Example of a SuDS Maintenance Plan

SUSTAINABLE DRAINAGE AND LANDSCAPE MANAGEMENT PLAN FOR ROBINSWOOD PRIMARY SCHOOL

1.0 An introduction to sustainable drainage systems or SuDS

SuDS are a new environmentally friendly approach to managing rainfall that uses landscape features to deal with surface water. SuDS aim to:

- Control the flow, volume and frequency of water leaving a development area
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- Provide attractive surroundings for the community
- Create opportunities for wildlife

2.0 SuDS at Robinswood Primary School and Matson Park

The SuDS are designed to prevent flooding of Robinswood Primary School and control the flow of water from springs in Matson Park using attractive landscape features.

- A low bank has been constructed in the park as a dam when water flows down the route of an old ditch during heavy rain.
- The everyday flow from springs above the path in the park have been directed along a new stream in the park that keeps a new wildlife pond full of water but also allows it to soak into the ground or flow onward to a controlled outfall into the school grounds.
- The controlled outfall into the school grounds allows heavy rainfall to leave the park slowly and make its way through green space above the school playing field.
- Exceptional storms or prolonged heavy rain can overflow from the park across a grass weir on the bank into the ‘environment space’ at the top of the playing field retained by a low bank running along the contour to the old oak tree.
- The school wildlife pond, with a toddler fence around it, gives children in the school an opportunity to learn about animals and plants that live in water and understand how the SuDS control system works.
- Water will slowly soak into the ground as it travels along the SuDS system but in exceptional storms some water may overflow down the side of the playing field towards the road as it did in the past but without going through the school first.

3.0 Managing the SuDS

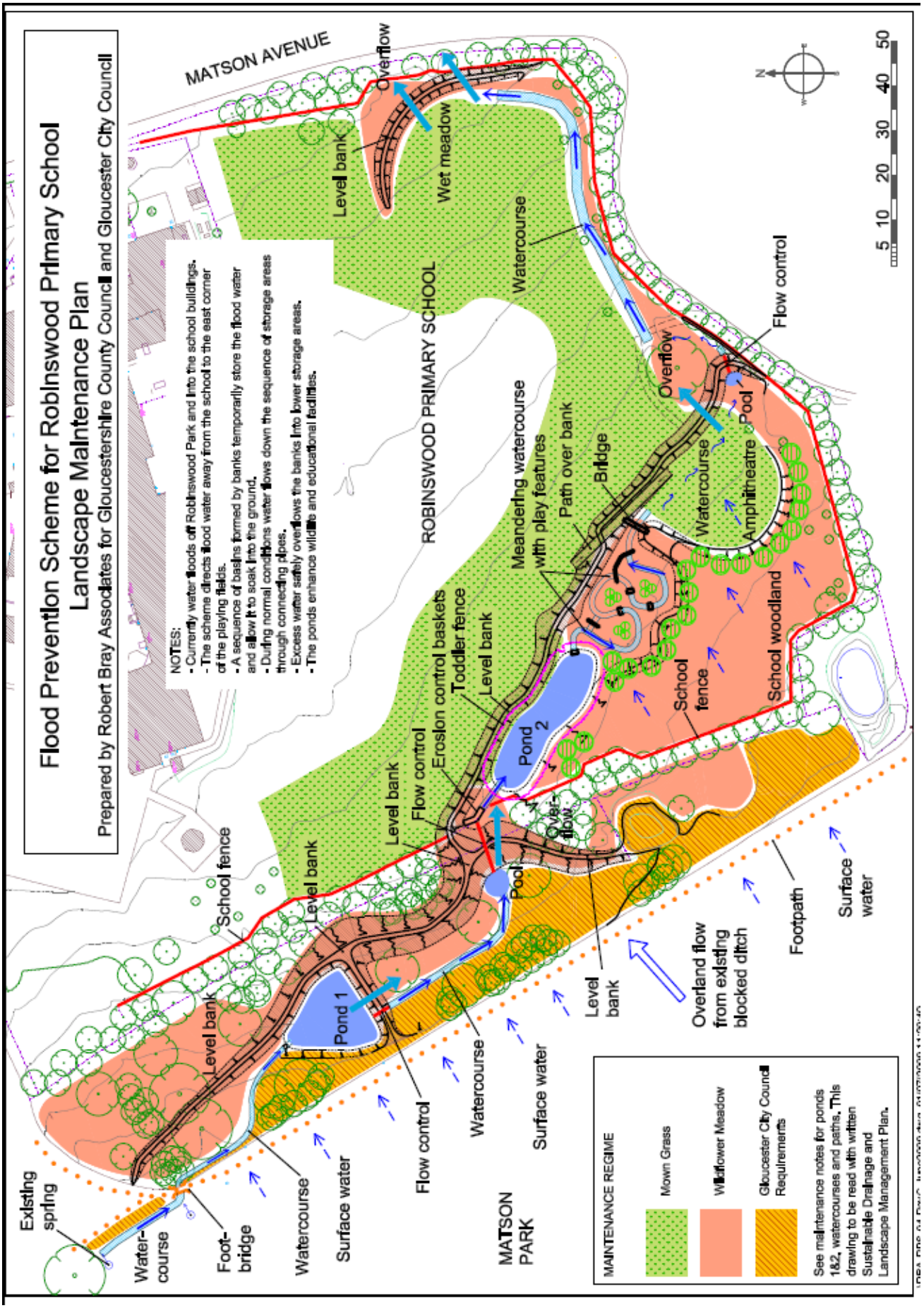
The SuDS at Robinswood Hill Primary School have been designed for easy maintenance to comprise:

- Regular day to day care - litter collection, grass cutting and checking the inlets and outlets where water enters or leaves a SuDS feature
- Occasional tasks - managing pond vegetation and removing any silt that builds up in the SuDS features
- Remedial work - repairing damage where necessary

Contact

In the vent of concern over any matter to do with the SuDS please contact: Robert Bray Associates – Sustainable Drainage Consultants and Landscape Architects, Fairfield, Coronation Road, Rodborough, Stroud, Gloucestershire, GL5 3SD, Tel: (01453) 764885 Fax: (01453) 7665545 Email: bob@robertbrayassociates.co.uk; Website: www.sustainabledrainage.co.uk

Example of a SuDS Maintenance Plan



4.0 Matson Park SuDS management

The SuDS sequence begins where the springs emerge above the path, near the park entrance from Underhill Road, and take a changed route under a new bridge to form a stream in the park.

ACTION:

– *Strim or mow grass where the springs emerge and allow vegetation to grow to at least 100mm or to full height annually in the low flow channel or stream bed.*

The new stream carries water to the first wildlife pond (POND 1 – see site plan).

ACTION:

– *Mow the path verge and grass up to the stream as current practice by GCC.*

- *Cut stream vegetation annually in September – November removing cuttings to a wildlife pile or from site.*
- *Allow grass beyond the stream to develop as meadow and cut at 100mm September – November removing cuttings to a wildlife pile or from site*

The wildlife pond will develop wetland vegetation round the edge with reasonably short grass towards the park side to allow people to look at the water.

Longer meadow grass on the far side of the pond and beyond the stream will provide a home for wildlife and an opportunity for creative play.

ACTION:

- *Mow the path verge and grass up to the stream and pond edge from park side as current*

  practice by GCC
- *Cut meadow grass beyond stream at 100mm September – November removing cuttings to a wildlife pile or from site*
- *Monitor how the pond edge develops and cut 30% of vegetation at 100mm each year during September – November, if required, removing cuttings to wildlife piles or from site*
- *Occasionally remove pond vegetation, if it spreads across the pond, by hand clearing, raking or machine clearance, using a 1 – 3 tonne tracked vehicle, with cuttings removed to wildlife piles or from site*
- *Check the outlet from the pond and the inlet on the other side of the bank are clear*

The stream flows onward from the pond through grass to a 'micropool' before it leaves the park through a final outlet into the school grounds 'environmental space' at the top of the playing field.

There is a grass overflow weir over the bank down to the school fence which should be cut annually to ensure erosion does not occur. Brambles should be allowed to re-colonise the base of the bank on the school side for security reasons.

ACTION:

- *Mow path verge and grass to the stream from the park side as current practice by GCC*
- *Cut meadow grass beyond stream at 100mm September – November removing cuttings to a wildlife pile or from site*
- *Cut 'micropool' vegetation annually September – November, if required, removing cuttings to a wildlife pile or from site*
- *Cut overflow weir as meadow grass at 100mm September – November removing cuttings to a wildlife pile or from site*

5.0 Robinswood Primary School SuDS management

Water from the Matson Park flows slowly through the bank or overflows over a grass weir in exceptional rainfall. The water arrives on the school site through the fence onto a stone filled basket channel flowing along a grass swale to the second wildlife pond and 'environmental space' (POND 2 see site plan).

ACTION:

- *Strim or mow grass around stone filled basket channel and along the swale to the pond at 100mm with grass at maximum height 150mm*

The school wildlife pond will develop a wetland edge along the 1m wide wet ledge before rising up to a flat dry ledge (or bench) provided for safety.

ACTION:

- *Allow grass beyond the pond and away from the school side to develop as meadow and cut at 100mm in September – November removing cuttings to a wildlife pile on site*
- *On the school side, cut the grass regularly at 100mm with grass at maximum height 150mm for access.*
- *Monitor pond vegetation and cut 30% of edge at 100mm each year, if necessary, during September – November, removing cuttings to wildlife piles*
- *Occasionally remove pond vegetation if it spreads across the pond by hand clearing or raking being careful not to damage the pond liner.*

The water leaves the pond under a small bridge into a swale maze flowing to a flat activity area.

Water leaves the southern end of the 'environmental space' through an outlet in the bank with a micropool in front of it.

ACTION:

- *Cut the grass in the swale maze channel once each year, September – November at 100mm removing cuttings to wildlife piles*
- *Cut grass paths, verges and the flat activity area at 35 – 50mm with 75mm maximum, leaving cuttings in situ or remove to wildlife piles*
- *Cut all other areas within the 'environment space' as meadow cut at 100mm in September – November removing cuttings to a wildlife pile on site during school summer holiday.*
- *Check the outlet and the inlet on each side of the bank is clear*

Should water reach the outlet from the 'environment space' then it will flow down a grass swale, a flat bottomed grass channel, to another holding basin before overflowing slowly through the boundary onto the road.

ACTION:

- *Cut the shallow swale and meadow as part of normal playing field maintenance*

6.0 SuDS and Landscape Maintenance – Summary

		Frequency	Unit Rate	Total
	REGULAR MAINTENANCE			
1	LITTER MANAGEMENT			
1.1	Pick up all litter in SuDS and Landscape areas and remove from site	12 visits monthly		
2	GRASS MAINTENANCE – all cuttings to wildlife piles			
2.1	Mow all grass verges, paths and amenity at 35-50mm with 75mm max. Leaving grass in situ	As required or monthly		
2.2	Mow all dry swales, dry SuDS basins and margins to low flow channels and other SuDS features at 100mm with 150mm max. Cut wet swales or basins annually as wildflower areas	4-8 visits as required Annually		
2.3	Wildflower areas strimmed to 50mm in Sept or at end of school holidays Or Wildflower areas strimmed to 50mm on 3 year rotation 30% each year	1 visit annually 1 visit annually		
3	INLETS AND OUTLETS			
3.1	Inspect monthly, remove silt from slab aprons and debris. Strim 1m round for access	12 visits monthly		
4	HARD SURFACES – not applicable			
4.1	Sweep all paving regularly. Sweep and suction brush permeable paving in autumn after leaf fall.	1 visit		
	OCCASIONAL TASKS			
5	INSPECTION AND CONTROL CHAMBERS – not applicable			
5.1	Annual inspection, remove silt and check free flow	1 visit		
6	WETLAND AND POND VEGETATION			
6.1	Wetland vegetation to be cut at 100mm on 3 – 5 year rotation. 30% each year. All cuttings to be removed to wildlife piles or from site.	As required		
7	SILT MANAGEMENT			
7.1	Inspect swales, ponds, wetlands annually for silt accumulation	1 visit		
7.2	Excavate silt, stack and dry within 10m of the SuDS feature, but outside the design profile where water flows, spread, rake and overseed	As required		

8	NATIVE PLANTING			
8.1	Remove lower branches where necessary to ensure good ground cover to protect soil profile from erosion.	1 visit annually		
	REMEDIAL WORK			
9	Inspect SuDS system regularly to check for damage or failure. Undertake remedial work as required.	As required		

7.0 Sustainable Drainage (SuDS) features checklist

SuDS techniques include landscape features and control structures to manage runoff as it flows to site outfalls. The following lists the features which may be found on a site.

- **Filter strips** are grass verges that allow runoff to flow through vegetation to a swale, wetland, infiltration area or other SuDS technique.
- **Swales** are linear, flat bottomed grassed or vegetated channels that convey water from one place to another. They can also store water and allow it to soak into the ground.
- **Underdrained Swales** are stone filled trenches with a perforated pipe in the bottom covered by engineered sandy soil and turf. These intercept dirty water and allow it to soak into the ground or lead it to a water storage feature.
- **Filter drains** clean, store and convey water to another feature or allow it to soak into the ground. They are stone filled trenches, sometimes with a perforated pipe in the bottom. These may be enlarged to treat dirty water, as **treatment trenches**, or increase soakage into the ground, as **infiltration trenches**.
- **Permeable surfaces** as permeable block paving, porous Asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc.
- **Infiltration basins, trenches, soakaways** and most of the preceding SuDS features allow water to soak into the ground.
- **Basins, ponds and wetlands** are depressions in the ground where water is stored and treated. Water levels rise after rain and then drops to the normal level as the excess soaks into the ground or is released slowly to a watercourse or drain. Some water maybe held back as a pond for final treatment, amenity or wildlife interest.
- **Bioretention areas** are planted areas with engineered topsoil over drainage layers that allow water to soak into the ground.
- **Green Roofs** are planted with sedum or other plant material. They clean and absorb water allowing it to evaporate. Excess water is drained from the roof to other SuDS features.
- **Inlets and outlets structures** are often conveyance pipes protected with mesh guards. They must be free from obstruction at all times to allow free flow through the SuDS.
- **SuDS flow control structures** are usually small orifices in control chamber, slots or V notches in weirs. They are usually near the surface so are accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- **Inspection Chambers** and rodding eyes are used on bends or where pipes come together. They allow cleaning of the system if necessary.
- **Overflows** can be below ground through gratings and chambers or over grass weirs in the open They must be kept clear at all times to protect areas from flooding.
- **Flood routes (exceedance routes)** allow water volumes exceeding the capacity of the SUDS

system to escape from the site without causing damage to property. This route must be clear of obstructions at all times.

SuDS design usually avoids below ground structures such as gully pots, oil separators and other sumps, which are a wildlife hazard, often ineffective and expensive to maintain. SuDS design also reduces pipework, manholes and interceptors. However water may be conveyed in surface features like rills and channels with changes in level managed in spouts or cascades. These hard landscape features require standard landscape maintenance.

8.0 Sustainable Drainage Maintenance Specification

1.0 GENERAL REQUIREMENTS

Maintenance activities comprise • **Regular Maintenance** • **Occasional Tasks** • **Remedial Work**	**Frequency**
Generally **Litter** Collect all litter or other debris and remove from site at each site visit.	 Monthly

- **Avoid** use of weedkillers and pesticides to prevent chemical pollution
- **Avoid** de-icing agents wherever possible to allow bio-remediation of pollutants in permeable surfaces.
- **Protect** all permeable, porous and infiltration surfaces from silt, sand, mulch and other fine particles.

Exclusions:

- Maintenance of rainwater harvesting chambers, pumps, etc.

2.0 FILTER STRIPS AND SWALES

- **Filter strips** are grass verges next to hard surfaces that allow runoff to flow through vegetation removing silt and pollution.
- **Swales** are linear, flat bottomed grassed or vegetated channels that convey water from one place to another which can also store water and allow it to soak into the ground.
- **Underdrained Swales** are free draining swales with stone filled trenches in the bottom covered by engineered sandy soil and turf that clean dirty water and allow it to soak into the ground or lead it to a water storage feature.

FILTER STRIPS AND SWALES	
Regular Maintenance	**Frequency**

Grass Mow amenity grass access paths and verges surrounding swales and filter strips at 35-50mm minimum and 75mm maximum or as specified. Mow filter strips and swales at 100mm with 150mm maximum to filter and control runoff in normal grass swales removing first and last cut in season if grass is longer than 150mm removing cuttings to wildlife piles on site. Where marsh or wetland develops in the swale due to wet conditions then cut annually, or as required, at 100mm removing cuttings to wildlife piles on site	Monthly or as required Monthly or as required Annual or as required
Occasional Tasks	**Frequency**
Where there is a build-up of silt on the filter strip, swale, under-drained swale or at inlets, i.e. 50mm or more above the design level, then remove and spread on site. Undertake when ground is damp in autumn or early spring and transplant turf and overseed to original design levels. Spread excavated material on site above SuDS design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.	As required
Remedial Work	**Frequency**
All damage to be made good to design profile unless there is a design flaw.	As required

3.0 FILTER DRAINS

- **Filter drains** are stone filled trenches, sometimes with a perforated pipe in the bottom, that collect, clean and store runoff before conveying the water to another SuDS feature or allowing it to soak into the ground.
- **Treatment trenches** are enlarged filter drains designed to treat a known volume of dirty water or increase soakage into the ground. They may also be used to intercept overland flows when they are referred to as **cut off drains**.

FILTER DRAINS AND INFILTRATION TRENCHES	
Regular Maintenance	**Frequency**
Grass edges Mow 1m min. wide grass surround to drain at 100mm and 150mm maximum to filter runoff and protect drain from silt.	Monthly or as required
Occasional Tasks	**Frequency**
Weeds Hand pull or spot treat individual weed growth only if necessary ensuring weedkiller does not enter the filter drain. Weed growth usually dies in dry weather.	As required
Remedial Work	**Frequency**

Siltation at surface Where there is no protective geotextile remove all stone and perforated pipe replacing as original Spec. and include separating geotextile as below. Where there is a separating geotextile (see Spec.) then remove surface stone layer and separating geotextile that protects the stone drain below. Replace geotextile and top stone layer.	As required

4.0 PERMEABLE SURFACES

- **Permeable surfaces** including permeable block paving, porous asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc. Permeable block paving and porous asphalt can be cleaned by suction brushing.

PERMEABLE AND POROUS SURFACES	
Regular Maintenance	**Frequency**
Cleaning Brush regularly and remove sweepings from all hard surfaces	Monthly
Occasional Tasks	**Frequency**
Permeable Pavements. Brush and vacuum surface once a year to prevent silt blockage and enhance design life.	Annually
Remedial Work	**Frequency**
Monitor effectiveness of permeable pavement and when water does not infiltrate immediately advise Client of possible need for reinstatement of top layers or specialist cleaning. Recent experience suggests jet washing and suction cleaning will substantially reinstate pavement to 90% efficiency.	As required

5.0 INFILTRATION DEVICES - soakaways, infiltration trenches and infiltration basins

- **Infiltration basins, trenches, soakaways** and most of the preceding SuDS features allow water to soak into the ground.

SOAKAWAYS, INFILTRATION TRENCHES AND INFILTRATION BASINS	
Regular Maintenance	**Frequency**
Grass edges Mow 1m min. wide grass surround to drain at 100mm and 150mm maximum to filter runoff and protect infiltration structure from silt.	Monthly or as required
Infiltration Basins Protect grass surface from compaction and siltation and manage main area of basin for design function or appearance.	

	As required
Occasional Tasks	**Frequency**
Infiltration Basins Where there is a build up of silt in the basin at inlets, i.e. 50mm or more above the design level then remove when the ground is damp in autumn or early spring and turf to the original design levels. Spread excavated material on site above SuDS design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance. **Infiltration Trench** Hand pull or spot treat individual weed growth only if necessary, ensuring weedkiller does not enter the drain and inhibit natural breakdown of pollutants.	As required As required
Remedial work	**Frequency**
Infiltration Basin Where the infiltration basin is compacted then reinstate by removal of silt and de-compaction of the surface by scarifying, spiking or the use of hollow tines to the basin area.	As required

6.0 BASINS, PONDS AND WETLANDS

- **Basins, ponds and wetlands** are depressions in the ground that store water. Water levels rise after rain and then drop to the normal level as the excess soaks into the ground or is released slowly to a watercourse or drain. Some water is often held back in a pond or wetland for final 'polishing' treatment or amenity interest.
- **Basins** are usually dry
- **Ponds** can be permanent or temporary and are mainly open water.
- **Wetlands** are mainly aquatic vegetation but can have small areas of open water like ponds.

BASINS, PONDS AND WETLANDS	
Regular Maintenance	**Frequency**
Grass Mow grass access paths and verges surrounding basins, ponds and wetlands areas at 35mm-50mm minimum and 75mm maximum or as specified to provide a cared for appearance and allow pedestrian access. Mow rough grass areas for occasional access or habitat reasons at 100mm and maximum 150mm with cuttings removed to wildlife piles Grass areas not required for access may be managed for wildlife interest and to reduce costs. 2 cuts in July and September or 1 cut annually in September or October as specified and cuttings removed to wildlife piles.	 Monthly or as required As required 4-6 times annually Annually or as required
Wet woodland management Manage annually as detailed spec. with cuttings left in situ or removed to wildlife piles.	Annually or as required

Wetland vegetation Cut (strim) at 100mm with cuttings removed to wildlife piles September - October or Maintain as a mosaic to be cut 25-30% in any one year at 100mm in September or October with cuttings removed to wildlife pile.	Annually or as required
Occasional Tasks	**Frequency**
Where silt accumulates on apron or area in front of inlet or outlet then remove and land apply within design profile of SuDS Where silt accumulates more than 150mm in base of wetland undertake a phased removal of silt subject to Client approval. Confirm whether a liner is present to hold water or prevent pollution of groundwater and protect. Remove silt as instructed but not more than 30% of pond or wetland area at any one time and to an agreed depth but not subsoil layer. Retain as much representative existing vegetation as possible to ensure rapid re-colonisation of open areas. Stack excavated material adjacent to wetland to allow de-watering of silt. Undertake silt removal during September-October to minimise damage to protected wildlife and ensure re-growth of aquatic vegetation before winter. Spread excavated material on site above SUDS design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.	Annually or every 3 years as required
Remedial work	**Frequency**
Although not usually required this may be needed due to damage to liners or control structures.	Undertake as design details or as required

7.0 INLETS, OUTLETS, CONTROLS, AND INSPECTION CHAMBERS

- **Inlets and outlets structures** may be surface structures or conveyance pipes with guards or headwalls. They must be free from obstruction at all times.
- **SuDS flow control structures** can be protected orifices, slots weirs or other controls at or near the surface to be accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- **Inspection Chambers** and rodding eyes are used on bends or where pipes come together and allow cleaning of the system if necessary. They should be designed out of the system where possible.

INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS	
Regular Maintenance	**Frequency**
Inlets, outlets and surface control structures	
Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
Strim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris	Monthly
Inspection chambers and below ground control chambers	

Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn	Annually
Occasional Maintenance	
Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage	As necessary
Remedial work	**Frequency**
Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary. Repair physical damage if necessary.	As required As required

8.0 OVERFLOWS AND FLOOD ROUTES

- **Overflows** are overland across weirs, through gratings or within chambers and must be kept clear at all times to protect areas from flooding. They allow onward flow when part of the SuDS system is blocked.
- **Flood routes (exceedance routes)** allow water volumes that exceed the capacity of the SuDS system to pass through or round the site without causing damage to property. These routes must be clear of obstructions at all times.

OVERFLOWS AND FLOOD ROUTES	
Regular Maintenance	**Frequency**
Overflows. Jet pipes leading from overflow structures annually and check by running water through the overflow. Check free flow at next SUDS feature – inlet to basin or chamber.	Annually
Overflows. Remove any accumulated grass cuttings or other debris on top of grass weirs or stone filled baskets overflows.	Monthly
Flood Routes. Make visual inspection. Check route is not blocked by new fences, walls, soil or other rubbish. Remove as necessary.	Monthly
Remedial	**Frequency**
Overflows. If overflow is not clear then dismantle structure and reassemble to design detail.	As required

9.0 ORNAMENTAL PLANTING AND EXISTING VEGETATION

- **Ornamental Trees -** All ornamental planting to be kept weed free and pruned using secateurs to keep the shrubs to an agreed and reasonable size.
- **Native Trees and Shrubs –** All native planting to be allowed to grow freely removing overhanging branches as required.

PLANTING AND EXISTING VEGETATION - Review	
Regular Maintenance	**Frequency**
Grass maintenance	

Amenity Grass - Mow all grass verges, paths and amenity grass at 35-50mm with 75mm max. All cuttings to remain in situ	16 visits
Rough grass – Mow at 75-100mm but not to exceed 150mm All cuttings to wildlife piles	4 - 8 visits
Wildflower areas strimmed to 50mm in Sept-Oct or Wildflower areas strimmed to 50mm July and Sept or Wildflower areas strimmed to 50mm on 3 year rotation 30% each year All cuttings to wildlife piles	1 visit 2 visit 1 visit
Ornamental tree & shrub planting. Weed all shrub beds as detailed spec as necessary. Cut back planting from lights, paths and visibility sight lines in late autumn and as necessary. Cut hedges slightly tapered back from base with flat top at specified height. Do not mulch planting adjacent to permeable/ porous paving surfaces. Remove stakes and ties from trees when no longer needed for support and within 3 years of planting. Protect from strimmer damage and remove competitive growth until well established.	4 visits
Native trees & shrub planting. Prune to shape in year 1. Protect trees from strimmer damage and remove competitive growth until well established. Remove stakes and ties from trees when no longer needed for support and within 3 years from planting.	1 visit
Existing trees Check existing trees for safety.	1 visit
Remedial	**Frequency**
Replace trees and shrubs which fail in the first five years after planting. Carry out tree surgery as necessary.	

10.0 SPILLAGE – EMERGENCY ACTION

Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore small spillages of oil, milk or other known organic substances should be

removed where possible using soak mats as recommended by the Environment Agency with residual spillage allowed to bio-remediate in the drainage system.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric.)

Contact the Environment Agency immediately.

11.0 QUERIES REGARDING A DESIGN FEATURE.

In the event of a concern or failure of a SuDS design feature contact Robert Bray Associates.

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