Proposed Development at
Raheen, Brittas, Co. Dublin

James & Brenda Tracey

Planning Submission Report to Engineering Services
SOUTH DUBLIN County Council

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Jimmy Callaghan Consulting Engineers							

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1 INTRODUCTION

Jimmy Callaghan Consulting Engineer was engaged by James and Brenda Tracey Club to prepare planning drawings and calculations for their site at Raheen, Brittas, Co. Dublin.

The proposed development will consist of a proposed Domestic Garage on their lands at the above location.

The proposed surface water run-off from the new garage roof will be channelled into a new soakaway system on the subject site. It is proposed to add SUDS features in form of the Filter Drains and Soakage Areas.

There will be no works to the existing foul network.

1.1 LOCATION

The development is located on the couple's property at Raheen, Brittas, Co. Dublin. The family dwelling is situated in front of he proposed garage and this is serves by a septic tank system to the front of the property, the surface water run off from this property outfalls into existing soakaways. Refer to Figure 1 for site location.

Figure 1 - Site Location

2 SURFACE WATER NETWORK

2.1 EXISTING SURFACE WATER

The existing surface water network connects to the a number of existing soakaways within the client's lands. These soakaways were approves on previous planning applications

2.2 SURFACE WATER NETWORK DESIGN

The drainage network was designed following the Greater Dublin Strategic Drainage Study (GDSDS) and will cater for the proposed garage. It is anticipated that there will be no increase on the hardstanding area.

2.3 SUSTAINABLE DRAINAGE SYSTEMS (SUDS)

The four main pillars of Suds design are water quantity, quality, amenity and biodiversity. Suds features can take many forms both above and below ground and can include planting and proprietary / manufactured products.

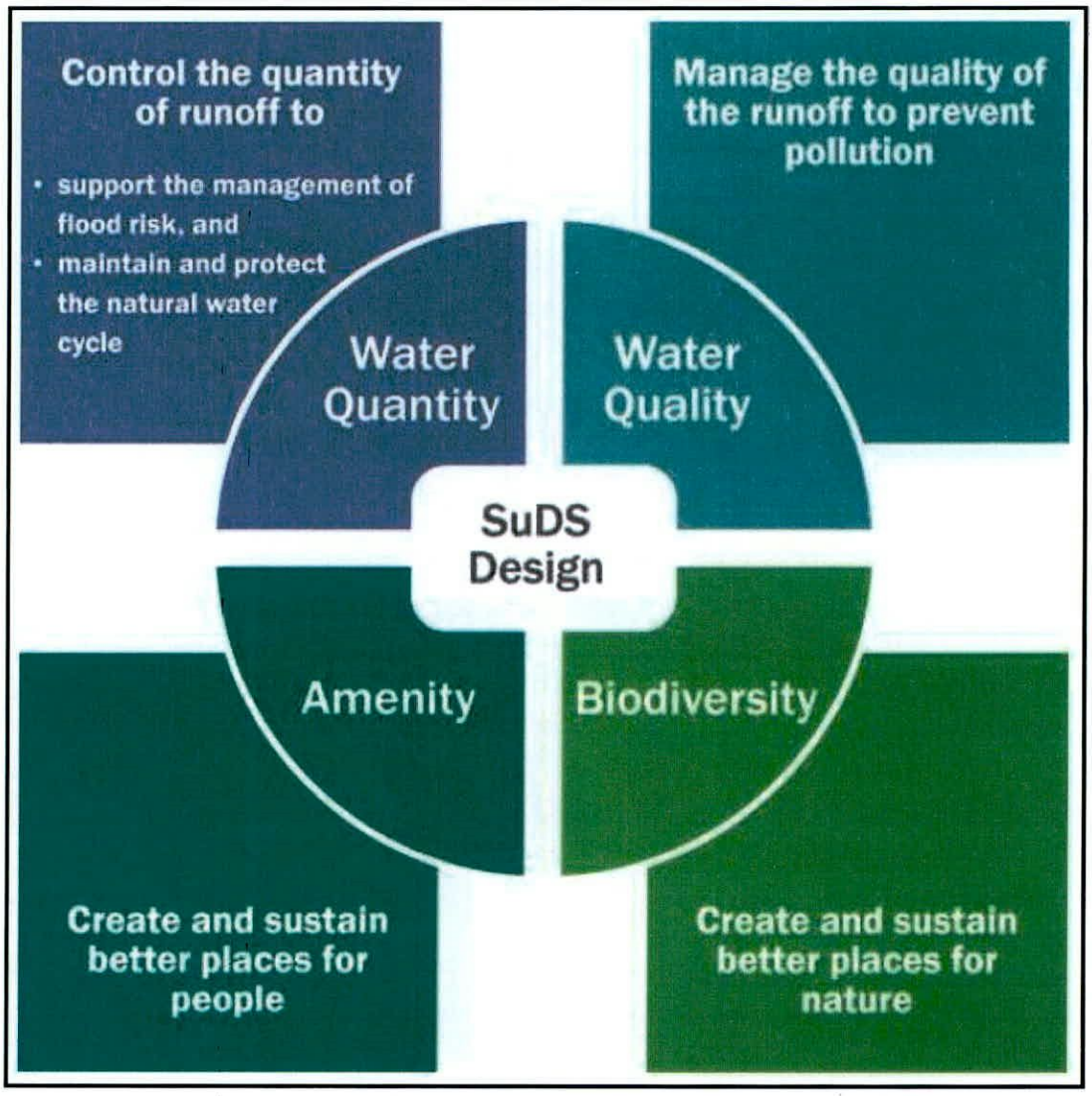

Figure 2 - The four pillars of SuDS design (CIRIA C753)

It is proposed to use a sustainable urban drainage system (SuDS) approach to storm water management for the run-off from the roof of the new garage. The overall strategy aims to provide an effective system to mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in stormwater

The SUDs features proposed are as follows:

2.4 SURFACE WATER ATTENUATION

The proposed soakaway area will provide attenuation volume for the proposed shed.

2.5 SURFACE WATER STORAGE

It is proposed to provide underground storage volume through the filter material that forms part of the soakaway area. Refer to drainage drawing for details.

2.6 WATER QUALITY MANAGEMENT

SuDS drainage designs collect and treat surface water runoff as close to source as possible. Surface water runoff is managed using a treatment train approach. This ensures that the quantity and quality of surface water runoff are addressed through the techniques of Pollution Prevention, Source Control, Site Control and Regional Control. The treatment train approach divides the drainage elements of the development into sub catchments with different drainage characteristics and land uses.

The treatment train approach applied to the proposed development is roof runoff discharging to the soakaway area and associated filter drain. We have used the simple index approach as per section 26.7.1 from CIRIA C753.

2.7 INTERCEPTION STORAGE

Interception storage is required in order to ensure that no run-off passes directly to the ditch for the majority of rainfall events with depths of 5mm or less. This is aimed

at trying to replicate greenfield runoff response when no runoff is likely to take place for most small events. This type of storage is principally aimed at river water quality protection - polluted water is prevented from entering the water course for all small rainfall events. A 5mm rainfall threshold which, if effectively applied, will reduce the number of events with runoff into a receiving water body by around 50% and reduce total runoff volumes from the site by a significantly higher proportion.

(Impermeable Area)x(5mm rainfall depth)x(80% paved runoff factor)

(12*12)x0.005x0.8 = 0.576m^3

The required Interception storage for this application is irrelevant, however it is proposed to provide interception storage volume as per calculations below.

This will be provided via soakage area and associated filter drain applied to the surface water network.

(Soakaway Area)x(37% of void ratio)x(0.15m of depth)

18*1x0.37x0.15 = 0.99m^3.

Therefore, the proposed interception storage will give a volume of 0.99m^3.

2.8 WATER QUALITY MANAGEMENT: DESIGN METHODS (TREATMENT VOLUME)

The approach to water quality risk management will be the simple index approach as per section 'Chapter 26 - CIRIA C753'.

2.8.1 Hazard Classification

Runoff from non-residential roofs is classed as 'low' and commercial yards and roads as 'medium' in terms of hazard classification (refer to Figure 3 below). A simple index approach will be used for this calculation.

TABLE 4.3 Minimum water quality management requirements for discharges to receiving surface waters and groundwater

Land use	Pollution hazard level	Requirements for discharge to surface waters, including coasts and estuaries[2]	Requirements for discharge to groundwater
Residential roofs	Very low	Removal of gross solids and sediments only	
Individual property driveways, roofs (excluding residential), residential car parks, low traffic roads (eg cul de sacs, home zones, general access roads), non-residential car parking with infrequent change (eg schools, offices)	Low	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources1* In England and Wales, Risk Screening[4] must be undertaken first to determine whether consultation with the environmental regulator is required. In Northern Ireland, the need for risk screening should be agreed with the environmental regulator.

Figure 3

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 4

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 5

As per Table 26.2 of CIRIA SUDS Manual 2015 (Figure 4) the Pollution Hazard level is 'very low' for residential roof and 'low' for non-residential roof.

As per Table 26.2 of CIRIA SUDS Manual 2015 (Figure 5) the Pollution Hazard level is classed as 'medium' for retail car parking/roads which is treated using a combination of soakaway areas and filter drains. The design below shows the results for TSS, Metals and Hydrocarbons.

TOTAL SUDS MITIGATION INDEX => Mitigation index1 +0.5(Mitigation index2)

Table 1 - TSS for Roofs

Hazard Indice for **TSS for Roofs**	**0.3**
Mitigation index**1** (Soakaway Area)	**0.8**
Mitigation index**2** (Filter drain)	**0.4**
Total Suds Mitigation Index	(**0.8**+(0.5***0.4**)=1.0
Conclusion	1.0>0.3
Minimum Cleansing Achieved	

Table 5 - Metals for Roofs

Hazard Indice for **Metals for Roofs**	**0.2**
Mitigation index**1** (Soakaway Area)	**0.8**
Mitigation index**2** (Filter drain)	**0.4**
Total Suds Mitigation Index	(**0.8**+(0.5***0.4**)=1.0
Conclusion	1.0>0.2
Minimum Cleansing Achieved	

Table 6 - Hydrocarbons for Roofs

Hazard Indice for **Hydrocarbons for Roofs**	**0.05**
Mitigation index**1 (Soakaway Area)**	**0.8**
Mitigation index**2** (Filter drain)	**0.4**
Total Suds Mitigation Index	(**0.8**+(0.5***0.4**)=1.0
Conclusion	1.0>0.05
Minimum Cleansing Achieved	

Table 7 - SUDS/Green Infrastructure mini feasibility study

Suds Measures	Measures to be used on this site	Rationale for selecting/not selecting measure
Source Control		
Swales	N	Not used
Tree Pits	N	Not used
Rainwater Butts	N	Not used
Rainwater harvesting	N	Not used
Soakaways	N	Not used
Infiltration trenches	N	Not used
Permeable pavement	N	Not used
Grasscrete	N	
Block paving	N	
Porous Asphalt	N	
Green Roofs	N	Not used
Filter strips	N	Not used
Soakaway areas	Y	Used
Filter Drain	Y	On soakaway area
Site Control		
Detention Basins	N	Not used
Retentions basins	N	Not used
Regional Control		
Ponds	N	Not used
Wetlands	N	Not used
Other		
	Y	
Attenuation tank	N	Soakaway stone layer
Oversized pipes	N	Not used

Table 8 - Flood Risk to be Assessed

Flood risk	Applicable to subject site	Measures to reduce risk	Residual risk
Fluvial	N	Not Applicable	
Pluvial	N		
Coastal	N		

2.9 COMPLIANCE WITH SURFACE WATER POLICY

Surface water management for the proposed development is designed to comply with the Greater Dublin Strategic Drainage Study (GDSDS) policies and guidelines and the requirements of South Dublin County Council. The guidelines require the following 4 main criteria to be provided by the development's surface water design.

- Criterion 1: River Water Quality Protection – 1.1 & 1.2

Satisfied by providing interception storage, treatment of run-off within the SUDS features.

- Criterion 2: River Regime Protection – 2.1 & 2.2

Satisfied by attenuating run-off with flow control devices prior to discharge to the outfall.

- Criterion 3: Level of Service (flooding) for the site – 3.1, 3.2, 3.3 & 3.4

Pluvial flood risk addressed by development designed to accommodate surface water runoff from a 100-year period storm plus climate change. The site is outside the 1000-year coastal flooding.

Criterion 4: River flood protection – 4.1, 4.2 & 4.3

Attenuation provided within the SUDS features i.e, modular permeable paving and on-line attenuation structures / features.

Refer to drainage drawing for Surface Water Network details.

3 CONCLUSION

The proposed development consists of a single story domestic garage location to the rear of the existing dwelling.

The location of the garage is to be placed on the existing yard area and hence the existing surface water run off from the development will not be increased.

Due to the low surface water flows from the proposed development (<5l/s) it was decided to slow down the peak runoff to the existing network through a bioretention area. This will also provide the 5mm interception and attenuation through the void ratio in the stone.

As there are no change to the existing toilets there will be no change to the foul flow.

As there are no change to the existing toilets there will be no change to the water demand.

The proposed development has been designed in accordance with the latest guidance documents.

Report By
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