

**STORMWATER MANAGENEMT  
DESIGN STANDARDS**

Version 1.0  
2014

### **Goals and Purpose:**

The general purpose of this design guide is to establish regulatory requirements for land disturbing and construction activities to help safeguard persons, protect property, and prevent damage to the environment in the City of Glencoe. 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 of Glencoe.
- 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.

### **Compatibility with other Regulations:**

The standards set forth in this document are not intended to modify or repeal any other ordinance, rule, regulation, or other provision of law. The standards of this document are in addition to the requirements of any other ordinance, rule, regulation, or other provision of law, and where any provision of these standards 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.

#### **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: ([http://stormwater.pca.state.mn.us/index.php/Main\\_Page](http://stormwater.pca.state.mn.us/index.php/Main_Page)).

"Construction Activity" means 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.

"City" means the City of Glencoe

"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.

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

"Green Infrastructure" is 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.

"Karst" (active) is 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.

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“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.

“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 State Disposal System Program (NPDES/SDS).

“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 Glencoe.

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

“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 Control Measure” means a measure that prevents eroded sediment from leaving the site.

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

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

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

“Stormwater Pollution Prevention Plan” or “SWPPP” means a comprehensive plan developed to manage and 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.

### **Receiving Waters:**

Buffalo Creek (River Segment 07010205-501)

Requires TMDL for: Aquatic Macroinvertebrate Bioassessments; Fecal Coliform; Fishes Bioassessments; Oxygen, Dissolved.

These impairments affect Aquatic Life, Aquatic Recreation.

Wetlands: Governed by Wetland Conservation Act (WCA)

### **Special Waters:**

DNR Designated Scientific and Natural Areas (Minn R 7050.0180, subd. 4): None

State Designated Wild River Segments (Minn R 7050.0180, subd. 5): None

Federal or State Designated Scenic or Recreational River Segments (Minn R 7050.0180, subd. 6a): None

Calcareous Fens (Minn R 7050.0180, subd. 6b): None

### **Receiving Waters with Prohibited Discharges, Restricted Discharges:**

Receiving Waters with Prohibited or Restricted Discharges (Minn R 7050.0180, subd. 3, 4, 5 and 6): None

Trout Waters: None

Impacts to Endangered or Threatened Species or Critical Habitats: None

Adversely Affected Historical Properties: None.

Drinking Source Water: The City of Glencoe provides drinking water to its residents from groundwater sources. These include three (3) wells ranging from 575 to 800 feet deep, pumped from the Mt. Simon-Hinckley aquifer. The Minnesota Department of Health has determined that the source(s) used to supply the City of Glencoe with drinking water are not particularly susceptible to contamination. To help protect the integrity of the City's drinking water source infiltration will be restricted within 200 feet of drinking water well, meaning a higher level of design and review will be required in these areas prior to allowing infiltration practices to occur.

### **Related Review and Regulations:**

Environmental Review Requirements (Minn R 4410 Environmental Review): Environmental reviews (EAW & EIS) shall be completed as required by Minnesota Administrative Rule, Chapter 4410, and Environmental Review

Glencoe Ordinance Requirements:

<http://www.glencoe.mn.org/city-government/city-ordinance-zoning-map/>

MPCA NPDES Construction Permit:

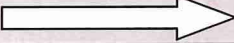

<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html>

Buffalo Creek Watershed District: <http://www.bcwatershed.org/>

Crow River Organization of Water: <http://www.crowriver.org/>

**Design Requirements:**

*Summary of Requirements*

Disturbed Area 	1 acre or more
Requirement 	
Grading Permit	<b>X</b>
Stormwater Pollution Prevention Plan (SWPPP)	<b>X</b>
Construction Site Stormwater Runoff Controls	<b>X</b>
Post-Construction Stormwater Management Requirements	<b>X</b>
NPDES Construction Permit	<b>X</b>

Notes: Disturbed area includes all land disturbance and construction activity, including land area that is part of a larger common plan of development or sale. Where deemed necessary by the City of Glencoe to safeguard persons, protect property, and prevent degradation to the environment in the City of Glencoe, requirements may be enforced for disturbed areas with less than above identified amount.

*Better Site Design*

The City encourages the use of better site designs as identified in the current version of the Minnesota Stormwater Manual ([http://stormwater.pca.state.mn.us/index.php/Main\\_Page](http://stormwater.pca.state.mn.us/index.php/Main_Page)). 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.

*Stormwater Pollution Prevention Plan (SWPPP)*

A SWPPP shall be submitted with the Grading 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 Grading 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.

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### *Construction Site Stormwater Runoff Control Requirements.*

Site plans and project documentation must incorporate erosion and sediment controls and waste controls as required and identified in the NPDES Construction Permit, including those identified in the NPDES Construction Permit for discharges to special and impaired waters, when applicable.

(<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html>)

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 probability 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 Glencoe 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.



*Post-Construction Stormwater Management Requirements.*

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 ([http://stormwater.pca.state.mn.us/index.php/Main\\_Page](http://stormwater.pca.state.mn.us/index.php/Main_Page)) 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. 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 storm events.
- C. Storm Sewer Conveyance System. Local storm sewer systems shall be designed for the 10-year storm event. 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.
- D. Flood Control.
1. The low floor elevation shall be set to the higher of the following:
    - a. Where an effective Base Flood Elevation (BFE) has been established the low floor elevation adjacent to a surface water body shall be established in accordance with the City's Floodplain Ordinance.
    - b. The low floor elevation shall be two (2) feet or more above the 100-year/24-hour event as determined by a technical evaluation by a qualified engineer or hydrologist.
  2. An emergency overflow shall be incorporated into the site design at or above the BFE or modeled 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.
  3. Existing, natural or man-made emergency overflows shall be analyzed as part of the design process.



4. Where natural overflow do not exist, the designer shall consider the possibility of long duration and extreme events. High water elevations shall be determined with analysis based on runoff volume resulting from a 100-year/10-day snowmelt (7.2 inches and saturated or frozen soil conditions [CN=100]) and/or the runoff resulting from a 100-year back-to-back rain event.
- E. Water Quality Treatment and Volume Control Requirements. Post-construction stormwater management must provide water quality treatment and volume control. Compliance with the water quality and volume control requirements can 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:

[http://stormwater.pca.state.mn.us/index.php/Overview\\_of\\_Minimal\\_Impact\\_Design\\_Standards\\_\(MIDS\)](http://stormwater.pca.state.mn.us/index.php/Overview_of_Minimal_Impact_Design_Standards_(MIDS))

- 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:
  - i. 0.55-inches of runoff from the new and fully reconstructed impervious surfaces on the site.
  - ii. 1.1-inches of runoff from the net increase impervious area on the site.
- d. Flexible Treatment Options for Sites with Restrictions. Every attempt to comply with the performance standards identified above shall be made. If full compliance with the performance standards 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.
  - i. **Factors to be considered in determining flexible treatment options.**
    1. Karst geology
    2. Shallow bed rock

3. High ground water
4. Hotspots or contaminated soils
5. Drinking Water Source Management Areas or within 200 feet of drinking water well
6. Zoning, setbacks or other land use requirements
7. Excessive costs
8. Poor soils (infiltration rates which are too low or too high, problematic urban soils)

ii. **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 on the MN Stormwater Website.

([http://stormwater.pca.state.mn.us/index.php/File:Final\\_MIDS\\_Flow\\_chart.pdf](http://stormwater.pca.state.mn.us/index.php/File:Final_MIDS_Flow_chart.pdf))

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 documented. When all of the conditions are fulfilled within an option alternative, the sequence is complete.

1. **Flexible Treatment Option 1 (FTO #1).** Attempt to comply with the following conditions:
  - a. Achieve at least 0.55 inch volume reduction goal, and
  - b. Remove 75 percent of the annual total phosphorus load, and
  - c. Options considered and presented shall examine the merits of relocating project elements to address varying soil conditions and other constraints across the site
2. **Flexible Treatment Option 2 (FTO #1).** Attempt to comply with the following conditions:
  - a. Achieve volume reduction to the maximum extent practicable (as determined by the City), and
  - b. Remove 60 percent of the annual total phosphorus load, and
  - c. Options considered and presented shall examine the merits of relocating project elements to address varying soil conditions and other constraints across the site.
3. **Flexible Treatment Option 3 (FTO#3)** Off-site 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. The owner and/or operator must provide appropriate

documentation to the City as support and the proposed mitigation must meet the following criteria:

- a. Mitigation project areas should be selected in the following order of preference. Proposed mitigation locations must be reviewed and approved by the City:
    - i. Locations that yield benefits to the same receiving water that receives runoff from the original construction activity
    - ii. Locations within the same Department of Natural Resource (DNR) catchment area as the original construction activity
    - iii. Locations in the next adjacent DNR catchment area upstream
    - iv. Locations within the City
  - b. 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.
  - c. Routine maintenance of structural stormwater BMPs cannot be used to meet mitigation requirements.
  - d. Mitigation projects must be completed within 24 months after the start of the original construction activity.
  - e. 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.
- iii. Volume reduction techniques considered shall include infiltration, reuse & rainwater harvesting, and canopy interception & evapotranspiration and/or additional techniques included in the MIDS calculator and the MN Stormwater Manual.
  - iv. Higher priority shall be given to BMPs that include volume reduction, secondary preference is to employ filtration techniques, followed by rate control.

**2. Option #2: Annual Average Standard:**

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

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

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- i. Stormwater discharge volume, unless precluded by the stormwater management limitations and exceptions below.
  - ii. Stormwater discharge of TSS
  - iii. Stormwater discharge of TP
- b. Redevelopment Areas. A net reduction from pre-development conditions on an annual average basis of:
  - i. Stormwater discharge volume, unless precluded by the stormwater management limitations below.
  - ii. Stormwater discharge of TSS
  - iii. Stormwater discharge of TP
- c. Stormwater Management Limitations and Exceptions:
  - i. Limitations
    1. The use of infiltration techniques are prohibited in the following areas:
      - a. Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit.
      - b. Where vehicle fueling and maintenance occur.
      - c. 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.
      - d. Where high levels of contaminants in soil or groundwater will be mobilized by infiltrating stormwater.
    2. 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.
      - a. With predominately Hydrologic Soil Group D (clay) soils.
      - b. Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features.
      - c. Within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13.
      - d. Where soil infiltration rates are more than 8.3 inches per hour.
      - e. Within 200 linear feet of a drinking water well.
    3. For linear projects where lack of right-of-way precludes the installation of volume control practices the City may allow exceptions for stormwater volume control as described below. A reasonable attempt

must be made, and documented, to obtain right-of-way during the project planning process.

ii. Exceptions for Stormwater Volume Control:

For most sites meeting the volume control requirement will require the use of infiltration BMPs. The City recognizes that there are a number physical site constraints that could limit the effectiveness of an infiltration system or site conditions which would prohibit stormwater infiltration. A lesser volume control standard may be applied, at the discretion of the City, under the circumstances identified below. The full treatment of TSS and TP must still be met.

1. The owner and/or operator of a construction activity is precluded from infiltrating stormwater due to limitations identified above.
2. The owner and/or operator of the construction activity implements volume reduction techniques, other than infiltration, on the site that reduce stormwater discharge volume but may not meet the full volume control requirement.

d. Mitigation Provisions. If the owner and/or operator of a construction activity believe that the requirements for TP and/or TSS cannot be met on the site of the original construction activity, the stormwater discharges that do not meet the TP and/or TSS standards may be mitigated at an off-site location at the City's discretion. The owner and/or operator must provide appropriate documentation to the City as support and the proposed mitigation must meet the following criteria:

- i. Mitigation project areas should be selected in the following order of preference. Proposed mitigation locations must be reviewed and approved by the City:
  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
- ii. 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.
- iii. Routine maintenance of structural stormwater BMPs cannot be used to meet mitigation requirements.
- iv. Mitigation projects must be completed within 24 months after the start of the original construction activity.
- v. 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.

F. Design Computation Criteria.

1. Rain fall amounts and distributions for storm water management and conveyance system analysis shall utilize the SCHAUER\_ Station (Site ID: 80-0280), located near Glencoe, MN, NOAA Atlas 14 data and antecedent moisture conditions 2 (AMC-2).
2. 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 and require 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 events scenarios as part of the initial site evaluation and design process.
3. Outlet energy dissipation shall be designed in accordance with MnDOT Design Criteria.
4. Permanent stormwater facilities shall provide adequate maintenance access. Vehicle lanes of not less than 10-feet wide and 15 percent slope shall be provided to access the facilities.
5. Infiltration Practices:
  - 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.
6. Stormwater Wet Ponds:
  - 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 oils and 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.

G. Long Term Maintenance of Stormwater BMPs. The type and interval of maintenance activities for 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. An example maintenance agreement can be found in Appendix A.



- 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 Stormwater Facilities

- a. **Acceptance of publicly owned stormwater facility.** Prior to final acceptance of the facility the following must be completed:
- i. Submittal of as-built drawing.
  - ii. Documentation certifying the BMP has been constructed in accordance with design specifications.
  - iii. Final inspection with City staff or City representative.

**Appendix A**

MIDS Fact Sheet

MIDS Design Sequence Flowchart

Example Maintenance Agreement



## 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.

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.



Tree trenches at Maplewood Mall

### 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?

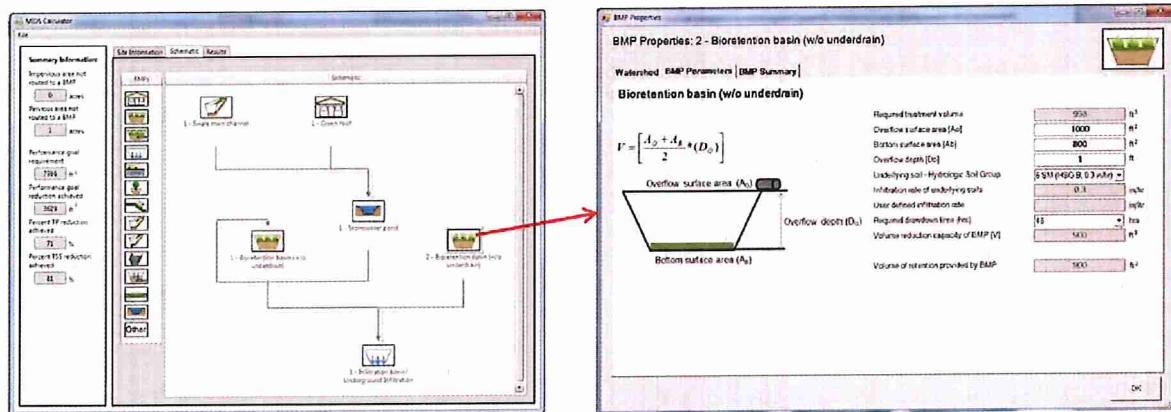
In studying rainfall data for Minnesota, 1.1 inches represents approximately 90 percent of all rain events in Minnesota. Rainfall events between 0.5 and 1.5 inches are responsible for about 75 percent of runoff pollutants. This is sometimes referred to as the “first flush” of pollutants. Therefore, by 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.

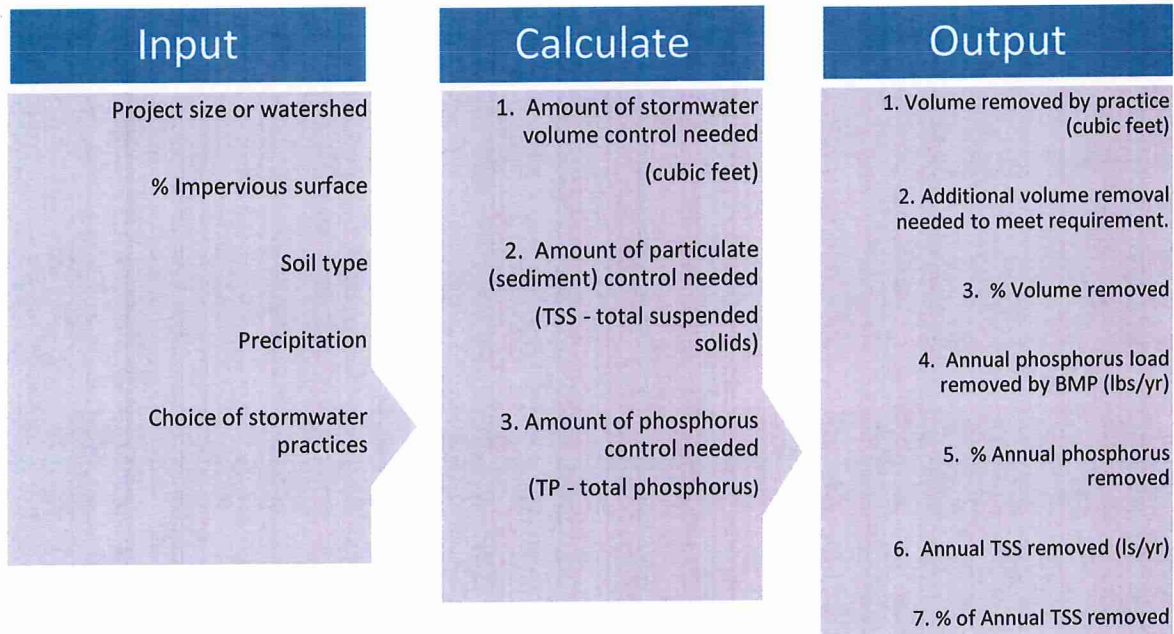
## Design specifications and a credit calculator

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.

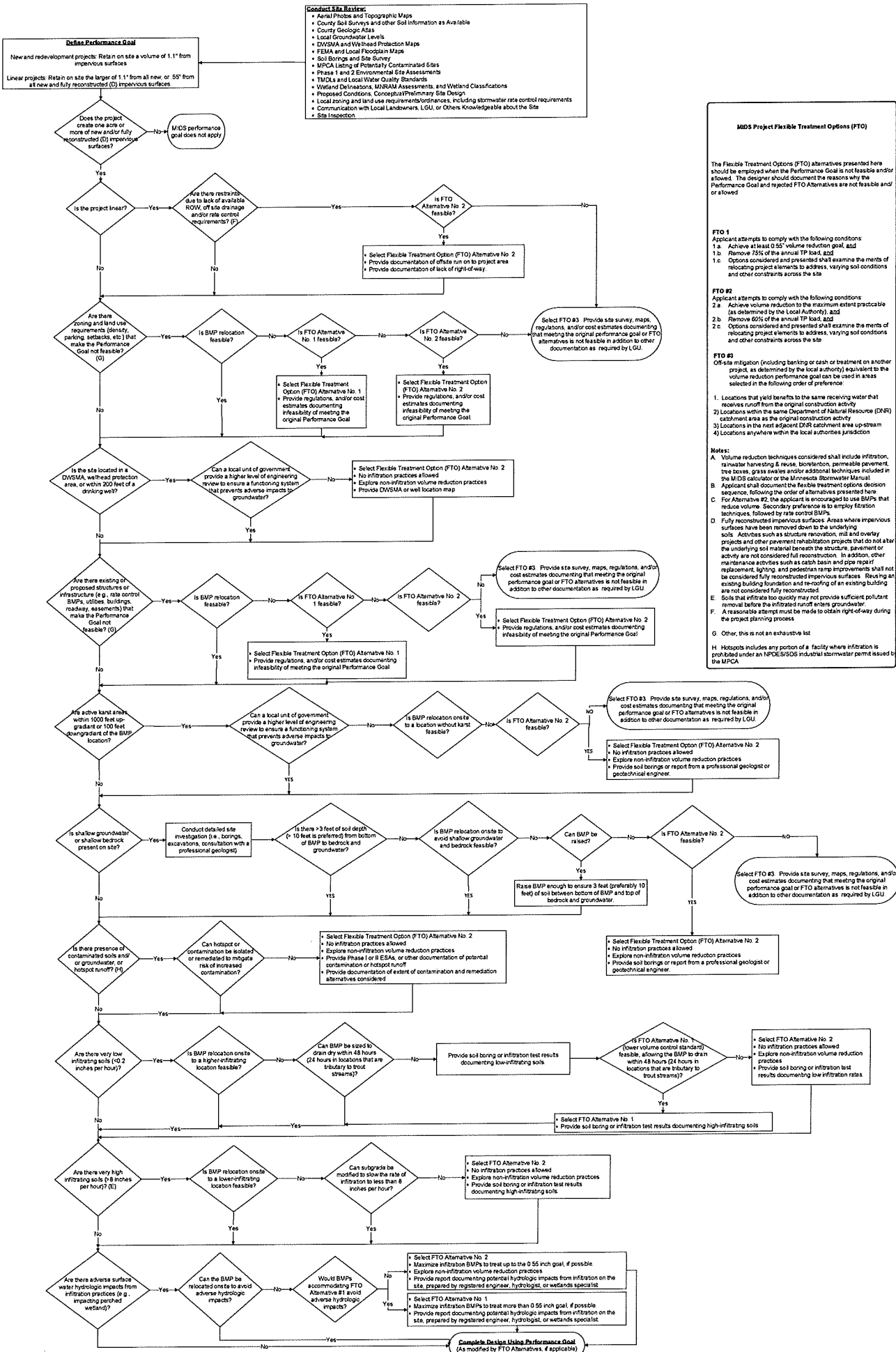
## Resources

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](http://stormwater.pca.state.mn.us/index.php/Main_Page).



MIDS DESIGN SEQUENCE FLOW CHART



EXAMPLE MAINTENANCE AGREEMENT

## Private Stormwater BMP Maintenance Agreement

I. THIS AGREEMENT, made this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between the City of \_\_\_\_\_, MN (hereinafter referred at as the "City") and, [corporation, individual] (hereinafter referred to as "\_\_\_\_\_") with reference to the following facts and circumstances:

A. (\*) \_\_\_\_\_ is the fee owner of certain real property situated in the City of \_\_\_\_\_, legally described as follows:  
(Legal) \_\_\_\_\_  
(\*)CAPS \_\_\_\_\_ ( )  
(hereinafter referred at as the "Subject Property")

B. As a condition of its approval of the development for the Subject Property, the City has required that the parties hereto enter into an agreement, which makes provision for the maintenance of the Stormwater Management Best Management Practice(s) (BMPs) located within the boundaries of the Subject Property as the same is described and depicted in those certain construction plans drawn by \_\_\_\_\_, approved by the City and constructed by \_\_\_\_\_. The Stormwater Management BMPs is(are) located in the platted drainage and utility easement in \_\_\_\_\_.

C. The parties hereto desire to set forth their agreement with respect to the maintenance of the Stormwater Management BMPs and the costs of such maintenance.

II. NOW THEREFORE, in consideration of the foregoing facts and circumstances, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto hereby agree as follows:

A. For the purpose of this Agreement, maintenance of the Stormwater Management BMPs shall mean the regular inspection, routine maintenance, and major maintenance described within the maintenance plan and as required to maintain the performance standard and function of the Stormwater Management BMPs identified within the project Stormwater Pollution Prevention Plan (SWPPP) and construction documents.

B. (\*) \_\_\_\_\_ shall be solely responsible for the maintenance of the Stormwater Management BMPs, and shall bear all costs of such maintenance.

C. (\*) \_\_\_\_\_ shall complete an annual report, certified by a qualified individual. The report shall include written documentation of the inspection schedule, times of inspection, remedial actions taken to repair, modify, or reconstruct the BMPs,

certification that the BMP is functioning in accordance with the approved plans, and notification of any planned change in responsibility for the BMPs. (\*) shall retain completed annual reports for a minimum of 15 years and shall provided the City with the written documentation upon request.

- D. (\*) shall grant the City or its agents or contractor the right of entry at reasonable times and in a reasonable manner for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining, or repairing the BMPs.
- E. (\*) shall grant to the City the necessary easements and right-of-way and maintain perpetual access from public right-of-ways to the BMPs for the City or its agent or contractor.
- F. If, upon inspection, the City finds that (\*) has failed to properly maintain the BMPs, the City may order the work to be performed within \_\_\_\_\_ days. In the vent the work is not performed or a schedule for undertaking the work to be performed has not been provided within the specified time, (\*) agrees to allow the City to enter the property and take whatever steps it deems necessary to maintain the BMPs. The cost reasonably incurred by the City for performing such maintenance shall be reimbursed to the City within 30 days by the party responsible for such maintenance and, if the responsible party does not timely reimburse the City, then the City may recover its costs by levying a special assessment.
- G. (\*) , as present owner of the Subject Property, for itself and respective successors and assigns, hereby waives any statutory right which it may have to contest any such assessment by the City of its maintenance costs on the basis of the benefit to portions of the Subject property.
- H. The City is under no obligation to maintain or repair said BMPs, and in no event shall this Agreement be construed to impose any such obligation on the City.
- I. (\*) heirs, administrators, executors, assigns and any other successor interest shall indemnify and hold harmless the City and its officers, agents and employees for any and all damages, accidents, casualties, occurrences, claims or attorney's fees which might arise or be asserted, in whole or in art, against the City from the construction, presence, existence, or maintenance of the BMPs subject to the Agreement. In the event a claim is asserted against the City, its officers, agents or employees, the City shall notify (\*) and (\*) shall defend at (\*) expense any suit based on such claim. If any judgment or claim against the City, its officers, agents or employees, shall be allowed, (\*) shall pay all costs and expenses in connection therewith. The City will not indemnify, defend or hold harmless in any fashion (\*) from any claims arising from any failure,

regardless of any language in any attachment or other document that the (\*) \_\_\_\_\_  
\_\_\_\_\_ may provide.

J. (\*) \_\_\_\_\_ shall not transfer, assign or modify its  
responsibilities with respect to this Agreement without the City's written prior consent. Nothing  
herein shall be construed to prohibit a transfer by (\*) \_\_\_\_\_.

K. No waiver of any provision of this agreement shall affect the right of any party thereafter to  
enforce such provisions or to exercise any right or remedy available.

L. (\*) \_\_\_\_\_ shall provide as attachment to this agreement  
the required Maintenance Plan, as-built drawings, and certification that the BMP has been  
constructed properly as required by the City of Glencoe Construction Site and Post-Construction  
Stormwater Management Ordinance and The City's Stormwater Management Design Guide.

M. The terms and conditions of the Agreement shall be binding upon, and shall insure to the  
benefit of, the parties hereto and their respective successors and assigns.

III. IN WITNESS WHEREOF, the parties hereto have caused this document to be executed as of the  
day and year first above written.

\_\_\_\_\_  
Title \_\_\_\_\_  
For the City of \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
[corporation, individual]

\_\_\_\_\_  
Date