

# Section VIII: Appendix

## Part A.

### GLOSSARY OF TERMS

#### 1% Annual Chance Storm

(also known as the 100-year storm) This size storm has a 1% chance of occurring in a given year. The 1% annual chance flood does not refer to a storm event that only happens once every 100 years.

#### Antecedent Moisture Content (AMC)

The quantity of moisture present in the soil at the beginning of a rainfall event. The Soil Conservation Service has three classifications, AMC I, II and III.

#### A.S.T.M.

American Society for Testing Materials

#### Backwater

The increased depth of water upstream of a restriction or obstruction, such as a dam, bridge or culvert.

#### Bankfull Flood

A condition where flow completely fills the stream channel to the top of the bank. In undisturbed watersheds, this occurs on average every 2 years and controls the shape and form of natural channels.

#### Barrel

The concrete or corrugated metal pipe that passes runoff from the riser through the embankment, and finally discharges to the pond's outfall.

#### Base Flow

The portion of stream flow that is not due to runoff from precipitation, usually supported by water seepage from natural storage areas such as ground water bodies, lakes or wetlands.

#### Best Management Practices (BMP)

A practice or combination of practices that prevent or reduce stormwater runoff and/or associated pollutants.

#### Bioretention

A water quality practice that utilizes landscaping and soils to treat stormwater runoff by collecting it in shallow depressions before filtering through a fabricated soil medium.

#### Borings

Cylindrical samples of soil profile used to determine infiltration capacity.

#### Buffer Strip

A zone where plantings capable of filtering stormwater are established or preserved, and where construction, paving and chemical applications are prohibited.

#### Catch Basin

A collection structure below ground designed to collect and convey water into the storm sewer system. It is designed so that sediment falls to the bottom of the catch basin and not directly into the pipe.

#### Check Dam

1. An earthen, aggregate or log structure, used in grass swales to reduce velocity, promote sediment deposition, and enhance infiltration.
2. A log or gabion structure placed perpendicular to a stream to enhance aquatic habitat.

#### Cistern

Containers that store large quantities of stormwater above or below ground. They can be used on residential, commercial, and industrial sites.

#### County Drain

An open or enclosed stormwater conveyance system that is under the legal jurisdiction of the Water Resources Commissioner's Office for construction, operation and maintenance.

#### Culvert

A closed conduit used for the passage of surface water under a road, or other embankment.

#### Curve Number (CN)

Determines the volume of stormwater removed from rainfall before runoff begins. It's based on land cover type, hydrologic condition, antecedent runoff condition and hydrologic soil group (HSG). The CN is a component in the NRCS Curve Number method for calculating storm runoff.

#### Design Storm

A rainfall event of specified size and return frequency, (e.g., a storm that occurs only once every 2 years). Typically used to calculate the runoff volume and peak discharge rate to or from a BMP.

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## Detention

The temporary storage of storm runoff, to control peak discharge rates and provide gravity settling of pollutants.

## Detention Basin

A constructed basin that temporarily stores water before discharging into a surface water body. Basins can be classified into four groups:

- 1. Dry Detention Basin**  
A basin that remains dry except for short periods following large rain storms or snow melt events. This type of basin is not effective at removing pollutants.
- 2. Extended Dry Detention Basin**  
A dry detention basin that has been designed to increase the length of time that stormwater will be detained, typically between 24-40 hours. This type of basin is not effective at removing nutrients such as phosphorus and nitrogen, unless some type of treatment is incorporated into the lower stage of the design (i.e., forebay, shallow marsh, etc.).
- 3. Wet Detention Basin**  
A basin that contains a permanent pool of water that will effectively remove nutrients in addition to other pollutants.
- 4. Extended Wet Detention Basin**  
A wet detention basin that has been designed to increase the length of time that stormwater will be detained, typically between 24-40 hours.

## Detention Time

The amount of time that a volume of water will remain in a detention basin.

## Discharge

The rate of flow or volume of water passing a point in a given time. Usually expressed as cubic feet per second (cfs).

## Disturbed Area

An area in which the natural vegetative soil cover has been removed or altered and is susceptible to erosion.

## Drainage area

The area of a watershed usually expressed in square miles or acres.

## Drawdown

The gradual reduction in water level in a pond BMP due to the combined effect of infiltration, evaporation and discharge.

## Dry well

Small infiltration pits or trenches filled with aggregate that receive clean runoff primarily from rooftops.

## Easement

A legal right, granted by a property owner to another entity, allowing that entity to make limited use of the property involved for a specific purpose. The Water Resources Commissioner secures temporary and permanent easements adjacent to county drains for the purpose of construction and maintenance access. Easements are recorded on the title to the land and transfer with the sale of land.

## Erosion

The wearing away of land surface by running water, wind, ice, or other geological agents.

## Extended Detention

A stormwater design feature that provides for the holding and gradual release of stormwater over a longer period of time than that provided by conventional detention basins, typically 24-40 hours. Extended detention allows pollutants to settle out before stormwater is discharged from the basin.

## Extended Detention Control Device

A horizontal pipe or series of pipes or vertical riser pipe designed to gradually release stormwater from a pond over a 24-40 hour interval.

## Fill

Added earth that is designed to change the contour of the land.

## Filter Fabric

Textile of relatively small mesh or pore size. The two major classifications are as follows:

- 1. Permeable.** This allows water to pass through while holding sediment back.
- 2. Impermeable.** This type prevents both runoff and sediment from passing through.

## First Flush

The delivery of a highly concentrated pollutant loading during the early stages of a storm, due to the washing effect of runoff on pollutants that have accumulated on the land. For the purposes of these Rules, first flush is the runoff from the first inch of precipitation.

## Floodplain

For a given flood event, that area of land adjoining a continuous watercourse that has been covered temporarily by water.

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## Flow Path

The distance that a parcel of water travels through a stormwater detention pond or wetland. It is defined as the distance between the inlet and outlet, divided by the average width.

## Flow Splitter

An engineered, hydraulic structure designed to divert a portion of stream flow to a BMP located out of the channel, or to direct stormwater to a parallel pipe system, or to bypass a portion of baseflow around a pond.

## Forebay

A small, separate storage area near the inlet to a detention basin, used to trap and settle incoming sediments before they can be delivered to the basin.

## Freeboard

The space from the top of an embankment to the highest water elevation expected for the largest design storm to be stored or conveyed. The space is required as a safety margin in a pond, basin or channel.

## French Drain

A subgrade drain consisting of a trench filled with aggregate to permit movement through the trench and into the soil. The trench may also contain perforated pipe to enhance the efficiency of the system.

## Gabion

A rectangular box of heavy gage wire mesh that holds large cobbles and boulders. Used in streams and ponds to change flow patterns, stabilize banks, or prevent erosion.

## Green Roof

Conventional rooftops that include a thin covering of vegetation allowing the roof to function more like a vegetated surface. The layer thickness varies between 2-6 inches and consists of vegetation, waterproofing, insulation, fabrics, growth media, and other synthetic components.

## Ground Water

Naturally existing water beneath the earth's surface between saturated soil particles and rock that supplies wells and springs.

## Ground Water Table

The upper surface or top of the saturated portion of the soil or bedrock layer, indicates the uppermost extent of groundwater.

## Hydraulic Radius

The area of a stream or conduit divided by its wetted perimeter.

## Hydrograph

A graph showing the variation in stage or discharge in a stream or channel, over time, at a specific point along the stream.

## Impervious Surface

A surface that prevents the infiltration of water into the ground such as roofs, streets, sidewalks, driveways, parking lots, and highly compacted soils.

## Infiltration

The absorption of water into the ground expressed in terms of inches/hour.

## Infiltration Capacity

The maximum rate at which the soil can absorb falling rain or melting snow. Usually expressed in inches/hour, or centimeters/second.

## Infiltration Practices

Best management practices (bed, trench, basin, well, etc.) that allow for rainfall to soak into the soil mantle.

## In-line Detention

Detention provided within the flow-carrying network.

## Invert

The elevation of the bottom interior surface of a conduit at any given cross section.

## Level-Spreader

A device used to spread out stormwater runoff uniformly over the ground surface as sheet flow i.e., not through channels. The purpose of level spreaders is to prevent concentrated, erosive flow from occurring, and to enhance infiltration.

## Locally Adapted Plants

A species that will thrive in local conditions. Local conditions include the hydrology, soil types and sunlight availability. Locally adapted species are often, but not limited to Michigan natives or cultivars of native species. For more information on individual species, see "Plants for Stormwater Design: Species Selection for the Upper Midwest" by Daniel Shaw & Rusty Schmidt.

## Low Impact Development (LID)

Activities that mimic a site's pre-development hydrology by using design techniques that are spatially distributed, decentralized micro-scale controls that infiltrate, filter, store, evaporate and detain runoff close to its source.

## Manhole

A structure that allows access into the sewer system.

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## Manning's Roughness Coefficient ("n")

A coefficient used in Manning's Equation to describe the resistance to flow due to the surface roughness of a culvert or stream channel.

## Mean Storm

Over a long period of years, the average rainfall event, usually expressed in inches.

## Mitigation

Making something less harsh or severe. LID mitigates by lessening the impacts of stormwater runoff from impervious surfaces.

## Multiple Pond System

A collective term for a cluster of pond designs that incorporate redundant runoff treatment techniques within a single pond or series of ponds. These pond designs employ a combination of two or more of the following: extended detention, permanent pool, shallow marsh or infiltration.

## Native Plants

Plants that historically co-evolved with the local ecology, geology and climate. Michigan Flora, [michiganflora.net](http://michiganflora.net), classifies plants as native or non-native species.

## Natural Wetland

Land characterized by the natural presence of water sufficient to support wetland vegetation.

## Non-point Source Pollution

Stormwater conveyed pollution that is not identifiable to one particular source, and is occurring at locations scattered throughout the drainage basin. Typical sources include erosion, agricultural activities, and runoff from urban lands.

## Non-structural BMPs

Stormwater runoff treatment techniques that use natural measures to reduce pollution levels that do not involve the construction or installation of devices (e.g. management actions).

## Off-line BMP

A water quality facility designed to treat stormwater that has been diverted outside of the natural watercourse or storm sewer system.

## Off-site Detention

Detention provided at a regional detention facility as opposed to storage on-site.

## One Hundred Year Flood (100-year flood)

The flood that has a 1 percent chance of occurring in any given year.

## Ordinary High Water Mark

The line between upland and bottomland which persists through successive changes in water level, below which the presence of water is so common or recurrent that the character of the soil and vegetation is markedly different from the upland.

## Orifice

An opening in a wall or plate.

## Peak Discharge

The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.

## Permeable

Allows liquid to pass through. Porous. Also pervious, the opposite of impervious.

**Pervious** See permeable.

## Pervious Pavement

An infiltration technique that combines stormwater infiltration, storage, and structural pavement that consists of a permeable surface underlain by a storage reservoir.

## Petition (Under P.A. 40 of 1956)

A legal request to the Water Resources Commissioner to perform maintenance or construction, or to establish a drainage district. Either the township or individual(s) can petition to have work performed or a district established.

## Pilot Channel

A riprap or vegetated low flow channel that routes runoff through a BMP to prevent erosion of the BMP surface.

## Planter Box

A device containing trees and plants near streets and buildings constructed to prevent stormwater from directly draining into sewers.

## Plat, Platting Process

A legal procedure, and the document that depicts it, whereby a larger piece of property is divided into smaller sections, and is accompanied by a full description of the original property, the dimension of each lot to be subdivided, and all relevant deed restrictions and easements.

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## Plunge Pool

A small permanent pool located at either the inlet to, or outfall from a BMP. The primary purpose of the pool is to dissipate the velocity of stormwater runoff, but it can also provide some pre-treatment.

## Pocket Wetlands

A stormwater wetland design adapted for small drainage areas with no reliable source of baseflow. The surface area of pocket wetlands is usually less than a tenth of an acre. The pocket wetland is usually intended to provide some pollutant removal for very small development sites.

## Pre-development

Time period before significant human change to the landscape. For the purpose of this manual, pre-development will follow the LID design calculations, where pre-development is further defined as either woods or meadow in good condition. This definition will not represent the actual pre-development condition of all land in Michigan. It does provide a simple, conservative value to use in site design that meets common LID objectives.

## Pretreatment

Technique to capture or trap coarse sediments within runoff, before they enter a BMP to preserve storage volumes or prevent clogging. Examples include swales, forebays and micropools.

## Proprietor

Any person, firm, association, partnership, corporation or any combination thereof.

## Protected Wetland

Any wetland protected by state law or local government regulation.

## Public Land Survey System (PLSS)

The PLSS is the surveying method used historically over the largest fraction of the United States to survey and spatially identify land parcels before designation of eventual ownership, particularly for rural, wild or undeveloped land. For the purposes of this document -- the drawing and legal description must follow the standards of MI Public Act 132 of 1970 - Certified Surveys and reference a PLSS corner. For platted subdivisions, the description must reference a lot corner with the name, liber and page of the subdivision. Note: Where PLSS corners do not exist, Private Claims corners may be accepted at the discretion of the WCWRC.

## Rain Barrel

A barrel designed to retain small volumes of stormwater runoff for reuse for landscaping.

## Rain Garden

Landscape elements that combine plantings and depressions that allow water to pool for a short time (e.g., a few days) after a rainfall and then be slowly absorbed by the soil and vegetation.

## Rational Formula

A simple technique for estimating peak discharge rates for very small developments, based on the rainfall intensity, watershed time of concentration, and a runoff coefficient.

## Release Rate

The rate of discharge in volume per unit time from a detention facility.

## Retention

The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

## Retention Basin

A stormwater management facility designed to capture runoff that does not discharge directly to a surface water body. The water is "discharged" by infiltration or evaporation. Also known as a Wet Pond.

## Return Interval

A statistical term for the average time of expected interval that an event of some kind will equal or exceed given conditions (e.g., a stormwater flow that occurs every 2 years).

## Reverse Slope Pipe

A technique for regulating extended detention times that is resistant to clogging. A reverse slope pipe is a pipe that extends downward from the riser into the permanent pool and sets the water surface elevation of the pool. The lower end of the pipe is located up to one foot below the water surface.

## Riparian Lands

Land directly adjacent to a surface water body (e.g., lake, stream, creek).

## Riprap

A combination of large stones, cobbles and boulders used to line channels, stabilized banks, reduce runoff velocities or filter out sediment.

## Riparian Buffer

An area next to a stream or river (sometimes also used for lakes) where development is restricted or prohibited. The buffers should be vegetated with herbaceous and woody native plants, or left in their natural state. Buffers filter stormwater before it reaches the water body and slows the stormwater velocity.

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## Riparian Corridor

The area adjacent to a stream or river (sometimes also used for lakes) that preserves water quality by filtering sediments and pollutants from stormwater before it enters the waterbody, protects banks from erosion, provides storage area for flood waters, preserves open space, and provides food and habitat for wildlife.

## Riser

A vertical pipe extending from the bottom of a basin that is used to control the discharge rate from the basin for a specified design storm.

## Routing

The derivation of an outflow hydrograph for a given reach of stream or detention pond from known inflow characteristics. The procedure uses storage and discharge relationships and/or wave velocity.

## Runoff

The excess portion of precipitation that does not infiltrate into the ground, but "runs off" and reaches a stream, water body or storm sewer.

## Runoff Coefficient

The ratio of the amount of water that is NOT absorbed by the surface to the total amount of water that falls during a rainstorm.

## Sediment

Soil material that is transported from its site of origin by water. May be in the form of bed load, suspended or dissolved.

## Sheetflow

Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

## Short Circuiting

The passage of runoff through a BMP in less than the theoretical or design detention time.

## Soil Erosion

The increased loss of the land surface that occurs as a result of the wearing away of land by the action of wind, water, gravity, or a combination of wind, water, gravity or human activities.

## Soil Group, Hydrologic

A classification of soils by the Soil Conservation Service into four runoff potential groups. The groups range from "A Soils" which are very permeable and produce little runoff, to "D Soils" which are relatively impermeable and produce much more runoff.

## Spillway

A depression in the embankment of a pond or basin, used to pass peak discharges in excess of the design storm.

## Stabilization

The establishment of vegetation or the proper placement, grading, or covering of soil to ensure its resistance to soil erosion, sliding, or other earth movement.

## Stormwater Runoff

Rainfall or snowmelt that runs off the land and is released into our rivers and lakes.

## Stormwater Wetland

A conventional stormwater wetland is a shallow pool that creates growing conditions suitable for the growth of marsh plants. Stormwater wetlands are designed to maximize pollutant removal through wetland uptake, retention and settling. These constructed systems are not located within delineated natural wetlands.

## Stream

By MDEQ definition: "a river, creek, or surface waterway that may or may not be defined by Act 40, P.A. of 1956; has definite banks, a bed, and visible evidence of continued flow or continued occurrence of water, including the connecting water of the Great Lakes." Even if water flow is intermittent, it is classified as a stream.

## Structural BMPs

Devices constructed for temporary storage and treatment of stormwater runoff.

## Swale

A natural depression or wide shallow ditch used to temporarily convey, store, or filter runoff.

## Tailwater

The depth of water at the downstream end of a culvert or crossing.

## Time of Concentration

The time it takes for surface runoff to travel from the hydraulically farthest portion of the watershed to the design point.

## Timing

The relationship in time of how runoff from subwatersheds combines within a watershed.

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## Underdrain

Perforated pipe installed to collect and remove excess runoff.

## Vegetated Filter Strip

Uniformly graded vegetated surface located between pollutant source areas and downstream receiving waters.

## Watershed

The complete area or region of land draining into a common outlet such as a river or body of water.

## Weir

A structure that extends across the width of a channel, and is used to impound, measure, or in some way alter the flow of water through the channel.

## Wetland

An area that is saturated by surface or groundwater with vegetation adapted for life under those soil conditions, such as swamps, bogs, fens, marshes and estuaries.

## Wetland Mitigation

A regulatory term that refers to the process of constructing new wetland acreage to compensate for the loss of natural wetlands during the development process. Mitigation seeks to replace structural and functional qualities of the natural wetland type that has been destroyed. Stormwater wetlands typically do not count for credit as mitigation, because their construction does not replicate all the ecosystem functions of a natural wetland.

## Wet Pond/Constructed Wetland

Surface or underground structures that provide temporary storage of stormwater runoff to prevent downstream flooding and the attenuation of runoff peaks.

## Wetland Perimeter

The wetted surface of a stream or culvert cross-section that causes resistance to flow. The water to surface interface is a distance, typically expressed in feet.