

Stormwater Facility Operation and Maintenance Fact Sheet

► BIORETENTION PLANTERS

Bioretention planters are intended to:

1. Reduce pollutant loads by filtering stormwater runoff through a layer of specially formulated soil and then infiltrating stormwater into the ground.
2. Pond water before overflowing to a drain inlet.
3. Infiltrate completely following each rain event.

Bioretention are not intended to:

1. Have standing water for periods longer than 48 hours after a storm
2. Serve as wetland or riparian habitat
3. Be accessed by anyone other than authorized personnel

The recommended routine maintenance activities for bioretention planters are:

On an as-needed basis:

1. Remove any soil build-up, fallen leaves, debris, and trash.
2. Irrigate plants as needed during prolonged dry periods. In general, plants should be selected to be drought-tolerant and not require irrigation after establishment (two to three years).
3. Prune or cut back plants for health and to ensure stormwater is able to flow into inlets and across the surface of the facility. Remove and replant as necessary. When replanting, maintain the design surface elevation and minimize the introduction of soil
4. Control weeds by manual methods or by adding mulch. If problem areas occur, corn gluten, white vinegar, vinegar-based products, or non-selective natural herbicides may be used.
5. Examine the vegetation to ensure that it is healthy and dense enough to provide filtering and to protect soils from erosion. Remove and replace all dead and diseased vegetation.
6. Replenish mulch as necessary. Use "aged mulch" (also called compost mulch) to reduce the ability of weeds to establish, keep soil moist, and replenish soil nutrients.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Monterey Regional Stormwater Management Program

Mulch may be added from time to time to maintain a mulch layer thickness of 1" to 2".

7. Check signage. Remove graffiti and replace if necessary.
8. Confirm that irrigation is adequate and not excessive.

Annually, prior to the beginning of the rainy season:

1. Remove trash, debris, vegetation, and accumulated sediment.
2. Replenish mulch as necessary. Use "aged mulch" (also called compost mulch) to reduce the ability of weeds to establish, keep soil moist, and replenish soil nutrients. Mulch may be added from time to time to maintain a mulch layer thickness of 1" to 2".
3. Visually inspect the facility to determine if any maintenance activities are required in order to be prepared for the upcoming season.
4. If necessary, replenish rock or other material used as a splash pad.
5. Inspect drainage outlets for signs of erosion or plugging. If minor erosion is observed, backfill the eroded area. Rock rip rap or a concrete splash pad may be needed to avoid future erosion. If significant erosion is observed, consult a Civil Engineer or Landscape Architect.
6. Inspect soil slopes for evidence of instability or erosion. If minor erosion is observed, backfill the eroded area, and cover the area with mulch or erosion control blanket to prevent future erosion. If significant erosion is observed, or if there is evidence of instability, consult a Civil Engineer or Landscape Architect.

During the rainy season:

1. Abate potential vectors (mosquito larvae) by filling holes in the ground in and around the facility so that there are no areas where water stands longer than 48 hours following a storm. If mosquito larvae are present and persistent, contact Monterey County Mosquito Abatement District. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.

Annually, at the end of the rainy season:

1. Remove trash, debris, dead vegetation, and accumulated sediment.
2. Determine if any maintenance activities should be scheduled, since many maintenance activities need to be performed during the dry season.

Do Not:

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Monterey Regional Stormwater Management Program

1. Do not add fertilizer to bioretention facilities. Compost tea, available from various nurseries and garden supply retailers, may be applied at a maximum recommended rate of 5 gallons, mixed with 15 gallons of water, per acre, up to two weeks prior to planting and once per year between March and June. Do not apply when temperatures are below 50°F or above 90°F or when rain is forecast in the next 48 hours.
2. Do not use pesticides or herbicides on bioretention facilities. Beneficial nematodes and non-toxic controls may be used.
3. Do not add "normal" soil into the bioretention facility. Engineered bioretention soil is specially formulated to provide a high infiltration rate; adding other "normal" soils can significantly reduce the ability of the facility to function as designed.
4. Do not re-grade or re-contour the bioretention facility. It is important that the ground surface be maintained in the design configuration.
5. Do not make additional openings in the side of the drain inlet in order to address surface water ponding issues. Water must pond up to the design overflow elevation before overflowing into the storm drain. If surface water ponding is an issue, contact the project civil engineer.

Major Facility Changes or Renovation:

Contact the project civil engineer (**Engineer's Name**), or other qualified engineer or landscape architect, in the event that major work is contemplated in or adjacent to the facility. Major work includes:

- Significant changes to the facility's planting palette or irrigation system.
- Re-grading the facility.
- Any activity which involves adding or removing soil from the facility.
- Modifying the "engineered" elements of the facility, including drain inlets, pipes, subsurface drains, check dams, water barriers, and structural elements.
- Improvements in areas which drain to the facility; especially improvements which would increase the area of impervious surface which drains to the facility.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Stormwater Facility Operation and Maintenance Fact Sheet

► RAINWATER HARVESTING CISTERN

A rainwater harvesting cistern is intended to:

1. Store stormwater runoff for extended periods of time.
2. Reduce the reliance on potable water, by providing a source of non-potable water for landscape irrigation use.
3. Reduce the quantity and velocity of stormwater runoff flowing to local drainage system.

A rainwater harvesting cistern is not intended to:

1. Produce water for potable uses.
2. Provide vector (mosquito larvae) habitat.
3. Be accessed by anyone other than authorized personnel.

The recommended routine maintenance activities for rainwater harvesting cisterns are:

At least twice a year:

1. Remove any soil, debris, or trash from the building gutters or roof drainage system which could prevent stormwater from entering the cistern.
2. Inspect the cistern screens to make sure debris is not collecting on the surface and there are no holes for insects to enter.
3. Inspect, remove and wash the stainless steel filter insert. Use a brush and water to remove any residue on the filter.
4. Inspect all downspout pipes to make sure debris has not collected or blocked them.
5. Inspect water stored in the cistern. Observe the water surface for mosquito larvae. Observe the floor of the cistern for accumulation of excess amounts of sediment or debris.
6. Check signage and water level indicator. Remove graffiti and replace if necessary.

Annually, at the end of the rainy season (after the tank is empty):

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Monterey Regional Stormwater Management Program

1. Remove trash, debris, and accumulated sediment from the inside of the cistern and the cistern filter. Use only vinegar or another non-toxic cleaner if needed.

Do Not:

1. Do not use synthetic pesticides or synthetic or toxic cleaners to clean the cistern.

Major Facility Changes or Renovation:

Contact the project civil engineer (**Engineer's Name**) landscape architect, or other qualified company in the event that major work is contemplated in or adjacent to the facility. Major work includes:

- Modifying the openings, screens, pipes, and structural elements.
- Improvements in areas which drain to the facility; especially improvements which would increase the area of impervious surface which drains to the facility.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Stormwater Facility Operation and Maintenance Fact Sheet

► PERMEABLE CONCRETE

Permeable concrete is intended to:

1. Infiltrate all precipitation during smaller storms.
2. Surface drain during higher-intensity storms.
3. Reduce pollutant loads by infiltrating stormwater and by filtering stormwater runoff through the aggregate base course.
4. Drain completely following each rain event.

Permeable concrete is not intended to:

1. Have standing water on its surface.
2. Settle over time

The recommended routine maintenance activities for permeable concrete is:

On an ongoing and as-needed basis:

1. Keep surrounding landscaped areas well maintained and covered with landscaping and/or mulch so that soils are prevented from being washed onto the permeable concrete.
2. Ensure the concrete pavement is draining and that there is no standing water.
3. Control weeds by manual methods. If problem areas occur, corn gluten, white vinegar, vinegar-based products, or non-selective natural herbicides may be used.
4. Monitor regularly to ensure that the surface drains properly after storms.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Annually, prior to September 1:

1. Inspect the surface of the system for signs of sediment build-up, surface flow characteristics, and surface ponding.
2. Remove soil build-up, fallen leaves, debris, and trash.
3. Vacuum the concrete using a dry vacuum type street sweeper or other dry vacuum system. Vacuum and sweeper settings may require adjustments to prevent surface damage and uptake of aggregate.
4. Re-inspect the surface for signs of accumulated sediment, erosion, or lost filler materials.
5. Annual vacuuming typically is all that is required, unless an excessive amount of sediment is deposited onto the permeable concrete. If excessive amounts sediment are deposited onto the permeable concrete, the source of the sediment should be investigated and addressed. If it is not possible to eliminate the issue, an increased sweeping frequency may be necessary.

Do not:

1. Do not pressure wash permeable concrete.
2. Do not seal, overlay, or repave with impermeable materials.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Stormwater Facility Operation and Maintenance Fact Sheet

► PERMEABLE GEO-CELL PAVING

Permeable geo-cell paving is intended to:

1. Provide an all-weather driving surface for vehicular traffic.
2. Infiltrate all precipitation during smaller storms.
3. Surface drain during higher-intensity storms.
4. Reduce pollutant loads by infiltrating stormwater and by filtering stormwater runoff through the aggregate base course.
5. Drain completely following each rain event.

Permeable geo-cell paving is not intended to:

1. Have standing water on its surface.
2. Become soft or unstable, even after prolonged precipitation.

The recommended routine maintenance activities for permeable geo-cell paving are:

On an ongoing and as-needed basis:

1. Keep surrounding landscaped areas well maintained and covered with landscaping and/or mulch so that soils are prevented from being washed onto the pervious pavement.
2. Remove soil build-up, fallen leaves, debris, and trash.
3. Ensure pervious pavement system is draining and that there is no standing water.
4. Control weeds by manual methods. If problem areas occur, corn gluten, white vinegar, vinegar-based products, or non-selective natural herbicides may be used.
5. Pesticide use should be limited and conducted by appropriate professionals. Synthetic pesticides shall not be used.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Stormwater Facility Operation and Maintenance Fact Sheet

► PERMEABLE PAVERS

Permeable pavers are intended to:

1. Infiltrate all precipitation during smaller storms.
2. Surface drain during higher-intensity storms.
3. Reduce pollutant loads by infiltrating stormwater and by filtering stormwater runoff through the aggregate base course.
4. Drain completely following each rain event.

Permeable pavers are not intended to:

1. Have standing water on its surface.
2. Shift or settle over time.

The recommended routine maintenance activities for permeable pavers are:

On an ongoing and as-needed basis:

1. Keep surrounding landscaped areas well maintained and covered with landscaping and/or mulch so that soils are prevented from being washed onto the permeable pavers.
2. Ensure the paver system is draining and that there is no standing water.
3. Control weeds by manual methods. If problem areas occur, corn gluten, white vinegar, vinegar-based products, or non-selective natural herbicides may be used.
4. Monitor regularly to ensure that the surface drains properly after storms.
5. Regular dusting or sweeping by either brush or vacuum systems. Cleaning intervals will depend on several factors including traffic type, traffic frequency and environmental factors.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Annually, prior to September 1:

1. Inspect the surface of the system for signs of sediment build-up, surface flow characteristics, and surface ponding.
2. Remove soil build-up, fallen leaves, debris, and trash.
3. Vacuum the pavers using a dry vacuum type street sweeper or other dry vacuum system. Vacuum and sweeper settings may require adjustments to prevent uptake of aggregate from the paver voids and joints.
4. Re-inspect the surface for signs of accumulated sediment, erosion, or lost filler materials.
5. Re-fill joints with aggregate (matching existing aggregate specification) if aggregate is more than 1/2" below the paver surface.
6. Annual vacuuming typically is all that is required, unless an excessive amount of sediment is deposited onto the permeable paving. If excessive amounts sediment are deposited onto the permeable paving, the source of the sediment should be investigated and addressed. If it is not possible to eliminate the issue, an increased sweeping frequency may be necessary.
7. Surface rehabilitation likely will be needed once every 5 to 20 years. Surface rehabilitation is needed when the infiltration characteristics of the paver system are not restored by standard dry vacuuming. Perform surface rehabilitation in accordance with the system manufacturer's current recommendations. Activities may include:
 - a. Pervious body paver systems:
 - i. Perform a light pressure wash at 1200-1500 psi in conjunction with wet vacuuming. A steam or hot water option will provide best results.
 - ii. Using a fan tip spray nozzle, at 30 degree angle, 14 to 16 inches from the paver and working at a 45 degree angle from the dominant pattern.
 - iii. Start from the highest grade, working in a sweeping motion, downhill to the lowest point of the project.
 - iv. Care must be taken not to allow the nozzle of the pressure washer to come in close contact with the paver as damage may occur.
 - v. Perform flood testing to verify the system's rehabilitated infiltration rate. The rehabilitated infiltration rate should be at least 3 inches per hour.
 - b. Pervious joint paver systems:
 - i. Remove the upper 1/2" to 1" of joint filler material (and the accumulated sediments) using a commercial vacuum sweeper with water jets and vacuum bar attachment.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Monterey Regional Stormwater Management Program

- ii. Backfill the joints with new joint filler (match existing filler material) and sweep the surface clean.
 - iii. Perform flood testing to verify the system's rehabilitated infiltration rate. The rehabilitated infiltration rate should be at least 50 inches per hour.
- c. Solvents or cleaners shall not be used.

Reconstruction:

Partial or full reconstruction is required in the event that the foregoing rehabilitation techniques fail to restore the system's function.

Reconstruction is also required if the pavement becomes unstable or settles.

A qualified civil engineer or landscape architect should be consulted if reconstruction is needed. A construction contractor qualified in permeable paver installation should perform any needed reconstruction.

Do not:

1. Do not pressure wash permeable pavers with more than 1500 psi . Only pressure wash by following the procedures specified by the manufacturer.
2. Do not seal, overlay, or repave with impermeable materials.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Stormwater Facility Operation and Maintenance Fact Sheet

► TREE BOX FILTER

High flow rate tree box type biofilters (“tree box filters”) are intended to:

1. Reduce pollutant loads by filtering stormwater runoff through a layer of engineered soil media.
2. Pond water to a specified depth before overflowing to a drain inlet.
3. Drain completely following each rain event.

Tree box filters are not intended to:

1. Infiltrate significant amounts of water into the underlying soil
2. Have standing water after a storm
3. Serve as wetland or riparian habitat
4. Be accessed by anyone other than authorized personnel

The recommended routine maintenance activities for tree box filter are:

On an as-needed basis:

1. Remove accumulated sediment, fallen leaves, debris, and trash.
2. Prune or cut back plants for health and to ensure stormwater is able to flow into inlets and across the surface of the facility. Remove and replant as necessary. When replanting, maintain the design surface elevation and minimize the introduction of soil.
3. Control weeds by manual methods.
4. Examine the vegetation to ensure that it is healthy. Remove and replace all dead and diseased vegetation.
5. Remove graffiti and replace signs and markers as necessary.
6. Confirm that irrigation is adequate and not excessive.

Annually, prior to the beginning of the rainy season:

1. Remove trash, debris, weeds, and accumulated sediment.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Monterey Regional Stormwater Management Program

2. Remove mulch and place 3" of new mulch. The mulch should be double-shredded hardwood mulch, or as specified by the system manufacturer. Mulch shall not be colored or dyed.
3. Prior to placing the new mulch, evaluate if additional engineered soil media is required. Additional soil media shall be obtained from the manufacturer; do not use other types of soil.
4. Adjust splash pad material. Replenish if needed.
5. Visually inspect the facility and surroundings to determine if any other maintenance activities are required in order to be prepared for the upcoming season.

During the rainy season:

1. Observe the water level draw-down characteristics of the tree box filter during the 24-hour period following rain events. The tree box filter should completely draw down immediately after rain event. If it does not draw-down immediately, inspect the tree box for sediment which may have accumulated and reduced the infiltrative ability of the engineered soil media. Sediment typically does not penetrate deeply into the mulch and soil media, and therefore can typically be removed by replacing the mulch layer. In some instances it may be necessary to additionally replace the top layer of soil media. If the facility is still not operating as desired, consult the system designer and/or the manufacturer.

Annually, at the end of the rainy season:

1. Remove trash, debris, vegetation, and accumulated sediment.
2. Determine if any maintenance activities should be scheduled, since many maintenance activities need to be performed during the dry season.

Do Not:

1. Do not add fertilizer to tree box filters. Compost tea, available from various nurseries and garden supply retailers, may be applied at a maximum recommended rate of 5 gallons, mixed with 15 gallons of water, per acre, up to two weeks prior to planting and once per year between March and June. Do not apply when temperatures are below 50°F or above 90°F or when rain is forecast in the next 48 hours.
2. Do not use pesticides or herbicides on tree box filters. Beneficial nematodes and non-toxic controls may be used.
3. Do not add "normal" soil into the tree box filters. Tree box filter soil media is specially formulated to provide a high infiltration rate; adding "normal" soils can significantly reduce the ability of the facility to function as designed.

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.

Monterey Regional Stormwater Management Program

*** This is a guidance document for general informational and educational purposes. There is no warranty regarding the completeness or accuracy of this information. Applicant must check with the local jurisdiction to ensure compliance with the Post-Construction Requirements and other applicable law.