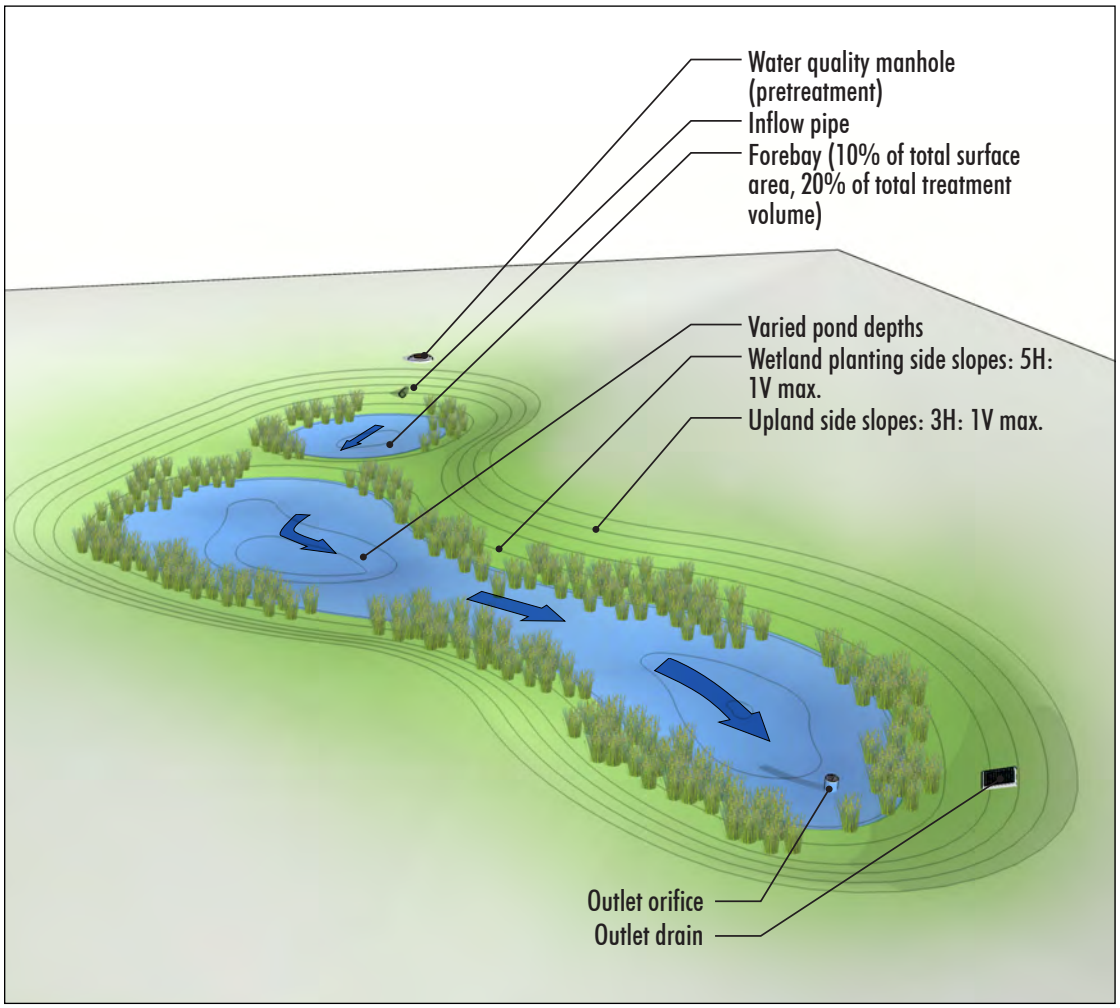
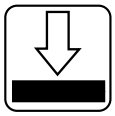
Constructed Water Quality Wetland




parking areas & impermeable landscape


impermeable soils


permeable soils

Description

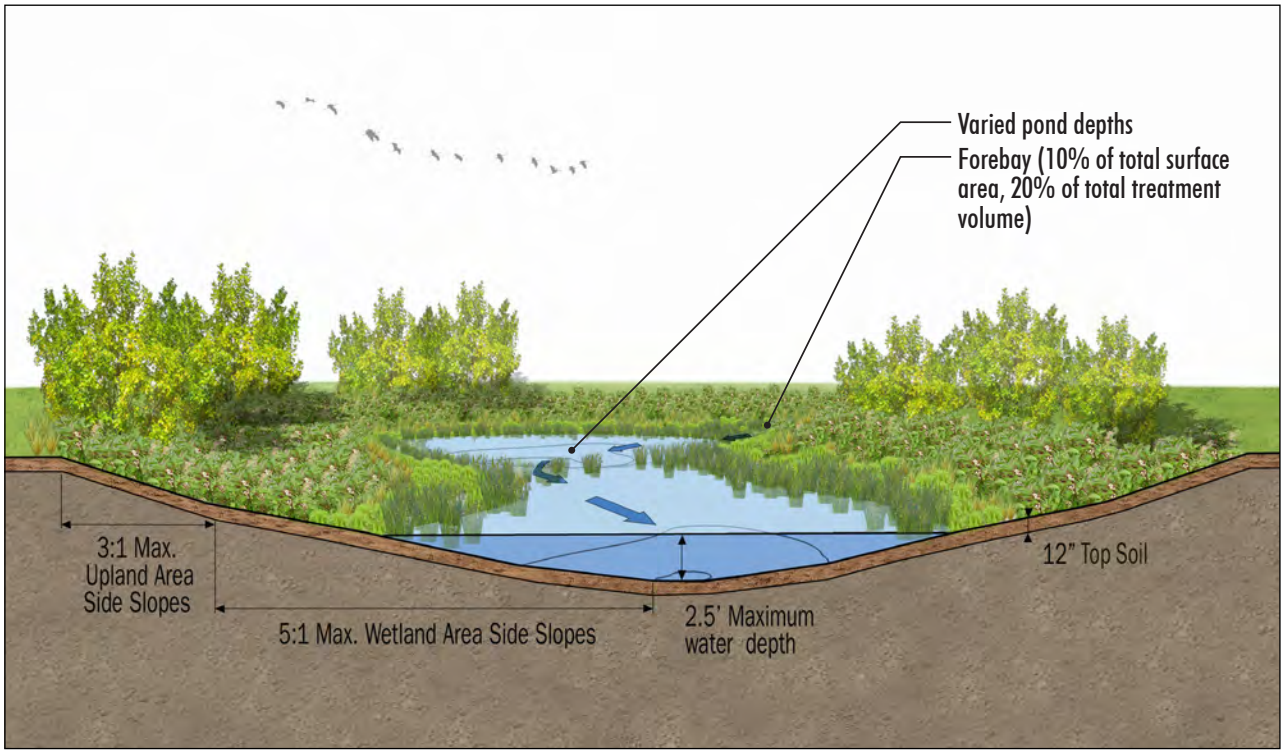
A constructed water quality wetland is a shallow landscaped depression that collects and holds stormwater runoff and allows pollutants to settle and filter out during storm events. Constructed wetlands have a permanent pool of water and also an extended detention area above that fills during storm events and releases water slowly over a number of hours. The permanent pool is sized to reduce pollution by settling and biological processes. The extended detention area is sized to meet flow control requirements.

Application & Limitations

Constructed water quality wetlands may help fulfill a site's landscaping area requirement. Constructed wetlands are approved to treat stormwater from all types of impervious surfaces, including private property and the public right-of way, runoff from rooftops, parking lots, and streets.

Ronler Acres, Hillsboro

Constructed Water Quality Wetland



Design Factors

Sizing

Sizing of the constructed water quality wetland is determined by the volume of runoff and the required detention time for treatment. At a minimum, the detention basin must accommodate the water quality design storm and be sized for a 48 hour drawdown time. The minimum water quality detention volume is equal to (1)x the water quality volume (WQV). The outlet orifice size is determined by the following equation:

$D = 24 * [(Q/ (C[2gH]0.5) / Pi] 0.5$

Where:

D (in) = diameter of orifice
Q(cfs) = WQV(cf) /(48*60*60)
C = 0.62
H(ft) = 2/3 x temporary detention height to centerline of orifice.

Geometry/Slopes

Constructed water quality wetlands have two or more cells. The first cell, known as the forebay, is at least 10% of the entire surface area and constitutes 20% of the treatment volume. If space is limited, one cell with a forebay at the inlet will settle sediments and distribute flow across the wet pond.

Unlike the flat bottom of an extended dry basin, in a constructed wetland the pool depth varies throughout the pond. Not including the permanent pool, the maximum depth of the water quality pool is 2.5-feet unless otherwise approved by the jurisdiction.

Side slopes for wetland planting areas should not exceed 5H: 1V (20%) and side slopes for non-wetland planting areas should not exceed 3H: 1V (33.33%). The minimum freeboard height is 1 foot from the 25-year design water surface elevation. A perimeter 10 to 20 feet wide provides inundation during storm events.

Piping for Constructed Water Quality Wetlands

Incoming flows to the water quality wetland facility are pretreated by a water quality manhole or other approved pretreatment method in accordance with District Standards. Other pretreatment methods may include proprietary devices, filter strip, trapped catch basin, or other methods as approved by the District or City. An approved outlet structure is provided for all flows.

Setbacks

Check with the local building department to confirm site-specific requirements.

Constructed Water Quality Wetland

Oleson Woods Apartments, Tigard

Design Factors (continued)

Soil Amendment/Mulch
A minimum of 12″ of topsoil should be applied to all treatment areas.

Vegetation
The entire facility area (permanent pool, side slopes and perimeter zone) are planted with vegetation appropriate for the varying planting conditions within the constructed wetland. Planting conditions within the wetland vary from saturated soil to relatively dry, and several planting zones should be considered. The zone between the bottom of the constructed wetland and the top of the permanent pool will be constantly inundated with water and have saturated soils. This wet zone should be planted with rushes, sedges, and other wetland species that are well-suited to water-saturated, oxygen-deprived (anaerobic) planting conditions. The variable depth of the bottom of the wetland will create a series of micro planting conditions. Within this wet zone, areas of open water may be too deep to support significant vegetation.

The side slopes above the permanent pool depth to the outer edges of the perimeter zone will have a moisture gradient that varies from wet near the bottom to relatively dry near the edge of the perimeter area where inundation rarely occurs. This moisture gradient will vary depending upon the maximum designed water depth, constructed wetland depth, and side slope steepness. This moist-to-wet transition zone from the top of the permanent pool to the designed high water line or top of freeboard should be planted with sedges, rushes, perennials, ferns and shrubs that can tolerate occasional standing water and wet-to-moist planting conditions. Areas above the designed high water line and immediately adjacent to the water quality wetland is a dry zone and will not be regularly inundated. The dry zone should be planted with self-sustaining, low maintenance grasses, perennials, and shrubs suitable for the local climate.

The planting design should minimize solar exposure of open water areas to reduce heat gain in the water. Lower water temperatures help to maintain healthy oxygen levels and minimize algae blooms. Trees or other appropriate vegetation should be planted at the perimeter of the pond to maximize shading.

The use of native plants is encouraged, but adapted, non-invasive ornamentals are acceptable for added aesthetic and functional value.

Constructed Water Quality Wetland

Synopsys, Hillsboro

Ronler Acres, Hillsboro

Vegetation (continued)
All vegetation should be densely and evenly planted to ensure proper hydrological function of the water quality wetland.

Plant Spacing
Constructed Water Quality Wetlands in tracts or easements are to be planted as follows to achieve the specified per acre densities:
i. Treatment area = 6 plugs per square foot (min. 1-inch diameter by 6-inch tall)
ii. Total number of trees per acre = area in square feet x 0.01
iii. Total number of shrubs per acre = area in square feet x 0.05
iv. Groundcover = plant and seed to achieve 100% areal coverage

Required Maintenance Period

- Water-efficient irrigation should be applied for the first two years after construction of the facility, particularly during the dry summer months, while plantings become established. Irrigation after these two years is at the discretion of the owner.
- If public, the permittee is responsible for the maintenance of the constructed water quality wetland for a minimum of two years following construction and acceptance of the facility.

Long Term Maintenance

If private, the property owner will be responsible for ongoing maintenance per a recorded maintenance agreement (see page 88 for example maintenance agreement).

For detailed Operation and Maintenance Plans that describe proper maintenance activities please refer to page 91.

All publicly maintained facilities must have a public easement.

References

Clean Water Services Design and Construction Standards