations (i.e. HGV turning movements).</p>
3.5	Sub-catchments	Dividing development into discreet parcels of land each with a SuDS component.	Yes	Where practicably possible grasscrete roads, rain garden, filter drains and swales have been provided given the planning site constraints listed in Checklist Reference 1.2. These elements intercept and treat the runoff prior to entering the overall attenuation for the entire catchment.
3.6	Storage	Indicate extent and location where runoff is stored.	Partially	Taking into account the planning constraints listed in Checklist Reference 1.2, it is not practicably possible to provide a long-term SuDS storage structure with a total volume of 514 m3 including freeboard (see RPT-22_112-005 Proposed Surface Water Attenuation Overview). In order to attenuate runoff for the 1 in 100 year storm event + 20% climate change, an attenuation storage tank as outlined in report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services.
3.7	Flow control	Location to demonstrate storage location.	Yes	A hydrobrake is provided downstream of the concrete storage tank (see Section 2.4.5 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
3.8	Outfall	Locations and method discharge.	Yes	Attenuated flows are discharged from the hydrobrake manhole into the tie-in existing manhole located at the northeast site boundary before outfalling into the



Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
				M50 Business Park drainage network southeast of the site. (See RPT-22_112-005 Proposed Surface Water Attenuation Overview).
<b>4. Quantity</b>				
4.1	Confirm interception losses will occur.	Demonstrate the use of SuDS components that provide interception losses.	Yes	Interception losses occur: - SuDS related losses due to infiltration: grasscrete roads, rain garden and green roofs at the Bike Shelter, Security Hut and Bin Store. - Non-SuDS related losses: full retention separator and bypass separator (See Section 2 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
4.2	Confirm how rate of flow from development will be reduced to Greenfield runoff rates	Demonstrate restricted flow rates are achievable. An increase in allowable discharge rates where direct discharge is made to estuary or sea will only be permitted in agreement with SDCC Drainage Department.	Yes	The area for the proposed development site is c.0.86 ha thus the allowable discharge rate to meet Greenfield runoff is 1.73 l/s. Discharge from the site will be controlled by means of an online hydrobrake vortex control (see RPT-22_112-005 Proposed Surface Water Attenuation).
4.3	Confirm how runoff will be managed to Greenfield runoff volumes.	Demonstrate that scale of SuDS will be sufficient to deal with volumes generated.	No	Given the planning constraints listed in <b>Checklist Reference 1.2</b> and service congestion, there is insufficient space for the proposed SuDS components to sufficiently manage surface water runoff to Greenfield runoff volumes. Therefore, storage and a flow control has been provided as per <b>Checklist Reference 3.6</b> and <b>3.7</b> .
4.4	Confirm climate change allowance and whether urban creep is applied.	Demonstrate additional volumes to be managed.	Yes	In accordance with South Dublin County Council Climate Change Action Plan (2019-2024), a climate change allowance of 20% has been adopted.



Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
4.5	Confirm 'long term storage'.	Demonstrate no increase in runoff from pre-development status.	Yes	As per <b>Checklist Reference 3.6 and 3.7</b> , long term storage with a total volume of 514 m <sup>3</sup> and a downstream online hydrobrake vortex control with allowable discharge of 1.73 l/s is provided to ensure that Greenfield runoff rate is not exceeded. (See RPT-22_112-005 Proposed Surface Water Attenuation Overview.)
<b>5. Quality</b>				
5.1	Confirm 'treatment stage' requirements.	Demonstrate SuDS components used in series to mitigate 'pollution hazard level'.	Yes	Where practicably possible, road runoff is subjected to no less than a 2-stage treatment process: stage 1 – treatment within the permeable paving and stage 2 – treatment within the bypass petrol inceptor. Whereas existing roof runoff is subjected to a minimum of 1-stage treatment within the hydrodynamic separator.  A portion of the new building will to subject to 2-stage treatment – rain garden and bypass interceptor.  Roof drainage from the bike shelter, security hut and bin store will be subject to 2-stage treatment – green roof and bypass interceptor.  For certain sections of the existing hard standing area at the loadings bays areas it is only feasible to provide 1-stage treatment due to the nature of the operations (i.e. HGV turning movements).
5.2	Confirm source control is present.	Demonstrate protection of development to enable amenity and biodiversity benefits.	Yes	Where practicably possible, source control such as permeable surfaces and rain gardens provide the first stage of treatment, intercepting primary pollution and reducing runoff flow rates.
5.3	Confirm interception losses.	Demonstrate everyday pollution retained on site.	Yes	Interception losses occur: - SuDS related losses due to infiltration: grasscrete roads, rain garden and green roofs. - Non-SuDS related losses: full retention separator and bypass separator (See Section 2 of the report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).



Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
<b>6. Amenity</b>				
6.1	Legibility	An understanding of how the SuDS function by people using or managing the site.	Yes	The proposed SuDS components are on the surface and are easy to understand how the surface water management system works. Blockages and other performance risks are easy to rectify through the provision of a surface water operations and maintenance plan (see Appendix E).
6.2	Accessibility	All parts of the SuDS easily reached and safe for recreation and maintenance. Safety by design.	Yes	All parts of the proposed SuDS scheme can be easily reached as there is no demarcation requirement.
6.3	Multi-functionality	All parts of the SuDS landscape usable whenever possible.	Yes	The proposed SuDS components are multifunctional as they do not only function as SuDS but have been incorporated into the overall landscape and site layout levels to provide visual characteristics.
6.4	Visual character	All elements of the SuDS design attractive (or at least visually neutral, e.g., inlets, outlets, and control structures) and safe.	Yes	Refer to <b>Checklist Reference 6.3</b> .
<b>7. Biodiversity</b>				
7.1	Clean water	A controlled flow of clean water' within and outside the site using 'source control' and the 'management train'	Yes	Surface water conveyance and open SuDS features such as the grasscrete roads, rain garden and green roofs, incorporated into the overall landscape site layout plan, provide topographical diversity and implicitly provide connectivity and habitat opportunities.
7.2	Connectivity	Links to outside and within development to ensure plants and animals can travel between habitat areas.	Yes	Refer to <b>Checklist Reference 7.1</b> .
7.3	Topographical diversity	Variable vertical and horizontal structures for complex habitat development.	Yes	Refer to <b>Checklist Reference 7.1</b> .



Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
7.4	Habitat creation	Exploit opportunities through ecological design.	Yes	Refer to <b>Checklist Reference 7.1</b> .
7.5	Sympathetic management	Create a mosaic of habitat types through maintenance.	No	Due to planning constraints, the site serves as a connector providing habitat opportunities through incorporating the proposed SuDS components into the overall landscaping and provision of applicable maintenance.



## 6 Conclusion

The existing site characteristics (such as geology, topography, flood risk and utilities) and the applicable Irish Water planning requirements that influence the overall SuDS strategy and design have been identified. The natural hydrology of the site has been investigated through flow route analysis in order to understand the impact of the proposed development.

Subsequently, the strategy for managing SuDS and surface water runoff was developed. SuDS components have been provided to control runoff frequency, flow rates, volumes and reduce concentrations of contaminants to acceptable levels. The proposed treatment train approach assures that both runoff quantity and quality are addressed through the overall techniques of pollution prevention and source control, whilst maximising the benefits of amenity and biodiversity.

In addition, this report provides a comprehensive response to the Clarification of Additional Information on the submitted Further Information Request. South Dublin County Council has requested additional SUDS measures be implemented across the site. The addition of the green roofs, and rain garden, whilst adding amenity value to the scheme, has been incorporated into the site. These additional SUDS measures have reduced the underground storage by 14.0m<sup>3</sup> and in addition, the surface water drainage treatment train has been improved as an addition 150m<sup>2</sup> is now subject to a two-stage treatment process.

The proposed strategy aligns with the provisions of the South Dublin County Council (SDCC) Development Plan 2022-2028 and the requirements as outlined in the SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide (2022) as far as practicably possible.