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Engineering Services Report

Proposed Amendment to a Residential Development

Garter Lane, Saggart, County Dublin

Client: Cape Wrath ULC

Job No. T054

September 2022

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ENGINEERING SERVICES REPORT

PROPOSED AMENDMENT TO A RESIDENTIAL DEVELOPMENT, GARTER LANE, SAGGART, COUNTY DUBLIN

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BS 1192 FIELD	**T054-CSC-ZZ-XX-RP-C-0001_ESR**

Job Ref.	Author	Reviewed By	Authorised By	Issue Date	Rev. No.
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T054	KP	GL	CT	13.05.2022	2
T054	KP	GL	CT	12.09.2022	3

1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Cape Wrath ULC to prepare an Engineering Services Report to accompany a planning application for an amendment to previously permitted residential development (granted by An Bord Pleanala under ABP-308088-20) at Garter Lane, Saggart, County Dublin.

This report assesses the proposed development under the following headings:

- Foul Drainage Infrastructure
- Stormwater Drainage Infrastructure
- Potable Water Infrastructure.

In preparing this report, CS Consulting has made reference to the following:

- South Dublin Development Plan 2016–2022
- Regional Code of Practice for Drainage Works
- The Greater Dublin Strategic Drainage Study
- Irish Water Code of Practice for Water
- Irish Water Code of Practice for Wastewater
- Local Authority Drainage Records.

The Engineering Services Report is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with the various additional information submitted by the other members of the design team, as part of the planning submission.

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The proposed development site is located on Garter Lane, Saggart, County Dublin. The site is located in the administrative jurisdiction of South Dublin County Council and has a total area of circa 1.18 ha.

Figure 1 – Site location
(map data: EPA, NTA, OSM Contributors)

The location of the proposed development site is shown in Figure 1 above; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 2.

The site is bounded by a greenfield to the north and east, by the Garter Lane to the west, and by the Fortunestown Lane and the Saggart Luas track to the south.

Figure 2 – Elements of surrounding road network
(map data & imagery sources: NTA, OSM Contributors, Google)

2.2 Existing Land Use

The subject site is brownfield and currently unoccupied.

2.3 Proposed Amendment

The proposed development comprises amendments to a Strategic Housing Development scheme permitted under ABP Ref. ABP-308088-20.

The development shall consist of modifications to the previously permitted development (ABP Ref. ABP-308088-20), comprising: replacement of 2 No. 1 bedroom unit with 1 No. 2 bedroom unit and an entrance lobby / concierge at ground floor level within permitted Block C; replacement of 3 No. 3 bedroom units with 3 No. 2 bedroom units and additional residential amenity spaces at first, third and fifth floor levels within permitted Block C; replacement of 2 No. 2 bedroom units with 2 No. 1 bedroom units and

additional residential amenity spaces at ground and third floor levels within permitted Block D; and the provision of an enlarged stretcher lift through all floor levels of permitted Blocks C and D. The total number of residential units proposed shall decrease from 224 No. to 223 No. as a result of the proposed amendments.

The proposed development shall also consist of:

- amendments to the permitted car parking areas at basement levels resulting in a total loss of 29 No. car parking spaces (151 No. car parking spaces are provided in total at basement level);
- the provision of c. 275 sq m of residential amenity space (incl. reception, office, staff amenities, multi-purpose spaces, meeting rooms and lobbies) at basement level of permitted Block C and D;
- minor elevation amendments to permitted Block D;
- the provision of a new external stair well to the eastern elevation of permitted Block D providing access from the ground floor level to the basement level;
- reduction of the roofed area above the basement ramp of permitted Block A and B;
- the provision of sprinkler tank rooms, landlord plants, comms room and attenuation tanks at basement level of permitted Blocks A, B, C and D;
- the provision of PV solar panel at all roof levels; amendments to hard and soft landscaping areas;
- and all associated site excavation and development works above and below ground.

3.0 FOUL DRAINAGE

3.1 Existing Foul Drainage Infrastructure

South Dublin County Council's drainage records indicate an existing 225mm diameter foul sewer traversing Fortunestown Lane flowing south to north, into the subject site. However, following receipt of a topographical survey, the foul sewer does not traverse into the subject site and stops short of the Luas line and then heads west following the route of Fortunestown Lane and flows east to west toward Naas Road. See **Appendix A** for South Dublin County Council's drainage records.

The proposed development shall be serviced by a new drainage system with separate sewers and manholes for both foul and storm water within the sites boundary. The proposed foul network has been designed in accordance with the Part H of the Building Regulations and the Irish Water Code of Practice for Wastewater.

3.2 Proposed Foul Drainage Arrangements

The proposed development shall remain at 223 No. residential units.

Based on Irish Water guidelines, the foul effluent generated shall be:

- <u>For the residential units:</u>

  ⇒ 446l/day per unit (based on 2.7 persons per unit x 150l/person/day, plus a 10% increase factor);

  ⇒ 446l/day/apt x 223 units = 99,458 l/day = 99.5 m^3/day;

  ⇒ 1.15 l/sec Average flow (1 DWF);

  ⇒ 6.9 l/sec Peak Flow (6 DWF).

All foul effluent generated from the proposed development from the upper's floors of each proposed block apartments shall be collected in separate foul pipes and flow under gravity, to the existing 225 mm diameter foul sewer on Garter Lane via a new connection. For the basement level, each proposed blocks effluent generated shall be collected in pipe of 150mm in diameter flowing under gravity to a pump station located in the basement to a stand-off manhole at ground level. The car parking areas shall have its runoff pass through an oil interceptor prior to discharging into the foul network in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

A connection application is with Irish Water based on the granted permission under An Bord Pleanala Ref: ABP-308088-20 and we are awaiting a favourable as costings for residential units are based on unit numbers.

The proposed foul water drainage infrastructure and routing plan is shown on drawing GAR-CSC-ZZ-00-DR-C-0003.

4.0 STORMWATER DRAINAGE

4.1 Existing Stormwater Drainage Infrastructure

Following receipt of SDCC drainage records (see **Appendix A**) there is a stormwater sewer at the southwest corner of the development site on Garter Lane.

4.2 Proposed Stormwater Drainage Arrangements

In accordance with the requirements of SDCC Drainage Division all new developments are to incorporate the principles of Sustainable Urban Drainage Systems, (SuDs). The SuDs principles require a two-fold approach to address storm water management on new developments.

The first aspect is to reduce any post development run-off to pre-development discharge rates. The development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1 in 100 year storm event increased by 20% for predicted climate change factors.

To ensure an accurate calculation of the required attenuation for the site Met Eireann was contacted to provide:

a) The SAAR (Standard Annual Average Rainfall) for the area: 731mm/year

b) The sliding duration table for the site indicating the 1:100 year rainwater intensities to be used

As the previous granted development under Reference ABP-308088-20, the proposed development is spilt into two by an access road that provides a link to granted development to the east.

Therefore, it is proposed to provide two separate attenuation systems to serve the two development zones, i.e. either side of the access road, as there is a strong possibility that the access road shall be taken in charge in the future. The reason for splitting the development into two networks is to avoid the drainage network going from private land to public land and back to private land again.

Two separate attenuation tanks shall be used to serve both development zones and shall be located within each basement.

Based on the above criteria, the northern element of the development shall require 215 m^3 of storage and 270m^3 shall be required to the southern element, see **Appendix B** for the attenuation calculations. Both sites shall limit their discharge to 2.0l/s as per the original grant of permission granted under reference ABP-308088-20. The 2 number attenuation tanks shall be reinforced concrete tanks that shall have individual pump systems that shall discharge stormwater at 2.0 l/s each to the gravity network.

The attenuated/pumped flows from the two development zones shall then discharge to the existing stormwater network on Garter Lane. The last public manhole and network to the existing sewer is to be constructed in accordance with Local Authority's requirements.

The second aspect is the policy of the Local Authority is to include Sustainable Urban Drainage Systems, SuDS, for all new applications, as such it is proposed to use a range of SuDS devises for the scheme they are listed below:

SuDs proposals are as follows;

- Use of green roof technology at roof and podium levels to cater for the initial interception storage. Green Roof System details are provided in **Appendix C**

- Permeable Paving to all new external parking spaces
- Permeable paving systems on podium level to cater for the initial interception storage
- Waterbutts for local irrigation and washing down

Please see Drawings No. GAR-CSC-ZZ-00-DR-C-0002 and GAR-CSC-ZZ-00-DR-C-0005 for the proposed stormwater drainage and SuDS layouts respectively. The proposed storm water network has been designed in accordance with the Part H of the Building Regulations and the Greater Dublin Regional Code of Practice for Drainage Works.

5.0 POTABLE WATER SUPPLY

5.1 Existing Potable Water System

Records obtained from Irish Water indicate public watermains (200mm diameter MoPVC) adjacent to the development site on Garter Lane and on Fortunestown Lane.

5.2 Proposed Potable Water System

The proposed development shall remain at 223 No. residential units.

It is proposed to make a connection off the existing watermain on Garter Lane to the development site and supply a 150mm diameter watermain to the proposed development site.

Based on Irish Water guidelines, the potable water requirements shall be:

- For the residential units:
  - ⇒ 405l/day per unit (based on 2.7 persons per unit x150l/person/day);
  - ⇒ 405l/day/apt x 223 units = 90,315 l/day = 90.3 m^3/day;
  - ⇒ 1.045 l/sec Average water demand;
  - ⇒ 5.225 l/s Peak Demand (5 times the average water demand).

A connection application is with Irish Water based on the granted permission under An Bord Pleanala Ref: ABP-308088-20 and we are awaiting a favourable as costings for residential units are based on unit numbers.

The proposed watermain infrastructure and routing plan is shown on drawing GAR-CSC-ZZ-00-DR-C-0004 included with this submission. The proposed watermain network has been designed in accordance with the Irish Water Code of Practice for Water.

Appendix A: South Dublin County Council & Irish Water Records

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UISCE ÉIREANN : IRISH WATER

Legend

- Pump Stations
- Irish Water
- Private
- Irish Water
- Non IW
- Gravity - Combined
- Gravity - Foul
- Gravity - Overflow
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Overflow
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Syphon - Overflow
- Overflow
- Gravity - Combined
- Gravity - Foul
- Gravity - Overflow
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Overflow
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Syphon - Overflow
- Overflow
- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

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Appendix B: Attenuation Calculations

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Project:	Garters Lane
Project No.:	T054
Calculation:	Attenuation 100-year Northern Block
Calcs By:	GL
Checked By:	
Date:	27.08.2022

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Site Location:	Dublin		
Design Storm Return Period:	100 years		
Climate Change Factor:	20 %		
Soil Type:	3		
Total Site Area:	0.534 ha		
Green Roof System:	0.073 ha	.....@	80% Impervious
Hard Roof:	0.050 ha	.....@	100% Impervious
Green Podium	0.244 ha	.....@	85% Impervious
Green Area	0.167 ha	.....@	0% Impervious
Effective Impermeable Area:	0.316 ha		

Allowable Outflow	**Calculate**	
IH124: QBAR = 0.00108 x AREA$^{0.89}$ x SAAR$^{1.17}$ x SOIL$^{2.17}$		
AREA:	0.0053 km^2	
SAAR:	731 mm	
SOIL:	0.37	
QBAR/ha	3.02 l/s/ha	
Allowable Outflow	**2.0 l/s**	Smallest Allowable Discharge Rate

Storage required =	**211 m^3**	

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71iA) (l/s)	Proposed Runoff (m^3)	Contiguous Land Runoff (m^3)	Total Runoff (m^3)	Allowable Outflow (m^3)	Storage Required (m^3)
5	15.0	18.0	216.0	185	55	0	55	1	55
10	20.9	25.1	150.5	129	77	0	77	1	76
15	24.6	29.5	118.1	101	91	0	91	2	89
30	30.4	36.5	73.0	62	112	0	112	4	109
60	37.6	45.1	45.1	39	139	0	139	7	132
120	46.5	55.8	27.9	24	172	0	172	14	158
180	52.6	63.1	21.0	18	194	0	194	22	173
240	57.4	68.9	17.2	15	212	0	212	29	183
360	65.0	78.0	13.0	11	240	0	240	43	197
540	73.6	88.3	9.8	8	272	0	272	65	207
720	80.4	96.5	8.0	7	297	0	297	86	211
1080	91.0	109.2	6.1	5	336	0	336	130	207
1440	99.4	119.3	5.0	4	367	0	367	173	195
2880	110.9	133.1	2.8	2	410	0	410	346	64
4320	120.7	144.8	2.0	2	446	0	446	518	-72
5760	129.2	155.0	1.6	1	478	0	478	691	-214
8640	144.0	172.8	1.2	1	532	0	532	1037	-504
11520	157.0	188.4	1.0	1	580	0	580	1382	-802
14400	168.6	202.3	0.8	1	623	0	623	1728	-1105
17280	179.4	215.3	0.7	1	663	0	663	2074	-1410
23040	198.9	238.7	0.6	1	735	0	735	2765	-2029
28800	216.6	259.9	0.5	0	801	0	801	3456	-2655
36000	237.0	284.4	0.5	0	876	0	876	4320	-3444

Project:	Garters Lane
Project No.:	T054
Calculation:	Attenuation 100-year Southen Block
Calcs By:	GL
Checked By:	
Date:	27.08.2022

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Site Location:	Dublin		
Design Storm Return Period:	100 years		
Climate Change Factor:	20 %		
Soil Type:	3		
Total Site Area:	0.534 ha		
Green Roof to Blue Roof System:	0.146 ha	.....@	80% Impervious
Hard Roof:	0.050 ha	.....@	100% Impervious
Green Podium	0.244 ha	.....@	85% Impervious
Green Area	0.094 ha	.....@	0% Impervious
Effective Impermeable Area:	0.374 ha		

Allowable Outflow	**Calculate**	
IH124: QBAR = 0.00108 x $AREA^{0.89}$ x $SAAR^{1.17}$ x $SOIL^{2.17}$		
AREA:	0.0053 km^2	
SAAR:	731 mm	
SOIL:	0.37	
QBAR/ha	3.02 l/s/ha	
Allowable Outflow	**2.0 l/s**	Smallest Allowable Discharge Rate

Storage required =	**269 m^3**	

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71iA) (l/s)	Proposed Runoff (m^3)	Contiguous Land Runoff (m^3)	Total Runoff (m^3)	Allowable Outflow (m^3)	Storage Required (m^3)
5	15.0	18.0	216.0	219	66	0	66	1	65
10	20.9	25.1	150.5	153	92	0	92	1	90
15	24.6	29.5	118.1	120	108	0	108	2	106
30	30.4	36.5	73.0	74	133	0	133	4	130
60	37.6	45.1	45.1	46	165	0	165	7	158
120	46.5	55.8	27.9	28	204	0	204	14	189
180	52.6	63.1	21.0	21	230	0	230	22	209
240	57.4	68.9	17.2	17	251	0	251	29	223
360	65.0	78.0	13.0	13	285	0	285	43	242
540	73.6	88.3	9.8	10	322	0	322	65	258
720	80.4	96.5	8.0	8	352	0	352	86	266
1080	91.0	109.2	6.1	6	399	0	399	130	269
1440	99.4	119.3	5.0	5	435	0	435	173	263
2880	110.9	133.1	2.8	3	486	0	486	346	140
4320	120.7	144.8	2.0	2	529	0	529	518	10
5760	129.2	155.0	1.6	2	566	0	566	691	-125
8640	144.0	172.8	1.2	1	631	0	631	1037	-406
11520	157.0	188.4	1.0	1	688	0	688	1382	-695
14400	168.6	202.3	0.8	1	739	0	739	1728	-989
17280	179.4	215.3	0.7	1	786	0	786	2074	-1288
23040	198.9	238.7	0.6	1	871	0	871	2765	-1893
28800	216.6	259.9	0.5	1	949	0	949	3456	-2507
36000	237.0	284.4	0.5	0	1038	0	1038	4320	-3282

Appendix C: Proposed Green Roof Information

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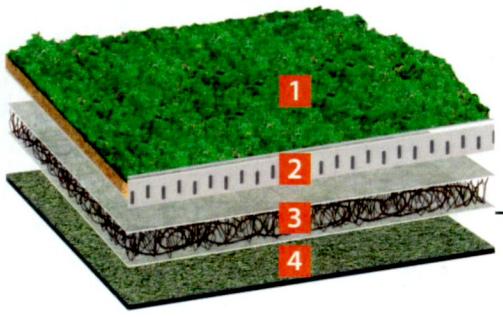
BAUDER

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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BAUDER

Revision: November 2020 V2

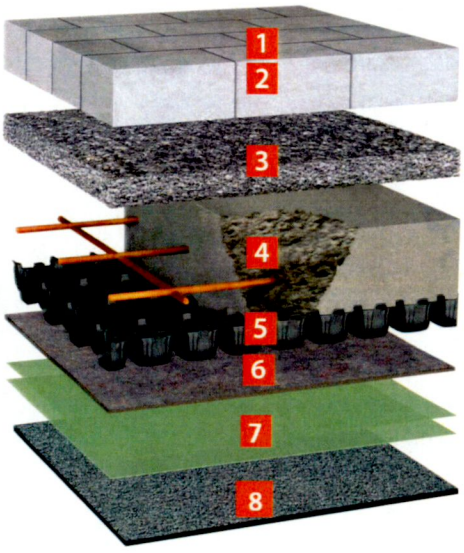
SYSTEM SUMMARY

Bauder Heavy Duty Bedded Paving Solution

Hard landscaping roof system (Heavy vehicle traffic)

The system allows areas of vehicle accessed hard landscaping to be formed over the top of the waterproofing system without effecting the drainage characteristics of the roof. Suitable for vehicles of up to SLW30 travelling at slow speed.

The information below is indicative and based on 0-3 ° pitch. Bauder recommend that any proposed system is verified by a structural engineer and the paving supplier. A comprehensive range of guarantees are available for this system.



Product	Description	thickness	weight
1 Paving	Any variety of stone or composite paving to provide the correct finish to the roof.	Varies	Varies
2 Mortar bed and joints	Details of joint widths and material is best specified by the paving supplier.	N/A	N/A
3 Bedding Layer	Either permeable bedding layer (2-5mm granite grit or similar) or a mortar bed.	50 mm	75Kg/m²
4 Sub-base	Reinforced concrete poured directly into the DSE40 .	350mm	700Kg/m²
5 Bauder DSE40	Drainage and storage element, made of 100% recycled HDPE.	40 mm	44Kg/m² (filled with type 1)
6 Bauder FSM1100 Protection Layer	Polyester and polypropylene fibre mix protection layer to prevent mechanical damage to the underlying waterproofing.	8mm	7.1Kg/m²
7 Bauder PE Foil x 2 Separation Layer	Polyethylene foil separation and slip layer manufactured from recycled granules.	0.4mm	0.38kg/m²
8 Bauder's Underlying Waterproofing System	Robust waterproofing is required for this build-up, typically Bituminous Membrane or Hot Melt systems.	Not Included	Not Included
Hard Landscaping Roof Build up (fully saturated, excludes the paving/mortar bed & waterproofing)		**448mm**	**826Kg/m²**

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BAUDER

TECHNICAL SYSTEM SUMMARY

HARD LANDSCAPED ROOF SYSTEM

BEDDED PAVING SOLUTION

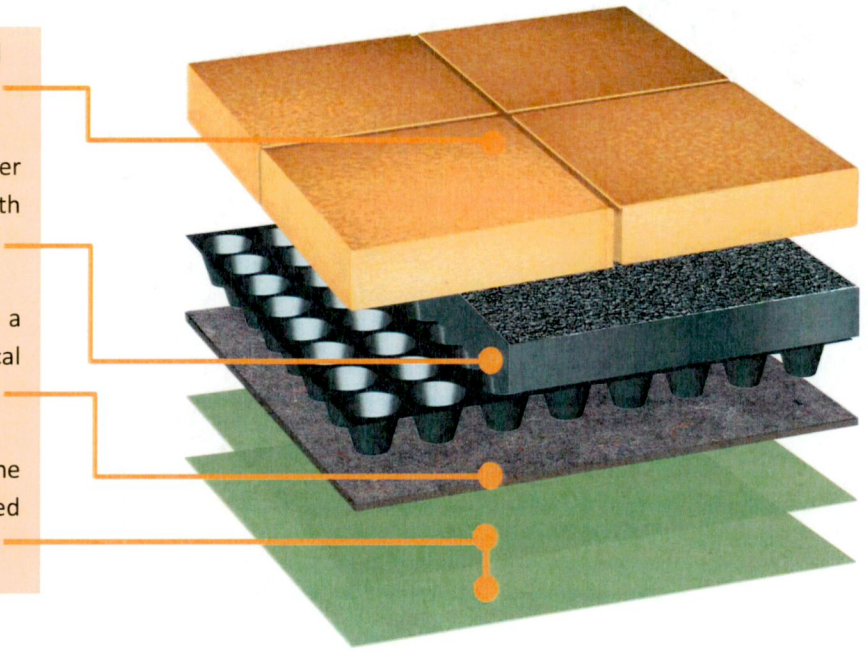
This system helps create low maintenance accessible areas, such as walkways, access roads and terrace spaces with container planting set atop the decking or paving if required. The hard landscaping can be designed to create distinct zones giving the space a visual dimension. A comprehensive range of guarantees are available for this system.

Concrete Paving Slabs provide a functional finish to the roof area.

Bauder DSE 20 multi-functional water storage and drainage layer, infilled with compound bedding.

Bauder FSM 600 Protection Mat is a protection layer to prevent mechanical damage to the waterproofing system.

Bauder PE Foil (two layers) is a polyethylene foil separation and slip layer manufactured from recycled granules.



When to Specify

This system is ideal for hard landscaping applications where the anticipated loading is moderate. A variety of finishes are available for hard landscaped access areas; decking, paving, loose gravel, all in combination to harmonise dimension, colour and texture.

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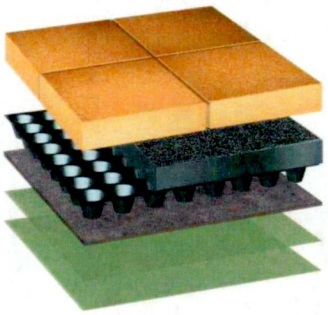
TECHNICAL SYSTEM SUMMARY

HARD LANDSCAPED GREEN ROOF SYSTEM

Weight Loading



Product	Thickness (mm)	Saturated Weight (Kg/m²)
Paving (Not supplied)	Variable	
Bauder DSE 20 (infilled)	20.0	19.7
Bauder FSM 600 Protection Mat	4.0	0.6
Bauder PE Foil Separation Layers	0.4	0.38
Totals	**24.40**	**20.68**

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