Specification for SuDS

Above ground SuDS within the site include Rain Gardens. They are designed as shallow depressions with filtration medium to manage the flow of water and to extract pollutants before the water enters the pipe network. The rain gardens will be planted with a range of shrubs, grasses, and herbaceous species.

Ornamental grass and herbaceous species shall be implemented during the first planting season after the hard landscape has been constructed to prevent damage to the new vegetation and to avoid compaction of soils. Avoid planting if the ground is waterlogged or if the ground is frozen.

Climatic conditions need to be observed with no planting/maintenance to be carried out in extremes of temperature <3°c or > 24°c (without suitable provision for irrigation). If the water supply is, or is likely to be, restricted by emergency legislation then planting/maintenance should be suspended.

Container grown plants: At any time of the year subject to weather conditions.

Maintenance objectives will include regular planting checks and maintenance to ensure that the planting is establishing, and the SuDS elements are consistent with the original design intentions. This will involve continuous / ongoing routine operations throughout the year, for which a detailed maintenance schedule is to be followed.

Regular maintenance and monitoring inspections of rain gardens should be undertaken to maintain SuDS performance and balance. Management and maintenance commitments would be more intense during the in initial establishment period, 1-2 years after planting. This would involve:

- Watering (as necessary)
- Weed control
- Pest and disease control
- Pruning
- Checking and cleaning of inlets and outlets
- Mulching (not bark mulch), and
- Litter picking.

Filter media for Rain gardens

The filter medium should be sufficiently permeable to allow water to pass through it, so that the surface of the retention area does not become waterlogged. It also needs to contain sufficient organic material and plant nutrients to support the proposed vegetation.

Filter media should be correctly specified. Any specification should take into account site specific requirements and constraints. The specification parameters should be clearly stated, so that in the event that a supplier ceases trading the filter material can still be replaced on a like for like basis.

Incorrect specification can cause reduced hydraulic conductivity through over compaction or structural collapse, leading to reduction in treatment capacity and surface ponding, loss of vegetation etc. The filter medium should be correctly installed with an appropriate level of compaction during installation to prevent migration of fine particles.

A filter medium that is placed uncompacted will initially show a very high hydraulic conductivity which will then rapidly decrease. So it is essential that testing of hydraulic conductivity be carried out on the compacted filter medium before installation.

A typical specification for the filter media:

clay and silt (< 0.063 mm) < 5%
fine sand (0.063-0.2 mm) <20%
medium sand (0.2–0.6 mm) 35% to 65%
coarse sand (0.60–2.0 mm) 50% to 60%
fine gravel (2.0-6.0 mm) <10%

The filter medium should be well graded, and the composition should contain limited particle size range.

Organic matter content

Organic matter content should be 3–5% (w/w).

pH

pH should be 5.5-8.5 (1:2.5 soil/water extract).

Electrical conductivity (salinity)

Electrical conductivity (EC) should be < 3300 µS/cm (1:2.5 soil/CaSO4 extract)

Major plant nutrients

Total nitrogen should be 0.10–0.30%
Extractable phosphorus should be 16-100 mg/l
Extractable potassium should be 120-900 mg/l
(Methods of analysis in accordance with BS 3882:2015, unless otherwise stated.)

Mulch layer

The use of an organic mulch should generally be avoided for systems where there potential for attenuation, owing to the risk of the mulch blocking the overflow (e.g Rain gardens). In the case of infiltration systems (with no overflow), a mulch may be used, but there is still a risk of excessive movement of material during high flows. A mulch layer (with a maximum depth of 75 mm) can be spread over the bioretention area to retain some soil moisture. Organic matting that degrades within six months, bonded fibre matric mulches or a layer of gravel can be used as an alternative to standard organic mulches. A gravel mulch may be valuable where there is a need to protect the soil from erosion or decrease the drop to the water storage zone (for safety reasons), while still maintaining an acceptable ponding volume; however, high planting densities should be used, to compensate for the reduced spread of plants.

Landscape Maintenance

Soft landscape areas to be maintained in accordance with **B.S. 7370 Part 3:1991** and Part 4:1993. The maintenance of trees should be in accordance with **BS 3998:2010** and **BS 8545:2014.** Maintenance operations to successfully establish plants shall be carried out for the first 5 years after planting.

Maintenance operations for successful plant establishment shall include watering; weed control; fertiliser application; pest and disease control; pruning; and litter picking. Watering for trees should follow an irrigation plan in accordance with BS 8545:2014 and must be in anticipation of drought.

Tree pruning should be in the winter months or summer (July-August). Cherries must be pruned only in the summer months after flowering.

The replacement of failed trees should occur once reasons for failure have been identified and amendments to the specification are made as necessary. Shrubs which die, are removed or become seriously damaged shall be replaced in the next planting season with others of similar size and species, to be agreed in writing by the Local Planning Authority. For all new landscape areas, the following maintenance programme shall be undertaken:

Inspections:	January - December. Replace dead plants when necessary.
Watering:	When necessary in accordance with an irrigation plan.
Pest and disease control:	January.
Litter removal:	January - December
Weed control:	February - May; July; and September.
Prune:	Winter months or summer.
Fork over planting beds:	March.
Cut grass and trim edges:	March - October.
Apply fertiliser:	April.
Lightly fork over planting beds:	September.
Rake / scarify grass	September.
Mulch:	Mid to late spring.

Watering: Water trees in accordance with an irrigation plan as per BS 8545:2014. Watering shrubs shall be carried out to maintain vigorous plant growth. Water shall soak into the ground; it is not sufficient to dampen the surface. Water must be applied slowly to avoid damage to plants.

Weed control: Hand weed to remove all weeds and their roots using a hoe, trowel or fork. Apply a herbicide to kill re-growth when required.

Fertiliser: Applications of fertiliser to be carried out early in the growing season. Ensure correct fertiliser application. Inspect once a month and after very heavy winds. Adjust ties if necessary to conform to stem growth or to prevent chafing.

Tree thinning: Progressive thinning to mimic natural selection, reduce intra-specific competition, and promote structural diversity.

Thinning Phase 1, Years 8–12: Inspect stock and remove any dead/diseased, obviously weak or poorly formed individuals. Fell carefully with sensitivity to the surrounding ecology. Subsequently, monitor for windthrow or edge exposure as a result of felling.

Thinning Phase 2, Years 15–20: Select dominants and co-dominants for retention by identifying those with full rounded crowns and then remove and closely competing specimens to these. Try to also select dominants with the intention of retaining a mixture of form, species and age class. Leave felled timber in situ as habitat if ecologically appropriate.

Thinning Phase 3, Years 25–30: Retain healthiest, best-formed, and ecologically beneficial specimens wth a view to encouraging veteran tree development. Inspection every 5 years from year 5 onwards by a qualified arborist or landscape manager.

Above phasing may shift based on growth rates, site conditions, and biodiversity outcomes. Maintain a thinning log and tree condition report for each phase.

Biodiversity Considerations

- Allow some natural regeneration where possible.
- Integrate understorey planting and deadwood habitat post-thinning.
- Use thinning as an opportunity to increase light penetration and structural layers.
- Thinning should be avoided during the bird nesting season, usually between March - September.

Pruning: At the appropriate season for the species, pruning to be carried out to remove all damaged diseased or dead wood. Prune shrubs to ensue the plant is kept well balanced and in good shape. For trees, pruning shall be in accordance with **BS 3998:2010.**

Pest and disease control: To be carried out if necessary and in accordance with best practice.

Litter removal: Collect and remove all extraneous rubbish.

Fork over planting beds: Prick up trodden or compacted soil surfaces to aerate the soil without damaging the plants.

Mulching (other than SuDS): Mulching to be topped up annually over the duration of the agreed maintenance period. At the end of the maintenance period, undertake a final mulch. Ensure that the soil is thoroughly moistened prior to remulching, applying water where necessary. Planting beds and trees: re-mulch to a minimum depth of 50 mm.

Mulching of SuDS: The use of an organic mulch should be avoided for systems where there is an overflow pit, owing to the risk of clogging. Spread a layer of gravel as an alternative to standard organic mulches over the SuDS to protect the soil from erosion.

Mowing: Species rich grass areas to be mowed as advised by the supplier.

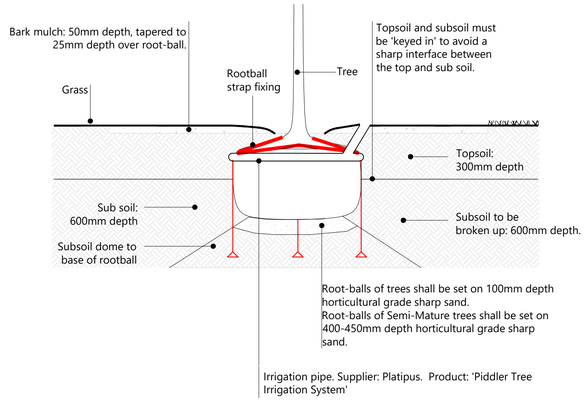
Raking/Scarifying: Relieve thatched conditions and remove dead grass in the autumn over all grassed areas.

Spiking (Aeration): Aerate to increase water, nutrient and oxygen movement into the soil.

General: If grass surface is disturbed by over use, restore by firming or lifting with a fork

Any newly planted trees, plants or hedgerows, which within a period of 5 years from the completion of the development die, are removed, become seriously damaged or diseased, or in the opinion of the Local Planning Authority otherwise defective, shall be replaced. Replacement planting shall take place during the first available planting season

Tree Pit Section



Typical tree pit detail showing tree planting in soft landscape Scale 1:20 @ A1

Implementation specification - generally

Ground preparation: Protect retained trees/areas of retained soil where structural landscaping is proposed in accordance with an approved Arboricultural Method Statement and Tree Protection Plan. Tree protection fencing shall be erected as noted within an Arboricultural Method Statement and Tree Protection Plan. The fence is to maintained for the duration of the works. Protection of existing trees against damage to be in accordance with the BS 5837:2012 - Trees in relation to design, demolition and construction - Recommendations. Protective fence to be approved by the LPA. Any excavations shall be in accordance with B.S. 8000 part 1:1989.

Imported soil: Soils may need to be imported to make up for any deficiency of soil on site.

Subsoil: Where required, supply approved imported subsoil to B.S. 8601:2013 Specification for subsoil and requirements for use - Multipurpose subsoil, to make up any deficiency in on-site subsoil.

Topsoil: Where required, supply approved imported topsoil to B.S. 3882:2015 Specification for topsoil - Multipurpose topsoil, to make up for any deficiency in on-site topsoil.
Certification of soil shall be in accordance with BS 8601/3882.

Soil profiles: Soil profiles outside of retained, in-situ soil, should comprise:
- 300mm topsoil over 600mm subsoil for trees planted within shrubs or where trees are planted in grass areas.
- 300mm topsoil over 300mm subsoil for shrub planting areas (with no trees) and the adjacent grass areas, and 150mm topsoil over 150mm subsoil for grass areas only.

Excavation: Any excavations in order to win soil for re-use as part of landscaping must be undertaken in accordance with BS 3882:2015, BS 8601:2013 and the 2009 DEFRA Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

Trees: excavate a few centimeters shallower than root-ball and twice its width with sloping, scarified sides. Root-balls of trees shall be set on a 150mm depth of horticultural grade sharp sand. Semi-Mature trees shall be set on a 400-450mm depth of horticultural grade sharp sand. Shrubs: excavate 300 x 300 x 300mm depth.

Backfilling: Trees: Backfill to reinstate 300mm over 600mm profile and do not add compost or fertiliser unless soil analysis demonstrates the need. If compost is applied it should be worked in generally to the top 150mm, not back-filled into tree pits. Shrubs: Backfill to reinstate soil profiles provided above and do not add compost or fertiliser unless soil analysis demonstrates the need.

Cultivation: Do not cultivate tree and shrub planting soils, only cultivate prior to planting if the soil is compacted (for example due to site/construction activities). For grass seeding areas, cultivate topsoil to a loose friable tilth suitable for grass seeding. Collect and remove from site all stones, builders' rubble and other deleterious material over 50mm in any dimension.

Planting areas: Plant specification to be in accordance with the HTA National Plant Specification. Tree planting to be in accordance with BS 8545:2014 - Trees from nursery to independence in the landscape recommendations.

Tree planting: No tree to be planted that does not conform in full with **Table 1, p.21, BS 8545:2014**, to be established via nursery inspections prior to and on delivery of trees. The positioning of proposed trees are to avoid underground services. **No tree to be substituted by an alternative without formal agreement by the LPA, but prior consultations with nurseries should clearly establish availability.**

Tree anchoring: Rootball fixing strap system to be provided by Platipus to secure the trees. See diargam above-right.
Supplier: Platipus. Product: Tree Anchoring with Strap. Product Code: RF1s/RF2s (depending on tree size). Ref: www.platipus-anchors.com/applications/tree-and-irrigation/
rootball-fixing-system---strap/

Note: Above ground stake supports for trees shall only be used where ground anchoring methods prove ineffective, but shall not be used to support trees with defective root-balls. Staking shall comprise x3 untreated wooden stakes set with two to the SW side and attached low (never more than one-third tree height) using flexible ties such as hessian nature-ties, arbor-tie or rubber straps. Ties shall allow for flexure without abrasion of the stem and all stakes and ties shall be removed before the third growing season.

Root barriers: Root barriers shall be installed (to be provided by GreenBlue Urban. Product: ReRoot 2000) and at a suitable depth to protect buried services. It shall be installed approximately 250mm parallel to the buried services and within 3m of the proposed trees.

Bark mulch (other than SuDS): Provide and spread evenly over all planting areas an organic graded bark flakes or similar approved bark mulch to a depth of 50mm. For trees, and in particular those planted in grass, apply a 50mm depth of much to give Mulching shall be free from toxins, pathogens and other extraneous substances harmful to plant, animal or human life. Ensure that all weeds have been cleared and that the soil have been watered thoroughly prior to mulching.

Mulching of SuDS: The use of an organic mulch should be avoided for systems where there is an overflow pit, owing to the risk of clogging. Spread a layer of clean stone gravel, 20mm particle size, to a depth of 50-70mm, as an alternative to standard organic mulches over the SuDS to protect the soil from erosion. No geotextile/ membrane to be installed under the gravel.

Species-rich grass to swales and attenuation basin: to be sown with a suitable seed mixture such as Emorsgate EM8 Meadow mixture for Wetlands, or similar and approved.

Maintenance: All landscape areas to be maintained in accordance with B.S. 7370 Part 3:1991 and Part 4:1993; including weed control, and adjustment to tree stakes and ties. Refer to the below.

General notes: Substitutions, if made, should be similar in size, form and water demand. Plants shall be arranged to avoid straight lines and geometric patterns.

Project Sakura

Specifications LA.**300**

Species-rich grass for Swales

Swale areas to be seeded with Emorsgate Seeds EM8: Meadow Mixture for Wetlands, or similar and approved.



Suggested Sowing Rates
40kg/ha 16kg/acre 4g/m2

Description
EM8 contains species suitable for seasonally wet soils and is based on the vegetation of traditional floodplain and water meadows. Soils in wet meadows may flood for short periods in winter, but are usually well drained in summer.

Ground Preparation
Endeavour to select ground that is not highly fertile and does not have a problem with perennial weeds. Good preparation is essential to success so aim to control weeds and produce a good quality seed bed before sowing.

To prepare a seed bed first remove weeds using repeated cultivation. Then plough or dig to bury the surface vegetation, harrow or rake to produce a medium tilth, and roll, or tread, to produce a firm surface.

Sowing
Sowings on ground prone to winter flooding are safest either in the early autumn or in spring once the land has drained. Most plants need time to grow mature enough to withstand flooding.

The seed must be surface sown and can be applied by machine or broadcast by hand. To get an even distribution and avoid running out, divide the seed into two or more parts and sow in overlapping sections. Do not incorporate or cover the seed but firm in with a roll, or by treading, to give good soil/seed contact.

First Year Management
Most of the sown meadow species are perennial and are slow to establish. Soon after sowing there will be a flush of annual weeds, arising from the soil seed bank. These weeds can look unsightly, but they will offer shelter to the sown seedlings, are great for bugs, and they will die before the year is out. So resist cutting the annual weeds until mid to late summer, especially if the mixture contains Yellow Rattle, or has been sown with a nurse of cornfield annuals. Then cut, remove and compost. Early August is a good time. This will reveal the young meadow, which can then be kept short by grazing or mowing through to the end of March of the following year. Dig out any residual perennial weeds such as docks.

Management Once Established
In the second and subsequent years EM8 sowings can be managed in a number of ways which, in association with soil fertility, will determine the character of the grassland. The best results are usually obtained by traditional meadow management based around a main summer hay cut in combination with autumn and possibly spring mowing or grazing.

Meadow grassland is not cut or grazed from spring through to late July/August to give the sown species an opportunity to flower. After flowering in July or August take a 'hay cut' : cut back with a scythe, petrol strimmer or tractor mower to c 50mm. Leave the 'hay' to dry and shed seed for 1-7 days then remove from site. Mow or graze the re-growth through to late autumn/winter to c 50mm and again in spring if needed.

Wetland habitats are characteristically quite variable in composition, reflecting local drainage and management. Conditions can vary, for instance, between the highs and lows in ridge and furrow grassland. Localized differences may require a targeted approach. For example, boggy areas which remain waterlogged for much of the year may be best sown with pond edge mixture EP1.

Composition
EM8 is a complete mix composed of 20% native wild flowers and 80% slow growing grasses (by weight). The flower and grass components are also available to order separately as EM8F for the flower component and EG8 for the grass component.

Ref: https://wildseed.co.uk/product/mixtures/complete-mixtures/meadow-mixtures-for-specific-soils/meadow-mixture-for-wetlands/

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tir collective LANDSCAPE ARCHITECTS

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