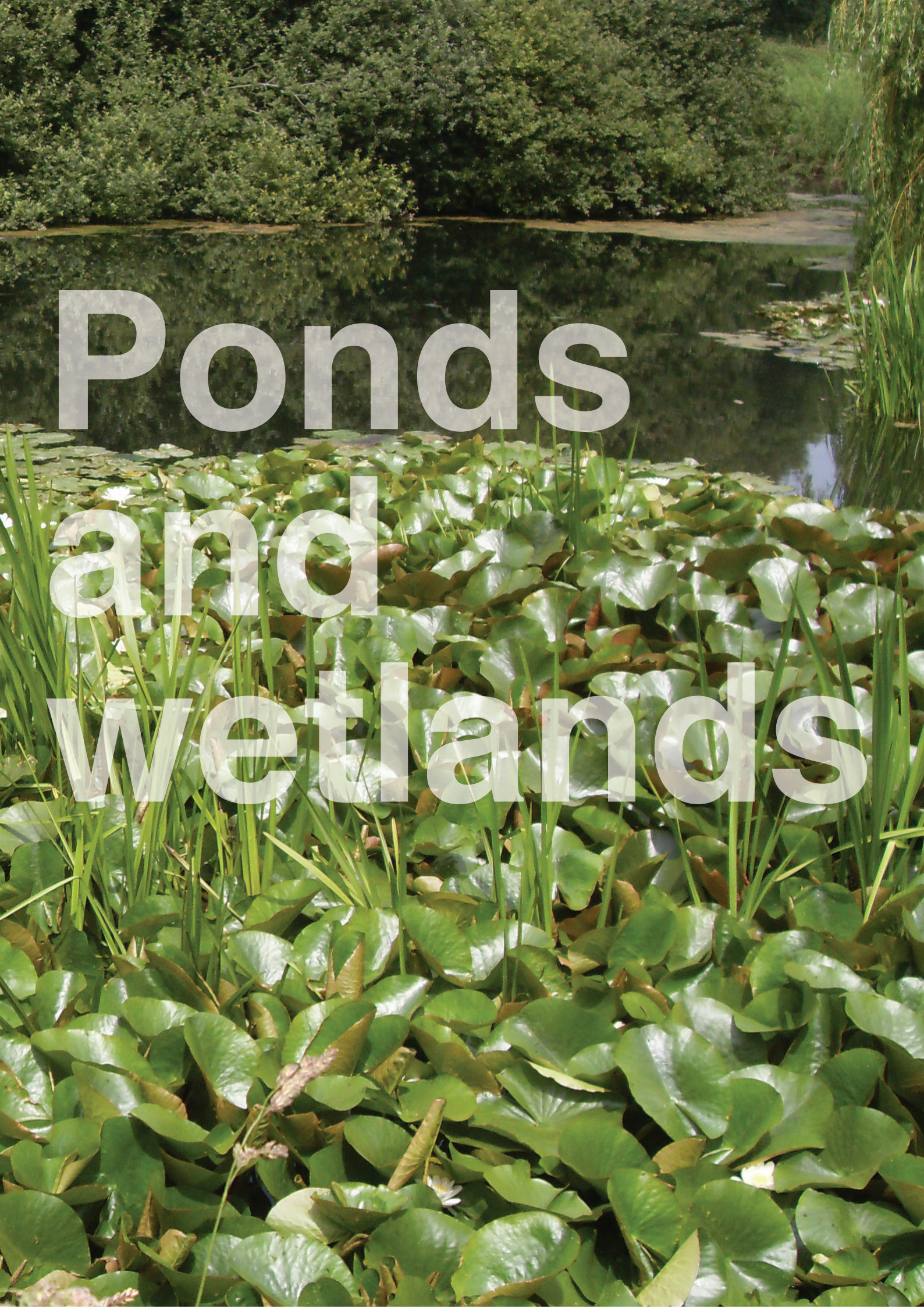


Ponds and wetlands

Ponds and wetlands

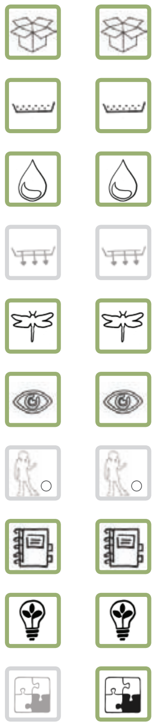
Ponds and wetlands are open areas of shallow water designed so the water level can rise to provide temporary storage for excess water during rainfall events. The water level rises temporarily when it rains. Equally as important, they provide valuable environmental benefits by helping to remove pollution from surface water runoff. Ponds are similar to wetlands but have a greater focus on storing excess water whereas wetlands have a greater focus on treatment of pollution.

Features that are adopted by Cambridge City Council will be located within areas of public open space and must be designed to be visually attractive, to enhance the space they occupy, to provide wildlife habitat and be safe. In general, ponds and wetlands that form part of a SUDS can be relatively small and should be designed so that they do not take up excessive space within a development as generally multiple smaller features can provide better biodiversity and easier maintenance.

Small ponds can be used in a housing development if integrated into the urban design, Malmo, Sweden

Benefits

Ponds Wetlands



How they work

In a well designed system most of the storage and treatment is performed by the upstream source control elements of the SUDS. Ponds and wetlands will provide a final `polish' to remove any remaining pollution. This is achieved by ensuring that water flows slowly through the pond over an extended period of time. The time water takes to travel through is known as the residence time. The greater this is the slower the water flow, which helps silt drop to the bottom of the pond and allows the vegetation and other organisms to remove pollution.

An important mechanism is biodegradation of oils by natural organisms in the pond. The organisms need a good supply of oxygen which means the permanent water must be shallow so oxygen can reach the bottom of the pond.

Cambridge specific design considerations

The exact form of the ponds and wetlands will depend on the specific topography and ground/soil conditions present at the site, as well as its orientation, aspect and proximity to other landscape features, buildings, etc. The design should contribute to the amenity of the local communities and be of an appropriate scale and form to suit the surrounding landscape character. In green open spaces they should have a natural feel with soft edges and forms that flow into the surrounding area.

The creation of bays suitable for breeding wildfowl should be integrated into the shape of larger ponds where possible. Hard edges and straight lines may be appropriate in some hard urban landscapes.

Small SUDS pool in high density housing – due to the close proximity to buildings hard edges are appropriate in this development, Stroud, Gloucestershire

Small SUDS pond, fully developed, Hopwood Services

For health and safety reasons, space constraints on most sites and due to the fact that natural ponds are generally small, it is likely that SUDS ponds will be small features that blend unobtrusively into the landscape. Large bodies of open water need careful consideration as SUDS ponds or wetlands in Cambridge.

Ponds should have varying depths and should include deep (1m) over-wintering areas as refuges for wildlife during severe winters.

Ponds and wetlands should be placed in developments so they are overlooked by housing and not hidden in an unseen corner. Alternatively, they can be located in larger areas of open space. This ensures the water features are a valued part of a development.

Wherever possible, the ponds or wetlands should be located away from artificial light sources as this will reduce the value of the feature to foraging bats. Like-wise, new lighting features should be avoided in close proximity to ponds.

There should be an assumption to retaining all existing native trees and vegetation. The layout of the ponds 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 Areas.

SUDS ponds should be overlooked by housing where possible, development in Elvetham Heath

The location of ponds in a development should be considered carefully in terms of biodiversity and connectivity to other areas. For example, if located next to a wildlife hazard such as a road it may be necessary to provide a route for wildlife to reach the pond. The design of fencing, if used, should allow access for wildlife below it.

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

Ponds and wetlands should be designed to prevent/discourage the introduction of unsuitable species such as fish and wildfowl into ponds or wetlands that are to support amphibians, particularly great crested newts. However, this and similar issues should be dealt with on a case by case basis.

Where a pond or wetland is intended to support nesting birds and/or waterfowl, islands should be provided to prevent foxes reaching nesting sites. The channel between the island and bank must be at least 3m clear width.

Shallow pond with gentle side slopes provides a safe feature with easy access for maintenance, Florida, USA

Planting

Providing there is no conflict with the SUDS operation the City Council will expect new ponds and wetlands to be planted to enhance biodiversity. Native species of local provenance will be favoured and should be appropriate for the individual conditions provided by each feature. Non-native species may be considered in the more formal or urban settings but care must be taken not to introduce invasive species to the pond or wetland system.

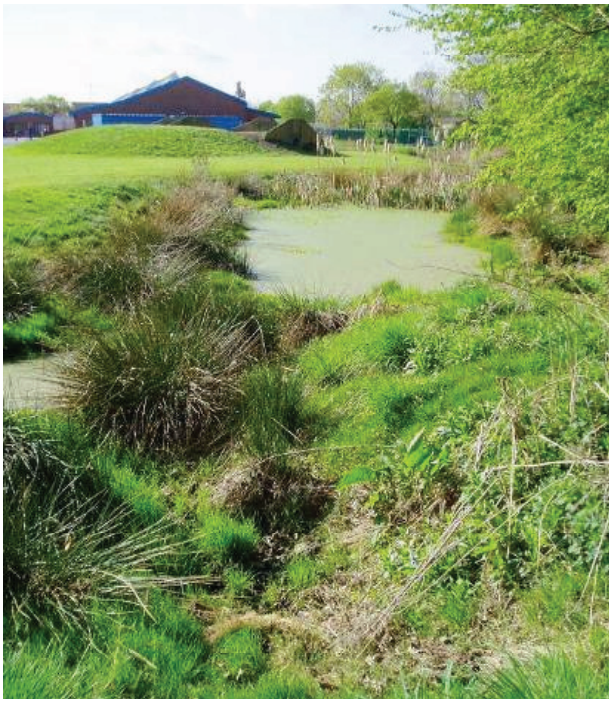
Were appropriate the species mix should aim to create habitats that contribute to local, regional and national Biodiversity Action Plan, which can be found at http://www.ukbap.org.uk/

Some ponds at the end of the system may lend themselves to natural colonisation, particularly if linking to existing wetlands or watercourses. The slow colonisation of these ponds can provide valuable successional habitats. However erosion during establishment of the vegetation needs to be carefully considered.

A planting list is provided at the end of this section

Practical issues and solutions

Many problems that have occurred with ponds are due to a lack of attention to detail during design and construction. Some of the most common pitfalls and solutions are discussed below. Good construction practice will mitigate these problems, reduce overall construction costs and ensure a smoother adoption process. CIRIA publication C698, Site Handbook for the Construction of SUDS also contains practical construction help and advice.



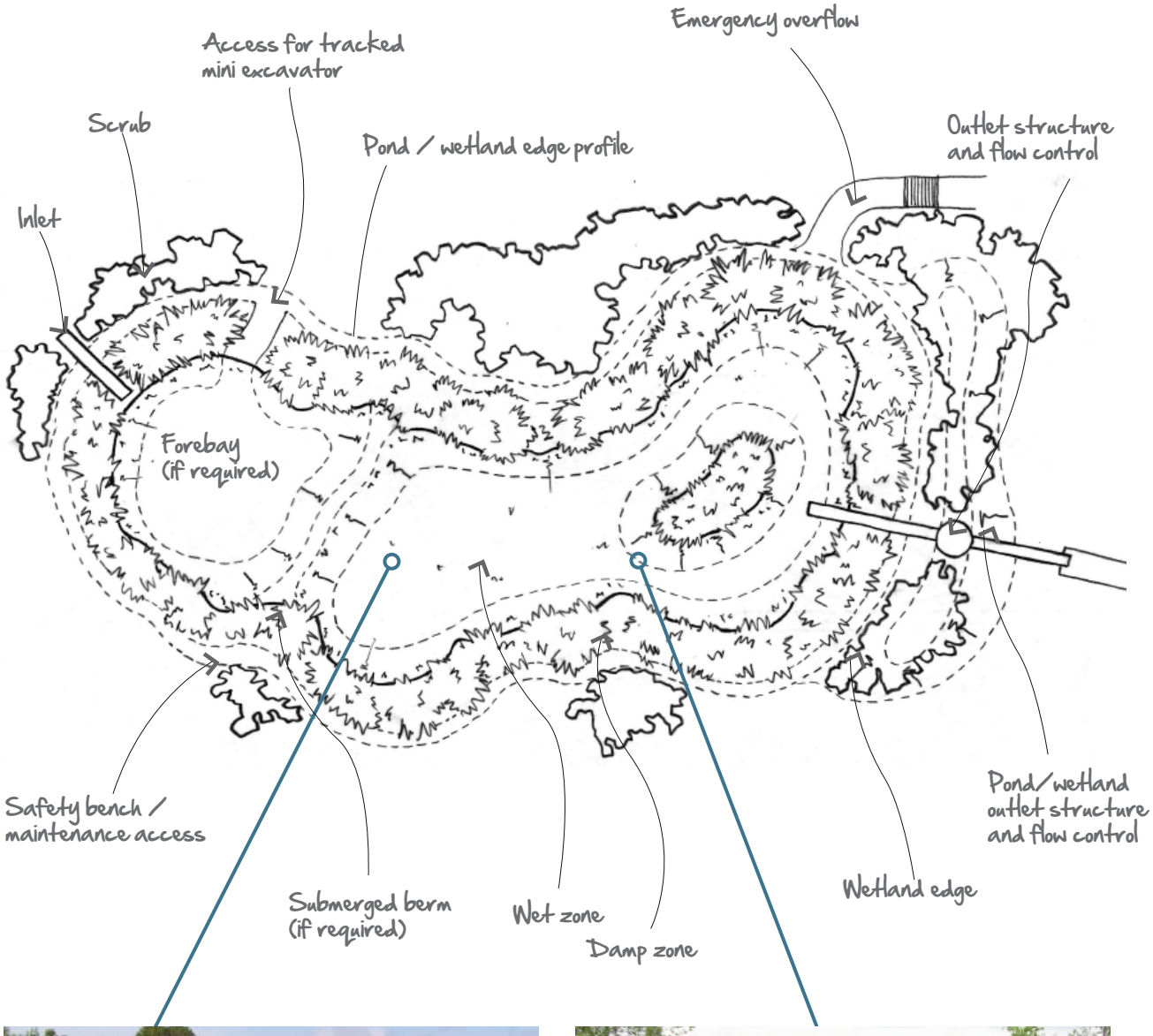
Algae in a SUDS pond is common in the first year or two after construction, Worcestershire

Silt in a pond during construction caused by erosion due to lack of topsoil and vegetation, motorway service area, M42

Turf used as erosion control in a pond, Worcestershire

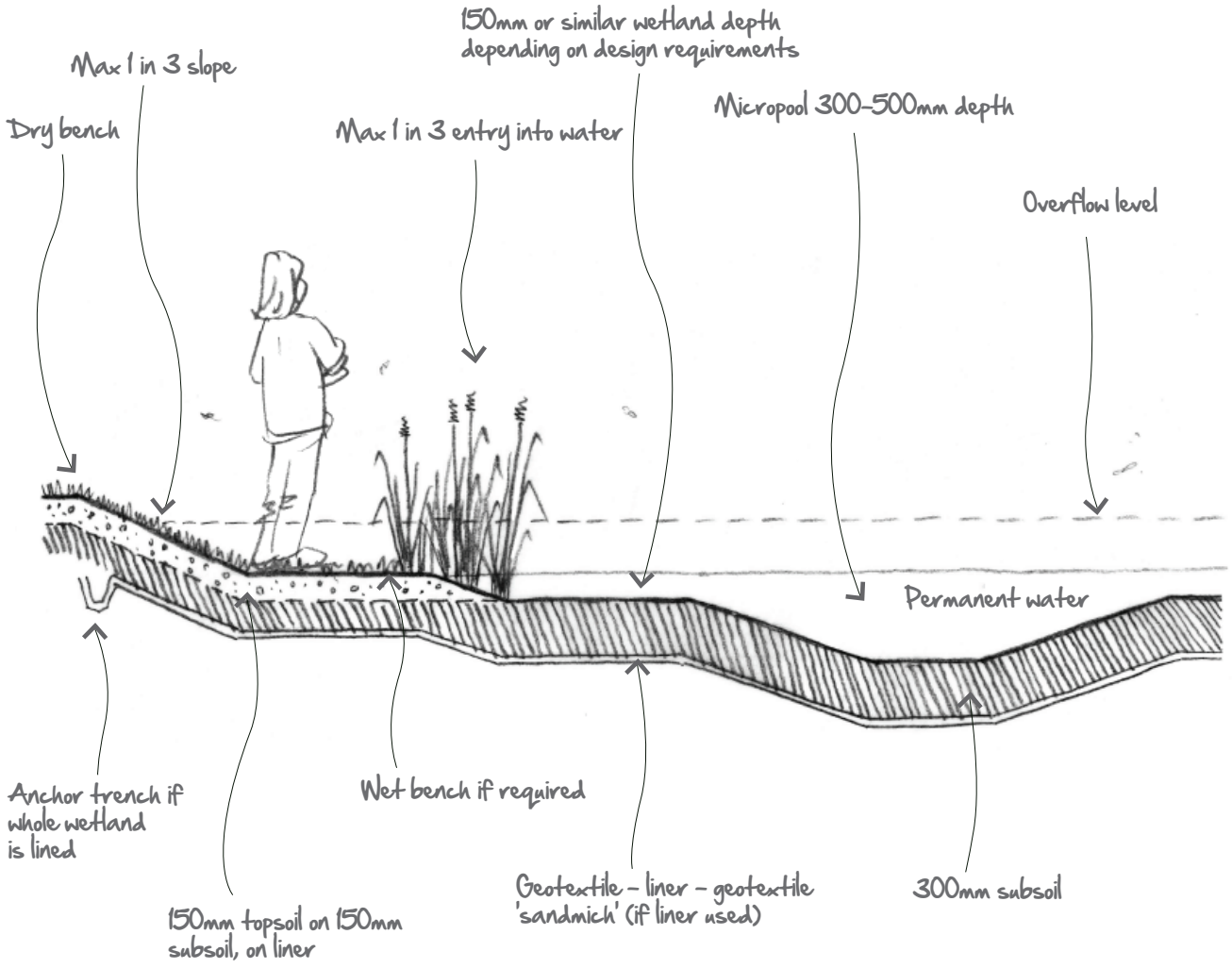
Practical issues and solutions

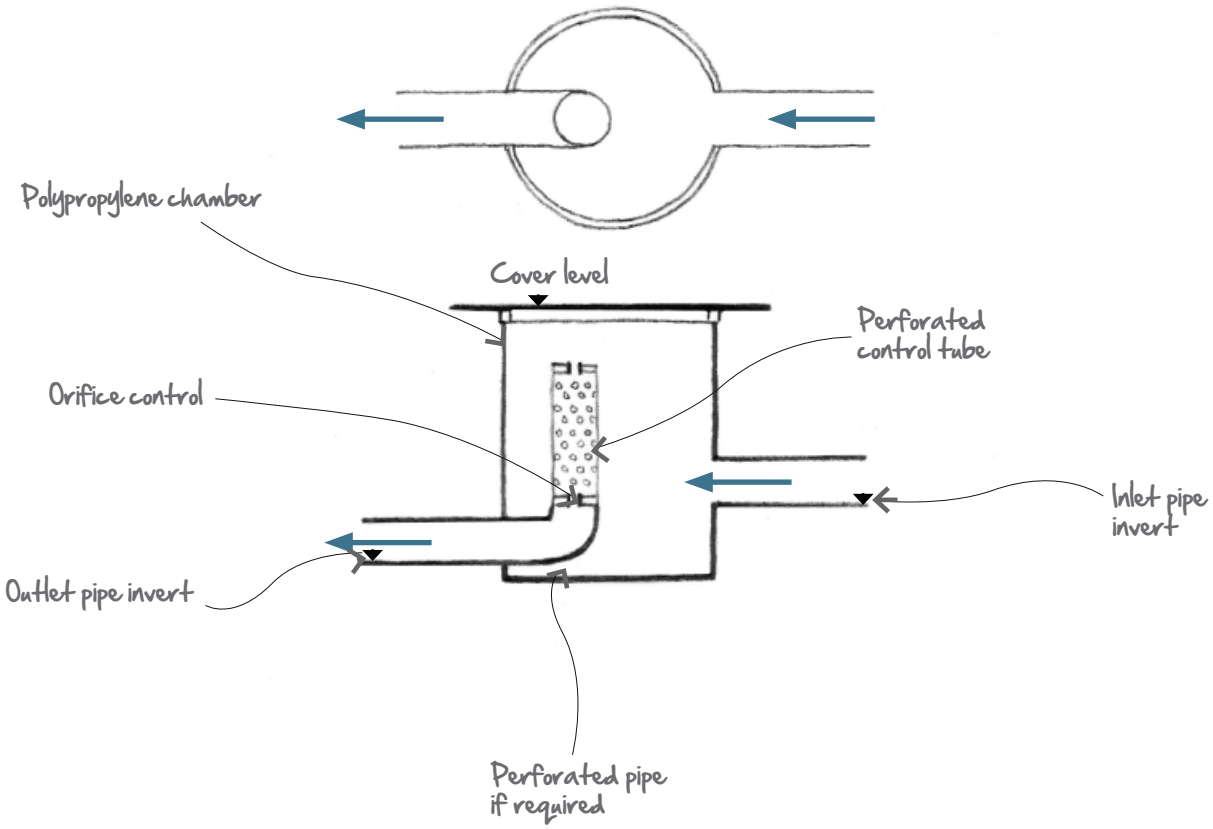
Problem: Silt build up during construction	**Solution:** Manage construction runoff and prevent it entering the pond by using straw bales or geotextile traps. If the pond is used to control construction runoff remove silt at end of project.
Problem: Erosion during construction before planting is established.	**Solution:** The easiest solution is to reuse topsoil without any application of weed killer. This allows existing vegetation in the topsoil to establish quickly. Another alternative is to use biodegradable erosion control mats.
Problem: Algal blooms in the water.	**Solution:** Avoid excessive use of fertiliser in surrounding landscape. However algal blooms are not uncommon as the pond establishes and will disappear in time.
Problem: Water is not retained in the pond.	**Solution:** Ensure that soils below the pond are suitable to retain water. If not provide a clay subsoil that is compacted correctly over base of pond or use a liner.
Problem: Pond liner exposed around edges of pond or wetland	**Solution:** Correct detailing and construction to ensure that liner has sufficient cover of stable soil at the edges (300mm minimum) and slopes do not exceed a gradient of 1:3; steeper slopes would encourage soil slippage.
Problem: Erosion at inlets. This is almost always a sign that source control is not provided upstream.	**Solution:** Water flows in to ponds and wetlands should normally be at low rates because source control has been provided upstream. The City Council will not adopt ponds or wetlands that do not have source control provision upstream.
Problem: Poor establishment of marginal plants due to over compaction of slide slopes and anaerobic conditions.	**Solution:** Correct construction to avoid excessive tracking of machinery. Subsoils should be ripped prior to topsoils being placed above.



SUDS pond in a public park designed for biodiversity with shallow side slopes and safety bench, Sheffield

SUDS pond/wetland in a motorway service area showing different zones, Hopwood Service Area, M42





Pond/wetland outlet structure and flow control

Maintenance requirements

Maintenance of ponds is relatively straight forward for landscape contractors and typically there is only a small amount of extra work required for a SUDS pond or wetland.

More intensive maintenance work such as silt and/or vegetation removal is only required intermittently, but it should be planned to be sympathetic to the requirements of wildlife in a pond. The best time to carry out more intensive work is between September and November when the impact on wildlife will be minimised (e.g. no newt breeding or young, ground nesting birds are not breeding, impact on water voles is less, etc.).

Intensive silt and vegetation removal should only be carried out to limited areas at any one time (25% to 30% of the pond area on one occasion each year). Again this is to minimise the impact on biodiversity.

Wherever possible the SUDS ponds and wetlands should be designed so that special machinery is not required to undertake maintenance.

The costs of maintenance can be found within Appendix B.

Managing wetland vegetation with a mini excavator. Larger excavators should not be necessary, motorway service area, M42

Planting list for SUDS ponds/ wetlands

The following species list is considered suitable for planting in Cambridge SUDs. This list should not be considered exhaustive and the exact choice should relate to site-specific conditions. Designs that aim to create a range of plant communities and habitats across a scheme are favourable.

Aquatics – submerged and floating, plant with weights, in permanently wet zone, equate to National Vegetation Communities, group A11

Potamogeton pectinatus (fennel pond weed)
Potamogeton natans (broad – leaved pond weed)
Myriophyllum spicatum (spiked water-milfoil)
Sparganium emersum (unbranched bur-reed)
Ranunculus circinatus (fan-leaved water-crowfoot)
Potamogeton lucens (shining pondweed)

Damp zone - inundation-tolerant, plant up to 250mm above anticipated normal water level as plugs in groups of 5-10Nr plants to create stands

Persicaria amphibia (amphibious bistort)
Caltha palustris (marsh marigold)
Phalaris arundinacea (reed canary grass)
Veronica beccabunga (brooklime)
Angelica sylvestris (wild angelica)
Lythrum salicaria (purple loosestrife)
Lotus uliginosus (greater bird's-foot trefoil)
Lycopus europaeus (gypsywort)
Myosotis scorpiodes / laxa-cespitosa (water forget-me-not)
Apium nodiflorum (fool's-water-cress)
Lychnis flos-cuculi (ragged robin)
Rumex hydrolapathum (water dock)
Mentha aquatica (water mint)
Cardamine pratensis (cuckoo flower)
Ranunculus flammula (lesser spearwort)
Juncus articulatus (jointed rush)
Carex pseudocyperus (hop sedge)
Stachys palustris (marsh woundwort)
Scrophularia auriculata (water figwort)

Wet zone – emergents, plant in 0-250mm of water, as plugs in groups of 5-10Nr. plants to create stands

Sparganium erectum (branched bur-reed)
Typha angustifolia (lesser bulrush)
Schoenoplectus lacustris (common clubrush)
Iris pseudacorus (yellow flag iris)
Glyceria fluitans (flote-grass)
Carex acutiformis (pond sedge)
Alisma plantago-aquatica (water-plantain)
Glyceria maxima (reed sweet-grass)
Veronica scutellata (marsh speedwell)

Dry zone - plant on upper slopes and bank-top as seed, at the following % cover

Festuca rubra (red fescue)
Anthoxanthum odoratum (sweet vernal grass)
Cynosurus cristatus (crested dogtail)
Briza media (quaking grass)
Deschampsia caespitosa (tufted hair grass)
Prunella vulgaris (selfheal)
Rhinanthus minor (yellow rattle)
Filipendula ulmaria (meadow sweet)
Lathyrus pratensis (meadow vetch)
Lotus corniculatus (common birdsfoot trefoil)
Carex hirta (hairy sedge)
Centaurea nigra (black knapweed)
Plantago lanceolata (ribwort plantain)
Potentilla anserina (silverweed)
Rumex acetosa (common sorrel)