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Development at St Claires Villas Lucan

Additional Information
Planning Ref: SD22A/0372
February 2023

ONCE Civil & Structural Ltd

Company Registration No. 464217

INTRODUCTION

This report has been prepared in reply to South Dublin County Council REQUEST FOR ADDITIONAL INFORMATION , decision order No.1470, register reference SD22A/0372

5. (i) The Applicant is requested to submit a drawing showing additional surface water attenuation for proposed development. Additional attenuation shall be by means of SuDS (Sustainable Drainage Systems).

The Site Drainage Layout Drawing No.5845/01 rev C shows the proposed surface water layout. Attenuation provided implementing Suds features green roof and permeable paving

(ii) The applicant is required to submit a revised drawing and report showing additional surface water attenuation provided by means of SuDS (Sustainable Drainage Systems) to include:

a) Above ground natural multifunctional (amenity, biodiversity, water treatment/quality and attenuation) sustainable natural drainage solutions such as blue/green roofs, permeable pavement, bioretention areas, rain gardens, filter drains, swales, bioretention tree pits.

b) Demonstrate the biodiversity value of SuDS - especially important given the site is in a Primary Green Corridor and next to a Core area.

c) Existing and modified flows.

d) Detailed design of SUDs features showing how they work.

e) A comprehensive SUDS management Plan to demonstrate that the proposed SUDS features

have reduced the rate of run off into the existing surface water drainage.

f) Landscape and drainage proposals to be consistent in SuDS proposals.

1. SURFACE WATER DESIGN

The Site Drainage Layout Drawing No.5845/01 shows the proposed surface water layout. Permeable paving is proposed for the parking zone that acts as an attenuation/ infiltration zone. All surface run-off is collected and discharges into the permeable paving sump. An overflow outlet is then connected to an inspection chamber which then discharges to the existing public surface water.

The surface water design methodology is in accordance with the criteria below:

- The pipe network is designed for a rainfall intensity of 50mm/hr, BS8301 8.8.2 or 1in 2year return period;
- Allowance for 20% Climate change;
- Attenuation storage in accordance with SUDS & South Dublin City Council requirements;
- Design for interception of the first 5mm of all rainfall events;

- Designed based on Wallingford method outlined in the CIRIA Report R156 (1996) and SuDS Manual C753

1.1. EXISTING SITE DATA

Average annual rainfall data obtained from Met Eireann for the area is shown in the figure below.

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 303878, Northing: 235466,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.4,	3.5,	4.1,	5.0,	5.7,	6.2,	7.9,	9.9,	11.3,	13.2,	14.9,	16.3,	18.4,	20.1,	21.5,	N/A ,
10 mins	3.3,	4.8,	5.7,	7.0,	7.9,	8.7,	11.0,	13.8,	15.7,	18.4,	20.8,	22.7,	25.7,	28.0,	29.9,	N/A ,
15 mins	3.9,	5.7,	6.7,	8.3,	9.3,	10.2,	13.0,	16.3,	18.5,	21.6,	24.5,	26.7,	30.2,	32.9,	35.2,	N/A ,
30 mins	5.1,	7.4,	8.7,	10.6,	12.0,	13.0,	16.5,	20.5,	23.1,	26.9,	30.3,	33.0,	37.2,	40.4,	43.1,	N/A ,
1 hours	6.8,	9.7,	11.3,	13.7,	15.4,	16.6,	20.9,	25.7,	29.0,	33.5,	37.6,	40.8,	45.8,	49.6,	52.8,	N/A ,
2 hours	8.9,	12.6,	14.6,	17.6,	19.7,	21.3,	26.5,	32.4,	36.3,	41.8,	46.7,	50.5,	56.3,	60.9,	64.7,	N/A ,
3 hours	10.5,	14.8,	17.0,	20.5,	22.8,	24.6,	30.4,	37.0,	41.4,	47.5,	52.9,	57.1,	63.6,	68.7,	72.8,	N/A ,
4 hours	11.8,	16.5,	19.0,	22.7,	25.2,	27.2,	33.5,	40.7,	45.4,	52.0,	57.9,	62.4,	69.3,	74.7,	79.2,	N/A ,
6 hours	13.9,	19.3,	22.1,	26.3,	29.2,	31.4,	38.5,	46.5,	51.8,	59.1,	65.6,	70.6,	78.3,	84.3,	89.2,	N/A ,
9 hours	16.4,	22.5,	25.7,	30.5,	33.7,	36.2,	44.3,	53.2,	59.1,	67.2,	74.4,	80.0,	88.4,	95.0,	100.4,	N/A ,
12 hours	18.4,	25.1,	28.7,	33.9,	37.4,	40.1,	48.8,	58.5,	64.8,	73.6,	81.4,	87.3,	96.4,	103.4,	109.2,	N/A ,
18 hours	21.6,	29.3,	33.4,	39.3,	43.3,	46.3,	56.1,	66.9,	74.0,	83.7,	92.3,	98.9,	108.9,	116.6,	122.9,	N/A ,
24 hours	24.3,	32.8,	37.2,	43.7,	48.0,	51.3,	61.9,	73.6,	81.2,	91.7,	100.9,	108.0,	118.7,	126.9,	133.7,	157.1,
2 days	30.4,	40.0,	44.9,	52.0,	56.7,	60.2,	71.5,	83.8,	91.7,	102.5,	111.9,	119.0,	129.8,	138.0,	144.8,	167.8,
3 days	35.4,	45.8,	51.1,	58.7,	63.7,	67.5,	79.4,	92.3,	100.4,	111.6,	121.2,	128.5,	139.5,	147.8,	154.6,	177.8,
4 days	39.7,	50.9,	56.5,	64.6,	69.8,	73.8,	86.3,	99.6,	108.1,	119.5,	129.4,	136.9,	148.1,	156.6,	163.5,	186.9,
6 days	47.3,	59.7,	65.9,	74.8,	80.4,	84.7,	98.1,	112.4,	121.3,	133.4,	143.7,	151.5,	163.1,	171.9,	179.0,	203.0,
8 days	54.1,	67.6,	74.2,	83.7,	89.7,	94.3,	108.5,	123.5,	132.8,	145.4,	156.1,	164.2,	176.2,	185.3,	192.6,	217.1,
10 days	60.3,	74.7,	81.8,	91.8,	98.2,	103.0,	117.9,	133.5,	143.2,	156.3,	167.4,	175.7,	188.1,	197.3,	204.8,	230.0,
12 days	66.1,	81.3,	88.8,	99.3,	106.0,	111.0,	126.5,	142.7,	152.8,	166.3,	177.7,	186.3,	199.0,	208.5,	216.1,	241.8,
16 days	76.8,	93.6,	101.7,	113.1,	120.3,	125.7,	142.4,	159.6,	170.3,	184.5,	196.5,	205.5,	218.8,	228.7,	236.7,	263.2,
20 days	86.8,	104.9,	113.6,	125.7,	133.4,	139.2,	156.8,	174.9,	186.1,	201.0,	213.6,	222.9,	236.7,	246.9,	255.2,	282.6,
25 days	98.5,	118.0,	127.4,	140.4,	148.6,	154.8,	173.4,	192.6,	204.4,	220.0,	233.1,	242.8,	257.1,	267.8,	276.4,	304.7,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Qbar was calculated in accordance with the Wallingford Method for the existing site:

Site Area = 360m2

Qbar = 0.075 l/s

1. SITE DETAILS			
Site Area (m2):	360	m2	
Public open space	0	m2	Not draining to system
Site Area (HA):	0.036	HA	Site area minus POS
SAAR (mm):	784	mm	*Source: www.met.ie/climate/services*
Soil Type:	2	-	*Reference: Flood Studies Report (NERC,1975)*
SPR:	0.3	-	*Reference: Flood Studies Report (NERC,1975)*
2. IH124 METHOD (WALLINGFORD)			
Is Qbar < 50 HA?	Yes	Use Method 1 Below	
1. QBAR BASED ON AREA RATIO (AREA<50 HA)			
Area Ratio:	0.0007		
Qbar (50 HA):	0.1040	m3/s	*Calculation: Qbar=0.00108*((0.01*Site Area)^0.89)*(SAAR^1.17)*SPR^2.17*
Qbar (Actual):	0.0001	m3/s	*Calculation: Qbar(50HA)*Area Ratio*
Qbar (Actual):	0.0749	l/s	*Calculation: Qbar Actual (m3/s)*1000*

1.2. ATTENUATION / INFILTRATION DESIGN

The storage volume is determined in accordance with Wallingford method based on correlations between storage requirements and hydrological and hydraulic characteristics of the site (ww.uksuds.com).

The calculated volume based on the IH124 method that follows is 8.9m3 at the minimum 2 l/s acceptance rate into the Public Sewer.

1.3. PERMEABLE PAVING

Porous paving is proposed for the 117m2. A percolation test is recommended however the attenuation sump has been sized based on attenuation and neglecting infiltration losses.

All surface run-off from the roof zones will enter the sump in the coarse graded aggregate layer through a perforated pipe. A perforated outlet pipe is provided should overflow conditions occur which discharges to Public Surface water network.

Vehicle access is required including emergency vehicles, therefore load category B was chosen. The proposed build-up is described below:

1. TOBERMORE HYDROPAVE 200x100x80mm
2. 50mm Thickness of 6.3-2mm grit to BS EN13242:2002
3. 350MM Thickness 4/20mm coarse graded aggregate to BS en 13242:2002
4. Impermeable to BS 7533 Part 13

The total stone volume provided is 41m3, which at 40% porosity corresponds to **16.4 m3** of available storage.

Green roof SuDS

Green roof can provide benefits in terms of reducing peak flow rates.

The Benefits of Installing Green Roof

Reducing the amount of surface water running off the Roof and so reducing the risk of flooding. Completed projects show a reduced annual run-off of at least 40% and more usually 60-70%. In some cases, for Intensive Green Roofs, the water retention can be up to 90%.

Providing habitat (homes), shelter and feeding opportunities for wildlife.

Contribute to sustainable drainage systems and water quality improvement.

Helping biodiversity

Improving the character and appearance of the building and the wider area

Providing extra heat and noise insulation.

Keeping the building cool in the summer.

Increasing the lifespan of the Roof membrane.

Helping to reduce the amount of dust and pollutants in the air.

Creating new open space for relaxation, providing potential for the creation of usable green spaces.

1. SITE DETAILS

Site Area (m2):	360	m2	
Public Open Space	0		
Site Area (HA):	0.036	HA	
SAAR (mm):	784	mm	*Source: www.met.ie/climate/services*
Soil Type:	2	-	*Reference: Flood Studies Report (NERC,1975)*
SPR:	0.3	-	*Reference: Flood Studies Report (NERC,1975)*

2. RUN-OFF AREAS

Surface Run-off zones (m2)	Area (m2)	Coefficient of Permeability	Effective Area (m2)
Impermeable Area	360	1	360.00
Landscaping and or green area	0	0.8	0.00
Partially permeable area	0	0.3	0.00
		Total Area	**360.00**

Use Qbar from Method 1 (Area<50 HA) or Method 2 (Area>50 HA)?	**Method 1**	
Qbar	**0.07**	**l/s**
Minimum flow rate	**2.00**	**l/s**
Interception rainfall depth	**5.00**	**mm**
Climate Change allowance	**20**	**%**

30 YEAR RETURN PERIOD

Time	Mins	Secs	Max Rainfall for 30 Year Storm (m)	Climate change Factored rainfall (m)	Area (m2)	Flow (l/s)	Volume (m3)	QBAR vol.(m3)	Attenuation volume required (m3)
5 min	5	300	0.0112	0.01344	360	10.13	3.04	0.60	2.44
10 min	10	600	0.0156	0.01872	360	8.23	4.94	1.20	3.74
15 min	15	900	0.0184	0.02208	360	6.83	6.15	1.80	4.35
30 min	30	1800	0.023	0.0276	360	4.52	8.14	3.60	4.54
60 min	60	3600	0.0288	0.03456	360	2.96	10.64	7.20	3.44
2 hour	120	7200	0.0361	0.04332	360	1.92	13.80	14.40	-0.60
3 hour	180	10800	0.0412	0.04944	360	1.48	16.00	21.60	-5.60
4 hour	240	14400	0.0452	0.05424	360	1.23	17.73	28.80	-11.07
6 hour	360	21600	0.0516	0.06192	360	0.95	20.49	43.20	-22.71
9 hour	540	32400	0.0588	0.07056	360	0.73	23.60	64.80	-41.20
12 hour	720	43200	0.0646	0.07752	360	0.60	26.11	86.40	-60.29
18 hour	1080	64800	0.0737	0.08844	360	0.46	30.04	129.60	-99.56
24 hour	1440	86400	0.0809	0.09708	360	0.38	33.15	172.80	-139.65
48 hour	2880	172800	0.092	0.1104	360	0.22	37.94	345.60	-307.66

100 YEAR RETURN PERIOD

Time	Mins	Secs	Max Rainfall for 100 Year Storm (m)	Climate change Factored rainfall (m)	Area (m2)	Flow (l/s)	Volume (m3)	QBAR vol.(m3)	Attenuation volume required (m3)
5 min	5	300	0.0161	0.01932	360	17.18	5.16	0.60	4.56
10 min	10	600	0.0224	0.02688	360	13.13	7.88	1.20	6.68
15 min	15	900	0.0264	0.03168	360	10.67	9.60	1.80	7.80
30 min	30	1800	0.033	0.0396	360	6.92	12.46	3.60	8.86
60 min	60	3600	0.0403	0.04836	360	4.34	15.61	7.20	8.41
2 hour	120	7200	0.0498	0.05976	360	2.74	19.71	14.40	5.31
3 hour	180	10800	0.0564	0.06768	360	2.09	22.56	21.60	0.96
4 hour	240	14400	0.0616	0.07392	360	1.72	24.81	28.80	-3.99
6 hour	360	21600	0.0697	0.08364	360	1.31	28.31	43.20	-14.89
9 hour	540	32400	0.0789	0.09468	360	1.00	32.28	64.80	-32.52
12 hour	720	43200	0.0862	0.10344	360	0.82	35.44	86.40	-50.96
18 hour	1080	64800	0.0976	0.11712	360	0.62	40.36	129.60	-89.24
24 hour	1440	86400	0.1066	0.12792	360	0.51	44.25	172.80	-128.55
48 hour	2880	172800	0.1189	0.14268	360	0.29	49.56	345.60	-296.04

Design Attenuation Volume	**8.9**	**m3**

Version 1.1 (28/03/2022)