STORMWATER MANAGENEMT DESIGN STANDARDS

Version 1.0
Approved by City Council March 7, 2017

GOALS AND PURPOSE:

The general purpose of these design standards is to established regulatory requirements for land disturbing and construction activities to help safeguard persons, protect property, and prevent damage to the environment in the City of St. Augusta. The goal is to establish requirements that will:

1) Assist in meeting the City's NPDES/SDS Municipal Separate Storm Sewer System (MS4) and Construction Stormwater General Permit requirements.
2) Assist in meeting Total Maximum Daily Load (TMDL) plan waste load allocations for impaired waters.
3) Protect life and property from dangers associated with flooding.
4) Protect public and private property and natural resources from damage resulting from stormwater runoff and erosion.
5) Provide a single, consistent set of performance goals that apply to all developments.
6) Establishing erosion and sediment control and waste control requirements for land disturbance activities within the jurisdiction of the City St. Augusta.
7) Establishing post-construction stormwater management requirements to prevent or reduce water pollution after land disturbing activity is complete.
8) Promote infiltration and ground water recharge.
9) Protect functional values of all types of natural water bodies.

APPLICABILITY:

These design standards shall apply to all land disturbance and/or construction activity that disturbs land of equal to or greater than five thousand (5,000) square feet or common plan of development or sale that disturbs equal to or greater than five thousand (5,000) square feet or as deemed necessary by the City of St. Augusta to safeguard persons, protect property, and prevent degradation to the environment in the City of St. Augusta. No land disturbance or discharge of stormwater shall occur without first obtaining a permit from the City of St Augusta.

COMPATIBILITY WITH OTHER REGULATIONS:

The requirements set forth with these design standards are not intended to modify or repeal any other ordinance, rule, regulation, or other provision of law. The requirements of these design standards are in addition to the requirements of any other ordinance, rule, regulation, or other provision of law, and where any provision of these requirements imposes restrictions different from those imposed by any other ordinance, rule, regulation, or other provision of law, whichever provision is more restrictive or imposes higher protective standards for human health or the environment shall control.

ULTIMATE RESPONSIBILITY:

The standards and requirements set forth herein and promulgated pursuant to these requirements are minimum standards; therefore these requirements do not intend or imply that compliance by any person will ensure that there will be no contamination, pollution, or unauthorized discharge of pollutants.

DESIGN REQUIREMENTS:

1. Summary of Requirements

Disturbed Area → / Requirement ↓	5,000 sf up to 1 acre	1 acre or more
Stormwater Management Permit	X	X
Stormwater Pollution Prevention Plan (SWPPP)	X	X
Construction Site Stormwater Runoff Controls	X	X
Post-Construction Stormwater Management Requirements		X
NPDES Construction Permit		X

2. Better Site Design

The City encourages the use of better site designs as identified in the current version of the Minnesota Stormwater Manual. Better site design involves a series of techniques applied early in the design process to reduce impervious cover, conserve natural areas, use pervious areas to more effectively treat stormwater runoff, and promote the treatment train approach to runoff management.

3. Stormwater Pollution Prevention Plan (SWPPP)

A SWPPP shall be submitted with the Stormwater Management Permit application. The SWPPP shall be consistent with the requirements outlined in this document, City ordinances, and State and Federal regulations.

A. SWPPP Plan Content. The SWPPP shall be completed prior to submitting a Stormwater Management Permit application and prior to conducting any land disturbing activities. SWPPP plan content must include at a minimum the items required and identified in the NPDES Construction Permit. This includes information to meet the requirements of the Construction Site Stormwater Runoff Control and Post-Construction Stormwater Management sections of this document, where applicable.

4. Construction Site Stormwater Runoff Control Requirements. *(Erosion & Sediment Controls during Construction)*

The construction site stormwater runoff control requirements shall apply to all land disturbance and construction activity that disturbs land of equal to or greater than five thousand (5,000) square feet or a common plan of development or sale that disturbs equal to or greater than five thousand (5,000) square feet or as deemed necessary by the City of St. Augusta to safeguard persons, protect property, and prevent degradation to the environment in the City of St. Augusta.

Erosion and sediment control and waste controls shall be planned for, designed, and implemented as required by these design standards and as defined in the NPDES

Construction Permit, including those identified in the NPDES Construction Permit for discharges to special and impaired waters, when applicable. These requirements are briefly described below:

A. Erosion Prevention Practices. Erosion Prevention Practices (BMPs) must be planned for, implemented, and maintained to prevent soil particle exposure and detachment in order to minimize site erosion.

B. Sediment Control Practices. Sediment Control Practices (BMPs) must be planned for, implemented, and maintained to prevent eroded sediment from leaving the site and to minimize sediment and other pollutants from entering surface waters, including curb and gutter systems and storm sewer systems.

C. Dewatering Activities. Dewatering or basin draining activities to remove surface or ground water to dry and/or solidify a construction site to enable construction activity must incorporate appropriate BMPs to discharge in a manner that does not cause nuisance conditions. Dewatering may require a Minnesota Department of Natural Resources water appropriation permit and, if dewatering water is contaminated, discharge of such water may require an individual MPCA NPDES/SDS permit.

D. Pollution Prevention Management Measures. Construction sites must incorporate pollution prevention management measures to reduce the probably of spills, leaks and discharges of pollutants.

E. Final Stabilization. Upon the completion of construction activity final stabilization must be completed to include perennial vegetative cover on all exposed soils.

F. Temporary Sediment Basins. Temporary sediment basin(s) are required to treat runoff where deemed necessary by the NPDES Construction Permit and where deemed necessary by the City of St. Augusta to safeguard persons, protect property, and prevent degradation to the environment.

G. Site Inspection and Maintenance. Construction sites must be inspected on a regular basis to ensure the integrity and effectiveness of all erosion prevention BMPs, sediment control BMPs, and pollution prevention management measures. All non-function BMPs must be repaired, replaced, or supplemented with functional BMPs.

H. Land disturbance shall conform to the natural limitations presented by topography and soil so as to create the least potential for soil erosion.

I. Erosion and siltation control measures shall be coordinated with the different stages of land disturbance. Appropriate control measures shall be installed prior to land disturbance activities when necessary to control erosion.

J. Land shall be disturbed in increments of workable size such that adequate erosion and siltation controls can be provided as construction progresses. The smallest practical area of land shall be exposed at any one period of time.

K. Whenever possible, natural vegetation shall be retained and protected.

L. Where the topsoil is removed, sufficient arable soil shall be set aside for re-spreading over the developed area. The soil shall be restored to a minimum depth of four (4) inches and shall be of a quality at least equal to the soil quality prior to development.

M. Exposed Slopes: The following are the minimum control measures that shall be taken to control erosion during any activity where soils are exposed:

1. No slope should be steeper in grade than four (4) feet horizontal to one (1) foot vertical.
2. Exposed slopes steeper in grade than ten (10) feet horizontal to one (1) foot vertical should be contour plowed to minimize direct runoff of water.

3. Along the top of each exposed slope, a berm or other BMP should be constructed to prevent runoff from flowing over the edge of the slope. Where runoff collecting behind said berm cannot be diverted elsewhere and must be directed down the slope, appropriate measures shall be taken to prevent erosion. Energy dissipation should be installed to prevent erosion at the discharge end.

4. Exposed slopes shall be protected by whatever means will effectively prevent erosion considering the degree of slope, soils material, and expected length of exposure.

5. Post-Construction Stormwater Management Requirements.
(Permanent Stormwater Treatment after Construction is Complete)

The post-construction stormwater management requirements shall apply to all land disturbance and construction activity that disturbs land of equal to or greater than one (1) ac or a common plan of development or sale that disturbs equal to or greater than one (1) ac or as deemed necessary by the City of St. Augusta to safeguard persons, protect property, and prevent degradation to the environment in the City of St. Augusta.

Site plans and project documentation must incorporate post-construction (permanent) stormwater management best management practices/systems to manage stormwater long term once construction activity is complete. Permanent stormwater systems shall be designed consistent with the Minnesota Stormwater Manual and in accordance with the following requirements:

A. Green Infrastructure. Green Infrastructure techniques and practices (including, but not limited to, infiltration, evapotranspiration, reuse/harvesting, conservation design, urban

forestry, green roofs, etc.), shall be given preference as design options consistent with zoning, subdivision and PUD requirements.

A combination of techniques which utilize infiltration, capture and reuse, evapotranspiration and other types of low impact development techniques are encouraged, rather than relying on a single practice or infiltration alone.

B. Discharges to Trout Streams
Permanent stormwater management facilities that discharge to a trout stream must minimize any increase in the temperature of runoff to the trout stream receiving water and/or tributaries. Projects must minimize temperature impacts as required in the NPDES Construction permit by utilizing one or more of the following measures:
    - Minimize new impervious surfaces.
    - Minimize the discharge from directly connected impervious surfaces.
    - Implement infiltration or other volume reduction practices.
    - Incorporate shading, filtration, vegetated discharge practices.
    - Other methods proven to reduce/minimize temperature increases.

C. Stormwater Runoff Rate Control. Post-development peak flow rates at each discharge point from the project area shall not exceed pre-development peak flow rates for the 2, 10, and 100-year, 24-hour design storms, unless otherwise approved by the City. The City of St. Augusta may impose a stricter requirement(s) where downstream systems are known to have capacity concerns.

D. Storm Sewer Conveyance System. Local storm sewer systems shall be designed for a minimum 10-year design frequency, unless otherwise approved by the City of St. Augusta. The City of St. Augusta may impose a stricter requirement(s) where deemed necessary.

The Rational Method shall be the preferred methodology for design of local systems. Culvert crossings or storm systems in County or State right-of-way may have a design frequency and requirements which differ from the City's requirements. The Designer shall contact each agency/unit of government to determine the appropriate design requirements and frequency for hydrologically-connected systems.

E. Flood Management.
    1. Flood protection shall be provided for a minimum one hundred (100) year design return frequency.
    2. Flood protection for public and personal property shall be one (1) foot plus any encroachment above the floodplain.
    3. An emergency overflow shall be incorporated into the site design at or above the Base Flood Elevation (BFE) or modeled 100-year/24-hour event high water level to convey a 100-year discharge away from buildings to the next downstream water body. The lowest opening shall be at least one and a half (1.5) feet above the emergency overflow elevation of the adjacent water body.

4. Existing, natural or man-made emergency overflows shall be analyzed as part of the design process.
5. Where natural overflow does not exist, the designer shall consider the possibility of long duration and extreme events. High water elevations shall be evaluated with analysis based on runoff volume resulting from a 100-year/10-day snowmelt with saturated or frozen soil conditions (CN=100) and/or the runoff resulting from a 100-year back-to-back rain event.

F. Water Quality Treatment and Volume Control Requirements**.** Post-construction stormwater management must provide water quality treatment and volume control.

Volume reduction techniques considered shall include infiltration, reuse & rainwater harvesting, canopy interception, and evapotranspiration and/or additional techniques included in the MIDS calculator and the MN Stormwater Manual.

Higher priority shall be given to BMPs that include volume reduction, secondary preference is to employ filtration techniques, followed by sedimentation.

Compliance with the water quality and volume control requirements shall be met by providing defensible and consistent hydrological assessments and modeling methods showing compliance with either the Minimal Impact Design Standards (MIDS) or the Annual Average Standards identified below.

1. Option 1: MIDS Standard:

Permanent stormwater management must meet the Minimal Impact Design Standards (MIDS) outlined and established by the Minnesota Pollution Control Agency (MPCA). These standards can be found within the MN Stormwater Manual and are summarized below:

a. New Development Areas (non-linear). Nonlinear development projects, on sites without restrictions, shall capture and retain on site 1.1 inches of runoff from all impervious surfaces on the site.

b. Redevelopment Areas (non-linear). Nonlinear redevelopment projects, on sites without restrictions, shall capture and retain on site 1.1 inches of runoff from the new and/or fully reconstructed impervious surfaces.

c. Linear Development. Linear projects, on sites without restrictions, shall capture and retain the larger of the following:

- 0.55 inches of runoff from the new and fully reconstructed impervious surfaces on the site.
- 1.1 inches of runoff from the net increase impervious area on the site.

Mill and overlay and other resurfacing activities are not considered fully reconstructed and are not required to meet the water quality or volume reduction requirements.

d. Flexible Treatment Options for Sites with Restrictions. Every attempt to comply with the performance standards identified above shall be made. If full compliance is not possible due to any of the factors identified below, the reasons must be clearly documented. Options should be considered and documented to examine the merits of relocating project elements to address varying soil conditions and other constraints across the site. If site constraints or restrictions limit the full treatment goal, the flexible treatment options identified below shall be used.

e. Factors to be considered in determining flexible treatment options.
   i. Karst geology
   ii. Shallow bed rock
   iii. High ground water
   iv. Hotspots or contaminated soils
   v. Drinking Water Source Management Areas or within 200 feet of drinking water well
   vi. Zoning, setbacks or other land use requirements
   vii. Excessive costs
   viii. Poor soils (infiltration rates which are to low or too high, problematic urban soils)

f. Flexible Treatment Options Sequencing. The MIDS Design Sequence Flowchart should be utilized when determining the appropriate flexible treatment option. The Design Sequence Flowchart can be found in Appendix A or within the MN Stormwater Manual.

   Each alternative should be considered in sequence starting with Flexible Treatment Option #1 and progressing to Flexible Treatment Option #3. The specific reasons why each alternative option cannot be met must be clearly documented. When all of the conditions are fulfilled within an option alternative, the sequence is complete.

   i. Flexible Treatment Option 1 (FTO #1). Attempt to comply with the following conditions:
      1) Achieve at least 0.55 inch volume reduction from all impervious surfaces from new development sites or from the new and fully reconstructed impervious from redevelopment sites, and
      2) Remove 75 percent of the annual total phosphorus load from all impervious surfaces from new development sites or from

the new and fully reconstructed impervious from redevelopment sites, and

3) Options considered and presented shall examine the merits of relocating project elements to address varying soil conditions and other constraints across the site.

ii. Flexible Treatment Option 2 (FTO #1). Attempt to comply with the following conditions:

1) Achieve volume reduction to the maximum extent practicable (as determined by the City), and
2) Remove 60 percent of the annual total phosphorus load from all impervious surfaces from new development sites or from the new and fully reconstructed impervious from redevelopment sites, and
3) Options considered and presented shall examine the merits of relocating project elements to address varying soil conditions and other constraints across the site.

iii. Flexible Treatment Option 3 (FTO#3) Treatment / mitigation at an off-site location may be implemented at the City's discretion. The off-site treatment must meet the performance of 1.1 inches of volume reduction for new development or redevelopment standards identified above. Proposed off-site treatment locations must be reviewed and approved by the City. Off-site treatment shall be achieved in areas selected in the following order of preference:

1) Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
2) Locations within the same Department of Natural Resource (DNR) catchment area as the original construction activity.
3) Locations in the next adjacent DNR catchment area up-stream.
4) Locations within the City.

Mitigation projects must involve the creation of new structural stormwater BMPs, the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP.

Routine maintenance of structural stormwater BMPs cannot be used to meet mitigation requirements.

Mitigation projects must be completed within 24 months after the start of the original construction activity.

If the mitigation project is a private structural BMP and the City is not responsible for long-term maintenance of the project, the City will

require written and recorded documentation of maintenance responsibilities.

2. OPTION 2: Annual Average Standard:

Permanent stormwater management Water Quality Treatment and Volume Control Requirements must be met by providing defensible and consistent hydrological assessments and modeling methods showing compliance with the annual average standards outlined below:

New Development Areas. No net increase from pre-development conditions on an annual average basis of:

a. Stormwater discharge volume, unless precluded by the stormwater management limitations and exceptions identified below.
b. Stormwater discharge of TSS
c. Stormwater discharge of TP

Redevelopment Areas. A net reduction from pre-development conditions on an annual average basis of.

a. Stormwater discharge volume, unless precluded by the stormwater management limitations identified below.
b. Stormwater discharge of TSS
c. Stormwater discharge of TP

3. Stormwater Management Limitations and Exceptions:

a. The use of infiltration techniques are prohibited in the following areas:
    i. Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit.
    ii. Where vehicle fueling and maintenance occur.
    iii. Where less than three (3) feet of separation from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock exists.
    iv. Where high levels of contaminants in soil or groundwater will be mobilized by infiltrating stormwater.

b. The use of infiltration techniques are restricted when the infiltration device will be constructed in areas identified below. A higher level of design and review is required in these restricted areas. The City engineer may request additional information and/or testing to ensure that infiltration basins will perform properly and that groundwater is adequately protected.
    i. With predominately Hydrologic Soil Group D (clay) soils
    ii. Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features

iii. Within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13
iv. Where soil infiltration rates are more than 8.3 inches per hour For

G. Design Computation Criteria**.**
1. Rain fall amounts for storm water management and conveyance system analysis shall utilize the NOAA Atlas 14 data. The Atlas 14 rainfall depths should utilize the Atlas 14 or NRCS Midwest and Southeast (MSE) distributions with antecedent moisture conditions 2 (AMC-2).
2. All ponding, detention or retention shall be designed for a 100 year frequency storm condition.
3. The City may require designers to run additional modeling scenarios with rainfall depths greater than the 100-year event. For example, modeling a 10-inch event or back-to-back 100-year events will allow the designer to evaluate the sensitivity of the system response to larger events relative to detention/retention area high water levels and emergency overflow paths. The designer is encouraged to run extreme event scenarios as part of the initial site evaluation and design process.
4. Outlet energy dissipation shall be designed in accordance with MnDOT Design Criteria.
5. Permanent stormwater facilities shall provide adequate maintenance access. Vehicle lanes of not less than 20-feet wide and 15 percent slope shall be provided around the facilities and also to access the facilities.
6. Infiltration practices shall at a minimum:
   a. Shall provide for pre-treatment of runoff to trap sediment prior to entering the infiltration system.
   b. Must be designed to draw down to the bottom elevation of the practice within 48 hours. The maximum ponding depth shall be based on the soil infiltration rate determined from site specific soil investigation data taken from the location of proposed infiltration practice(s) on site.
7. Stormwater wet pond(s) at a minimum:
   a. Shall have a minimum 4-foot ponding depth and maximum 10-foot ponding depth.
   b. Shall have a minimum 20-foot buffer around the perimeter of the basin. The buffer shall extend from the 100-year high water level.
   c. Shall have an aquatic bench having 10:1 (H:V) slope for the first 10 feet extending down from the normal water level of the basin.
   d. Shall have a 3:1 maximum slope.
   e. Shall be configured to prevent short circuiting.
   f. Shall have skimming devices designed to remove floatable material.
   g. Shall include liner material (compacted cohesive soils, geosynthetic materials, plastic liner, soil additives, or other material) when located in areas with high infiltration rates and/or when located in areas with prohibited infiltration to create a permanent pool and prevent contamination of ground water.

H. Long Term Maintenance of Permanent Stormwater BMPs. The type and interval of maintenance activities for permanent stormwater BMPs are often dependent upon the degree of pollutant loading from a particular drainage basin. BMP maintenance can be broken into three categories: inspection, routine maintenance, and major maintenance.

1. Private Facilities
   a. **Maintenance Agreement.** The owner shall enter into a Maintenance Agreement with the City.

   b. **Maintenance Plan.** An inspection and maintenance plan shall be develop, approved, and included as an attachment with the Maintenance Agreement. At a minimum, maintenance plans must include the following information:
      i. Inspections
         1. Responsible person(s) for completing inspections.
         2. Frequency inspections are to be completed. At a minimum, stormwater facilities must be inspected annually.
         3. Each BMP type has its own unique characteristics. However, inspections will generally consist of an assessment to assure its functionality and general condition.
      ii. Routine Maintenance
         1. Responsible person(s) for conducting routine maintenance.
         2. Frequency routine maintenance is to be completed. At a minimum, routine maintenance must be completed at a frequency necessary to maintain the performance standard they were designed for.
         3. The type of routine maintenance anticipated. Routine maintenance will generally consist of trash and vegetation removal, unclogging of drains, minor sediment removal, and exchange of filter media where applicable.
      iii. Major Maintenance
         1. Responsible person(s) for conducting major maintenance.
         2. Anticipated frequency major maintenance is to be completed. At a minimum, major maintenance needs to be completed as required from inspection reports and/or when there are failures in the BMP.
         3. Type of major maintenance anticipated. Major maintenance generally consists of significant reconstruction including: dredging, excavation, removal of existing media, replacing fabric, replacing the under-drain, and reestablishment of vegetation.

2. Public Permanent Stormwater Facilities
   a. **Acceptance of publicly owned permanent stormwater facilities.** Prior to final acceptance of a facility the following must be completed:
      i. Approved maintenance plan(s) provided to the City meeting the requirements above.
      ii. Submittal of as-built drawings.

iii. Documentation certifying the BMP has been constructed in accordance with design specifications.
iv. Final inspection and approval by City staff or City representative.

DEFINITIONS:

"Best Management Practices" or "BMP" means practices to prevent or reduce the pollution of the waters of the state, including schedules of activities, prohibitions or practices, and other management practices, and also includes treatment requirements, operating procedures and practices to control site runoff, spillage or leaks, sludge, or waste disposal or drainage from raw material storage.

"Better Site Design" means the control and management of stormwater quantity and quality through the application of Better Site Design Techniques as outlined in the current version of the Minnesota Stormwater Manual.

"City" means the City of St. Augusta

"Common plan of development or sale" is a contiguous area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one proposed plan. One plan is broadly defined to include design, permit application, advertisement or physical demarcation indicating that land-disturbing activities may occur.

"Construction Activity" includes construction activity as defined in 40 CFR 122.26(b)(14)(x) and small construction activity as defined in 40 CFR 122.26(b)(15). This includes a disturbance to the land that results in a change in the topography, existing soil cover (both vegetative and non-vegetative), or the existing soil topography that may result in accelerated stormwater runoff, leading to soil erosion and movement of sediment into surface waters or drainage systems. This may include clearing, grading, filling, and excavating.

"Dewatering" means the removal of surface or ground water to dry and/or solidify a construction site to enable construction activity. Dewatering may require a Minnesota Department of Natural Resources water appropriation permit and, if dewatering water is contaminated, discharge of such water may require an individual MPCA NPDES/SDS permit.

"Energy Dissipation" means method employed at pipe outlets to prevent erosion caused by the rapid discharge of water scouring soils.

"Erosion Control" means a measure that prevents soil particles exposure and detachment.

"Green Infrastructure" means a wide array of practices at multiple scales that manages wet weather and that maintains or restores natural hydrology by infiltrating, evapotranspiring, or harvesting and using stormwater. On a regional scale, green infrastructure is the preservation or restoration of natural landscape features, such as forests, floodplains and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale, green infrastructure consists of site and neighborhood-specific practices, such as bioretention, trees, green roofs, permeable pavements, cistern, etc.

"Impervious Surface" means a constructed hard surface (gravel, concrete, asphalt, pavers, etc.) that either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development.

"Karst" *(active)* means a geographic area underlain by carbonate bedrock (or other forms of bedrock that can erode or dissolve) with less than 50 feet of sediment cover.

"Land Disturbance" means any project or activity, including removal of vegetation, excavations, clearing, filling, stockpiling, grading, or other earth change that directly or indirectly affects slopes, water bodies, the moving of ground cover or which may result in the movement of sediment.

"Linear Project" means construction or reconstruction of roads, trails, sidewalks, and rail lines that are not part of a common plan of development or sale. Mill, overlay and other resurfacing projects are not considered to be reconstruction.

"Maximum Extent Practicable" means the statutory standard (33 U.S.C. 1342(p)(3)(B)(iii)) that establishes the level of pollutant reductions that an Owner or Operator must achieve.

"Municipal Separate Storm Sewer System" or "MS4" means the conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains owned and operated by the City of St. Augusta, which is designed or used for collecting or conveying stormwater.

"NPDES Construction Permit" means the current Minnesota Pollution Control Agency General Permit to Discharge Stormwater Associated with Construction Activity Under the National Pollution Discharge Elimination System Sate Disposal System Program (NPDES/SDS).

"New Development" means all construction activity that is not defined as redevelopment and areas where new impervious is being created.

"Owner" and/or "Operator" includes the plural as well as the singular, and where appropriate shall include a natural person, partnership, firm, association, public, or quasi-public corporation, Private Corporation, or a combination of any of them, with legal or equitable interest in the parcel of record or as identified on the land disturbance permit.

"Receiving Water" means any lake, river, stream, or wetland that receives stormwater discharges from the MS4.

"Redevelopment" means any construction activity where, prior to the start of construction, the areas to be disturbed have 15 percent or more of existing impervious surface(s).

"Saturated soil" is the highest seasonal elevation in the soil that is in a reduced chemical state because of soil voids being filled with water. Saturated soil is evidenced by the presence of redoximorphic features or other information.

"Sediment" means soil particle(s) exposed to movement.

"Sediment Control" means a measure that prevents eroded sediment from leaving the site.

"Steep Slopes" means slopes that are 1:3 (V:H) (33.3 percent) or steeper in grade.

"Stormwater" means rainwater runoff, snow melt runoff, and surface runoff and drainage. (Minn .R. 7090.0080, subp.12.)

"Stormwater Pollution Prevention Plan" or "SWPPP" means a comprehensive plan developed to manage and reduce the discharge of pollutants in stormwater.

"Structural Stormwater BMPs" mean stationary and permanent BMPs designed, constructed and operated to prevent or reduce the discharge of pollutants in stormwater.

"Waters of the State" means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the state or any portion thereof. (Minn. Stat. 155.01, subd. 22.)

APPENDIX A:

MIDS Fact Sheet

MIDS Design Sequence Flowchart

Minnesota Minimal Impact Design Standards

What is Minimal Impact Design Standards?

Minimal Impact Design Standards (MIDS) represent the next generation of stormwater management in Minnesota. The emphasis today is on keeping the raindrop where it falls in order to minimize stormwater runoff and pollution and preserve natural resources. Low Impact Development (LID) is an approach to stormwater management that mimics a site's natural hydrology as the landscape is developed and preserves and protects environmentally-sensitive site features such as riparian buffers, wetlands, steep slopes, valuable (mature) trees, floodplains, woodlands and highly permeable soils.

Tree trenches at Maplewood Mall

Minnesota's new MIDS offers guidelines, recommendations and tools that will help LID be implemented more uniformly across Minnesota's landscape and provides guidance to effectively implement the concepts and practices LID promotes and encourages.

MIDS contains four main elements to meet these needs:

- A stormwater volume performance goal for new development, redevelopment and linear that will provide enhanced protection for Minnesota's water resources.
- New credit calculations that will standardize the use of a range of innovative structural stormwater techniques.
- Design specifications for a variety of green infrastructure best management practices (BMPs).
- A model MIDS ordinance package that will help developers and communities implement MIDS.

What are the benefits?

Adapting and using LID approaches offers multiple benefits including minimizing and reducing the amount of pollution reaching our lakes, rivers and streams and helps to recharge groundwater resources. MIDS establishes unified LID standards, approaches and credits so we can consistently apply these principals across Minnesota communities. MIDS helps communities measure progress toward water and natural resource protection and restoration goals. MIDS will also be used as the highest standard for meeting the stormwater practice for Minnesota Green Step Cities.

Who will use MIDS?

The concepts behind MIDS can essentially be used by all Minnesotans – we can all do our part in minimizing stormwater runoff and pollution. MIDS was specifically developed for designers, engineers, planners, contractors, stormwater managers, landscape architects, public works staff, landscape industry, land use regulators and others involved in new development and redevelopment projects. MIDS methodologies will provide tools for these individuals to quantify reductions in post-development runoff and pollutant loading from a wide variety of LID practices.

Where did MIDS come from?

Recognizing the value of LID to Minnesota's high valued water and natural resources, the 2008 Legislature directed the MPCA to develop MIDS.

> Minn. Stat. § 115.03, subd. 5c reads:
>
> "The agency shall develop performance standards, design standards, or other tools to enable and promote the implementation of low impact development and other storm water management techniques. For the purposes of this section, "low impact development" means an approach to storm water management that mimics a site's natural hydrology as the landscape is developed. Using the low impact development approach, storm water is managed on site and the rate and volume of predevelopment storm water reaching receiving waters is unchanged. The calculation of predevelopment hydrology is based on native soil and vegetation".

Upon passage of the legislation, a stakeholder group was created to guide the MPCA in the development of MIDS. This group met monthly for three years and was instrumental in creating the MIDS work products.

Performance goals(s)

A performance goal specifies what level of stormwater treatment must be achieved. The MIDS performance goals were developed to satisfy the legislation by determining how much precipitation must be retained on a particular site. It is expressed as a volume of water calculated by taking a depth of rainfall that falls on an impervious surface.

Minnesota's new MIDS performance goal

Performance Goal for New Development:

New, nonlinear developments that create more than one acres of new impervious surface on sites without restrictions, stormwater runoff volumes will be controlled and the post-construction runoff volume shall be retained on site for 1.1 inches of runoff from impervious surfaces statewide.

Performance Goal for Redevelopment:

Nonlinear redevelopment projects on site without restrictions that create one or more acres of new and/or fully reconstructed impervious surfaces shall capture and retain on site 1.1 inches of runoff from the new and/or fully reconstructed impervious surfaces.

Performance Goal for Linear:

Linear projects on sites without restrictions that create one acre or greater of new and/or fully reconstructed impervious surfaces, shall capture and retain the larger of the following:

- 0.55 inches of runoff from the new and fully reconstructed impervious surfaces
- 1.1 inches of runoff from the net increase in impervious area

Mill and overlay and other resurfacing activities are not considered fully reconstructed.

Why 1.1 inches? What is the significance?

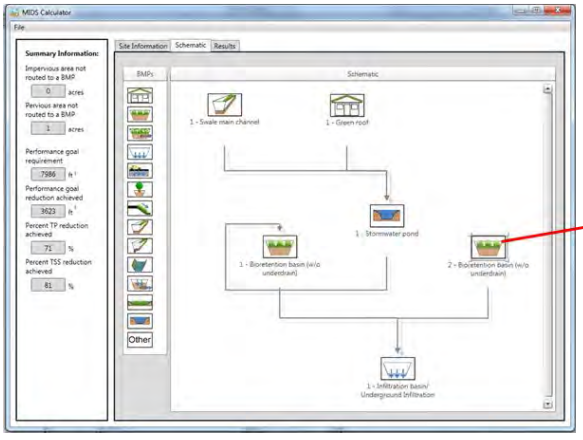
In studying rainfall data for Minnesota, 1.1 inches represents approximately 90 percent of all rain events in Minnesota. Rainfall events between 0.5 and 1.5 inches are responsible for about 75 percent of runoff pollutants. This is sometimes referred to as the "first flush" of pollutants. Therefore, by more carefully managing rainfall events of this size using LID approaches, we can prevent or minimize stormwater volume and pollution during many of the runoff events in Minnesota.

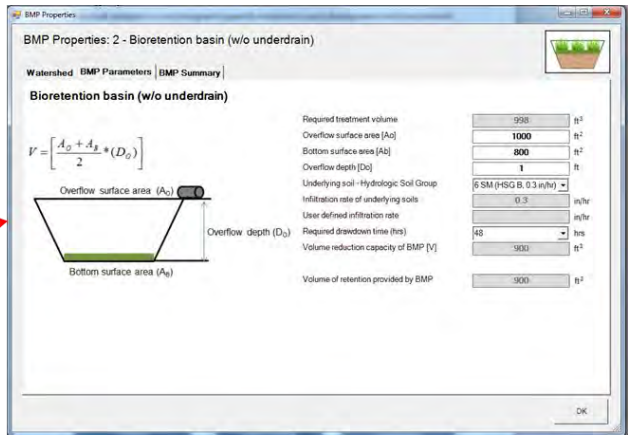
Flexible treatment option – not all sites can retain 1.1 inches

While reducing the volume of runoff leaving a developed site is the only way to mimic native hydrology, there are situations where it is simply not feasible. Infiltration is the most common practice to reduce runoff volumes, but soil conditions may not always allow water to soak into the ground. Much of Minnesota has tight clay soils, shallow bedrock, or karst topography that are not conducive to infiltration as a stormwater management approach. Additionally, some sites may have contamination, existing building or utility conflicts, or other site constraints such as zoning requirements that create difficulties in providing volume reduction. In order to accommodate alternative forms of water quality treatment on sites with restrictions, a Flexible Treatment Options Sequence and accompanying Design Guidance Flow-Chart was developed. Project proposers are taken through a step by step approach to document site restrictions and how they have attempted to meet the full 1.1 inches performance goal. If the 1.1 inch performance goal is shown to be infeasible, a 0.55 inch performance goal is explored, followed by a 60 percent annual Total Phosphorus removal goal, and then a final option to meet the 1.1 inches volume reduction goal at an off-site location.

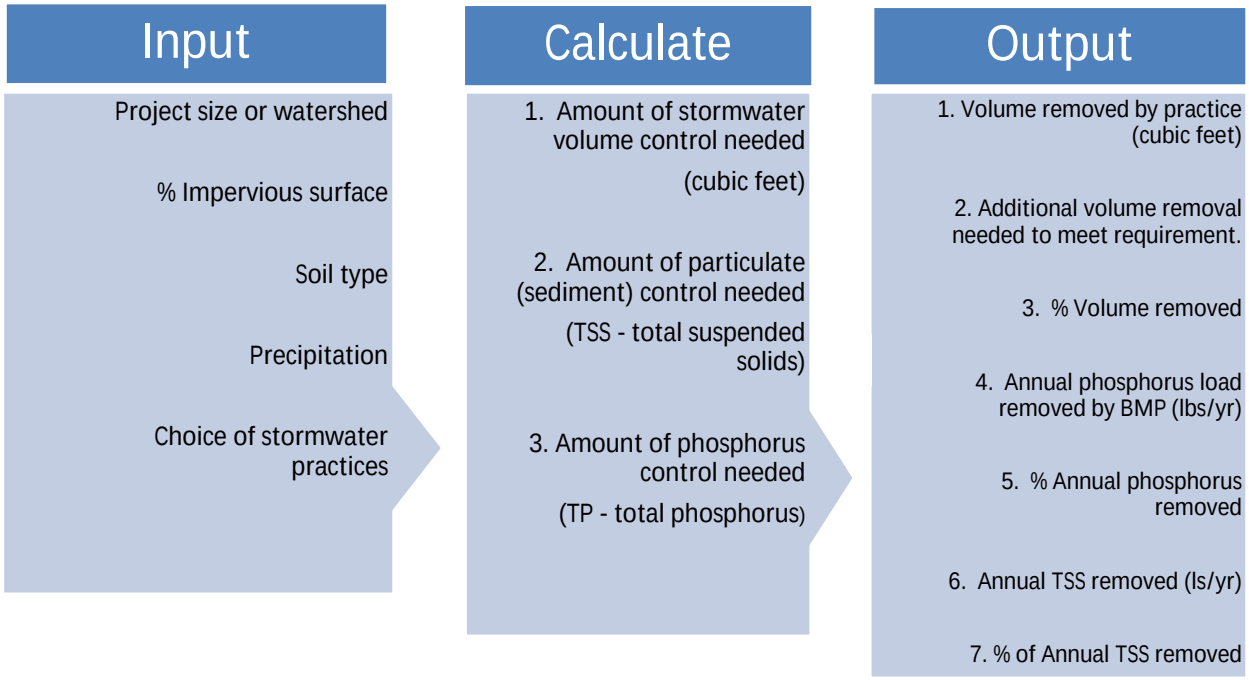
Design specifications and a credit calculator

The credit calculator is a tool designed to quantify reductions in post-development runoff and pollutant loading using a variety of LID practices. This graphic user interactive tool allows individuals to enter a project's site conditions and determine the amount of stormwater volume retention needed and the pollution loading (sediment and phosphorus). The calculator then provides a method to enter their stormwater practices of choice and determine (calculate) the amount of stormwater volume and pollution reduction (credit) they can achieve. Currently, the credit calculator includes LID practices for green roofs, bioretention basins, infiltration basins, permeable pavement, infiltration trench/tree box, swales, filter strips and sand filters. Other practices will be added in the future. The calculator includes convenient links to specific design specifications for LID practices that are found within the **Minnesota Stormwater Manual**.





How does the calculator work?



The credit calculator and design specifications will be located within the **Minnesota Stormwater Manual**. [See Resource Links below]

Model ordinances for communities that support clean water goals

A Community Assistance Package (CAP) is being developed to provide ordinances and tools that help integrate LID principles, including the MIDS performance goals and calculator, into a package that can be used by local units of government. These tools can be used by communities to help them achieve MIDS performance goals for stormwater volume. The CAP will include instructions about how to use the checklists, and various training materials and approaches used during implementation in several test or pilot communities.

Resources

MIDS webpage: http://www.pca.state.mn.us/veiza8e.

Minnesota Stormwater Manual (which includes MIDS work products): http://stormwater.pca.state.mn.us/index.php/Main_Page.

MIDS DESIGN SEQUENCE FLOW CHART

version 6.18.13

Conduct Site Review:
- Aerial Photos and Topographic Maps
- County Soil Surveys and other Soil Information as Available
- County Geologic Atlas
- Local Groundwater Levels
- DWSMA and Wellhead Protection Maps
- FEMA and Local Floodplain Maps
- Soil Borings and Site Survey
- MPCA Listing of Potentially Contaminated Sites
- Phase 1 and 2 Environmental Site Assessments
- TMDLs and Local Water Quality Standards
- Wetland Delineations, MNRAM Assessments, and Wetland Classifications
- Proposed Conditions, Conceptual/Preliminary Site Design
- Local zoning and land use requirements/ordinances, including stormwater rate control requirements
- Communication with Local Landowners, LGU, or Others Knowledgeable about the Site
- Site Inspection

Define Performance Goal

New and redevelopment projects: Retain on site a volume of 1.1" from impervious surfaces

Linear projects: Retain on site the larger of 1.1" from all new, or .55" from all new and fully reconstructed (D) impervious surfaces.

Does the project create one acre or more of new and/or fully reconstructed (D) impervious surfaces?
- No → MIDS performance goal does not apply
- Yes →

Is the project linear?
- Yes → Are there restraints due to lack of available ROW, off site drainage and/or rate control requirements? (F)
  - Yes → Is FTO Alternative No. 2 feasible?
    - Yes →
      - Select Flexible Treatment Option (FTO) Alternative No. 2
      - Provide documentation of offsite run on to project area
      - Provide documentation of lack of right-of-way.
    - No → Select FTO #3. Provide site survey, maps, regulations, and/or cost estimates documenting that meeting the original performance goal or FTO alternatives is not feasible in addition to other documentation as required by LGU.
  - No →
- No →

Are there zoning and land use requirements (density, parking, setbacks, etc.) that make the Performance Goal not feasible? (G)
- Yes → Is BMP relocation feasible?
  - No → Is FTO Alternative No. 1 feasible?
    - Yes →
      - Select Flexible Treatment Option (FTO) Alternative No. 1
      - Provide regulations, and/or cost estimates documenting infeasibility of meeting the original Performance Goal
    - No → Is FTO Alternative No. 2 feasible?
      - Yes →
        - Select Flexible Treatment Option (FTO) Alternative No. 2
        - Provide regulations, and/or cost estimates documenting infeasibility of meeting the original Performance Goal.
      - No → Select FTO #3. Provide site survey, maps, regulations, and/or cost estimates documenting that meeting the original performance goal or FTO alternatives is not feasible in addition to other documentation as required by LGU.
  - Yes →
- No →

Is the site located in a DWSMA, wellhead protection area, or within 200 feet of a drinking well?
- Yes → Can a local unit of government provide a higher level of engineering review to ensure a functioning system that prevents adverse impacts to groundwater?
  - No →
    - Select Flexible Treatment Option (FTO) Alternative No. 2
    - No infiltration practices allowed
    - Explore non-infiltration volume reduction practices
    - Provide DWSMA or well location map
  - Yes →
- No →

Are there existing or proposed structures or infrastructure (e.g., rate control BMPs, utilities, buildings, roadway, easements) that make the Performance Goal not feasible? (G)
- Yes → Is BMP relocation feasable?
  - No → Is FTO Alternative No. 1 feasible?
    - Yes →
      - Select Flexible Treatment Option (FTO) Alternative No. 1
      - Provide regulations, and/or cost estimates documenting infeasibility of meeting the original Performance Goal
    - No → Is FTO Alternative No. 2 feasible?
      - Yes →
        - Select Flexible Treatment Option (FTO) Alternative No. 2
        - Provide regulations, and/or cost estimates documenting infeasibility of meeting the original Performance Goal
      - No → Select FTO #3. Provide site survey, maps, regulations, and/or cost estimates documenting that meeting the original performance goal or FTO alternatives is not feasible in addition to other documentation as required by LGU.
  - Yes →
- No →

Are active karst areas within 1000 feet up-gradiant or 100 feet downgradiant of the BMP location?
- Yes → Can a local unit of government provide a higher level of engineering review to ensure a functioning system that prevents adverse impacts to groundwater?
  - No → Is BMP relocation onsite to a location without karst feasible?
    - No → Is FTO Alternative No. 2 feasible?
      - NO →
        - Select FTO Alternative No. 2
        - No infiltration practices allowed
        - Explore non-infiltration volume reduction practices
        - Provide soil borings or report from a professional geologist or geotechnical engineer.
      - YES → Select FTO #3. Provide site survey, maps, regulations, and/or cost estimates documenting that meeting the original performance goal or FTO alternatives is not feasible in addition to other documentation as required by LGU.
  - YES →
- No →

Is shallow groundwater or shallow bedrock present on site?
- Yes → Conduct detailed site investigation (i.e., borings, excavations, consultation with a professional geologist).
  - → Is there >3 feet of soil depth (> 10 feet is preferred) from bottom of BMP to bedrock and groundwater?
    - No → Is BMP relocation onsite to avoid shallow groundwater and bedrock feasible?
      - No → Can BMP be raised?
        - Yes → Raise BMP enough to ensure 3 feet (preferably 10 feet) of soil between bottom of BMP and top of bedrock and groundwater.
        - No → Is FTO Alternative No. 2 feasible?
          - NO → Select FTO #3. Provide site survey, maps, regulations, and/or cost estimates documenting that meeting the original performance goal or FTO alternatives is not feasible in addition to other documentation as required by LGU.
          - YES →
            - Select Flexible Treatment Option (FTO) Alternative No. 2
            - No infiltration practices allowed
            - Explore non-infiltration volume reduction practices
            - Provide soil borings or report from a professional geologist or geotechnical engineer.
      - YES →
    - YES →
  - YES →
- No →

Is there presence of contaminated soils and/ or groundwater, or hotspot runoff? (H)
- Yes → Can hotspot or contamination be isolated or remediated to mitigate risk of increased contamination?
  - No →
    - Select Flexible Treatment Option (FTO) Alternative No. 2
    - No infiltration practices allowed
    - Explore non-infiltration volume reduction practices
    - Provide Phase I or II ESAs, or other documentation of potential contamination or hotspot runoff
    - Provide documentation of extent of contamination and remediation alternatives considered
  - Yes →
- No →

Are there very low infiltrating soils (<0.2 inches per hour)?
- Yes → Is BMP relocation onsite to a higher-infiltrating location feasible?
  - No → Can BMP be sized to drain dry within 48 hours (24 hours in locations that are tributary to trout streams)?
    - No → Provide soil boring or infiltration test results documenting low-infiltrating soils. → Is FTO Alternative No. 1 (lower volume control standard) feasible, allowing the BMP to drain within 48 hours (24 hours in locations that are tributary to trout streams)?
      - No →
        - Select FTO Alternative No. 2
        - No infiltration practices allowed
        - Explore non-infiltration volume reduction practices
        - Provide soil boring or infiltration test results documenting low infiltration rates.
      - Yes →
        - Select FTO Alternative No. 1
        - Provide soil boring or infiltration test results documenting high-infiltrating soils.
    - Yes →
  - Yes →
- No →

Are there very high infiltrating soils (>8 inches per hour)? (E)
- Yes → Is BMP relocation onsite to a lower-infiltrating location feasible?
  - No → Can subgrade be modified to slow the rate of infiltration to less than 8 inches per hour?
    - No →
      - Select FTO Alternative No. 2
      - No infiltration practices allowed
      - Explore non-infiltration volume reduction practices
      - Provide soil boring or infiltration test results documenting high-infiltrating soils.
    - Yes →
  - Yes →
- No →

Are there adverse surface water hydrologic impacts from infiltration practices (e.g., impacting perched wetland)?
- Yes → Can the BMP be relocated onsite to avoid adverse hydrologic impacts?
  - No → Would BMPs accommodating FTO Alternative #1 avoid adverse hydrologic impacts?
    - No →
      - Select FTO Alternative No. 2
      - Maximize infiltration BMPs to treat up to the 0.55 inch goal, if possible.
      - Explore non-infiltration volume reduction practices
      - Provide report documenting potential hydrologic impacts from infiltration on the site, prepared by registered engineer, hydrologist, or wetlands specialist.
    - Yes →
      - Select FTO Alternative No. 1
      - Maximize infiltration BMPs to treat more than 0.55 inch goal, if possible.
      - Provide report documenting potential hydrologic impacts from infiltration on the site, prepared by registered engineer, hydrologist, or wetlands specialist.
  - Yes →
- No →

Complete Design Using Performance Goal
(As modified by FTO Alternatives, if applicable)

MIDS Project Flexible Treatment Options (FTO)

The Flexible Treatment Options (FTO) alternatives presented here should be employed when the Performance Goal is not feasible and/or allowed. The designer should document the reasons why the Performance Goal and rejected FTO Alternatives are not feasible and/ or allowed.

FTO 1
Applicant attempts to comply with the following conditions:
1.a. Achieve at least 0.55" volume reduction goal, and
1.b. *Remove 75%* of the annual TP load, and
1.c. Options considered and presented shall examine the merits of relocating project elements to address, varying soil conditions and other constraints across the site

FTO #2
Applicant attempts to comply with the following conditions:
2.a. Achieve volume reduction to the maximum extent practicable (as determined by the Local Authority), and
2.b. *Remove 60%* of the annual TP load, and
2.c. Options considered and presented shall examine the merits of relocating project elements to address, varying soil conditions and other constraints across the site.

FTO #3
Off-site mitigation (including banking or cash or treatment on another project, as determined by the local authority) equivalent to the volume reduction performance goal can be used in areas selected in the following order of preference:

1. Locations that yield benefits to the same receiving water that receives runoff from the original construction activity
2) Locations within the same Department of Natural Resource (DNR) catchment area as the original construction activity
3) Locations in the next adjacent DNR catchment area up-stream
4) Locations anywhere within the local authorities jurisdiction

Notes:
A. Volume reduction techniques considered shall include infiltration, rainwater harvesting & reuse, bioretention, permeable pavement, tree boxes, grass swales and/or additional techniques included in the MIDS calculator or the Minnesota Stormwater Manual.
B. Applicant shall document the flexible treatment options decision sequence, following the order of alternatives presented here.
C. For Alternative #2, the applicant is encouraged to use BMPs that reduce volume. Secondary preference is to employ filtration techniques, followed by rate control BMPs.
D. Fully reconstructed impervious surfaces: Areas where impervious surfaces have been removed down to the underlying soils. Activities such as structure renovation, mill and overlay projects and other pavement rehabilitation projects that do not alter the underlying soil material beneath the structure, pavement or activity are not considered full reconstruction. In addition, other maintenance activities such as catch basin and pipe repair/ replacement, lighting, and pedestrian ramp improvements shall not be considered fully reconstructed impervious surfaces. Reusing an existing building foundation and re-roofing of an existing building are not considered fully reconstructed.
E. Soils that infiltrate too quickly may not provide sufficient pollutant removal before the infiltrated runoff enters groundwater.
F. A reasonable attempt must be made to obtain right-of-way during the project planning process

G. Other, this is not an exhaustive list

H. Hotspots includes any portion of a facility where infiltration is prohibited under an NPDES/SDS industrial stormwater permit issued by the MPCA