

A draft stormwater agreement requiring
maintenance for all stormwater Best
Management Practices (BMPs)

DRAFT STORMWATER MAINTENANCE AGREEMENT

Stormwater Equipment
Manufacturers Association

www.stormwaterassociation.com
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NOTICE:

This is a draft Stormwater Agreement for use by state and local government agencies in setting an ordinance requiring the maintenance of all stormwater Best Management Practices BMPs. Stormwater BMP's are practices whether land-based, proprietary or natural that provide a level of treatment and/or storage to improve the water quality of our watershed. These practices in one form or another are installed on every project. Like a car, these practices require routine maintenance and inspection to continue to function as intended. The Stormwater Equipment Manufacturers Association (SWEMA) recommends that any organization or person using this draft ordinance consult with their legal counsel to ensure the provisions contained in this document are in compliance with local laws and state requirements.

Maintenance:

The Stormwater Equipment Manufacturers Association is a strong advocate for the proper maintenance of all Best Management Practices (BMPs) used for stormwater systems. All systems require maintenance regardless of the type of BMP installed. The maintenance requirements vary with each BMP and should be tailored according to system and site specific needs. The owner of the BMP should be aware of the annual maintenance costs associated with each BMP and should consider these in establishing the long term operations and maintenance plan.

Operation and Maintenance Agreement

The Operation and Maintenance (O&M) Agreement for a site is comprised of the following elements:

1. An Inspection and Maintenance Agreement signed by the developer or BMP owner.
2. A Long-term Maintenance Plan written by the design engineer or plan designer. The Maintenance Plan must include a description of the stormwater system and its components, inspection priorities, inspection schedule for each component, and a schematic for each BMP.
3. Drawing of easements on a plat or a system location map to enable owner or municipality to locate BMPs as needed.

A sample Operation and Maintenance Agreement is contained in this document that includes templates for inspection checklists for each type of structural BMP, including water quality buffers. The inspection checklists can also serve as an inspection report for each facility. As noted above, inspection priorities and schedules for each BMP type must be submitted to the designated authority when required by the owner or municipality, as a component of the long-term maintenance plan for the site. These templates are general guidelines and may be modified by the design engineer or plan designer as needed for site specific conditions.

INSPECTION and MAINTENANCE AGREEMENT for STORMWATER FACILITIES

Permit number: _____

Map & parcel number: _____

Project Name & Address:

THIS AGREEMENT, made this _____ day of _____, 20__, by and between (*insert full BMP owner's name*) _____, hereinafter referred to as the "OWNER(S)" of the following property and (NAME OF GOVERNMENT AGENCY) hereinafter referred to as the "AGENCY."

WITNESSETH, that

WHEREAS, the Landowner is the owner of certain real property, with full authority to execute deeds, mortgages, other covenants, do hereby covenant with the AGENCY and agree as follows:

1. The OWNER(S) covenant with the AGENCY that the OWNER(S) shall provide for adequate long term maintenance and continuation of the stormwater control measures described in the SWPPP (Stormwater Pollution Prevention Plan) and shown in the location map, deed of easement drawing or plat attached hereto to ensure that the facilities are and remain in proper working condition in accordance with approved design standards, rules and regulations and applicable laws. The OWNER(S) shall perform preventative maintenance activities at intervals described in the inspection schedule included in the Operations and Maintenance Plan along with necessary landscaping (grass cutting, etc.) and trash removal as part of regular maintenance.
2. The OWNER shall submit to the AGENCY an annual report by ____ (define the due date) each year. The report shall include the Operations and Maintenance Plan that documents the inspection schedule, times of inspection, remedial actions taken to repair, modify or reconstruct the system, the state of control measures and notification of any planned change in responsibility for the system.
3. The OWNER(S) shall grant to the AGENCY or its agent or contractor the right of entry at reasonable times and in a reasonable manner for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the facility.

4. The OWNER shall grant to the AGENCY the necessary easements and rights-of-way and maintain perpetual access from public rights-of-way to the facility for the AGENCY or its agent and contractor.
5. If, upon inspection, the AGENCY finds that OWNER(S) has failed to properly maintain the facilities, the AGENCY may order the work performed within ____ days. In the event the work is not performed within the specified time, the OWNER(S) agrees to allow the AGENCY to enter the property and take whatever steps it deems necessary to maintain the stormwater control facilities. This provision shall not be construed to allow the AGENCY to erect any structure of a permanent nature on the land of the OWNER(S) without first obtaining written approval of the OWNER(S).
6. The AGENCY is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the AGENCY. The OWNER(S) shall reimburse the AGENCY upon demand the costs incurred in the maintenance of the facilities.
7. If the OWNER fails to pay the AGENCY for the above expenses after ____ days written notice, the OWNER authorizes the AGENCY to collect said expenses from the OWNER through appropriate legal action and the OWNER shall be liable for the reasonable expenses of collection, court costs, and attorney fees.
8. The OWNER(S) and the OWNER(S) heirs, administrators, executors, assigns and any other successor interest shall indemnify and hold harmless the AGENCY and its officers, agents and employees for any and all damages, accidents, casualties, occurrences, claims or attorney's fees which might arise or be asserted, in whole or in part, against the AGENCY from the construction, presence, existence, or maintenance of the stormwater control facilities subject to the Agreement. In the event a claim is asserted against the AGENCY, its officers, agents or employees, the AGENCY shall notify OWNER(S) and the OWNER(S) shall defend at OWNER(S) expense any suit based on such claim. If any judgment or claims against the AGENCY, its officers, agents or employees, shall be allowed, the OWNER(S) shall pay all costs and expenses in connection therewith. The AGENCY will not indemnify, defend or hold harmless in any fashion the OWNER(S) from any claims arising from any failure, regardless of any language in any attachment or other document that the OWNER(S) may provide.
9. The OWNER(S) shall not be able to transfer, assign or modify its responsibilities with respect to this agreement without the AGENCY's written prior consent. Nothing herein shall be construed to prohibit a transfer by OWNER(S).
10. No waiver of any provision of this Agreement shall affect the right of any party thereafter to enforce such a provision or to exercise any right or remedy available.
11. The OWNER(S) shall record a plat showing and accurately defining the easements for stormwater control facilities. The plat must reference the Instrument Number where this

Agreement and its or attachments are recorded and contain a note that the OWNER(S) is responsible for maintaining the stormwater management facilities.

12. The OWNER(S) shall record that Agreement in the Office of the Register of Deeds for the county of _____, state____, and the Agreement shall constitute a covenant running with the land and shall be binding upon the OWNER(S) and the OWNER(S) heirs, administrators, executors, assigns and any other successors in interest.

Attest by OWNER(S)

OWNER(S) Signature

OWNER(S) Signature

OWNER(S) Print Name

OWNER(S) Print Name

Date

Date

STORMWATER BMP MAINTENANCE GUIDELINES

The required maintenance interval for stormwater BMPs are often dependent upon the degree of pollutant loading from a particular drainage basin. BMP maintenance can best be broken into three categories: **inspection**, **routine maintenance**, and **major maintenance**. Though each BMP type has its own unique characteristics, **inspections** will generally consist of an assessment to assure its functionality and the general condition. **Routine maintenance** will generally consist of trash and vegetation removal, unclogging of drains, minor sediment removal and exchange of filter media where applicable. **Major maintenance** will be completed as required from inspections and generally consists of significant reconstruction due to failures in the BMP. Examples of Major Maintenance include dredging, excavation, removal of existing media, replacing fabric, replacing the under-drain, and reestablishment of vegetation. The following schedule is offered as a guideline for performing **Inspection** and **routine maintenance** for a range of BMP categories.

BMP	Inspection Frequency	Routine Maintenance Frequency
<i>Inspection Frequency key: A = annual; M=monthly; S=after major storms; Q=Quarterly; SA=Semi Annually</i>		
Bioretention Systems	A, S	2 x /year
Cartridge or Module Media Filtration Structures	SA	1 – 2 x /year
Catch Basin Inserts (long term)	Q	3 – 4 x /year
Dry Pond	M	3 – 4 x /year
Dry Wells	A	1 x /year
Filter Strips or Swales	M	2 – 3 x /year
Green Roofs	SA; S	2 – 3 x /year
Hydrodynamic or Gravity Separators	SA	1 – 2 x /year
Infiltration Trenches	A; S	2 – 3 x /year
Permeable Pavement	A	2 – 3 x /year
Rainwater Gardens	SA; S	2 – 3 x /year
Rainwater Harvesting	SA; S	2 – 3 x /year
Sand Filter	Q first year; SA after	1 – 2 x / year
Trash & Debris Screens	SA; S	2 – 3 x /year
Underground Storage Facilities	SA	1 x /year
Wetlands	SA	2 x /year
Wet Pond	Q	2 – 3 x /year

Above table developed by SWEMA as a general reference or guideline.

STORMWATER BMP MAINTENANCE COST ESTIMATES

In a 2017 report sponsored by the Municipal Water Infrastructure Council and the Environmental and Water Resources Institute of the American Society of Civil Engineers, Clary and Piza¹ published a synthesis of costs associated with maintaining green infrastructure (GI). Clary's primary focus for the survey report was to compile data to support whole-life cost estimates of various small-scale GI technologies, emphasizing on the maintenance costs of those systems. Stormwater authorities across the United States contributed their data to Clary's report; at the time of the survey however, it was evident that access to small-scale GI maintenance cost data were relatively limited.

An analysis of the Clary report is shown below with the goal presenting the data arranged by type of BMP GI technology and normalized to dollar per square foot of the facility. Figure 1 interprets the summary table in a visual format, emphasizing the range of annual maintenance costs for the given GI BMP. The data from the summary table was further normalized in Figure 2 for the estimated stormwater loading rate of each GI system in cubic feet per second to the annual maintenance cost amount. The subsequent tables provide the data behind these charts.

As apparent from Clary's original report, some GI systems offer a wide range of annual maintenance costs for the same GI type. Maintenance costs of any GI system is subject to variables that ultimately impact the overall cost amount, such as listed in Clary's report, but not limited to: the variability of year to year costs, location and social economies, dry vs. wet climates and microclimates (shaded vs. direct sunlight), area of facility prone to natural disasters (drought, flooding, etc.), frequency of performed maintenance of the facility, surrounding land-use of the facility, age of facility, and level of desired maintenance and design of the facility. It should also be noted that most facilities require a minimum maintenance cost regardless of facility size. In addition, economies of scale are expected for larger facilities, so there are some limitations of a normalized cost per square foot approach, leading to the possibility of maintenance cost tools to overestimate the cost.

The maintenance costs of manufactured BMPs are less variable due to the controlled conditions within the device. The volume of water to be disposed of along with any spent filtration media can be estimated and budgeted for on a predictable schedule. Additionally, regular maintenance on a manufactured BMP returns the system to a "like new" condition, readying it for another year of service.

Reference 1: Clary, J., & Piza, H. (2017). (publication). *Cost of Maintaining Green Infrastructure* (pp. 53–70). Reston, VA: American Society of Civil Engineers.

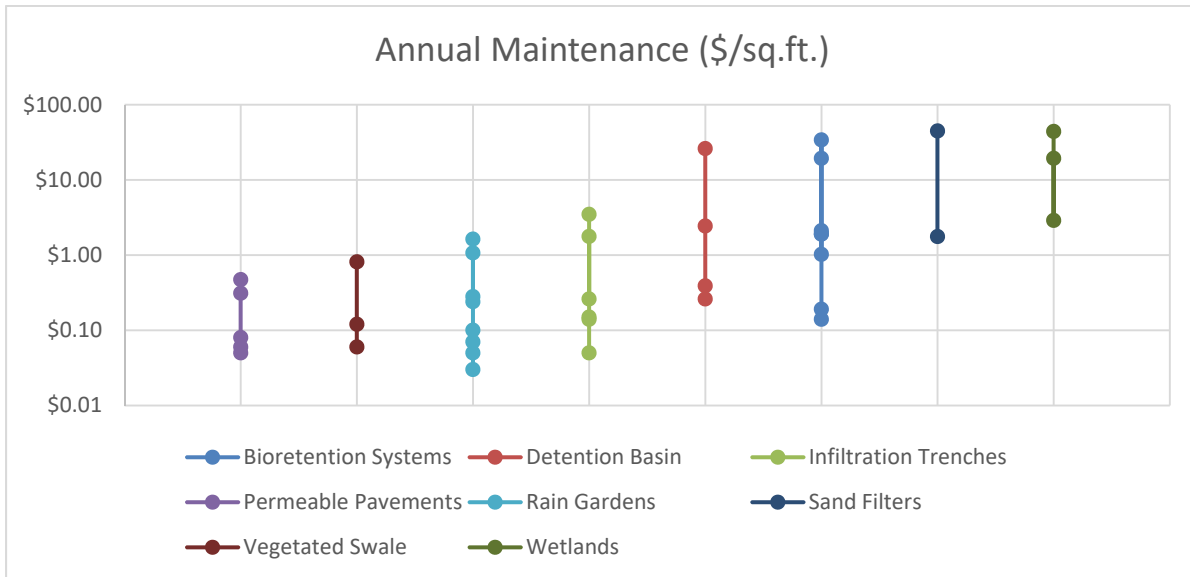


Figure 1. Annual Maintenance Costs per square foot of BMP facility

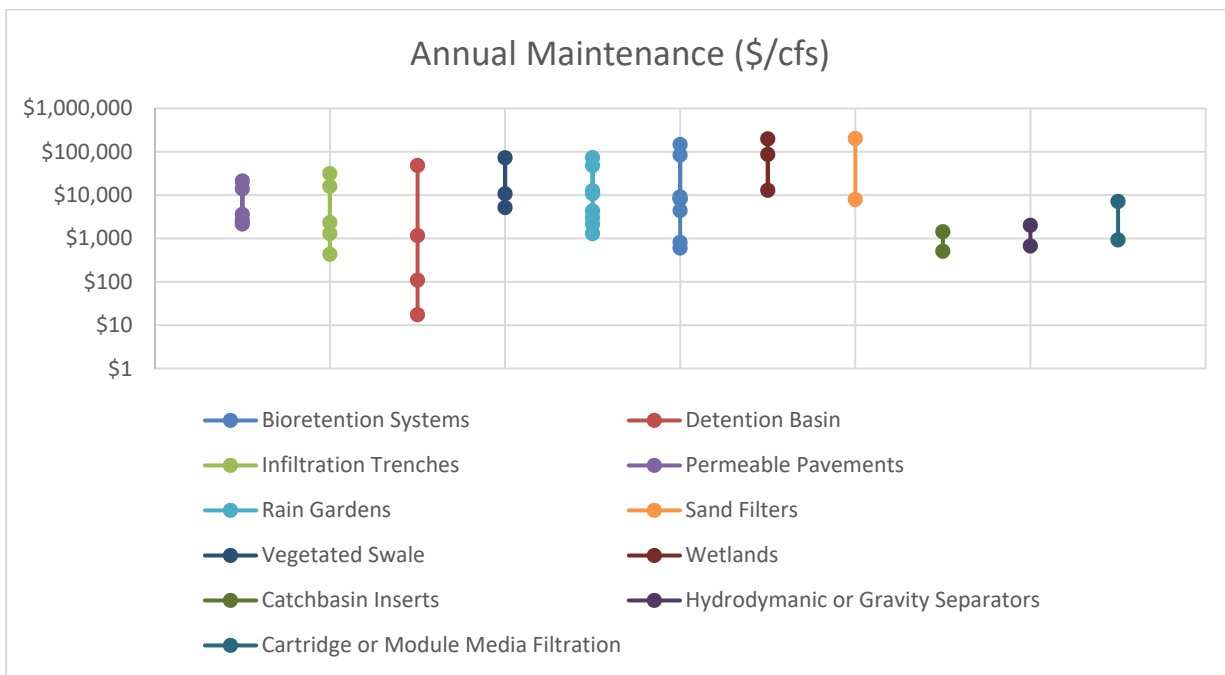


Figure 2. Annual Maintenance Costs per CFS of water treatment

Table 1: Data from the Cost Estimating Tools Surveyed (Clary and Piza, 2017)

BMP TYPE	\$ YEAR	LOW (\$/sq.ft.)	HIGH (\$/sq.ft.)	ORIGINAL BMP TYPE	SOURCE
Bioretention Systems	2005		\$1.91	Dry Pond	UNHSC
	2005	\$0.14	\$2.11	Bioretention	UM & Minn. DOT
	2009		\$19.33	Bioretention	UDFCD Realcost Tool
	2003		\$33.89	Bioretention in clay/sandy soils	NCSU Biological & Agricultural Engineering
	2005		\$1.89	Bioretention	UNHSC
	2005	\$0.19	\$1.02	Retention Basin	UM & Minn. DOT
Detention Basin (estimated max. depth 10 ft)	2005	\$0.26	\$0.39	Detention Basin	UM & Minn. DOT
	2005		\$2.43	Wet Pond	UNHSC
	2003		\$26.01	Wet Pond	NCSU Biological & Agricultural Engineering
Infiltration Trenches	2014	\$0.05	\$1.77	Infiltration Basin	EPA Stormwater Calculator
	2005	\$0.15	\$0.26	Infiltration Trench	UM & Minn. DOT
	2005	\$0.14	\$3.47	Infiltration Basin	UM & Minn. DOT
Permeable Pavement	2014	\$0.05	\$0.08	Reducing directly connected impervious area	EPA Stormwater Calculator
	2014	\$0.06	\$0.31	Permeable Pavement	EPA Stormwater Calculator
	2005		\$0.47	Porous Asphalt	UNHSC

BMP TYPE	\$ YEAR	LOW (\$/sq.ft.)	HIGH (\$/sq.ft.)	ORIGINAL BMP TYPE	SOURCE
Rain Garden	2014	\$0.03	\$0.28	Green Roof	EPA Stormwater Calculator
	2014	\$0.07	\$1.63	Rain Garden	EPA Stormwater Calculator
	2014	\$0.05	\$1.07	Street Planter	EPA Stormwater Calculator
	2014	\$0.10	\$0.24	Rainwater Harvesting	EPA Stormwater Calculator
Sand Filters	2003		\$1.76	Sand Filters	NCSU Biological & Agricultural Engineering
	2005		\$44.67	Sand Filters	UNHSC
Vegetated Swale	2014	\$0.06	\$0.12	Vegetated Swale	EPA Stormwater Calculator
	2005		\$0.81	Vegetated Swale	UNHSC
Wetlands	2009		\$19.33	Constructed Wetlands	UDFCD Realcost Tool
	2005		\$2.88	Gravel Wetlands	UNHSC
	2003		\$43.93	Stormwater Wetlands	NCSU Biological & Agricultural Engineering

Table 2: Reported cost of annual maintenance². Range based on range of available unit sizes.

BMP TYPE	Avg \$ YEAR	LOW (\$/sq.ft)	HIGH (\$/sq.ft)
Catch basin Inserts (1.3-16 sq.ft.)	2007	\$34	\$96
Hydrodynamic or Gravity Separators (12.6-78.5 sq.ft)	2002	\$45	\$135
Cartridge or Module Media Filtration (12.6-96 sq.ft)	2004	\$31	\$238

Reference 2: International BMP Database, “Urban BMP O&M Cost Database”, Referenced 2022, Reston, VA: American Society of Civil Engineers.

Table 3: Estimated loading rates for BMPs

BMP TYPE	Est. Loading Rate (in/h)	Est. Loading Rate (gpm/sq.ft.)
Bioretention Systems	10	0.1
Detention Basin		10
Infiltration Trenches	5	0.05
Permeable Pavement	1	0.01
Rain Garden	1	0.01
Rainwater Harvesting	1	0.01
Sand Filters	10	0.1
Vegetated Swale	0.5	0.005
Wetlands	10	0.1
Catchbasin Inserts		30
Hydrodynamic or Gravity Separators		30
Cartridge or Module Media Filtration		15