



# *Stormwater Management Plan*

## **SECTION 1: COVERAGE**

This plan will help maintain the stormwater management facilities located at the Catholic University of America. Stormwater management facilities sometimes called stormwater best management practices (SWBMP) facilities. A SWBMP facility is a structure or vegetated area that minimizes the impact of stormwater runoff on receiving water bodies and other environmental resources. The facilities are intended to reduce the volume of water that reaches the District of Columbia sewer system as well as the number of pollutants carried in it. They can range from large structures, such as engineered ponds, to more discrete structures, such as underground tanks and landscaping along curbs.

This plan will apply to any such SWBMP facility installed and managed by the Catholic University of America. The goal of this plan is to manage stormwater in a manner that will protect the environment, especially natural water bodies, and public health; minimize waste, and reduce toxicity. The plan is informed by the [District of Columbia Department of Energy and the Environment's \(DOEE\) Self-inspection / Self-reporting Guidance Manual for Stormwater Management Best Practices Facilities](#).

## **SECTION 2: SCOPE**

The scope of the plan covers all current and future SWBMP facilities on campus. As of August 2021, there are [84 such facilities](#). Catholic University contains the following types of SWBMP facilities:

- *Green Roofs*: Green roofs capture and store rainfall in engineered growing media that is designed to support plant growth.
- *Rainwater Harvesting*: Rainwater harvesting systems store rainwater and release it for future use. Rainwater that falls on a rooftop or other impervious surface is collected and conveyed into an above- or below-ground tank (also referred to as a cistern), where it is stored for non-potable uses or for on-site disposal. A rain barrel is a simpler type of rainwater harvesting facility.
- *Permeable Pavement*: Permeable pavement is an alternative paving surface that captures and temporarily stores stormwater by filtering it through voids in the pavement surface into an underlying stone reservoir. Filtered stormwater may be collected and returned to the conveyance system, or allowed to partially infiltrate into the soil. Design variants include porous asphalt, pervious concrete, and permeable pavers.
- *Bioretentions/ Rain Gardens*: Bioretentions capture and store stormwater runoff and pass it through a filter bed of soil media composed of sand, soil, and organic matter. Filtered runoff may be collected and returned to the conveyance system, or allowed to infiltrate into the soil.
- *Sand Filter*: A sand filter captures and temporarily stores stormwater and passes it through a filter bed of sand and stone. A typical Catholic University sand filter is contained in an underground concrete vault. The filter consists of three chambers: the first is devoted to separating sediment and trash from the water, the second is a filter bed consisting of sand and stone, and the third

- allows for treated water to discharge from the facility.
- *Infiltration Trench & Basins*: Infiltration trenches capture and temporarily store stormwater before allowing it to infiltrate into the soil over a two-day period. This type of facility includes infiltration trenches and infiltration basins. Infiltration facilities use temporary surface or underground storage to allow incoming stormwater runoff to infiltrate into underlying soils.
- *Stormceptor*: An oil grit separator designed to protect waterways from hazardous material spills and stormwater pollution, including suspended sediment, free oils, floatables, and other pollutants that attach to particles.
- *Baysaver*: This SWBMP facility uses density differences and gravity to remove suspended solids and floatables from stormwater runoff, and keeps it from entering waterways.

## 1. New Construction and SWBMP facilities

When Catholic University undertakes a construction project that disturbs more than 5,000 square feet of land coverage, it is required to inspect and maintain its stormwater facility as required by the stormwater management plan. This is described in the District of Columbia Municipal Regulations, Title 21, Chapter 5, Section 528.1:

*Each owner or designee of each lot and parcel that is part of a site that undertook a major regulated project shall be responsible for maintenance required by the Stormwater Management Plan (SWMP) approved by the Department and shall record that responsibility in a declaration of covenants.*

## 2. Maintenance Best Practices

The maintenance needs differ depending on the stormwater facility. The following subsections provide details on what the next steps the responsible parties may need to take to optimize the effectiveness of Catholic University's stormwater facilities and meet maintenance requirements according to DOEE.

### Green Roofs

The use of herbicides, insecticides, and fungicides should be avoided since their presence could hasten the degradation of some waterproofing membranes. Fertilization is generally not recommended due to the potential for leaching of nutrients from the green roof. Recommended maintenance activities are as follows:

As needed or as required by the manufacturer:

- Water to promote plant growth and survival.
- Inspect the green roof and replace dead or dying vegetation.

### *Semi-annual Tasks and Activities*

- Inspect the waterproof membrane for leaks and cracks.
- Weed to remove invasive plants (do not dig or use pointed tools where there is potential to harm the root barrier or waterproof membrane).
- Inspect roof drains, scuppers, and gutters to ensure they are not overgrown and have not accumulated organic matter deposits. Remove any accumulated organic matter or debris.
- Inspect the green roof for dead, dying, or invasive vegetation. Plant replacement vegetation as needed.
- Inspect for standing water.

**Warning: Exercise caution and utilize proper fall protection when working on a roof.**

## **Rainwater Harvesting**

Periodic inspections and maintenance shall be conducted for each system by a qualified professional/staff. Maintenance requirements for rainwater harvesting systems vary according to use. Systems that are used to provide supplemental irrigation water have relatively low maintenance requirements, while systems designed for indoor uses have much higher maintenance requirements. Recommended maintenance activities are as follows:

### **Rain Barrel**

#### *Quarterly Tasks and Activities*

- Inspect and clean pre-screening devices and first-flush diverters.

#### *Semi-annual Tasks and Activities*

- Keep gutters and downspouts free of leaves and other debris.

#### *Annual Tasks and Activities*

- Inspect and clean storage cistern lids, paying special attention to vents and screens on inflow and outflow spigots. Check mosquito screens and patch holes or gaps immediately.
- Inspect condition of overflow pipes, overflow filter path, and/or secondary stormwater treatment facilities.

#### *36-Month Tasks and Activities*

- Clear overhanging vegetation and trees over roof surface.

### **Cistern**

#### *According to Manufacturer and Completed by a Qualified Inspector*

- Inspect water quality devices.

#### *As indicated in tiered risk assessment management (TRAM) Completed by a Qualified Inspector*

- Provide water quality analysis to DDOE.

#### *36-Month Tasks and Activities to be Completed by a Qualified Inspector*

- Inspect cistern for sediment buildup.
- Check the integrity of the backflow preventer.
- Inspect structural integrity of cistern, pump, pipe, and electrical system.
- Replace damaged or defective system components.

### **Permeable Pavement**

It is difficult to prescribe the specific types or frequency of maintenance tasks that are needed to maintain the hydrologic function of permeable pavement systems over time. The frequency of maintenance will depend largely on pavement use, traffic loads, and the surrounding land use. One preventative maintenance task for large-scale applications (e.g., parking lots) involves vacuum

sweeping on a frequency consistent with the use and loadings encountered in the site. Many experts consider an annual, dry-weather sweeping in the spring months to be important. The contract for sweeping should specify that a vacuum sweeper is used that does not use water spray, since spraying may lead to subsurface clogging. Additional, recommended maintenance activities are as follows:

#### *After Installation Tasks and Activities*

- For the first 6 months following construction, the facility and contributing drainage area (CDA) should be inspected at least twice after storm events that exceed 1/2 inch of rainfall.
- Conduct any needed repairs or stabilization.

#### *Tasks and Activities Once Every 1–2 Months during the Growing Season*

- Mow grass in grid paver applications.

#### *Tasks and Activities As Needed*

- Stabilize the CDA to prevent erosion.
- Remove any soil or sediment deposited on the pavement.
- Replace or repair any pavement surfaces that are degenerating or spalling.

#### *Semi-annual - Quarterly Tasks and Activities (depending on use)*

- Mechanically sweep pavement with a standard street sweeper to prevent clogging.

#### *Annual Tasks and Activities*

- Conduct a maintenance inspection.
- Spot weed for grass applications.

#### *24-36 Month Tasks and Activities*

- Remove any accumulated sediment in pre-treatment cells and inflow points.

#### *De-Clogging Tasks and Activities*

- Conduct maintenance using a regenerative street sweeper or a vacuum sweeper.
- Replace any necessary joint material.

## **Bioretention**

Standing water is the most common problem in bioretention facilities. If water remains on the surface for more than 72 hours after a storm, adjustments to the grading or underdrain repairs may be needed. The surface of the filter bed should also be checked for accumulated sediment or a fine crust that builds up after the first several storm events. There are several methods that can be used to rehabilitate the filter:

- Open the underdrain observation well or cleanout and pour in water to verify that the underdrains are functioning and not clogged or otherwise in need of repair. The purpose of this check is to see if there is standing water all the way down through the soil. If there is standing water on top, but not in the underdrain, then there is a clogged soil layer. If the underdrain and standpipe indicate standing water, then the underdrain must be clogged and will need to be cleaned out.
- Remove accumulated sediment and till 2 to 3 inches of sand into the upper 6 to 12 inches of soil.

- Install sand wicks from 3 inches below the surface to the underdrain layer. This reduces the average concentration of fines in the media bed and promotes quicker drawdown times. Sand wicks can be installed by excavating or auguring (i.e., using a tree auger or similar tool) down to the top of the underdrain layer to create vertical columns which are then filled with a clean open-graded coarse sand material (e.g., ASTM C-33 concrete sand or similar approved sand mix for bioretention media). A sufficient number of wick drains of sufficient dimension should be installed to meet the design dewatering time for the facility.
- Remove and replace some or all of the soil media.

Additional recommended maintenance activities are as follows:

#### *Quarterly Tasks and Activities*

- Mow grass filter strips and bioretention with turf cover.
- Spot weed, remove trash, and rake the mulch.
- Supplement mulch to maintain a 3-inch layer.
- Prune trees and shrubs.
- Remove sediment in pretreatment cells and inflow points.
- Add reinforcement planting to maintain desired vegetation density.
- Remove invasive plants using recommended control methods.
- Remove any dead or diseased plants.
- Stabilize the contributing drainage area to prevent erosion.

### **Sand Filters**

The maintenance of filters is required and involves several routine maintenance tasks. Cleanup should be scheduled at least once a year to remove trash and floatables that accumulate in the pretreatment cells and filter bed. Frequent sediment cleanouts in the dry and wet sedimentation chambers are recommended every 1 to 3 years to maintain the function and performance of the filter. If the filter treats runoff from a stormwater hotspot, crews may need to test the filter bed media before disposing of the media and trapped pollutants. Petroleum hydrocarbon contaminated sand or filter cloth must be disposed of according to District solid waste disposal regulations. Testing is not needed if the filter does not receive runoff from a designated stormwater hotspot, in which case the media can be safely disposed of in a landfill. Additional recommended maintenance activities are as follows:

#### *Semi-annual Tasks and Activities*

- Check for oil, trash, and sediment accumulation in the first chamber.
- Stabilize the contributing drainage area and side-slopes to prevent erosion.

#### *Monthly Tasks and Activities*

- Remove blockages and obstructions from inflows. Trash collected on the grates protecting the inlets shall be removed regularly to ensure the inflow capacity of the stormwater facility is preserved.

#### *Annual Tasks and Activities*

- Dig a small test pit in the filter bed to determine whether the first 3 inches of sand are visibly discolored and need replacement.
- Check to see if inlets and flow splitters are clear of debris and are operating properly.
- Check concrete structures and outlets for any evidence of spalling, joint failure, leakage, corrosion, etc.
- Ensure that the filter bed is level and remove trash and debris from the filter bed. Sand or gravel covers should be raked to a depth of 3 inches.

#### *5-year Tasks and Activities*

- Replace the top sand layer.
- Till or aerate surface to improve infiltration/grass cover.

### **Storage Facilities**

Maintenance requirements for underground storage facilities will generally require quarterly visual inspections by a qualified staff/professional from the manhole access points to verify that there is no standing water or excessive sediment buildup. Entry into the system for a full inspection of the system components (pipe or vault joints, general structural soundness, etc.) should be conducted annually. Confined space entry credentials are typically required for this inspection. Additional recommended maintenance activities are as follows:

#### *As Needed Tasks and Activities*

- Water dry pond side slopes to promote vegetation growth and survival.
- Remove sediment and oil/grease from inlets, pretreatment devices, flow diversion structures, storage facilities, and overflow structures.
- Ensure that the contributing drainage area, inlets, and facility surface are clear of debris.
- Ensure that the contributing drainage area is stabilized. Perform spot-reseeding where needed.
- Repair undercut and eroded areas at inflow and outflow structures.

#### *Annual Tasks and Activities by Catholic University Responsible Parties*

- Measure sediment accumulation levels in the forebay. Remove sediment when 50% of the forebay capacity has been lost.
- Inspect the condition of stormwater inlets for material damage, erosion or undercutting. Repair as necessary.
- Inspect the banks of upstream and downstream channels for evidence of sloughing, animal burrows, boggy areas, woody growth, or gully erosion that may undermine pond embankment integrity.
- Inspect outfall channels for erosion, undercutting, rip-rap displacement, woody growth, etc.
- Inspect condition of principal spillway and riser for evidence of spalling, joint failure, leakage, corrosion, etc.
- Inspect condition of all trash racks, reverse sloped pipes or flashboard risers for evidence of clogging, leakage, debris accumulation, etc.
- Inspect maintenance access to ensure it is free of debris or woody vegetation, and check to see whether valves, manholes, and locks can be opened and operated.
- Inspect internal and external side slopes of dry ponds for evidence of sparse vegetative cover, erosion, or slumping, and make needed repairs immediately.
- Monitor the growth of wetlands, trees, and shrubs planted in dry ponds. Remove invasive species and replant vegetation where necessary to ensure dense coverage.

### **Proprietary Facilities: Stormceptors and Baysavers**

In order to ensure the effective and long-term performance of a proprietary facility, regular maintenance tasks and inspections are required. All proprietary facilities should be inspected by a qualified staff/professional and maintained in accordance with the manufacturer's instructions and recommendations and any maintenance requirements associated with the device's verification by DDOE.

## **Stormceptors**

For optimum performance, the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, which is approximately 15% of the unit's total storage capacity. The frequency should be adjusted based on historical inspection results due to variable site pollutant loading. Sediment removal is easier when removed on a regular basis at or prior to the recommended maintenance sediment depths, as sediment build-up can compact making removal more difficult.

The unit should be cleaned out immediately after an oil, fuel, or chemical spill.

### *Semi-annual Tasks and Activities*

- Stormceptor is to be inspected from grade through a standard surface manhole access cover.
- Conduct an inspection of sediment and oil depth with a sediment probe and oil dipstick. If total storage is more than 15% full, conduct maintenance activities.
- Conduct a visual inspection of the internal components of the system.

### *Annual/ Maintenance Tasks and Activities*

- Remove build-up using a vacuum truck.
- Conduct maintenance during dry weather conditions when no flow is entering the unit.

## **Baysaver**

### *Semi-annual Tasks and Activities*

- Check the depth of sediment in each manhole with a grade stick or similar device. Maintenance is required when the sediment depth in either manhole exceeds 2 feet.

When maintenance is required, complete the following tasks:

#### Contaminant Storage Manhole

- Remove the entire volume of the contaminated water by vacuum truck.
- Clean the manhole walls and flush out the manhole using a high-pressure hose and remove water by a vacuum truck. Ensure the manhole is clean.

#### Primary Separation Manhole

- Using a submersible pump, pump the clean water from the center of the manhole directly into the empty storage manhole until the water levels fall to 1 foot above the sediment layer.
- Remove the settled sediment and remaining water by a vacuum truck.
- Clean the manhole walls and flush out the manhole using a high-pressure hose and remove flushing water by a vacuum truck. Make certain manhole is clean.
- Contaminated material removed from the manholes must be disposed of responsibly and legally by the operator of the vacuum truck.

## **3. Compliance**

The Self-Inspection & Self-Reporting (SISR) program is an effort by DOEE to maintain stormwater facilities more consistently and enlist their owners to perform necessary inspections of their own facilities. Having stormwater facilities that are regularly inspected and well-maintained contributes to the District's efforts to meet its sustainability goal of swimmable and fishable waterways. This work also helps improve the quality, health, and safety of water in the Anacostia and Potomac rivers, Rock Creek

and their surrounding areas. It is also in the interest of property owners like Catholic University to perform their own inspections.

At Catholic University, many of the SWBMPs can be inspected and maintained by a mixture of staff and consultants. It will be up to the discretion of the Facilities Maintenance and Operations and Environmental Health & Safety departments to determine which inspections and maintenance activities can be completed in-house versus with the help of outside contractors. As it pertains to safety, complexity and/or time constraints, outside consultants will be used to inspect and maintain:

- Rainwater harvesting (cisterns)
- Rainwater harvesting (rain barrel)
- Bioretentions
- Sand Filters
- Storage Facilities
- Baysavers
- Stormceptors

**At a minimum, Catholic University will complete the SISR protocol of all SWBMPs on an annual basis.**

Additionally, certain documentation needs to be in place within the first five years of a stormwater facility being constructed. To be eligible for SISR, plans must have an as-built set of engineering drawings that include a certification that the project was completed and that it was built as designed. Also, an initial inspection of the stormwater facility is required by DOEE. These two conditions must be met within the first years of a stormwater facility being constructed. If after five years either the as-built is missing or the stormwater facility has not been inspected by DOEE, then it is no longer eligible for SISR.

## **Inspection Process**

The steps necessary for SISR are outlined in the sections below. The primary tasks that need to be completed include:

- Accessing the database
- Locating the stormwater facilities
- Conducting the inspection.

### **Accessing the Database**

Visit the Stormwater Database at <https://octo.quickbase.com>.

Once signed into the account, the Responsible Party can:

- View all approved SWMPs associated with Catholic University.
- Submit the inspection and maintenance reports associated with Catholic University's facilities.
- View previous inspections and maintenance reports.
- Grant access to someone who will conduct inspections and/or maintenance on Catholic University's behalf.

### **Conducting the Assessment**

After identifying the location of the stormwater facilities, the Responsible Party can begin the inspection. However, the ability to proceed is weather dependent. Assessments should not occur while it is raining or within 72 hours of a rain event. If it has been less than 72 hours from the last rainfall event, the

Responsible Parties must wait to perform the inspection.

### **Complete the Inspection Report**

This assessment process involves making visual observations of the stormwater facility and surrounding area, as well as submitting answers to inspection questions. The stormwater facility-specific inspection questions will dictate what sort of conditions and features the Responsible Parties should look for.

The following information will be requested in the inspection report:

- Owner Information
- Facility Information
- Inspection Information
- Inspection Tasks
- Photos
- Supporting Documents

### **Submitting the Inspection**

If maintenance is not required or already completed, the Responsible Parties may finish the SISR process by submitting the report via the stormwater database. If maintenance is required and has not been completed, the Responsible Parties must first complete maintenance and then submit the report with supporting documentation.

After the Responsible Parties have finished going through all of the inspections questions, review the answers. Before the report can be submitted, the Responsible Parties will be asked to confirm that all answers were answered and entered as intended. The Responsible Parties will need to read the final statement and declare that all of the provided information is accurate.

## **SECTION 3: PERFORMANCE METRIC**

The plan's initial performance metric will be to achieve 100% compliance with the District of Columbia's Department of Energy and the Environment (DOEE) Self-Inspection / Self-Reporting for Stormwater Management Best Practices Facilities.

The party(s) responsible under Section (4) shall periodically evaluate the success of this plan's implementation. This may include:

- Providing a report on an annual basis to senior management within the Facilities Planning and Management Division.
- Completing property management tasks and activities at regular intervals.
- Reporting annually to DOEE's Self-Inspection & Self-Reporting (SISR) program.

## **SECTION 4: RESPONSIBLE PARTIES**

The Facilities Maintenance and Operations Team is primarily responsible for executing the scope of the stormwater management plan. The responsibilities are outlined below:

- Marcus Lucas, Senior Director: Provides managerial support for the stormwater management tasks within the FMO Team.
- Alexandra Harry, Assistant Director: Executes the successful completion of the SISR program with DOEE approval; directs grounds team to inspect and maintain existing SWBMP facilities as needed.
- Stormwater Vendor: Vendor will inspect and document the majority of the SWBMP facilities for DOEE

- compliance.
- Grounds Team: Completes preventative maintenances for selected SWBMP facilities.

## SECTION 5: Resources

- [Self-inspection / Self-reporting Guidance Manual For Stormwater Management Best Practices Facilities](#): DOEE's guide on self-inspection/ self-reporting.
- [Stormwater Management Facility Maintenance FAQs](#): Frequently asked questions on stormwater maintenance.
- [Stormwater Management at Catholic University](#): DOEE's presentation on stormwater inspection and maintenance protocol at Catholic University.
- [SWMBMP at Catholic University](#): Excel spreadsheet listing all of the BMPs on campus.

## SECTION 6: TIME PERIOD

This policy shall take effect on October 2019, and shall continue indefinitely or until amended and/or replaced by a subsequent sustainable stormwater management policy.

Distribution: Vice President for Finance & Treasurer  
Compliance Office  
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Associate Vice President, Facilities Planning & Management  
Facilities Maintenance & Operations Staff  
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