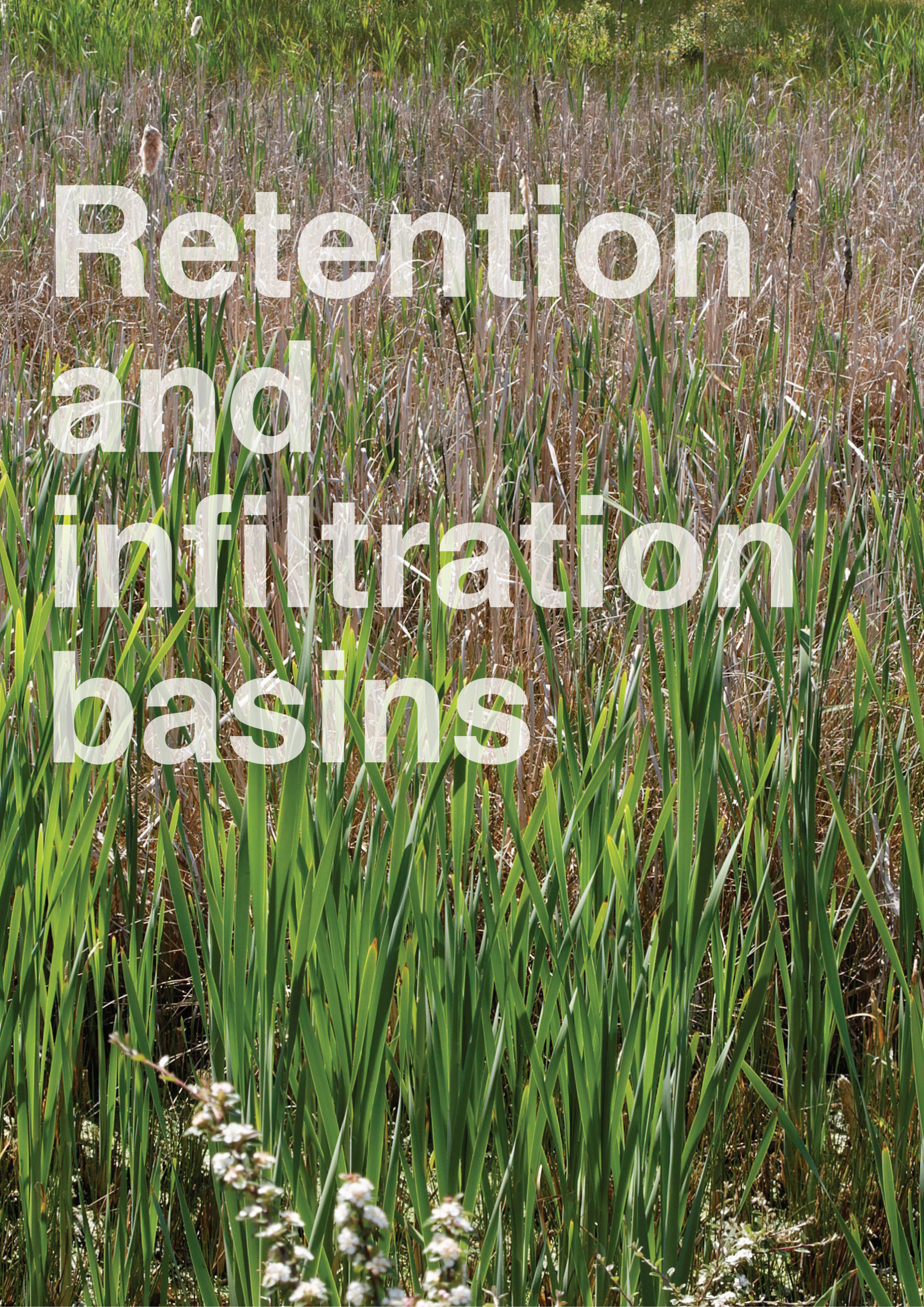


Retention and infiltration basins

Retention and infiltration basins

Description

Retention and infiltration basins are open, usually flat, areas of grass that are normally dry. In heavy rainfall they are used to store water for a short time and so they fill with water. They are often multi use; for example, they can double as play areas. Retention basins can have local areas of wetland depending on the design. Shallow depressions can potentially provide relatively large areas of storage.

Benefits

Retention Basins	Infilltration Basins
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓

How they work

Retention basins provide short term storage for excess rainwater. During very heavy rainfall the water level will slowly rise. Afterwards the water level drops slowly as the water flows out of the basin into a nearby watercourse or sewer.

Infiltration basins are similar to retention basins except that the stored water soaks into the ground below the basin. The soils below the basin have to be sufficiently permeable to allow water to soak in quickly enough. If the soils are marginally suitable for infiltration then trenches may be constructed below the basin to make it work more effectively.

Basins remove some pollution from rainwater runoff but still require source control up stream to operate most effectively.

Infiltration basin during rainfall in a housing development. The basin is normally dry and contains water occasionally, Petersfield

Cambridge specific design considerations

Retention basins are most suitable to the clayey soils present below much of Cambridge. This is because the clays soils do not soak up a lot of water (although in summer some water will soak into the clay following a particularly dry period).

The exact form of basins will depend on the specific ground levels, topography, etc. As with ponds and wetlands, basins should have an appropriate scale and form to suit the surrounding landscape character. They should be designed to provide attractive landscaped areas that are not simply areas of plain grass.

The bottoms of infiltration basins are normally flat, although water can infiltrate through sloping areas as well. Retention basins may have a damp zone at the bottom depending on the design and can be designed to provide ecological and/or amenity value.

Housing should be designed to overlook basins, rather than basins being placed in an unseen corner. Basins can also be located in larger areas of open space.

There should be an assumption to retaining all existing native trees and vegetation. The layout of the basins should respect the presence of trees, and in particular, ensure that their root systems are not compromised. Proposals should accord with BS5837: 2005 and take account of any implications resulting from the presence of Tree Preservation Orders (TPOs) and Conservation Area designations.

Small interpretation boards should be provided and these should include information relating to the function of the basin and the local fauna and flora the system supports.

Planting

The City Council will expect new basins to be planted to enhance biodiversity and contribute to local, national and regional aims, for example Biodiversity Action Plans (BAP). Landscaping requirements will take precedence over enhancing biodiversity when planting basins. The following should be considered:

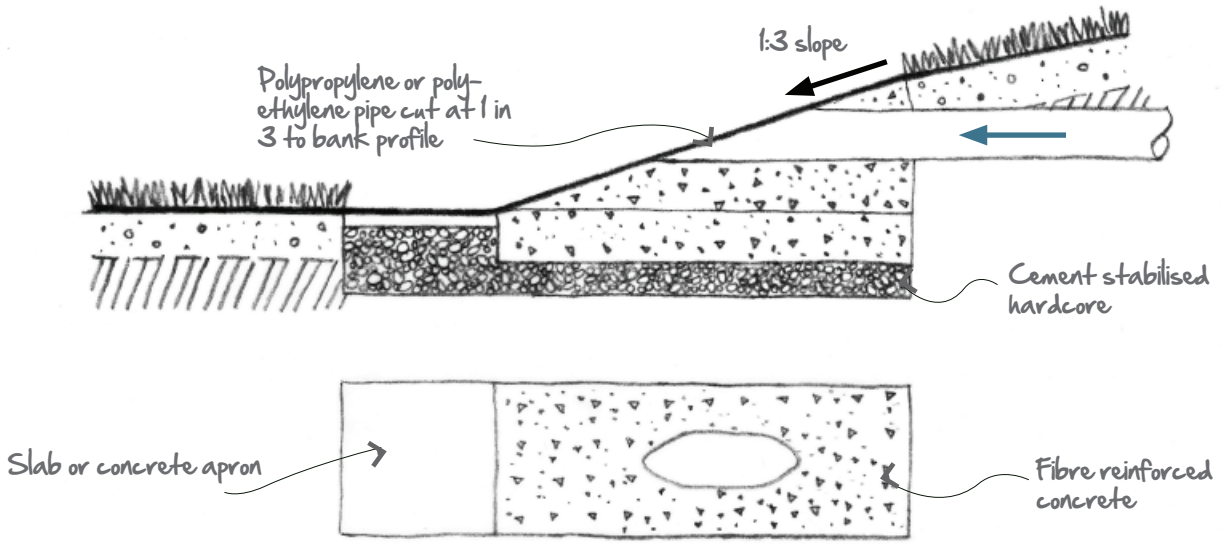
- The planting should provide a permanent ground cover so that bare soil is not washed out of the basin when it operates.
- The planting should be able to tolerate periodic cover by water up to 1m depth for up to 48 hours.
- The bottom of an infiltration basin is likely to be quite a dry environment due to the sandy rootzone and permeable underlying soils.
- Planting introduced to improve ecology actually makes infiltration basins work more effectively by slowing down flows and keeping the soil free draining.

Basin in a housing development with an information board to explain its purpose to residents, Cambourne

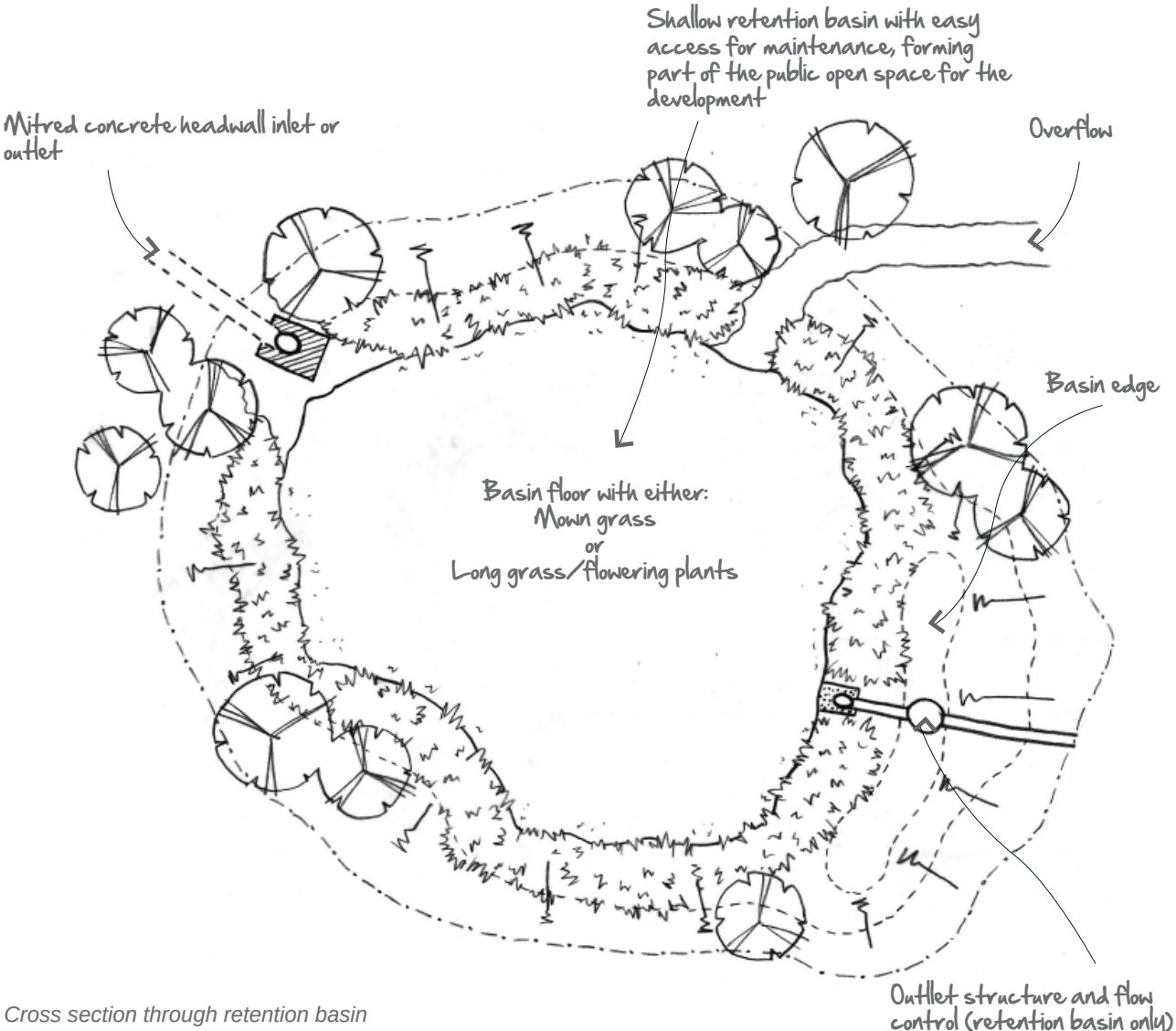
Practical issues and solutions

Problem: Compaction of soil in base of infiltration basin during construction, resulting in reduced infiltration rate.	**Solution:** Manage construction plant and prevent heavy plant using the basin as an access route.
Problem: Topsoil is not sufficiently permeable.	**Solution:** Use a root zone mix that has a high sand content to maximise the permeability.
Problem: Wet or boggy patches develop in base, especially close to inlets, where not expected.	**Solution:** This often occurs because the base has not been constructed to the correct levels. Use a rootzone material to cover the base or a short length of infiltration trench at the inlets. The bottom of flat basins should be constructed to quite tight tolerances of 10mm level difference in 3m.
Problem: Silt build up during construction.	**Solution:** Manage construction runoff and prevent it entering the basin by using straw bales or geotextile traps. If the basin is used to control construction runoff remove silt at end of project.
Problem: Erosion during construction before planting is established.	**Solution:** The easiest solution is to reuse topsoil without any application of weed killer. This allows existing vegetation seed in the topsoil to establish quickly. Another alternative is to use biodegradable erosion control mats.

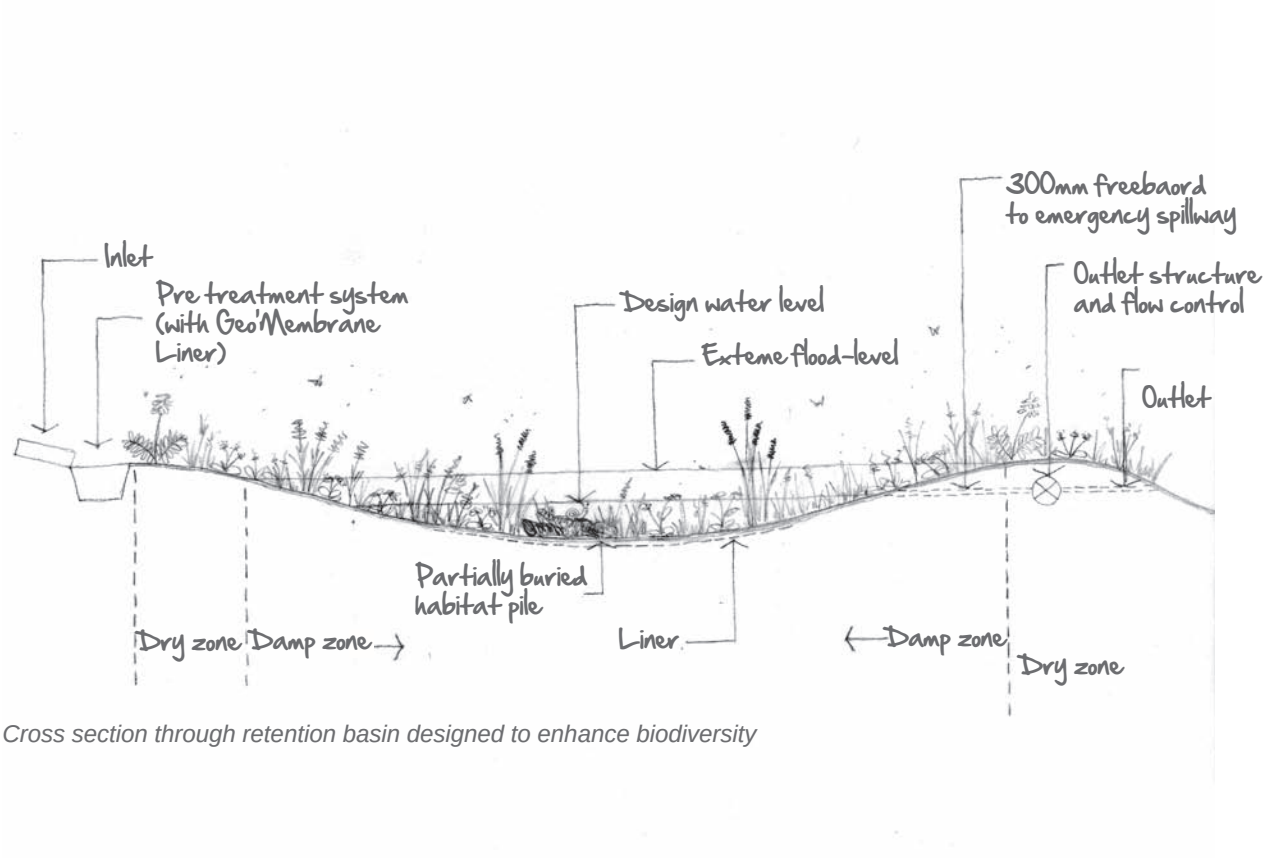
Basin with a water channel maze at a school in Worcestershire



Mitred concrete headwall



Cross section through retention basin designed to enhance biodiversity



Cross section through retention basin designed to enhance biodiversity

Retention basin with a wetland bottom, motorway service area, M42

Shallow retention basin with easy access for maintenance, forming part of the public open space for the development

Maintenance requirements

Maintenance of basins is relatively straight forward for landscape contractors and typically there is only a small amount of extra work (such as the management of control structures) required over and above that required for any open space. More intensive maintenance work such as silt removal is only required intermittently.

Basins should be designed so that special machinery is not required to undertake maintenance. Grass cutting in the bottom of basins should not be carried out when it is wet.

The costs of maintenance can be found at Appendix B.

Mowing amenity grassland around basins, Sheffield