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ENGINEERING DRAINAGE REPORT FOR PLANNING SUBMISSION

**Kinnegad Economic Enterprise Hub
Kinnegad
Co. Westmeath**

Reference: 99-06
Date: 04 March 2024



**ENGINEERS
IRELAND**



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Proposed Kinnegad Economoc Enterprise Hub, Kinnegad, Co. Westmeath

Ref: 99-06

Drainage Summary for the Kinnegad Economoc Enterprise Hub, Kinnegad, Co. Westmeath

1.0 General

The site is located north of the current renovations to the 'Kinnegad Library', with a 3m wide access strip linking the site back to Mullingar Road.

Irish Grid Reference X: 259743; Y: 245436.

The site comprises existing derelict double storey residential and shed on a site of area of approx. 1092 m².

The development consists of part demolition, renovation and extension of a two storey Community Economic Enterprise Hub (EEH) with associated services and landscaped gardens in Kinnegad, Co. Westmeath

The site rises gently northwards, with the Footpath at Mullingar Road at approximately 76.3mOD and the rear of the site at approximately 77.3m. The existing house, to be renovated and retained has an existing floor level of 77.3mOD.

2.0 Foul Water Drainage

Currently, the wastewater and surface water from the existing buildings discharges as a combined system to the existing 225mm diameter combined sewer adjacent to the cul-de-sac behind the 'Kinnegad Library'.

It is proposed to discontinue and grub up the existing combined drains and replace with dedicated foul drains (and dedicated surface water), with a new 100mm diameter uPVC foul outfall drain discharging to the existing 225mm diameter combined sewer.

The final manhole is to be built in accordance Irish Water standards.

All new foul drains shall be 100mm diameter uPVC at gradients of minimum 1:40 / 1:60 in accordance with Part H of the Building Regulations 2010, unless otherwise noted.

Refer to OBA drawing numbers 99-06-C01 and 99-06-C02, for further details.

3.0 Surface Water Drainage

As mentioned above, all existing (unattenuated) surface water discharges to the existing combined sewer.

It is proposed to provide a new sedum green blue roof, which will attenuate roof rainwater prior to limited flow discharge.

It is also proposed to provide a 600-litre rainwater harvesting tank, supplying the EEH wc's. Overflow from the rainwater harvesting tank will be attenuated in a Stormtech Arched SW attenuation tank, providing sufficient attenuation to store the 100-year return storm with an additional allowance of 20% for climate change. Discharge is to be limited through the use of a hydrobrake, located in the final outfall manhole.

Please refer to the attached attenuation related calculations and details for further details of the attenuation proposal.

All new surface water drains shall be 150mm diameter uPVC at minimum gradient of 1:60, unless otherwise noted, and are designed and to be installed in accordance with Building Regulations 2010 and the Greater Dublin Regional Code of Practice for Drainage Work. All drainage works shall be in accordance with the requirements of Westmeath County Council.

Refer to drawing no. 99-06-C01 and 99-06-C02 for further details.

4.0 Water Connection

It is also proposed to provide a new 32mm diameter service connection, including Irish Water compliant boundary box, feeding from the existing 110mm diameter PE watermain on the Mullingar Road.

Refer to drawing no. 99-06-C01 for further details.

References: Building Regulations 2010, Part H, Drainage and Wastewater disposal
 Greater Dublin Regional Code of Practice for Drainage Works
 Greater Dublin Strategic Drainage Study
 Irish Water 'Water Code of Practice'. And
 Irish Water 'Waste-water Code of Practice'.

Storm Water Attenuation Calculations

Total Site Area = 1092 m²

Areas contributing to SW Run-off:

Description	Finish	Area (m ²)	Percentage run-off (%)	Equivalent run-off area (m ²)
Sedum Roof	green blue roof	315	90	283.5
Equivalent impermeable area:				283.5

Site Greenfield runoff = 0.66 l/s (Q_{bar})

Where the calculated Greenfield runoff for the site is less than 2 l/s, the minimum permissible site outflow is to be set at 2 l/s

Permissible outflow (from site) = **1.4 l/s**
 Permissible outflow (from roof attenuation) = **0.6 l/s**

* Note: Remaining Ground Floor external & pitched roof attenuation in Stormtech tank with max. 1.4 l/s discharge

100 year storm

Permissible Volume (l)= Actual Achievable Outflow (l/s) x time (s)

Actual Volume (l)= (Equivalent Impermeable Area x depth of rainfall)

Storage capacity (l)= Actual - Permissible Volumes

Duration min	Rainfall mm	Permissible l	Actual l	Store l
15	19.9	540.00	5641.65	5101.65
30	24.6	1080.00	6974.10	5894.10
60	30.5	2160.00	8646.75	6486.75
120	37.7	4320.00	10687.95	6367.95
240	46.6	8640.00	13211.10	4571.10
360	52.7	12960.00	14940.45	1980.45
720	65.2	25920.00	18484.20	-7435.80
1440	80.6	51840.00	22850.10	-28989.90

Rainfall figures are Site specific, Met Eireann

From table above, required storage volume is 6.49 m³
 Allow 20% for climate change, volume required = 7.78 m³

Storage in 100mm deep Baudem RWR100 Blue Roof Attenuation cell @ 95% void = 95 l/m²
 therefore **Storage Provided** = 315 x 0.095 = 29.93 m³

Max. green blue roof controlled discharge = 0.6 l/s

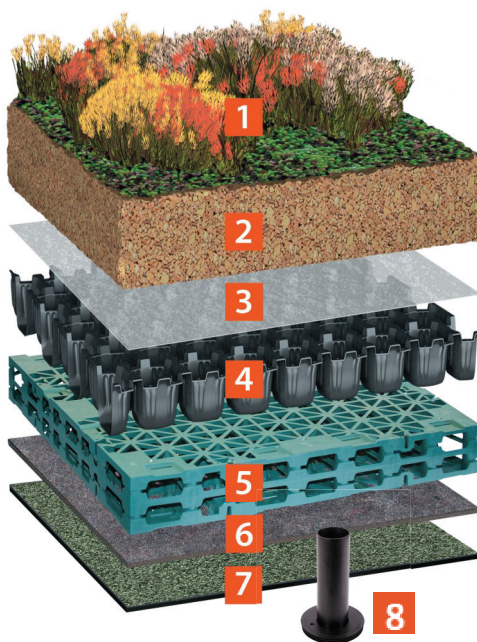
SYSTEM SUMMARY

BauderBLUE STORMcell Sedum on Substrate

Sedum on Substrate over a Blue Roof Solution

Green roofs are an ideal partner for blue roofs as they will naturally delay and reduce rain water run-off from the roof. When combined, the blue roof system (RWR 100 blue roof attenuation cell) and ST-B or ST-HB flow restrictors allow the precise control of the roofs discharge rate and enable large volumes of water to be attenuated at roof level.

A sedum blanket offers a low maintenance green roof. Laying Bauder's mature SB sedum blanket on a bed of Bauder's SUB-EM UK extensive substrate gives the system both rooting depth and water retention.



Product	Description	Thickness	Saturated weight
1 SB sedum blanket *	Typically sown with 17 species of sedums and grown by Bauder for around 12 months before it is harvested.	25mm	24.0Kg/m ²
2 SUB-EM UK extensive substrate	A lightweight, low nutrient growing material tested to BS8616 and manufactured to meet both GRO and FLL guidelines.	80mm	96Kg/m ²
3 SV125 100 filter fleece	Filtration layer that prevents substrate fines from washing into the drainage and water storage layer.	1mm	0.125Kg/m ²
4 DSE 20 drainage board	A 20mm drainage board, holding 7.4 ltr/m ² . It is manufactured from 100% recycled HDPE.	20mm	8.6Kg/m ² (water filled)
5 RWR 100 blue roof attenuation cell	A high strength void element which is 95%+ void. This can hold 95 litres per m ² .	100mm	8.06 kg/m ²
6 FSM 600 protection layer	Is 100% recycled Polyester and polypropylene fibre mix protection layer to prevent mechanical damage to the underlying waterproofing.	4mm	0.6Kg/m ²
7 Bauder's underlying waterproofing system	Bauder's BTGRS & BTGRS PLUS bituminous membranes or Bauder Hot Melt, bituminous waterproofing system.	N/A	N/A
8 ST-B or ST-HM flow restrictor	A combined restrictor plate and overflow, enabling discharge flow rates to be altered for SUDS requirements.	N/A	N/A
Blue & Green Roof Build up (fully saturated excluding the water held in the RWR 100 blue roof attenuation cell during a rain event and the underlying waterproofing)		230mm	137Kg/m²

*Bauder also produce Wildflower and seeded solutions

When to specify

Where an immediate vegetated finish is required on completion. Bauder SB sedum blanket gives instant ground cover and a low maintenance solution. Ideal for very exposed roof environment.

Note: Bauder Blue roof systems require bespoke flow rate calculations please contact Bauder's technical department

Storm Water Attenuation Calculations

Total Site Area = 1092 m²

Areas contributing to SW Run-off:

Description	Finish	Area (m ²)	Percentage run-off (%)	Equivalent run-off area (m ²)
External Landscaping	natural landscaped	686	40	274.4
Pitched roof	tiles	91	90	81.9
Equivalent impermeable area:				356.3

Permissible outflow (from site) = **2.0 l/s**

Permissible outflow (from grnd flr external attenuation) = **1.6 l/s**

* Note: Roof attenuation in green/blue roof with max. 0.6 l/s discharge

100 year storm

Permissible Volume (l)= Actual Achievable Outflow (l/s) x time (s)

Actual Volume (l)= (Equivalent Impermeable Area x depth of rainfall)

Storage capacity (l)= Actual - Permissible Volumes

Duration min	Rainfall mm	Permissible l	Actual l	Store l
15	19.9	1440.00	7090.37	5650.37
30	24.6	2880.00	8764.98	5884.98
60	30.5	5760.00	10867.15	5107.15
120	37.7	11520.00	13432.51	1912.51
240	46.6	23040.00	16603.58	-6436.42
360	52.7	34560.00	18777.01	-15782.99
720	65.2	69120.00	23230.76	-45889.24
1440	80.6	138240.00	28717.78	-109522.22

Rainfall figures are site specific, see Met Eireann rainfall table attached.

From table above, required storage volume is 5.88 m³

Allow 20% for climate change,
therefore storage required is 7.06 m³

Tank discharge = 1.60 l/s

User Inputs

Chamber Model:	SC-310
Outlet Control Structure:	No
Project Name:	Kinnegad EEH
Engineer:	Alan Manthe
Project Location:	
Measurement Type:	Metric
Required Storage Volume:	7.01 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	153 mm.
Stone Above Chambers:	153 mm.
Average Cover Over Chambers:	458 mm.
Design Constraint Dimensions:	(3.00 m. x 28.00 m.)

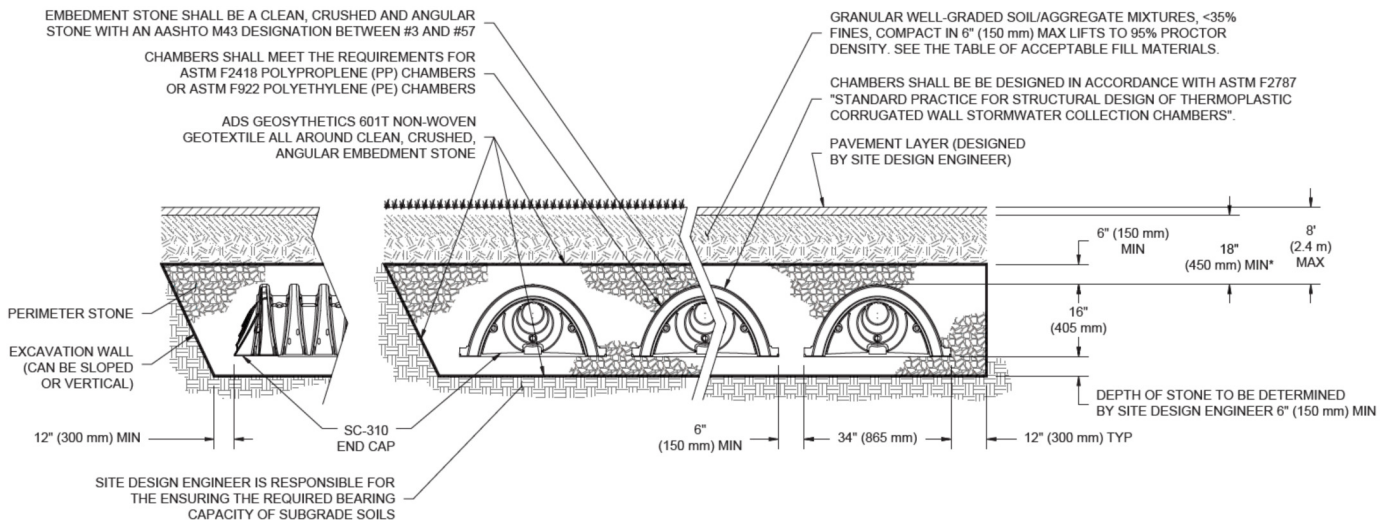
Results

System Volume and Bed Size

Installed Storage Volume:	7.37 cubic meters.
Storage Volume Per Chamber:	0.42 cubic meters.
Number of Chambers Required:	6
Number of End Caps Required:	2
Chamber Rows:	1
Maximum Length:	14.00 m.
Maximum Width:	1.48 m.
Approx. Bed Size Required:	20.62 square meters.

System Components

Amount Of Stone Required:	13 cubic meters
Volume of Excavation (Not Including Fill):	15 cubic meters
Total Non-woven Geotextile Required:	76 square meters
Woven Geotextile Required (excluding Isolator Row):	4 square meters
Woven Geotextile Required (Isolator Row):	20 square meters
Total Woven Geotextile Required:	15 square meters
Impervious Liner Required:	0 square meters



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

Calculated by:	Alan Manthe
Site name:	Kinnegad EEH
Site location:	Kinnegad

Site Details

Latitude:	53.45569° N
Longitude:	7.10147° W
Reference:	1324820656
Date:	Feb 21 2024 19:55

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.

Runoff estimation approach IH124

Site characteristics
 Total site area (ha): 0.1

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.

Methodology

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

SPR estimation method: Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(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.

Hydrological characteristics

	Default	Edited
SAAR (mm):	916	916
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

(3) Is $SPR/SPRHOST \leq 0.3$?

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):	0.66	0.66
1 in 1 year (l/s):	0.56	0.56
1 in 30 years (l/s):	1.09	1.09
1 in 100 year (l/s):	1.29	1.29
1 in 200 years (l/s):	1.42	1.42

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 259743, Northing: 245436,

DURATION	Interval		Years													
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.5,	4.0,	4.7,	5.2,	5.6,	6.8,	8.1,	9.0,	10.2,	11.3,	12.2,	13.4,	14.4,	15.2,	N/A ,
10 mins	3.5,	4.8,	5.5,	6.5,	7.2,	7.7,	9.4,	11.3,	12.6,	14.3,	15.8,	16.9,	18.7,	20.1,	21.2,	N/A ,
15 mins	4.2,	5.7,	6.5,	7.7,	8.5,	9.1,	11.1,	13.3,	14.8,	16.8,	18.6,	19.9,	22.0,	23.6,	25.0,	N/A ,
30 mins	5.5,	7.4,	8.4,	9.9,	10.9,	11.7,	14.1,	16.8,	18.5,	20.9,	23.0,	24.6,	27.1,	29.0,	30.6,	N/A ,
1 hours	7.3,	9.7,	10.9,	12.8,	14.0,	14.9,	17.9,	21.1,	23.2,	26.0,	28.6,	30.5,	33.4,	35.6,	37.4,	N/A ,
2 hours	9.6,	12.6,	14.2,	16.4,	17.9,	19.0,	22.6,	26.5,	29.0,	32.4,	35.4,	37.7,	41.1,	43.7,	45.8,	N/A ,
3 hours	11.3,	14.8,	16.5,	19.1,	20.7,	22.0,	26.0,	30.3,	33.1,	36.9,	40.2,	42.6,	46.4,	49.3,	51.6,	N/A ,
4 hours	12.7,	16.5,	18.4,	21.2,	23.0,	24.3,	28.7,	33.4,	36.3,	40.4,	43.9,	46.6,	50.6,	53.6,	56.1,	N/A ,
6 hours	14.9,	19.2,	21.4,	24.5,	26.6,	28.1,	32.9,	38.1,	41.4,	45.9,	49.8,	52.7,	57.1,	60.5,	63.2,	N/A ,
9 hours	17.6,	22.5,	24.9,	28.4,	30.7,	32.4,	37.8,	43.6,	47.3,	52.2,	56.5,	59.7,	64.5,	68.2,	71.1,	N/A ,
12 hours	19.8,	25.1,	27.8,	31.6,	34.1,	35.9,	41.8,	48.0,	51.9,	57.2,	61.8,	65.2,	70.3,	74.2,	77.4,	N/A ,
18 hours	23.3,	29.3,	32.3,	36.6,	39.4,	41.5,	48.0,	54.9,	59.2,	65.0,	70.0,	73.8,	79.4,	83.7,	87.1,	N/A ,
24 hours	26.1,	32.7,	36.0,	40.7,	43.7,	45.9,	52.9,	60.3,	65.0,	71.2,	76.6,	80.6,	86.6,	91.1,	94.7,	107.0,
2 days	31.3,	38.5,	42.1,	47.1,	50.4,	52.8,	60.2,	68.0,	72.8,	79.3,	84.8,	89.0,	95.1,	99.7,	103.4,	115.7,
3 days	35.8,	43.8,	47.7,	53.1,	56.5,	59.1,	67.0,	75.3,	80.4,	87.2,	93.0,	97.3,	103.7,	108.5,	112.3,	125.1,
4 days	40.1,	48.6,	52.8,	58.6,	62.2,	65.0,	73.4,	82.1,	87.5,	94.7,	100.7,	105.2,	111.9,	116.8,	120.8,	134.1,
6 days	47.9,	57.5,	62.2,	68.6,	72.7,	75.8,	85.1,	94.7,	100.6,	108.4,	115.0,	119.8,	127.0,	132.4,	136.7,	151.0,
8 days	55.1,	65.7,	70.8,	77.9,	82.4,	85.7,	95.9,	106.2,	112.6,	121.0,	128.1,	133.3,	141.0,	146.8,	151.4,	166.5,
10 days	61.9,	73.5,	79.0,	86.7,	91.5,	95.1,	106.0,	117.1,	123.9,	132.9,	140.4,	146.0,	154.2,	160.3,	165.1,	181.2,
12 days	68.5,	81.0,	86.9,	95.1,	100.3,	104.1,	115.7,	127.5,	134.7,	144.3,	152.2,	158.1,	166.7,	173.1,	178.3,	195.2,
16 days	81.0,	95.2,	101.9,	111.1,	116.9,	121.2,	134.1,	147.3,	155.2,	165.8,	174.5,	181.0,	190.5,	197.5,	203.1,	221.6,
20 days	93.1,	108.8,	116.3,	126.4,	132.8,	137.5,	151.7,	166.0,	174.7,	186.2,	195.7,	202.7,	213.0,	220.5,	226.6,	246.5,
25 days	107.8,	125.3,	133.6,	144.9,	151.9,	157.1,	172.7,	188.5,	198.0,	210.5,	220.9,	228.6,	239.8,	248.0,	254.6,	276.2,

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

Klargester Commercial Below Ground Rainwater Harvesting System

Overview

Klargester's Aquabank commercial range is a fully integrated, intelligent rainwater harvesting solution suitable for new housing developments requiring multiple systems.

The commercial range provides a secure solution for any size of building project from 6,000 litres up to 79,000 litres of water in a single tank. For larger capacities, multiple tanks may be connected together to meet storage requirements.

It is available as either a gravity or direct system, depending on specific site requirements.

Applications



Commercial Vehicle/Fleet/Plant
Washing Areas



Garden Centres



Golf Courses
(Green and Equipment Maintenance)

Features and Benefits

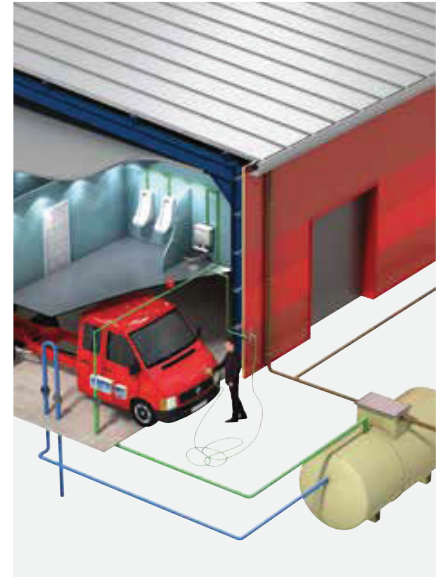
- Made from tough, durable GRP.
- Capacities range from 6,000–79,000 litres within a single tank.
- Multiple tanks can be joined to cater for larger volumes
- Can be installed under trafficked areas (with reinforced concrete support).
- Packaged units delivered directly to site.

Water Conservation Drivers in the UK and Ireland

- BREEAM (BRE Environmental Assessment Method)
- Future-proof against water shortages
- Climate change and environmental awareness
- Reduction in water costs
- Green agenda globally
- Building differentiation

Each Klargester large installation is carefully sized and selected, taking into consideration the following factors:

- Roof water yield
- Projected water consumption
- Groundwork criteria (prevailing water table, soil conditions, requirements or traffic access)
- Suitable filters and pumps to match system specifications, ensuring the water is kept at an optimum level of clarity and supply pressure)



Case Study



Providing cost-effective water for social housing with Klargester Rainwater Harvesting



Louth County Council wanted to find a sustainable, low-cost rainwater harvesting solution for more than 30 new social and affordable homes, to lower the expected demand of around 150 litres of mains water per person, per day.

We supplied a Klargester rainwater system for every home, to capture the rainwater which falls on the roofs and is in plentiful supply in the region. Fully integrated with the mains plumbing, rainwater collected from the roofs is stored in an underground tank and used to flush the WCs in each home, easing demand on the mains supply.

ENVIREAU RAINWATER HARVESTING

With over 10 years expertise in the design of commercial Rainwater Harvesting systems, our Commercial Envireau leads the way in fully integrated systems for a range of commercial premises. You can enjoy a completely flexible component selection, as we tailor the Envireau to each building and water application.



TECHNICAL INFORMATION

SINGLE PUMP Product Code	TWIN PUMP Product Code	Roof Size (m ²)	Capacity (Ltrs)	Diameter (m)
ENV0200SKSW	ENV0200TKSW	200	6000	1.4
ENV0275SKSW	ENV0275TKSW	275	8000	1.8
ENV0350SKSW	ENV0350TKSW	350	10,000	1.8
ENV0485SKSW	ENV0485TKSW	485	14,000	1.4
ENV0625SKSW	ENV0625TKSW	625	18,000	2.6
ENV0765SKSW	ENV0765TKSW	765	22,000	2.6
ENV0900SKSW	ENV0900TKSW	900	26,000	2.6
ENV1040SKSW	ENV1040TKSW	1040	30,000	2.6
ENV1320SKSW	ENV1320TKSW	1320	38,000	2.6
ENV1460SKSW	ENV1460TKSW	1460	42,000	2.6
ENV1735SKSW	ENV1735TKSW	1735	50,000	2.6
ENV2050SKSW	ENV2050TKSW	2050	59,000	2.6
ENV2325SKSW	ENV2325TKSW	2325	67,000	2.6

ENV2745SKSW	ENV2745TKSW	2745	79,000	2.6
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OVERVIEW

FEATURES AND BENEFITS

Enjoy a bespoke fit. We'll consider roof water yield, projected water consumption and ground work criteria.

Capacities from 6000 to 79000 litres within a single tank

Multiple tanks can be joined to cater for larger volumes

Can be installed under trafficked areas

Complete packaged units delivered direct to site
