

300 BROOK DRIVE - HABITAT MANAGEMENT AND MONITORING PLAN

INTRODUCTION

This Habitat Management and Monitoring Plan (HMMP) has been produced by Greengage Environmental Limited (Greengage) to support the development of the site known as 300 Brook Drive in Reading, Berkshire (planning application number: PL/24/1520).

The development seeks *'External refurbishment of an existing office building (Use Class E) including alterations to the main entrance space, elevations, installation of solar photovoltaics (PV) panels and electric vehicle charging points, replacement plant equipment, external lighting, erection of a new cycle store with changing facilities, a new external pergola and associated landscaping works.'*

This HMMP summarises how the significant on-site enhancements being delivered by the development will be managed and monitored for at least 30 years, in-line with statutory Biodiversity Net Gain (BNG) requirements.

POST-DEVELOPMENT HABITATS

The development proposes to create new habitats and enhance existing habitats on-site to provide a net gain for biodiversity. New habitats proposed include other neutral grassland, urban trees, introduced shrub, other green roof, and rain garden. Existing areas of modified grassland will be enhanced to other neutral grassland.

Existing areas of reedbed and mixed scrub will be retained. These habitats will be retained in their existing condition and will continue to be managed by those responsible for the wider Green Park site management. Some areas of modified grassland and introduced shrub will also be retained.

The post-development habitats to be created, enhanced or retained, and managed for 30 years, are shown in Figure 1 below.

Figure 1 Proposed Habitats Plan

300 BROOK DRIVE

 Red Line Boundary

Habitats

-  Artificial unvegetated unsealed surface
-  Developed land; sealed surface
-  Introduced shrub
-  Mixed scrub
-  Modified grassland
-  Other green roof
-  Other neutral grassland
-  Rain garden
-  Reedbeds

Hedgerows

-  Non-native and ornamental hedgerow

Individual Trees

-  Proposed small tree
-  Retained medium tree
-  Retained small tree

Title: Proposed Habitats

Drawn by: SR
Date: 13/05/2025

Reviewed by: JB
Date: 13/05/2025

Project number: 552638
Sources: Google Satellite Imagery



HABITAT AND CONDITION TARGETS

Target Habitat Type	Targeted Condition	Years to Targeted Condition	Condition Assessment Targets	Comments
Modified grassland	Poor	N/A	Poor condition will be retained by continuing to achieve criteria C, D, F, and G.	Approximately 464m ² of modified grassland will be retained in its current condition. Poor condition does not require the satisfaction of any condition criteria and changes to the existing management regime are not required.
Other neutral grassland	Poor	1 (enhanced) 2 (created)	Poor condition will be targeted by achieving only criteria D and E.	The majority of the other neutral grassland will be amenity grassland sown with a species-rich wildflower grassland seed mix that responds well to regular mowing, such as Emorsgate EL1 Flowering Lawn Mixture. These areas will be managed to a short height for amenity use.
Other neutral grassland	Moderate	10	Moderate condition will be targeted by achieving criteria A, B, D, and E.	Two patches of other neutral grassland in the western lawn, over the raised land of the amphitheatre and adjacent the existing Chinese silver grass, will be managed for biodiversity and allowed to grow tall with a varied sward height and will thus achieve moderate condition.
Artificial unvegetated; unsealed surface	N/A	0	N/A	N/A
Developed land; sealed surface	N/A	0	N/A	N/A
Introduced shrub	N/A	1	N/A	Approximately 1041m ² of introduced shrub will be planted. Introduced shrub is not subject to a condition assessment and thus does not require satisfaction of any condition criteria.
Other green roof	N/A	1	N/A	Approximately 88m ² of other green roof will be created. Other green roof is not subject to a condition assessment and thus does not require satisfaction of any condition criteria. The green roof will be managed in-line with the Sedum Roof Maintenance Schedule produced for the site.
Rain garden	Moderate	3	Moderate condition will be targeted by achieving criteria B and C.	A rain garden will be created within the western lawn. The rain garden will be planted with marginal vegetation comprising a variety of species that benefit native wildlife (i.e. via pollinator provision).
Urban tree	Moderate	27	Moderate condition will be targeted by achieving criteria B, D, and F. Some trees are/will be native species, and therefore also meet criterion A.	30 new trees will be planted. A mix of native and non-native species will be used. These trees should oversail vegetation. Intensive pruning regimes should not be put in place; the trees should retain at least 75% of expected canopy for a tree of their age and height.
Non-native and ornamental hedgerow	N/A	1	N/A	Approximately 47m of non-native and ornamental hedgerow will be planted. Non-native and ornamental hedgerow is not subject to a condition assessment and thus does not require satisfaction of any condition criteria.
Retained				
Mixed scrub	Moderate	N/A	Moderate condition will be retained by continuing to achieve criteria B, C, and E.	This mixed scrub on site will be retained in its current condition. Some areas adjacent to the existing scrub are sparsely vegetated and a slight natural expansion of the existing scrub habitat into these areas is expected. The mixed scrub will continue to be managed in-line with the pre-development regime, by those responsible for managing the wider Green Park site.
Reedbeds	Good	N/A	Good condition will be retained by continuing to achieve criteria A, B, C, D, E, and I.	The reedbed on site will be retained in its current condition (which, as a precaution due to insufficient data, was assigned as good for the BNG assessment). The reedbed will continue to be managed in-line with the pre-development regime, by those responsible for managing the wider Green Park site.
Urban tree	Moderate	N/A	Moderate condition will be retained by continuing to achieve criteria B, D, and F. Some trees are/will be native species, and therefore also meet criterion A.	68 trees in moderate condition will be retained. These trees should continue to be managed in-line with the pre-development regime. Intensive pruning regimes should not be put in place; the trees should retain at least 75% of expected canopy for a tree of their age and height.

				Five trees in good condition will be retained. These trees should continue to be managed in-line with the pre-development regime. Intensive pruning regimes should not be put in place; the trees should retain at least 75% of expected canopy for a tree of their age and height.
Urban tree	Good	N/A	Good condition will be retained by continuing to achieve criteria B, C, D, and F. Some trees will be native species, and therefore also meet criterion A.	Five trees in good condition will be retained. These trees should continue to be managed in-line with the pre-development regime. Intensive pruning regimes should not be put in place; the trees should retain at least 75% of expected canopy for a tree of their age and height.

CREATION, ENHANCEMENT AND MANAGEMENT TARGETS AND PRESCRIPTIONS

The habitat creation and management prescriptions for the newly created habitats on site are given below. All other post-development habitats are not subject to condition assessment and require no specific management actions (i.e. introduced shrub and non-native and ornamental hedgerow) or are to be retained in their current condition with no change to existing management (i.e. mixed scrub, modified grassland and reedbeds).

Other neutral grassland

Creation and management summary

Condition Assessment Criteria		Targeted	Creation/Enhancement Approach	Management Approach
A	The parcel represents a good example of its habitat type, with a consistently high proportion of characteristic indicator species present relevant to the specific habitat type. Note – this criterion is essential for achieving Moderate or Good condition for non-acid grassland types only.	Yes (biodiversity) / No (amenity)	Other neutral grassland will be created through seeding. Where existing grassland is being enhanced, it should first be disturbed (e.g. scarification). Areas managed for biodiversity will be seeded with a species-rich wildflower mix and will be allowed to grow taller with a varied sward height and will represent a good example of this habitat type. Amenity grassland areas will be seeded with a species-rich grassland mix suited to regular mowing and will be managed for amenity use so will not represent a good example of this habitat type.	Supplementary sowing will be used where required to increase the species diversity of the habitat. Areas managed for wildflowers/biodiversity will be managed with cuts occurring twice per year (early Spring and late Summer/early Autumn). Amenity grassland areas are not expected to pass this criterion, though supplementary sowing will be provided if/when areas become overly bare/worn.
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20 per cent is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	Yes (biodiversity) / No (amenity)	The seed mix sown for the biodiverse areas should be species-rich and support a varied sward height, through the natural structural variation of the species present.	The biodiverse areas will be managed with cuts occurring twice per year (Spring and late Summer/Autumn), meaning the grassland will have ample opportunity to grow tall and varied in height. The amenity grassland will be managed regularly to a short height for amenity use.
C	Cover of bare ground between 1% and 5%, including localised areas, for example, rabbit warrens.	No	N/A	N/A
D	Cover of bracken <i>Pteridium aquilinum</i> less than 20% and cover of scrub (including bramble) less than 5%.	Yes	Grassland seed mixes will be sown and will not contain these species.	The grassland will be monitored for the establishment of undesirable species. Any found to be growing within the grassland will be removed and managed.
E	Combined cover of species indicative of suboptimal condition and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging activities) accounts for less than 5% of total area. If any INNS (as listed on Schedule 9 of WCA) are present, this criterion is automatically failed.	Yes	Grassland seed mixes will be sown and will not contain these species. Damage due to excessive disturbance/compaction is not anticipated in these areas.	The grassland will be monitored for the establishment of undesirable species. Any found to be growing within the grassland will be removed and managed. If undesirable species continuously establish due to high nutrient levels, additional cuts with arisings removed from the grassland will be undertaken to reduce nutrient levels.

F	There are 10 or more vascular plant species per m2 present, including forbs that are characteristic of the habitat type. Note – this criterion is essential for achieving Good condition for non-acid grassland types only.	No	N/A	N/A
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Creation, enhancement and management detailed methods

Action	Relevant Parcels	Timing	Prescriptions
Preparation of the soils for seeding	All	Autumn	Topsoil shall be kept weed-free prior to planting by hand weeding. Existing topsoil will be reused from the site where possible. Imported topsoil, if required, should be compatible in pH with existing soil on site and shall comply with British Standard (BS)3882: 2015 Multipurpose topsoil.
Seeding	All	Autumn	Seed to be surface sown in the Autumn, bulking up the seed with an inert carrier such as sand to make distribution easier, by machine or broadcast by hand. Rolling not usually necessary. No fertilisers shall be used. Wildflower seeding shall be undertaken in the Autumn, however an allowance for additional watering and overseeding between May-July should be made.
Onward maintenance	All	Post-planting	Maintenance visits will typically be undertaken once monthly between October and March and twice monthly between April and September. A guide minimum number of 18 visits per year shall therefore be undertaken. Overseeding wildflower areas as necessary to establish seeded areas.
Cutting	Areas managed for biodiversity	Late Summer/early Autumn and early Spring	Cutting after flowering in late July/August to 50 millimetres (mm), leaving the 'hay' to dry and shed seed for 1-7 days then remove from site. Mow the re-growth through to late Autumn Winter to c.50mm and again in Spring if needed. Do not cut from Spring through to late July/August to give sown species an opportunity to flower.

Other green roof

Creation and management summary

The other green roof is not subject to condition assessment criteria within the Statutory Biodiversity Metric methodology and thus does not require the satisfaction of specific criteria for the satisfaction of BNG. However, the green roof must be managed and maintained for the full 30 year period required by BNG. To achieve this, the green roof will be managed in-line with the Sedum Roof Maintenance Schedule produced for the site (see Appendix A) and the general maintenance guidance for the Bauder XF301 system (See Appendix B). The schedule details the first 5 years of management and will be extended to cover the full 30 year period required by BNG.

Replacement planting should take place where planting fails to establish or is damaged or diseased. Guidance for replacement sedum ‘patching’ is detailed within the Sedum Patching Maintenance Guide (see Appendix C).

Long-term irrigation guidance is detailed within the General Maintenance Watering Guide (see Appendix D).

Rain garden

Creation and management summary

Condition Assessment Criteria		Targeted	Creation/Enhancement Approach	Management Approach
A	Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area.	No	N/A	N/A
B	The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing	Yes	The rain garden will be planted with a variety of plant species that are beneficial for wildlife, including species on the Royal Horticultural Society’s Plants for Pollinators list.	Supplementary planting will be provided as required.

	nectar sources for a range of invertebrates at different times of year.			
C	Invasive non-native plant species (listed on Schedule 9 of WCA) and others which are to the detriment of native wildlife (using professional judgement) cover less than 5% of total vegetated area. Note - to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover).	Yes	Invasive non-native species will not be planted.	The rain garden will be monitored for the establishment of undesirable species. Any found to be growing will be removed and managed.

Creation, enhancement and management detailed methods

Action	Relevant Parcels	Timing	Prescriptions
Planting	All	Autumn	Plant using native or climate-resilient wet-tolerant species suitable for rain gardens (e.g. sedges, rushes, purple loosestrife, meadowsweet, dogwood, willow). Mulch with 35mm composted woodchip without blocking inlets.
Establishment care	All	Summer (Years 1-3)	Water plants during prolonged dry spells. Keep areas around plants weed-free by hand or mulch (avoid herbicide use). Replace failures in the following planting season.
Weed & silt control	All	Spring/Summer	Regularly remove invasive or aggressive weeds (e.g. reed canary grass). Inspect inlets/outlets quarterly, removing accumulated litter and silt to maintain infiltration capacity
Replanting	All	Autumn	Replant poorly established or failed specimens.
Long-term Management	All	As needed	Selective thinning/pruning of shrubs to prevent shading of herbaceous species if necessary. Maintain surface permeability by controlling silt/litter build-up.

Urban trees

Creation and management summary

Condition Assessment Criteria		Targeted	Creation Approach	Management Approach
A	The tree is a native species (or more than 70% within the block are native species).	Yes / No	A mix of native and non-native species will be planted.	If any of the native trees fail, these must be replaced with the same species, or another native species.
B	The tree canopy is predominantly continuous, with gaps in canopy cover making up <10% of total area and no individual gap being >5 m wide (individual trees automatically pass this criterion).	Yes	Individual trees automatically pass this criterion	N/A
C	The tree is mature (or more than 50% within the block are mature).	No	N/A	N/A
D	There is little or no evidence of an adverse impact on tree health by human activities (such as vandalism, herbicide or	Yes	N/A	The trees will be carefully managed to avoid damage (i.e. not heavily pruned).

	detrimental agricultural activity). And there is no current regular pruning regime, so the trees retain >75% of expected canopy for their age range and height.			
E	Natural ecological niches for vertebrates and invertebrates are present, such as presence of deadwood, cavities, ivy or loose bark.	No	N/A	N/A
F	More than 20% of the tree canopy area is oversailing vegetation beneath.	Yes	Trees will be planted within, and will therefore be oversailing, vegetation.	The underlying habitats should be managed so that there is always vegetation beneath at least 20% of the tree canopy. Re-planting of understorey vegetation will be provided where needed.

Creation, enhancement and management detailed methods

Action	Timing	Prescriptions
Preparation of the soils for tree planting	October to March	Planters to be installed if required and existing subsoil to be broken up to assure adequate drainage. Any hardcore or rubble shall be fully removed. Topsoil is then to be laid over prepared subsoil as noted. Topsoil shall be kept weed-free prior to planting by hand weeding. Existing topsoil will be reused from the site where possible. In existing topsoiled areas, the depth of soil shall be checked to ensure minimum requirements noted above are achieved. Imported topsoil, if required, should be compatible in pH with existing soil on site and shall comply with BS3882: 2015 Multipurpose topsoil.
Tree planting	October to March	All tree planting to be in accordance with BS8545:2014. Tree pits to be excavated to a minimum size of 600mm larger than the root ball. Base of pit to be slightly domed; not to be broken up unless drainage problems are apparent. Tree pit backfill to reflect soil profile – i.e.: subsoil up to approx. 400mm from ground surface, topsoil above, approx. 400mm depth. Trees to be double staked, with a low cross bar, fixed with rubber tree ties and rubber pad. Trees outside planting areas to be mulched with minimum 50mm settled depth, medium graded ornamental bark mulch to 1.2m diameter. All planting shall be undertaken, at the latest, within the first planting season following substantial completion of the major construction and groundworks. The developer may, however, undertake planting prior to this, outside of the planting season, using fully containerised planting material. This is on the understanding that increased watering will be required to establish the planting successfully. All planting works will be undertaken and supervised by a competent professional landscape contractor.
Onward maintenance	Post-planting	Water trees as necessary to ensure vigorous and successful establishment during the early years after planting i.e. particularly Years 1 - 3. Keeping planting areas free from weeds. All planted/mulched areas shall be hand weeded as appropriate/required. Fertilising of tree pits annually in Spring using a suitable organic slow-release fertiliser. Checking and adjusting all tree stakes and ties at every maintenance visit during the first one to two years after planting. Removal of stakes and ties once trees are securely established (guide 12 - 18 months after planting). Replace plants that fail where required with the approved species (within five years of planting as a minimum). All planting will be inspected annually in late Summer. Any dead, dying or diseased plants shall be removed and replanted according to the approved plan in the following planting season.

MONITORING

Monitoring strategy

A site visit by a suitably qualified ecologist (SQE) will occur post-habitat creation, to ensure that all features have been installed as proposed/expected and to advise on remedial measures if applicable.

A monitoring visit by a SQE will occur annually thereafter to ensure the successful establishment of the features and provide adjustments to the monitoring and management processes as needed. The annual monitoring visit will be undertaken during the peak botanical season i.e. between May - August. Management will be an iterative process, and recommended management techniques may be altered throughout the course of the establishment to maximise the success of the features. After the first three years, and upon successful establishment, the monitoring checks will occur again on Year 5, and then in five-year intervals throughout the remainder of the 30-year period (i.e. Year 10, Year 15, Year 20, Year 25 and Year 30).

Photos to be taken at each monitoring check and a short report produced recording the species planted, current BNG condition assessment, and any remedial actions to improve the condition/succeed in reaching the proposed conditions in the expected timescale (if still feasible). Records of species lists for the grassland, mixed scrub, and reedbeds (including marginal vegetation) should be kept by the management company

Monitoring plan to be reviewed after five years, and frequency at which monitoring needs to be carried out thereafter until 30 years post-installation should be determined. The number of monitoring visits may be adjusted over the 30 year period, if deemed appropriate by the SQE.

Monitoring methods and intervals

Habitat Type	Monitoring Methods	Monitoring Interval and Timing
Other neutral grassland	Undertake quadrat sampling to identify the habitat type that is establishing and the number of species per m ² . Check for the establishment of any invasive non-native or undesirable species e.g. buddleia. Estimate percentage of bare ground, bramble and bracken cover. Collect a botanical species list across grassland to check against target species list.	Annually from Years 1-3, then again in Year 5, followed by five-year intervals (i.e. Year 10, Year 15, Year 20, Year 25 and Year 30). Post Year 5, monitoring frequency will be reviewed. Surveys to be completed between May and August during peak botanical season.
Other green roof	Record sedum cover to identify any areas of failure to inform the need for re-planting. Check for the establishment of any invasive non-native or undesirable species e.g. buddleia. Check for any signs of wear or tears in green roof membrane that may require repair or replacement.	Annually from Years 1-3, then again in Year 5, followed by five-year intervals (i.e. Year 10, Year 15, Year 20, Year 25 and Year 30). Post Year 5, monitoring frequency will be reviewed. Surveys to be completed between May and August during peak botanical season.
Rain garden	Record species present and coverage to document whether a single species is over dominant (>75% cover). Check for the establishment of any invasive non-native or undesirable species. Check that drainage is adequate.	Annually from Years 1-3, then again in Year 5, followed by five-year intervals (i.e. Year 10, Year 15, Year 20, Year 25 and Year 30). Post Year 5, monitoring frequency will be reviewed. Surveys to be completed between May and August during peak botanical season.
Individual trees	Record number and species of trees present. Check whether all trees are establishing well. Signs of success are new growth, lack of dead limbs, no rot holes or callouses or lesions forming. Note any signs of adverse health e.g. rot, dead branches, fungal infections etc.	Annually from Years 1-3, then biennially i.e. during Year 5. Post Year 5, monitoring frequency will be reviewed. Survey to be undertaken March – September when tree foliage is in growth.

Monitoring reports

Project Year	Month Report to be Submitted	Month Management Plan to be reviewed	Comments
Year 1	October/November	October/November	Allows for surveys to be undertaken between May – August during the peak botanical season. Report on results of initial creation and management measures. As per HMMP, habitat will be monitored annually for the first 3 years.
Year 2	October/November	October/November	Report on results of initial management measures. Suggest amendments accordingly. Habitat will be monitored annually for the first 3 years.
Year 3	October/November	October/November	Report on results of initial management measures. Suggest amendments accordingly. Habitat will be monitored annually for the first 3 years.

Year 5	October/November	October/November	Report on results of management measures and of success/progress in the first 5 years post-establishment. Suggest amendments accordingly. Agree on a new monitoring schedule (suggested every 5 years) for the remainder of the HMMP commitment period (30 years total).
Year 10	October/November (on the year of monitoring)	October/November (on the year of monitoring)	Subject to review by the project ecologist as monitoring progresses. Monitoring and progress of establishment and management to be reviewed every 5 years.
Year 15	October/November (on the year of monitoring)	October/November (on the year of monitoring)	Subject to review by the project ecologist as monitoring progresses. Monitoring and progress of establishment and management to be reviewed every 5 years.
Year 20	October/November (on the year of monitoring)	October/November (on the year of monitoring)	Subject to review by the project ecologist as monitoring progresses. Monitoring and progress of establishment and management to be reviewed every 5 years.
Year 25	October/November (on the year of monitoring)	October/November (on the year of monitoring)	Subject to review by the project ecologist as monitoring progresses. Monitoring and progress of establishment and management to be reviewed every 5 years.
Year 30	October/November (on the year of monitoring)	October/November (on the year of monitoring)	Subject to review by the project ecologist as monitoring progresses. Monitoring and progress of establishment and management to be reviewed every 5 years.

Adaptive Management

Where creation/enhancement fails, in the first instance, the management company or landowner are to consult with the appointed SQE to identify the root cause of the failure of establishment of the planting.

Replacement planting, additional irrigation, or alterations to the species mix used may all be considered as remedial actions.

Where planted trees fail, these must be replaced. Either with the same species, or changes to the planting palette may be made where this can increase the success of establishment e.g. the use of hardier species.

Where grassland does not establish, oversewing of seed of the same mix may be used. Landscape architect to be consulted on choosing the appropriate seed type.

Where raingarden does not establish, new marginal vegetation must be planted after identifying the root cause for the failure of establishment and undertaking appropriate remedial actions (e.g. land reprofiling).

If sedum within the green roof fails to establish, or fails due to severe weather events etc., new sedum must be planted, in-line with the sedum 'patching' guidance provided in Appendix C.

It is the responsibility of the landowner and any contractors/consultants hired by the council to contact the SQE and discuss and perform remedial actions in a timely manner.

APPENDIX A SEDUM ROOF MAINTENANCE SCHEDULE

300 Brook Drive - Sedum Roof Maintenance Schedule

Sedum Roof to End of Journey Facility

BauderGREEN XF 301 Lightweight Sedum Blanket system to be installed on top of an insulating thermaroom strip followed by a single ply membrane with an associated drainage mat to provide suitable support in respect of both irrigation and drainage. All of which is illustrated within Figure 1 below and for completeness the sedum roof will be bordered by a 400mm edge trim. Please refer to the accompanying technical specifications for further details.

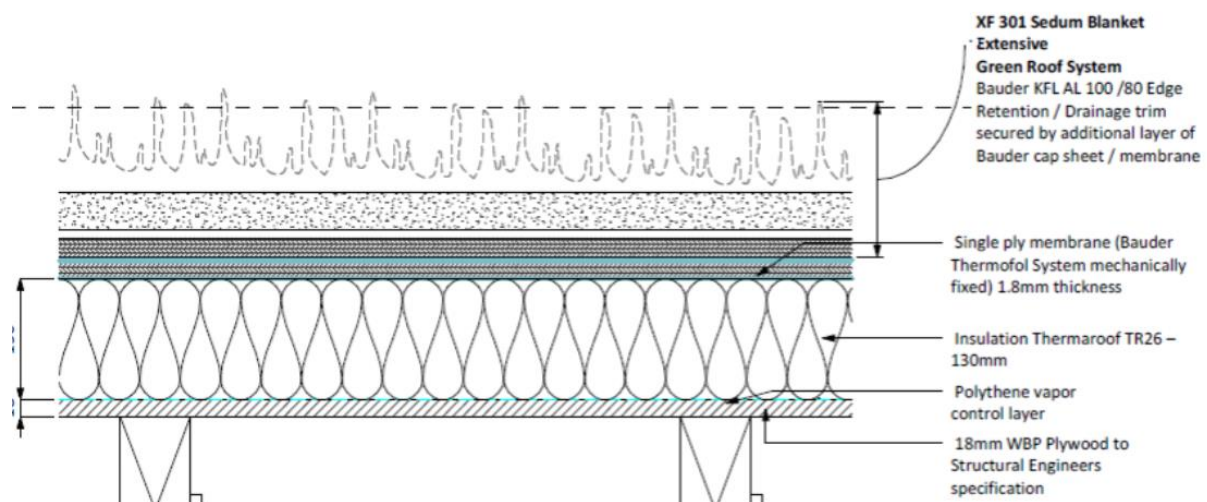


Figure 1. Proposed cross-section for the BauderGREEN XF 301 Lightweight Sedum system

Maintenance Operations

Proposed sedum roof to be maintained in accordance with British Standards 7370 Part 3:1991 and Part 4:1993.

In line with the requirements of Condition 4 the proposed maintenance operations intend to successfully establish plants on site and shall be maintained in perpetuity. For completeness these arrangements shall be subject to review every 5 years to ensure optional conditions are maintained, wherever possible, and shall include the following: watering/irrigation; monitoring of plant encroachment; weed control; and fertiliser application.

In the event any part of the proposed sedum blanket dies, are removed or become seriously damaged these sections shall be replaced in the next planting season with a replacement of a similar size and species.

For completeness the proposed sedum roof shall be installed and maintained in accordance with the manufacturers guidance documents. Please find copies of those of relevance attached which includes the following:

- Bauder XF301 General Maintenance Lightweight Sedum System (Rev V7 February 2022)
- Bauder General Maintenance Watering Guide (Rev V2 April 2022)

- Bauder General Maintenance Sedum Patching Guide (Rev V2 April 2022)

APPENDIX B GENERAL MAINTENANCE – LIGHTWEIGHT SEDUM SYSTEM

General Maintenance Lightweight Sedum System

Bauder XF301 system



General maintenance procedures

Bauder green roof extensive systems

These practises should be carried out annually as part of a structured maintenance regime.

General Maintenance

The appearance of the vegetation on an extensive green roof will change over the year. The growth and flowering of the individual species within the vegetation mix will be dependant upon fluctuations in the seasonal weather. Extensive green roofs and sedum plants will not always be green. In the winter, sedum will become smaller and turn red/brown in colour as they prepare themselves to withstand the coming winter frosts.

Bauder recommends that all green roofs have a way of watering during prolonged periods without rain. All green roofs will benefit from water during droughts. Generally sedums are much more drought tolerant than native wildflowers but both will benefit from a prolonged soaking (not little and often) to prevent them from fully drying out (see Bauder's Watering Guide).

All green roofs will require feeding from time to time. Bauder's lightweight Xero Flor Sedum Blanket contains little in the way of natural nutrient, so fertiliser must be applied annually to ensure that the plants become resistant to extremes of weather and temperature.

The Bauder Sedum Blanket contains approximately 14-17 different plant species. Not every species incorporated will survive and the more dominant will prevail over time dependant on location.

General maintenance is best carried out annually during springtime. However, increasing the number of visits will improve the aesthetics of the roof.

Preliminary Maintenance Procedures

The following procedures should be carried out in order to ensure the roof is maintained in good condition and to protect the validity of the waterproofing system guarantee:

- Ensure that relevant health and safety procedures are followed when working at roof level, this includes making sure that safe access can be gained to the roof. It is advised that the contractor should always seek proof of current maintenance for any man-safe roof access systems prior to proceeding with the work on site.
- Remove all dead vegetation and debris from the roof surface, taking particular care to ensure that all chute outlets, gutters and downpipes are clear.

Please note: Roofs in the vicinity of taller trees will need more frequent maintenance. Bauder recommend removing dead leaves during the spring and again in the autumn, to ensure that they do not damage the roof vegetation.

- Remove the lids of all inspection chambers, ensure that all rainwater outlets and downpipes are free from blockages and that water can flow freely away.
- Ensure that any protective metal flashings and termination bars remain securely fixed in place. Renew or repair as necessary.
- Examine all mastic sealant and mortar pointing for signs of degradation. Repair or replace as necessary.
- Check that all promenade tiles and paving slabs remain in position, secure and in good condition.
- The building owner should keep a record of all inspections and maintenance carried out on the roof. Any signs of damage, contamination or degradation to the waterproofing should be reported to Bauder immediately, in order that arrangements can be made for remedial work to be carried out if necessary.

General maintenance procedures

Green roof extensive system

- When carrying out maintenance to adjoining areas, care must be taken not to damage either the landscaping or the waterproofing system. If it is considered that either element has been effected, Bauder should be contacted for advice. Any waterproofing damage caused after completion of the original installation may invalidate the guarantee.
- Any unauthorised alterations to the waterproofing system will invalidate the guarantee. If such a situation should arise, Bauder should be contacted to advise on the alteration and how it should be incorporated without effecting the guarantee.

Vegetation Maintenance Tasks

Application of Fertiliser to the vegetation: As a general rule all sedum based green roofs require feeding annually to promote strong growth in the sedum and make them more drought tolerant.

Plant encroachment

Any vegetation which has invaded into drainage outlets, inspection chambers, walkways and the vegetation barriers (pebbles) should be removed. Additional washed stoned pebbles, similar to existing can be added if movement or settlement of the pebble vegetation barrier has occurred.

- If an irrigation system is fitted, it is best to run it only during prolonged dry weather and for limited periods – see ‘Irrigation’ information.
- Only a relatively few species of sedum and other plants suitable for an extensive green roof installation will persist in partial and full shade, and they will generally be greener in colour and grow in these locations.
- If problems with the vegetation are suspected, Bauder may be contacted for advice and, if necessary, a suggested course of action.

Weeding

- With the exception of saplings, which should always be removed, weeds in an extensive green roof should be considered as a problem only of aesthetics. If considered excessive, they can be removed either manually or by using a ‘spot weed wipe’.

Repairing Bare Patches

- Bare patches can be easily repaired and this is best done during the main growing seasons of March/April or from late August until the end of September.
- Using vegetation cuttings from surrounding areas of abundant growth and either Bauder substrate or a sand soil mix following the guidance of Bauder’s Sedum Patching Maintenance Guide.

General maintenance procedures

Green roof extensive system

Vegetation Maintenance Tasks

Fertiliser for Bauder XF301 sedum blankets

- Bauder Sedum Blankets are grown in a shallow growing medium which contains very little nutrient, so the annual application of fertiliser is crucial to ensure the plants remain healthy.
- Fertiliser should ideally be applied during March/April, as it helps the plants to prepare for extreme weather conditions. Organic fertiliser can be obtained direct from Bauder in 20kg bags.
- Always apply the fertiliser at the given rate on the instructions. It is recommended that the fertiliser is lightly 'watered in' immediately after application, to avoid "burning" of the foliage. Dung-based organic fertilisers should be avoided.

Irrigation Bauder XF301 systems

Bauder always advises that there should be a way to water any green roof during times of dry weather. This might be a water supply point adjacent to the green roof, or a fully automatic irrigation system.

Bauder recommends when sedum systems are installed, that there is provision of either a sprinkler or drip line irrigation system if the following conditions apply: -

- The roof is in full sun.
- All roof with a slopes exceeding a 2° pitch.
- Windy or exposed site locations.
- Sites up to 50 miles inland of the east coast of the UK mainland.

Irrigation should only be activated during periods of dry weather, or if the sedum plants are showing signs of distress. The irrigation system is best run at night or at dawn or dusk to minimize unnecessary evaporation. Then once every 4-6 days for the duration of the hot weather. This can be easily managed by using an inexpensive battery-powered, programmable timer.

General maintenance procedures

Green roof extensive system

BAUDER GREEN ROOF MAINTENANCE SERVICE

Green roof maintenance service is carried out by Bauder's preferred maintenance providers. These experienced green roof maintenance companies have worked closely with Bauder carrying out maintenance services throughout mainland Britain for several years.

A typical maintenance programme includes:

- **Roof evaluation** - a comprehensive review of the Bauder green roof to determine what remedial work, if any, needs to be completed.
- **Removal of weeds and unwanted items** - over time a green roof can become congested with leaves, debris and other unwanted vegetation, which can be removed.
- **Inspection** - examination of roof outlets and removal of any encroaching vegetation to enable water to flow freely to rainwater pipes.
- **Application of fertiliser** - to help restore a green roof to its best, an organic slow release granular fertiliser will encourage growth.
- **Testing** - after all work has been performed, the irrigation system will be examined to ensure it works as expected.

This work can be undertaken by the companies detailed below, who directly manage the maintenance of green roofs and will cover all aspects of the service from quotations through to invoicing. Bauder and our preferred suppliers are committed to the arrangement and will ensure a high standard of expert care and advice for our customers.

Green roof maintenance contractors currently recommended to maintain green roof elements for the Bauder system

Green Maintenance in England and Wales:

The Urban Greening Company

Mr Mike Cottage
105 Ridgeway
Marlow
Buckinghamshire
SL7 3LH
07515 887868
greenmaintenance@tugc.co.uk
tugc.co.uk

Green Maintenance in Scotland:

Urban Utopia Landscapes

Mr Gavin Gale
Mayville Gardens East
Edinburgh
Lothian
EH5 3DW
0800 061 4353
office@urbanutopialandscapes.com
urbanutopialandscapes.com

If you would like Bauder to forward your details to one of the preferred maintenance companies, please email **c.rodick@bauder.co.uk** giving the details of the green roof and contact information with explicit permission for your details to be shared with the preferred supplier.

APPENDIX C SEDUM PATCHING MAINTENANCE GUIDE

General Maintenance Sedum Patching

Extensive green roof systems



Sedum Patching Maintenance Guide

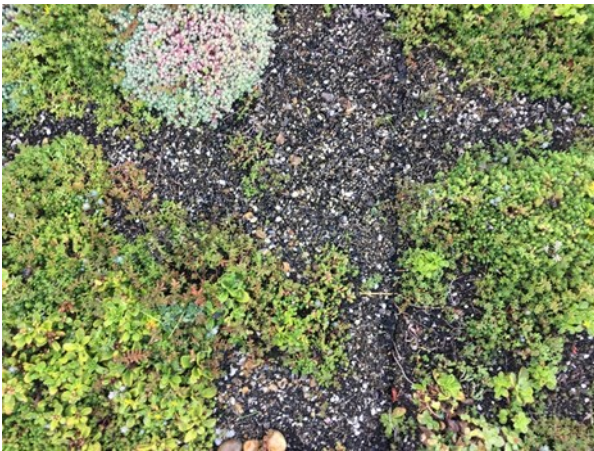
Bauder green roof extensive systems

Repairing patches in your sedum blanket

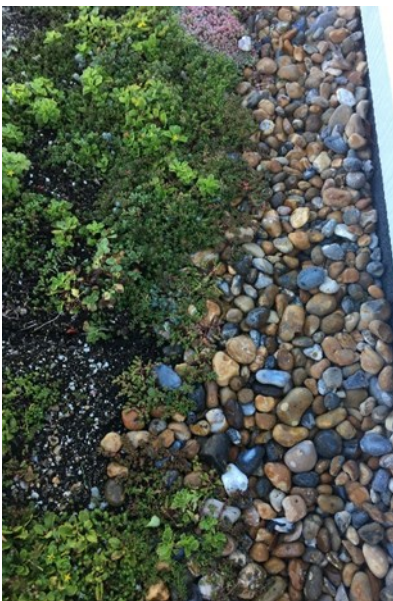
Sedums are succulents, they are easily damaged by foot traffic or crushing. This guide explains how to repair small bare areas in sedum coverage. The repair work should only be carried out during the growing season. Patching should be limited to areas that can be easily watered regularly over the following 6-8 weeks.

Assess the areas that require repairs.

You will need approx. one 20kg bag of substrate per m² of bare roof



Make sure blankets are butted up tight and joints as neat as possible. Fill all gaps with substrate.



Harvest sedum cuttings from around the pebble margin of the roof, these can be pulled out completely. If more material is required sedum can be taken from areas of very lush growth. Gently tear off the top growth of the sedum plants (do not try and pull out the roots).

Sedum Patching Maintenance Guide

Bauder green roof extensive systems



Either spread these directly on to the area or add to a bucket of substrate and mix in the cuttings.



Spread the cuttings / substrate mix as a thin layer over the bare areas.



Fertilise the whole roof using Bauder Slow Release Organic Fertiliser.

Water regularly with a gentle spray for 6-8 weeks to keep the blanket moist. Refer to Bauder Watering Guide.

When complete, avoid walking on the green roof.

Please note: Patching should not take place between November and February or in very hot dry conditions in mid-summer.

For more information, please refer to Bauder Green Roof Watering Guide and Bauder Extensive Green Roof Maintenance Guide.

APPENDIX D GENERAL MAINTENANCE – WATERING GUIDE

General Maintenance Watering Guide

Extensive green roof systems



Watering Guide

Bauder green roof extensive systems

The following is a simple guide for the requirements of the initial establishment watering (directly after installation) and long-term watering or irrigation for a Bauder extensive green roof system.

All green roofs require water at installation and in hot, dry weather.

Establishment Watering

All green roofs require some form of establishment watering which should continue until the plants have developed a sound root system. Establishment watering critically needs a fully operational rooftop water supply with adequate pressure and flow rate at the point where watering is delivered. This watering should be via surface sprinklers or on small roofs a hose with a fine rose. This must be carried out even when an irrigation system has been fitted that will come into operation at a later stage. In warm weather, watering should take place in the early morning or evening to reduce evaporation.

Bauder Flora Mixes / Wildflower Plugs / WB Native Wildflower Blanket

Bauder recommend that seeded and plug planted areas are installed in the spring and autumn months when there is usually milder weather, moderate temperatures, and likelihood of regular rainfall. Seed and plugs are very difficult to establish in mid-summer and do not grow in mid-winter.

Seed & Plugs: Water for 10-12 weeks after installation.

Bauder Wildflower Plugs should be saturated completely prior to planting. Seeded roofs should not be watered until seed has germinated - for more information see Bauder Green Roof Installation Guide.

WB Native Wildflower Blanket: Water for 6-8 weeks after installation.

Ensure the substrate remains damp to the touch by watering regularly. In mid-summer, the roof may need daily, watering and will have to be constantly monitored.

Bauder XF301 / Bauder SB Substrate Sedum Blanket / Sedum Plugs

Sedum is quite drought resistant but only once it has fully established.

XF301/Bauder SB Substrate Sedum Blanket: Water for 4-6 weeks after installation.

Sedum Plugs: Water for 10-12 weeks after installation.

Ensure the substrate remains damp to the touch by watering regularly. In mid-summer, the roof may need daily, watering and will have to be constantly monitored.

Note: Sedum turns red when stressed through lack of water.

Bauder recommend that sedum plug planted areas are installed only in the spring and autumn months when there is usually milder weather, moderate temperatures, and likelihood of regular rainfall.

Key points for installation:

- Ensure all other roof works are completed before the green roof is installed.
- Test the watering system prior to the delivery of the vegetation, ensure there is a working water source at roof level with sufficient pressure at the point of watering.
- Do not try to install living vegetation in hot, sunny weather.
- Install any vegetation on the day it is delivered (See Bauder's Green Roof Installation Guide).
- Ensure the vegetation blankets are laid carefully and additional substrate is used to patch any open joints.

Watering Guide

Bauder green roof extensive systems

- Water in the vegetation (even in winter) and fertilise if required (with Bauder Organic Fertiliser).
- Watering should take place in the early morning or evening to reduce evaporation.
- Avoid any trafficking of the roof.
- Avoid any storage of materials on the roof.
- Continue to water the roof as required for the whole establishment period.

Long Term Watering / Irrigation

This advice is for green roofs after their initial establishment is complete. Roofs are hostile environments for all plants. There is an increase in wind at higher levels and the reduced depth of substrate can dry out quickly when surrounded by a warm building. The perimeter of a planting area is more prone to drying than the centre.

ALL green roofs will require watering in times of drought.

Generally watering is best carried out in the early morning or later evening (irrigation should be set to come on at night).

Bauder Flora Mixes / Wildflower Plugs / WB Native Wildflower Blanket

The British Native species are not as drought tolerant as sedum. The depth of growing medium (substrate) means the plants struggle to retain enough water in very dry weather. Watering should be carried out regularly as the weather dictates, typically in the summer months this would involve watering after one or two weeks without rainfall.

Watering is likely to prolong the flowering season for many species.

Ideally monitor the appearance of the roof along with the local weather forecast. When watering, water until the substrate is soaked, and the drainage board is full of water. The roof can be left for a further 1-2 weeks before it will need watering again.

Note: Overwatering will produce a lush, thick green roof covering which can choke other species, underwatering will increase the speed in which plants flower and go to seed or brown off.

Bauder XF301 / Bauder SB Substrate Sedum Blanket / Sedum Plugs

Sedum is a very drought resistant plant and will survive even quite long periods of drought, however it will benefit from the occasional soaking i.e. in prolonged hot, dry weather (2-3 weeks without rain in the summer months).

Note: Sedum turns red when stressed through lack of water.

Advise: Water heavily once every week, water the sedum until the vegetation and substrate are total soaked.

Note: Overwatering will encourage grass and weed species to establish, underwatering will shrink the sedum plants enabling erosion of the exposed substrate.

This guide assumes: Summer months are April to October. Winter Months: November to March. Whilst generally summer months are hotter and drier, common sense should dictate when the weather is particularly severe for the time of year.

More comprehensive details are contained in the Watering Requirement Guidelines, which include details of irrigation.