

BIO-5: Constructed Wetland

A constructed wetland is a system consisting of a sediment forebay and one or more permanent micro-pools with aquatic vegetation covering a significant portion of the basin. Constructed treatment wetlands typically include components such as an inlet with energy dissipation, a sediment forebay for settling out coarse solids and to facilitate maintenance, shallow sections (1 to 2 feet deep) planted with emergent vegetation, deeper areas or micro pools (3 to 5 feet deep), and a water quality outlet structure. The interactions between the incoming stormwater runoff, aquatic vegetation, wetland soils, and the associated physical, chemical, and biological unit processes are a fundamental part of constructed wetlands.

<i>Also known as:</i>
<ul style="list-style-type: none"> ➤ <i>Stormwater Wetlands</i> ➤ <i>Wetland Basins</i> ➤ <i>Treatment Wetland</i>

<p style="text-align: center;">Constructed Wetland Source: Geosyntec Consultants</p>

Feasibility Screening Considerations

- Feasibility screening is not applicable to constructed wetlands; however the potential risk of groundwater contamination should be considered in selection and design.

Opportunity Criteria

- Potential regional treatment for a relatively large watershed drainage area.
- Applicable for use with projects involving roads, highways, commercial residences, parks, open spaces, or golf courses.
- Requires large footprint area. Applicable for drainage areas treating areas larger than 10 acres and less than 10 square miles.
- Applicable in drainage areas with source of base flow to maintain water level.
- Wetlands present potential safety concerns and habitat for mosquito and midge breeding.

OC-Specific Design Criteria and Considerations

- Minimum set-backs from foundations and slopes should be observed.
Infiltration should not cause geotechnical concerns related to slope stability or erosion.
- Proposed basins in areas with slopes greater than 7 percent or within 200 feet from the top of a hazardous slope or landslide area require geotechnical investigation and report completed by licensed civil engineer.
- A natural shape and range of intermixed depths is recommended for constructed wetland geometry.
- Design includes sediment forebay to remove coarse solids.
- Maximum residence time equals 7 days (dry weather).
- Flow path length to width ratio is 3:1 (minimum) and 4:1 or greater (preferred).

- Minimum side slope ratio (H:V) should be 4:1 for interior side slopes, 2:1 for exterior sideslopes, and 3:1 for landscaped slopes.
- A buffer zone with a minimum width of 25 feet should be provided around the top perimeter of the constructed treatment wetlands.
- A source of water should be provided if water balance indicates losses will exceed inputs.
- Inlets and outlets should be positioned to maximize flowpaths through the facility. All inlets should enter the first cell of the wet detention basin.
- Minimum freeboard should be 1 foot above the maximum water surface elevation.

Computing Sizing Criteria for Constructed Wetlands

This document does not provide specific sizing guidance for constructed wetlands. Wetlands should be designed by a team of wetland specialists that understand wetland ecology and biology and are familiar with methods to avoid stagnation, odors, and vector issues associated with maintaining a permanent pool. The BMP designer(s) must demonstrate that the facility is sized to capture and treat the volume of runoff not being addressed by upstream BMPs such that 80 percent of the total average annual runoff from the site is retained or treated.

The retention volume within a constructed wetland is the equal to the permanent pool volume. The drawdown time criteria, or the rate at which the retention volume becomes available, does not apply to constructed wetlands. All runoff in excess of the retention volume that flows through the wetland is considered biotreated.

Configuration for Use in a Treatment Train

- Constructed wetland basins would generally be designed to serve as the final BMP before discharging runoff off-site.
- Constructed wetland basins may be preceded in a treatment train by HSCs and LID BMPs in the drainage area, which would reduce the pollutant load and volume of runoff entering the basin, thereby reducing the sizing requirements of the wet detention basin.

Additional References for Design Guidance

- Western Washington Stormwater Management Manual, Volume V, Chapter 10:
<http://www.ecy.wa.gov/pubs/0510033.pdf>
- CASQA BMP Handbook for New and Redevelopment:
<http://www.cabmphandbooks.com/Documents/Development/TC-21.pdf>
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 7:
http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf
- LA County LID Manual, Chapter 5: http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf
- SMC LID Manual:
http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf