



Operations and Maintenance Manual			
	Print	Sign	Date
Originator	Olyi Ltd (M Hoddinott – Consultant)		
Checked	Greenroofers R Hendy (Managing Director)		
Reviewed by			
Accepted by			

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Amendment Record

Issue	Amendment	Author	Date

Extensive Sedum Roof Kingsgate School



100126417

Friday, 28 April 2017

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1.0 Significant Risks

- 1.1 **There are no significant risks with this system**
- 1.2 **All risk relates to access of the roof for maintenance**

2.0 System Component

2.1 The system comprises of:

- **Protection layers:**
 - supplied by others
- **Drainage layer:**
 - GRD25 nominal 25mm rigid compression cell multifold drainage board supplied by Greenroofers Ltd.
- **Growing medium:**
 - Greenroofers engineered lightweight extensive green roof substrate. The material will contain a mixture of pumice, expanded clay and crushed brick amongst other ingredients such as fillers of coarse sand. It will contain organic peat free compost and have a bulk dry weight of 936kg/m³. Installed to a finally settled depth of 55mm including an allowance for 20% settlement in accordance with the GRO Code of Best Practice.
- **Vegetation layer:**
 - GRS38 Sedum mat, average 25mm thick pre-grown mat containing a minimum of 11 species of sedum (sourced from 38 different varieties) at 90% coverage upon delivery and harvest.
- **Vegetation break:**
 - 300mm wide, Coastal 20, 20/40mm washed rounded pebble margin, free from sharp edges and contaminants
- **Perimeter Trim:**
 - 80mm high aluminium slotted trim, mechanically fixed to under layer to serve as a separation barrier to perimeters.
- **Habitat Spaces**
 - Not required.

3.0 The Works

3.1 Scope

The scope of works for this project are the installation of a light weight sedum green roof structure with paving slabs laid on adjustable supports.

3.2 Hazardous Materials

3.2.1 No hazardous materials were employed in this construction

3.2.2 COSHH Sheets are available on request

3.2.3 No waste consignment notices are applicable

3.3 Site Installation & Monitoring Records

3.3.1 Materials installed as per the customers instructions and recognised industry best practice.

3.4 Quality Assurance & Handover

3.4.1 Site walked with the contractors representative and accepted

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4.0 Statutory Notifications

All products supplied CE marked where appropriate and with manufacturing traceability where required.

5.0 Operations and Maintenance

5.1 Installation of sedum roof and paving, no mechanical parts, with the exception of irrigation if required (not applicable in this instance)

5.2 The roof must be watered thoroughly for a period of 10 weeks following handover. The term watered may include a prolonged period of rainfall, but site specific conditions should be checked to ensure that area is not saturated but is also moist.

5.3 Planned maintenance

Autumn:

- Trim the roof surface to remove all dead vegetation, rake off debris and cart away.

Spring:

- Inspect substrate surface and vegetation barriers; remove all unwanted grasses, weeds, saplings etc.
- Any bare areas of substrate must be re-seeded and lightly raked over, or re-planted.
- Ensure that perimeters and roof outlets are free from weeds and other blockages.
- Fertilise with slow release nutrient fertilizer at a rate of 25 grams per square metre.

5.4 Maintenance Contract

5.4.1 If a maintenance contract is entered into, our inspection will map the in 50 m2 sections. This will enable us to monitor the species growth and uptake

5.4.2 Any "bold" spots will have additional rhizomes spread throughout the area to encourage growth and full coverage

5.4.3 Dead material will be removed from the roof to avoid the build up of nitrates

5.4.4 Paving slabs will be checked for stability

5.4.5 Please refer to maintenance schedule attached in the appendix for specifics

5.5 Significant Maintenance H&S risks

5.5.1 Manual handling is not to be undertaken with loads over 20kg and should be risk assessed for the ergonomics of the site.

5.5.2 Safety and PPE protection should be work when Strimming and removing dead materials

5.5.3 Any fall arrest system and subsequent PPE should be assessed for suitability and accepted prior to enter a zone on the roof where fall arrest equipment is required.

5.5.4 All provided PPE including fall arrest equipment MUST be worn when working on the roof space


5.5.5 Data sheets and COSSH information available from The Greenroofers GREENROOFERS Ltd, 1st Floor, 2 Woodberry Grove, Finchley, N12 0DR, 0120 3605 7385, info@greenroofers.co.uk

6.0 Test inspections and Approvals



6.1 The roof is deemed to be performing and acceptable providing the living materials can be visually seen to be alive and flourishing.

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Appendix 1 – Materials



Mixed Sedum Mat
Product Data Sheet (GRMS20) Issue Date: Feb 2017

The Greenroofs sedum blankets are a biodegradable coconut fibre based blanket with a light weight mineral based substrate and 10 to 14 species of sedum grown into the components for every 30 sqm. The Greenroofs mixed sedum mat (GRMS20) offers seasonal variation in colour including a vivid flowering season to attract pollinators.

The blankets boast at least 85% coverage upon delivery and are grown for a period of at least 18 months prior to harvesting. The vegetation blankets are produced outdoors and in accordance with FLL guidelines.

The succulent Sedum plants are adept at storing water in their leaves and are therefore extremely suitable for varying weather conditions.

Maintenance is subject to the location, construction build-up and degree of exposure, but as a minimum we would recommend fertilisation and weeding at least once a year, and following the guidelines given in the GRO Green Roof Design and Specification document.


Installation and maintenance of the Greenroofs blanket is easy following our guidelines. The blankets may be installed on sloping surfaces of up to 30 degrees.


Technical details overleaf.

For more information or guidance please use the contact details as shown below.
 *Minimum content dependent upon the region and also the particular client preferences; not all of the materials stated will necessarily be present. Greenroofs reserve the right to alter materials and the mix to achieve the values stated in accordance with the clients requirements.
 Please note that data provided is based on results achieved using our test equipment and specific layout. Drainage board used is 25mm deep. More detailed information on ancillary products used in testing may be made available upon request.
 All Greenroofs products comply to the recommendations of the G.R.D. and the F.L.L. for the production and sustainability.

Notes/

Green Roofers, 1st Floor, 2 Woodberry Grove, Finchley, N12 0DR, T: 0203 605 7385, M: 07506786721, E: info@greenroofs.co.uk







Mixed Sedum Mat
Product Data Sheet (GRMS20) Issue Date: Feb 2017

Technical data:

Coverage	Approx. 85%
Basic weight	10 – 12kg per sqm
Saturated weight	16 – 20kg per sqm
Thickness	Nominal 20mm
Standard Sizes	1 x 1.2m – approx. 50kgm per pallet



Species Assessment Chart

Sedum album coral carpet:


Flower period: June / July Maximum height: ca. 10 cm Colour of flowers: white


Sedum album murale:

Flower period: June / July Maximum height: ca. 10 cm Colour of flowers: white



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Mixed Sedum Mat
Product Data Sheet (GRMS20) Issue Date: Feb 2017

Sedum Lydium:



Flower period: June / July Maximum height: ca. 10 cm Colour of flowers: pink / white

Sedum Acre:


Flower period: June / July Maximum height ca. 5 cm Colour of flowers: yellow


Sedum Sexangulare:

Flower period: June / July Maximum height: ca. 5 cm Colour of flowers: yellow



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Mixed Sedum Mat
Product Data Sheet (GRMS20) Issue Date: Feb 2017

Sedum Hispanicum minus:



Flower period: June / July / August Maximum height: ca. 5 cm Colour of flowers: white / pink

Sedum spurium fuldaglut:


Flower period: August / September Maximum height: ca. 15 cm Colour of flowers: pink / red

Sedum floriferum:

Flower period: June / July Maximum height: ca. 15 cm Colour of flowers: yellow

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Appendix A cont – Materials

Project Ref: **X**
Issued: **1**
Pages: 1 of 1

Lightweight Extensive Substrate Product Data Sheet (GRLES60)

A clean drainage and growth media designed for use in living roof applications.
Supplied in Bulk Bags certified for safe lifting, or 25kg pallets shrink-wrapped on recycled 4-way pallets.
Product is bagged specifically for projects to ensure material is kept dry and free from growth or detritus.
A safety certificate for the bulk bags can be issued to client, contractor or site.
Components List by weight per tonne:

Expanded Clay	150kg
Crushed Brick	350kg
Clean Coarse Sand	320kg
8mm Pumice Stone	40kg
0-20mm Organic Peat Free Leaf Compost	55kg
Dry weight per cubic metre	936kg
Saturated Weight	1100kg (approx.)
Coverage	10sqm per Tonne
pH range	6 - 8
Max Water Capacity	45 up to 55% Volume
Packaged	Bulk Tonne Bags or 25kg bags

For more information or guidance please use the contact details as shown below.

*Vatiable content Dependent upon the region and also the particular client preferences, not all of the materials stated will necessarily be present. Greenroofers reserve the right to alter materials and the mix to achieve the values stated in accordance with the clients requirements.

Test results Please note that data provided is based on results achieved using our test equipment and specific layout. Drainage boards used is 20mm deep. More detailed information on ancillary products used in testing may be made available upon request.

Note:// All Greenroofers mixes comply to the recommendations of the Q.R.O. and the F.L.L. for fire precaution and sustainability.

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Project Ref: **X**
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Rigid Multiflow Drainage Layer Product Data Sheet (GRD8)

GRD8 is a nominal 6mm rigid compression cell multiflow drainage layer with mechanically fixed 150g/m² filtration layer supplied by Greenroofers Ltd. The board is a drainage geo composite with an internal HDPE dimple core combined with one filter geotextile.

Filter geotextile (Polypropylene)

Weight	EN ISO 9864	g/m ²	100	+/- 10
Tensile Strength MD/CDM	EN ISO 10319	N/m	6/6	-1
Elongation at max load	EN ISO 10319	%	55/50	+/- 30
CBR puncture resistance	EN ISO 12236	N	1000	- 15
Cone drop test	EN ISO 13433	mm	38	+ 6
Water permeability	EN ISO 11058	mm/s	100	-40
Opening size	EN ISO 12955	Micron	95	+/- 35

Drainage (HDPE)

Weight	EN ISO 9864	g/m ²	500	+/- 5
Width		M	2.4	+/- 3%

Geocomposite

Weight	EN ISO 9864	g/m ²	600	+/- 50
Thickness at 2 kPa	EN ISO 9863-1	mm	7.5	+/- 1
Tensile Strength MC/CDM	EN ISO 10319	kN/m	10/10	-5
Elongation at max load	EN ISO 10319	%	50/55	+/-15
Compression resistance	-	kN/m ²	200	+/- 30

Hydraulic Performance

Plane flow cap MD 20kPa S	EN ISO 12958	l/(m.s)	1.65	+/-0.2
Plane flow capacity	EN ISO 12958	l/(m.s)	20%	
Hydraulic gradient	Contact	l = 0.04	l = 0.10	l = 1
Load 20kPa S/R		0.30	0.45	1.65
Load 50kPa S/R		0.20	0.35	1.30
Load 100kPa S/R		0.15	0.20	0.80

s/s contact soft/soft S/R contact soft/rigid

Durability
Forecast minimum durability (natural soils 4<PH<9 and T<25°C) % years

Standard Dimensions

Width	m	2	+/-3%
Length	m	20	+/-2%
Rolls/pallet	No.	6	

For more information or guidance please use the contact details as shown below. The information given in this data sheet is accurate to the best of our knowledge, however our commitment to continuous improvement necessitates that product improvement may change certain items. No guarantee or liability can be drawn from the information mentioned herein.

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Appendix B – Schedule of Maintenance Contract (separate cost)

Greenroofers Maintenance Contract 
Project Name 100190417
 Wednesday, 19 April 2017

The Customer :
 Address :
 Contact :

who declares to be duly authorized by the Customer for signing this agreement with the Greenroofers Ltd, registered office
 have entered into this inspection and maintenance agreement for the project detailed below:

Name :
 Address :
 Structure and scope :

in accordance with the conditions listed overleaf and forming an integral part of such conditions.
 Unless explicitly stated otherwise, the general conditions of sale, delivery and payment of the Greenroofers Ltd of which a copy is enclosed, shall also apply.


Schedule of fees:-

Item Description	Fee	Status
Visual inspection for acceptability within agreed terms		
Ecological report and status of species development		
Annual Removal of invasive plants and other items detrimental to the performance of the roof		
Autumn trim and growth control visit		
Spring fertilization and health check		
Gutter cleaning and drainage check		
Gently water roof as required		
Total (excl VAT)		

The fee charged by the Greenroofers Ltd for this agreement is exclusive of VAT, to be paid within thirty days of the invoice date. Any increase of this fee shall be based upon the current RPI on an annual basis, in consultation with the Customer.

This agreement shall take effect on the date of it being signed and is entered into for a duration of two years. This agreement can be terminated prematurely, subject to three months' notice by registered letter.

1 GR008.02 Maintenance Agreement 190417 / Project Name this document contains 3 pages

Greenroofers Maintenance Contract 
Project Name 100190417
 Wednesday, 19 April 2017

Conditions with the green roof inspection and maintenance agreement

Article 1 Inspection
 The Greenroofers Ltd will undertake to inspect the living roof at least twice a year. The scope of the inspection includes all materials supplied and/or fitted by the Greenroofers, and removal of any materials from site.

Article 2 Inspection activities
 Where agreed in the schedule, the inspection consists of a check of the visible condition of the living roof, such as:
 - Complete annual area inspection – overview
 - Checking the status of the species
 - Checking and correcting minor defects to the living roof
 - Removal of invasive species
 - Inspecting irrigation systems if present
 - Highlighting possible issues such as barren patches and diseased areas
 - Removal of debris from the gutters and drains
 - Application of appropriate fertilizer


Article 3 Minor maintenance activities
 Minor maintenance activities will be carried out at the time of the inspection. "Minor maintenance activities" are activities which can be reasonably carried out by the inspector using the materials and tools usually brought to the inspections.

Article 4 Major maintenance activities
 a) If the inspection by the inspector shows that the living roof requires maintenance or repair measures beyond the scope of minor maintenance, he will report this to the Customer.
 b) The Greenroofers will carry out these activities after consulting with the Customer, and at the conditions and cost agreed additionally, unless these activities are covered by any warranty which may be in place.

Article 5 Amendments
 Any changes to the project can involve a surcharge. Changes to the ownership and/or management must be communicated to the Greenroofers forthwith. If the project is transferred to a third party or to third parties, the rights and duties related to warranty shall also apply to the new owner.

Article 6 Final provisions
 Repairs due to damage caused by misuse, contingencies or improper use of the Greenroof by the Customer or a third party are not covered by this agreement. Materials which have been taken out by the Customer or a third party and have been incorrectly replaced are not covered by this agreement and will be repaired against additional costs.

2 GR008.02 Maintenance Agreement 190417 / Project Name this document contains 3 pages

Greenroofers Maintenance Contract 
Project Name 100190417
 Wednesday, 19 April 2017

Drawn up and signed in duplicate.
 In London on DATE

.....
 Mr. / Mrs....
 for the Customer

.....
 Mr. Ryan Hendy
 for Greenroofers Ltd

Date and Revisions
 19th April 2017

Location and Contacts
 1st Floor, 2 Woodberry Grove, Finchley, London. N12 0DR

Green Roofer Contacts
 Ryan Hendy Managing Director ryan@greenroofers.co.uk 07506 786 721
 Richard Longden Technical Director richard@greenroofers.co.uk 07593 023 552
 Connor Deal Operations Manager connor@greenroofers.co.uk 07807 781 945

Office 020 7754 0365

In the first instance of an emergency please ring the office number

3 GR008.02 Maintenance Agreement 190417 / Project Name this document contains 3 pages



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Appendix C – Handover Certificate (example)

Handover Certificate Example Project	GREENROOFERS 1001 Tuesday, 28 February 2017
 GREENROOFERS	
<h3>Handover Certificate</h3>	
<p>This is to certify that the <i>Choose an item.</i> has been inspected by the Greenroofers representative, <i>Choose an item., Choose an item..</i> The work is deemed acceptable, and installed to the requirements of the GRO Code of Practice as per our quotation dated <i>Click or tap to enter a date..</i> The roof is now the responsibility of <i>Choose an item., except</i> for items of agreed maintenance contained in the O + M Manual.</p>	
<p>Please note it is now your responsibility to:</p> <ul style="list-style-type: none">Water the roof for 10 weeks as recommended by GRONot walk over the areaNot store materials on the areaNot spill anything hazardous to horticulture over the areaFollow the guidelines given in our O+M manual	
Guarantee Period:	10 years with approved maintenance contract
Prepared For:	Ryan Hendy
Client Address:	Greenroofers
Contact:	Ryan Hendy
Contact Tel:	-
Contact Email:	ryan@greenroofers.co.uk
Prepared By:	Ryan Hendy
Contact Tel:	0203 605 7385
Contact Email:	info@greenroofers.co.uk
<p><u>Please notify the Greenroofers Ltd within 3 weeks should you not accept the details of this certificate.</u></p>	
_____ Ryan Hendy Managing Director	_____ Dated
<small>Green Roofers, 1st Floor, 2 Woodberry Grove, Finchley, N12 0DR, T: 0203 605 7385, M: 07506786721, E: info@greenroofers.co.uk</small>	
 GREENROOFERS	
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