BM BARRETT **MAHONY**
CIVIL & STRUCTURAL
CONSULTING ENGINEERS

DRAINAGE STRATEGY REPORT FOR PLANNING

Project:

KILNAMANAGH AFC

OCT 2021

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run-off from a catchment. The GDSDS recommends limiting discharge to QBAR or 2l/s/ha, whichever is greater.
The IH124 equation estimates Qbar with the following equation:

$$Qbar_{rural} = 0.00108[Area^{0.89}] \times [SAAR^{1.17}] \times [Soil^{2.17}]$$

where:

- $Qbar_{rural}$ is the mean annual flood flow from a rural catchment (approximately 2.3 year return period).
- AREA is the area of the catchment in ha.
- SAAR is the standard average annual rainfall derived from Met Eireann data in mm.
- SPR is Standard Percentage Runoff coefficient for the SOIL category.

The greenfield run-off rate for the catchment (0.104ha or 1,040sq.m) has been calculated based on an estimated SOIL category of 3 (SPR value = 0.37) and Met Eireann SAAR value of 721mm:

Qbar for the Catchment: = 0.3l/s

Refer to Appendix II for Qbar Calculation using UK SuDS Greenfield Runoff Rate Estimation tool.

The specification however of discharge rates less than 2l/s is not recommended through vortex flow controls due to the high risk of blockages. Therefore, a baseline discharge limit of 2l/s for the 1 in 100yr storm plus 20% climate change is proposed - i.e. the surface water attenuation system will be designed to ensure discharge rates do not exceed 2l/s for the 1 in 100yr storm plus 20% climate change. A hydrobrake vortex flow control will be installed to facilitate this, in the final manhole upstream of the proposed discharge location to the existing surface water network. Refer to Appendix V for details of proposed hydrobrake vortex flow control device.

2.5 Proposed Extensive Green Roof

The clubhouse building will be covered with a proprietary extensive (sedum blanket) green roof system. The system will provide a minimum storage capacity of 5litres/m^2.

Rainwater outlet positions will be subject to detailed design by specialist subcontractor, however the SuDS strategy for the development will involve discharging all rainwater downpipes to the permeable paving subbase around the perimeter of the building footprint using proprietary rainwater diffuser units.

Refer to Appendix VI for typical rainwater diffuser data sheet. Refer to Appendix VII for typical sedum blanket extensive green roof to achieve 5litres/m^2.

2.6 Proposed Permeable Paving Footpaths

The proposed external footpaths will be constructed using permeable paving. The permeable paving design has been designed in accordance with BS7533 Part 13 for pedestrian traffic, and allows for partial infiltration ("System B") through the base. In the event of poor infiltration rates on site, it should be noted that infiltration has been conservatively ignored in all attenuation storage requirement calculations.

Accumulations of surface water in the subbase will be collected using 100mm diameter perforated land drain pipes, with all pipes connected by standard domestic access junctions to facilitate rodding at changes in direction.

water drain). This collector pipe, then leads to a silt trap manhole (0.5m sump), prior to connecting via a solid 150mm diameter pipe to the hydrobrake manhole.

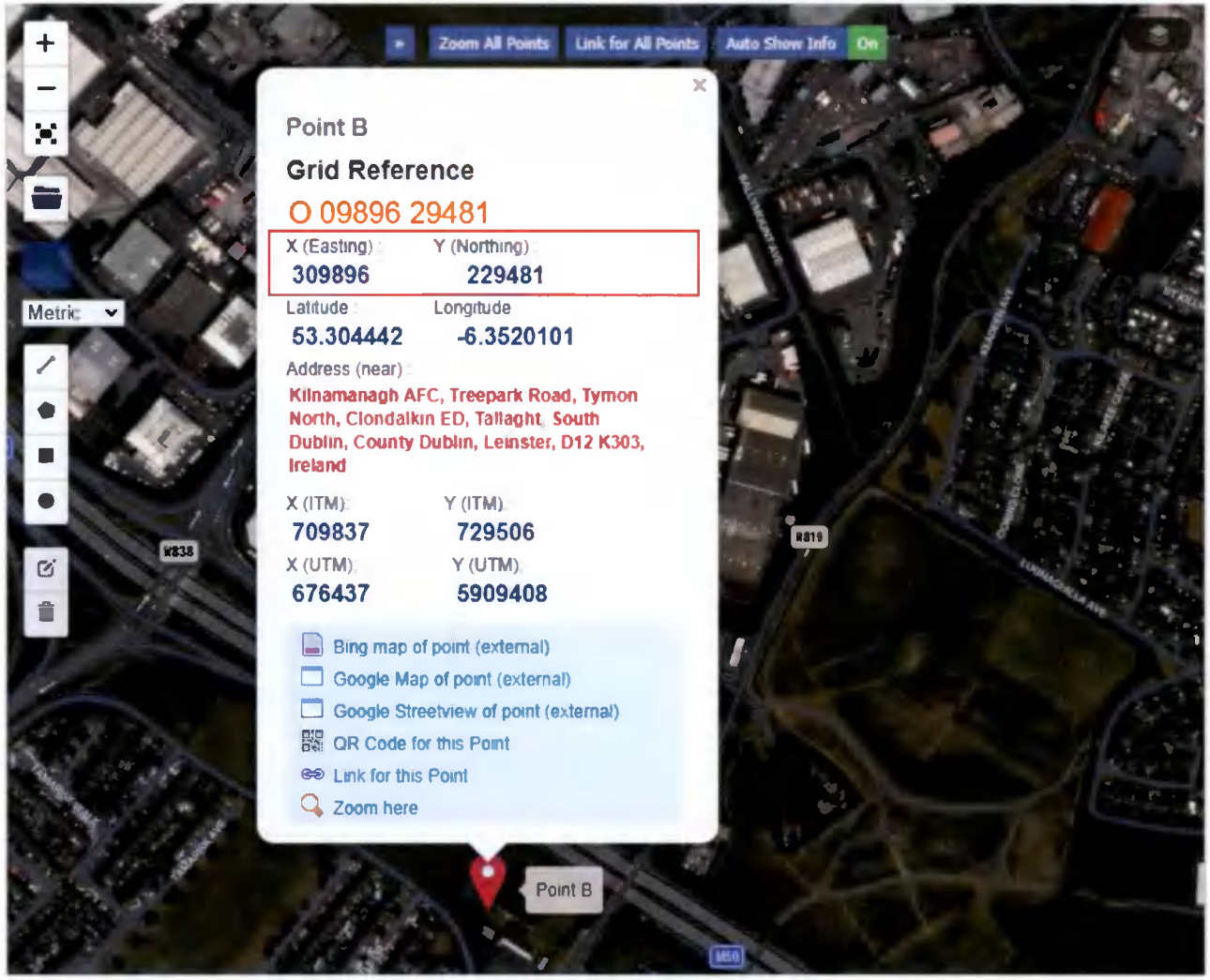
3. CONCLUSION

In summary, it is considered the surface water drainage proposals are adequately sized to serve the proposed development. The design represent a robust and cost effective sustainable solution to managing surface water, and is in accordance with best practice design guidance on sustainable drainage systems.

Irish Grid Coordinates
at the Subject Site:

X (Easting): 309896
Y (Northing): 229481

Source:
https://irish.gridreferencefinder.com/



SAAR Value based on Met Eireann **"1981-2010 Annual Average Rainfall Grid"**

Nearest Coordinates:
E: 310000 and **N: 229000**

SAAR = 721mm

Source: Met Eireann

Easting and Northing Irish Grid Co-ordinates

east	north	Annual Average Rainfall(mm)
310000	225000	991
310000	226000	906
310000	227000	824
310000	228000	763
310000	229000	721
310000	230000	700
310000	231000	702
310000	232000	718
310000	233000	733
310000	234000	746
310000	235000	759
310000	236000	773
310000	237000	786
310000	238000	798
310000	239000	812
310000	240000	821
310000	241000	826
310000	242000	828
310000	243000	826
310000	244000	823
310000	245000	814

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Peter O'Dwyer
Site name:	Kilnamanagh AFC
Site location:	Tree Park Road, Dublin 24

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.30443° N
Longitude:	6.35199° W
Reference:	1051279887
Date:	Oct 19 2021 08:26

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.104

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	2	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.37

Hydrological characteristics	Default	Edited
SAAR (mm):	948	721
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.13	2.13
Growth curve factor 100 years:	2.61	2.61
Growth curve factor 200 years:	2.86	2.86

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.27	0.31
1 in 1 year (l/s):	0.23	0.26
1 in 30 years (l/s):	0.58	0.66
1 in 100 year (l/s):	0.71	0.81
1 in 200 years (l/s):	0.77	0.88

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Peter O'Dwyer
Site name:	Kilnamanagh AFC
Site location:	Tree Park Road, Dublin 24

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.30444° N
Longitude:	6.35202° W
Reference:	1239444614
Date:	Oct 19 2021 18:32

Site characteristics

Total site area (ha):	0.104
Significant public open space (ha):	0
Area positively drained (ha):	0.104
Impermeable area (ha):	0.104
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	100
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.1
Net impermable area for storage volume design (ha):	0.1
Pervious area contribution to runoff (%):	0

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:	1.2
Urban creep allowance factor:	1.0
Volume control approach	Flow control to max of 2 l/s/ha or Qbar
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	3
SPR:	0.3	0.37

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	77.7
Rainfall 100 yrs 12 hrs:	--	96.3
FEH / FSR conversion factor:	1	1.32
SAAR (mm):	948	721
M5-60 Rainfall Depth (mm):	14	17
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.72	1.72
Growth curve factor 30 year:	2.13	2.13
Growth curve factor 100 years:	2.61	2.61
Q_{BAR} for total site area (l/s):	0.27	0.31
Q_{BAR} for net site area (l/s):	0.27	0.31

Appendix IV

Microdrainage Output for Attenuation Sizing

Summary of Results for 100 year Return Period (+20%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
360 min Winter	-0.113	0.887	1.9	0.0	1.9	43.1	O K
480 min Winter	-0.127	0.873	1.9	0.0	1.9	42.4	O K
600 min Winter	-0.154	0.846	1.9	0.0	1.9	41.1	O K
720 min Winter	-0.190	0.810	1.9	0.0	1.9	39.4	O K
960 min Winter	-0.271	0.729	1.9	0.0	1.9	35.4	O K
1440 min Winter	-0.483	0.517	1.9	0.0	1.9	25.1	O K
2160 min Winter	-0.721	0.279	1.9	0.0	1.9	13.5	O K
2880 min Winter	-0.840	0.160	1.8	0.0	1.8	7.8	O K
4320 min Winter	-0.916	0.084	1.5	0.0	1.5	4.1	O K
5760 min Winter	-0.933	0.067	1.2	0.0	1.2	3.3	O K
7200 min Winter	-0.942	0.058	1.0	0.0	1.0	2.8	O K
8640 min Winter	-0.948	0.052	0.9	0.0	0.9	2.5	O K
10080 min Winter	-0.952	0.048	0.8	0.0	0.8	2.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
360 min Winter	12.233	0.0	70.2	0.0	308
480 min Winter	9.993	0.0	76.7	0.0	380
600 min Winter	8.537	0.0	82.1	0.0	456
720 min Winter	7.505	0.0	86.7	0.0	532
960 min Winter	6.123	0.0	94.5	0.0	682
1440 min Winter	4.595	0.0	106.2	0.0	950
2160 min Winter	3.443	0.0	119.0	0.0	1280
2880 min Winter	2.803	0.0	128.5	0.0	1592
4320 min Winter	2.095	0.0	142.3	0.0	2232
5760 min Winter	1.703	0.0	152.4	0.0	2936
7200 min Winter	1.450	0.0	160.3	0.0	3672
8640 min Winter	1.271	0.0	166.7	0.0	4392
10080 min Winter	1.137	0.0	171.9	0.0	5128

Model Details

Storage is Online Cover Level (m) 0.500

Tank or Pond Structure

Invert Level (m) -1.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	48.6	1.000	48.6	1.001	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0067-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	67
Invert Level (m)	-1.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.0	Kick-Flo®	0.599	1.6
Flush-Flo™	0.296	1.9	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	0.800	1.8	2.000	2.7	4.000	3.8	7.000	4.9
0.200	1.9	1.000	2.0	2.200	2.9	4.500	4.0	7.500	5.1
0.300	1.9	1.200	2.2	2.400	3.0	5.000	4.2	8.000	5.2
0.400	1.9	1.400	2.3	2.600	3.1	5.500	4.4	8.500	5.4
0.500	1.8	1.600	2.5	3.000	3.3	6.000	4.6	9.000	5.5
0.600	1.6	1.800	2.6	3.500	3.5	6.500	4.7	9.500	5.7

Pipe Overflow Control

Diameter (m)	0.100	Roughness k (mm)	0.600	Upstream Invert Level (m)	-0.100
Slope (1:X)	100.0	Entry Loss Coefficient	0.500		
Length (m)	1.000	Coefficient of Contraction	0.600		

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	2.000
Flush-Flo™	0.296	1.950
Kick-Flo®	0.599	1.584
Mean Flow		1.730

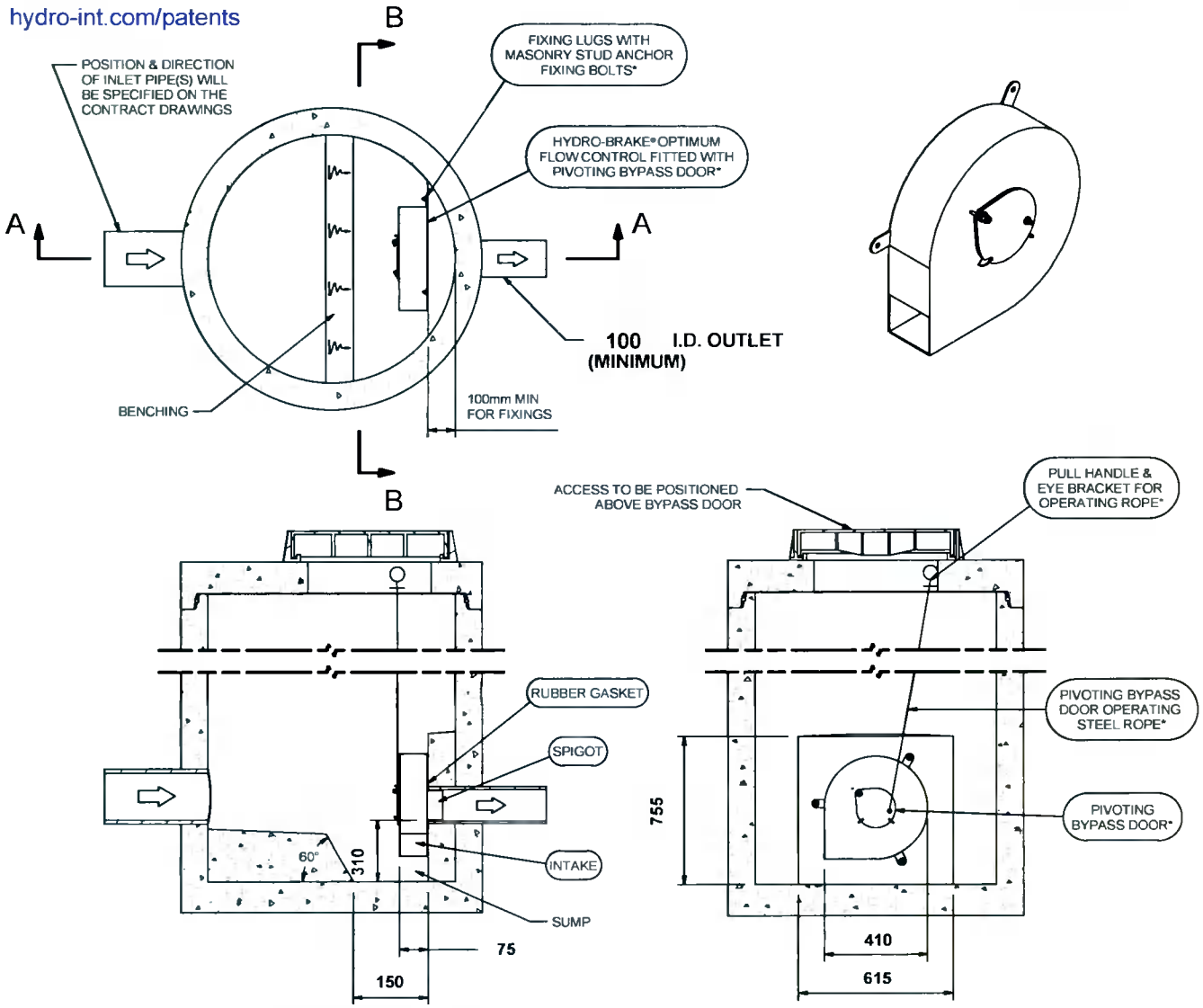
Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

WRc Approved PT/329/0412

hydro-int.com/patents



SECTION A-A

SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE !

The head/flow characteristics of this SHE-0067-2000-1000-2000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	10/19/2021 6:58 PM
SITE	Dublin 24
DESIGNER	Peter O'Dwyer
REF	Kilnamanagh AFC

SHE-0067-2000-1000-2000
Hydro-Brake® Optimum

podwyer@bmce.ie

Appendix VI

Rainwater Diffuser Data Sheet

Permavoid Rainwater Diffuser Unit

Data Sheet

Permavoid Rainwater Diffuser Unit can be utilised in these SuDS techniques

TECHNIQUES													
Blue-Green roofs	Podium Decks	Trees	Sports Pitches	Cycle Paths	Permeable Paving (sub base & podium)	Bioretention & Rain Gardens	Attenuation Storage Tanks	Infiltration	Swales	Filter Drains	Detention Basins	Ponds & Wetlands	Filter Strips
			✓		✓		✓						

Visit **www.polypipe.com/greeninfrastructure**

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Polypipe

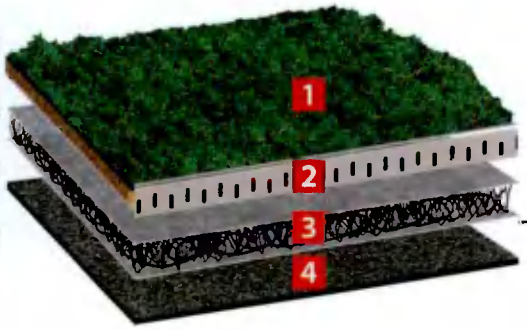
BAUDER

Revision: November 2020 V2

SYSTEM SUMMARY Bauder XF301 Sedum System

Lightweight sedum blanket system

Bauder XF301 Single Layer Sedum System is an ultra-light weight sedum system. Where the roof is laid to a fall of <2° the product can be laid directly onto the waterproofing. When laid on flat roofs, an additional drainage mat (SDF mat layer 3 below) is fitted. XF301 also contains a moisture mat which retains up to 5 Ltr of water/m². The vegetation within the system is a mix of sedum varieties. Bauder's "Green Roof Promise" is available for this system.



Product	Description	thickness	weight
1 Bauder XF301 Sedum Blanket*	A single layer sedum system, GRO compliant substrate is held within a nylon mesh with attached moisture mat. The sedum blanket is grown for circa 12 months and contains up to 17 species of sedum	28mm	44Kg/m²
2 Bauder AL40	A bespoke edge trim which retains the XF301 system and secures the system to the underlying waterproofing	N/A	N/A
3 Bauder SDF Mat	Multifunctional drainage, filtration and protection layer manufactured from ultraviolet resistant nylon woven loops, which are thermally bonded to geo-textile filter fleece facings. (Only required on flat roofs)	20mm	1Kg/m²
4 Underlying Waterproofing system	Bauder's underlying waterproofing system, options for Bituminous Membrane, Hot Melt, Single-ply or Cold applied liquid systems.	N/A	N/A
Green Roof Build up (fully saturated, excludes the waterproofing)		**48mm**	**45Kg/m²**

*Bauder also produce deeper sedum & wildflower blankets solutions

Where to specify:

Ideally suited to lightweight wooden roof decks or any building where weight and depth of system is critical.

Please note: All green roofs require water during times of drought. Bauder recommend that the watering and maintenance of this roof is considered and addressed during its design.

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