

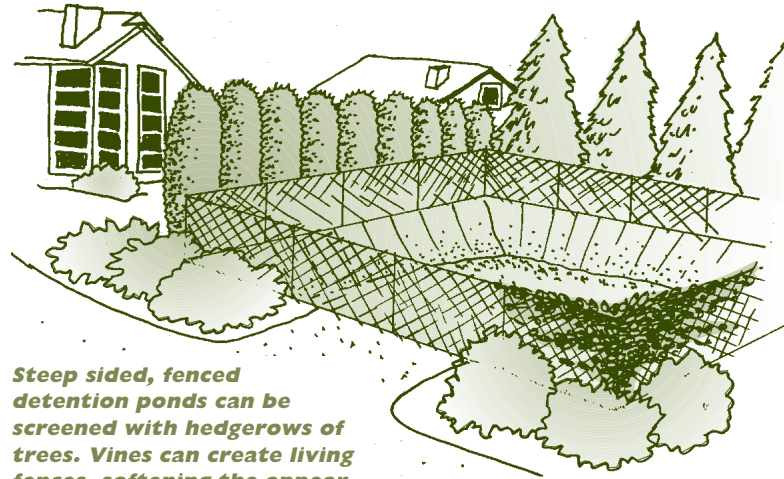
## FOCUSING ON ENHANCEMENT

### Techniques that Work

The visual appearance of most detention ponds can be improved in three ways: by screening, by visual and/or functional integration and by enhanced maintenance.

### Screening

Screening, using fences, hedges or hedgerows (trees) is perhaps the easiest way to amend a detention pond's necessarily bare appearance. However, if not handled carefully, trying to hide something can make it that much more visible. Since our eyes



**Steep sided, fenced detention ponds can be screened with hedgerows of trees. Vines can create living fences, softening the appearance of the fence and its corners.**

pass over the common and focus on the unusual, it would be best to integrate with features and vegetation used elsewhere in the immediate vicinity.

Various kinds of wooden fencing will certainly screen the pond from view, but such fencing cannot be maintained

with current County funding and must be the responsibility of the community, neighbor, or homeowner's association. With the advent of recycled plastic wood, it is now possible to install fencing that never needs painting or replacement and does not rot. Solid screening can tend to close and segregate the pond area off from the rest of the neighborhood. Open lattice fencing allows light to pass through, better integrating

the site, and providing a fine support for vines or shrubs.

More creative approaches to fencing could involve artwork by community members or art professionals. Such work has been done to some power transfer stations like the one on Western Avenue and Union Street in downtown Seattle.

Unattractive cyclone fences will be less visible if coated with black vinyl (green vinyl is more noticeable than black). Also, they can be made into living fences by planting shrubs or vines around their perimeters.

Vines like Boston ivy, grapes, kiwi, akebia and evergreen clematis make good living fences. Avoid English ivy (*Hedera helix*) – it has become a noxious weed, choking out native flora. Even dwarf fruit trees and crab apples can be espaliered onto a fence (pruned

**This simple white fence and foreground tree distracts the eye enough that the detention pond depression behind it virtually disappears.**



**This attractive pond edge is planted with pyramidalis.**



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## SOME SHRUBS OR VINES FOR LIVING FENCES

- barberries (*Berberis darwinii* and *B. veruculosa*)
- camelia (*Camelia sasanqua*)
- quince (*Chenomeles*)
- cotoneaster (*Cotoneaster horizontalis*, *C. simonsii*)
- forsythia (*Forsythia suspensa sieboldii*)
- winter jasmine (*Jasminum nudiflorum*)
- euonymous (*Euonymous fortunei*)
- bittersweet (*Celastrus orbiculatus*)
- Russian vine (*Polygonum*)

and tied in a flat, layered pattern), bearing flowers in spring and fruit in the fall. In areas with some shade and access to water, the climbing hydrangea makes an incomparable living fence. All living fences require some annual pruning, summer watering and “TLC.”

Hedges make good screens. Rows of trees (hedgerows) will screen ponds from upper story

windows. Pines, firs, cedars, spruce and evergreen magnolia make good evergreen choices. Of the deciduous trees, small leafed varieties would be best: locusts, ashes and elms. Avoid trees with invasive root systems like aspen and willow. Likewise, avoid those that grow too fast and tall and which could blow over easily like cottonwood, white poplar and alder. When



**This dwarf apple tree has been attractively espaliered onto a wire fence but requires careful maintenance.**

thorned hedges such as holly, rosa rugosa or barberry are well enough established that no one can easily penetrate them,

cyclone fences behind them may be removed.

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## SOME PLANTS THAT MAKE GOOD HEDGES

- english laurel
- photinia
- yew
- arbor-vitae
- hemlock
- western red cedar
- hornbeam (*Carpinus*)
- hawthorn (*Crataegus*)
- cypress (*Cupressocyparis*)
- beech (*Fagus*)
- holly (*Ilex*)
- California wax myrtle (*Myrica californica*)
- privet (*Ligustrum*)

### Flowering Hedges

- barberry (*Berberis stenophylla*)
- escallonia (*Escallonia macrantha*)
- roses (*rugosas*, shrub and *floribundas*)
- spiraea (*Spiraea vanhouttei*)

**A conifer hedge screens this large pond and adds visual support to the tall fir tree. Under today's standards the cyclone fence would be largely unnecessary and the shallow pond bottom could be put to additional use as a playfield.**



## LANDSCAPE REQUIREMENTS IN THE DESIGN MANUAL

If stormwater ponds are landscaped, some criteria need to be met in order to ensure that the pond's engineering function is protected and that maintenance is not made more difficult. Some criteria restrict planting in certain areas and some address how the planting itself should be designed and installed.

### Where not to landscape

- ▶ Within 10 feet of inlet or outlet pipes or other manmade structures such as spillways
- ▶ On berms that impound water and are over four feet high

### Where landscaping is restricted

- ▶ On berms that impound water but are **less** than four feet tall, only small trees or shrubs that have fibrous roots may be planted. Some examples are red-twig dogwood (*Cornus stolonifera*), filbert (*Corylus cornuta*), highbush cranberry (*Vaccinium*

*opulus*) and strawberry tree (*Arbutus unedo*) and fruit trees on dwarf root stock.

- ▶ In open space tracts set aside under the four-to-one program, "natural appearing" plantings are required. The open woodland or Northwest savannah styles discussed below (next page) are generally considered to produce natural appearing landscapes. Native species are preferred but not required.
- ▶ Set trees well back from the water to prevent leaf-fall into the pond.

### Landscaping criteria

- ▶ Use good soil. Amend native soil with well-rotted compost tilled into the subgrade.

- ▶ Plant in clumps or "landscape islands" rather than rows.
- ▶ Ensure that there is enough space between plantings and structures to allow room for an industrial mower to maneuver. A minimum of six feet is needed for the mower.
- ▶ Use trees that produce little leaf-fall (evergreen trees, Oregon ash, locust, etc.).
- ▶ Use drought tolerant species.

### Recommended landscape styles

1. *Open woodland.* Plant trees and shrubs grouped in island-like clusters underplanted

with shade-tolerant groundcovers. About 30 percent or more of the site should be covered with these "islands." Place the treed islands at several elevations rather than "ringing" the pond. Some islands may have lower shrubs or just groundcover to increase variety.

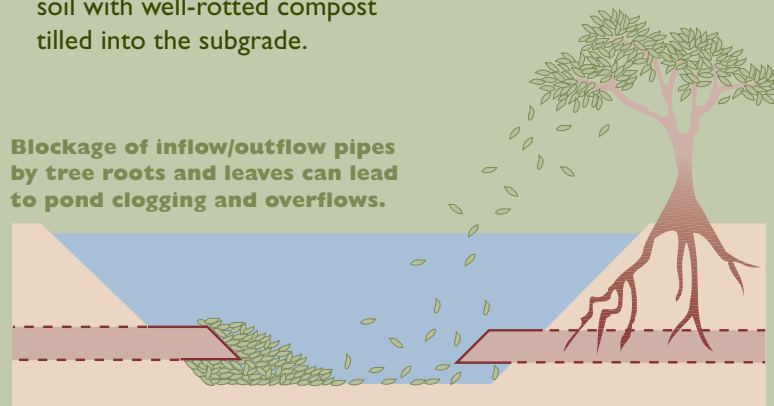
2. *Northwest savannah.* Again, evergreen landscape islands or clusters should be used and should cover at least 10 percent of the site. The remainder of the area should be planted with grass or a grass/wildflower mix. Dwarf grasses are preferred.

One useful dwarf grass mix is given below:

- dwarf tall fescue 40% (by weight)
- dwarf perennial rye "Barclay" 30%
- red fescue 25%
- colonial bentgrass 5%

Wildflowers can be substituted for dwarf perennial rye on a 1:1 basis.

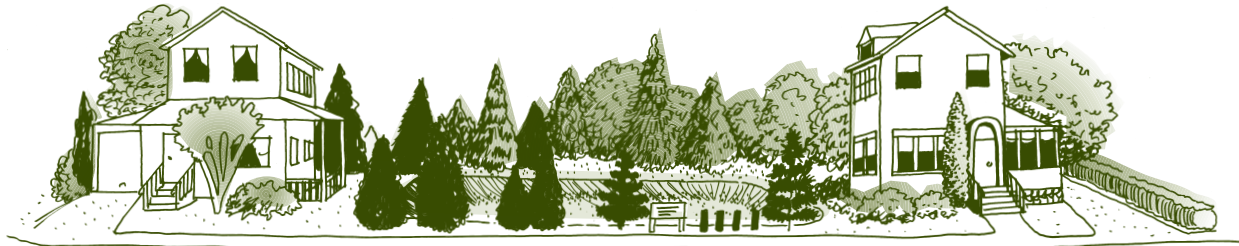
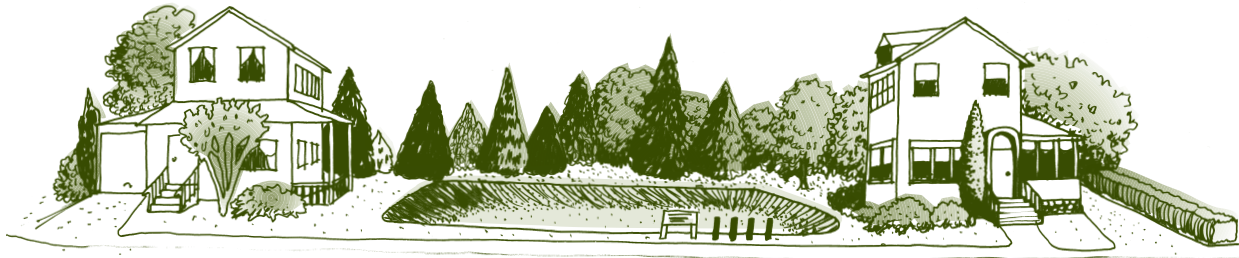
**Blockage of inflow/outflow pipes by tree roots and leaves can lead to pond clogging and overflows.**



## Visual Integration

Visually integrating ponds into the neighborhood or community environment offers the most rewards to the surrounding community. Apart from functional considerations, visual integration is most easily accomplished by using appropriate planting styles in the area surrounding the pond. For instance, a pond in a very manicured housing development might reflect a more refined appearance and use clusters of low-maintenance plantings on its perimeter.

Because ground covers tend to look more cultivated than a rarely mowed, grassy edge, they can help a pond appear more integrated with a well tended



*This shows a comparison of two ponds, one with trees in front, one without.*

neighborhood landscape. In two years, a handsome ground cover can be established on pond perimeters and may rarely need mowing or weeding. In

most cases, ground covers located outside the pond storage area must be drought tolerant and mulched with wood chips to prevent grasses from invading.

Developments in more rural settings might use what could be called the “Northwest Savannah” style, a meadow-like grassland punctuated with

**The entrance to this detention pond adjoins the entrance to the community and is well maintained. In the detention pond itself a basketball court has been installed.**



**A ground cover of vinca surmounted by a hedge of pyramidalis makes an attractive planting on the inside or outside of a berm or cut slope.**



clusters of evergreen conifers. This style is pleasant to look at and appears to be a genuine and natural part of the north-west landscape. Many ponds inadvertently become grassy meadows anyway but lack the large evergreens which complete the picture. The trick to making it work is to include at least one foreground tree that visually links to similar background trees. The pond will seem to disappear. This simple configuration of evergreens could improve the look of many a pond.

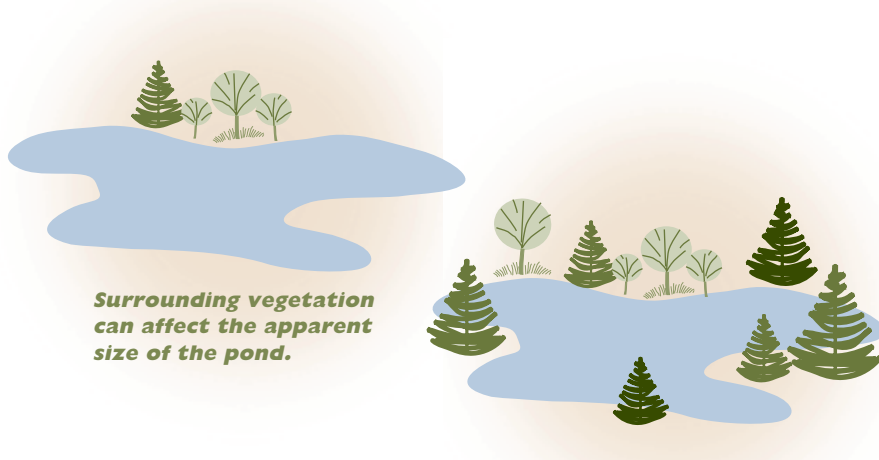
Ponds built adjacent to existing forests, wetlands, or ravines could also appear better integrated by the addition of some native plantings on their

perimeters. It might be better to use native plants that can tolerate some droughty exposures, such as kinnikinnick, Nootka rose (*Rosa nootkana*), common juniper (*Juniperus communis*) and shore pine (*Pinus contorta contorta*); and species such as mock orange (*Philadelphus lewisii*), ocean spray (*Holodiscus discolor*), oregon grape (*Mahonia sp.*), blue elderberry and snowberry. A good guide to such plants can be found in *Wetland Plants of King County and Puget Sound Lowlands* and the *Native Plant Guide*, both prepared by King County. For these and other resources, call the WLR Division at (206) 296-6519.

### Alternative Ground Covers and Erosion Control

Most ponds are built as quickly as possible, then immediately hydro-seeded to prevent erosion. Very little study or consideration has been given to alternative materials, seed mixes or plant choices. The use of a heavy mulch of wood chips held with jute on the pond perimeter, as now allowed by the Surface Water Design Manual, can inhibit weeds until clumps of native plants can mature. The wood chips eliminate the need to mow, which might otherwise claim the natives as well as the weeds.

Grasses are often used in and around ponds because they are easy to maintain, do not interfere with the function of the pond and establish quickly. A mix of seeds is useful as some grasses will do better at different altitudes along the pond slope. As an alternative to hydro-seed, a striking “meadow” look could be achieved using blue oat grass (*Helictotrichon sempervirens*). It grows about two feet tall and wide, is extremely drought tolerant and rarely needs mowing or weed eating. Planted two to three feet apart, it forms a dense, silver blue ground cover with which few



**The 6th Ave. “habitat style” detention pond (case study E) uses landscape architect Peggy Gaynor’s method of spreading wood chips, planting with natives and leaving preexisting native foliage to inoculate the disturbed area.**



weeds can compete. Maintenance consists of annual “pulls” – reaching into the clump and pulling out the dead straw. This straw, when broken up, becomes a choice slug barrier around strawberries and other slug targets. Blue fescue (*Festuca cenerea*) or Mexican feather grass (*Stipa tenuissima*) could also be used to create a low growing meadow.

Bent grass (*Agrostis tenuis*) has the distinction of being low growing, drought tolerant and capable of being inundated by water for long periods. Since it tends to bend over and lay on itself it rarely appears to need mowing.

There are some native perennial grasses which, once established, form a dense cover that would need little or no mowing and which usually grow less than two feet tall. These include: red fescue, including creeping red, chewings, and hard fescue (*Festuca rubra*), and sheeps fescue (*Festuca tenuifolia*). An ecology lawn mix has been developed by Oregon State University that blends low, slow growing fine fescues with clovers, wildflowers and herbs. For more information see Stevie Daniel’s book: *The Wild Lawn Handbook*<sup>3</sup> which describes many alternative planting styles and provides resource lists.

**At Meadowbrook wetland (case study E) these sedges completely surround the small pond and require no care once established.**



**A ground cover of native kinnikinnik interspersed with fir trees does need to be weeded from time to time but provides an attractive and drought tolerant cover.**

#### Drought tolerant ground covers

These would work well in the Northwest: St. John’s wort (*Hypericum sempervirens*), sedum (*Sedum sarmentosum*), creeping myoporum (*Myoporum parvifolium*), dwarf fleecy-flower (*Polygonum cuspidatum compactum*), low-growing cultivars of ice plant (*Lampranthus spp.*), lamb’s ears (*Lantana*), and African trailing daisy (*Osteospermum spp.*). Perhaps several could be mixed, letting the fittest survive. Ground covers requiring some

water would include periwinkles (*Vinca minor* and *major*), bugle weed (*Ajuga reptans*), candytuft (*Iberis sempervirens*), and snow-in-summer (*Cerastium tomentosum*).

#### Low growing shrubs and plants

Low growing shrubs, herbs and creeping perennials also make good ground covers either in mixed or solid plantings. One promising mix includes: “snow-in-summer in a blend with blue gama grass

(*Bouteloua gracilis*) accented with several penstemons (*Penstemon pinnifolius*, *P. strictus*, and *P. ambiguus*) and yarrow (*Achillea taget*) ‘Moonshine’.”<sup>4</sup>

Some drought tolerant shrubs include: rosemary (*Rosmarinus officinalis*), juniper species (prostrate and spreading varieties), sageleaf rockrose (*Cistus salviifolius*), artemesia (‘Powis Castle’), senecio (‘Sunshine’), grey and green santolina (*Santolina chamaecyparissus* and *S. virens*), and French and Spanish Lavender (*Lavandula dentata* and *L. stoechas*). The heath and heather families (*Calluna* and *Erica*) also make excellent ground covers combined with dwarf conifers. Low growing junipers make thick, drought-tolerant ground covers but must be weeded occasionally.

It must be remembered that most ponds are constructed using the native soil substrate which is usually inorganic

glacial till or hard clay. While this makes for strong embankments it does not grow healthy plants. Depending on what plants are specified, organic soil amendments must be included in the pond design if plants are to succeed. According to Design Manual requirements, if the topsoil does not have an organic content of 7 to 10 percent, at least two inches of compost should be tilled into the planting area to a depth of at least six inches. Organic content results in faster, fuller growth of most ground covers. Standard landscape installation guidelines should be followed for staking, mulching and planting trees.

### **Functional Integration**

With urban and suburban densities increasing, quality open space can be a real, functioning value in a community. Ponds designed with attractively planted edges, gentle slopes or irregular shapes

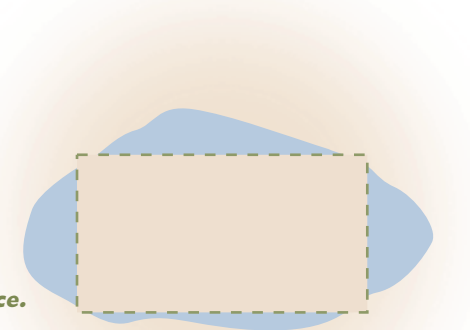
serve well as open space or even as recreational amenities. Ponds built on the edges of wetlands, streams, recreational space or natural green belts, can extend the sense of open space these areas create. Sport courts in the bottom of mostly dry detention ponds might also better integrate the pond into the life of the community.

It is sometimes difficult for a developer of new properties to anticipate the eventual character of the neighborhood that will surround a pond. But, as less land is available for new development, the only alternative will be re-development. In this case the design of the pond and its edges will better be able to respond to the established character and possible needs of a community.

Native plants are not always appropriate for every pond, nor do ponds necessarily have to be naturalistic. ***As long as the pond performs its design function there is no reason it can't reflect more urban forms, such as public fountains, reflecting pools and recirculating cascades.***

Plants are not the only way to better integrate ponds into neighborhoods. Both new materials and new uses for old materials can provide creative solutions to old problems. Instead of unattractive, rugged rock and gravel access roads, a product called “grass crete” (and similar products) could be used on the top surface over a gravel substrate. “Grass crete” is a system of concrete pavers

***A pond may be excavated in a rectangular form, then graded to create a more natural appearance.***





**This pond serves as a putting green, basketball court and tennis court giving the adjacent house the appearance of being a large estate.**

with a lattice construction which allows grass to grow in the spaces. When needed, maintenance equipment can be driven over it. A similar product is produced in recycled plastic.

Another new product – using recycled plastic lumber – is

available as a substitute for wood; plastic timbers can be used as fence posts, sign posts, and retaining walls, never rotting or needing replacement. Various interlocking concrete retaining wall blocks are also now available. For further information regarding the uses

**These large water quality ponds were placed on either side of the extended entry road into this community lending a pastoral and exclusive quality to the whole community.**



of recycled products in general, call the King County Commission for Marketing Recycled Materials at (206) 296-4439.

### ***Designing for Maintenance***

There is no doubt that maintenance is the single most important determinant of proper pond operation, allowable variances and overall pond appearance. Understanding maintenance is essential to creating appropriate planting and functional design. All ponds are under the care of the original developer or association for two years after construction. After this time, the County begins its standard mowing maintenance of

residential ponds – currently one mowing per year. The County has no funding for ongoing weeding maintenance. Homeowners' associations can, and occasionally do, perform a higher, more ornamental level of maintenance. Some communities even request a non-mowing regimen, preferring the pond to look natural and support wildlife habitat. Ponds could certainly be planted with low maintenance ground covers, punctuated with shrubs, trees and paths or trails as long as the community is willing to establish and care for them. Almost any ground cover – including grass – will need

**This detention pond at Bellevue Botanical Gardens has been designed to double as an elaborate Japanese garden. While the maintenance regime is high, the reward to visitors is pure delight.**

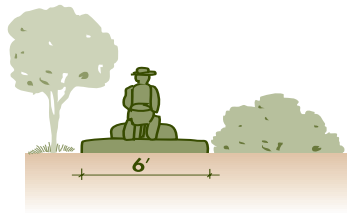




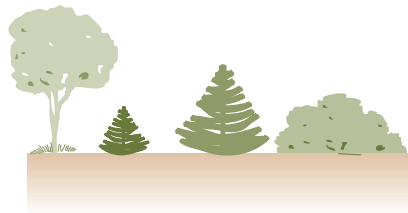
some light annual weeding and watering if it is to look good.

***Pond planting designs that do not consider the minimal maintenance regimes provided by the County or the kind of mowing equipment used cannot be easily maintained.*** From an analysis of maintenance practices, here are some guidelines that should help the designer create maintainable ponds:

- ▶ Build side slopes and berms no steeper than 40% or standard riding mowers won't function.
- ▶ Allow six feet of mowable area between ornamental tree and shrub areas since mowers are six feet wide. Randomly scattered plantings with less than six feet between them



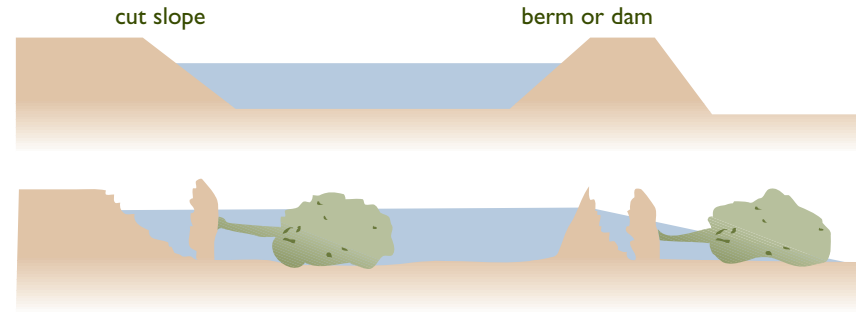
***For mowing maintenance, plantings should be kept six feet apart.***



***Scattered plantings prevent mowing maintenance.***

cannot be mowed and will ultimately be removed.

- ▶ Cluster plantings so that mowing could happen around clusters but not necessarily within them.
- ▶ Assure watering from the homeowners' association if non-drought tolerant perennials, trees, shrubs or vines are part of the design. Without summer irrigation these plants will not survive.
- ▶ Avoid planting perennials where committed care is not guaranteed. Although trees and shrubs may be able to survive the mower, perennials will look like meadow weeds and be mowed also.
- ▶ Provide ongoing maintenance to keep weeds at bay until any ground covers or



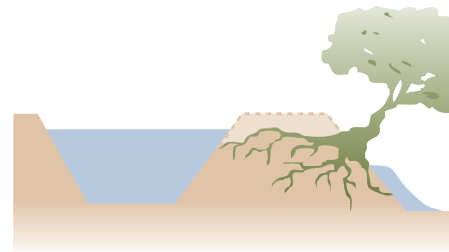
***Blowdowns on cut slopes pose little threat.***

***Blowdowns to plantings on berms can lead to failure of the dam and disaster.***

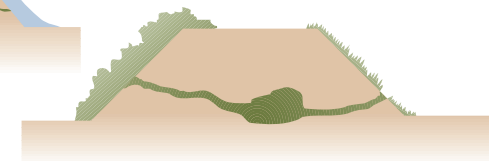
- ▶ cluster plantings become well established.
- ▶ Avoid planting deciduous trees and shrubs within the pond area as their falling leaves will fill the pond, clog drainage and smother out grasses and other ground covers.

- ▶ Do not plant trees on steep slopes or berms – in order to prevent damage from blowdowns.

Ponds are mowed for two reasons: because most neighborhoods request it and because larger weeds and trees will invariably invade, mature, be difficult to eradicate



***“Piping” of water along living or dead roots to the embankment surface can potentially cause dam failure.***



***Berms planted with thick, shrubby ground cover can mask rodent activity that could weaken the berm and lead to dam failure. In this case, planting with grasses is preferable. (Planting on cut slopes poses no such threat – see diagram above.)***



**This six foot wide riding mower is typical of the mowers used to maintain stormwater ponds.**

and eventually limit water storage. In the few County ponds that are not mowed, when sediment and plant mass begin to inhibit pond functioning, they are removed. Some of the most attractive stormwater facilities are perhaps the old, forgotten, overgrown or “retired” sites which resemble natural wetlands and require little or no maintenance. These ponds may or may not function as designed, however.

There is no reason why a pond can't be specifically designed to develop into a wetland dominated by those natives so nicely adapted to typical stormwater pond microclimates: willow, alder, cattail and emergents – as long as there is still sufficient storage at plant maturity and as long as inlet and outlet function without fail (see Peggy Gaynor case studies). This should not be attempted if significant siltation will reduce the designed storage. Nor should it be attempted when ponds are built with berms. These may not have trees growing on their slopes as roots may act as water conduits during extreme retention events leading to possible blow-outs in the pond embankment.

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## A QUALITY FUTURE

### *Unresolved Issues*

This booklet has been prepared during a time of transition for both the Surface Water Design Manual and for the County agencies which enforce it. Public/private partnerships are being explored. Maintenance costs and procedures are being reexamined. These efforts are a result of the County's Growth Management Initiative called “Smartgrowth”.

It is also a time of change for the development community. The urban growth boundary compels decreasing new development and increasing redevelopment and densification strategies. Both public and private sectors are learning to listen to the voter/consumer who increasingly opts for policies and choices that enhance quality of life and guarantee resource protection. Individual communities are learning to provide enhanced

maintenance above that which public and commercial entities are able to provide.

In the production of this booklet many individuals have had input – engineers, landscape architects, developers, builders, students, homeowners, resource managers, ecologists, horticulturalists. A wide variety of opinion exists between these thoughtful contributors on all the issues covered here. Many have asked questions or made suggestions for which we have no current answers or solutions. The County hopes to eventually address these and other questions while keeping an open ear to further innovation. Patience, persistent dialogue, and creative exploration will make this possible.

### *Quality Environments*

Less than five percent of the world's water is fresh.



**Detention ponds don't have to be ugly. At Providence Point this detention pond with its stunning fountain, well manicured grounds and walking trails is the jewel of the community.**

Stormwater is not wastewater, it is a *resource* – as potential ground water, as unpolluted water, as habitat, as amenity. We have learned the fundamentals of managing stormwater

but it is time to finesse this process. One of the definitions of “sophisticated” is: refined complexity. There is no doubt that the issues surrounding ponds are a complex web of interrelated parts: their engi-

**This is a water quality pond we can all live with.**



neering, their maintenance, their cost, their appearance, their place in our communities. There is no doubt, also, that we are learning as we go, through feedback, better modeling methods and the “cross-fertilization” of science, skill and art. *It is clear that we already know enough to create truly sophisticated, multi-functional, attractive and well integrated ponds; all of which help create a quality urban environment.* Some of the case studies outlined in this booklet are good examples. Future innovations will lead to better improvements.

In the realm of stormwater management, we hope this booklet is a productive step in the direction of healthy collaboration. Public and private participants must have both the vision and the willingness to work in concert to create state-of-the-art pond designs that protect the environment, benefit the investor, and provide needed amenities for communities. This efficiency is

achievable and has begun. The Water and Land Resources Division invites ongoing constructive comment and effective innovation and will be working to provide opportunities and flexibility for both.

For questions regarding the design and enhancement of stormwater ponds, call the Water and Land Resource Division's local drainage services unit at (206) 296-1900.

For questions regarding variances or adjustments to design criteria, call the Department of Development and Environmental Services at (206) 296-6600.

For special use permits (adding sculptures or play equipment to ponds) call King County Real Property at (206) 296-0887.