

Stormwater GIS 2NDNATURE

A simple and effective way to organize essential stormwater data with GIS

Asset Type	Asset SubType	Map Symbol	Treatment Process	Reduces Volume	Reduces Concentration	Conveyance	Definition	Other Common Names	
Structural BMP Structural best management practice (sBMP). An engineered stormwater control structure designed to accept, attenuate, and treat a known drainage area for the defined design storm standard.	Bed Filter	BF	+	☐	☐	☐	A large regional structure that uses granular media (e.g., sand, activated alumina, or proprietary media) to actively filter stormwater to remove stormwater pollutants. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. No volume reduction occurs due to the impervious base. May be a confined space.	Underground Sand Filter Surface Sand Filter Perimeter Sand Filter Organic Media Filter	
	Detention Basin	DT	☑	☐	☐	☐	A large regional basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. One or more outflow orifices may exist, but at least one is located at the base of the basin to allow complete draining between storms. Design treatment capacity and drawdown time are critical design specifications that will vary asset to asset. No volume reduction occurs due to the impervious base. Vegetation may or may not be present. A confined space detention basin is likely a treatment vault.	Detention Pond (impervious)	
	Media Filter	MF	+	☐	☐	☐	A large regional underground flow-through structure that filters stormwater through a membrane or other media. Media or membrane types may be selected to target the specific removal of the pollutants of concern. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. No volume reduction occurs due to the impervious base. Designs vary and likely a confined space.	Proprietary Subsurface Filtration Systems: Stormfilter Perk Filter™ Jellyfish™	
	Treatment Vault	TV	☑	☐	☐	☐	A proprietary subsurface flow-through structure that physically separates sediment, trash, leaf litter, debris, and other pollutants from stormwater utilizing different separation and settling techniques. The material is retained within the structure until removed. No volume reduction occurs due to an impervious base. Proprietary designs can vary and likely a confined space.	Hydrodynamic Separator (e.g., Vortechs, CDS, DVS) Wet Vault, Detention Vault, Flow Separation Vault, Gross Solids Retention Devices, Large Scale Settling Basins	
	Cistern	CT	☑	☐	☐	☐	A cistern is designed to capture and retain rainwater runoff from rooftops, driveways, and other impervious surfaces and to prevent it from entering the storm drain system. Cisterns are typically made of concrete, plastic, or metal and can range in size from small underground tanks to large above-ground containers. The water is captured and reused for various purposes, such as irrigation, flushing toilets, and washing clothes, reducing the demand for potable water.	Rainwater Tank Stormwater Storage Tank Rain Catcher	
	Green Stormwater Infrastructure (GSI) sBMP types that rely upon nature-based treatment processes such as biogeochemical cycling or infiltration . Incorporation of GSI delivers water resiliency benefits to the community.	Infiltration Basin	IB	☑	☐	☐	A large regional structure with a highly permeable substrate (aggregate or rock) designed to store and infiltrate significant volumes of stormwater. Little to no surface detention storage. Vegetation distribution should be minimal and preferably absent. May be a confined space.	Large-Scale Infiltration Feature Underground Infiltration System Infiltration Chamber	
		Dry Basin	DB	☑	☐	☐	☐	A large regional basin with inlets and outlets that detains stormwater to reduce peak flows and improve water quality downstream. Water drains out through one or more outlets, but at least one outlet orifice is located at the base to allow complete draining between storms. Longer drawdown times help capture particulate pollutants. Design treatment capacity and drawdown time are key specifications that vary. The pervious base allows water to soak in. The basin may have grass and trees but wetland or riparian plant species are absent.	Extended Detention Basin Dry Pond Pervious Detention Pond
		Retention Basin	RB	☑	☐	☐	☐	A large regional open-air basin with discrete inlets designed to retain a large volume of stormwater runoff in a persistent pool. A bypass outlet may exist, but a lower-elevation treated outlet does not. Long retention times result in volume reductions from evapotranspiration and lateral infiltration through the walls of the structure. Vegetation may or may not be present. Any vegetation is typically wetland/riparian species.	Retention Pond, Wet Detention Pond, Stormwater Management Pond Vernal Pond, Wet Infiltration Basin
		Wet Basin	WB	☑	☐	☐	☐	A large regional flow-through open-air basin with discrete inlets and outlets. It retains water in a persistent pool. One or more outflow orifices may exist at different elevations. The lowest outlet elevation defines the wet pool capacity. Dense wetland vegetation is usual, and different plants might be added. The base is often organic matter and silt, limiting infiltration. Volume reductions, if any, occur primarily by evapotranspiration.	Wet Pond, Retention Pond, Wetland Swale, Wet Extended Retention Pond, Stormwater Wetlands, Constructed Wetlands
		Bioretention	BR	☑	☐	☐	☐	A plant-filled structure that ponds, holds, and filters stormwater through a specialized soil media (ideally 18-24 inches thick). It relies upon a combination of physical, chemical, and biological processes to transform pollutants and improve effluent water quality. Unlike a biofiltration feature, it has a permeable base designed to let water soak in, reducing stormwater volume. Designs vary.	Biofilter Rain Garden (unlined) Self-Retaining Areas
	Multibenefits include: Flood hazard reduction Protection of water quality Lowering ambient temperatures to address urban heat islands Increasing green spaces to protect biodiversity Replenishing underground aquifers Restoring the natural hydrologic cycle	Biofiltration	BI	☑	☐	☐	A plant-filled structure that ponds, holds and filters stormwater through a specialized soil media (ideally 18-24 inches thick). It relies upon a combination of physical, chemical, and biological processes to transform pollutants and improve effluent water quality. Unlike bioretention, it has a lined base and all effluent discharges through an underdrain. Designs vary.	Lined Rain Garden, Urban Biofilter, Tree Box, TreePod, Filterra	
		Bioswale	BS	☑	☐	☐	☐	A vegetated area where stormwater flows spread naturally, with no outlet structure, using gentle slopes and dense vegetation for runoff filtration. Water treatment involves vegetation absorption and infiltration. It's a less engineered, variously sized, pervious system.	Grass Swale Grass Filter Strips Vegetated Buffer Strips Bioswales
		Green Roof	GR	☑	☐	☐	☐	A vegetated layer on the roof of a building where rainwater is passively filtered through a specialized soil media. Effluent discharges via an underdrain. Designs vary from shallow soil layers and simple plant cover to intensive green roofs with deep soil and a more diverse plant selection. No volume reduction occurs due to the impervious base.	Living Roof Vegetated Roof Ecoroofs
		Pervious Pavement	PP	☑	☐	☐	☐	Use of sustainable materials to create a durable, pervious surface overlaying a crushed stone base that allows stormwater to percolate and infiltrate the underlying soil. Pervious pavement designs may include an underlying reservoir to increase infiltration rates. The footprint across different assets can vary greatly, typically used for parking lots, sidewalks, driveways, or other hardscaped surfaces.	Permeable Pavement, Porous Asphalt, Pervious Concrete, Porous Aggregate, Pervious Pavers, Permeable Pavers
		Infiltration Feature	IF	☑	☐	☐	☐	A structure designed to put stormwater into the ground. Vegetation is absent. It can be a vertical well or a long horizontal trench filled with permeable materials to promote infiltration and recharge.	Infiltration Trench, Exfiltration Trench, Percolation Trench, French Drain, Roof Drip-Line Dry Well
Rain Barrel	RN	☑	☐	☐	☐	Closed storage to capture and retain rainwater runoff from an adjacent rooftop to prevent it from entering the storm drain system. Rain barrels are typically made of concrete, plastic, or metal, can range in size, and are commonly above ground. The water is captured and reused for various purposes, such as irrigation, flushing toilets, and washing clothes to reduce potable water demand.	Rainwater Collection System, Rainwater Tank, Rainwater Catcher, Water Barrel, Water Tank		
Filtration Device	FD	+	☐	☐	☐	A compact device placed in catch basins that filters stormwater through a chosen media, like a membrane, to eliminate specific pollutants. It regulates filtration by flow rate and releases treated water through an outlet or underdrain. No volume reduction due to an impervious base. Designs vary.	Filtration Device Proprietary Inserts Catch Basin Inserts Drain Inserts Inlet Filters Decentralized Media Filter		
Settling Basin	SB	☑	☐	☐	☐	A localized open air flow-through structure used to detain stormwater flow to settle out and retain debris, sediment, trash, and pollutants prior to outflow. The material is retained within the structure until removed. No volume reduction occurs due to the impervious base.	Settling Pond, Sediment Basin Decant Pond, Concrete Forebay, Forebay		
Catch Basin An inlet that conveys stormwater from the surface into the storm drain system.	Sediment Trap	ST	☑	☐	☐	A catch basin that includes a vertical sump at the base designed to retain debris, sediment, trash, and pollutants. The material is retained within the structure until removed. No volume reduction occurs due to the impervious base.	Drop Inlet with Sump Sediment Chamber, Small Hydrodynamic Separator, Bubble Up		
	Drop Inlet			☐	☐	☐	A catch basin where the base is at grade with the base of the adjacent lines. A drop inlet does not provide any water quality benefit.	Curb Cut Inlet	
Storm Drain A linear feature built to carry away excess stormwater.	Pipe			☐	☐	☐	A closed linear structure that conveys stormwater flows.		
	Open Channel			☐	☐	☐	Any permanent surface line that conveys stormwater runoff above ground and can be easily accessed. The base of an open channel may be impervious, permeable, or vegetated.		
	Culvert			☐	☐	☐	A closed linear structure that conveys stormwater under a road, trail, or similar flow obstruction.		
Outfall				☐	☐	☐	A specific point where flows from a municipal separate storm sewer system, exit a permitted boundary, or discharge directly to a defined receiving water. Outfalls include the outlets of pipes, structural BMPs, open channels, and other points of concentrated flow. Regulatory requirements may designate outlets that exceed a certain diameter or size threshold as a regulated outfall.	MS4 Stormwater Discharge Point	
Lift Station				☐	☐	☐	Assets designed to move stormwater from lower to higher elevation, primarily where the source's peak is insufficient for gravity flow or when gravity conveyance will result in excessive excavation depths and high construction costs.	Pump Station	
Manhole				☐	☐	☐	A vertical access shaft from the ground surface to a stormwater structure, usually at a junction, that allows for cleaning, inspections, and repairs. These are typically covered openings in a floor, pavement, or other surface, enabling field personnel to enter.	Utility Hole, Maintenance Hole	
Clean Out				☐	☐	☐	A vertical access shaft from the ground surface to a stormwater structure, usually at a junction, that allows for maintenance and cleaning.		

Pollutant Load = volume x concentration

Stormwater pollutant load reductions are achieved by reductions in volume, concentration, or both.

- Reduces Volume:** Less volume leaves the sBMP than comes in.
- Reduces Concentration:** Lower pollutant concentration flow out of the sBMP than flows in.
- Conveyance:** The physical flow of stormwater downslope that mitigates and does not induce localized flooding. Clogging and other causes of capacity loss can impact intended performance.

Structural BMP Treatment Processes: The predominant physical, chemical, or biological processes employed by structural stormwater BMP type to reduce downstream flood hazard and improve water quality.

- Infiltration**
The reduction of stormwater volumes and associated pollutant loading by retention of runoff volumes and recharge of stormwater back into the ground. Maintenance is likely required to sustain intended performance.
- Particle Capture**
The reduction of storm water pollutant concentrations and loads through physical mechanisms like ponding, vertical settling, flow separation etc. to retain pollutants. Maintenance is required to sustain intended performance.
- Media Filtration**
Similar to a water filter on a kitchen faucet, media filtration is a process by which stormwater volumes flow through a specific media designed to absorb and remove pollutant constituents present in stormwater. Maintenance is required to sustain intended performance.

- Biogeochemical Cycling**
Reduction of downstream stormwater pollutant loading by the promotion of naturally occurring biological, physical, and chemical interactions. These interactions include plants uptaking nutrients, microbial communities causing chemical transformations, particles attaching to surface vegetation and others. Maintenance is required to sustain intended performance.
- Capture and Reuse**
Diversion and collection of stormwater from the drainage system to re-purpose the collected water for various purposes such as irrigation, toilet flushing, industrial processes, cooling, and others that ultimately offset local demand on potable resources.



Additional Resources

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