Chapter 14
Landscaping guidance for stormwater practices

14.1 Introduction

Landscaping is critical to improving both the function and appearance of stormwater management practices. It has aesthetic, ecological and economic value that is often not recognised during site design and construction. In almost all cases, compliance with regulatory requirements is the key driver and the issue of how a stormwater practice fits into the local landscape can be overlooked.

Moreover, where the initial developer is not the eventual property owner, there may not be a long term interest in landscaping.

Where the local territorial authority assumes the maintenance responsibility for the practice and/or becomes the owner of the practice, landscaping issues must become a standard asset management cost in the Council's financial plans.

If the practice is considered an eyesore, property values will go down and the general public response to stormwater management will be negative. The stormwater practice must be an integral part of the development and given the same landscape attention as other parts of the site.

Plate 14-1: Example of a stormwater pond with little attention given to landscaping

14.2 Objective

The objectives of landscaping stormwater management practices are to:

- improve their aesthetics
- improve their water quality and ecological function
- increase the economic value of the site

A good landscape plan will consider all three objective. This means involving a professional landscape architect with experience in natural system design.

Considerations include:

- site soils
- slopes
- hydrologic conditions
- water quality/ecological benefits.

The following discussion expands on the three objectives.

14.2.1 Improve the aesthetic appeal of stormwater practices

Aesthetics is a subjective yet very important aspect of everyday life. It is a concept that is difficult to define quantitatively. Something that is good aesthetically tends to be considered tasteful, pleasing, appropriate and fitting for its location. Tastes differ, and disagreement about what is aesthetic is common. The goal of this section is to ensure that stormwater practices are designed as an asset to the property owner and to the overall community.

14.2.2 Improve the water quality and ecological function of the practices

Attention to landscaping as a component of a stormwater management practice can have a significant positive effect on water quality and ecological function. Shading of practices can reduce thermal impacts on receiving systems. Vegetated buffer zones (woody or grassed) can reduce sediment entry, and natural vegetation promotes local ecological diversity.

Landscaping plans should consider:

- chemical use reduction
- contaminant source reduction
- impervious surface mitigation.

Projects should be designed to minimise the need for toxic or potentially contaminating materials such as herbicides, pesticides, and fertilisers within the stormwater management practice area.

Materials that could leach contaminants or pose a hazard to people or wildlife should not be used as components of a stormwater practice (examples can include chemically treated wood or galvanised metals).

Good landscaping can also reduce impacts of impervious surfaces by incorporating swales by paths and accessways.

14.2.3 Increase the economic value of the site

A number of studies demonstrate the economic benefits of properly landscaped stormwater systems:

- study in Maryland in the U.S. found that properly designed stormwater management ponds increased adjacent property values by 10 - 15 %
- the U.S. EPA's literature review of the impacts of urban runoff ponds on property values is available on EPA's website at www.epa.gov/OWOW/NPS/runoff.html
- City of Christchurch has been engaged in natural stream restoration and has identified significant monetary benefit to property values for properties abutting the restored stream channels

14.3 Use of native species

This stormwater management manual encourages the use of native plants in stormwater management practices, where they are appropriate. Native plants are defined as those species found in the Auckland Region before European migration.

Native species have distinct genetic advantages over non-native species for planting. As they have evolved here naturally, indigenous plants are best suited for our local climate. This translates into greater survivorship when planted and less replacement and maintenance during the life of a stormwater management practice. Both of these attributes provide cost savings for the practice owner.

People often plant exotic species for their ornamental value. While it is important to have aesthetic stormwa-

ter management practices for public acceptance and the maintenance of property value, it is not necessary to introduce foreign species for this purpose. There are a number of native species that are aesthetically pleasing and can be used as ornaments.

14.4 General landscape guidance for all stormwater practices

there are several components of a landscape plan. They should be considered individually and together to ensure implementation of a successful landscape plan. The components include the following:

- stormwater practice area
- landscape screening
- soils
- site preparation
- planting
- general guidance

Plate 14-2: Stormwater management pond with significant landscaping

14.4.1 Stormwater practice area

The practice area includes the stormwater management practice itself, maintenance accessways, fencing and a minimum buffer around these elements. The buffer ensures that adequate space is available for landscaping. Other site elements can be located within the buffer if the need arises. The landscape plan should designate the practice and buffer area.

14.4.2 Landscape screening

Practice elements such as chain link fences, concrete headwalls, outfall pipes, riprap, gabions, steel grates, steep side slopes, manhole covers, and so on. can be screened from general public view with plant materials. Landscape screens of shrubs and trees could have a significant beneficial effect on public perception if used effectively.

14.4.3 Soils

It is necessary to test the soil in which you are about to plant in order to determine the following:

- pH
- major soil nutrients
- minerals
- seasonal wetness and water-retention capacity

The soil samples should be analysed by a qualified professional who will explain the results and their implications for plant selection.

14.4.4 Site preparation

Construction areas are often compacted, so that seeds wash off the soil and roots cannot penetrate it. No material storage or heavy equipment should be allowed in the stormwater practice or buffer area after site clearing has been completed, except to excavate and grade the stormwater management area. All construction and other debris must be removed before topsoil is placed.

For planting success, soils should be loosened to a depth of approximately 150mm. Hard clay soils will require disking to a deeper depth. The soil should be loosened regardless of the ground cover. This will improve seed contact with the soil, increase germination rates and allow the roots to penetrate the soil.

Providing good growing conditions can prevent poor vegetative cover. This saves money as vegetation will not need to be replanted.

14.4.5 Planting

In selecting plants, consider their desired function in the landscape. Is the plant needed as ground cover, soil stabiliser or a source of shade? Will the plant be placed to frame a view, create a focus or provide an accent? Does the adjacent use provide conflicts or potential problems and require a barrier, screen, or buffer? Nearly every plant and plant location should be provided to serve some function in addition to any aesthetic appeal.

Certain plant characteristics are obvious but may be overlooked in the plant selection, especially:

- size
- shape

Tree limbs, after several years, can affect power lines. A wide growing shrub may block an important line of sight to oncoming vehicular traffic. A small tree, when full grown, could block views. Consider how these characteristics can work today and in the future.

It is critical that selected plant materials are appropriate for soil, hydrological conditions and other practice and site conditions. More information on adequacy of specific plant species is provided in the individual practice chapters.

14.4.6 General guidance

- Trees, shrubs, and any type of woody vegetation are not allowed on a dam embankment.
- Check water tolerances of existing plant materials prior to inundation of area.
- Stabilise aquatic and safety benches with emergent wetland plants and wet seed mixes.
- Do not block maintenance access to structures with trees or shrubs
- To reduce thermal warming, shade inflow and outflow channels as well as northern exposures of ponds.
- Shading of standing water reduces undesirable algae blooms
- Avoid plantings that will require routine or intensive chemical applications.
- Test the soil to determine if there is a need for amendments
- Use low maintenance ground cover to absorb stormwater runoff
- Plant stream and water buffers with trees and shrubs where possible to stabilise banks and provide shade
- Maintain and frame desirable views. Take care not

Plate 14-3: A well landscaped stormwater management pond

to block views at road intersections or property entrances. Screen unattractive views into the site.

- Use plants to prohibit pedestrian access to ponds or steeper slopes.
- Consider the long-term vegetation management strategy of the stormwater practice, keeping in mind the maintenance obligations of the eventual owners.
- Preserve existing bush areas to the extent possible.

14.5 Specific landscape provisions for individual stormwater management practices

Plate 14-4: Example of a pond having a good shape but no provision for landscape planting

In addition to the general guidance presented above, more specific guidance is given below for individual stormwater practices (this guidance is subject to variation from site to site).

14.5.1 Ponds and wetlands

Chapters 5 and 6 provide design guidance for ponds and wetlands. Ponds and wetlands have several defined elements that affect landscaping, including:

- pond shape
- pond topography
- zones of water inundation and periodic saturation.

Pond shape

Pond or wetland shape strongly influences public reaction. A rectangular pond is not seen as a 'natural' site feature and offers little in terms of amenity value. A pond with an irregular shoreline or one that apparently fits in with natural contours is more attractive. In addition, an irregular shape has a longer edge than a rectangular pond and allows for more planting, both above and below the water line. The ARC strongly recommends an irregular shoreline or one that follows existing contours. A minimum recommended buffer area around the pond is five metres above the shoreline where a reverse safety bench, as detailed in Chapters 5 and 6, and plantings can be established.

Pond topography

Topography has a major effect on the range of plants that can be grown, the movement of water through the pond or wetland and public safety. Steep side slopes can be dangerous for people slipping into a pond and will have affect the types of plants that can be used.

The ARC recommends a 300 mm deep three metre wide level bench below the normal pool level. This is recommended for safety reasons and for growth of emergent wetland plants. The plants will act to restrict public access to deeper water.

Plate 14-5: Example of a dry extended detention pond with good landscaping

Islands, effectively placed, can also be used for multiple benefits. They can increase

stormwater flow paths, provide additional landscaped areas and provide wildlife habitat. Islands also increase edge lengths and vegetated areas.

Zones of water inundation and periodic saturation

Normal pond and wetland function will result in a number of zones becoming established, each providing different landscaping opportunities.

Zone 1 Periodic flooding zone
Sometimes flooded, but usually above the normal water level
This zone is inundated by floodwaters that quickly recede in a day or less. Key landscaping objectives may be to stabilise steep slopes and establish low maintenance natural vegetation.

Zone 2 Bog zone
Apart from short periods in the summer, the soil is saturated

This encompasses the pond or wetland shoreline. The zone includes the safety bench and may also be periodically inundated if storm events are subject to extended detention. Plants may be difficult to establish in this zone as they must be able to withstand inundation of water during storms or occasional drought during the summer. These plants assist in shoreline stabilisation and shading the shoreline, contaminant uptake and limiting human access. They also have low maintenance requirements.

Zone 3 0 - 150 mm deep of normal pool depth

This is a transition zone between the bog zone and the 150 - 500 mm ponded depthin which the water level sometimes drops and the area becomes a bog. Plants in this area must be able to tolerate periodic (but not permanent) saturated soil conditions.

Plate 14-6: Well landscaped rain gardens in a commercial parking area

Zone 4 150 - 500 mm deep
This is the main zone where wetland plants will grow in stormwater ponds and wetlands. Plants must be able to withstand constant inundation of water and enhance contaminant uptake.

Plants will stabilise the bottom and edge of the pond, absorbing wave impacts and reducing erosion. They will slow water velocities and increase sediment deposition rates along with reducing resuspension of sediments.

Zone 5 500 - more than 1000 mm deep
This zone is not generally used for planting because there are not many plants that can survive and grow in this zone.

14.5.2 Infiltration and filter practices

Infiltration and filter practices either take advantage of existing permeable soils or create a permeable medium such as sand. When properly planted, vegetation will thrive and enhance the functioning of the prac-

tices. For example, pretreatment buffers will trap sediments. Successful plantings provide aesthetic value and wildlife habitat, making the facilities more acceptable to the general public.

Planting around infiltration or rain garden practices for a 5 - 10 metre distance will cause sediments to settle out before entering the practice, thus reducing the frequency of maintenance clean out. As a planting consideration, areas where soil saturation may occur should be determined so that appropriate plants may be selected. Shrubs or trees must not be planted in areas where maintenance access is needed.

Plate 14-7: A well vegetated riparian corridor amenity to the community, amenity to the stream

14.5.3 Swales and filter strips

Key considerations include:

- soil characteristics
- plant interaction
- effects on stormwater treatment
- riparian buffers

The characteristics of the soil are perhaps as important as practice location, size, and treatment volume. The soil must be able to promote and sustain a robust vegetative cover.

Plant interaction is also important. Planting woody vegetation next to a swale or filter strip may shade the swale intolerant grass species in it.

The landscape plan will have to consider the effects that overall landscaping will have on stormwater treatment.

Riparian buffers are an excellent example of filter strips with high ecological, water quality and aesthetic value. Whan appropriately designed, they can treat dispersed runoff from adjacent land. The buffer, as plate 14-7 shows, can be an amenity to the community and increase economic value of adjacent lands.

14.6 Bibliography

City of Portland, Stormwater Management manual, Adopted July 1, 1999, revised September 1, 2000.

Maryland Department of the Environment, 2000 Maryland Stormwater Design Manual, Volumes I & II