Bioretention
Multi-Benefit Full Capture Systems

June 2023

This information sheet generically describes the categorically certified Bioretention Multi-Benefit Full Capture Systems and the associated specific design requirements.

Figure A: Photograph of a Bioretention System at Sacramento State University

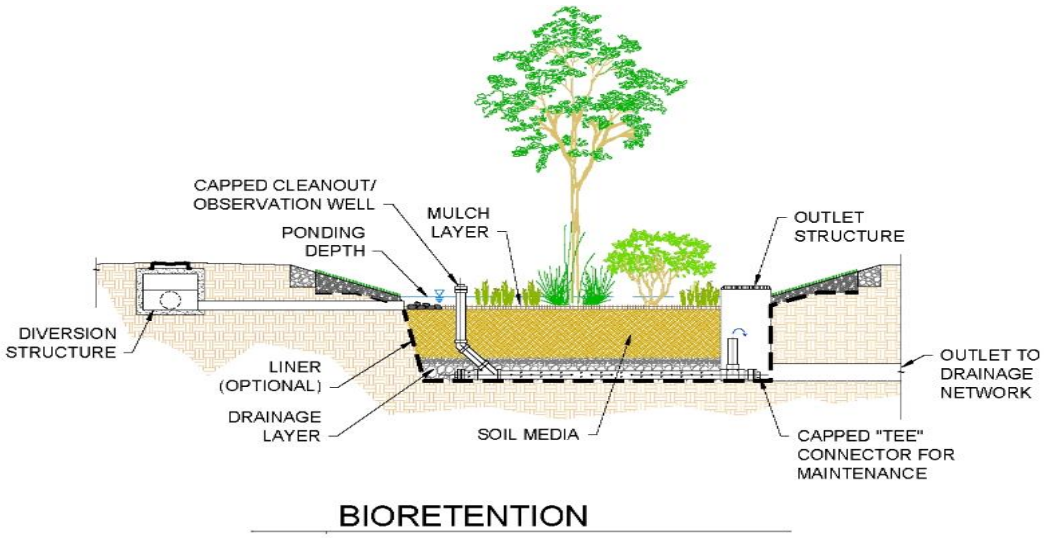

Figure B: Schematic Diagram of a Generic Bioretention System

Description

Although Bioretention Multi-Benefit Full Capture Systems (Bioretention Systems) come in various shapes and sizes (see Figures A and B), the Systems generally remove pollutants from stormwater runoff through a physical filtration that occurs as stormwater passes through a sequence of media layers. The treatment area consists of a ponding layer, a vegetated and mulched layer, an engineered soil layer, and a supporting bed layer of sand or gravel. Stormwater entering the treatment area evapotranspires or gradually passes through the mulch/soil/gravel layers where it then infiltrates into native soil and/or collects in an underdrain that conveys to a discharge point.

The vegetated and mulched layer of the Bioretention System must have a surface area large enough to trap trash and reduce the risk of trash and other debris (e.g.; vegetation) interfering with the hydraulic capacity of the Bioretention System. The subsurface of the Bioretention System may include perforated pipes, chambers, open bottom concrete galleries or other high voids structures designed to temporarily store water prior to infiltration**.**

Multi-Benefit Certification Limitations

Wet ponds or wetlands are not eligible for certification as Full Capture Systems.

The following systems must be individually certified through the State Water Board's Full Capture System certification process, regardless of whether they otherwise meet the conditions of this certification:

- Pre-manufactured systems (i.e., those manufactured off-site that are generally available for sale);
- Systems inserted into the existing storm drain infrastructure (e.g., storm vaults); and
- Systems that are designed to contain water for more than 96 hours after conclusion of a storm event in an underground system of pipes, chambers, concrete vaults, or similar void structures connected to exterior inlets or outlets.

Performance, Design, and Maintenance

Permittees and other responsible entities[1]I shall design, construct, and maintain Bioretention Systems in accordance with the following six (6) requirements:

1. Bioretention Systems shall trap particles that are 5 millimeters or greater at any time during a storm event for the following:
   a. The peak flow rate generated by the region specific 1-year, 1-hour storm event from the applicable sub-drainage area; or
   b. The peak flow rate of the corresponding storm drain (if the Bioretention System is designed to treat flows from the corresponding storm drain that is designed for less than the peak flow rate generated from a 1-year, 1-hour storm event).
2. Bioretention Systems may include either or both of the following to trap particles for either

[1] These requirements also apply to any entity designing a Bioretention System to comply with a Water Board permit or a permittee's requirements implementing the Trash Provisions.

flow described above in section 1.a or 1.b:
   a. A screen at the system's inlet, overflow, or bypass outlet; or
   b. An up-gradient structure designed to bypass flows exceeding the flows as described in section 1.a or 1.b[2]
3. The peak flow rates referenced in section 1.a, above, shall be calculated using one of the following methods:
   a. For small drainage areas (generally less than 50 acres) – The Rational equation method which is expressed as Q = CIA where:
      Q = design flow rate (cubic feet per second)
      C = runoff coefficient (dimensionless)
      I = design rainfall intensity (as determined per the rainfall isohyetal map specific for each region) specific to each region, inches/hour
      A = subdrainage area (acres)
   b. For large drainage areas (generally more than 50 acres or more) – Other accepted hydrologic mathematical methods that more accurately calculate peak flow rates from large drainage areas.
4. Permittees that have developed a stormwater resource plan pursuant to California Water Code Section 10562 shall only install or approve Bioretention System designs with groundwater recharge functionality at locations suitable for groundwater recharge.
5. For Bioretention Systems that incorporate groundwater recharge capacity into the sizing of the Bioretention System for the purpose of requirements related to the peak flow rates in item 1, above, the percolation rate below the Bioretention System must either be measured directly or estimated employing conservative hydrogeologic assumptions.
6. A registered California licensed Professional Engineer shall stamp and sign Bioretention System design plans as required by California Business & Professions Code section 6700, et seq.
7. Because regular maintenance of the Bioretention System is required to maintain adequate trash capture capacity and to ensure that captured trash does not migrate offsite, the Permittee shall establish a maintenance schedule based on:
   a. The maintenance frequency as required in the applicable State/Regional Water Board stormwater permit; and
   b. Site-specific factors including the design trash capture capacity of the Bioretention System, local storm frequency, and characterization of trash and vegetation accumulation in the corresponding sub-drainage area.

[2] Upon approval by the appropriate Regional Water Quality Control Board Executive Officer, a 5 millimeter screen and/or upgradient structure may not be required if the Bioretention System is designed for flood control from flows generated by very large storm events.