

APPENDIX C – STORM WATER STANDARDS ORDINANCE

ARTICLE I. – IN GENERAL

Section 1. – Title.

An Ordinance to Regulate and Control All Storm water Runoff for New Land Development or Re-Development and the regulation of non-storm water discharges to the storm drainage system Within the City of Ecorse (City) and to Promote the Safety, Public Health, and General Welfare of Residents of the City; to Provide Minimum Requirements for Storm Water Management, to Establish Standards for Engineering as they Pertain to Storm Water Management including regulating the contribution of pollutants to the City’s municipal separate storm sewer system (MS4) through the regulation of non-storm water discharges to the storm drainage system to the maximum extent practicable as required by federal and state law.

In order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process, the objectives of this ordinance are:

- (1) To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by stormwater discharges by any user,
- (2) To prohibit Illicit Connections and Discharges to the municipal separate storm sewer system,
- (3) To establish legal authority to Regulate and Control All Storm water Runoff for New Land Development or Re-Development Within the City,
- (4) To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this ordinance

Section 2. – Preamble.

This Ordinance is adopted pursuant to, and in accordance with, Act 182, Michigan Public Acts of 1991; and Act 207 of Michigan Public Acts of 1993 as amended; and Act 288, Michigan Public Acts of 1967 as amended; and Act 591 of Michigan Public Acts of 1996 as amended.

Section 3. – Enacting Clause.

The City of Ecorse Ordains:

ARTICLE II. – SHORT TITLE

Section 1. – Short Title.

This ordinance shall be known and cited as the “Storm Water Standards Ordinance”

ARTICLE II. – SCOPE

Section 1. – Preamble.

This ordinance applies to all land development causing or requiring the reshaping, grading or regrading, paving, or installation of underground utilities.

Site storm water runoff management apply to all land within the city. This ordinance shall not apply retroactively to the development of land (except that any redevelopment or new construction shall comply with the applicable provision of this ordinance) including;

1. Subdivisions or developments completed prior to the effective date hereto.
2. A single parcel, or a single lot in a subdivision recorded prior to the effective date of this ordinance, intended for only one or two family dwelling unit.

This ordinance does not repeal, abrogate, annul, or in any way impair or interfere with existing provisions of other laws, ordinances or regulations, except as hereinafter provided. Where this ordinance imposes a greater restriction or more demanding requirement upon land that is imposed or required by other ordinances in the City, the provision of this ordinance shall control.

Section 2. – Administration.

This ordinance shall be administered by the City Manager or the manager’s designee.

Section 3. – Rules of Construction.

For the purpose of this ordinance the following rules of construction apply.

- a. Words used in the present tense include the future tense; and in the singular, include the plural, and in the masculine gender, include the feminine gender, unless the context clearly indicates the contrary.
- b. The term “shall” is mandatory; the term “may” is permissive.
- c. A word or term not interpreted or defined by this article shall be used with the meaning of common or standard utilization.

ARTICLE III. – Definitions

Section 1. – Definitions.

Unless the context specifically indicates otherwise, the meaning of the terms used in this ordinance shall be as follows:

Best Management Practice (BMP) - A practice or combination of practices based on current, accepted engineering standards that prevent or reduce storm water runoff and/or associated pollutants. BMPs include schedules of activities, prohibitions of practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Construction Plans - Detailed plans showing the existing and proposed features of a proposed development and engineering calculations supporting the design of the proposed features.

County Drain - A drain which has been designated as an Established Drain wholly within Wayne County. The drain as defined shall include the main stream or trunk and all tributaries or branches of any

creek or river, any watercourse or ditch, either open or closed, any covered drain, any sanitary or any combined sanitary and storm sewer or storm sewer or conduit composed of tile, brick, concrete, or other material, any structures or mechanical devices, that will properly purify the flow of such drains, any pumping equipment necessary to assist or relieve the flow of such drains and any levee, dike, barrier, or a combination of any or all of same constructed, or proposed to be constructed, for the purpose of drainage or for the purification of the flow of such drains, but shall not include any dam and flowage rights used in connection therewith which is used for the generation of power by a public utility subject to regulation by the public service commission.

Design Storm - A rainfall event of specified return frequency and duration (e.g. a 100-year, 24-hour storm) that is used to calculate peak flows and /or runoff volumes.

Detention Facility - A storm water management practice that captures storm water runoff temporarily and releases the storm water to a surface water body or drain at a restricted rate.

Development - A residential, industrial, municipal, commercial, or other project involving the construction of structures and/or paved surfaces on natural or previously developed land.

Drainage District – Any county or inter-county drainage district legally established pursuant to applicable provisions of the Drain Code.

Easement - A legal right granted by a property owner to another entity, allowing that entity to make limited use of the property for a specific purpose.

Established Drain - An open or enclosed storm water conveyance system that has been legally established as a county or inter-county drain pursuant to applicable provisions of the Drain Code.

First Flush - During the early stages of a storm, storm water with a highly concentrated pollutant load, due to the runoff washing away the pollutants that have accumulated on the land.

Freeboard - The vertical distance from the top of an embankment to the design water elevation of a detention basin or retention basin, required as a safety margin.

Hazardous Materials. Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Headwater - The depth of water at the upstream end of a culvert.

Illegal Discharge - Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Article VI Section 1 of this ordinance.

Illicit Connections - An illicit connection is defined as either of the following:

- a. Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency or,
- b. Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

Infiltration - The absorption of water into the ground, often expressed in terms of inches per hour.

Inter-county Drain - A drain traversing two or more counties that has been legally established as an established drain.

Invert - The interior surface of the bottom of a pipe.

Municipal Separate Storm Sewer System (MS4) - means the publicly owned and operated system (including but not limited to roads, catch basins, curbs, gutters, parking lots, ditches, conduits, pumping devices, or man-made channels) that is designed or used for collecting or conveying storm water; is not a combined sewer where storm water mixes with sanitary wastes; and is not part of a POTW; and which are not “waters of the state”. The term does not include separate storm water drainage conveyances that serve an individual building or comparable discrete area. The system may convey the non-storm water discharges which are excluded from prohibition by this ordinance and as described in Section 600.

Non-stormwater - Any discharge to the storm drain system that is not composed entirely of storm water are prohibited. *Any discharges or flows categorized and/or defined as non-stormwater discharges or flows if identified as significant contributors to violations of Water Quality Standards and are prohibited to storm sewers within the City. This ordinance shall not authorize illicit discharges; however, the City excludes prohibiting the discharges or flows listed in Section 600. of this ordinance.*

Obvert – The interior surface of the top of a pipe.

Pre-development Rate – The peak outflow rate of the property based on existing pervious and impervious areas.

Pre-developed Rate – The peak outflow rate of the property based on existing surface prior to any development, i.e. agricultural.

Proprietor - A person, firm, association, partnership, corporation or combination of any of them which may hold ownership in land whether recorded or not. “Proprietor” shall be synonymous with “Developer” or “Land owner”.

Retention Facility - A storm water management practice that captures storm water runoff and does not discharge to a surface water body or watercourse, but allows the water to evaporate or infiltrate into the ground.

Redevelopment - Additions and/or modifications to an existing development.

Riprap - A combination of large stone, cobbles, and boulders used to line channels, stabilize banks, reduce runoff velocities, or filter out sediment.

Runoff - The excess portion of precipitation that does not infiltrate into the ground or is not captured by vegetation, but flows overland to a stream, storm sewer, or water body.

Spillway - A depression in the embankment of a detention basin used to allow overflow of storm water during storm events in excess of the design storm.

Storm Drain - storm ditch or storm sewer or conduit composed of tile, brick, concrete, or other material, any structures or mechanical devices, that will properly purify the flow of such drains, any pumping equipment necessary to assist or relieve the flow of such drains and any levee, dike, barrier, or a combination of any or all of same constructed, or proposed to be constructed, for the purpose of drainage or for the purification of the flow of such drains.

Storm Drainage System - Publicly-owned facilities by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, storm ditches, reservoirs, and other drainage structures.

Storm Water - Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation including snowmelt, and resulting from such precipitation.

Tailwater - The depth of water at the downstream end of a culvert.

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

Wastewater means any water or other liquid, other than uncontaminated storm water, discharged from a facility.

Waters of the State - means groundwaters, lakes, rivers, and streams and all other watercourses and waters, including the Great Lakes, within the jurisdiction of this state. (R324.3101 (aa), 451 PA 1994),

ARTICLE IV. – GENERAL REQUIREMENTS

Section 1. - Requirement To Prevent, Control, And Reduce Storm Water Pollutants By The Use Of Best Management Practices.

- a. The City, with this ordinance, adopts requirements identifying Best Management Practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S. The owner or operator of a commercial or industrial establishment shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses through the use of these structural and non-structural BMPs. Further, any person responsible for a property or premise, which is, or may

be, the source of an illicit discharge, may be required to implement, at said person's expense, additional structural and non-structural BMPs to prevent the further discharge of pollutants to the municipal separate storm sewer system. Compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of storm water associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section. These BMPs shall be part of a stormwater pollution prevention plan (SWPPP) as necessary for compliance with requirements of the NPDES permit.

- b. "Reasonable Protection" for the purposes of this ordinance shall mean the installation, operation and maintenance of the required structural and/or non-structural BMPs, implementation and documentation of the BMPs operation and maintenance procedures and practices; and pollution prevention and good housekeeping (P2/GH) procedures and practices necessary for the establishment to comply with state and federal stormwater regulations.

ARTICLE V. – DESIGN REQUIREMENTS

Section 1. – Preamble.

The following general storm water management requirements apply to all new developments and redevelopments in the City of ECORSE.

Section 2. – General Requirements.

- a. The design process shall begin by identifying sensitive areas located on the site and laying out the site to protect the sensitive areas.
- b. Best Management Practices (BMPs) that reduce the amount of storm water runoff and improve water quality are required and shall be designed on a site specific basis. All BMPs shall be included on the plans and will be subject to review and approval by the appropriate government agency such as the City Ecorse, the Wayne County Department of Public Services (WCDPS) and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) as necessary for permits.
 1. During construction, all sites that disturb one or more acres of land, or are located within 500 feet of waters of the state, BMP usage shall be monitored and recorded in the weekly Soil Erosion Sedimentation Control (SESC) reports. In such cases, weekly SESC reports shall also be required during construction.
 2. Land uses with potential for significant pollutant loading, including but not limited to: gas stations, commercial vehicle maintenance and repair, auto recyclers, recycling centers, and scrap yards, will require BMPs which address regulation of the specific hazard as determined by the WCDPS or the City Engineer.
 3. The Developer/Owner shall include a long-term operation and maintenance schedule for all permanent BMPs. A maintenance agreement between the Developer/Owner and the City is required for permanent BMPs which shall include but not be limited to: inspection of structural or vegetative BMPs, performance of maintenance and corrective actions

when BMPs are neglected by the owner, and deed restrictions. All such maintenance agreements shall be binding on the property and shall remain in effect in the event the property ownership is transferred or sold.

4. Projects that disturb more than 5 acres of land, require a NPDES permit.
- c. Onsite management of storm water is required first and foremost, unless site constraints consistent with the flowchart, as determined by the City Engineer, preclude this approach.
- d. Storm water shall be managed using three standards: flood control, water quality, and pre-treatment to protect both water resources and real property.
 1. Flood control shall be provided for all sites through detention. Retention systems are not permitted. On-site detention of storm water is required of all new developments or redevelopments to maintain the peak outflow to a rate not exceeding the pre-development runoff rate.
 2. Water Quality control system shall be provided on all new developments or redevelopments and may be accomplished with manufactured units, settling ponds/forebay, bio-filtration, or combination of systems. Developments that disturb less than one acre, and are not part of a larger common plan of development or sale, may be exempted from the City's Water Quality treatment standards as approved by the City Engineer, except for high risk pollutants.
 - a. Water Quality control system must reduce post development total suspended solids (TSS) loadings by 80% or to not exceed solids loadings of 80 milligrams per liter.
 - b. Water Quality control systems must provide a minimum treatment volume equal to one inch of runoff from the project site.
 - c. The use of many decentralized Low Impact Development (LID) BMPs is not mandated, but is encouraged on private sites.
 - d. The City of Ecorse does not have any open municipal or open County drains however, channel protection is required. It is required that the post-development project site runoff volume and peak flow rate must be maintained at or below pre-development levels for all storms up to the 2-year, 24-hour event. Pre-development level means the runoff flow volume and rate for the last land use prior to the planned new development or redevelopment. Compliance with this requirement is determined by calculating the existing ("pre-development") and post-development runoff volume and rate for the 2-year and smaller storm events. The method is described in the Department of Environmental Quality (DEQ) publication *Computing Flood Discharges for Small Ungaged Watersheds*, dated July 2003 (updated January 22, 2010).

- e. If it is demonstrated using the Alternative Approach Flow Chart that the development cannot meet the required channel protection performance standard, the developer may propose incorporation of green infrastructure (i.e. Rain gardens, green (vegetated) roofs, permeable pavement, impervious cover removal, use of trees, etc.) This includes instances where site conditions (e.g., space limitations or tight soils that prevent infiltration or soil or ground water contamination, “hot spots”) challenge or prohibit feasibility of maintaining the project site’s pre-development runoff levels for all storms up to the 2-year, 24-hour event. Green Infrastructure shall be allowed under all circumstances consistent with the flowchart. Review of these proposals will be consistent with the “SEMCOG Low Impact Development Manual for Michigan, 2008” or current standards.
3. Pre-treatment is required for infiltration and filtration for ease of maintenance and to protect BMP integrity and preserve longevity.
- e. Overland flow routes and the extent of high water levels for the 100-year storm shall be identified for all sites.
 - f. Storm water discharges from activities with a high risk for an accidental spill of pollutants (storm water “hot spots”) shall provide spill containment.
 - g. The design maximum release rate, volume or concentration of storm water discharged from a site shall not exceed the capacity of existing infrastructure or cause impairment to the offsite receiving area. Evaluation of the existing outlet must be performed and an adequate outlet must be provided. Designing engineer should contact the City Engineer to determine available capacity of the downstream system.
 - h. Unless otherwise noted, hydraulic and hydrologic calculations (including rainfall volumes and distributions) shall be based on current EGLE standards (i.e. NOAA Atlas 14) and procedures in place at the time of application.
 - i. Construction plans for a phased development shall show the existing and/or proposed drainage systems for all prior phases of the development, unless the drainage system for the current phase is entirely independent of the prior phases. Furthermore, drainage plans for a phase of a development must not be dependent upon work planned to be performed in a future phase.
 - j. Plans shall include a grading plan showing existing and proposed topographic contour lines and proposed finish floor and basement floor elevations.
 - k. All existing natural or manmade drains shall be shown on the plans. The proposed changes to the site must not interfere with Common Law Natural Flow Rights. Existing drains must be preserved or relocated, or the flow otherwise accommodated by the proposed plans.

Provisions for the maintenance of the drain must be included in the deed restriction or an equivalent legally binding agreement. EGLE and/or the Army Corps of Engineers may also require permits for changes made to such drains.

- l. If an established County drain is involved, construction plans shall include a note indicating that “All work performed in the right-of-way of an established drain shall require a permit from the Wayne County Department of Public Services.”
- m. Where drainage is discharged to an established drain, such outlets shall be so designed as to enter the drain at an angle of 90 degrees or less, as determined by the upstream centerline.
- n. Unless the storm sewers are to be owned and maintained by a single private entity (i.e. municipal or commercial development, manufactured housing community, etc.), all storm sewers shall be located within an easement. The minimum easement width for a storm sewer shall be 12 feet centered on the sewer centerline. City Engineer may require a larger easement as necessary to facilitate future repairs.
- o. Privately maintained storm infrastructure, including but not limited to; pipes, Storm water detention facility, water treatment units, bio-swales, etc., will require a maintenance agreement.
- p. All existing and proposed on-site drainage easements shall be clearly shown.
- q. No public Right-of-Way runoff shall be routed through private storm sewer unless approved by City Engineer.

Section 3. – Established Drains.

No construction activities shall be allowed without approval from the Wayne County Department of Public Services for any development directly discharging to an established County Drain. All work within the Right-of-Way of the established drain is subject to the design standards and requirements of the Wayne County Department of Public Services.

Section 4. – Storm Sewers and Structures

Storm water conveyance system is comprised of the combination of storm sewers (conduits) or open ditches, and connecting structures such as manholes and catch basins conveying the Storm water runoff to the outlet point.

- a. Storm Sewers

1. All storm sewer pipe, manholes, catch basins, and inlets shall meet MDOT specifications unless otherwise approved by the City Engineer.
2. Plans shall show boundaries and acreages of catchment areas contributing runoff to each proposed or existing catch basin and/or inlet. Runoff from off-site tributary areas must be accommodated in design or rerouted.
3. Maximum catchment area for a catch basin shall be as follows:

For intercepting catch basins:	10,000 square feet
For low point catch basins:	12,000 square feet
4. The required discharge capacity for each reach of sewer shall be determined by the Rational Method.
5. A 10-year design storm shall be used such that rainfall intensity, $I = 175 / (T + 25)$, where T = time of concentration in minutes.
6. Where a 100-year design storm event calculation is required, the rainfall intensity shall be such that, $I = 275 / (T+25)$ where T = time of concentration in minutes.
7. The runoff coefficient, C , shall be in conformance with normal design practice. Where a weighted average coefficient is employed, the computations shall be submitted for review.
 - a. Minimum C -coefficients for various finish surfaces are as follows:

Water Surface:	1.00
Impervious Pavement & Roofs:	0.90
Dense graded stone & pavers:	0.80
Open graded stone:	0.60
Lawns:	0.20

Other surface c -coefficients subject to approval by City Engineer
 - b. The following averaged C -coefficients may be used in lieu of weighted coefficient for proposed developments:

Single-Family Residential:	0.35
Multi-Family Residential:	0.55
Commercial:	0.85
Industrial:	0.90
8. A complete set of storm sewer design calculations shall accompany every set of construction plans submitted for review.
9. Sewer capacities shall be based on the Manning equation for full flow velocity. With Manning's "n" coefficient as follows:

Smooth Lined, Metal, PVC or HDPE Pipe:	0.011
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Reinforced Concrete Pipe: 0.013
Corrugated, Metal, PVC, or HDPE Pipe: 0.024
Other pipe material n-coefficients subject to approval by city engineer.

10. Minimum allowable full flow pipe velocity shall be 2.5 ft/sec. (except where the minimum diameter requirement makes this unachievable.) Desirable pipe velocity range shall be 4-8 ft/sec. Maximum allowable pipe velocity shall be 10 ft/sec.
11. Hydraulic grade lines for the 10-year storm shall be calculated and shown as a part of all storm sewer profiles.
 - a. The hydraulic grade line may rise above the top of the pipe but in no case shall the elevation of the hydraulic grade line exceed the elevation of a point lying 1 foot below the rim elevation of a manhole, catch basin or inlet.
 - b. The hydraulic grade line upstream of a detention facility shall be calculated assuming the design high water elevation (e.g. full detention). OR 8/10 of pipe, whichever is higher.
12. To account for energy losses, at structures a flow change of direction of greater than 45 degrees, a 0.10' drop shall be added from the upstream to downstream pipes. Approval from City Engineer is required to waive the requirement for sites where existing conditions do not provide adequate storm depth to facilitate the drop.
13. At structure with a change of pipe size, the 8/10th elevation, OR obvert of the pipes shall align. Approval from City Engineer is required to waive the requirement for sites where existing conditions do not provide adequate storm depth to facilitate the drop.
14. The storm sewer pipe shall have a minimum diameter of 12 inches when constructed in a public right-of-way or easement.
15. Storm sewers shall have a minimum of three and one-half feet of cover from the finished surface to the horizontal centerline, where existing conditions allow. City Engineer may approve less cover should existing conditions restrict cover.
16. The storm sewer plan and profile drawing shall show the following data:
 - Proper identification and numbering of manholes, catch basins and inlets
 - Invert and casting elevations for all structures
 - Pipe length (C/L to C/L of structures)
 - Pipe diameter
 - Pipe slope
 - Pipe class or designation
 - Detail of trench construction and type of backfill material

17. An end section with prefabricated bar screen shall be installed on the end of all storm sewers 12 inches in diameter or larger. Openings of the bar screen shall be no more than six inches on center.
- b. Structures
1. The minimum inside diameter of all manholes, catch basins and inlets shall be 48 inches, with the following exception: Inlet structures from which water will be discharged directly into a catch basin may be 24 inches inside diameter. The depth of such inlets shall be no greater 5.0 feet and no less than 3.5 feet from the top of frame and cover to the invert.
 2. Manholes and inlets structures may be constructed of brick, manhole block, precast concrete (ASTM C478) or cast-in-place concrete.
 - a. All manhole block or brick structures shall be plastered on the outside with 1 to 2.5 mix of portland cement mortar, ½-inch thick. No calcium chloride or other chemical shall be added to lower the freezing point of the mortar, as the strength of the mortar may be lessened.
 3. Maximum manhole spacing shall be as follows:

For sewers 12 inches to 42 inches:	400 feet
For sewers 48 inches to 60 inches:	500 feet
For sewers 66 inches and larger:	600 feet
 4. Yard type catch basins shall be provided at all low points in drainage swales. Provide intercepting yard type catch basins such that not more than 300 feet of swale drainage runs into any one catch basin other than a low point catch basin where 600 feet of drainage is allowed.

Section 5. – Storm Water Management Facilities Flood Control.

- a. Retention (not permitted) or Bio-retention

A storm water management practice that captures storm water runoff and does not discharge to a surface water body or watercourse, but allows the water to evaporate or infiltrate into the ground. The facility could be underground or above ground. Above ground facilities may be vegetated facilitating absorption of water by the vegetation (bio-retention).

- b. Detention (flood control)

Detention storage facilities are designed to detain runoff for a short period of time and then release it to a watercourse where it returns to the hydrologic cycle. The objective of detention

storage is to regulate the released runoff rate and to reduce the impact on downstream drainage systems. Detention storage may be in the form of surface storage i.e. pond (basin) or parking lot, or underground storage. Detention ponds may be dry or wet ponds. Where the pond is designed as a wet pond, a minimum of 3' deep permanently wet pool shall be incorporated to reduce vegetative growth (algae).

In keeping with Common Law Natural Flow Rights and the Michigan Drain Code, concentrated discharges of storm water (such as the outflow from a detention facility) or increased surface water runoff over property owned by others must be pursuant to a valid right-of-way, easement, or other written permission from all property owners affected. The outflow from a detention facility is considered to be such a concentrated discharge of storm water.

Infiltration may be incorporated into a detention facility design, subject to review and approval by the City Engineer except in areas of soil or groundwater contamination as determined by and in coordination with EGLE. The design engineer / owner shall provide field testing to support permeability rates pre- and post-construction. A safety of factor of 2 shall be utilized to determine the design permeability rate. Infiltration designs shall be based on Darcy's Law of Permeability.

1. All forms of detention storage shall meet the following criteria:

- a. On-site detention of storm water is required of all new developments or redevelopments to maintain the peak outflow to a rate similar to the pre-development runoff rate for the 10 year 24 hour storm event as calculated from equation in Section 503.1.E. In no case shall the outflow from a site exceed the capacity of the receiving drain to accept the flow. Design Engineer should contact the City Engineer for existing capacity of the receiving drain.
- b. The detention pond shall be designed to drain completely within 24 to 48 hours after a rain event. In the case of extended detention when required for channel protection, the volume shall be held for 48 hours or released at the 1-year/24 hour discharge rate.
- c. The tributary area shall include all acreage contributing runoff to the detention storage facility, including any off-site tributary area in its existing state, whether developed or undeveloped.
- d. The following equations shall be used to determine the 10-year detention volume:

Q_a = Allowable release rate, cfs

$Q_o = Q_a / (A C)$, where A = Tributary area in acres, C = weighted runoff coefficient

Detention time in minutes, $T = -25 + \sqrt{6,562.5 / Q_o}$

Storage volume per impervious acre, $V_s = 10,500 T / (T + 25) - 40 Q_o T$

Required detention volume in cubic feet, $V = V_s \times A \times C$

- e. If the site is located near the downstream end of a drainage district, the City Engineer may require that the proprietor's engineer generate and submit hydrographs of the outflow from the existing site and from the proposed site (i.e. detention facility) and a hydrograph of the flow in the receiving drain to verify that the detained outflow would not result in an increase in the peak flow in the receiving drain. If the detained outflow would result in an increase in the peak flow in the receiving drain, then storm water detention is not an acceptable storm water management option.
- f. Portions of the developing site may be allowed to drain unrestricted (i.e. not through a detention facility) if any of the following conditions are met:
 - a. The areas draining unrestricted are not being disturbed or altered by the construction, such that they will maintain their existing drainage characteristics and patterns.
 - b. The runoff coefficient of the proposed surface does not increase as part of the re-developed area.
- g. Where the detention facility is to be equipped with a pump discharge, the proprietor shall be required to furnish design data on pump(s) and discharge force main so that the capacity of the system can be verified. These data will include system curve calculations, the pump performance curves, and a profile of the system piping. The pumping station should be able to release the first flush volume over approximately 24 hours, the bankfull flood volume over 24-48 hours, and the 100-year flood volume at a rate not to exceed 0.15 cfs/ac of tributary area. A back-up generator will be required to ensure the operation of the pumping station in the event of power loss. The City discourages the use of pumped outlets, and will not accept responsibility for damages due to power failure, pump malfunction, or Acts of God that result in storm conditions that exceed the design conditions of the pump station.
- h. An agreement for acceptance and maintenance of the detention facility, executed by the proprietor, shall be submitted to the City of ECORSE prior to final approval. The agreement both as form and content shall be subject to the approval of the City.
- i. A minimum of one-foot freeboard shall be provided above the design high water elevation.
- j. A 12-ft. wide minimum access easement shall be provided for all detention facilities, as measured from the top of bank or perimeter of storage (underground facilities).
- k. A 25-ft. wide minimum setback from property lines and buildings shall be provided for all detention basins, as measured from the top of bank or perimeter of storage (underground facilities).

- l. Detention basin configurations where storm water must “back-up” into the basin (i.e. storm water enters the conveyance system downstream of the basin) will not be permitted.
- m. Multiple detention basins serving a single development should function independently. If the outflow from one basin passes through another basin before being discharged to the receiving drain, a full hydraulic analysis (i.e. a computer model simulation) will be required to ensure that the system functions satisfactorily.
- n. If at any time the detention basin is to function as a sediment basin (for use during the construction phase), an outlet filter shall be provided. Such an outlet filter is to be designed in accordance with criteria established by the Wayne County Department of Public Services. Such use of a detention basin shall be considered a temporary measure only. The proprietor shall be responsible for sediment removal upon completion of construction.

c. Detention Ponds (basins)

A detention basin is a form of detention storage where the storm water is detained above ground as surface water.

- 1. Detention volume in a gravity-outlet detention basin must be located:
 - a. Above the invert of the lowest row of orifices in the outlet standpipe,
 - b. Above the elevation of the dry weather base flow in the receiving drain,
 - c. Above the elevation of the groundwater table. Soil boring data used to determine
- 2. The detention basin outlet shall consist of a vertical standpipe with multi-level orifices to control the release of storm water from the basin, including the first flush volume and 10 year flood volume
 - a. The standpipe shall not be less than 36 inches in diameter. Double standpipes (e.g. a 36-inch diameter inner standpipe within a 48-inch diameter outer standpipe) are encouraged. Double standpipes are believed to be less prone to blockages of the control orifices, and therefore require less maintenance. The inner standpipe should contain the appropriate number and configuration of orifices to provide the controlled release of the first flush volume and the 10-year flood volume. The outer standpipe should contain at least several times the orifice area as the inner standpipe over the entire height of the standpipe, such that the head loss across the outer standpipe orifices is negligible.

- b. The standpipe shall contain multiple rows of orifices (i.e. holes) to control the release of the first flush runoff volume and 10-year volume.
 - i. First flush orifices shall be located at the elevation of the pond floor (or permanent pool water level, if a wet pond),
 - ii. Additional 10-year flood control orifices shall be located at the elevation of the first flush volume in the basin, where the first flush volume is calculated as the first one inch of runoff over the site, or $V_{ff} \text{ (cf)} = 3630 \times A \text{ (acres)} \times C$, where C is the runoff coefficient.
 - iii. Additional one-hundred-year- (or ten-year for sites less than five acres) flood control orifices shall be located at the elevation of the bankfull flood volume in the basin, where the bankfull flood volume is calculated as the rainfall from a 1.5-year storm, or $V_{bf} \text{ (cf)} = 8170 \times A \text{ (acres)} \times C$.
- c. Orifices should not be less than 3 inch in diameter for single standpipe outlet design. Should smaller orifices be required, a double standpipe design, item 2a above, shall be incorporated.
- d. The top of the standpipe shall consist of a grating at or above the design (high) water level to serve as an overflow mechanism, in addition to the overland overflow spillway/berm.
 - i. The standpipe overflow grate and spillway must provide adequate capacity to overflow the peak 100-year basin inflow with no more than one foot of head (i.e. water level must not exceed the one foot of freeboard)
- e. The standpipe shall be encased in stone extending to the design (high) water level to allow for filtering of the storm water prior to discharge from the basin. The encasement stone size shall be large enough so as not to plug or pass through the orifices in the standpipe.
- f. The standpipe shall contain a sediment sump with a depth of at least one foot.
- g. The outlet pipe extending from the standpipe to the receiving drain shall be sized to convey the calculated 10-year peak inflow to the detention basin.
- h. The location of the outlet pipe extending downstream of the standpipe shall be indicated on a profile drawing of the receiving drain, whether or not the receiving drain is an established drain. The receiving drain profile shall extend at least from the upstream end of the site to the downstream end of the site.

- i. A manhole structure with an internal weir wall and orifices can be used in lieu of a standpipe design. Orifices smaller than 3 inches in a manhole structure shall be trapped to avoid clogging.
 - j. The outlet control structure (standpipe or manhole) must be accessible by vehicle for regular maintenance.
 3. Downstream of the overflow spillway, the storm water overflow must be directed (either by overland flow or via a swale or ditch) to the receiving drain.
 4. The side slopes shall not be steeper than 6 ft. horizontal to 1 ft. vertical. Slope protection shall be provided as necessary. Basin side slope elevation contours shall be shown on the plans. Steeper side slopes may be approved by the City Engineer and may require fencing.
 5. Unless the detention basin contains a permanent pool, the bottom of all detention basins shall be graded in such a manner as to provide positive flow to the outlet. A minimum bottom slope of 1% shall be provided.
 6. Dry detention ponds shall be seeded (MDOT Class A Seed) or sodded (MDOT Class B Sod) and the turf shall be fully established before the city approves the detention basin for operation and maintenance.
 7. Dry detention ponds shall provide a minimum of 1 percent slope along the bottom for drainage.
- d. Underground Detention

Underground storage is a form of detention storage where the storm water is detained in underground pipes. Like a detention basin, the water is released at a controlled rate to a receiving drain.

In addition to the general requirements indicated above in Section 504.2.A, underground detention facilities shall meet the following requirements:

- a. To minimize sedimentation in the downstream drainage district, sediment shall be removed from the storm water before water enters the underground storage facility (e.g. in first flush forebay, manufactured water quality structures, or within the catch basins using removable filtration inserts).
- b. The pipe material used for the underground storage facility shall have an expected life of at least 50 years.
- c. Access manholes shall be provided along the underground storage facility to allow for maintenance.

- d. No permanent structures shall be constructed above the underground storage facility.
 - e. Underground chambers with stone bedding will require submittal of the manufacturer's volume calculations for review by the City Engineer. Stone voids storage may be included
- e. Parking Lot Surface Detention

Parking Lot Surface Storage is a form of detention storage where the storm water is detained in the parking lot surface creating temporary flooding of the parking lot. Like a detention basin, the water is released at a controlled rate to a receiving drain.

In addition to the general requirements indicated above in Section 504.2.A, parking lot surface detention facilities shall meet the following requirements:

- a. Storage elevation must be less than one foot from the finish floor elevation of the nearest building.
- b. Storage depth shall not exceed 12 inches at any location of the parking lot.

Section 6. – Storm Water Management Facilities Water Quality Control.

Water Quality Control consists of reducing or eliminating pollutants and suspended solids from the storm water runoff prior to discharging to the existing system. Water Quality Control can be achieved by various methods. Water Quality Control should be achieved using Best Management Practices (BMPs) in order to reduce the post development total suspended solids (TSS) loading by a minimum of 80% or not to exceed TSS loadings of 80 milligrams per liter.

A. Settling Ponds (basins) / Forebay

- 1. A settling pond (first flush pond) is means to detain the first flush volume so that a minimum of 80% of the TSS settle to the bottom of the pond.
- 2. A settling pond may be stand alone or adjacent to a detention pond as a settling forebay.
- 3. The first flush volume is calculated as the first one inch of rainfall over the site or
 - a. $V_{ff} (cf) = 3630 \times A(\text{acres}) \times C$, where C is the runoff coefficient
- 4. The outlet of a first flush basin or sediment collection unit shall be designed to release the first flush volume over 24-36 hours.
- 5. The first flush basin or sediment collection unit shall contain a bypass structure and/or berm to allow the 10-year peak flow to bypass without hydraulic interference.

B. Structural BMPs

1. Structural BMPs (i.e. prefabricated swirl chambers or sand filter structures) can serve as the water quality management BMPs. Manufacturer's data must be provided, for approval by the City Engineer, to indicate that TSS removal rate is met.
 2. Structural BMPs can be designed as in-line or off-line configuration, provided that the structure has built-in overflow mechanism that will not re-suspend settled TSS.
- C. Natural BMPs
1. Natural BMPs (i.e. vegetative swales or cells) may be permitted subject to approval by the City Engineer. Design Engineer shall provide data to support TSS removal rate effectiveness.
- D. Oil Separators / Spill Containment
1. For Developments where there is an increased risk of pollutants entering the storm system (hot spots), additional means of water quality control such as oil separators or spill containment shall be provided for review and approval by the City Engineer.

ARTICLE VI. – DISCHARGE REQUIREMENTS.

Section 1. - Discharge Prohibitions.

- a. Prohibition of Illegal Discharges.

No person shall discharge or cause to be discharged into the municipal separate storm sewer system (MS4) or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.

The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited except as described as follows:

1. The following discharges if identified as not being a significant contributor to violations of Water Quality Standards (WQS) are excluded from discharge prohibitions established by this ordinance:
 - a. Water line flushing and discharges from potable water sources
 - b. Landscape irrigation runoff, lawn watering runoff, and irrigation waters
 - c. Diverted stream flows and flows from riparian habitats and wetlands
 - d. Rising groundwaters and springs

- e. Uncontaminated groundwater infiltration and seepage
 - f. Uncontaminated pumped groundwater, except for groundwater cleanups specifically authorized by NPDES permits
 - g. Foundation drains, water from crawl space pumps, footing drains, and basement sump pumps
 - h. Air conditioning condensation
 - i. Waters from noncommercial car washing
 - j. Street wash water
 - k. Dechlorinated swimming pool water from single, two, or three family residences. (A swimming pool operated by the permittee shall not be discharged to a separate storm sewer or to surface waters of the state without NPDES permit authorization from the EGLE.
 - l. Discharges or flows from firefighting activities if identified as not being significant sources of pollutants to waters of the State.
2. Discharges specified in writing by the authorized enforcement agency as being necessary to protect public health and safety.
 3. Dye testing is an allowable discharge, but requires a "Notice of Intent to Treat" under the General Rule 97 Certification of Approval to be obtained from EGLE prior to the commencement of the test.
 4. The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.
- b. Prohibition of Illicit Connections.
1. The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited.
 2. This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.
 3. A person is considered to be in violation of this ordinance if the person connects a line conveying sewage to the MS4, or allows such a connection to continue.

ARTICLE VII. – INSPECTION AND MONITORING REQUIREMENTS.

Section 1. - Monitoring Of Discharges.

a. Applicability.

This section applies to all facilities that have storm water discharges, facilities associated with industrial activity, and those having construction activity.

b. Access to Facilities.

1. The City of Ecorse shall be permitted to enter and inspect facilities subject to regulation under this ordinance as often as may be necessary to determine compliance with this ordinance. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to representatives of the City.
2. Facility operators shall allow the City ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES permit to discharge storm water, and the performance of any additional duties as defined by state and federal law.
3. The City shall have the right to set up on any permitted facility such devices as are necessary and/or required by the MS4 permit to conduct monitoring and/or sampling of the facility's storm water discharge.
4. The City has the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure stormwater flow and quality shall be calibrated to ensure their accuracy.
5. Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the operator at the written or oral request of the City and shall not be replaced. The costs of clearing such access shall be borne by the operator.
6. Unreasonable delays in allowing the City access to a permitted facility is a violation of a storm water discharge permit and of this ordinance. A person who is the operator of a facility with a NPDES permit to discharge storm water associated with industrial activity commits an offense if the person denies the authorized enforcement agency reasonable access to the permitted facility for the purpose of conducting any activity authorized or required by this ordinance.
7. If the City has been refused access to any part of the premises from which stormwater is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this ordinance, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this ordinance or any order issued hereunder, or to protect the overall public health, safety,

and welfare of the community, then the City may seek issuance of a search warrant from any court of competent jurisdiction.

ARTICLE VIII. – ENFORCEMENT.

Section 1. - Enforcement.

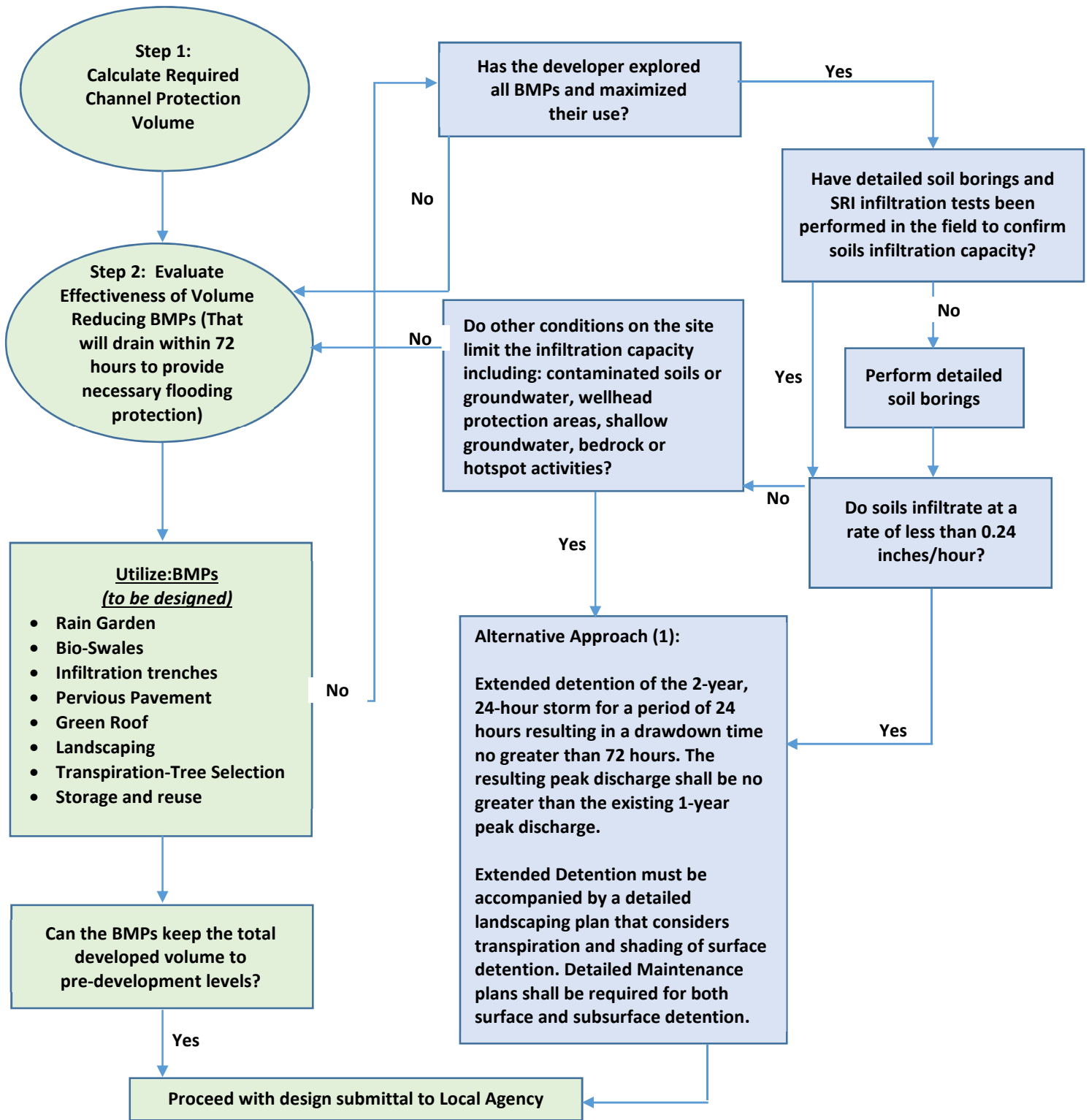
a. Notice of Violation.

Whenever the [authorized enforcement agency] finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, or failed to comply with the City's current Illicit Discharge Elimination Plan and Total Maximum Daily Load (IDEP & TMDL) plan and as amended, the authorized enforcement agency may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:

1. The performance of monitoring, analyses, and reporting;
2. The elimination of illicit connections or discharges;
3. That violating discharges, practices, or operations shall cease and desist;
4. The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property; and
5. Payment of a fine to cover administrative and remediation costs; and
6. The implementation of source control or treatment BMPs.

If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

CITY OF ECORSE, MICHIGAN
STORM WATER STANDARDS ORDINANCE
CHANNEL PROTECTION PERFORMANCE STANDARD
ALTERNATIVE APPROACH FLOW CHART



Ref: Lower Grand River Organization of Watersheds MS4 Stormwater Ordinance Committee Alternative Approach Flow Chart

1. NOTE: If utilizing extended detention as a post-construction storm water runoff control, additional BMPs likely will be needed to maintain the pre-development volume and peak rate levels for all storms up to the 2-year, 24-hour event, through green infrastructure or specific low impact development (LID) on-site BMPs for meeting the performance standard