once
consultant engineers

4 Bridgecourt Office Park
Walkinstown Avenue
Dublin 12
Tel / Fax: 01-426 4883 / 01-429 7971
email: mail@once.co
www.once.co

PROPOSED NEW DEVELOPMENT AT PAINTWORLD, 1-2 BALLYMOUNT ROAD LOWER, DUBLIN 12

AN BORD PLEANALA
REGISTER REFERENCE: SD22A/0017
DRAINAGE DESIGN REPORT

Prepared by ONCE, Consulting Engineers

Date: May 2023

DOCUMENT REVIEW SHEET
DOCUMENT NO: ONCE-00-01
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Project Client: Paintworld Limited

Project Title: 1-2 Ballymount Road Lower

Project Number: 5342

Document Title: AN BORD PLEANALA DRAINAGE PLANNING REPORT

Document File Ref.: 5342-01

Rev.	Date	Issued to	Prepared by	Checked by	Approved by	Comments
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Project Preparation and Contact Person

01/06/2023

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Thomas O Neill– tom@once.co

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1. Introduction

This report has been prepared in support of an An Bord Pleanala appeal to the South Dublin County Council Register **Reference SD22A/0017** application.

The planning submission was prepared to comply with the South Dublin County Council Drainage policy.

We have outlined below the methodology of how compliance with was achieved and expanded on the detail of the parts of the technical design to show compliance.

2. Outline of design

The proposed surface water drainage from the development will comply with the South Dublin County Council Sustainable Drainage Explanatory Design and Evaluation Guide 2022.

SDCC Policy G14 Require the provision of Sustainable Urban Drainage Systems (SUDS) in the County and maximise the amenity and biodiversity value of these systems.

G14 Objective 1: To limit surface water run-off from new developments through the use of Sustainable Urban Drainage, Systems (SuDS) using surface water and nature-based solutions and ensure that SuDS is integrated into all new development in the County and designed in accordance with South Dublin County Council's Sustainable Drainage Systems (SuDS) Explanatory, Design and Evaluation Guide.

GI4 Objective 2: To incorporate a SuDS management train during the design stage whereby surface water is managed locally in small sub-catchments rather than being conveyed to and managed in large systems further down the catchment.

GI4 Objective 3: To require multifunctional open space provision within new developments to include provision for ecology and sustainable water management.

GI4 Objective 4: To require that all SuDS measures are completed to a taking in charge standard,

GI4 Objective 5: To promote SuDS features as part of the greening of urban and rural streets to restrict or delay runoff from streets entering the storm drainage network.

GI4 Objective 6: To maintain and enhance existing surface water drainage systems in the County and promote and facilitate the development of Sustainable Urban Drainage Systems (SUDS), including integrated constructed wetlands, at a local, district and County level, to control surface water outfall and protect water quality.

- permeable paving to all private car parking spaces and 50% runoff from all permeable paved areas. A piped link through the permeable paving sub base from the roof water discharge to the main drainage network. This pipe shall be perforated to encourage infiltration of roof water through the sub-base of the permeable paving area
- green roof & hydroplanter.

3. Existing site services local authority networks

The proposal complied with the SDCC policy by addressing the in three ways,

1. Runoff destination
    a. The reuse of the surface water as a resource was reviewed and considered not feasible in a small multi unit residential development where the shared storage of a communal water supply to service WC's would lead to maintenance and health concerns with control and management of the resource.
    b. The site has a 100% development proposed, comprising the proposed building and a parking area. A green roof is proposed on the flat roof of the structure to provide a nature based feature that will promote interception loss by evaporation.
    c. There hard landscaping area to be used for parking to the front of the site will be a permeable paving that will infiltrate runoff into the ground.
    d. There are no open surface water drainage systems adjacent to the site to discharge to. The runoff from the site that is not captured by the green roof proposal or infiltration of the car park is captured in a holding system, with a permeable base for infiltration.
2. The Hydraulic requirements of the site were assessed and as the development has the potential to impact upon property or infrastructure,
    a. The site does not pose a pollution risk to the environment rising from overflow from a combined sewer to a receiving water course.
    b. The site is not at risk from a 1:100 year flood / rainfall event.

The Hydraulic requirements for the site were assessed and comply with the requirements of section 5.3, as noted below.

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Criterion	Sub-criterion	Return Period (Years)	Design Objective
Criterion 1 River Water Quality Protection	1.1	<1	Interception storage of at least 5mm, and preferably 10mm, of rainfall where run-off to the receiving water can be prevented.
Criterion 2 River Regime Protection	2.1	1	Discharge rate equal to 1-year greenfield site peak runoff rate or 2 l/s/ha, whichever is the greater. Site critical duration storm to be used to assess attenuation storage volume.
	2.2	100	Discharge rate equal to 1 in 100-year greenfield site peak run-off rate. Site critical duration storm to be used to assess attenuation storage volume.
Criterion 3 Level of Service (Flooding) for the Site.	3.1	30	No flooding on site except where specifically planned flooding is approved. Summer design storm of 15 or 30 minutes are normally critical.
	3.2	100	No internal property flooding. Planned flood routing and temporary flood storage accommodated on site for short high intensity storms (critical duration events).
	3.3	100	No internal property flooding. Floor levels at least 500mm above maximum river level and adjacent on-site storage retention.
	3.4	100	No flooding of adjacent urban areas. Overland flooding managed within the development.

Criterion	Sub-criterion	Return Period (Years)	Design Objective
Criterion 4 River Flood Protection (Criterion 4.1, or 4.2 or 4.3 to be applied)	4.1	100	"Long-term" floodwater accommodated on site for development run-off volume which is in excess of the greenfield run-off volume. Temporary flood storage drained by infiltration on a designated flooding area brought into operation by extreme events only. 100-year, 6 hour duration storm to be used for assessment of the additional volume of run-off.
	4.2	100	Infiltration storage provided equal in volume to "long term" storage. Usually designed to operate for all events. 100-year, 6-hour duration storm to be used for assessment of the additional volume of run-off.
	4.3	100	Maximum discharge rate of Qbar or 2 l/s/ha, whichever is the greater, for all attenuation storage where separate "long term" storage cannot be provided.

The site was assessed and complies with the following Criteria

Criterion	Sub Catchment	Return Period (Years)	Design Objectives Proposal
Criterion 1 River Water Quality Protection	1.1	<1	The site has two catchment areas. The flat roof has a green / blue roof design with 200mm of substrate. This will hold 10% water or 20mm of depth within its structure. This will accommodate the 10mm interception storage
			The permeable pavement has 350mm of permeable hardcore. This has a 30% permeability, holding 60mm /sq.m of interception storage.
Criterion 2 River Regime Protection	2.1	1	The discharge from the site is restricted by the interception at the green roof and permeable pavement features. The excess from the site will be limited to 2L/sec/ha.
	2.2	100	The runoff from the site for a 100 year return period will be attenuated on site with discharge limited to 2L/sec/ha
Criterion 3 Level of Service (Flooding) for the site	3.1	30	No internal flooding is planned for 30 year return periods of rainfall events, with all surface water runoff intercepted and discharged by evaporation, infiltration and discharge to the public sewer.

	3.2	100	No internal flooding is planned for 100 year return periods of rainfall events, with all surface water runoff intercepted and discharged by evaporation, infiltration and discharge to the public sewer.
	3.3	100	There are no rivers that impact on the site that require the internal floor level to be raised.
	3.4	100	No flooding is predicted or designed of adjacent urban areas. No over land flooding is predicted in the site. All surface water is intercepted and discharged in a controlled manner from the site.
Criterion 4 River Flood Protection (Criterion 4.1,or 4.2 or 4.3 to be applied)	4.1	100	The site is designed with a long term flood water accommodation on site for the surface water runoff volume. The runoff is intercepted and discharged by evaporation and infiltration for a 100 year 6 hour duration.

3. Water Quality

    a. The site complied with the Policy IE3 Surface Water and Groundwater.

    b. The surface water runoff is intercepted at the roof and permeable pavement levels.

    c. The catchment is sized to capture for a 100year rainfall event with no planning overland flooding.

    d. The rainfall runoff will be intercepted by a green roof and stone paving providing a protection of any discharge from pollution with a source control of the flow.

4. Amenity and Biodiversity

    a. The proposed site has a open space to the front parking area. This parking has been designed as a permeable pavement with infiltration. The existing site and adjoining sites have a similar parking area.

    b. The parking area will integrate into the existing open space landscaping.

5. Drainage design concept

a. The drainage is designed to capture rainfall runoff at source.

   i. The roof rainfall is intercepted by a green roof design.

   ii. The parking rainfall is intercepted by a permeable pavement design.

b. Rainfall runoff is controlled at source by these features.

c. The rainfall runoff is conveyed between the features this increases interception losses, treats pollution, promotes an ease of maintenance with an operational legibility.

6. Managing pollution

   a. The requirements from the Policy document are.

Contributing Surface Type	Pollution Hazard Level	SuDS Components
Residential roofs	Very low	Discharge to any SuDS components
Normal commercial roofs	Low	Discharge to any SuDS components
Leachable metal roofs	Low but polluting	Bioretention or source control with one or two further SuDS components.
Driveways, residential, car parks, low traffic roads, low use car parks (schools and offices)	Low	Permeable pavement or source control with one SuDS component
Commercial yards, delivery areas, busy car parks, other low traffic roads (except trunk roads and motorways)	Medium	Permeable pavement or source control with one or two further SuDS components.
Haulage yard, lorry parks, waste sites, sites handling chemicals and fuels, industrial sites	High	Carry out detailed risk assessment and consult with the appropriate licencing authority.

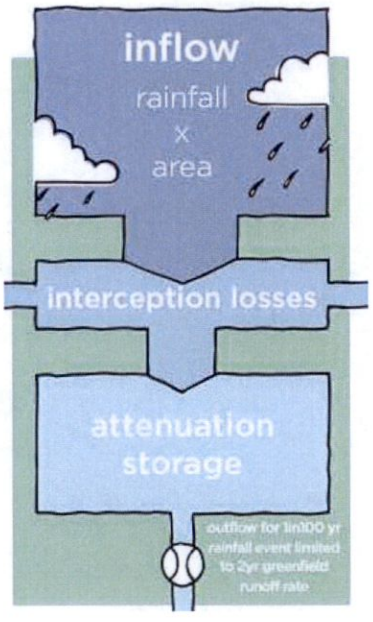
   b. The roof is a residential developemnt with a Very low Pollutuin Hazard.

   c. The roof rainfall is intercepted by a green roof design.

   d. The car park is a Driveway, residential car park with low traffic. This has a Low Pollution Hazard.

   e. The is protected by a permeable pavement design

The proposed drainage design is based on Approach 2 for the calculation of flow rates and storage.



7. Detail drainage design

   a. The first stage of the drainage interception is the green roof with an area of 210 m^2.

   b. The roof is designed as an extensive green roof with 200mm soil depth.

   c. The vegetation will be drought resilient grass.

   d. The rainfall will be intercepted by the soil and discharge over an impermeable layer to a orifice control.

   e. The volume of storage can be calculated as 200m^2 x 0.2m x 30% = 12m^3.

   f. The second stage of interception is the car park permeable pavement.

   g. The car park is 175m^2 of permeable pavement with 350mm of permeable stone.

   h. The volume of storage can be calculated as 175m^2 x 0.35m x 30% = 18.3m^3.

   i. A piped link through the permeable paving sub base from the roof water discharge to the main drainage network. This pipe will be perforated to encourage infiltration of roof water through the sub-base of the permeable paving area.

   j. All excess surface run-off is collected and discharges into STORMTECH SC-740 attenuation tank or similar approved.

k. The Stormtect is an overflow outlet which is then connected to an manhole fitted with hydrobrake flow control device which then discharges to the existing public surface water.

l. The Qbar calculations for the site are outlined below.

m. The surface water runoff volume is calculated below with a required storage for a 100 year return period of 30min intensity of 9.6m^3.

n. The pipe network is designed for a rainfall intensity of 50mm/hr, BS8301 8.8.2 or 1in 2year return period;

o. Allowance for 20% Climate change;

p. Design for interception of the first 5mm of all rainfall events;

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

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: 311060, Northing: 230897,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.4,	3.6,	4.2,	5.2,	5.9,	6.4,	8.2,	10.2,	11.6,	13.6,	15.4,	16.8,	19.0,	20.7,	22.2,	N/A ,
10 mins	3.4,	5.0,	5.9,	7.2,	8.2,	8.9,	11.4,	14.3,	16.2,	19.0,	21.5,	23.4,	26.5,	28.9,	30.9,	N/A ,
15 mins	4.0,	5.9,	6.9,	8.5,	9.6,	10.5,	13.4,	16.8,	19.0,	22.3,	25.2,	27.5,	31.1,	34.0,	36.4,	N/A ,
30 mins	5.3,	7.7,	9.0,	11.0,	12.3,	13.4,	17.0,	21.1,	23.8,	27.8,	31.3,	34.1,	38.3,	41.7,	44.5,	N/A ,
1 hours	7.0,	10.0,	11.6,	14.1,	15.8,	17.2,	21.5,	26.5,	29.9,	34.6,	38.8,	42.1,	47.2,	51.2,	54.5,	N/A ,
2 hours	9.2,	13.0,	15.1,	18.2,	20.3,	21.9,	27.3,	33.4,	37.4,	43.1,	48.1,	52.1,	58.1,	62.8,	66.7,	N/A ,
3 hours	10.8,	15.2,	17.6,	21.1,	23.5,	25.3,	31.3,	38.2,	42.7,	49.0,	54.6,	58.9,	65.6,	70.8,	75.1,	N/A ,
4 hours	12.2,	17.0,	19.6,	23.4,	26.0,	28.0,	34.6,	42.0,	46.8,	53.6,	59.7,	64.4,	71.6,	77.1,	81.7,	N/A ,
6 hours	14.3,	19.9,	22.8,	27.2,	30.1,	32.4,	39.7,	48.0,	53.4,	61.0,	67.7,	72.9,	80.8,	86.9,	92.0,	N/A ,
9 hours	16.9,	23.2,	26.5,	31.5,	34.8,	37.4,	45.6,	54.9,	60.9,	69.3,	76.8,	82.5,	91.3,	98.0,	103.6,	N/A ,
12 hours	18.9,	25.9,	29.5,	35.0,	38.6,	41.4,	50.4,	60.4,	66.9,	76.0,	83.9,	90.1,	99.5,	106.7,	112.7,	N/A ,
18 hours	22.3,	30.2,	34.4,	40.5,	44.6,	47.7,	57.8,	69.0,	76.3,	86.4,	95.2,	102.0,	112.3,	120.3,	126.8,	N/A ,
24 hours	25.0,	33.8,	38.3,	45.0,	49.5,	52.9,	63.8,	75.9,	83.7,	94.6,	104.1,	111.4,	122.5,	131.0,	138.0,	162.1,
2 days	31.1,	41.0,	46.1,	53.5,	58.4,	62.1,	74.0,	86.9,	95.1,	106.5,	116.4,	123.9,	135.3,	144.0,	151.1,	175.4,
3 days	36.0,	46.9,	52.4,	60.4,	65.6,	69.6,	82.2,	95.8,	104.5,	116.4,	126.6,	134.4,	146.2,	155.1,	162.4,	187.3,
4 days	40.3,	51.9,	57.9,	66.4,	71.9,	76.1,	89.4,	103.6,	112.7,	125.0,	135.6,	143.6,	155.8,	164.9,	172.4,	197.8,
6 days	47.7,	60.8,	67.4,	76.7,	82.8,	87.4,	101.8,	117.1,	126.8,	139.9,	151.2,	159.7,	172.4,	182.1,	189.9,	216.4,
8 days	54.3,	68.6,	75.7,	85.8,	92.3,	97.2,	112.6,	128.9,	139.1,	152.9,	164.7,	173.6,	187.0,	197.0,	205.1,	232.6,
10 days	60.4,	75.7,	83.2,	94.0,	100.9,	106.1,	122.3,	139.4,	150.2,	164.6,	177.0,	186.2,	200.1,	210.5,	218.9,	247.2,
12 days	66.0,	82.3,	90.3,	101.6,	108.9,	114.4,	131.4,	149.2,	160.4,	175.4,	188.2,	197.8,	212.1,	222.8,	231.5,	260.7,
16 days	76.5,	94.4,	103.2,	115.6,	123.5,	129.5,	147.8,	167.0,	179.0,	195.0,	208.7,	218.8,	234.0,	245.3,	254.5,	285.1,
20 days	86.1,	105.5,	115.0,	128.4,	136.9,	143.2,	162.8,	183.2,	195.9,	212.8,	227.1,	237.8,	253.7,	265.6,	275.2,	307.1,
25 days	97.4,	118.5,	128.8,	143.2,	152.3,	159.1,	180.1,	201.8,	215.3,	233.2,	248.3,	259.6,	276.3,	288.8,	298.8,	332.3,

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

DOCUMENT REVIEW SHEET
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	Section	Qbar Calculation			Sheet No	
	Calcs by	Date	Chkd by	Date	DWG No	Calc. Rev
	AA	27/09/2022	TON			

1. SITE DETAILS

Site Area (m2):	464	m2	
Public open space	94	m2	Not draining to system
Site Area (HA):	0.037	HA	Site area minus POS
SAAR (mm):	700	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):	0.0911	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):	0.0674	l/s	*Calculation: Qbar Actual (m3/s)*1000*

2. QBAR ON FULL AREA (AREA > 50HA)

Qbar:	0.0001	m3/s	*Calculation: Qbar=0.00108*((0.01*Site Area)^0.89)*(SAAR^1.17)*SPR^2.17*
Qbar:	0.1490	l/s	*Calculation: Qbar Actual (m3/s)*1000*

Applicable Qbar	0.0674	l/s	*Source: Based on applicable method above*

3. GROWTH REDUCTION CURVE

Method 1 (AREA<50HA)

Return Period	Factor	Qbar	Unit	
10 Years	1.7	0.11	l/s	*Calculation: Applicable Qbar*Factor*
30 Years	2.13	0.14	l/s	*Calculation: Applicable Qbar*Factor*
100 Years	2.61	0.18	l/s	*Calculation: Applicable Qbar*Factor*
200 Years	2.86	0.19	l/s	*Calculation: Applicable Qbar*Factor*

Method 2 (AREA>50 HA)

Return Period	Factor	Qbar	Unit	
10 Years	1.7	0.25	l/s	*Calculation: Applicable Qbar*Factor*
30 Years	2.13	0.32	l/s	*Calculation: Applicable Qbar*Factor*
100 Years	2.61	0.39	l/s	*Calculation: Applicable Qbar*Factor*
200 Years	2.86	0.43	l/s	*Calculation: Applicable Qbar*Factor*

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

Site Area = 0.0464 ha

Qbar = 0.674 l/s

METHOD 1 - BS8301 8.8.3 (Wallingford Rational Method)

Impermeable area drained to surface water sewer is 300 m2 from roof runoff.

Time of concentration = time of entry + (length of drain / full bore velocity of flow)

BS8301 8.8.4 (c)

Time of entry for a two-year return period is 4 to 7 mins

For a flat catchments we take the longer time of 7 mins = 420 s

Taking an average velocity = 0.75m/s

Total length of drain picking up the development catchment = 50m approx

t = 420 + (50 / 0.75) = 487s t = 8 mins

Referring to published Met office rainfall depth data table on the previous page:

Closest data is for storm duration of 10 mins with a two-year return period,

Rainfall = 5.7mm per 10min period = 34.2 mm per hour

Q=Ap x i x Cv x Cr x 2.78 (area drained by section of network 3000m2)

Q= (3000/10000) x 34.2 x 1.3 x .8 x 2.78

Q= 3 l/s

METHOD 2 - BS8301 8.8.2 design for rainfall intensity of 50mm/hr

Outfall Flow = [(300x50/1000) / (60x60)] x1000 = 4.2 l/s

The surface water pipe network is therefore designed to cater for an outfall of 4.2 l/s, per the requirements of BS8301.

The proposed surface water network utilises 150 mm uPVC pipes at a minimum fall of 1:150. The capacity of which based on a roughness value of Ks=0.6mm at full bore is 22 l/s

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						5342	
	Section		Attenuation Volume			Sheet No	
CALCULATION SHEET	Calcs by		Date	Chkd by	Date	DWG No.	Calc. Rev
	AA		27/09/2022	TON			

1. SITE DETAILS

Site Area (m2):	464	m2	
Public Open Space	94		
Site Area (HA):	0.037	HA	
SAAR (mm):	700	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	Effective Area (m2)
Impermeable Area	370	1	370.00
Landscaping and or green area	0	0.8	0.00
Partially permeable area	0	0.3	0.00
		Total Area	**370.00**

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	0.0116	0.01392	370	11.00	3.30	0.60	2.70
10 min	10	600	0.0162	0.01944	370	8.90	5.34	1.20	4.14
15 min	15	900	0.019	0.0228	370	7.32	6.59	1.80	4.79
30 min	30	1800	0.0238	0.02856	370	4.84	8.72	3.60	5.12
60 min	60	3600	0.0299	0.03588	370	3.17	11.43	7.20	4.23
2 hour	120	7200	0.0374	0.04488	370	2.05	14.76	14.40	0.36
3 hour	180	10800	0.0427	0.05124	370	1.58	17.11	21.60	-4.49
4 hour	240	14400	0.0468	0.05616	370	1.31	18.93	28.80	-9.87
6 hour	360	21600	0.0534	0.06408	370	1.01	21.86	43.20	-21.34
9 hour	540	32400	0.0609	0.07308	370	0.78	25.19	64.80	-39.61
12 hour	720	43200	0.0669	0.08028	370	0.64	27.85	86.40	-58.55
18 hour	1080	64800	0.0763	0.09156	370	0.49	32.03	129.60	-97.57
24 hour	1440	86400	0.0837	0.10044	370	0.41	35.31	172.80	-137.49
48 hour	2880	172800	0.0951	0.11412	370	0.23	40.37	345.60	-305.23

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	0.0168	0.02016	370	18.70	5.61	0.60	5.01
10 min	10	600	0.0234	0.02808	370	14.23	8.54	1.20	7.34
15 min	15	900	0.0275	0.033	370	11.51	10.36	1.80	8.56
30 min	30	1800	0.0341	0.04092	370	7.38	13.29	3.60	9.69
60 min	60	3600	0.0421	0.05052	370	4.68	16.84	7.20	9.64
2 hour	120	7200	0.0521	0.06252	370	2.96	21.28	14.40	6.88
3 hour	180	10800	0.0589	0.07068	370	2.25	24.30	21.60	2.70
4 hour	240	14400	0.0644	0.07728	370	1.86	26.74	28.80	-2.06
6 hour	360	21600	0.0729	0.08748	370	1.41	30.52	43.20	-12.68
9 hour	540	32400	0.0825	0.099	370	1.07	34.78	64.80	-30.02
12 hour	720	43200	0.0901	0.10812	370	0.88	38.15	86.40	-48.25
18 hour	1080	64800	0.102	0.1224	370	0.67	43.44	129.60	-86.16
24 hour	1440	86400	0.1114	0.13368	370	0.55	47.61	172.80	-125.19
48 hour	2880	172800	0.1239	0.14868	370	0.31	53.16	345.60	-292.44

Design Attenuation Volume	9.7	m3

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8. Permeable paving

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

    b. TOBERMORE HYDROPAVE 200x100x80mm

    c. 50mm Thickness of 6.3-2mm grit to BS EN13242:2002

    d. 350MM Thickness 4/20mm coarse graded aggregate to BS en 13242:2002

    e. Impermeable to BS 7533 Part 13

9. Conclusion

The development of the site complies with the SuDs policy of South Dublin County Council.

The underground tank is an infiltration tank with a permeable base. It is not designed as the only attenuation of the rainfall from the development but as a final feature in a connected set of features from the green roof to permeable paving to discharge.

The site has no potential for Natural SuDs features, as the site have 100% coverage in a built up town location, the appropriate features have been provided with a Green/Blue roof construction to the flat roofs of the building and infiltration of the landscaping at ground level.

The features comply with the recommended criteria for SuDs in the Policy documentation.

The rainfall SuDs features are design not increase the downstream flood risk to any significant level from the development.

ENGINEERS IRELAND
Thomas O'Neill
Chartered Engineer
Registrant 027682
of The Institution of Engineers of Ireland

Thomas O Neill
for ONCE Consultant Engineers