

ORDINANCE #09-04

REPEALING AND RECREATING CHAPTER 28
DE PERE MUNICIPAL CODE RELATING TO STORMWATER MANAGEMENT

WHEREAS, the Common Council of the City of De Pere, having reviewed the recommendation of the City Plan Commission regarding the proposed repeal and recreation of Chapter 28 De Pere Municipal Code regarding stormwater management and having scheduled a public hearing then to be decided by the Common Council; and

WHEREAS, the City Clerk-Treasurer, having published a Notice of Public Hearing regarding such proposed ordinance change and, pursuant thereto, a public hearing having been held on the 3rd day of February, 2009 at 7:35 p.m. and the Common Council having heard all interested parties or their agents and attorneys.

NOW THEREFORE, THE COMMON COUNCIL OF THE CITY OF DE PERE,
WISCONSIN, DO ORDAIN AS FOLLOWS:

Section 1: Chapter 28 De Pere Municipal Code, **Stormwater Management**, is hereby repealed in its entirety and recreated as follows:

CHAPTER 28
STORMWATER MANAGEMENT ZONING ORDINANCE
(POST CONSTRUCTION)

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STORMWATER MANAGEMENT (POST CONSTRUCTION)

28-1 AUTHORITY.

- (a) This ordinance is adopted by the Common Council under the authority granted by §62.234 Wis. Stats. This ordinance supersedes all provisions of an ordinance previously enacted that relate to stormwater management regulations. Except as otherwise specified in §62.234 Wis. Stats., §62.23 Wis. Stats., applies to this ordinance and to any amendments to this ordinance.
- (b) The provisions of this ordinance are deemed not to limit any other lawful regulatory powers of the same governing body.
- (c) The Common Council hereby designates the Director of Public Works or designee to administer and enforce the provisions of this ordinance.
- (d) The requirements of this ordinance do not pre-empt more stringent stormwater management requirements that may be imposed by any of the following:
 - (1) Wisconsin Department of Natural Resources administrative rules, permits or approvals including those authorized under §281.16 and 283.33, Wis. Stats.
 - (2) Targeted non-agricultural performance standards promulgated in rules by the Wisconsin Department of Natural Resources under s. NR 151.004, Wis. Adm. Code.

28-2 FINDINGS OF FACT.

The Common Council finds that uncontrolled, post-construction runoff has a significant impact upon water resources and the health, safety and general welfare of the community and diminishes the public enjoyment and use of natural resources. Specifically, uncontrolled post-construction runoff can:

- (a) Degrade physical stream habitat by increasing stream bank erosion, increasing streambed scour, diminishing groundwater recharge, diminishing stream base flows and increasing stream temperature.
- (b) Diminish the capacity of lakes and streams to support fish, aquatic life, recreational and water supply uses by increasing pollutant loading of sediment, suspended solids, nutrients, heavy metals, bacteria, pathogens and other urban pollutants.
- (c) Alter wetland communities by changing wetland hydrology and by increasing pollutant loads.
- (d) Reduce the quality of groundwater by increasing pollutant loading.
- (e) Threaten public health, safety, property and general welfare by overtaxing storm sewers, drainage ways, and other minor drainage facilities.
- (f) Threaten public health, safety, property and general welfare by increasing major flood peaks and volumes.
- (g) Undermine floodplain management efforts by increasing the incidence and levels of flooding.

28-3 PURPOSE AND INTENT.

- (a) **PURPOSE.** The general purpose of this ordinance is to establish long-term, post-construction runoff management requirements that will diminish the threats to public health, safety, welfare and the aquatic environment. Specific purposes are to:
 - (1) Further the maintenance of safe and healthful conditions.
 - (2) Prevent and control the adverse effects of stormwater; prevent and control soil erosion; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control building sites, placement of structures and land uses; preserve ground cover and scenic beauty; and promote sound economic growth.
 - (3) Control exceedance of the safe capacity of existing drainage facilities and receiving water bodies; prevent undue channel erosion; control increases in the scouring and transportation of particulate matter; and prevent conditions that endanger downstream property.

- (b) INTENT. It is the intent of the Common Council that this ordinance regulates post-construction stormwater discharges to waters of the state. This ordinance may be applied on a site-by-site basis. The Common Council recognizes, however, that the preferred method of achieving the stormwater performance standards set forth in this ordinance is through the preparation and implementation of comprehensive, systems-level stormwater management plans that cover hydrologic units, such as watersheds, on a municipal and regional scale. Such plans may prescribe regional stormwater devices, practices or systems, any of which may be designed to treat runoff from more than one site prior to discharge to waters of the state. Where such plans are in conformance with the performance standards developed under §281.16, Wis. Stats., for regional stormwater management measures and have been approved by the Common Council, it is the intent of this ordinance that the approved plan be used to identify post-construction management measures acceptable for the community.

28-4 APPLICABILITY AND JURISDICTION.

(a) APPLICABILITY.

- (1) Where not otherwise limited by law, this ordinance applies to all post-construction sites, unless the site is otherwise exempt under paragraph (2).
- (2) A post-construction site that meets any of the criteria in this paragraph is exempt from the requirements of this ordinance.
 - A. 1- and 2-family residential dwellings that are not part of a larger common plan of development or sale and that result in less than 1 acre of disturbance.
 - B. Non-point discharges from agricultural activity areas.
 - C. Non-point discharges from silviculture activities.
 - D. Mill and crush operations.
- (3) Notwithstanding the applicability requirements in paragraph (1), this ordinance applies to post-construction sites of any size that, in the opinion of the Director of

Public Works, is likely to result in runoff that exceeds the safe capacity of the existing drainage facilities or receiving body of water, that causes undue channel erosion, that increases water pollution by scouring or the transportation of particulate matter or that endangers property or public safety.

(b) JURISDICTION.

This ordinance applies to post construction sites within the boundaries and jurisdiction of the City of De Pere, as well as the extraterritorial division of land subject to an ordinance enacted pursuant to §236.45(2) and (3) Wis. Stats.

(c) EXCLUSIONS.

This ordinance is not applicable to activities conducted by a state agency, as defined under §227.01 (1), Wis. Stats., but also including the office of district attorney, which is subject to the state plan promulgated or a memorandum of understanding entered into under §281.33 (2), Wis. Stats.

28-5 DEFINITIONS.

- (a) “Administering authority” means the Director of Public Works.
- (b) “Agricultural activity area” means the part of the farm where there is planting, growing, cultivating and harvesting of crops for human or livestock consumption and pasturing or outside yarding of livestock, including sod farms and silviculture. Practices in this area may include waterways, drainage ditches, diversions, terraces, farm lanes, excavation, filling and similar practices. The agricultural activity area does not include the agricultural production area.
- (c) “Agricultural production area” means the part of the farm where there is concentrated production activity or impervious surfaces. Agricultural production areas include buildings, driveways, parking areas, feed storage structures, manure storage structures, and other impervious surfaces. The agricultural production area does not include the agricultural activity area.

- (d) "Average annual rainfall" means a calendar year of precipitation, excluding snow, which is considered typical. For purposes of this ordinance, average annual rainfall means measured precipitation in Green Bay, Wisconsin between March 29 and November 25, 1969.
- (e) "Best management practice" or "BMP" means structural or non-structural measures, practices, techniques or devices employed to avoid or minimize sediment or pollutants carried in runoff to waters of the state.
- (f) "Business day" means a day the office of the Director of Public Works is routinely and customarily open for business.
- (g) "Cease and desist order" means a court-issued order to halt land disturbing construction activity that is being conducted without the required permit.
- (h) "Combined sewer system" means a system for conveying both sanitary sewage and stormwater runoff.
- (i) "Common plan of development or sale" means a development or sale where multiple separate and distinct land disturbing construction activities may be taking place at different times on different schedules but under one plan. A common plan of development or sale includes, but is not limited to, subdivision plats, certified survey maps, and other developments.
- (j) "Connected imperviousness" means an impervious surface that is directly connected to a separate storm sewer or water of the state via an impervious flow path.
- (k) "Construction site" means an area upon which one or more land disturbing construction activities occur, including areas that are part of a larger common plan of development or sale.
- (l) "Design storm" means a hypothetical discrete rainstorm characterized by a specific duration, temporal distribution, rainfall intensity, return frequency, and total depth of rainfall. The TR-55, Type II, 24-hour design storms for City of De Pere are: 1-year, [2.2] inches; 2-year, [2.5] inches; 5-year, [3.3] inches; 10-year, [3.8] inches; 25-year, [4.4] inches; and 100-year, [5.3] inches.
- (m) "Development" means residential, commercial, industrial, institutional, or other land uses and associated roads.

- (n) "Division of land" means the creation from one or more parcels or building sites of additional parcels or building sites where such creation occurs at one time or through the successive partition within a 5 year period.
- (o) "Effective infiltration area" means the area of the infiltration system that is used to infiltrate runoff and does not include the area used for site access, berms or pretreatment.
- (p) "Erosion" means the process by which the land's surface is worn away by the action of wind, water, ice or gravity.
- (q) "Exceptional resource waters" means waters listed in s. NR 102.11, Wis. Adm. Code.
- (r) "Extraterritorial" means the unincorporated area within 3 miles of the corporate limits of a first, second, or third class city, or within 1.5 miles of a fourth class city or village.
- (s) "Final stabilization" means that all land disturbing construction activities at the construction site have been completed and that a uniform, perennial, vegetative cover has been established, with a density of at least 70% of the cover, for the unpaved areas and areas not covered by permanent structures, or employment of equivalent permanent stabilization measures.
- (t) "Financial guarantee" means a performance bond, maintenance bond, surety bond, irrevocable letter of credit, or similar guarantees submitted to the Director of Public Works by the responsible party to assure that requirements of the ordinance are carried out in compliance with the stormwater management plan.
- (u) "Governing body" means the Common Council.
- (v) "Highway" has the meaning given in §340.01 (22), Wis. Stats.
- (w) "Highway reconditioning" has the meaning given in §84.013 (1)(b), Wis. Stats.
- (x) "Highway reconstruction" has the meaning given in §84.013(1)(c), Wis. Stats.
- (y) "Highway resurfacing" has the meaning given in §84.013(1)(d), Wis. Stats.
- (z) "Impervious surface" means an area that releases as runoff all or a large portion of the precipitation that falls on it, except for frozen soil. Rooftops, sidewalks, driveways, parking lots and streets are examples of areas that typically are impervious. Gravel surfaces are considered impervious, unless specifically designed to encourage infiltration.
- (aa) "In-fill area" means a new development area less than 5 acres in size that is located within existing urban sewer service areas, surrounded by already existing development or

- existing development and natural or man-made features where development cannot occur..
- (bb) “Infiltration” means the entry of precipitation or runoff into or through the soil.
 - (cc) “Infiltration system” means a device or practice such as a basin, trench, rain garden or swale designed specifically to encourage infiltration, but does not include natural infiltration in pervious surfaces such as lawns, redirecting of rooftop downspouts onto lawns or minimal infiltration from practices, such as swales or road side channels designed for conveyance and pollutant removal only.
 - (dd) “Karst feature” means an area or surficial geologic feature subject to bedrock dissolution so that it is likely to provide a conduit to groundwater, and may include caves, enlarged fractures, mine features, exposed bedrock surfaces, sinkholes, springs, seeps or swallets.
 - (ee) “Land disturbing construction activity” (or “disturbance”) means any man-made alteration of the land surface resulting in a change in the topography or existing vegetative or non-vegetative soil cover, that may result in runoff and lead to an increase in soil erosion and movement of sediment into waters of the state. Land disturbing construction activity includes clearing and grubbing, demolition, excavating, pit trench dewatering, filling and grading activities, and soil stockpiling.
 - (ff) “Maintenance agreement” means a legal document that provides for long-term maintenance of stormwater management and best management practices.
 - (gg) “MEP” or “maximum extent practicable” means a level of implementing best management practices in order to achieve a performance standard specified in this ordinance which takes into account the best available technology, cost effectiveness and other competing issues such as human safety and welfare, endangered and threatened resources, historic properties and geographic features. MEP allows flexibility in the way to meet the performance standards and may vary based on the performance standard and site conditions.
 - (hh) “Minor reconstruction of a highway” means reconstruction of a highway that is limited to 1.5 miles in continuous or aggregate total length of realignment and that does not exceed 100 feet in width of roadbed widening.
 - (ii) “New development” means that portion of a post-construction site where impervious surfaces are being created or expanded. Any disturbance where the amount of

impervious area for the post-development condition is greater than the pre-development condition is classified as new development. For purposes of this ordinance, a post-construction site is classified as new development, redevelopment, routine maintenance, or some combination of these three classifications as appropriate.

- (jj) "Off-site" means located outside the property boundary described in the permit application.
- (kk) "On-site" means located within the property boundary described in the permit application.
- (ll) "Ordinary high-water mark" has the meaning given in s. NR 115.03(6), Wis. Adm. Code.
- (mm) "Outstanding resource waters" means waters listed in s. NR 102.10, Wis. Adm. Code.
- (nn) "Percent fines" means the percentage of a given sample of soil, which passes through a # 200 sieve.
- (oo) "Performance standard" means a narrative or measurable number specifying the minimum acceptable outcome for a facility or practice.
- (pp) "Permit" means a written authorization made by the Director of Public Works to the applicant to conduct land disturbing construction activity or to discharge post-construction runoff to waters of the state.
- (qq) "Permit administration fee" means a sum of money paid to the Director of Public Works by the permit applicant for the purpose of recouping the expenses incurred by the authority in administering the permit.
- (rr) "Pervious surface" means an area that releases as runoff a small portion of the precipitation that falls on it. Lawns, gardens, parks, forests or other similar vegetated areas are examples of surfaces that typically are pervious.
- (ss) "Pollutant" has the meaning given in §283.01(13), Wis. Stats.
- (tt) "Pollution" has the meaning given in §281.01(10), Wis. Stats.
- (uu) "Post-construction site" means a construction site following the completion of land disturbing construction activity and final site stabilization.
- (vv) "Post-development" means the extent and distribution of land cover types present after the completion of land disturbing construction activity and final site stabilization.

- (ww) "Pre-development" means the extent and distribution of land cover types present before the initiation of land disturbing construction activity, assuming that all land uses prior to development activity are managed in an environmentally sound manner.
- (xx) "Preventive action limit" has the meaning given in s. NR 140.05(17), Wis. Adm. Code.
- (yy) "Redevelopment" means that portion of a post-construction site where impervious surfaces are being reconstructed, replaced, or reconfigured. Any disturbance where the amount of impervious area for the post-development condition is equal to or less than the pre-development condition is classified as redevelopment. For purposes of this ordinance, a post-construction site is classified as new development, redevelopment, routine maintenance, or some combination of these three classifications as appropriate.
- (zz) "Responsible party" means any entity holding fee title to the property or other person contracted or obligated by other agreement to implement and maintain post-construction stormwater BMPs.
- (aaa) "Routine maintenance" means that portion of a post-construction site where pre-development impervious surfaces are being maintained to preserve the original line and grade, hydraulic capacity, drainage pattern, configuration, or purpose of the facility. Remodeling of buildings and resurfacing of parking lots, streets, driveways, and sidewalks are examples of routine maintenance, provided the lower ½ of the impervious surface's granular base is not disturbed. The disturbance shall be classified as redevelopment if the lower ½ of the granular base associated with the pre-development impervious surface is disturbed or if the soil located beneath the impervious surface is exposed. For purposes of this ordinance, a post-construction site is classified as new development, redevelopment, routine maintenance, or some combination of these three classifications as appropriate.
- (bbb) "Runoff" means stormwater or precipitation including rain, snow or ice melt or similar water that moves on the land surface via sheet or channelized flow.
- (ccc) "Separate storm sewer" means a conveyance or system of conveyances including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all of the following criteria:
- (1) Is designed or used for collecting water or conveying runoff.
 - (2) Is not part of a combined sewer system.

- (3) Is not draining to a stormwater treatment device or system.
- (4) Discharges directly or indirectly to waters of the state.
- (ddd) "Site" means the entire area included in the legal description of the land on which the land disturbing construction activity occurred.
- (eee) "Stop work order" means an order issued by the Director of Public Works which requires that all construction activity on the site be stopped.
- (fff) "Stormwater management plan" means a comprehensive plan designed to reduce the discharge of pollutants from stormwater after the site has undergone final stabilization following completion of the construction activity.
- (ggg) "Stormwater management system plan" is a comprehensive plan designed to reduce the discharge of runoff and pollutants from hydrologic units on a regional or municipal scale.
- (hhh) "Stormwater Reference Guide" means the Stormwater Reference Guide of August 15, 2007, as amended from time to time and which is available for inspection from the Office of the Building Inspector and City Engineer.
- (iii) "Technical standard" means a document that specifies design, predicted performance and operation and maintenance specifications for a material, device or method.
- (jjj) "Top of the channel" means an edge, or point on the landscape, landward from the ordinary high-water mark of a surface water of the state, where the slope of the land begins to be less than 12% continually for at least 50 feet. If the slope of the land is 12% or less continually for the initial 50 feet, landward from the ordinary high-water mark, the top of the channel is the ordinary high-water mark.
- (kkk) "TR-55" means the United States Department of Agriculture, Natural Resources Conservation Service (previously Soil Conservation Service), Urban Hydrology for Small Watersheds, Second Edition, Technical Release 55, June 1986.
- (lll) "Transportation facility" means a public street, a public road, a public highway, a public mass transit facility, a public-use airport, a public trail, or any other public work for transportation purposes such as harbor improvements under §85.095(1)(b), Wis. Stats.
- (mmm) "Type II distribution" means a rainfall type curve as established in the "United States Department of Agriculture, Soil Conservation Service, Technical Paper 149, published 1973". The Type II curve is applicable to all of Wisconsin and represents the most intense storm pattern.

(nnn) "Waters of the state" has the meaning given in §281.01 (18), Wis. Stats.

28-6 TECHNICAL STANDARDS.

The following methods shall be used in designing and maintaining the water quality, peak discharge, infiltration, protective area, and fueling / vehicle maintenance components of stormwater practices needed to meet the water quality standards of this ordinance:

- (a) Technical standards identified, developed or disseminated by the Wisconsin Department of Natural Resources under subchapter V of chapter NR 151, Wis. Adm. Code.
- (b) Technical standards and guidance identified within the Stormwater Reference Guide.
- (c) Where technical standards have not been identified or developed by the Wisconsin Department of Natural Resources, other technical standards may be used provided that the methods have been approved by the Director of Public Works.
- (d) In this ordinance, the following year and location has been selected as average annual rainfall: Green Bay, 1969 (Mar. 29-Nov. 25).

28-7 PERFORMANCE STANDARDS.

- (a) RESPONSIBLE PARTY. The responsible party shall implement a post-construction stormwater management plan that incorporates the requirements of this section.
- (b) PLAN. A written stormwater management plan in accordance with Section 28-7 shall be developed and implemented for each post-construction site.
- (c) REQUIREMENTS. The stormwater management plan shall meet the following minimum requirements to the maximum extent practicable:
 - (1) TOTAL SUSPENDED SOLIDS. BMPs shall be designed, installed and maintained to control total suspended solids carried in runoff from the post-construction site as follows. The total suspended solids reduction shall be based on the average annual rainfall, as compared to no runoff management controls.

- A. For post-construction sites with 20,000 square feet or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance, the following is required:
 - i. Reduce the total suspended solids load by 80% for new development.
 - ii. Reduce the total suspended solids load by 40% for redevelopment.
 - iii. No total suspended solids load reduction is required for routine maintenance areas, unless runoff from the routine maintenance area discharges into a proposed water quality BMP.
 - B. For post-construction sites with less than 20,000 square feet of impervious surface disturbance, reduce the total suspended solids load using BMPs from the City of De Pere Stormwater Reference Guide. These sites are not required to satisfy a numeric performance standard.
 - C. Sites with a cumulative addition of 20,000 square feet or greater of impervious surfaces after the adoption date [Insert adoption date] of this ordinance are required to satisfy the performance standards within Section 28-7C(1)A.i, ii, and iii.
 - D. The amount of total suspended solids control previously required for the site shall not be reduced as a result of the proposed development or disturbance.
 - E. Notwithstanding subds. A to D., if the design cannot achieve the applicable total suspended solids reduction specified, the stormwater management plan shall include a written and site-specific explanation why that level of reduction is not attained and the total suspended solids load shall be reduced to the maximum extent practicable.
2. PEAK DISCHARGE. BMPs shall be designed, installed and maintained to control peak discharges from the post-construction site as follows:
- A. For post-construction sites with 20,000 square feet or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance, the following is required:

- i. The peak post-development discharge rate shall not exceed the peak pre-development discharge rate for the 2-year, 10-year, and 100-year, 24-hour design storms. These peak discharge requirements apply to new development and redevelopment areas. No peak discharge control is required for routine maintenance areas, unless runoff from the routine maintenance area discharges into a proposed peak flow control facility.
- ii. TR-55 methodology shall be used for peak discharge calculations, unless the administering authority approves an equivalent methodology. The meaning of “hydrologic soil group” and “runoff curve number” are as determined in TR-55. Peak pre-development discharge rates shall be determined using the following “meadow” runoff curve numbers:

Maximum Pre-Development Runoff Curve Numbers - Meadow				
Hydrologic Soil Group	A	B	C	D
Runoff Curve Number	30	58	71	78

- B. For post-construction sites with less than 20,000 square feet of impervious surface disturbance, reduce peak post-development discharge rates using BMPs from the City of De Pere Stormwater Reference Guide. These sites are not required to satisfy a numeric performance standard.
- C. Sites with a cumulative addition of 20,000 square feet or greater of impervious surfaces after the adoption date [Insert adoption date] of this ordinance are required to satisfy the performance standards within Section 28-7(c)2A.i and ii.
- D. The amount of peak discharge control previously required for the site shall not be reduced as a result of the proposed development or disturbance.
- E. An adequate outfall shall be provided for each point of concentrated discharge from the post-construction site. An adequate outfall consists of non-erosive discharge velocities and reasonable downstream conveyance.

F. Exemptions. The following transportation facilities are not required to meet the peak discharge requirements of this paragraph (2) provided the transportation facility is not part of a larger common plan of development or sale:

- i. A transportation facility where the change in hydrology due to development does not increase the existing surface water elevation at any point within the downstream receiving surface water by more than 0.01 of a foot for the 2-year, 24-hour storm event.
- ii. A highway reconstruction site.
- iii. A transportation facility that is part of a redevelopment project.

(3) INFILTRATION. BMPs shall be designed, installed, and maintained to infiltrate runoff in accordance with the following, except as provided in subds. H through K.

A. For residential developments with 20,000 square feet or more of impervious surface disturbance and residential developments with 1 acre or more of land disturbance, one of the following shall be met:

- i. Infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 90% of the pre-development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.
- ii. Infiltrate 25% of the post-development runoff from the 2 year -24 hour design storm with a type II distribution. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR-55. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

- B. For non-residential developments with 20,000 square feet or more of impervious surface disturbance and non-residential developments with 1 acre or more of land disturbance, including commercial, industrial and institutional development, one of the following shall be met:
 - i. Infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 60% of the pre-development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.
 - ii. Infiltrate 10% of the runoff from the 2 year - 24 hour design storm with a type II distribution. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes, and not composite curve numbers as defined in TR-55. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.
- C. Pre-development condition shall assume “good hydrologic conditions” for appropriate land covers as identified in TR-55 or an equivalent methodology approved by the administering authority. The meaning of “hydrologic soil group” and “runoff curve number” are as determined in TR-55. However, when pre-development land cover is cropland, rather than using TR-55 values for cropland, the following runoff curve numbers shall be used:

Maximum Pre-Development Runoff Curve Numbers - Cropland				
Hydrologic Soil Group	A	B	C	D
Runoff Curve Number	56	70	79	83

- D. For residential and non-residential developments with less than 20,000 square feet of new impervious surfaces, infiltrate runoff volume using

BMPs from the Stormwater Reference Guide. These sites are not required to satisfy a numeric performance standard.

- E. Sites with a cumulative addition of 20,000 square feet or greater of impervious surfaces after the adoption date [Insert adoption date] of this ordinance are required to satisfy the performance standards within Section 28-7(c)3A, B, and C.
- F. The amount of infiltration previously required for the site shall not be reduced as a result of the proposed development or disturbance.
- G. Before infiltrating runoff, pretreatment shall be required for parking lot runoff and for runoff from new road construction in commercial, industrial and institutional areas that will enter an infiltration system. The pretreatment shall be designed to protect the infiltration system from clogging prior to scheduled maintenance and to protect groundwater quality in accordance with subd. K. Pretreatment options may include, but are not limited to, oil/grease separation, sedimentation, biofiltration, filtration, swales or filter strips.
- H. Exclusions. Infiltration of runoff from the following areas are prohibited from meeting the infiltration requirements of this paragraph (3):
 - i. Areas associated with tier 1 industrial facilities identified in s. NR 216.21(2)(a), Wis. Adm. Code, including storage, loading, rooftop and parking.
 - ii. Storage and loading areas of tier 2 industrial facilities identified in s. NR 216.21(2)(b), Wis. Adm. Code.
 - iii. Fueling and vehicle maintenance areas.
 - iv. Areas within 1000 feet upgradient or within 100 feet downgradient of karst features.
 - v. Areas with less than 3 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock, except this subd. H.v. does not prohibit infiltration of roof runoff.

- vi. Areas with runoff from industrial, commercial and institutional parking lots and roads and residential arterial roads with less than 5 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock.
 - vii. Areas within 400 feet of a community water system well as specified in s. NR 811.16(4), Wis. Adm. Code, or within 100 feet of a private well as specified in s. NR 812.08(4), Wis. Adm. Code, for runoff infiltrated from commercial, industrial and institutional land uses or regional devices for residential development.
 - viii. Areas where contaminants of concern, as defined in s. NR 720.03(2), Wis. Adm. Code are present in the soil through which infiltration will occur.
 - ix. Any area where the soil does not exhibit one of the following soil characteristics between the bottom of the infiltration system and the seasonal high groundwater and top of bedrock: at least a 3-foot soil layer with 20% fines or greater; or at least a 5-foot soil layer with 10% fines or greater. This does not apply where the soil medium within the infiltration system provides an equivalent level of protection. This subd. H.ix. does not prohibit infiltration of roof runoff.
- I. Exemptions. Infiltration of runoff from the following areas are not required to meet the infiltration requirements of paragraph (3):
- i. Areas where the infiltration rate of the soil is less than 0.6 inches/hour measured at the site.
 - ii. Parking areas and access roads less than 5,000 square feet for commercial and industrial development.
 - iii. Redevelopment and routine maintenance areas.
 - iv. In-fill areas less than 5 acres.

- v. Infiltration areas during periods when the soil on the site is frozen.
 - vi. Roads in commercial, industrial and institutional land uses, and arterial residential roads.
 - vii. Highways provided the transportation facility is not part of a larger common plan of development or sale.
- J. Where alternate uses of runoff are employed, such as for toilet flushing, laundry or irrigation, such alternate use shall be given equal credit toward the infiltration volume required by this paragraph.
- K.
- i. Infiltration systems designed in accordance with this paragraph shall, to the extent technically and economically feasible, minimize the level of pollutants infiltrating to groundwater and shall maintain compliance with the preventive action limit at a point of standards application in accordance with ch. NR 140, Wis. Adm. Code. However, if site specific information indicates that compliance with a preventive action limit is not achievable, the infiltration BMP may not be installed or shall be modified to prevent infiltration to the maximum extent practicable.
 - ii. Notwithstanding subd. par. a., the discharge from BMPs shall remain below the enforcement standard at the point of standards application.
4. PROTECTIVE AREAS.
- A. "Protective area" means an area of land that commences at the top of the channel of lakes, streams and rivers, or at the delineated boundary of wetlands, and that is the greatest of the following widths, as measured horizontally from the top of the channel or delineated wetland boundary to the closest impervious surface. However, in this paragraph, "protective area" does not include any area of land adjacent to any stream enclosed within a pipe or culvert, such that runoff cannot enter the enclosure at this location.

- i. For outstanding resource waters and exceptional resource waters, and for wetlands in areas of special natural resource interest as specified in s. NR 103.04, 75 feet.
 - ii. For perennial and intermittent streams identified on a United States geological survey 7.5-minute series topographic map, or a county soil survey map, whichever is more current, 50 feet.
 - iii. For lakes, 50 feet.
 - iv. For highly susceptible wetlands, 50 feet. Highly susceptible wetlands include the following types: fens, sedge meadows, bogs, low prairies, conifer swamps, shrub swamps, other forested wetlands, fresh wet meadows, shallow marshes, deep marshes and seasonally flooded basins.
 - v. For less susceptible wetlands, 10 percent of the average wetland width, but no less than 10 feet nor more than 30 feet. Less susceptible wetlands include degraded wetlands dominated by invasive species such as reed canary grass.
 - vi. In subd. A.i., iv. and v., determinations of the extent of the protective area adjacent to wetlands shall be made on the basis of the sensitivity and runoff susceptibility of the wetland in accordance with the standards and criteria in s. NR 103.03.
 - vii. For concentrated flow channels with drainage areas greater than 130 acres, 10 feet.
- B. Wetlands shall be delineated. Wetland boundary delineations shall be made in accordance with s. NR 103.08(1m). This paragraph (4) does not apply to wetlands that have been completely filled in accordance with all applicable state and federal regulations. The protective area for wetlands that have been partially filled in accordance with all applicable state and federal regulations shall be measured from the wetland boundary delineation after fill has been placed.
- C. Paragraph (4) applies to post-construction sites located within a protective area, except those areas exempted pursuant to subd. F below.

- D. The following requirements shall be met:
- i. Impervious surfaces shall be kept out of the protective area to the maximum extent practicable. The stormwater management plan shall contain a written site-specific explanation for any parts of the protective area that are disturbed during construction.
 - ii. Where land disturbing construction activity occurs within a protective area, and where no impervious surface is present, adequate sod or self-sustaining vegetative cover of 70% or greater shall be established and maintained. The adequate sod or self-sustaining vegetative cover shall be sufficient to provide for bank stability, maintenance of fish habitat and filtering of pollutants from upslope overland flow areas under sheet flow conditions. Non-vegetative materials, such as rock riprap, may be employed on the bank as necessary to prevent erosion, such as on steep slopes or where high velocity flows occur.

Note to Users: It is recommended that seeding of non-aggressive vegetative cover be used in the protective areas. Vegetation that is flood and drought tolerant and can provide long-term bank stability because of an extensive root system is preferable. Vegetative cover can be measured using the line transect method described in the University of Wisconsin Extension publication number A3533, titled "Estimating Residue Using the Line Transect Method".

- iii. Best management practices such as filter strips, swales, or wet detention basins, that are designed to control pollutants from non-point sources may be located in the protective area.
- E. A protective area established or created after the adoption date [Insert adoption date] of this ordinance shall not be eliminated or reduced, except as allowed in subd. F.ii, iii, or iv below.

- F. Exemptions. The following areas are not required to meet the protective area requirements of paragraph (4):
- i. Redevelopment and routine maintenance areas provided the minimum requirements within in subd. E above are satisfied.
 - ii. Structures that cross or access surface waters such as boat landings, bridges and culverts.
 - iii. Structures constructed in accordance with §59.692(1v), Wis. Stats.
 - iv. Post-construction sites from which runoff does not enter the surface water, except to the extent that vegetative ground cover is necessary to maintain bank stability.

Note to Users: A vegetated protective area to filter runoff pollutants from post-construction sites described in subd. F.iv is not necessary since runoff is not entering the surface water at that location. Other practices, necessary to meet the requirements of this section, such as a swale or basin, will need to be designed and implemented to reduce runoff pollutants before the runoff enters a surface water of the state.

- (5) FUELING AND VEHICLE MAINTENANCE AREAS. Fueling and vehicle maintenance areas shall, to the maximum extent practicable, have BMPs designed, installed and maintained to reduce petroleum within runoff, such that the runoff that enters waters of the state contains no visible petroleum sheen.

Note to Users: A combination of the following BMPs may be used: oil and grease separators, canopies, petroleum spill cleanup materials, or any other structural or non-structural method of preventing or treating petroleum in runoff.

- (6) SWALE TREATMENT FOR TRANSPORTATION FACILITIES. Section 28-7(c)6 is not applicable to transportation facilities that are part of a larger common plan of development or sale.

A. Applicability. Except as provided in subd. B., transportation facilities that use swales for runoff conveyance and pollutant removal meet all of the requirements of this section, if the swales are designed to the maximum extent practicable to do all of the following:

1. Be vegetated. However, where appropriate, non-vegetative measures may be employed to prevent erosion or provide for runoff treatment, such as rock riprap stabilization or check dams.

Note to Users: It is preferred that tall and dense vegetation be maintained within the swale due to its greater effectiveness at enhancing runoff pollutant removal.

2. Carry runoff through a swale for 200 feet or more in length that is designed with a flow velocity no greater than 1.5 feet per second for the peak flow generated using either a 2-year, 24-hour design storm or a 2-year storm with a duration equal to the time of concentration as appropriate. If a swale of 200 feet in length cannot be designed with a flow velocity of 1.5 feet per second or less, then the flow velocity shall be reduced to the maximum extent practicable.

Note to Users: Check dams may be included in the swale design to slow runoff flows and improve pollutant removal. Transportation facilities with continuous features such as curb and gutter, sidewalks or parking lanes do not comply with the design requirements of this paragraph. However, a limited amount of structural measures such as curb and gutter may be allowed as necessary to account for other concerns such as human safety or resource protection.

B. Exemptions. The Director of Public Works may, consistent with water quality standards, require other provisions of this section be met on a

transportation facility with an average daily travel of vehicles greater than 2500 and where the initial surface water of the state that the runoff directly enters is any of the following:

- i. An outstanding resource water.
- ii. An exceptional resource water.
- iii. Waters listed in s. 303(d) of the federal clean water act that are identified as impaired in whole or in part, due to nonpoint source impacts.
- iv. Waters where targeted performance standards are developed under s. NR 151.004, Wis. Adm. Code, to meet water quality standards.

(7) EXEMPTIONS. The following areas are not required to meet the performance standards within Section 28-7(c):

- A. Agricultural production areas with less than 100,000 square feet of impervious surface disturbance.
- B. Underground utility construction such as water, sewer, gas, electric, telephone, cable television, and fiber optic lines. This exemption does not apply to the construction of any above ground structures associated with utility construction.
- C. The following transportation facilities are exempt, provided the transportation facility is not part of a larger common plan of development or sale.
 - i. Reconditioning or resurfacing of a highway.
 - ii. Minor reconstruction of a highway. Notwithstanding this exemption, the protective area requirements within NR 151.24(6) Wisconsin Administrative Code apply to minor reconstruction of a highway.
 - iii. A redevelopment transportation facility with no increase in exposed parking lots or roads.
 - iv. A transportation facility with less than 10% connected imperviousness based on complete development of the

transportation facility, provided the cumulative area of all parking lots and rooftops is less than one acre.

- v. Routine maintenance for transportation facilities if performed to maintain the original line and grade, hydraulic capacity or original purpose of the facility.

(d) GENERAL CONSIDERATIONS FOR ON-SITE AND OFF-SITE STORMWATER MANAGEMENT MEASURES. The following considerations shall be observed in managing runoff:

- (1) Natural topography and land cover features such as natural swales, natural depressions, native soil infiltrating capacity, and natural groundwater recharge areas shall be preserved and used, to the extent possible, to meet the requirements of this section.
- (2) Emergency overland flow for all stormwater facilities shall be provided to prevent exceeding the safe capacity of downstream drainage facilities and prevent endangerment of downstream property or public safety.

(e) LOCATION AND REGIONAL TREATMENT OPTION.

- (1) The BMPs may be located on-site or off-site as part of a regional stormwater device, practice or system.
- (2) Post-construction runoff within a non-navigable surface water that flows into a BMP, such as a wet detention pond, is not required to meet the performance standards of this ordinance. Post-construction BMPs may be located in non-navigable surface waters.
- (3) Except as allowed under par. (4), post-construction runoff from new development shall meet the post-construction performance standards prior to entering a navigable surface water.
- (4) Post-construction runoff from any development within a navigable surface water that flows into a BMP is not required to meet the performance standards of this ordinance if:
 - A. The BMP was constructed prior to the effective date of this ordinance and

- the BMP either received a permit issued under ch. 30, Stats., or the BMP did not require a ch. 30, Wis. Stats., permit; and
- B. The BMP is designed to provide runoff treatment from future upland development.
- (5) Runoff from existing development, redevelopment and in-fill areas shall meet the post-construction performance standards in accordance with this paragraph.
- A. To the maximum extent practicable, BMPs shall be located to treat runoff prior to discharge to navigable surface waters.
 - B. Post-construction BMPs for such runoff may be located in a navigable surface water if allowable under all other applicable federal, state and local regulations such as ch. NR 103, Wis. Adm. Code and ch. 30, Wis. Stats.
- (6) The discharge of runoff from a BMP, such as a wet detention pond, or after a series of such BMPs is subject to this chapter.

Note to Users: This section does not supersede any other applicable federal, state or local regulation such as ch. NR 103, Wis. Adm. Code and ch. 30, Wis. Stats.

- (7) The Director of Public Works may approve off-site management measures provided that all of the following conditions are met:
- A. The Department of Public Works determines that the post-construction runoff is covered by a stormwater management system plan that is approved by the Department of Public Works and that contains management requirements consistent with the purpose and intent of this ordinance.
 - B. The off-site facility meets all of the following conditions:
 - i. The facility is in place.
 - ii. The facility is designed and adequately sized to provide a level of stormwater control equal to or greater than that which would be afforded by on-site practices meeting the performance standards of this ordinance.

- iii. The facility has a legally obligated entity responsible for its long-term operation and maintenance.
- (8) Where a regional treatment option exists such that the Director of Public Works exempts the applicant from all or part of the minimum on-site stormwater management requirements, the applicant shall be required to pay a fee in an amount determined in negotiation with the Director of Public Works. In determining the fee for post-construction runoff, the Director of Public Works shall consider an equitable distribution of the cost for land, engineering design, construction, and maintenance of the regional treatment option.
- (f) **ALTERNATE REQUIREMENTS.** The Director of Public Works may establish stormwater management requirements more stringent than those set forth in this section if the Director of Public Works determines that an added level of protection is needed to protect sensitive resources. Also, the Director of Public Works may establish stormwater management requirements less stringent than those set forth in this section if the Director of Public Works determines that less protection is needed to protect sensitive resources and provide reasonable flood protection. However, the alternative requirements shall not be less stringent than those requirements promulgated in rules by Wisconsin Department of Natural Resources under NR 151 Wisconsin Administrative Code.

28-8 PERMITTING REQUIREMENTS, PROCEDURES AND FEES.

- (a) **PERMIT REQUIRED.** No responsible party may undertake a land disturbing construction activity without receiving a post-construction runoff permit from the Director of Public Works prior to commencing the proposed activity.
- (b) **PERMIT APPLICATION AND FEES.** Unless specifically excluded by this ordinance, any responsible party desiring a permit shall submit to the Director of Public Works a permit application made on a form provided by the Director of Public Works for that purpose.

- (1) Unless otherwise excepted by this ordinance, a permit application must be accompanied by a stormwater management plan, a maintenance agreement and a non-refundable permit administration fee.
 - (2) The stormwater management plan shall be prepared to meet the requirements of Sections 28-7 and 28-9, the maintenance agreement shall be prepared to meet the requirements of Section 28-10, the financial guarantee shall meet the requirements of Section 28-11, and fees shall be those established by the Common Council as set forth in Section 28-12.
- (c) REVIEW AND APPROVAL OF PERMIT APPLICATION. The Director of Public Works shall review any permit application that is submitted with a stormwater management plan, maintenance agreement, and the required fee. The following approval procedure shall be used:
- (1) Within 20 business days of the receipt of a complete permit application, including all items as required by sub. (2), the Director of Public Works shall inform the applicant whether the application, plan and maintenance agreement are approved or disapproved based on the requirements of this ordinance.
 - (2) If the stormwater permit application, plan and maintenance agreement are approved, or if an agreed upon payment of fees in lieu of stormwater management practices is made, the Director of Public Works shall issue the permit.
 - (3) If the stormwater permit application, plan or maintenance agreement is disapproved, the Director of Public Works shall detail in writing the reasons for disapproval.
 - (4) The Director of Public Works may request additional information from the applicant. If additional information is submitted, the Director of Public Works shall have 20 business days from the date the additional information is received to inform the applicant that the plan and maintenance agreement are either approved or disapproved.
 - (5) Failure by the Director of Public Works to inform the permit applicant of a decision within 20 business days of a required submittal shall be deemed to mean

approval of the submittal and the applicant may proceed as if a permit had been issued.

- (d) PERMIT REQUIREMENTS. All permits issued under this ordinance shall be subject to the following conditions, and holders of permits issued under this ordinance shall be deemed to have accepted these conditions. The Director of Public Works may suspend or revoke a permit for violation of a permit condition, following written notification of the responsible party. An action by the Director of Public Works to suspend or revoke this permit may be appealed in accordance with Section 28-14.
- (1) Compliance with this permit does not relieve the responsible party of the responsibility to comply with other applicable federal, state, and local laws and regulations.
 - (2) The responsible party shall design and install all structural and non-structural stormwater management measures in accordance with the approved stormwater management plan and this permit.
 - (3) The responsible party shall notify the Director of Public Works at least 10 business days before commencing any work in conjunction with the stormwater management plan, and within 10 business days upon completion of the stormwater management practices. If required as a special condition under sub. (E), the responsible party shall make additional notification according to a schedule set forth by the Director of Public Works so that practice installations can be inspected during construction.
 - (4) Practice installations required as part of this ordinance shall be certified "as built" by a licensed professional engineer. Completed stormwater management practices must pass a final inspection by the Director of Public Works or its designee to determine if they are in accordance with the approved stormwater management plan and ordinance. The Director of Public Works or its designee shall notify the responsible party in writing of any changes required in such practices to bring them into compliance with the conditions of this permit.
 - (5) The responsible party shall notify the Director of Public Works of any significant modifications it intends to make to an approved stormwater management plan.

The Director of Public Works may require that the proposed modifications be submitted to it for approval prior to incorporation into the stormwater management plan and execution by the responsible party.

- (6) The responsible party shall maintain all stormwater management practices in accordance with the stormwater management plan until the practices either become the responsibility of the Common Council, or are transferred to subsequent private owners as specified in the approved maintenance agreement.
- (7) The responsible party authorizes the Director of Public Works to perform any work or operations necessary to bring stormwater management measures into conformance with the approved stormwater management plan, and consents to a special assessment or charge against the property as authorized under subch. VII of ch. 66, Wis. Stats., or to charging such costs against the financial guarantee posted under Section 28-11.
- (8) If so directed by the Director of Public Works, the responsible party shall repair at the responsible party's own expense all damage to adjoining municipal facilities and drainage ways caused by runoff, where such damage is caused by activities that are not in compliance with the approved stormwater management plan.
- (9) The responsible party shall permit property access to the Director of Public Works or its designee for the purpose of inspecting the property for compliance with the approved stormwater management plan and this permit.
- (10) Where site development or redevelopment involves changes in direction, increases in peak rate and/or total volume of runoff from a site, the Director of Public Works may require the responsible party to make appropriate legal arrangements with affected property owners concerning the prevention of endangerment to property or public safety.
- (11) The responsible party is subject to the enforcement actions and penalties detailed in 28-13, if the responsible party fails to comply with the terms of this permit.
- (12) The permit applicant shall post the "Certificate of Permit Coverage" in a conspicuous location at the construction site.

- (e) PERMIT CONDITIONS. Permits issued under this subsection may include conditions established by Director of Public Works in addition to the requirements needed to meet the performance standards in Section 28-7 or a financial guarantee as provided for in Section 28-11.
- (f) PERMIT DURATION. Permits issued under this section shall be valid from the date of issuance through the date the Director of Public Works notifies the responsible party that all stormwater management practices have passed the final inspection required under sub. (D)(4).
- (g) ALTERNATE REQUIREMENTS. The Director of Public Works may prescribe alternative requirements for applicants seeking an exemption to on-site stormwater management performance standards under Section 28-7 (e) or for applicants seeking a permit for a post-construction site with less than 20,000 square feet of impervious surface disturbance.

28-9 STORMWATER MANAGEMENT PLAN.

- (a) PLAN REQUIREMENTS. The stormwater management plan required under Section 28-8 (b) shall comply with the City of De Pere Stormwater Reference Guide and contain at a minimum the following information:
 - (1) Name, address, and telephone number of the landowner and responsible parties.
 - (2) A legal description of the property proposed to be developed.
 - (3) Pre-development site map with property lines, disturbed limits, and drainage patterns.
 - (4) Post-development site map with property lines, disturbed limits, and drainage patterns.
 - A. Total area of disturbed impervious surfaces within the site.
 - B. Total area of new impervious surfaces within the site.
 - C. Performance standards applicable to site.
 - D. Proposed best management practices.

- E. Groundwater, bedrock, and soil limitations.
 - F. Separation distances. Stormwater management practices shall be adequately separated from wells to prevent contamination of drinking water.
- (b) **ALTERNATE REQUIREMENTS.** The Director of Public Works may prescribe alternative submittal requirements for applicants seeking an exemption to on-site stormwater management performance standards under Section 28-7 (c) or for applicants seeking a permit for a post-construction site with less than 20,000 square feet of impervious surface disturbance.

28-10 MAINTENANCE AGREEMENT.

- (a) **MAINTENANCE AGREEMENT REQUIRED.** The maintenance agreement required under Section 28-8 (b) for stormwater management practices shall be an agreement between the Director of Public Works and the responsible party to provide for maintenance of stormwater practices beyond the duration period of this permit. The maintenance agreement shall be filed with the County Register of Deeds as a property deed restriction so that it is binding upon all subsequent owners of the land served by the stormwater management practices.
- (b) **AGREEMENT PROVISIONS.** The maintenance agreement shall contain the following information and provisions and be consistent with the maintenance plan required by Section 28-9(a)(6):
- (1) Identification of the stormwater facilities and designation of the drainage area served by the facilities.
 - (2) A schedule for regular maintenance of each aspect of the stormwater management system consistent with the stormwater management plan required under Section 28-8 (b).
 - (3) Identification of the responsible party(s), organization or city, county, town or village responsible for long term maintenance of the stormwater management

practices identified in the stormwater management plan required under Section 28-8 (b).

- (4) Requirement that the responsible party(s), organization, or city, county, town or village shall maintain stormwater management practices in accordance with the schedule included in par. (2).
 - (5) Authorization for the Director of Public Works to access the property to conduct inspections of stormwater management practices as necessary to ascertain that the practices are being maintained and operated in accordance with the agreement.
 - (6) A requirement on the Director of Public Works to maintain public records of the results of the site inspections, to inform the responsible party responsible for maintenance of the inspection results, and to specifically indicate any corrective actions required to bring the stormwater management practice into proper working condition.
 - (7) Agreement that the party designated under par. (3), as responsible for long term maintenance of the stormwater management practices, shall be notified by the Director of Public Works of maintenance problems which require correction. The specified corrective actions shall be undertaken within a reasonable time frame as set by the Director of Public Works.
 - (8) Authorization of the Director of Public Works to perform the corrected actions identified in the inspection report if the responsible party designated under par. (3) does not make the required corrections in the specified time period. The Director of Public Works shall enter the amount due on the tax rolls and collect the money as a special charge against the property pursuant to subch. VII of ch. 66, Wis. Stats.
- (c) **ALTERNATE REQUIREMENTS.** The Director of Public Works may prescribe alternative requirements for applicants seeking an exemption to on-site stormwater management performance standards under Section 28-7 (e) or for applicants seeking a permit for a post-construction site with less than 20,000 square feet of impervious surface disturbance.

28-11 FINANCIAL GUARANTEE.

- (a) ESTABLISHMENT OF THE GUARANTEE. The Director of Public Works may require the submittal of a financial guarantee, the form and type of which shall be acceptable to the Director of Public Works. The financial guarantee shall be in an amount determined by the Director of Public Works to be the estimated cost of construction and the estimated cost of maintenance of the stormwater management practices during the period which the designated party in the maintenance agreement has maintenance responsibility. The financial guarantee shall give the Director of Public Works the authorization to use the funds to complete the stormwater management practices if the responsible party defaults or does not properly implement the approved stormwater management plan, upon written notice to the responsible party by the Director of Public Works that the requirements of this ordinance have not been met.
- (b) CONDITIONS FOR RELEASE. Conditions for the release of the financial guarantee are as follows:
- (1) The Director of Public Works shall release the portion of the financial guarantee established under this section, less any costs incurred by the Director of Public Works to complete installation of practices, upon submission of "as built plans" by a licensed professional engineer. The Director of Public Works may make provisions for a partial pro-rata release of the financial guarantee based on the completion of various development stages.
 - (2) The Director of Public Works shall release the portion of the financial guarantee established under this section to assure maintenance of stormwater practices, less any costs incurred by the Director of Public Works, at such time that the responsibility for practice maintenance is passed on to another entity via an approved maintenance agreement.
- (c) ALTERNATE REQUIREMENTS. The Director of Public Works may prescribe alternative requirements for applicants seeking an exemption to on-site stormwater management performance standards under Section 28-7 (e) or for applicants seeking a

permit for a post-construction site with less than 20,000 square feet of impervious surface disturbance.

28-12 FEE SCHEDULE.

The fees referred to in this ordinance shall be established by resolution of the Common Council. A schedule of the fees so established shall be available for review in the office of the Director of Public Works or City Clerk-Treasurer.

28-13 ENFORCEMENT.

- (a) Any land disturbing construction activity or post-construction runoff initiated after the effective date of this ordinance by any person, firm, association, or corporation subject to the ordinance provisions shall be deemed a violation unless conducted in accordance with the requirements of this ordinance.
- (b) The Director of Public Works shall notify the responsible party by certified mail of any non-complying land disturbing construction activity or post-construction runoff. The notice shall describe the nature of the violation, remedial actions needed, a schedule for remedial action, and additional enforcement action which may be taken.
- (c) Upon receipt of written notification from the Director of Public Works under sub. (b), the responsible party shall correct work that does not comply with the stormwater management plan or other provisions of this permit. The responsible party shall make corrections as necessary to meet the specifications and schedule set forth by the Director of Public Works in the notice.
- (d) If the violations to a permit issued pursuant to this ordinance are likely to result in damage to properties, public facilities, or waters of the state, the Director of Public Works may enter the land and take emergency actions necessary to prevent such damage. The costs incurred by the Director of Public Works plus interest and legal costs shall be billed to the responsible party.

- (e) The Director of Public Works is authorized to post a stop work order on all land disturbing construction activity that is in violation of this ordinance, or to request the City Attorney to obtain a cease and desist order in any court with jurisdiction.
- (f) The Director of Public Works may revoke a permit issued under this ordinance for non-compliance with ordinance provisions.
- (g) Any permit revocation, stop work order, or cease and desist order shall remain in effect unless retracted by the Director of Public Works or by a court with jurisdiction.
- (h) The Director of Public Works is authorized to refer any violation of this ordinance, or of a stop work order or cease and desist order issued pursuant to this ordinance, to the [municipal attorney, corporation counsel] for the commencement of further legal proceedings in any court with jurisdiction.
- (i) Any person, firm, association, or corporation who does not comply with the provisions of this ordinance shall be subject to a forfeiture of not less than \$200 or more than \$1,000 per offense, together with the costs of prosecution. Each day that the violation exists shall constitute a separate offense.
- (j) Compliance with the provisions of this ordinance may also be enforced by injunction in any court with jurisdiction. It shall not be necessary to prosecute for forfeiture or a cease and desist order before resorting to injunctive proceedings.
- (k) When the Director of Public Works determines that the holder of a permit issued pursuant to this ordinance has failed to follow practices set forth in the stormwater management plan, or has failed to comply with schedules set forth in said stormwater management plan, the Director of Public Works or a party designated by the Director of Public Works may enter upon the land and perform the work or other operations necessary to bring the condition of said lands into conformance with requirements of the approved plan. The Director of Public Works shall keep a detailed accounting of the costs and expenses of

performing this work. These costs and expenses shall be deducted from any financial security posted pursuant to S.11 of this ordinance. Where such a security has not been established, or where such a security is insufficient to cover these costs, the costs and expenses shall be entered on the tax roll as a special charge against the property and collected with any other taxes levied thereon.

28-14 APPEALS.

- (a) **BOARD OF APPEALS.** The board of appeals, created pursuant to §14.21 of the City of De Pere ordinances pursuant to §62.23(7)(e), Wis. Stats, shall hear and decide appeals where it is alleged that there is error in any order, decision or determination made by the Director of Public Works in administering this ordinance. The board shall also use the rules, procedures, duties, and powers authorized by statute in hearing and deciding appeals. Upon appeal, the board may authorize variances from the provisions of this ordinance that are not contrary to the public interest, and where owing to special conditions a literal enforcement of the ordinance will result in unnecessary hardship.

- (b) **WHO MAY APPEAL.** Appeals to the board of appeals may be taken by any aggrieved person or by an officer, department, board, or bureau of the City of De Pere affected by any decision of the Director of Public Works.

28-15 SEVERABILITY.

If any section, clause, provision or portion of this ordinance is judged unconstitutional or invalid by a court of competent jurisdiction, the remainder of the ordinance shall remain in force and not be affected by such judgment.

Adopted by the Common Council of the City of De Pere, Wisconsin, this 3rd day of
February, 2009.

APPROVED:



Michael J. Walsh, Mayor

ATTEST:



Vicki L. Scray, Deputy Clerk

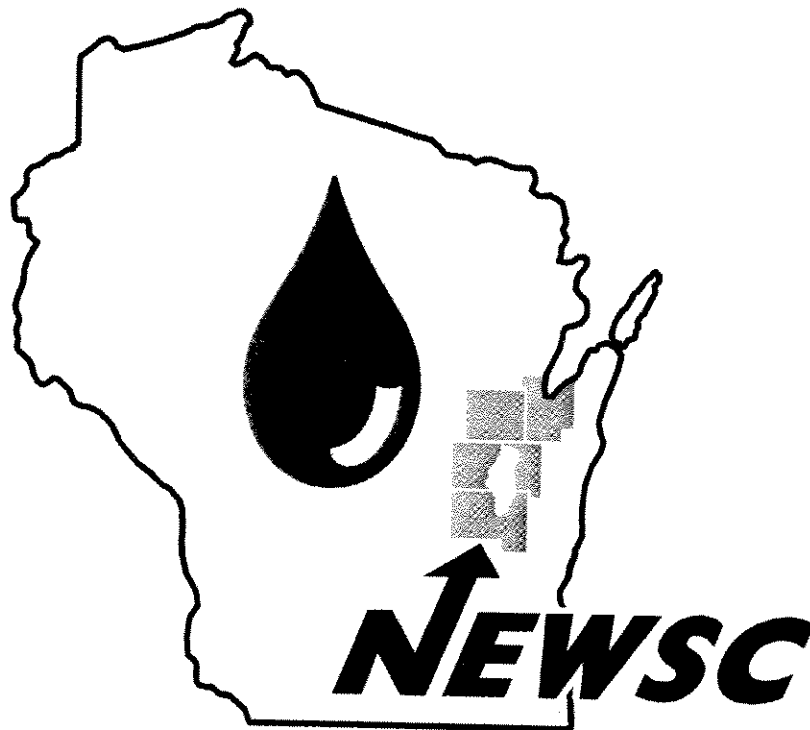
Ayes: 8

Nays: 0

NEWSC STORMWATER REFERENCE GUIDE

FOR THE:

POST-CONSTRUCTION STORMWATER MANAGEMENT ORDINANCE



North East Wisconsin Stormwater Consortium

PREPARED BY:
NEWSC STORMWATER & EROSION CONTROL COMMITTEE

PREPARED FOR:
NEWSC MEMBERSHIP

DATE:
August 15, 2007

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EXECUTIVE SUMMARY

The NEWSC Stormwater Reference Guide (Reference Guide) has been created to act as a companion to the NEWSC Model Post-Construction Stormwater Management Ordinance (Ordinance). The Ordinance cites the Reference Guide as the resource for details that were omitted from the model Ordinance due to the potential for variations in each municipality's permitting process and level of expertise in regard to the Ordinance. Items in the Reference Guide can be changed without the public hearing process as the changes are typically administrative and/or technical and do not affect the Ordinance's intent and requirements. The Reference Guide is organized similar to the Post-Construction Stormwater Management Ordinance for ease of relating the comments in the Reference Guide to the appropriate sections in the ordinance.

Post-Construction Stormwater Management Ordinance						
Site	Requirements ^a					
	Sediment (TSS)	Peak Discharge	Infiltration		Protective Area	Fueling & Vehicle Maintenance Areas
			Residential	Non-Residential		
> 25,000 ft ² Impervious Surface ^b	No Numeric Standard	No Numeric Standard	No Numeric Standard	No Numeric Standard	Width Varies	No Visible Petroleum Sheen
New Development	80%	2/10/100	90% of pre-development infiltration volume	60% of pre-development infiltration volume	Width Varies	No Visible Petroleum Sheen
	40%	2/10/100	Exempt	Exempt	Potentially Exempt	No Visible Petroleum Sheen
	None, unless discharging into a BMP	None, unless discharging into a BMP	Exempt	Exempt	Potentially Exempt	No Visible Petroleum Sheen
Transportation Facilities ^c	-Carry runoff through a grass swale a minimum of 200 feet long. -Velocity in grass swale < 1.5 ft/s for the 2-yr, 24- hour storm peak discharge.					

^a Summary of Section S.07 Performance Standards of the Post-Construction Stormwater Management Zoning Ordinance. See Ordinance and this Reference Guide for specific requirements, exemptions and prohibitions.

^b The impervious surface areas created after the adoption date of the Ordinance are cumulative. For example, if a site first adds 18,000 ft² of parking and then adds a 2,001 ft² building the following year, the site is held to the >20,000 ft² requirements at that time.

^c Provides alternative criteria for transportation facilities with grass swale drainage systems. The alternative criteria may be used by the applicant to satisfy Section S.07 Performance Standards. The alternative criteria may not be used for transportation facilities that are part of a larger common plan of development.

S.01 AUTHORITY

S.02 FINDINGS OF FACT

S.03 PURPOSE AND INTENT

- (1) PURPOSE
- (2) INTENT

S.04 APPLICABILITY AND JURISDICTION

- (1) APPLICABILITY
- (2) JURISDICTION
- (3) EXCLUSIONS

The Wisconsin Department of Transportation (WisDOT) has entered into a memorandum of understanding with the Wisconsin Department of Natural Resources that satisfies s. 281.33 (2), Wis. Stats., such that activities directed and supervised by WisDOT are exempt from this Ordinance.

Activities directed and supervised by the local municipality are covered by this Ordinance.

S.05 DEFINITIONS

"Biofiltration system" means a bioretention system which does not qualify for any infiltration credit pursuant to S.07(3)(c) of the Post-Construction Stormwater Management Ordinance.

"Structural height" means the difference in elevation in feet between the point of lowest elevation of the top of the embankment before overtopping and the lowest elevation of the downstream toe of embankment.

S.06 TECHNICAL STANDARDS

Below is a list of Technical Standards and Guidance Documents that shall be used to satisfy Performance Standards contained in the ordinance. Technical Standards specify the minimum criteria for a best management practice (BMP). Guidance Documents contain recommendations and additional "how to" guidance. Performance Standards take precedence over Technical Standards and Technical Standards take precedence over Guidance Documents.

- (a) **Technical Standards:** The following are applicable Wisconsin Department of Natural Resources (DNR) Conservation Practice Standards or Technical Standards:
 - 1001 Wet Detention Basin
 - 1002 Site Evaluation for Stormwater Infiltration
 - 1003 Infiltration Basin
 - 1004 Bioretention For Infiltration
 - 1005 Vegetated Infiltration Swale
 - 1006 Method for Predicting the Efficiency of Proprietary Storm Water Sedimentation Devices
 - 1100 Interim Turf Nutrient Management

These standards may be found on the DNR website at
<http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm>

- (b) **Local Modifications to Technical Standards:** The following are local requirements which are intended to supplement, clarify, or supersede DNR Technical Standards.

1001 - Wet Detention Basin

Dry Detention Basin-

- Dry detention ponds shall be designed to meet requirements in Technical Standard 1001, except criteria contained in Sections V.A.2, V.B., and V.C.
- Dry detention ponds shall be designed to meet the local modifications provided below for Technical Standard 1001, except permanent pool and extended detention volume criteria.
- Dry detention ponds shall not receive any water quality or TSS credit, unless written approval is obtained from the DNR. The approval letter must specifically indicate the amount of TSS credit provided by the dry pond.
- Dry detention pond shall have a minimum bottom slope to the principal outlet of 1%. The applicant may request a waiver if site characteristics create a hardship.
- As part of the Operation & Maintenance Plan, sediment accumulation in the dry pond shall be monitored. Accumulated sediment shall be removed when 5% to 10% of the storage volume is lost for the 2-year, 24-hour design storm.

Pond Watershed-

- Wet ponds are not recommended for small watersheds (< 15 acres in clay soil). A wet pond located in a small watershed may develop stagnation problems and become a public nuisance. Public acceptance of stormwater BMPs is important to the success of a local stormwater program. Dry ponds, biofiltration, proprietary devices, and other BMPs are recommended for small watersheds.

100-Year Floodplain-

- Wet and dry detention ponds shall not be located in a 100-year floodway or 100-year flood storage area unless a hydrologic and hydraulic study is conducted in accordance with NR 116. Easements will be required if the flood study indicates the 100-year floodway or flood storage area is impacted by the pond or its embankment. Ponds shall not impede 100-year flood conveyance along navigable streams and non-navigable channels.

Permanent Pool-

- Pool Shape- A minimum length to width ratio of 3:1 is required between the principal inlet and principal outlet. The applicant may request a waiver if site characteristics create a hardship. Redevelopment and pond retrofit projects may be eligible for a waiver. Typically, new development is not eligible for a waiver.
- Liner- If soils are more permeable than a saturated hydraulic conductivity of 1×10^{-5} cm/sec, a liner is needed to maintain permanent pool levels. If soils are tighter than a saturated hydraulic conductivity of 1×10^{-7} cm/sec, no liner is needed (e.g. sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, or clay). A risk analysis shall be conducted if soils are between a saturated hydraulic conductivity of 1×10^{-5} cm/sec and 1×10^{-7} cm/sec. The risk analysis shall include proximity to public wells (400 ft) and private wells (100 ft), depth to groundwater and bedrock, and source pollutants (Tier 1 & Tier 2 Industries, fueling & maintenance areas). Liner materials can be soil, bentonite or synthetic.

- Aerators- Generally, aerators are not allowed unless written approval is obtained from the Wisconsin DNR. The approval letter must specifically state the proposed aerators are acceptable.

Extended Detention Volume-

- Disregard Section V.A.2.b(2) of Technical Standard 1001. If the wet pond's pollutant removal is not determined with SLAMM or P8, the 1-year, 24-hour design storm shall be released from the wet pond using the following formula:

$$Q_{\text{outflow}} = V_s * SA$$

Q_{outflow} = maximum allowable 1-year discharge rate (cfs)

V_s = 5.12×10^{-5} ft/sec settling velocity

SA = surface area of permanent pool (square feet)

Peak Flow Control-

- Do not use Table 2 in Technical Standard 1001. Use the maximum pre-development runoff curve numbers contained in the Post-Construction Stormwater Management Ordinance.
- It is recommended that the developer and designer contact the local municipality to discuss peak discharge requirements for the site early in the design process. The local municipality may have adopted alternative peak discharge requirements for the site which are different than the Post-Construction Stormwater Management Ordinance. At a minimum, the peak discharge requirements contained in NR 151 shall be met.

Inflows-

- Pipe inlets shall be protected from soil washouts due to seepage along the pipe's granular bedding and backfill. Rip-rap or other protection shall be placed around the entire pipe perimeter.
- Other inflow points shall be protected from scour and erosion.

Principal Outlet-

- All flows shall pass through the principal outlet during the 2-year and 10-year, 24-hour design storms. The principal outlet shall consist of one or more flow control structures and discharge pipes.
- Pipes- Generally concrete, PVC, or CMP are the preferred pipe materials. Corrugated PE will tend to jack-up due to frost heave and flotation. The minimum recommended pipe diameter is 12-inches.
- Orifices- Orifices smaller than 4 inches are not recommended due to the potential for clogging. Consider using a 6-inch perforated drain pipe and restrictor plate (refer to Section V.B.8 of Technical Standard 1004 for guidance). The total opening area of all perforation holes combined shall be sufficient to allow the drain pipe to discharge at full capacity, as would occur if there were no orifice restriction. Backfilling the drain pipe with 1-inched washed stone provides protection from clogging.
- Trash racks or other equivalent litter control devices are required for all outlet openings that control the 2-year, 24-hour design storm. The maximum bar spacing shall be less than 2-inches and less than $\frac{1}{2}$ the smallest opening dimension, whichever is more restrictive. The minimum surface area for the trash rack shall be 5 to 10 times the outlet's cross sectional area to prevent

clogging. Trash racks keep litter and debris in the pond and prevent it from discharging into streams, rivers, and lakes.

- Trash racks are also required for other outlet openings that have a width, height, or diameter less than 12-inches. The maximum bar spacing shall be less than $\frac{1}{2}$ the smallest opening dimension. The minimum surface area for the trash rack shall be at 5 to 10 times the outlet's cross sectional area to prevent clogging.
- Reverse-sloped pipes and other underwater outlets may impact a wet pond's TSS removal efficiency. Outlets that draw water from below the permanent pool's surface elevation reduce the effective surface area and depth of the permanent pool. If reverse-sloped pipes and other underwater outlets are used, special consideration is required for SLAMM & P8 modeling to ensure accurate water quality results. Also, underwater outlets may freeze during winter.

Flap Gates-

- Flap gates are required if the 2-year or 10-year, 24-hour design storm flows backward through the principal outlet. Backwater from a down slope conveyance system may impact a pond's water quality and/or flood control performance.
- Flap gates are not required if the permanent pool's water surface elevation is higher than the 10-year water elevation at the pond outlet (i.e. tailwater).
- Flap gates may be required if the permanent pool's water surface elevation is lower than the 10-year water elevation at the pond outlet (i.e. tailwater). If hydrographs are available for the tailwater condition, an evaluation can be performed to determine if flap gates are required due to backwater. If hydrographs are not available, flap gates are required.
- Flap gates shall not impede flow in down slope channels or streams.
- Ice accumulation within the down slope conveyance system shall be considered during flap gate and principal outlet design.

Tailwater-

- Tailwater conditions shall be evaluated at the pond outlet.
- Tailwater conditions along lakes, rivers, and streams may be obtained from available 100-year floodplain studies.
- Tailwater conditions may require that 2, 10, and/or 100-year, 24-hour runoff volumes be held in the pond, without release, until the down slope hydrograph allows the pond and flap gate to discharge flow.
- It is recommended that the designer contact the local municipality to discuss tailwater conditions early in the design process. The local municipality may have information available to assist with the tailwater evaluation.

Emergency Spillway-

- The routed 2-year and 10-year, 24-hour design storm may not pass through the emergency spillway. The routed 100-year, 24-hour design storm may not pass through the emergency spillway if the pond is designed to have a:
 - Structural height > 6 feet and flood storage capacity > 50 acre-feet, or
 - Structural height > 25 feet and flood storage capacity > 15 acre-feet.
- Backwater from a down slope conveyance system may not pass through the emergency spillway during the 2-year or 10-year, 24-hour design storm. Also, backwater may not pass through the emergency spillway during the 100-year,

24-hour design storm, unless a hydrologic and hydraulic evaluation indicates the site's peak discharge requirements are still satisfied, despite the backwater.

- When feasible, the emergency spillway should not be constructed on an embankment or over fill material. Spillways constructed on an embankment or over fill material are more prone to failure.
- The emergency spillway shall be constructed of permanent materials (i.e. poured concrete, grouted riprap, articulated concrete block, etc.) if the spillway is constructed on an embankment. The permanent material shall extend from the top of embankment to the down slope toe of embankment. The permanent material shall be shaped to contain flows and reduce potential for erosion and embankment failure.

Topsoil & Seeding-

- Topsoil is required in the safety shelf to encourage wetland plant growth (12-inch minimum thickness).
- When feasible, install a wetland seed mix or mature plants in the safety shelf to improve pond safety, reduce wave erosion along the shoreline, improve pollutant removal, and discourage geese residence. Use non-invasive species.
- When feasible, maintain a high grass buffer around the permanent pool's perimeter. The high grass buffer will further improve pond safety and geese control. Also, the perimeter of the permanent pool is typically the most difficult area to mow due to saturated soil conditions.

Record Drawings-

- Surveyed record drawings certified by a Professional Engineer shall be submitted upon completion of construction of all wet and dry ponds. As part of the record drawings, the Professional Engineer may need to verify BMP performance using computer modeling. Refer to record drawing checklist for requirements.

1002 - Site Evaluation for Stormwater Infiltration

- A site layout should not be developed until Step B is complete. Information obtained from Step B is used to:
 - Identify soil textures within the site.
 - Identify infiltration exclusions and exemptions.
 - Develop a site layout and identify potential infiltration device locations.
- For Step B, the minimum number of initial test pits or soil borings required for a new development area are as follows:
 - Two for the initial 10 acres, plus one per 10 acres thereafter.
 - One per soil unit. Soil units are depicted on NRCS Soil Survey Maps.
 - Example calculations:
 - 4 acres with 1 soil unit = min. of 2 test pits or soil borings
 - 20 acres with 2 soil units = min. of 3 test pits or soil borings.
 - 20 acres with 5 soil units = min. of 5 test pits or soil borings.
 - 34 acres with 3 soil units = min. of 4 test pits or soil borings.
- Upon completion of Step B, it is recommended that the developer and designer meet with the municipality to discuss infiltration requirements for the development to avoid redesign during permit submittal.
- Information obtained from Step C is used to design each infiltration device. As part of Step C, a second set of test pits or soil borings are required. Refer to Table 1, Technical Standard 1002 for test pit or soil boring requirements.

1003 - Infiltration Basin

- Record Drawings- Surveyed record drawings certified by a Professional Engineer shall be submitted upon completion of construction of all infiltration basins. As part of the record drawings, the Professional Engineer may need to verify BMP performance using computer modeling. Refer to record drawing checklist for requirements.

1004 - Bioretention For Infiltration

- Biofiltration systems shall be designed to meet requirements in Technical Standard 1004, except for the storage layer and sand/native soil interface layer. Also, the engineered soil planting bed may be reduced to a 30 inch thickness.
- Rain Gardens shall be designed to meet requirements in Technical Standard 1004, except for the engineered soil planting bed, storage layer, underdrain, and sand/native soil interface layer. Rain Gardens are typically used in residential areas. Rain Gardens are primarily intended for roof runoff, but may also be used for lawn, sidewalk and driveway runoff.
- SLAMM, P8 or an equivalent methodology shall be used to evaluate the TSS reduction associated with a bioretention, biofiltration, or rain garden BMP.
- Record Drawings- Surveyed record drawings certified by a Professional Engineer shall be submitted upon completion of construction of all bioretention and biofiltration facilities. As part of the record drawings, the Professional Engineer may need to verify BMP performance using computer modeling. Also, as part of the record drawings, the contractor shall certify the bioretention or biofiltration device was constructed in accordance with the approved construction plans and that the installed engineered soil complies with the material specifications. Refer to record drawing checklist for requirements.

1005 – Vegetated Infiltration Swale

- Grass swales shall meet the following design criteria if the applicant plans to take credit for TSS reductions calculated by SLAMM or P8.

Bottom Width	Trapezoid or parabolic shape with max. 6 ft width
Side Slopes	4:1 or flatter for triangular shaped swales (waiver is needed if steeper) 3:1 or flatter for trapezoidal channels (waiver is needed if steeper)
Longitudinal Slope	4% maximum (waiver is needed if steeper)
Flow Velocity	1.5 fps or less for 2-year storm. The vegetation type, mowing height, depth of flow, and O&M Plan must be consistent with the selected Manning's 'n' value.

- The grass swale infiltration rate used in SLAMM or P8 shall be obtained from Table 2, Technical Standard 1002. The design infiltration rate shall be based on the most confining soil layer within 5 feet of the grass swale's bottom elevation.
- Minimum longitudinal slope for a grass swale is 1%. The applicant may request a waiver if site characteristics create a hardship.
- Grass swales shall be designed for a 2-inch lawn height. If an alternative height is desired, it is recommended that the developer and designer contact the local municipality early in the design process to obtain

approval. The local municipality may have ordinances or other design criteria which dictate the allowable mowing height.

- Driveway culverts shall be considered when the swale length (density) is determined for purposes of SLAMM or P8 modeling. The maximum allowable culvert length for each lot shall be specified on the plans.
- Minimize or mitigate soil compaction during grading activities.
- Grassed swales shall be designed for the proper drainage area. Generally, it will be best to have one or two sizes to be used wherever needed throughout the development. The design shall be based on the largest drainage area served.
- Grassed swales shall be designed according to the planned vegetation type and maintenance that will be provided. Generally, grassed channels will be designed to have stable velocities when the vegetation is shortest and adequate capacity when the vegetation is longest.

1006 - Method for Predicting the Efficiency of Proprietary Storm Water Sedimentation Devices

- The DNR is currently developing Technical Standard 1006 for proprietary devices. Until this Technical Standard is complete, proprietary devices shall comply with DNR guidance developed as part of the "Meeting New State Regulations: Post-Construction Stormwater Management Workshops".

(c) **Guidance Documents:** The following are the applicable Guidance Documents:

- S100 Compost
- Guidance for the Establishment of Protective Areas for Wetlands
- "Construction Site" Definition – "Common Plan of Development"
- Technical Note for Sizing Infiltration Basins and Bioretention Devices
- Rain Gardens: A How-To Manual for Homeowners (see above local modifications to Technical Standard 1004). <http://clean-water.uwex.edu/pubs/home.htm#rain>
- Meeting New State Regulations: Post-Construction Stormwater Management Workshops <http://www.dnr.state.wi.us/org/water/wm/nps/stormwater/post-constr/index.htm>
- Estimating Residue Using the Line Transect Method (UW-Extension A3533).
- The Wisconsin Stormwater Manual
- Wisconsin Department of Transportation (DOT) - Facilities Development Manual
- Wisconsin DOT Standard Specifications for Highway and Structure Construction
- Other National Publications

(d) **Local Easement Requirements:**

- Easements are typically required for BMPs and conveyance systems that serve more than one property owner or lot. Conveyance systems include storm sewers, grass swales, channels, streams, and overland relief paths. Easement widths will vary.
- An ingress / egress easement or direct access to a public street is typically required for BMPs that serve more than one property owner or lot.
- It is recommended that the developer and designer contact the local municipality early in the design process to discuss easements and width requirements.

S.07 PERFORMANCE STANDARDS

- (1) **RESPONSIBLE PARTY**
- (2) **PLAN**
- (3) **REQUIREMENTS**
 - (a) **TOTAL SUSPENDED SOLIDS**

Post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance are required to meet the ordinance's numeric performance standards. All other post-construction sites are not required to meet these numeric performance standards. BMP design guidance is provided below in Section (h) for sites with less than 20,000 sq.ft. of impervious surface disturbance.

Computer Models:

Pollutant loading models such as SLAMM, DETPOND, P8 or an approved equivalent methodology may be used to evaluate the efficiency of the design in reducing total suspended solids. Information on how to access SLAMM and P8 is available at <http://dnr.wi.gov/org/water/wm/nps/models/SLAMM.htm> or contact the stormwater coordinator in the runoff management section of the bureau of watershed management at (608) 267-7694.

Use the most recent version of SLAMM, DETPOND and P8. The applicant may request a waiver of this requirement.

Design Clarifications:

No Controls- "No Controls" is the baseline condition for each site. No TSS credit is provided for meeting the baseline condition. The baseline condition is defined as follows:

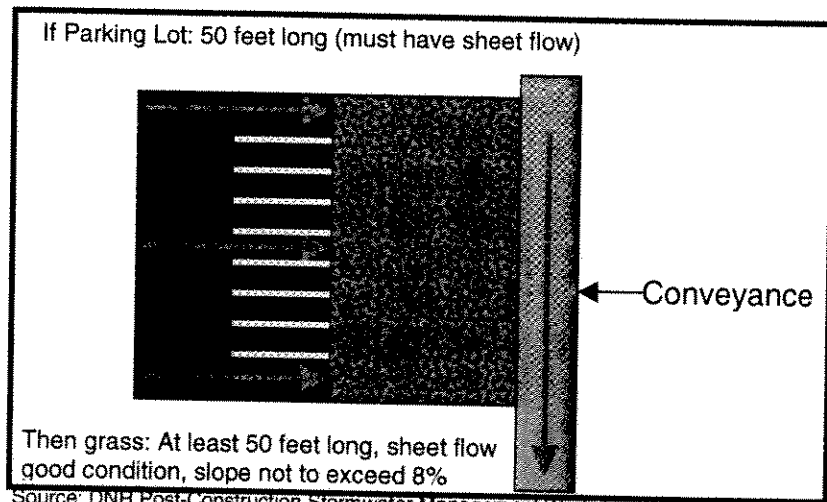
- Assume site is stabilized (no erosion).
- Assume proposed impervious surfaces are in place. Impervious surface reductions (e.g. reduced street width) can not be used to claim TSS credit; however, impervious surface reductions will lower runoff volumes which will reduce the required size for stormwater management BMPs.
- Assume no stormwater management BMPs.
- Assume curb and gutter / storm sewer drainage system in fair condition.
- If the applicant intends to claim TSS credit for disconnecting an impervious surface, the "No Controls" condition shall be based on the "typical" percent connected impervious values established by the DNR:

LAND USE	% CONNECTED
Open space / undeveloped	5
Suburban Residential	7
Park	10
Cemetery	12
Low Density Residential	14
Medium Density Residential – With Alley	25
Medium Density Residential – No Alley	28
Schools - Institutional	39
High Density Residential – With Alley	42
High Density Residential – No Alley	42
Mobile Home Residential	47
Freeway	51
Multi-Family Residential	51

Miscellaneous Institutional	59
Medium Industrial	64
High Rise Residential	65
Light Industrial	71
Office Park – Commercial	74
Hospital – Institutional	76
Commercial Strip Mall	91
Shopping Center – Commercial	91
Commercial Downtown	96

Disconnection- TSS credit is provided for runoff volume reductions associated with disconnecting impervious surfaces beyond the “typical” percent connected impervious values established by the DNR. In order to consider an impervious surface as “disconnected”, the following criteria shall be met:

- Residential Roofs: Discharge runoff over a minimum 20-foot long pervious surface that is in good condition and graded for sheet flow.
- Other Impervious Surfaces:
 - Source area flow length may not exceed 75 feet.
 - Source area and pervious area must be graded for sheet flow.
 - Pervious area must be in good condition, have a slope less than 8%, and have a flow length at least as long as the contributing impervious area’s length (but never less than 20 feet).



Street Sweeping & Catch Basin Cleaning- No TSS credit is provided for street sweeping, catch basin cleaning, or other management type BMPs in new development areas.

Infiltration Rate- The design infiltration rate for a BMP shall be based on the most confining soil layer within 5 feet of the BMP’s bottom elevation. Infiltration rates shall be obtained from Table 2, Technical Standard 1002.

Grass Swale- The grass swale infiltration rate used in SLAMM or P8 shall be obtained from Table 2, Technical Standard 1002. For SLAMM, the typical swale geometry shall be entered in lieu of using the “Wetted Width” option. SLAMM will calculate the “Wetted Width” for each rain event based on the typical swale geometry.

Uncontrolled Areas- The performance standard for TSS is a site standard, not a BMP standard. Often, a site contains uncontrolled areas that do not flow through a BMP (e.g. wet pond, grass swale). Typically, it is necessary to increase the TSS reduction provided by other onsite BMPs in order to offset or over compensate for these uncontrolled areas.

Routine Maintenance Areas– No performance standard or TSS reduction is required for routine maintenance areas. However, the applicant is responsible for proper performance of onsite BMPs. In order to ensure proper BMP performance, the applicant has two options:

- Divert the routine maintenance area around onsite BMPs, or
- Include runoff volumes from the routine maintenance area in onsite BMP calculations. However, no TSS credit is provided for the routine maintenance area unless it is reclassified as redevelopment.

Offsite Drainage Areas– The applicant is not responsible for satisfying TSS performance standards for offsite areas that drain into the project site. However, the applicant is responsible for proper performance of onsite BMPs. In order to ensure proper onsite BMP performance, the applicant has two options:

- Divert offsite runoff around onsite BMPs, or
- Include offsite runoff volumes in onsite BMP calculations. The amount of onsite TSS credit is determined by multiplying the BMP's percent TSS reduction by the base TSS load for the onsite area.

Example Calculations:

The development site currently contains 30 acres of institutional land uses and 70 acres of agricultural land uses. The entire 100 acre site will be disturbed as part of the proposed project. Within the 100 acre site, the developer plans to:

- Redevelop 20 acres (existing institutional) into a new commercial area.
- Conduct routine maintenance on 10 acres of existing asphalt parking lot (existing institutional). Parking lot will be part of new commercial area.
- Develop 70 acres (existing agriculture) into a new residential area.

The "No Controls" or base TSS load is computed as follows:

- Commercial area = 20 acres x 600 lbs/acre = 12,000 lbs
- Residential area = 70 acres x 400 lbs/acre = 28,000 lbs
- "No Controls" TSS Load = 40,000 lbs

The "TSS Reduction Required" is computed as follows:

- Commercial area = 12,000 lbs x 40% (redevelopment) = 4,800 lbs
- Residential area = 28,000 lbs x 80% (new development) = 22,400 lbs
- "TSS Reduction Required" = (4,800 + 22,400) / 40,000
= 0.68 or 68%

A wet pond is proposed for the site. The pond achieves an 80% TSS reduction for its 130 acre watershed. The 130 acre watershed includes 20 acres of commercial area, 10 acres of commercial parking lot, 60 acres of residential area, and 40 acres of offsite residential area.

- Commercial area = 12,000 lbs x 80% (wet pond) = 9,600 lbs
- Commercial parking lot = 8,000 lbs x 80% (wet pond) = 6,400 lbs
- Residential area (60 acres) = 24,000 lbs x 80% (wet pond) = 19,200 lbs
- Offsite residential area = 16,000 lbs x 80% (wet pond) = 12,800 lbs
- Pond TSS Reduction = (9,600 + 6,400 + 19,200 + 12,800) / 60,000
= 0.80 or 80%

The "TSS Reduction Provided" is computed as follows:

- Commercial area = 12,000 lbs x 80% (wet pond) = 9,600 lbs
- Residential area (60 acres) = 24,000 lbs x 80% (wet pond) = 19,200 lbs
- Residential area (10 acres) = 4,000 lbs x 0% (uncontrolled) = 0 lbs
- "TSS Reduction Provided" = (9,600 + 19,200 + 0) / 40,000
= 0.72 or 72%

72% > 68%, therefore the TSS requirement is satisfied.

In the example, the 10 acre commercial parking lot could have been included in the "TSS Reduction Required" and "TSS Reduction Provided" calculations if it was reclassified as redevelopment, as opposed to routine maintenance. The reclassification would have allowed the applicant to plan for future reconstruction of the 10 acre commercial parking lot.

In the example, the 40 acre offsite residential area could have been included in the "TSS Reduction Required" and "TSS Reduction Provided" calculations if it was a regional pond, as opposed to an onsite pond. A regional pond would have allowed the owner of the 40 acre offsite residential area to take credit for the TSS reduction provided by the wet pond.

(b) PEAK DISCHARGE

Post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance are required to meet the ordinance's numeric performance standards. All other post-construction sites are not required to meet these numeric performance standards. BMP design guidance is provided below in Section (h) for sites with less than 20,000 sq.ft. of impervious surface disturbance.

Computer Models:

Peak discharge rates shall be evaluated using TR-55 methodology and a computer model. NRCS recently released a new Windows version of TR-55 referred to as WinTR-55. Unfortunately, WinTR-55 has some unacceptable restrictions in computing T_c and the computations for outlet structures are too approximate to be useable. Therefore, WinTR-55 is not acceptable software.

Other software packages are acceptable if they match the results and methodology of TR-55 (DOS version). There are multiple hydrology/pond routing computer programs available. They must be approved by the administering authority. Examples of common computer programs are HEC-HMS, XPSWMM, HydroCAD, HydraFlow, PondPack, etc.

Each pre-development watershed shall be evaluated for peak discharge. It is not accurate or necessary to "link" all of the pre-development watersheds to determine the ultimate allowable discharge for the site. The allowable discharge for each outfall shall be determined based on the individual pre-development watershed as discussed more in depth below in "TR-55 Methodology Clarifications".

TR-55 Methodology Clarifications:

Time of Concentration (T_c)-

Pre-Development Requirements

- The T_c route shall be the route that takes the longest time to reach the outfall and not necessarily the furthest point in the watershed.
- The T_c route shall be shown to scale on the pre-development contours with each flow segment labeled.
- The pre-development T_c should typically be at least 30 minutes in NE Wisconsin. This may not apply to small sites.
- A Manning's "n" value of 0.24 shall be used for sheet flow "meadow" conditions. For redevelopment areas, assume impervious surfaces do not exist.
- The sheet flow length before development in NE Wisconsin is usually 250' to 300'. This may not apply to small sites.

- For shallow concentrated flow, "unpaved" or "paved" shall be used to represent vegetated swales and paved swales, respectively.

Post-Development Requirements

- The T_c route shall incorporate and represent the development. If the development is large, consider dividing the development into multiple watersheds.
- T_c will almost always be shorter after development.
- The T_c route shall be shown to scale on the post-development drainage plan with each flow segment labeled.
- The sheet flow length after development will seldom be greater than 50' to 100' due to the grading around homes and buildings. A sheet flow length of greater than 100 feet requires approval from the reviewing authority (except for large paved parking areas).
- A Manning's "n" value of 0.24 is appropriate for sheet flow "lawn" conditions.
- The minimum sheet flow slope shall be 2% for residential lawns.
- For shallow concentrated flow, "unpaved" or "paved" shall be used to represent vegetated swales and paved swales, respectively.
- The T_c flow path stops when it reaches the inflow of a wet or dry detention basin.
- The post-development T_c is important for determining the correct storage volume required. See the Storage Volume for Detention Basins section below.

Runoff Curve Numbers (CN)-

Pre-Development Requirements

- The following Curve Numbers shall be used for "meadow" conditions:

Maximum Pre-Development Runoff Curve Numbers (meadow)				
Hydrologic Soil Group	A	B	C	D
Curve Number	30	58	71	78

- Existing concentrated wooded areas shall be modeled as "Woods, Good Hydrologic Condition" with curve numbers of 30, 55, 70, and 77 for hydrologic soil groups A, B, C, and D, respectively.
- Soil units can be found in the applicable County Soil Survey (or, if provided, on the [Municipality's] website.)
- The appropriate hydrologic soil groups are located at the following website: <http://soildatamart.nrcs.usda.gov/County.aspx?State=W>

To get an online soils report, do the following:

1. Select the appropriate County.
2. Select the "Generate Reports" button.
3. Select the appropriate soils for the site (hold the ctrl key for multiple).
4. Select the report type (RUSLE2 Related Attributes or Water Features) below to get the Hydrologic Group(s) for the site.
5. Select the "Generate Report" button.

**Notice that a number of soils have different hydrologic soil groups than those shown in the original County USDA Soils book. The Internet groups are the ones to use.

Post-Development Requirements

- The Runoff Curve Number for lawns shall be used for developed areas that will be vegetated. Woods, wetland, or prairie areas preserved with a recorded document may be modeled as such.

Pre/Post-Development Curve Number Determination for Permeable Soils

- Refer to the Site Evaluation for Infiltration Report to verify that soils mapped in hydrologic groups A or B are well drained. If not well drained use the County USDA Soils Books hydrologic group explanation to determine the appropriate hydrologic group.
- If the existing site consists of multiple hydrologic groups, especially a combination of highly permeable and non-permeable, consideration shall be given to the proposed site balance cut/fill. See Appendix A of TR-55 for discussion on disturbed soil profiles as a result of urbanization.

Example: The site consists of 30% Hydrologic Group A soils and 70% Hydrologic Group C soils. The following scenarios shall be handled as noted:

1. If the site earthwork does not balance within the respective Hydrologic Group and it is anticipated that the "C" soils will be filled on the "A" soils, the "C" soil RCN shall be used.
2. If the site earthwork balances within each respective Hydrologic Group and it is anticipated that offsite fill will be required to achieve the desired dwelling elevations, the "C" soil RCN shall be used.
3. If the site balances within each respective Hydrologic Group and no or minimal fill is anticipated on the "A" soils, compaction mitigation shall be provided.

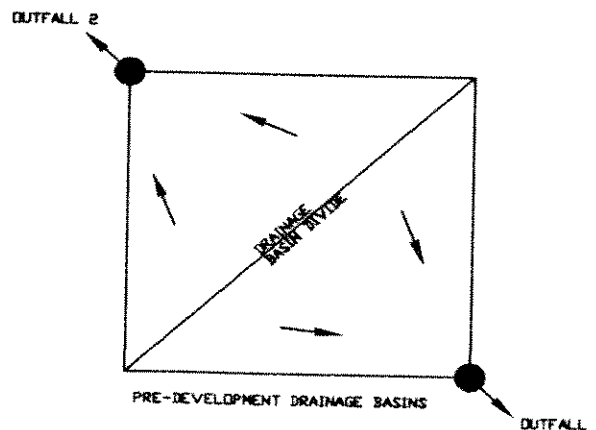
Drainage Area-

Pre-Development Requirements

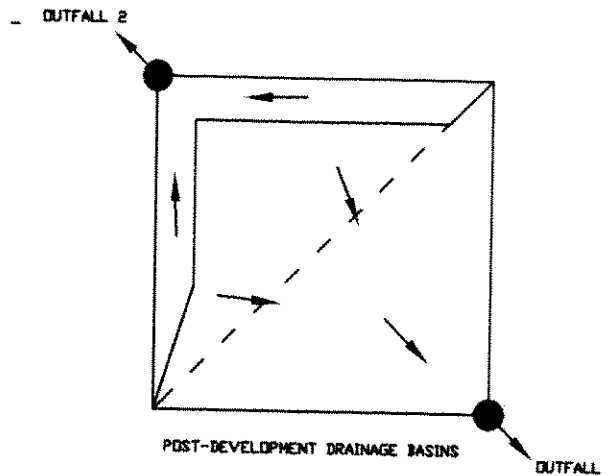
- Determine the total contributing drainage area to the development, including offsite properties.
- If the pre-developed site consists of multiple drainage basins, each outfall shall be evaluated for peak discharge.

Example:

The pre-development site shown below is 40 acres and consists of 2 drainage basins, each 20 acres. Each outfall has a peak discharge of 4, 8, and 12 cfs for the 2, 10, and 100-year design storms, respectively.



The post-development site shown below is the same 40 acres; however, Outfall 1 now has 30 acres draining to it and Outfall 2, 10 acres.



The post-development discharges for Outfall 2 are 3, 6, and 9 cfs for the 2-, 10-, and 100-year design storms, respectively. Outfall 2 meets the peak discharge requirements of the Ordinance because the post-development peak discharges are below the pre-development discharges for Outfall 2.

The post-development discharges for Outfall 1 are 12, 24, and 36 cfs for the 2-, 10-, and 100-year design storms, respectively. Outfall 1 does not meet the peak discharge requirements of the Ordinance. Stormwater facilities have to be installed to lower the post-development peak discharges to the pre-development discharges of 4, 8, and 12 cfs for the 2-, 10-, and 100-year design storms, respectively.

Below is an example of appropriate Stormwater Management Plan summary tables as required:

Pre-Development Peak Discharges			
Design Storm	2-year	10-year	100-year
Outfall 1	4 cfs	8 cfs	12 cfs
Outfall 2	4 cfs	8 cfs	12 cfs

Post-Development Peak Discharges			
Design Storm	2-year	10-year	100-year
Outfall 1	3.6 cfs	7.5 cfs	10.9 cfs
(undetained)	(12 cfs)	(24 cfs)	(36 cfs)
Outfall 2	3 cfs	6 cfs	9 cfs

Post-Development Requirements

- The design of stormwater runoff control facilities shall be based on the total contributing drainage area, not just the area being developed. Any off-site drainage area must be included in the plan facilities or safely diverted around the planned facilities.
- Off-site contributing areas that are not diverted must use the meadow condition runoff curve number for pre-development flow computations whether the off-site area is presently developed or not.
- Offsite contributing areas that are diverted shall use the highest anticipated runoff curve number for the offsite area for a safe design. Also, the diversion shall provide 0.3' of freeboard and assume 10%

settlement for the 100-year flow. The conveyance shall be contained within an easement. The discharge location for the diversion shall be at the pre-developed outfall or at a stable location.

- If more than 30% of the drainage area will be impervious, it will often be necessary to divide the drainage area into a pervious sub-area and impervious sub-area for correct computation of peak flow.

Peak Discharge Method-

- For Wisconsin, use the Type II, 24-hour rainfall distribution for design storms.
- Natural depressions shall be evaluated or considered when determining peak discharge rates for the predevelopment condition.

Storage Volume for Detention Basins (TR-55)-

- The approximate storage-routing curves should not be used if the adjustment for ponding (discussed above in the peak discharge section) is used.
- This manual method is good for determining quick estimates of the effects of temporary detention on peak discharges. Computer programs that utilize TR-20 provide more accurate methods of analysis and routing.
- The procedure should not be used to perform final design if an error in storage of 25 percent cannot be tolerated. Figure 6-1 may significantly overestimate the required storage capacity.
- When the peak outflow discharge is too close to post-development peak inflow discharge, parameters that affect the rate of rise of a hydrograph become especially significant.

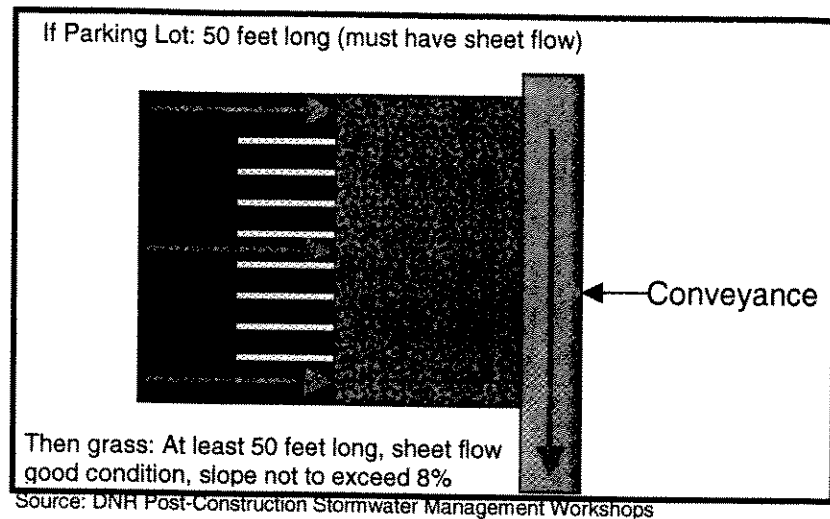
Design Clarifications:

It is recommended that the developer and designer contact the local municipality to discuss peak discharge requirements for the site early in the design process. The local municipality may have adopted alternative peak discharge requirements for the site which are different than the Post-Construction Stormwater Management Ordinance. At a minimum, the peak discharge requirements contained in NR 151 shall be met.

Outfalls- Performance standards for peak discharge shall be satisfied at each outfall associated with the site. Written approval is required from down slope property owners if post-development peak discharge rates are not less than or equal to pre-development peak discharge rates at each outfall.

Disconnection- Disconnecting impervious surfaces can help achieve the peak discharge requirement. Disconnecting impervious surfaces not only reduces runoff volumes, but also increases time of concentrations. In order to consider an impervious surface as "disconnected", the following criteria shall be met:

- Residential Roofs: Discharge runoff over a minimum 20 foot long pervious surface that is in good condition and graded for sheet flow.
- Other Impervious Surfaces:
 - Source area flow length may not exceed 75 feet.
 - Source area and pervious area must be graded for sheet flow.
 - Pervious area must be in good condition, have a slope less than 8%, and have a flow length at least as long as the contributing impervious area's length (but never less than 20 feet).



Uncontrolled Areas- The performance standard for peak discharge is an outfall standard. Often, a site contains an uncontrolled area for each outfall that does not flow through a BMP (e.g. wet pond). Typically, it is necessary to increase the peak discharge control provided by the onsite BMP in order to offset or over compensate for the uncontrolled area.

Routine Maintenance Areas- No performance standard or peak discharge reduction is required for routine maintenance areas. However, the applicant is responsible for proper performance of onsite BMPs. In order to ensure proper BMP performance, the applicant has two options:

- Divert the routine maintenance area around onsite BMPs, or
- Include runoff volumes from the routine maintenance area in onsite BMP calculations. For the predevelopment condition, routine maintenance areas shall be modeled as a meadow land use. For the post-development condition, routine maintenance areas shall be modeled using the actual site conditions.

(c) INFILTRATION

Post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance are required to meet the ordinance's numeric performance standards. All other post-construction sites are not required to meet these numeric performance standards. BMP design guidance is provided below in Section (h) for sites with less than 20,000 sq.ft. of impervious surface disturbance.

Computer Models:

A model that calculates runoff volume, such as RECARGA, SLAMM, P8, TR-55, or an approved equivalent methodology may be used to evaluate the efficiency of the infiltration design. Information on how to access RECARGA, SLAMM, or P8 is available at <http://dnr.wi.gov/org/water/wm/nps/models/index.htm> or contact the stormwater coordinator in the runoff management section of the bureau of watershed management at (608) 267-7694.

Use the most recent version of RECARGA, SLAMM, and P8. The applicant may request a waiver of this requirement.

Depending on the type of infiltration device, groundwater mounding may need to be evaluated. Refer to Table 1, Technical Standard 1002 for groundwater mounding requirements. A model that calculates groundwater mounding is

available at <http://dnr.wi.gov/org/water/wm/nps/models/guidance/index.htm> or contact the stormwater coordinator in the runoff management section of the bureau of watershed management at (608) 267-7694.

Design Clarifications:

Maximum required Effective Infiltration Area (EIA) is calculated as follows:

- For residential land uses, the EIA cap is 1% of the project site. For residential, the project site is defined as the area of land disturbance.
- For non-residential land uses, the EIA cap is 2% of the project site. For non-residential, the project site is defined as the portion of land disturbance dedicated to rooftops and parking lots.
- Excluded and exempted areas are included in the EIA cap calculation.
- The maximum required EIA cap may be voluntarily exceeded.

Exclusions- Infiltration from source areas or at locations identified in section S.07(3)(c)8 of the ordinance is not prohibited. Rather, credit will not be given toward achieving the infiltration requirement. Runoff from excluded areas does not have to be included in calculating the infiltration goal. However, if runoff from an excluded area flows through an infiltration BMP, the following is required:

- Use caution. These source areas and locations are excluded from the ordinance's infiltration requirement due to groundwater contamination concerns. The municipality is not responsible for the applicant's decision to infiltrate this runoff. The applicant is solely responsible for NR 140 compliance and groundwater protection.
- The BMP design must take runoff from excluded areas into account to assure the device can safely handle the additional flow and volume.

Exemptions- Infiltration from source areas or at locations identified in section S.07(3)(c)9 of the ordinance is not required. Despite the ordinance, the applicant may choose to infiltrate exempted runoff. If exempted runoff is infiltrated, credit will be given toward achieving the infiltration requirement. Runoff from exempted areas does not have to be included in calculating the infiltration goal. However, if runoff from an exempted area flows through an infiltration BMP, the BMP design must take it into account to assure the device can safely handle the additional flow and volume.

Groundwater Protection- It is the applicant's sole responsibility to protect groundwater. Compliance with Preventative Action Limits (PAL) contained in NR 140 must be maintained. Also, infiltration system discharges must remain below Enforcement Standards (ES) contain in NR 140. DNR Technical Standards should meet these groundwater protection requirements.

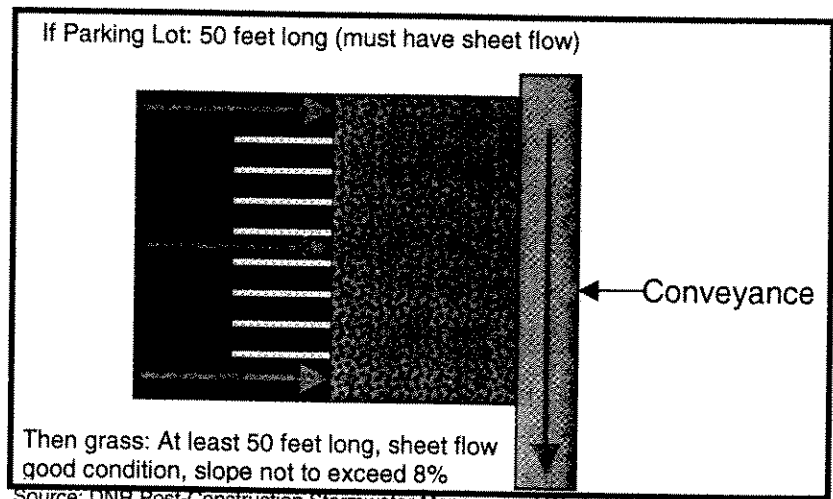
Maximum Extent Practicable (MEP):

- Definition takes into consideration best available technology, cost-effectiveness, natural resource protection, historic preservation, human safety & welfare, and site conditions (see ordinance).
- Topography- To achieve the infiltration requirement, maximum extent practicable should not be interpreted to require significant topography changes that create an excessive financial burden. Two feet or less of elevation change is considered reasonable and to the MEP.
- Pumping- To achieve the infiltration requirement, maximum extent practicable should not be interpreted to require stormwater pumping.

Roof Runoff- To minimize potential groundwater impacts, it is desirable to infiltrate the cleanest runoff. To achieve this, a design may propose greater infiltration of runoff from low pollutant sources such as roofs, and less from higher pollutant source areas such as parking lots.

Disconnection- Disconnection of impervious surfaces can be used to help achieve the infiltration requirement. However, disconnection is not considered to be part of an infiltration system. Therefore, disconnected areas do not count toward the maximum effective infiltration area calculation. In order to consider an impervious surface as "disconnected", the following criteria shall be met:

- Residential Roofs: Discharge runoff over a minimum 20 foot long pervious surface that is in good condition and graded for sheet flow.
- Other Impervious Surfaces:
 - Source area flow length may not exceed 75 feet.
 - Source area and pervious area must be graded for sheet flow.
 - Pervious area must be in good condition, have a slope less than 8%, and have a flow length at least as long as the contributing impervious area's length (but never less than 20 feet).



Routine Maintenance Areas- No performance standard or infiltration requirement is provided for routine maintenance areas. However, the applicant is responsible for proper performance of onsite BMPs. In order to ensure proper BMP performance, the applicant has two options:

- Divert the routine maintenance area around onsite BMPs, or
- Include runoff volumes from the routine maintenance area in onsite BMP calculations. The applicant will receive credit for infiltrating runoff from the routine maintenance area provided it is not an excluded area.

Offsite Drainage Areas- The applicant is not responsible for satisfying infiltration performance standards for offsite areas that drain into the project site. However, the applicant is responsible for proper performance of onsite BMPs. In order to ensure proper onsite BMP performance, the applicant has two options:

- Divert offsite runoff around onsite BMPs, or
- Include offsite runoff volumes in the onsite BMP calculations. The amount of onsite credit is determined by prorating the infiltration volume. The applicant will not receive credit for infiltrating offsite runoff, unless the BMP is a regional facility.

Alternative Uses- The volume of runoff used for alternative uses will be credited towards the infiltration requirement. Alternative uses may include toilet flushing, laundry, and irrigation (e.g. cisterns, rain barrels, green roofs). In addition to the stormwater benefits, these alternative uses may also reduce municipal invoices for drinking water.

Example Calculations:

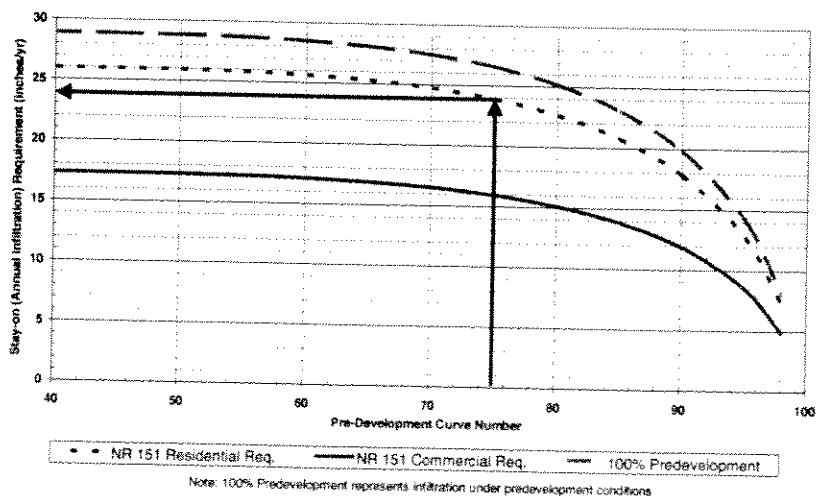
The site is currently 100 acres of cropland. Following development, the site will be 30 acres medium residential, 20 acres commercial, and 50 acres cropland. Native soils in the area to be developed are sandy loams, silt loams and silty clay loams. Hydrologic soil groups are B and C with an average pre-development curve number of 75. A site investigation using Step B of the DNR Technical Standard 1002, Site Evaluation for Stormwater Infiltration, determined that 10 of the acres to be developed into medium residential have an infiltration rate of 0.10 in/hr and are therefore exempt from the infiltration requirements. The site investigation also determined that 10 acres to be developed into commercial are excluded from the infiltration requirements. The post-development curve number for the pervious portions of the residential and commercial components will be 80, based on TR-55. The residential component will be 40% impervious. The commercial component will be 80% impervious.

The residential and commercial components will meet the infiltration requirements using two infiltration basins. Upon completion of a preliminary site layout, two locations were chosen for investigation using Step C of Technical Standard 1002. The first location investigated was in the residential area that is not exempt from the infiltration requirements. The soil texture at the residential infiltration basin site is a sandy loam with a design infiltration rate of 0.5 in/hr. The second location investigated was in the commercial area that is not excluded from the infiltration requirements. The soil texture at the commercial infiltration basin site is a loamy sand with a design infiltration rate of 1.63 in/hr.

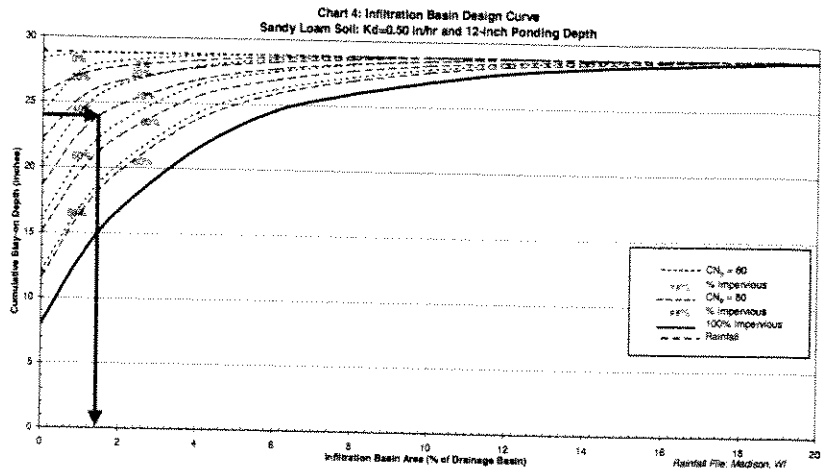
Step 1: Determine Infiltration Basin Size - Residential Component

Step 1A: Determine Target Stay-on Depth – Residential
Using Chart 1, the target stay-on depth is 24 inches/year.

CHART 1 - TARGET STAY-ON (ANNUAL INFILTRATION) REQUIREMENT
Based on the annual 1981 Rainfall for Madison, WI



Step 1B: Determine Preliminary Effective Infiltration Area – Residential
Using Chart 4, the preliminary effective infiltration area needed for the infiltration basin is 12,197 square feet (43,560 * 20 acres * 1.4%).



Step 1C: Maximum Required Effective Infiltration Area – Residential

- Residential Land Disturbance (30 acres total)
 - Building roof 5 acres
 - Driveway & sidewalk 2 acres
 - Street 5 acres
 - Lawn / landscaping 18 acres
- Maximum Required EIA = 13,068 sq.ft. (43,560 * 30 acres * 1%)

Step 1D: Determine Final Effective Infiltration Area – Residential

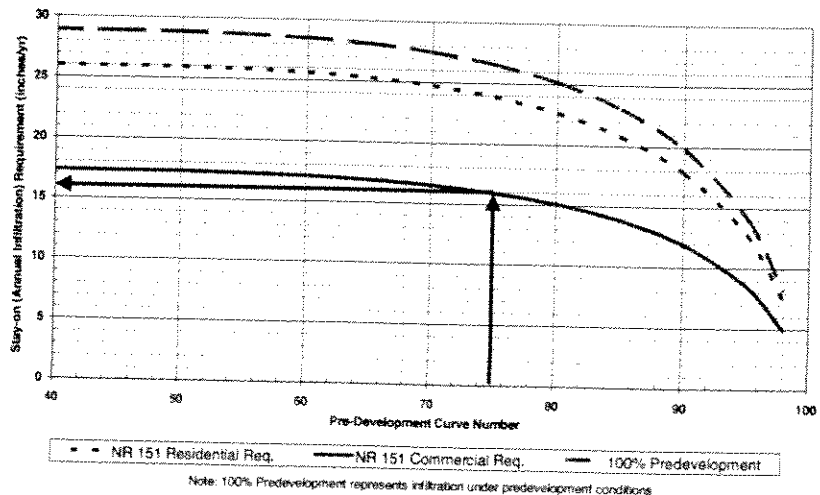
Using Technical Standard 1003, the preliminary effective infiltration area of 12,197 sq.ft. needs to be adjusted (depth, slope, cell configuration) to determine the final effective infiltration area. Groundwater mounding also needs to be checked. The maximum EIA cap does not appear to impact the infiltration basin's size (12,197 sq.ft. < 13,068 sq.ft.).

Step 2: Determine Infiltration Basin Size – Commercial Component

Step 2A: Determine Target Stay-on Depth – Commercial

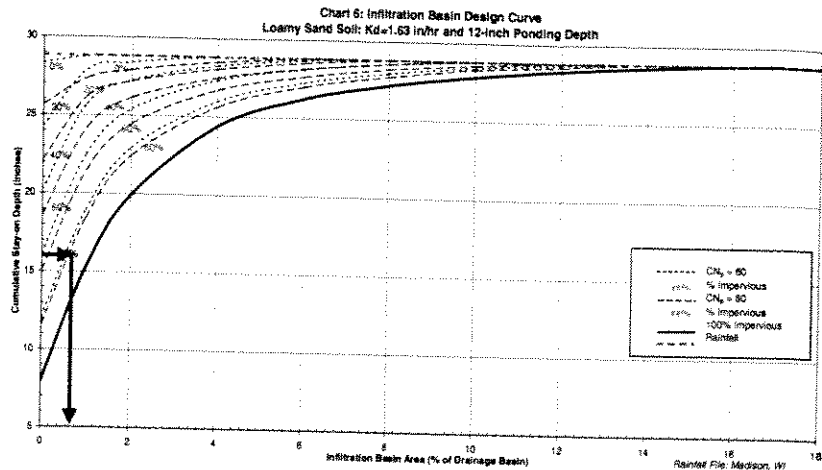
Using Chart 1, the target stay-on depth is 16 inches/year.

CHART 1 - TARGET STAY-ON (ANNUAL INFILTRATION) REQUIREMENT
Based on the annual 1981 Rainfall for Madison, WI



Step 2B: Determine Preliminary Effective Infiltration Area – Commercial

Using Chart 6, the preliminary effective infiltration area needed for the infiltration basin is 2,614 square feet (43,560 * 10 acres * 0.6%).



Step 2C: Maximum Required Effective Infiltration Area – Commercial

- Non-Residential Land Disturbance (20 acres total)
 - Building roof 6 acres
 - Parking lot 7 acres
 - Street 3 acres
 - Lawn / landscaping 4 acre
- Maximum Required EIA = 11,326 sq.ft. ($43,560 \times 13 \text{ acres} \times 2\%$)

Step 2D: Determine Final Effective Infiltration Area – Commercial

Using Technical Standard 1003, the preliminary effective infiltration area of 2,614 sq.ft. needs to be adjusted (depth, slope, cell configuration) to determine the final effective infiltration area. Groundwater mounding also needs to be checked. The maximum EIA cap does not appear to impact the infiltration basin's size (2,614 sq.ft. < 11,326 sq.ft.).

(d) **PROTECTIVE AREAS**

All post-construction sites are required to meet the ordinance's protective area performance standards.

Design Clarifications:

Adjacent Property Owners- If a stream or channel is placed or relocated along a property line, an easement or letter of permission is required from any property owners impacted by the protective area's new location. Also, if a stormwater facility or structure is proposed within an onsite stream or channel, 100-year flood elevations shall be evaluated to determine if offsite property owners are impacted by backwater or a flood elevation increase. An easement or letter of permission is required from any property owners impacted by backwater.

Wetland Delineations- Wetland delineations shall be performed by a professional soil scientist, professional hydrologist, or other qualified individual approved by the administering authority. The individual performing the delineation shall classify the wetland as a less susceptible wetland, highly susceptible wetland, exceptional resource water, or outstanding resource water.

Disturbances- Protective areas may be disturbed as part of a project, if necessary. Disturbed areas must be stabilized from erosion and restored with a self-sustaining vegetation.

Type of Vegetation- It is recommended that seeding of non-invasive vegetative cover be used in the protective areas. Vegetation that is flood and drought tolerant and can provide long-term bank stability because of an extensive root

system is preferable. Vegetative cover can be measured using the line transect method described in the University of Wisconsin Extension publication number A3533, titled "Estimating Residue Using the Line Transect Method".

Best Management Practices-

- BMPs may be located in protective areas (ponds, swales, etc.)
- Other state and local regulations may apply to BMPs located in protective areas and waters of the state, including the following:
 - Navigation, Dams, & Bridges (Chapter 30 and 31, Stats.)
 - Wetland Water Quality Standards (NR 103)
 - Wetlands (US Army Corps of Engineers Section 404 regulations)
 - Shoreland Management (NR 115, NR 117, & local regulations)
 - Floodplain Management (NR 116 & local regulations).
- For purposes of section S.07(3)(d)6.d of the ordinance, a vegetated protective area to filter runoff pollutants from post-construction sites is not necessary since runoff is not entering the surface water at that location. Other practices, necessary to meet the requirements of this section, such as a swale or basin, will need to be designed and implemented to reduce runoff pollutants before the runoff enters a surface water of the state.

(e) **FUELING AND VEHICLE MAINTENANCE AREAS:**

All post-construction sites are required to meet the ordinance's no visible petroleum sheen performance standard.

Design Clarifications:

The following BMPs are recommended to meet the performance standards contained within section S.07(3)(e) of the ordinance:

- Enclose vehicle maintenance areas in a building or under a roof.
- Install a roof or canopy over fueling areas.
- Divert runoff away from fueling and vehicle maintenance areas.
- Keep adsorbent spill cleanup materials onsite at all times.
- Install an oil / water separator and/or biofiltration device.
- Post the spill response phone numbers in conspicuous onsite locations. The municipality's Illicit Discharge Ordinance requires reporting of hazardous spills. The local municipality's spill response phone number is 911 and the DNR's 24-hour spill response phone number is 1-800-943-0003.

(f) **SWALE TREATMENT FOR TRANSPORTATION FACILITIES**

Post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance are required to meet the ordinance's numeric performance standards. All other post-construction sites are not required to meet these numeric performance standards. BMP design guidance is provided below in Section (h) for sites with less than 20,000 sq.ft. of impervious surface disturbance.

Design Clarifications:

For purposes of section S.07(3)(f)1.a of the ordinance, it is preferred that tall and dense vegetation be maintained within the swale due to its greater effectiveness at enhancing runoff pollutant removal. However, the local municipality may have ordinances or other design criteria which dictate the allowable mowing height for grass swales.

For purposes of section S.07(3)(f)1.b of the ordinance, check dams may be included in the swale design to slow runoff flows and improve pollutant removal. Transportation facilities with continuous features such as curb and gutter, sidewalks or parking lanes do not comply with the design requirements of section S.07(3)(f)1.b of the ordinance. However, a limited amount of structural measures such as curb and gutter may be allowed as necessary to account for other concerns such as human safety or resource protection.

For purposes of section S.07(3)(f)2 of the ordinance, the Department of Natural Resource's regional stormwater staff can determine if additional BMPs, beyond a water quality swale, are needed.

(g) EXEMPTIONS FOR S.07(3) PERFORMANCE STANDARDS

Projects that consist of only the construction of bicycle paths or pedestrian trails generally meet the exception found under section S.07(3)(g)3.d of the ordinance, as these facilities have minimal connected imperviousness.

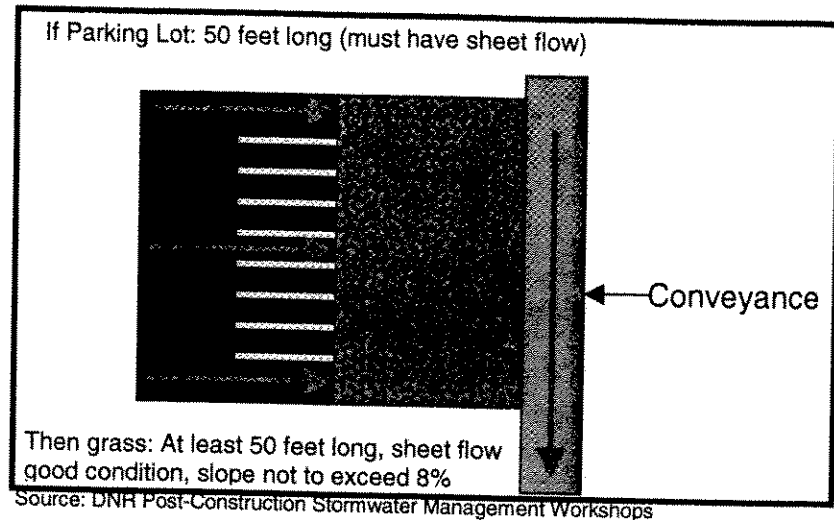
(h) SITES WITH LESS THAN 20,000 SQ.FT. OF IMPERVIOUS SURFACE DISTURBANCE

Pursuant to S.07(6) of the ordinance, the municipality may establish stormwater management requirements more stringent than those set forth in this section if the municipality determines that an added level of protection is needed.

Design Clarifications:

For a post-construction site with less than 20,000 sq.ft. of impervious surface disturbance, the applicant shall comply with the protective area requirements in section S.07(3)(d) of the ordinance, petroleum sheen requirements in section S.07(3)(e) of the ordinance, and one of the two requirements provided below. It is recommended that the developer and designer contact the local municipality early in the design process to discuss which requirement must be complied with:

1. Disconnect impervious surfaces. 90% or more of disturbed impervious surfaces must be disconnected. In order to consider an impervious surface as "disconnected", the following criteria shall be met:
 - Roofs: Discharge runoff over a minimum 20 foot long pervious surface that is in good condition and graded for sheet flow.
 - Other Impervious Surfaces:
 - Source area flow length may not exceed 75 feet.
 - Source area and pervious area must be graded for sheet flow.
 - Pervious area must be in good condition, have a slope less than 8%, and have a flow length at least as long as the contributing impervious area's length (but never less than 20 feet).



2. Use the following best management practices and good housekeeping practices to reduce peak flow rates, improve water quality, and encourage infiltration:
 - Vehicle and equipment maintenance shall be performed inside buildings when feasible. Used fluids / batteries shall be stored and disposed of properly. Repair any vehicle leaks as soon as possible.
 - Outdoor trash bins are required for fast food restaurants, convenience stores, and gas stations. Litter shall be cleaned up daily and disposed of properly.
 - Fertilizers shall be used sparingly for lawn areas. Fertilizers shall be immediately swept off streets, parking lots, driveways, and sidewalks. Soil testing and compliance with Technical Standard 1100 (Turf Nutrient Management) is also encouraged.
 - Stream, shoreline, swale, and other erosion problems shall be repaired as part of the development project when feasible.
 - Roof downspouts, parking lots, driveways, and sidewalks shall discharge stormwater runoff to lawn or other pervious areas when feasible. Rain barrels are also encouraged at roof downspouts to store water for irrigation and watering landscaped areas (reduces municipal water invoice).
 - Create depressions in lawn areas and other landscape areas to temporarily store and treat stormwater runoff from roofs, parking lots, driveways and sidewalks when feasible. Grass swales, biofiltration devices, bioretention devices, and rain gardens are also encouraged when feasible.
 - Filter baskets shall be installed in parking lot catch basins when feasible.
 - Preserve wooded areas, trees, shrubs, and other native vegetation that are in good condition when feasible.

(i) OTHER DESIGN REQUIREMENTS

- Topographic surveys and plans shall be on 1929 NGVD vertical datum.
- Grass swales shall be designed with a minimum longitudinal slope of 1%.
- Storm sewers shall be designed for a 10-year design storm. A copy of storm sewer design calculations, time of concentration paths, tailwater conditions, and watershed maps shall be submitted.

- Culverts shall be designed for a 25, 50 or 100-year design storm, depending on location. Contact the municipality for more specific design guidance. A copy of culvert design calculations, time of concentration paths, tailwater conditions, and watershed maps shall be submitted.
- Overland flow paths shall be designed for a 100-year design storm. Flow paths shall be provided for street low points and other depressions. The location of overland flow paths shall be shown on the plans. The maximum depth of ponding in street low points shall be 9-inches. The 9-inch depth is measured at the street centerline.
- Minimum finished ground elevations shall be provided for buildings if deemed necessary to provide reasonable flood protection. The minimum finished ground elevation shall be > 1 foot above the 100-year flood elevation and extend at least 15 feet beyond the building. Minimum elevations may need to be specified for lakes, rivers, streams, ponds, and overland flow paths.
- A letter of permission may be required from down slope property owners if a post-development "point discharge" was "sheet flow" during the pre-development condition.
- The applicant may request a waiver or lesser design standard if site characteristics create a hardship.

Maximum Permissible Velocities for Channels			
Channel Cover	Slope Range %	Erosion-resistant soils	Easily eroded soils
Bermuda Grass	0-5	8 fps	6 fps
	5-10	7 fps	5 fps
	>10	6 fps	4 fps
Buffalo grass, Kentucky bluegrass, Smooth brome, blue grama	0-5	7 fps	5 fps
	5-10	6 fps	4 fps
	>10	5 fps	3 fps
Grass mixture	0-5	5 fps	4 fps
	5-10	4 fps	3 fps
Do not use on slopes steeper than 10%, except for side slopes in a combination channel.			
Lespedeza sericea, weeping love grass Ischaemum (yellow bluestem), kudzu, alfalfa, crabgrass	0-5	3.5 fps	2.5 fps
	Do not use on slopes steeper than 5%, except for side slopes in a combination channel.		
Annuals – used on mild slopes or as temporary protection until permanent covers are established, common lespedeza, Sudan grass	0-5	3.5 fps	2.5 fps
	Use on slopes steeper than 5% is not recommended		

Source – Chow Open Channel Hydraulics

(4) CONSIDERATIONS FOR ONSITE / OFFSITE STORMWATER MANAGEMENT MEASURES

All proposed land development activities should be planned, designed, and implemented:

1. In a manner that best fits the terrain of the site, avoiding steep slopes and other environmentally sensitive areas;

2. According to the unique resource conditions at, around, and downstream from a given site;
3. According to the principles of Low Impact Development. Use source controls rather than end-of-pipe treatment. Reduce, prevent and mitigate the adverse impacts of development by maintaining infiltration, reducing frequency and volume of discharges, reducing peak flows, and maintaining groundwater recharge. These goals can be accomplished by using:
 - Reduced impervious surfaces
 - Functional grading to slow runoff and thereby lengthen the time of concentration
 - Vegetated channels rather than paving or pipes
 - Disconnection of impervious surfaces; drain to vegetated areas
 - Bioretention (rain gardens) and filtration (buffer) landscape areas
 - Any other techniques that reduce the runoff curve number (RCN) or increase the time of concentration (Tc)
 - Use wet detention basins after all source area practices and techniques have been employed

Overall, the goal is to design the site as an integral, living part of the environment with careful use of principles and practices that are both low impact on runoff and simple for people to maintain and live with.

4. To maintain groundwater recharge areas and the infiltration capacity of native soils by avoiding the unnecessary filling of large natural depressions or compaction of upper soil horizons by construction equipment;
5. To maintain soil infiltration by keeping all topsoil on site;
6. To provide the protective area, shoreland, wetland, and environmentally sensitive area setback along all water courses; and
7. According to the sequence in the "Treatment Train":
 - a. First do source controls:
 - Reduce impervious areas to the maximum extent possible
 - Maintain undisturbed soil
 - Maintain existing trees, shrubs and vegetation
 - b. Next do lot controls
 - Grade lots to create long areas of overland flow rather than channels
 - Minimize directly connected impervious areas by such practices as directing roof water to vegetated areas and draining driveways to grass rather than the street
 - Include "rain gardens" (undrained areas that will pond water)
 - c. Then do site controls
 - Use grassed waterways and diversions rather than paved channels
 - Maintain wetlands
 - Use vegetated road ditches rather than curb and gutter
 - Use wet detention basins. They can have pools 5 or more feet deep or may be designed as wetlands, but existing wetlands cannot be incorporated into stormwater facilities.
 - Use off line detention basins
 - d. Finally, do Regional controls such as regional detention basins.

(5) LOCATION AND REGIONAL TREATMENT OPTION

When using the regional treatment option, a letter is required from the owner of the regional facility. At a minimum, the letter shall state the following:

- Regional facility complies with ordinance requirements,
- Site can use regional facility for ordinance compliance, and

- Maintenance agreement for regional facility has been recorded at the County Register of Deeds.

(6) ALTERNATE REQUIREMENTS

S.08 PERMITTING REQUIREMENTS, PROCEDURES AND FEES

- (1) PERMIT REQUIRED**
- (2) PERMIT APPLICATION AND FEES**
- (3) REVIEW AND APPROVAL OF PERMIT APPLICATION**
- (4) PERMIT REQUIREMENTS**

The permit applicant is required to post the permit in a conspicuous place at the construction site.

Record Drawings-

- Post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance are required to have record drawings. Record drawings shall be signed by a licensed Professional Engineer. Agricultural land uses, unless they are exceptionally large or special in some other way, are not required to have record drawings. Typically, agricultural land uses will not need anything more than review and acceptance by the administering authority.
- Post-construction sites with less than 20,000 sq.ft. of impervious surface disturbance are not typically required to have record drawings. Typically, sites with less than 20,000 sq.ft. of impervious surface disturbance will not need anything more than review and acceptance by the administering authority.

- (5) PERMIT CONDITIONS**
- (6) PERMIT DURATION**
- (7) ALTERNATE REQUIREMENTS**

S.09 STORMWATER MANAGEMENT PLAN

(1) PLAN REQUIREMENTS

The stormwater management plan for post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance shall contain, at a minimum, the following information.

- (a) Name, address, and telephone number for the following or their designees: landowner; developer; project engineer for practice design and certification; person(s) responsible for installation of stormwater management practices; and person(s) responsible for maintenance of stormwater management practices prior to the transfer, if any, of maintenance responsibility to another party.
- (b) A proper legal description of the property proposed to be developed, referenced to the U.S. Public Land Survey system or to block and lot numbers within a recorded land subdivision plat.
- (c) Pre-development site conditions, including:
 1. One or more site maps at a scale of not less than 1 inch equals [100] feet. The site maps shall show the following: site location and legal property description; predominant soil types and hydrologic soil groups;

- existing cover type and condition; one or two foot topographic contours of the site; topography and drainage network including enough of the contiguous properties to show runoff patterns onto, through, and from the site; watercourses that may affect or be affected by runoff from the site; flow path and direction for all stormwater conveyance sections; watershed boundaries used in hydrology determinations to show compliance with performance standards; lakes, streams, wetlands, channels, ditches, and other watercourses on and immediately adjacent to the site; limits of the 100 year floodplain; location of wells and wellhead protection areas covering the project area and delineated pursuant to s. NR 811.16, Wis. Adm. Code.
2. Hydrology and pollutant loading computations as needed to show compliance with performance standards. All major assumptions used in developing input parameters shall be clearly stated. The geographic areas used in making the calculations shall be clearly cross-referenced to the required map(s).
- (d) Post-development site conditions, including:
1. Explanation of the provisions to preserve and use natural topography and land cover features to minimize changes in peak flow runoff rates and volumes to surface waters and wetlands.
 2. Explanation of any restrictions on stormwater management measures in the development area imposed by wellhead protection plans and ordinances.
 - a. Stormwater infiltration systems and ponds shall be located at least 400 feet from a well serving a community water system unless the Wisconsin Department of Natural Resources and municipality concur that a lesser separation distance would provide adequate protection of a well from contamination.
 - b. Stormwater management practices shall be located with a minimum separation distance from any well serving a non-community or private water system as listed within s. NR 812.08.
 3. One or more site maps at a scale of not less than 1 inch equals [100] feet showing the following: post-construction pervious areas including vegetative cover type and condition; impervious surfaces including all buildings, structures, and pavement; post-construction one or two foot topographic contours of the site; post-construction drainage network including enough of the contiguous properties to show runoff patterns onto, through, and from the site; locations and dimensions of drainage easements; locations of maintenance easements specified in the maintenance agreement; flow path and direction for all stormwater conveyance sections; location and type of all stormwater management conveyance and treatment practices, including the onsite and offsite tributary drainage area; location and type of conveyance system that will carry runoff from the drainage and treatment practices to the nearest adequate outlet such as a curbed street, storm drain, or natural drainage way; watershed boundaries used in hydrology and pollutant loading calculations and any changes to lakes, streams, wetlands, channels, ditches, and other watercourses on and immediately adjacent to the site.
 4. Hydrology and pollutant loading computations as needed to show compliance with performance standards. The computations shall be made for each discharge point in the development, and the geographic areas used in making the calculations shall be clearly cross-referenced to the required map(s).
 5. Results of investigations of soils and groundwater required for the placement and design of stormwater management measures. When permanent infiltration systems are used, appropriate onsite testing shall be conducted to determine if seasonal groundwater elevation or top of bedrock is within 5 feet of the proposed infiltration system. Detailed drawings including cross-sections and profiles of all permanent stormwater conveyance and treatment practices.

- (e) A description and installation schedule for the stormwater management practices needed to meet the performance standards in S.07.
- (f) A maintenance plan developed for the life of each stormwater management practice including the required maintenance activities and maintenance activity schedule.
- (g) Cost estimates for the construction, operation, and maintenance of each stormwater management practice.
- (h) Other information requested in writing by the [administering authority] to determine compliance of the proposed stormwater management measures with the provisions of this ordinance.
- (i) All site investigations, plans, designs, computations, and drawings shall be certified by a [licensed professional engineer] to be prepared in accordance with accepted engineering practice and requirements of this ordinance.

(2) ALTERNATE REQUIREMENTS

S.10 MAINTENANCE AGREEMENT

(1) MAINTENANCE AGREEMENT REQUIRED

Post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance are required to have a maintenance agreement. The applicant shall use the municipality's standard forms for the maintenance agreement. The local municipality is responsible for recording the signed maintenance agreement at the County Register of Deeds.

Post-construction sites with less than 20,000 sq.ft. of impervious surface disturbance are not typically required to have a maintenance agreement.

Sites utilizing the regional treatment option are not typically required to have a maintenance agreement. However, a maintenance agreement is required for the regional facility.

(2) AGREEMENT PROVISIONS

(3) ALTERNATE REQUIREMENTS

S.11 FINANCIAL GUARANTEE

(1) ESTABLISHMENT OF GUARANTEE

Post-construction sites with 20,000 sq.ft. or more of impervious surface disturbance and post-construction sites with 1 acre or more of land disturbance are required to have a financial guarantee. The financial guarantee includes the cost associated with stormwater BMPs, record drawings, project administration, and contingencies.

Post-construction sites with less than 20,000 sq.ft. of impervious surface disturbance are not typically required to have a financial guarantee.

Sites utilizing the regional treatment option are not typically required to have a financial guarantee.

(2) CONDITIONS FOR RELEASE

The financial guarantee shall not be released until the applicant conducts a final inspection with a municipal representative, submits "record drawings" certified by a licensed Professional Engineer, completes punch list items, and pays fees.

(3) ALTERNATE REQUIREMENTS

S.12 FEE SCHEDULE

S.13 ENFORCEMENT

S.14 APPEALS

- (1) BOARD OF APPEALS OR ADJUSTMENT
- (2) WHO MAY APPEAL

S.15 SEVERABILITY

S.16 EFFECTIVE DATE

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