DOCUMENT TITLE

PLANNING APPLICATION SD21A/0259

ADDITIONAL INFORMATION RESPONSE-SuDS

FOR DWELLING AT
1 BEVERLY DRIVE, SCHOLARSTOWN

CLIENTS
MARK AND DAVID RENWICK

PROJECT NO. 2113

REVISION	DATE
1.0	19/01/2022

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1.0 INTRODUCTION

SDCC COUNCIL REFERENCE: SD21A/0259

This report has been prepared on behalf of Mark and David Renwick (hereafter referred to as the clients) as part of the response to paragraph 4 of the **further information request** (FIR) from South Dublin County Council (SDCC) issued with respect to the planning application referenced above.

Paragraph 4 requests the following information:

> *SDCC Water Services have raised concerns in regard to the setback of the proposed development from the existing surface water main and lack of information on sustainable drainage systems (SuDS). The applicant is requested to submit the following information:*
> *(1) A revised full set of drawings showing the proposed development revised so that it is sufficiently set back from the existing surface water main east of the site.*
> *(2) Information on the proposed SuDS for the proposed development.*

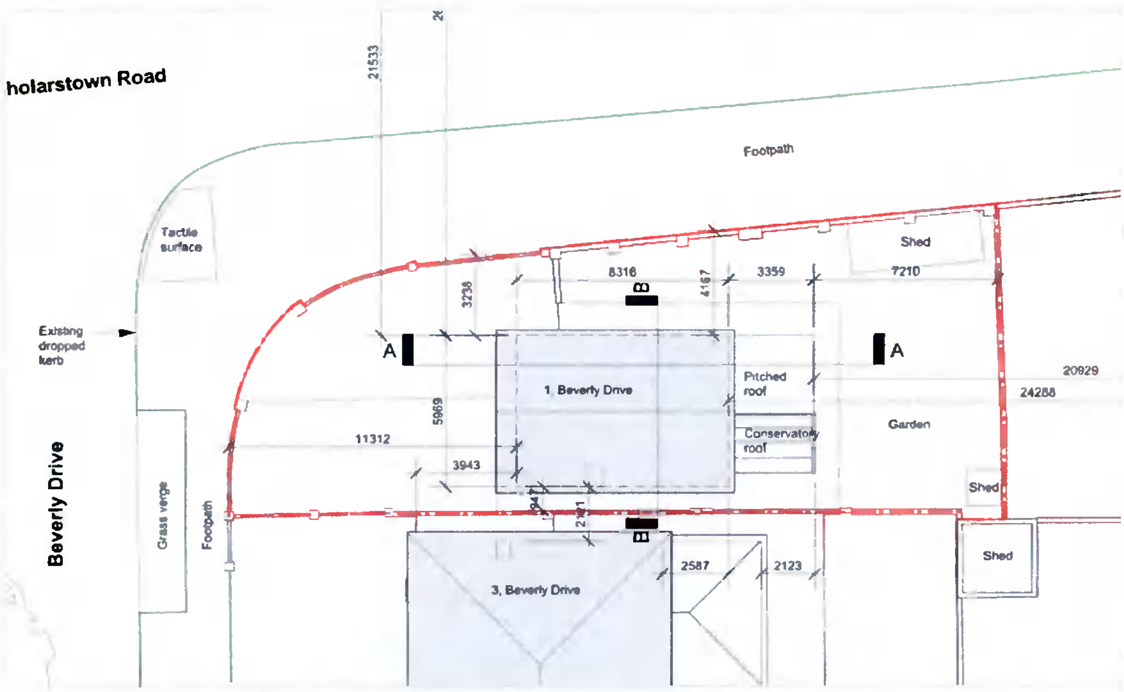

Fig 1.1: Existing site plan no 1 Beverley Drive. Site boundary denoted in DASHED RED

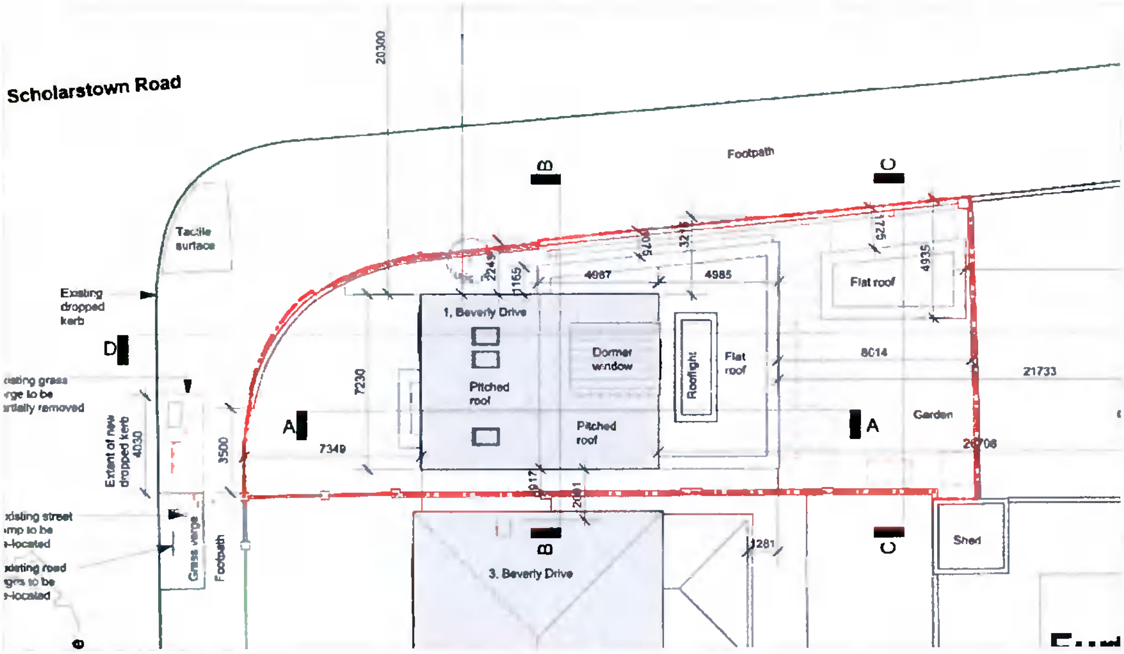

Fig 1.2: Proposed site plan for no 1 Beverley Drive.

2.0 SCOPE OF REPORT

2.1 Brief

This report addresses part (2) of section 4 by reviewing the principles of SuDS, determining the most appropriate SuDS options suitable for the proposed development and assessing the impact on the public drainage network of the proposed development.

This report has been prepared by with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

2.2 References

The following documents have been reviewed and provide the basis for recommendation of the most applicable SuDS measures for the project as proposed

- SDCC Water and Drainage Considerations
- Dublin City Development Plan :SW Drainage and Sustainable Urban Drainage Systems
- CIRIA Report C753 The SuDS Manual-V6
- Greater Dublin Region Code of Practice for Drainage Works

3.0 SuDS ASSESSMENT

3.1 Definition

The function and purpose behind SuDS (sustainable drainage systems) is to employ diverse and bespoke water drainage solutions which maximise the opportunities and benefits of water management and reduce the traditional reliance on traditional surface water drainage systems.

There are four main categories of benefits that can be achieved by SuDS: **water quantity, water quality, amenity** and **biodiversity**. These are the four pillars which underpin the design of all SuDS systems.

3.2. SuDS Systems Overview

There are a diverse range of different SuDS drainage systems developed for different applications which adhere to the core principles outlined above but they can all be grouped under the following categories:

Rainwater harvesting systems - components that capture rainwater and facilitate its use within the building or local environment.

Previous surfacing systems structural surfaces that allow water to penetrate (thus reducing the proportion of run off) but is conveyed to the drainage system, e.g. green roofs, pervious paving. Many of these systems also include some surface storage and treatment.

Infiltration systems - components that facilitate the infiltration of water into the ground. These often include temporary storage zones to accommodate run off volumes before slow release to the soil.

Conveyance systems - components that convey flows to downstream storage systems. Where possible, these systems also provide flow and volume control and treatment, eg swales.

Storage systems - components that control the flows and, or possible, volumes of run off being discharged from the site, by storing water and releasing it slowly (attenuation). These systems may also provide further treatment of the run off, eg ponds, wetlands and detention basins.

Treatment systems - components that remove or facilitate the degradation of contaminants present in the run off.

3.3. System Options

The following table details all principal SuDS conforming designs recognisable as separate systems. It is usual practice that drainage designers employ one or more of these components in the design of an overall site-specific SuDS system.

Types of SuDS components	
Component type	**Description**
Rainwater harvesting systems	Rainwater is collected from the roof of a building or from other paved surfaces in an over-ground or underground tank for use on site. Depending on its intended use, the system may include treatment elements. The system should include specific storage provision if it is to be used to manage runoff to a design standard.
Green roofs	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation. Blue roofs store water at roof level, without the use of vegetation.
Infiltration systems	These systems collect and store runoff allowing it to infiltrate into the ground. Overlying vegetation and underlying unsaturated soils can offer protection to groundwater from pollution risks.
Proprietary treatment systems	These subsurface and surface structures are designed to provide treatment of water through the removal of contaminants.
Filter strips	Runoff from an impermeable area is allowed to flow across a grassed or otherwise densely planted area to promote sedimentation and filtration.
Filter drains	Runoff is temporarily stored below the surface in a shallow trench filled with stone/gravel, providing attenuation, conveyance and treatment (via filtration).
Swales	A vegetated channel is used to convey and treat runoff (via filtration). These can be "wet", where water is designed to remain permanently at the base of the swale, or "dry" where water is only present in the channel after rainfall events. It can be lined, or unlined to allow infiltration.
Bioretention systems	A shallow landscaped depression allows runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils prior to collection or infiltration. In its simplest form it is often referred to as a rain garden. Engineered soils (gravel and sand layers) and enhanced vegetation can be used to improve treatment performance.
Trees	Trees can be planted within a range of infiltration SuDS components to improve their performance, as root growth and decomposition increase soil infiltration capacity. Alternatively they can be used as standalone features within soil-filled tree pits, tree planters or structural soils, collecting and storing runoff and providing treatment (via filtration and phytoremediation).
Pervious pavements	Runoff is allowed to soak through structural paving. This can be paving blocks with gaps between solid blocks, or porous paving where water filters through the block itself. Water can be stored in the sub-base and potentially allowed to infiltrate into the ground.
Attenuation storage tanks	Large, below-ground voided spaces can be used to temporarily store runoff before infiltration, controlled release or use. The storage structure is often constructed using geocellular or other modular storage systems, concrete tanks or oversized pipes.
Detention basins	During a rainfall event, runoff drains to a landscaped depression with an outlet that restricts flows, so that the basin fills and provides attenuation. Generally, basins are dry, except during and immediately following the rainfall event. If vegetated, runoff will be treated as it is conveyed and filtered across the base of the basin.
Ponds and wetlands	Features with a permanent pool of water can be used to provide both attenuation and treatment of runoff, where outflows are controlled and water levels are allowed to increase following rainfall. They can support emergent and submerged vegetation along their shoreline and in shallow, marshy zones, which enhances treatment processes and biodiversity.

Table 3.1: SuDS systems.

3.4. Appropriate Site-Specific Systems

Because of the limited garden area space available at the location soakaways and ground drains will not be suitable as the requirement for clearance of minimum 5m from structural foundations prescribed in BRE365 and TGD part H cannot be met. The limited space would also impact on the capacity for stable tree root structure to form, negating the use of tree pits as an option.

Proprietary treatment systems, swales, bioretention systems, detention systems, ponds and wetlands are designed for large area treatment and are not applicable to single houses. Attenuation is arguably inappropriate for a project of this size as the greenfield runoff rate is less than 2 l/s. Please refer to section 4 of this report for further details including calculation.

The remaining options are **green roofs, pervious (permeable) pavements and rainwater harvesting** and it is proposed to incorporate these three elements in the drainage design.

3.4.1 Green Roofs

Green roofs are areas of living vegetation, installed on the top of buildings, for a range of reasons including visual benefit, ecological value, enhanced building performance and the reduction of surface water run off. The different types of green roof can be categorised as follows:

- Extensive roofs. have low substrate depths (and therefore low loadings on the building structure), simple planting and low maintenance requirements; they tend not to be accessible.
- Intensive roofs (or roof gardens) have deeper substrates (and therefore higher loadings on the building structure) that can support a wide variety of planting but which tend to require more intensive maintenance; they are usually accessible.

In this case an extensive roof type would be most appropriate. This will be to specialist design (by the greenroof installers) conducted in liaison with a structural engineer to ensure the roof can accommodate the extra loading. It may be assumed that mixed seed sedum planting will be utilised. This will require some minimum maintenance such as fertilising once a year etc.

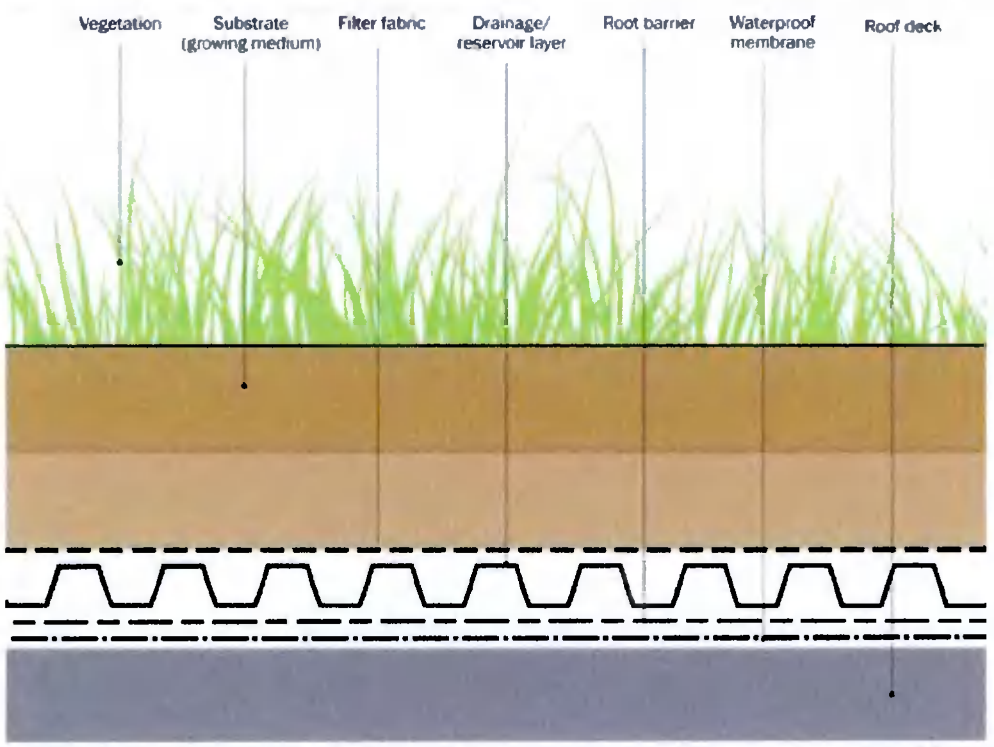

Fig 3.4.1: Typical green roof buildup.

3.4.2 Permeable Pavements

Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while at the same time allowing rainwater to infiltrate through the surface and into the underlying structural layers. Some typical examples are shown in the figure below.

Permeable pavement drainage has been shown to have decreased concentrations of a range of surface water pollutants when compared to impermeable surface drainage, including heavy metals, oil and grease, sediment etc. It is proposed in this application to use concrete paving blocks set in a layer of bedding sand. The sand will act as catchment for first flush contaminants but in addition to this it is proposed to install a geotextile layer above the subgrade material as a secondary barrier. Please refer to the middle section of the indicative figure below.

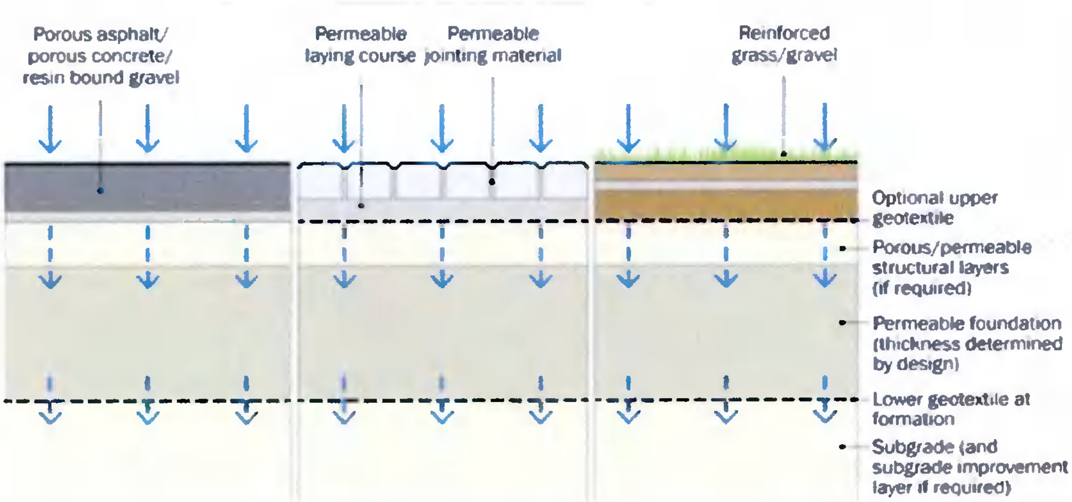

Fig 3.4.2: Typical pervious/permeable pavement buildup details.

3.4.3 Rainwater Harvesting

Rainwater harvesting refers to the retention and storage of rainwater for non potable applications. It is proposed to fit a 200l water butt to one of the down pipes to the rear of the house for use in gardening applications

Fig 3.4.3: Typical water butt with downpipe diverter and inline filter..

4.0 GREENFIELD RUNOFF RATE and EXISTING S.W. FLOW RATE

A standard greenfield runoff calculation is given below which demonstrates that that Qbar for the site is 0.1l/s well below the allowable attenuated flow level threshold of 2l/s.

The existing house has a roof area of 78.34m^2 and combined with the front drive area (53.3 m^2) which drains out onto the road gives a total contributing area of 131.64 m^2 to the public system. The area of the pitched roof of the proposed house and ancillary building measures 92.4 m^2 total, which, combined with the 52.8 m^2 flat (green) roof proposed, will represent a reduction in contributing area (and consequently surface water volumes) to the public network compared with the present house and its impermeably paved parking area.

Assessment of Allowable Runoff Rates:

GREEN FIELD RUNOFF RATES

Project:	1 Beverly Drive				
Job No:	2113				
Date:	12/01/2022				
Q_{bar} =	0.00108 x Area$^{[illegible]}$ x SAAR$^{[illegible]}$ x Soil$^{[illegible]}$				
Site area =	304 m^2	0.000304 km^2			
SAAR [1] =	835 mm				
Soil [1] =	3 Soil Index	0.37			
Calculate Q_{bar} for 50 ha site and interpolate for				304	m2
	50 ha =	0.5	km^2		
For 50 ha Site:	Q_{bar} =	0.191486 m^3/s =		191.49	l/s
For Above Site:	Q_{bar} =	0.000116 m^3/s =		0.10	l/s

Allowable Discharge

	Factor	Discharge	
1 year	0.85	0.10	l/s
30 year	2.13	0.20	l/s
100 year	2.61	0.30	l/s

Notes:
1) Obtained from UKSUDs website

Notes:

1) Total area of site = 304m^2

2) Max allowable attenuated rate =2 l/s/ha

3) 3 = Intermediate Soil (silty)
(Assumed pending SI results)

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6.7.2 Assessment of Greenfield Runoff Volumes

The estimation of runoff volume from pervious areas using FSSR 16 is detailed in Appendix D. However this closely approximates to an assumption that runoff volume is equal to the SPR value for the soil type. Table 6.7 summarises the SPR value for the 5 soil types used in the FSR procedure.

SOIL	SPR value (% runoff)
1	0.1
2	0.3
3	0.37
4	0.47
5	0.53

Table 6.7 SPR Values for SOIL (pervious surface runoff factor)

Table 4.1: Greenfield Runoff rate calculation

5.0 CONCLUSION

We have reviewed the guideline documentation, project plans and SuDS design specifications and recommend the inclusion of a **green roof** for the flat roof area, **permeable paving** for the parking and pedestrian traffic areas and **rainwater harvesting** using a water butt as the most appropriate surface water management systems for the proposed project which comply with the principles of SuDS.

The inclusion of these measures will result in a net decrease of rainfall runoff entering the public system compared with those volumes generated by the current property.

Nial O Brien BE, MIEI
19th January 2022