



# **Stormwater Management Design Standards**

**City of South St. Paul**

**October 2018**

# Stormwater Management Design Standards

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## 1. DESIGN OVERVIEW

The City of South St. Paul's Stormwater Pollution Prevention Plan (SWPPP) identifies the goals and policies that define the City's stormwater management program, which are implemented via the City Stormwater Management Ordinance (Article IV) and these Stormwater Management Design Standards. South St. Paul's stormwater requirements were written to meet the City's goals to preserve, protect, and manage its water resources as well as to meet federal, state, and watershed stormwater regulations and to meet the following objectives:

- Minimize increases in stormwater runoff rates from any development to reduce flooding, siltation and erosion and in order to maintain the integrity of stream channels,
- Minimize increases in nonpoint source pollution caused by stormwater runoff from development which would otherwise degrade local water quality,
- Minimize the total annual volume of surface water runoff that flows from any specific site during and following development so as not to exceed the predevelopment hydrologic regime to the maximum extent practicable,
- Ensure that these management controls are properly maintained and pose no threat to public safety, and
- Implement stormwater management controls to help meet current and future total maximum daily load (TMDL) goals, to address the need to improve water quality, and to meet objectives in the Local Surface Water Management Plan.

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## 2. DEFINITIONS

For the purpose of this Design Manual, the following definitions describe the meaning of the terms used in this Design Manual:

*Applicant* means a property owner or agent of a property owner who has filed an application for a Stormwater Management Permit.

*Applicability* means any land disturbing activity requiring a City of South St. Paul's Stormwater Management Plan as defined in City Zone Code Article IV: Stormwater Management.

*Channel* means a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

*Erosion and Sediment Control Plan* means otherwise known as a stormwater pollution prevention plan (SWPPP) which is a set of plans prepared by or under the direction of a licensed professional engineer or certified contractor indicating the specific measures and sequencing to be used to control the sediment and erosion on a project site during and after construction.

*Impervious Area* means those surfaces that cannot effectively infiltrate rainfall (e.g., building rooftops, pavement, sidewalks, gravel, driveways, swimming pools, etc.).

*Land Disturbance Activity* means any activity that changes the volume or peak discharge rate of stormwater runoff from the land surface. This may include the grading, digging, cutting, scraping, or excavating of soil, placement of fill materials, paving, construction, substantial removal of vegetation, or any activity that bares soil or rock or involves the diversion or piping of any natural or fabricated watercourse.

*Maintenance Agreement* means document recorded against the property which provides for long-term maintenance of stormwater treatment practices.

*National Pollutant Discharge Elimination System (NPDES)* means the program for issuing, modifying, revoking, reissuing, terminating, monitoring, and enforcing permits under the Clean Water Act (Sections 301, 318, 402, and 405) and United States Code of Federal Regulations Title 33, Sections 1317, 1328, 1342, and 1345.

*New Development* means all construction activity that is not defined as redevelopment. Land

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that was previously developed, but now razed and vacant, will not be considered new development.

*Nonpoint Source Pollution* means pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

*Off-Site Facility* means a stormwater management measure located outside the subject property boundary described in the permit application for land development activity.

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

*Responsible Party* means the entity which will be responsible for ownership and maintenance of Stormwater Treatment Practices.

*Stop Work Order* means an order which requires that all construction activity on a site be stopped.

*Stormwater Management* means the use of structural or non-structural practices that are design to reduce stormwater runoff pollutant loads, discharge volumes, and/or peak discharge rates.

*Stormwater Management Plan* means a set of drawings or other documents submitted by a person as a prerequisite to obtaining a stormwater management approval, which contains all of the required information and specifications pertaining to Stormwater Management.

*Stormwater Reviews* means any site that the either increases impervious surface by greater than 1 acre or redevelops 1 acre or greater of impervious. The review will be completed to evaluate compliance with the City of South St. Paul's water quality and water quality requirements as specified in these standards. For sites either creating or redeveloping less than 1 acre of impervious the City will work with the applicant to determine if water quality practices can be incorporated into the site. Sites less than 1 acre will also not be allowed to negatively impact downstream properties (or water bodies).

*Stormwater Runoff* means flow on the surface of the ground, resulting from precipitation.

*Stormwater Treatment Practices (STPs)* means measures, either structural or nonstructural, that are determined to be the most effective and practical means of preventing or reducing

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point source or nonpoint-source pollution inputs to stormwater runoff and waterbodies.

*Water Quality Volume (WQ<sub>v</sub>)* means that runoff storage volume needed to treat the specified phosphorus loading as determined in the South St. Paul Stormwater Management Design Standards.

*Watercourse* means a permanent or intermittent stream or other body of water, either natural or fabricated, which gathers or carries surface water.

*Watershed* means the total drainage area contributing runoff to a single point.

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## 3. APPLICABILITY

An Erosion and Sediment Control (ESC) Plan and/or Stormwater Management Plan (SWMP) may be required, based on the criteria outlined below. These plans shall be consistent with NPDES permit requirements, and the filing or approval requirements of other regulatory bodies. When required, these plans shall be approved prior to the issuance of any permits.

### 3.1 Erosion and Sediment Control

Unless otherwise exempted by these Standards, Applicants are required to follow the Erosion and Sediment Control requirements of **Section 6** of these Standards and are encouraged to incorporate the Stormwater Management requirements of **Section 7** and **8**, for all proposed land disturbing activities within the City that meet any or all of the following:

1. Involves excavation or filling, or a combination of excavation and filling, in excess of 100 cubic yards of material; or
2. Is a land disturbing activity, regardless of size, that the City determines is likely to cause an adverse impact to an environmentally sensitive area or other property, or may violate any other erosion and sediment control standard set forth in this ordinance.

### 3.2 Stormwater Management

Unless otherwise exempted in these Standards, Applicants are required to develop a Stormwater Management Plan that meets the requirements of Sections 7 and 8 of these Standards, for all proposed land disturbing activities that meet any or all of the following:

1. Any land disturbing activity that may ultimately result in the addition of 1.0 acre or greater of impervious surfaces, including smaller individual sites that are part of a common plan of development that may be constructed at different times; or
2. Any land disturbance activity, regardless of size, that the City determines is likely to cause an adverse impact to an environmentally sensitive area or other property.

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## 4. SUBMITTAL REQUIREMENTS

### **Stormwater Management Plan Requirements**

A stormwater management plan shall be submitted with the permit application for a project equaling or exceeding the thresholds of **Section 3**. The stormwater management plan shall fully address the design and function of the project proposal and the effects of altering the landscape relative to the direction, rate of discharge, volume of discharge and timing of runoff.

No building permit will be approved unless it includes a Stormwater Management Plan detailing how runoff and associated water quality impacts resulting from the development will be controlled or managed. This plan must indicate whether stormwater will be managed on-site or off-site and, if on-site, the general location and type of practices.

The Stormwater Management Plan must be signed by a licensed professional engineer in the State of Minnesota, who will verify that the design of all stormwater management practices meet the submittal requirements outlined in the Submittal Checklist found in Appendix A. No building permit, grading permit, sediment control permit, or subdivision approval shall be issued until a satisfactory final Stormwater Management Plan, or a waiver thereof, shall have undergone a review and been approved by the City after determining that the plan waiver is consistent with the requirements of this manual.

Record drawings are required for all projects that impact wetlands and/or the floodplain, require water quality ponding, have significant grade changes, and/or have other unusual circumstances. Record drawings must be certified by a professional land surveyor or civil engineer. (Record drawings should not include temporary erosion control measures.)

### **Stormwater Management Conceptual Plan Requirements**

A stormwater management concept plan submittal is required. A concept plan identifies basic site information, locations of proposed development features, and preliminary locations and sizing of STPs. The City prefers to provide water quality improvement through the use of regional stormwater treatment systems versus site-by-site systems. If regional systems are not available, on-site treatment may be required. The concept submittal has a greater chance of identifying major obstacles and can facilitate alternative stormwater management arrangements in a timely fashion and at the onset of project planning. If a concept plan is submitted for review, it should include sufficient information (e.g., maps, basic hydrologic and water quality calculations etc.) to evaluate the environmental characteristics of the project site. This information should show the potential impacts of all proposed development of the site, both present and future, on the water resources, and show the effectiveness and acceptability of the measures proposed for managing stormwater generated at the project site. The intent of this

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conceptual planning process is to determine the type of stormwater management of stormwater runoff from future development, and to identify major issues prior to completing final plans. The concept plan is less time consuming and more efficient to evaluate proposed development plans with this step of the review process. The following information shall be included with this concept plan:

1. A map (or maps) indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural stormwater management and sediment control facilities. The map(s) will also clearly show proposed land use with tabulation of the percentage of surface area to be adapted to various uses; drainage patterns; locations of utilities, roads and easements; the limits of clearing and grading; a written description of the site plan and justification of proposed changes in natural conditions may be required.
2. Sufficient calculations to show that the proposed stormwater management measures are capable of controlling runoff from the site in compliance with this Stormwater Management Design Manual.
3. A written or graphic inventory of the natural resources at the site and surrounding area as it exists prior to the commencement of the project and a description of the watershed and its relation to the project site. This description should include a discussion of solid conditions, forest cover, topography, wetlands, and other native vegetative areas on the site. Particular attention should be paid to environmentally sensitive features that provide opportunities or constraints for development.
4. A brief written description of the required maintenance burden for the proposed stormwater management facility.

The final plan provides more detailed design information for the proposed STPs, and includes much more detail in terms of hydrologic conditions and site features.

For redevelopment, an applicant should include within a concept plan measures for controlling existing stormwater runoff discharges and water quality from the site in accordance with the standards of this Manual. After review of the concept plan and modifications are made to that plan as deemed necessary by the City, a final Stormwater Management Plan may be submitted for approval.

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## 5. PLAN REVIEW PROCEDURES

The general review process, from the submittal of the concept and final plans to the issuance of the Stormwater Management Plan approval, is summarized in the following seven steps:

1. Determine what stormwater management provisions apply (stormwater management, erosion control, buffers, floodplain management).
2. What permits, or approvals, are required for the project site, and what waivers and/or exemptions are applicable (COE, DNR, MPCA, Lower Mississippi Watershed District, WCA, etc.)
3. Are the selected practices appropriate for this site?
4. Are the practices designed to meet the minimum performance criteria?
5. Does the Plan meet other resource protection requirements as specified in the City of South St. Paul's Code?
6. Are provisions for long-term maintenance adequate, including access and methods for maintenance defined?

Any changes to the approved plan must be submitted to the City for review and approval before work can commence.

No development, utility or street construction will be allowed and no Building Permits will be issued unless the development is in full compliance with the requirements of these Standards.

If the City determines that the Stormwater Management Plans and/or Runoff Control Plan and an Erosion and Sediment Control Plan meet the requirements of these standards, the City shall issue a permit valid for a specified period of time that authorizes the land disturbance activity contingent on the implementation and completion of this plan.

If the City determines that the Stormwater Management Plan and/or Erosion and Sediment Control Plan do not meet the requirements of these Standards, the City shall not issue a permit for the land disturbance activity. The Plans must be resubmitted for approval before the land disturbance activity can begin. All land use and building permits shall be suspended until the developer has an authorized permit.

**Modification of Plan** – The applicant must amend the ESC Plan or SWMP as necessary to correct problems identified or address situations whenever:

1. A change in design, construction, operation, maintenance, weather, or seasonal conditions that has a significant effect on the discharge or pollutants to surface waters or underground waters.

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2. Inspections or investigations indicate the plans are not effective in eliminating or significantly minimizing the discharge or pollutants to surface waters or underground waters or that the discharges are causing water quality degradation;  
or
3. The plan is not achieving the general objectives of minimizing pollutants in stormwater discharges associated with construction activity; or
4. The plan is not consistent with the terms and conditions of these standards.

### 6. CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

#### 6.1 Erosion Control

1. The Permittee must plan for and implement appropriate construction phasing vegetative buffer strips, horizontal slope grading, and other construction practices to minimize erosion. All areas not to be disturbed shall be marked (e.g. with flags, stakes, signs, silt fence etc.) on the project site before any work begins.
2. All exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased and no later than seven (7) days after construction activity in that portion of the site has temporarily or permanently ceased when discharge points on the project is within one mile of a special or impaired water and flows to that special or impaired water.
3. Additional BMPs together with enhanced runoff controls, are required for discharges to special waters and impaired waters. The BMPs identified for each special or impaired water are required for those areas of the project draining to a discharge point on the project that is within one mile of a special or impaired water and flows to that water. The additional BMPs are identified in Appendix A of the NPDES Construction General Permit.
4. The permittee must stabilize the normal wetted perimeter of any temporary or permanent drainage ditch or swale that drains water from any portion of the construction site, or diverts water around the site, within 200 linear feet from the property edge, or from the point of discharge into any surface water. Stabilization of the last 200 linear feet must be completed within 24-hours after connecting to a surface water or property edge.
5. Pipe outlets must have temporary or permanent energy dissipation before connecting to surface water.
6. When possible, all slopes must be graded in such a fashion so that tracking marks made from heavy equipment are perpendicular to the slope.
7. All areas disturbed during construction must be restored as detailed in these requirements. The type of permanent restoration shall be clearly shown on the plans including but not limited to sod, seed, impervious cover and structures. A minimum of 6 inches of topsoil must be installed prior to permanent restoration. Areas in which the top soil has been placed and finish graded or areas that have been disturbed and other grading or site building construction operations are not actively underway must be temporary or permanently restored as set forth in the following requirements.
  - 1) Areas with slopes that are less than 3:1 must be seeded and mulched within 14 days of the area not being actively worked.

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- 2) Areas with slopes that are greater or equal to 3:1 must be seeded and erosion control blanket placed within 14 days of the area not being actively worked.
- 3) All seeded area must be either mulched and disc anchored, hydro- mulched, or covered by erosion control blanket to reduced erosion and protects the seed. Temporary or permanent mulch must be disc anchored and applied at a uniform rate of 2 tons per acre and have 90% coverage.
- 4) If the disturbed area will be re-disturbed within a six-month period, temporary vegetative cover shall be required consisting of an approved seed mixture and application rate.
- 5) If the disturbed area will not be re-disturbed within a six-month period, permanent vegetative cover shall be required consisting of an approved seed mixture and application rate.
- 6) All areas that will not have maintenance done such as mowing as part of the final design shall be permanently restored using an approved seed mixture and application rate.
- 7) Restoration of disturbed wetland areas shall be accomplished using an approved seed mixture and application rate.
8. All erosion control measures must be maintained for the duration of the project until final stabilization has been achieved. If construction operations or natural events damage or interfere with any erosion control measures, they shall be restored to serve their intended function.
9. Additional erosion control measures shall be added as necessary to effectively protect the natural resources of the City. The temporary and permanent erosion control plans shall be revised as needed based on current site conditions and to comply with all applicable requirements

### **6.2 Sediment Control Practices**

1. Sediment control practices must be established on all down gradient perimeters before any up gradient land disturbing activities begin. These practices must remain in place until final stabilization has been achieved.
2. If down gradient treatment system is overloaded additional up gradient sediment control practices must be installed to eliminate overloading. The SWPPP must be amended to identify the additional practices.
3. All storm drain inlets must be protected by approved BMPs during construction until all potential sources for discharge have been stabilized. These devices must be maintained until final stabilization is achieved. Inlet protection may be removed if a specific safety concern (street flooding/freezing) has been identified.
4. Temporary stockpiles must have silt fence or other effective sediment controls on the down gradient side of the stockpile and shall not be placed within twenty-five

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(25) feet from any road, wetland, protected water, drainage channel, or stormwater inlets. Stockpiles left for more than 14 days must be stabilized with mulch, vegetation, tarps or other approved means.

5. Vehicle tracking of sediment from the project site shall be minimized by approved BMPs. These shall be installed and maintained at the City approved entrances. Individual lots shall each be required to install and maintained entrances throughout the construction building until a paved driveway is install.
6. Sediment that has washed or tracked from the site by motor vehicles or equipment shall be cleaned from paved surfaces throughout the duration of construction.
7. Silt fence or other approved sediment control devices must be installed in all areas as shown on the SWPPP.
8. Silt fence or other approved sediment control devices shall be required along the entire curb line, except for approved opening where construction entrance will be installed or drainage flows away from curb. This device must be maintained until final stabilization is achieved. Ditch checks shall be required in ditch bottoms. Spacing for the ditch checks must be as followed:

$$\frac{\text{Height (of the sediment device used)}[\text{ft}] \times 100}{\text{Slope Gradient}}$$

9. Dust control measures, such as application of water must be performed periodically due to weather, construction activity, and/or as directed by the City.
10. Flows from diversion channels or pipes (temporary or permanent) must be routed to sedimentation basins or appropriate energy dissipaters to prevent the transport of sediment to outflow or lateral conveyors and to prevent erosion and sediment buildup when runoff flows into the conveyors.
11. A concrete washout shall be installed on projects that require the use of concrete. All liquid and solid wastes generated by concrete washout operations must be contained in a leak-proof containment facility or impermeable liner. A sign must be installed adjacent to each washout facility to inform operators to utilize the proper facilities.
12. All sediment control measures shall be used and maintained for the duration of the project until final. If construction operations or natural events damage or interfere with any erosion control measures, they must be restored to serve their intended function.
13. Additional sediment control measures shall be added as necessary to effectively protect the natural resources of the City. The temporary and permanent erosion control plans shall be revised as needed based on current site conditions and to comply with all applicable requirements.
14. Restrict clearing and grading adjacent to an existing wetland boundary to

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provide for a protective buffer strip of natural vegetation as per **Section 8**.

### **6.3 Temporary Sediment Basins**

A temporary sediment basin (or permanent) shall be provided when 10 or more acres of disturbed soil drain to a common location prior to the runoff leaving the site or entering surface waters. The Permittee is also encouraged, but not required to install temporary sediment basins in areas with steep slope or highly erodible soils even if the area is less than ten (10) acres and it drains to one common area. The basins shall be designed and constructed according to the following requirements:

1. The basins must provide storage below the outlet pipe for a calculated volume of runoff from a 2-year, 24-hour storm from each acre drained to the basin, except that in no case shall the basin provide less than 1,800 cubic feet of storage below the outlet pipe from each acre drained to the basin.
2. Where no such calculation has been performed, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage below the outlet pipe per acre drained to the basin shall be provided where attainable until final stabilization of the site.
3. Temporary basin outlets will be designed to prevent short-circuiting and the discharge of floating debris. The basin must be designed with the ability to allow complete basin drawdown (e.g., perforated riser pipe wrapped with filter fabric and covered with crushed gravel, pumps or other means) for maintenance activities, and provide a stabilized emergency overflow to prevent failure of pond integrity. Energy dissipation must be provided for the basin outlet.
4. In the construction of new basin outlets, skimmers are required. Skimmers are also required to be incorporated into the existing system whenever feasible and practical.
5. Temporary (or permanent) basins must be constructed and made operational concurrent with the start of soil disturbance that is up gradient of the area and contributes runoff to the pond.
6. Where the temporary sediment basin is not attainable due to site limitations, equivalent sediment controls such as smaller sediment basins, and/or sediment traps, silt fences, vegetative buffer strips or any appropriate combination of measures are required for all down slope boundaries of the construction area and for those side slope boundaries deemed appropriate as dictated by individual site conditions. In determining whether installing a sediment basin is attainable, the Permittee must consider public safety and may consider factors such as site soils, slope, and available area on-site. This determination must be documented in the SWPPP.

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7. The Permittee shall maintain the sedimentation basins and will remain functional until an acceptable vegetative cover is restored to the site, resulting in a pre-development level rate of erosion. The city will not issue building permits for lots containing sediment basins until they have been removed or relocated based on the projects restoration progress.
8. Basins designed to be used for permanent stormwater management shall be brought back to their original design contours prior to acceptance by the City.

### **6.4 Dewatering and Basin Draining**

1. If water cannot be discharged into a sedimentation basin before entering a surface water it must be treated with appropriate BMPs, such that the discharge does not adversely affect the receiving water or downstream landowners. The Permittee must make sure discharge points are appropriately protected from erosion and scour. The discharge must be dispersed over riprap, sand bags, plastic sheeting or other acceptable energy dissipation measures. Adequate sediment control measures are required for discharging water that contains suspended soils.
2. All water from dewatering or basin draining must discharge in a manner that does not cause nuisance conditions, erosion in receiving channels or on downslope properties, or inundation in wetlands causing significant adverse impacts to wetlands.

### **6.5 Inspections and Maintenance**

1. The Permittee shall be responsible for inspecting and maintenance of the BMPs.
2. The Permittee must routinely inspect the construction project once every seven (7) days during active construction and within 24-hours of a rainfall event of 0.5 inches or greater in 24-hours.
3. All inspections and maintenance conducted during construction must be recorded in writing and must be retained with the SWPPP. Records of each inspection and maintenance activity shall include:
  - 1) Date and time of inspections.
  - 2) Name of person(s) conducting the inspections.
  - 3) Findings of inspections, including recommendations for corrective actions.
  - 4) Corrective actions taken (including dates, times, and the party completing the maintenance activities).
  - 5) Date and amount of all rainfall events 0.5 inches or greater in 24-hours.
  - 6) Documentation of changes made to SWPPP.
4. Parts of the construction site that have achieved final stabilization, but work continues on other parts of the site, inspections of the stabilized areas can be reduced to once a month. If work has been suspended due to frozen ground

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conditions, the required inspections and maintenance must take place as soon as runoff occurs or prior to resuming construction, whichever happens first.

5. All erosion and sediment BMPs shall be inspected to ensure integrity and effectiveness. All nonfunctional BMPs shall be repaired, replaced or supplemented with a functional BMP. The Permittee shall investigate and comply with the following inspection and maintenance requirements:
  - 1) All silt fences must be repaired, replaced, or supplemented when they become nonfunctional or the sediment reaches 1/2 of the height of the fence. These repairs shall be made within 24-hours of discovery, or as soon as field conditions allow access.
  - 2) Temporary and permanent sedimentation basins must be drained and the sediment removed when the depth of sediment collected in the basin reaches 1/2 the storage volume. Drainage and removal must be completed within 72-hours of discovery, or as soon as field conditions allow access.
  - 3) Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment being deposited by erosion. The Permittee shall remove all deltas and sediment deposited in surface waters, including drainage ways, catch basins, and other drainage systems, and restabilize the areas where sediment removal results in exposed soil. The removal and stabilization shall take place within seven (7) days of discovery unless precluded by legal, regulatory, or physical access constraints. The Permittee shall use all reasonable efforts to obtain access. If precluded, removal and stabilization shall take place within seven (7) calendar days of obtaining access. The Permittee is responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any work.
  - 4) Construction site vehicle exit locations shall be inspected for evidence of off-site sediment tracking onto paved surfaces. Tracked sediment shall be removed from all off-site paved surfaces, within 24-hours of discovery, or if applicable, within a shorter time. It shall be the responsibility of the developer / contractor to keep streets and property adjacent to construction areas free from sediment carried by construction traffic at sites entrances and access points, and from site runoff and blowing dust.
  - 5) The Permittee is responsible for the operation and maintenance of temporary and permanent water quality management BMPs, as well as all erosion prevention and sediment control BMPs, for the duration of the construction work at the site. The Permittee is responsible until another Permittee has assumed control over all areas of the site that have not been finally stabilized

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or the site has undergone final stabilization, and a Notice of Termination (NOT) has been submitted to the MPCA.

- 6) If sediment escapes the construction site, off-site accumulations of sediment shall be removed in a manner and at a frequency sufficient to minimize off-site impacts (e.g., fugitive sediment in streets could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets).
6. All infiltration areas shall be inspected to ensure that no sediment from ongoing construction activities is reaching the infiltration area and that these areas are protected from compaction due to construction equipment driving across the infiltration area.

### **6.6 Pollution Management Measures/Construction Site Waste Control**

1. The Permittee must implement the following pollution prevention management measures on the site.
  - 1) Solid Waste – Collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other wastes must be disposed of properly and must comply with MPCA disposal requirements.
  - 2) Hazardous Materials including oil, gasoline, paint and other hazardous substances must be properly stored, including secondary containment to prevent spills, leaks or other discharge. Restricted access to storage areas shall be provided to prevent vandalism. Storage and disposal of hazardous waste shall be in compliance with MPCA regulations.
  - 3) External washing of trucks and other construction vehicles must be limited to a defined area of the site. Runoff shall be contained and waste from the washing activity properly disposed of. No engine degreasing is allowed on-site.
  - 4) The City of South St. Paul prohibits discharges of any material other than stormwater or treated discharges from dewatering or basin draining activities. Prohibited discharges include but are not limited to vehicle and equipment washing, maintenance spills, wash water, and discharges of oil and other hazardous substances.
  - 5) The Permittee must comply with all other pollution prevention/good housekeeping requirements of the MPCA NPDES Construction General Permit.

### **6.7 Final Stabilization**

1. The Permittee must ensure final stabilization of the project. Final stabilization is not complete until the following is completed:

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- 1) All soil disturbing activities at the site have been completed and all soils will be stabilized by a uniform perennial vegetative cover with a density of at least 70 percent over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions; and
  - 2) All drainage ditches, constructed to drain water from the site after construction is complete, must be stabilized to preclude erosion; and
  - 3) All temporary synthetic, and structural erosion prevention and sediment control BMPs (such as silt fence) must be removed as part of the site final stabilization; and
  - 4) The Permittee must clean out all sediment from conveyances and from temporary sedimentation basins that are to be used as permanent water quality management basins. Sediment must be stabilized to prevent it from washing back into the basin, conveyances or drainage ways discharging off-site or to surface waters. The cleanout of permanent basins must be sufficient to return the basin to design capacity.
2. For residential construction only, final stabilization has been achieved when:
    - 1) Temporary erosion protection and down gradient perimeter control for individual lots has been completed and the residence has been transferred to the homeowner.
    - 2) The Permittee has distributed the MPCA “Homeowner Fact Sheet” to the homeowner so the homeowner is informed for the need, and benefits, of final stabilization.

### **6.8 Training**

1. The SWPPP must provide a chain of command showing who prepared the SWPPP, who is responsible for the management of the construction site and inspections.
2. The training shall consist of a course developed by a local, state or federal agency, professional organization, water management organization, or soil and water conservation district and must contain information that is related to erosion prevention, sediment control, or permanent stormwater management and must relate to the work that the trainee is responsible for managing.

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## 7. STORMWATER MANAGEMENT DESIGN STANDARDS

### 7.1 Guidance on Stormwater Treatment Practices (STPs)

The Stormwater Management Plan shall meet the volume control, water quality, and water quantity requirements of these Standards and the *Minnesota Stormwater Manual*. Deviations from recommended guidance will require detailed written explanation with discretion given by the City.

Final site design and choice of permanent stormwater volume reduction practices shall be based on outcomes of the MIDS Calculator, P8, or other model that shows the performance goal can be met and shall meet the performance goals in **Section 8** of these design standards. The MIDS calculator is available on the MPCA's [website](#).

### 7.2 List of Acceptable Stormwater Treatment Practices

In the development of appropriate Stormwater Treatment Practices (STP) appropriate for the development and redevelopment, volume control systems are foremost of importance to apply in the design. Filtration is warranted when site conditions do not allow for an effective infiltration facility. For flooding or rate control, detention systems are typically the preferred practice. Low Impact Design (LID) practices are encouraged when they can be functionally incorporated into the design. Alternative practices may be approved at the discretion of the City Engineer. For projects where infiltration is not feasible the STPs proposed shall meet the performance identified in the Flexible Treatment Options (FTO).

The *Minnesota Stormwater Manual* identifies a number of potential STPs that can be used during design. The following include a list of potential options that can be considered during development and redevelopment.

#### **Volume Control Systems:**

- Infiltration trench
- Infiltration basin
- Raingarden
- Underground storage
- Reuse
- Green Roofs
- Trees/Tree Planters

#### **Detention Systems:**

- Wet pond
- Stormwater re-use systems
- Multiple pond systems
- Extended detention basin
- Micro-pool extended detention basin
- Dry detention ponds
- Underground storage
- Other, as approved by the City of South St. Paul

# Stormwater Management Design Standards

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## **Filtration Systems:**

- Surface sand filter
- Underground sand filter
- Perimeter sand filter
- Organic filter
- Bioretention system
- Raingarden with underdrain
- Pervious pavement with underdrain
- Underground storage with underdrain
- Tree trench
- Enhanced turf

## **Wetlands:**

- Shallow wetland
- Pond/wetland systems
- Extended detention wetland

## **Open Channel Systems:**

- Dry swale
- Wet swale
- Grass swale
- Natural channel, or stream

# Stormwater Management Design Standards

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## 8. STORMWATER TREATMENT PLAN DESIGN CRITERIA

Proposed Stormwater Management Plans must incorporate Volume Control, Water Quality, and Rate Control as the basis for stormwater management in the proposed development plan. The City of South St. Paul, as a permitted MS4, requires for new development projects to have a no net increase from pre-project conditions of total volume, TSS, and TP; in addition, for redevelopment projects within the city, it is required to have a net reduction from pre-project conditions of total volume, TSS and TP.

### 8.1 Volume Control Requirements

Volume control measures are required on projects to meet the water quality criteria of the South St. Paul City Code and the MS4 Permit. Volume control shall be required for proposed new impervious areas greater than one acre or redevelopment of impervious greater than one acre. If an applicant can demonstrate that the volume control standard has been met, then the water quality sizing criteria shall be considered satisfied.

Volume control may be waived by the city for sites with impermeable soil, where the seasonally high groundwater table is less than three feet from the bottom of the infiltration basin, bedrock depth is less than three feet from the bottom of the infiltration basin, in a stormwater hot spot, or is in an area where groundwater has a high vulnerability for contamination. If the applicant claims that infiltration is not feasible on-site, the applicant must provide supporting documentation to the city. If the city agrees that infiltration is not feasible, the applicant shall design alternative stormwater runoff treatment methods meeting the requirements as established in **Section 8.2**

### 8.2 Volume Control Calculations

Depending on applicability, new and redevelopment projects shall capture and retain on-site 1.1 inches of runoff from the net increase in impervious surfaces in post-construction conditions. For projects that create or redevelop less than one acre of impervious surfaces, the City encourages applicants to incorporate volume control provisions to the extent feasible. For linear projects, the City will incorporate volume control improvements where feasible.

For projects where it is not feasible to meet the volume reductions requirements it will be required to meet the water quality requirements of these stormwater management design standards. Infiltration is infeasible when:

- Where industrial facilities are not authorized to infiltrate industrial stormwater under and NPDES/SDS Industrial Stormwater Permit issued by the MPCA.
- Where vehicle fueling and maintenance occur.

## Stormwater Management Design Standards

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- With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of the bedrock.
- Where high levels of contaminant in soil or groundwater will be mobilized by the infiltrating stormwater

The use of infiltration techniques shall be restricted and subject to additional City review where the infiltration BMP will be constructed in any of the following areas:

- Soils are predominately Hydrologic Soil Group D (clay) soils.
- Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features.
- Drinking Water Supply Management Areas are present, as defined by Minn. R. 4720.51000, subp. 13, unless precluded by a local unit of government with an MS4 permit.
- Soil infiltration rates are more than 8.3 inches per hour unless soils are amended to flow the infiltration rate below 8.3 inches per hour.

The City Engineer may allow a lesser volume reduction requirement than required if the project meets one of the prohibitions listed above and if the project implements to the Maximum Extent Practicable (MEP) other volume reduction techniques such as evapotranspiration, reuse/harvesting, conservation design, green roofs, etc. on site. If other volume reduction techniques are not used, documentation must be provided on why that decision was made.

### **8.3 Water Quality**

The water quality requirements shall be considered satisfied if the volume control standard has been satisfied. In the event that it is infeasible to meet the volume control standard due to site constraints, the proposed STP will need to provide for the following in decreasing order of preference:

#### *Flexible Treatment Option 1*

Provide 0.55 inches of volume control and filtration for the remaining 0.55 inches.

#### *Flexible Treatment Option 2*

Provide filtration to meet the volume control requirement.

#### *Flexible Treatment Option 3*

Demonstrate 50% total phosphorus removal annually through NURP ponds or use of other BMPs.

## Stormwater Management Design Standards

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For new or redevelopment projects that do not trigger the volume control requirement but disturb more than one acre of land (mill and overlay and pavement rehabilitation projects will not be considered disturbances), it will be required to demonstrate a 50% reduction in total phosphorus leaving the site. Linear projects will attempt to meet this water quality requirement where feasible.

For areas that discharge directly to the Mississippi River or to an impaired water body for which a TMDL has been completed, the findings of the TMDL will replace this requirement (where more stringent). The required reduction of total phosphorus may be accomplished through the use of regional or on-site stormwater BMPs such: ponds, NURP (National Urban Runoff Program) basins, infiltrations basins, biofiltration, vegetated swales, mechanical devices, porous pavements, or any other techniques effective at phosphorus reduction. Linear construction projects should meet the above water quality policy where possible and feasible. Linear projects will be required to meet NPDES Construction Permit requirements.

1. It is required that implementation of best management practices during development and redevelopment to achieve the goal of reducing nonpoint source pollution, with emphasis placed on the watershed that drain (or will drain) to the Mississippi River.
2. It is encouraged to reduce the amount of impervious surface upon development or redevelopment.
3. For replacement discharge points/outfalls or existing stormwater discharge points/outfalls, there should be pretreatment of stormwater prior to its discharge to wetlands and other water resources.
4. For new stormwater discharge points/outfalls, the City will provide pretreatment (at least grit removal) of stormwater prior to its discharge to wetlands and other water resources.

### 8.4 **Rate Control**

1. At a minimum, detention basins should maintain existing flow rates for the 2, 10, and 100-year 24-hour rainfalls in accordance to the City's Stormwater Management Plan storm data as shown in the table below:

<b>Event</b>	<b>Rainfall/Snowmelt Depth (inches)</b>
2-year, 24 hour	2.8
10-year, 24 hour	4.2
100-year, 24 hour	7.4
100-year, 10-day snowmelt	7.2

2. Detention basins shall be designed with capacity for the critical 100-year event, which is defined as the 100-year event that produces the highest water level

## Stormwater Management Design Standards

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- among a 2-hour, 6-hour, 12-hour, or 24-hour rainfall events or the 10-day, 7.2-inch snowmelt runoff event.
3. The maximum duration for rainfall critical event analysis shall be 24-hours except in cases where basins are landlocked, where back to back 24-hour events and the 10-day 7.2-inch snowmelt runoff event shall also be used. In all cases a hydrograph method of analysis should be used. For the 24-hour rainfall event, or back to back 24-hour rainfall events, a MSE 3 distribution should be used. For shorter duration, critical events other distributions may be used with the approval of the City Engineer.
  4. Easements over floodplains, detention areas, wetlands, ditches, and all other parts of the stormwater system as areas develop or redevelop are required.
  5. All drainage system analyses and designs shall be based on proposed full development land use patterns.
  6. Future discharge rates from new development and redevelopment will at a minimum not exceed the existing discharge rates, or rates which would interfere with sensitive downstream uses.
  7. It is preferred to provide rate control through the use of regional stormwater detention/retention systems versus site-by-site retention systems. If regional systems are not available, on-site systems may be required.
  8. Development adjacent to a landlocked basin and the basin is not provided an outlet, freeboard should be determined based on one of three methods (whichever provides for the highest freeboard elevation):
    - 1) Two feet above the HWL determined by modeling back to back 100-year, 24-hour events,
    - 2) Three feet above the highest known water level, or
    - 3) Five feet above the HWL determined by modeling a single 100-year, 24-hour event.
  9. When modeling landlocked basins, the starting water surface elevation should be the basins Ordinary High Water elevation, which can be determined through hydrologic modeling or, in the case of a DNR regulated basin, from a DNR survey.
  10. For basins with a suitable outlet, freeboard will be 2 feet above the HWL determined by modeling the 100-year critical event. Emergency overflows a minimum of 1.5 feet below lowest ground elevation adjacent to a structure should also be provided.
  11. Adjacent to channels, creeks, and ravines freeboard will also be 2 feet to the 100-year critical event elevation.
  12. A MSE 3 24-hour rainfall distribution with average antecedent moisture conditions should be utilized for runoff calculations.

## Stormwater Management Design Standards

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13. The recommended minimum outlet diameter is 6 inches due to plugging susceptibility and may supersede the rate control requirement for the 2-year event.
14. City standard detail plates should be utilized for pond outlet structures.
15. Multistage outlets are to be incorporated into pond designs to control flows from smaller, less frequent storms and help maintain base flows in downstream open channels where practicable.

### **8.5 Freeboard**

Building elevation separations of with respect to ponds, lakes, streams, and stormwater features shall be designed as follows:

1. The basement floor elevation of any new building shall be placed at least two feet above the elevation of any known historic high groundwater elevations for the area and at least two feet above the 100-year high surface water elevation in the area.
2. The low building opening elevation of any new building shall be at least three feet above the projected 100-year high water elevation for the area. If this standard is considered a hardship, the standard may be lowered to placing the low building opening elevation at least two feet above the projected 100-year high water elevation if the following can be demonstrated:
  - 1) That within the two-foot freeboard area above the 100-year high water elevation, stormwater storage is at least 50 percent of the stormwater storage capacity below the 100-year high water elevation; and
  - 2) That a 25 percent obstruction of the basin outlet for a 100-year critical-duration rainfall event would not result in a high-water elevation greater than one foot above the 100-year high water elevation; and
  - 3) An adequate overflow route from the basin will assure that water levels, even for extreme rainfall events, will be greater than one foot below the low building opening elevation.
3. An emergency spillway from ponding areas shall be installed a minimum of one foot below the lowest building opening and shall be designed to have a capacity to overflow water at an elevation below the lowest building opening at a rate not less than three times the 100-year peak discharge rate from the basin or the 100-year inflow rate to the basin, whichever is higher.

### **8.6 Floodplain Management**

The City prohibits filling activities within the 100-year floodplain that will cause an increase in the stage of the 100-year or regional flood or cause an increase in the flood damages in the reach affected unless compensatory storage is provided and/or channel improvement is provide that will not result in the flood stage. Filling within the floodway is prohibited unless

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the filling meets FEMA, DNR, and Watershed District requirements, and City Zoning Code. Applications proposing to alter the floodplain shall submit the following:

1. Cut/fill diagrams along with calculations demonstrating that the filling or alteration of the floodplain is not resulting in a reduction in the flood stage/storage.

### 8.7 **Buffers**

Buffers are required adjacent to wetlands for projects requiring a stormwater management permit as defined in City's Comprehensive Stormwater Management Plan.

1. The Buffers zones are as follows:
  - 1) Buffers based on a MnRAM classification or similar classification system will be as follows (measured from the delineated wetland edge):

Management Class	Base Buffer Width	Minimum Applied Buffer Width
Manage 3	20 feet	16 feet
Manage 2	30 feet	24 feet
Manage 1	40 feet	34 feet
Preserve	75 feet	67 feet

- 2) The Applied Buffer Width, the actual width of wetland buffer(s) required for a permitted project, shall be the Base Buffer Width as reduced by beneficial slope or soil conditions pursuant to the following formulas:
  - i. For every 5 percent decrease in average buffer slope from 20 percent, the Base Buffer Width may be reduced by 2 feet.
  - ii. For every grade of Hydrologic Soil Group above Type D for the predominant buffer soil condition, the Base Buffer Width may be reduced by 2 feet.

Reductions for beneficial slope or soil conditions shall not reduce the buffer width to less than the applicable Minimum Applied Buffer Width.

- 3) Buffer width may vary based on demonstrated site constraints, provided that a width of at least 50 percent of the Applied Buffer Width is maintained at all points, there is no reduction in total buffer area, and the buffer provides wetland and habitat protection at least equivalent to a buffer of uniform Applied Buffer Width. Buffer width averaging calculation will exclude any part of the buffer exceeding 200 percent of the Applied Buffer Width. The area of any path or trail allowed in the buffer will be added to the total area required by the Applied Buffer Width, except that construction of a trail or path of no more than 4 feet in width to provide riparian access through the buffer will not increase the required buffer area.
  - 4) The Applied Buffer Width may be further reduced by the City upon a
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demonstration by the applicant that the proposed buffer conditions clearly provide function and value equal to or greater than would be provided by a buffer of the applicable Applied Buffer Width, but may not be reduced to less than 50 percent of the applicable Applied Buffer Width.

- 5) The Applied Buffer Width for Linear Reconstruction Projects shall be limited to the extent of available right-of-way. A buffer is not required for resurfacing of an existing road, sidewalk or trail that does not increase the area of impervious surface.
- 6) The Applied Buffer Width for New Principal Residential Structures shall be limited to 25 percent of the distance between the existing structure at the point that it is nearest to the wetland and the wetland, or 25 feet, whichever is greater, provided that such a buffer shall not exceed the Base Buffer Width, and the buffer shall not render a property unbuildable.
- 7) Buffer strip vegetation should be appropriate to the goals for the water body. Where acceptable natural vegetation exists in buffer strip areas, the retention of such vegetation in an undisturbed state is preferred. The MPCA's manual "Plants for Stormwater Design: Species Selection for the Upper Midwest" provides guidance on buffer plant selection.
- 8) A protective buffer strip of vegetation surrounding the permanent pool at a minimum width of 16 1/2 feet.

### **8.8 Shoreland Management**

The City of South St. Paul has an established shoreland management Code Section 118.169: Shorelands Zoning. The City Code has established setbacks for placement of structures and impervious and also requirements for shoreland alterations. The City also encourages the following for work occurring within the shoreland zone:

1. Encourage the use of natural vegetation or bioengineering techniques for the stabilization of shorelines.
2. Use materials such as granite or fieldstone for shoreline stabilization project where hard armoring is necessary.
3. Encourage the use of techniques that will minimize runoff and improve water quality associated with new development and redevelopment. When possible use existing natural drainage ways, wetlands, and vegetated soil surfaces to convey, store, filter, and retain stormwater runoff before discharge to public waters. When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle stormwater runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways, and ponds may be used. Preference shall be given to designs using surface drainage, vegetated filter strips,

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bioretention areas, rainwater gardens, enhanced swales, off-line retention areas, and natural depressions for infiltration rather than buried pipes and human-made materials and facilities (*MnDNR Alternative Shoreland Standards, 2005*).

### **8.9 Mitigation Requirements**

Under certain circumstances, some construction projects cannot meet the TSS and/or TP reduction requirements for new or redevelopment projects on the site of the original construction. All methods must be exhausted prior to considering alternative locations where TSS and TP treatment standards can be achieved. If the City has determined that all methods have been exhausted, the permittee will be required to identify alternative locations where TSS and TP treatment standards can be achieved.

- Mitigation projects will be chosen 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 City of South St. Paul.
- Mitigation projects shall involve the establishment new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMPs.
- Previously required routine maintenance of structural stormwater BMPs cannot be considered mitigation.
- Mitigation projects must be finished within 24 months after the original construction activity begins.

### **8.10 Long Term Inspection and Maintenance of Stormwater Facilities**

1. No private stormwater facilities may be approved unless a maintenance plan is provided that defines how access will be provided, who will conduct the maintenance, the type of maintenance and the maintenance intervals. At a minimum, all private stormwater facilities shall be inspected annually and maintained in proper condition consistent with the performance goals for which they were originally designed and as executed in the stormwater facilities maintenance agreement.
  2. Access to all stormwater facilities must be inspected annually and maintenance shall be performed as needed. The applicant shall obtain all necessary easement or other property interests to allow access to the facilities for inspection or maintenance for both the responsible party and the City of South St. Paul.
  3. All settled materials including settled solids, shall be removed from ponds, sumps, grit chambers, and other devices, and disposed of properly.
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# Stormwater Management Design Standards

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## 9. STORMWATER TREATMENT PRACTICE DESIGN STANDARDS

### 9.1 Storm Sewers

1. Manhole spacing shall not exceed 400 feet.
2. Where more than one pipe enters a structure, a catch basin/manhole shall be used.
3. Storm sewer pipe should match top of pipe to top of pipe unless grade constraints prevent this. In that case, hydraulic calculations will be necessary to verify that excessive surcharging will not occur.
4. Stormwater pipes shall be designed utilizing the Rational Method. Channel design shall be hydrograph method only. All methods are subject to the City Engineer's approval.
5. Lateral systems shall be designed for the 10-year rainfall using the Rational Method. State Aid roadway storm sewer shall be designed per the State Aid requirements.
6. The minimum full flow velocity within the storm sewer should be 3 feet per second (fps). The maximum velocity shall be 10 fps, except when entering a pond, where the maximum velocity shall be limited to 6fps.
7. Trunk storm sewer should be designed at a minimum to carry the 100-year storm event pond discharge in addition to the 10-year design flow for directly tributary areas. The following table shall be used for the calculation of peak rates using the Rational Method:

Cover Type	10-Year Runoff Coefficient
Single-family Residential	0.4
Multi-family Residential	0.5
Commercial	0.7
Industrial	0.7
Parks, Open Space	0.2
Ponds, Wetlands	1.0

8. For storms greater than the 10-year event, and in the case of plugged inlets, transient street ponding will occur. For safety reasons, the maximum depth in streets should not exceed 1.5 feet at the deepest point.
9. To promote efficient hydraulics within manholes, manhole benching shall be provided to 1/2 diameter of the largest pipe entering or leaving the manhole.
10. Vaned grate (3067V) catch basin castings shall be used on all streets.
11. The maximum design flow at a catch basin for the 10-year storm event shall be three (3) cubic feet per second (cfs), unless high capacity grates are provided.  
Catch basins at low points will be evaluated for higher flow with the approval of the City Engineer.

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12. All structures located in the street are to be a minimum of four feet deep (rim to invert) and a minimum of three feet deep elsewhere. Two-by-three catch basins are to be four (4) feet deep.

### 9.2 Outlet and Inlet Pipes

1. Inlet pipes of stormwater ponds shall be extended to the pond normal water level whenever possible.
2. Outfalls with velocities greater than 4 fps into channels, where the angle of the outfall to the channel flow direction is greater than 30 degrees, requires energy dissipation or stilling basins.
3. Outfalls with velocities of less than 4 fps, that project flows downstream into a channel in a direction 30 degrees or less from the channel flow direction, generally do not require energy dissipaters or stilling basins, but will require riprap protection.
4. In the case of discharge to channels, riprap shall be provided on all outlets to an adequate depth below the channel grade and to a height above the outfall or channel bottom. Riprap shall be placed over a suitably graded filter material and filter fabric to ensure that soil particles do not migrate through the riprap and reduce its stability. Riprap shall be placed to a thickness at least 2.5 times the mean rock diameter to ensure that it will not be undermined or rendered ineffective by displacement. If riprap is used as protection for overland drainage routes, grouting may be recommended.
5. Discharge velocity into a pond at the outlet elevation shall be 6 fps or less. Riprap protection is required at all inlet pipes into ponds from the NWL to the pond bottom.
6. Where outlet velocities to ponds exceed 6 fps, the design should be based on the unique site conditions present. Submergence of the outlet or installation of a stilling basin approved by the City is required when excessive outlet velocities are experienced.
7. Submerged outlet pipes from ponds are not allowed.

Multi-stage outlets are to be incorporated into pond designs to control flows from smaller, less frequent storms and help maintain base flows in downstream open channels where practicable.

### 9.3 Channels and Overland Drainage

1. Overland drainage routes where velocities exceed 4 fps should be reviewed by the City Engineer and approved only when suitable stabilization measures are proposed.
2. Open channels and swales are recommended where flows and small grade

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differences prohibit the economical construction of an underground conduit. Open channels and swales can provide infiltration and filtration benefits not provided by pipe.

3. Design of streambank stabilization and streambed control measures should consider unique or special site conditions, energy dissipation potential, adverse effects, preservation of natural processes and habitat and aesthetics in addition to standard engineering and economic criteria.
4. Point discharges of stormwater to open channels or detention basins shall be constructed in a manner that minimizes added erosion.
5. Effective energy dissipation devices should be provided at all conveyance system discharges to prevent bank, channel or shoreline erosion.
6. Open channels shall be designed to convey the critical 100-year event.
7. The minimum grade in all unpaved areas shall be 2%.
8. Maximum length for drainage swales shall be 400 feet.
9. Channel side slopes should be a maximum of 4:1 (horizontal to vertical) with gentler slopes being desirable.
10. Riprap shall be provided at all points of juncture, particularly between two open channels and where storm sewer pipes discharge into a channel.
11. Open channels should be designed to handle the expected velocity from a 10-year design storm without erosion. Riprap may need to be provided.
12. Acceptable erosion in drainageways is limited to that which causes no net degradation of the watercourse or destruction of properties adjacent to the watercourse.
13. Grassed waterways are encouraged to maximize infiltration where feasible and not detrimental to groundwater supplies.
14. Periodic cleaning of an open channel is required to ensure that the design capacity is maintained. Therefore, all channels shall be designed to allow easy access for equipment.

### **9.4 Ponds**

Where on-site water quality detention basins are required, copies of the calculations determining the design of the basin(s) shall be provided. The size and design considerations will be dependent on the receiving water body's water quality category, the imperviousness of the development and the degree to which on-site infiltration of runoff is achieved. Design of on-site detention basins, as described in the site's runoff water management plan, shall incorporate recommendations from the nationwide urban runoff program (NURP) and "Protecting Water Quality in Urban Areas", published by the Minnesota Pollution Control Agency, as adopted by the city, or the applicable publications, as adopted by the city. The following design considerations are required for on-site water quality detention basins based on the receiving water's water quality category. These designs include permanent detention

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for water quality treatment; extended detention designs may be substituted if they provide treatment equivalent to the requirements below:

1. A permanent pool (dead storage) volume below the normal outlet shall be greater than or equal to the runoff from a two and one-half inch (2.5") 24-hour storm over the entire contributing drainage area assuming full development.
2. A permanent pool average depth (basin volume/basin area) which shall be greater than four feet (4'), with a maximum depth of less than ten feet (10').
3. An emergency spillway (emergency outlet) adequate to control the 100-year frequency critical duration rainfall event.
4. Basin side slopes above the normal water level should be no steeper than three to one (3:1) when possible, and preferably flatter. A basin shelf with a minimum width of ten feet (10') and a maximum slope of ten to one (10:1) below the normal water level is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long term maintenance.
5. To prevent short circuiting, the distance between the major inlets and normal outlet shall be maximized.
6. A flood pool (temporary storage) volume above the principal outlet spillway shall be adequate so that the peak discharge rate from the 1-, 10- and 100-year frequency critical duration storm is not greater than the peak discharge for a similar storm and predevelopment watershed conditions.
7. Extended detention of runoff from the more frequent (1-year to 5-year) storms shall be achieved through a principal spillway design which shall include a perforated vertical riser, a small orifice outlet or a compound weir. The spillway must be constructed of a limited maintenance material. The use of treated or naturally decay resistant timber shall not be allowed.
8. Effective energy dissipation devices which reduce outlet velocities to four feet per second (4 fps) or less shall consist of riprap, stilling pools or other such measures to prevent erosion at all stormwater outfalls into the basin and at the detention basin outlet.
9. Trash and floatable debris skimming devices shall be placed on the outlet of all on-site detention basins to provide treatment up to the critical duration 10-year storm event. These devices can consist of baffled weirs, submerged inlets or other such measures capable of restricting the overflow of floatable materials, including litter, oil and grease. The skimming device must be constructed of a limited maintenance material. The use of treated or naturally decay resistant timber shall not be allowed. Computations for the design of such devices shall be included. The maximum velocity through the skimming device shall be less than one foot per second (1 fps) on the 2-year 24-hour event.
10. For purposes of erosion control, vegetation protection and wildlife habitat

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enhancement, the 10-year flood level of the basin shall be no more than two feet (2') above the normal level of the basin.

11. All constructed ponds shall be provided a maintenance access from an adjacent roadway. The maintenance access shall be provided in the form of an easement no narrower than 20 feet. The maintenance access shall have a longitudinal slope no steeper than 6:1 and minimal cross slope. Maintenance access routes, due to their extra width, also serve well as emergency overflow (EOF) routes.

### 9.5 Infiltration/Filtration Practices

1. Sizing of filtration/infiltration practices, or STPs, shall be in conformance with the volume control requirements of this manual and the *Minnesota Stormwater Manual*.
2. When designing an infiltration practice for volume control and water quality management, on-site testing and detailed analysis are strongly encouraged in order to determine the infiltration rates of the proposed infiltration facility. Documented site-specific infiltration or hydraulic conductivity measurements (double-ring infiltrometer) completed by a licensed soil scientist or engineer is required. In the absence of a detailed analysis, the saturated infiltration rates listed in the Infiltration Rates for Infiltration STPs table found on the *Minnesota Stormwater Manual* shall be used. A piezometer shall be installed in order to ascertain the level of the local groundwater table and demonstrate at least three feet of separation between the bottom of the proposed facility and the groundwater. The soil boring is required to go to a depth of at least five feet below the proposed bottom of the STP. The soils shall be classified using the Unified Soil Classification system. The least permeable soil horizon will dictate the infiltration rate. Infiltration practices shall be designed to infiltrate the required runoff volume within 48 hours.
3. Pretreatment, in the form of ponds, forebays, filter strips, or other approved methods, shall be provided for all infiltration areas. Pretreatment upstream of volume management practices is a key element in the long-term viability of infiltration areas. The level of pretreatment varies largely depending on the STP and drainage area of the watershed. City staff and *Minnesota Stormwater Manual* recommendations shall be utilized for determining the appropriate level of pretreatment on a case-by-case basis.
4. The infiltration practice shall not be used within fifty feet of a municipal, community or private well, unless specifically allowed by an approved wellhead protection plan.
5. The infiltration practice shall not be used for runoff from fueling and vehicle maintenance areas and industrial areas with exposed materials posing

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contamination risk, unless the infiltration practice is designed to allow for spill containment.

6. The infiltration practice shall not be used in Hydrologic Soil Group (HSG) C or D soils without soil corrections.
7. Vegetation of infiltration/filtration practices shall be as shown in the City of South St. Paul's Standard Details. A plan for management for vegetation shall be included in the Stormwater Pollution Prevention Plan.
8. If soils are unsuitable for infiltration, then filtration may be used with drain tile, provided in accordance with the City of South St. Paul's Standard Details.
9. Subgrade soils for infiltration/filtration practices shall be as presented in the City of South St. Paul's Standard Details. Assume a 40% void ratio for clean washed rock and 20% for construction sand for the purposes of volume calculations.
10. Rock storage beds shall be constructed using crushed angular granite that has been thoroughly washed to remove all fine particles that could result in clogging of the system.
11. For infiltration benches adjacent to ponds, benches shall have slopes no steeper than 5:1 over the proposed infiltration zone. A slope of 10:1 is preferred. The *Minnesota Stormwater Manual* cites concerns with locating infiltration features immediately adjacent to ponds. To address this, benches shall be located to maintain hydraulic separation from the saturated zone of the pond to minimize the loss of infiltration potential over time.

### 9.6 **Emergency Overflow Paths**

1. Emergency Overflows (EOFs) shall be sized with a minimum bottom width of five feet and 4:1 side slopes.
2. The maximum flow depth in EOFs shall be less than or equal to one foot as calculated for a 100-year back-to-back storm event.

### 9.7 **Outlets for Landlocked Basins**

1. Only the existing tributary area may discharge to a landlocked basin unless provision has been made for an outlet from the basin.
2. The form of outlet may range from temporary pumps to gravity storm sewers. The outlet is to be in place before increased water levels are likely to affect vegetation, slope stability and property values.
3. It is recommended to reduce the amount of impervious area coverage and increase infiltration opportunities in watershed tributary to landlocked basins.
4. In establishing high water elevations and whether outlets are needed for landlocked basins, the long duration events, such as multiple-year wet cycles and high runoff volume events will be considered (e.g. snowmelt events that last for

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many weeks).

5. Emergency overflows or outlets to drainage systems will be required to any landlocked area if the available stormwater storage capacity is inadequate to prevent flooding of residences and if the available downstream conveyance system capacity is adequate to accept additional flow.

## 10. DESIGN EXAMPLES

The design process for each of the acceptable Stormwater Treatment Practices is detailed in the [Minnesota Stormwater Manual](#).

### 11. STORMWATER TREATMENT PRACTICE DETAIL DRAWINGS

Please refer to the City of South St. Paul's Engineering Details for the following:

- Bioretention
- Media Filter System
- Vegetative Filter System
- Infiltration Trench
- Infiltration Basin
- Stormwater Pond/Wetland

## 12. CONSTRUCTION SPECIFICATIONS

Construction specifications and details are found in the *Minnesota Stormwater Manual* for each of the acceptable STPs, unless otherwise restricted by this manual.

## 13. CHECKLISTS

Refer to Appendix A & B

- Checklists for Construction Inspection and Operation & Maintenance
- Construction Inspection and Operation & Maintenance Checklists for each of the approved Stormwater Treatment Practices are available in the *Minnesota Stormwater Manual*.



## MS4 Stormwater Pollution Plan Review

<b>Permit #</b>		<b>Date Received:</b>		<b>SWPPP Reviewer:</b>		
<b>Project Name:</b>	<b>Site Size:</b>		acres			
	<b>Area of Disturbance:</b>		acres			
<b>Address / Location:</b>	<b>Existing Impervious:</b>		acres			
	<b>Proposed Impervious:</b>		acres			
<b>Notes:</b>						
1. A completed checklist shall be provided for all projects requiring the development of a stormwater management plan in the city.						
2. Provide a comment for any item checked with a no.						
<b>Permits</b>						
				Yes ✓	No ✓	NA ✓
Has an NPDES Construction General Permit been obtained?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are Wetlands shown on plans and has wetland permitting been completed?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is any work being proposed within a DNR Public Water? If yes, have all applicable permits been obtained?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are any other permits necessary and have they been obtained?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>						
<b>Plan Details</b>						
				Yes ✓	No ✓	NA ✓
A description of the construction activities and the potential for sediment and other pollutant discharges from the site.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maps showing the locations of all surface waters, including wetlands, stormwater ponds or basins within one mile of the site.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Areas of the site that will drain to a public water the Department of Natural Resources has promulgated "work in water restrictions" for fish spawning timeframes.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A determination whether surface waters within one mile of the site are special or impaired for one of the construction-related parameters and additional or enhanced BMPs that will be utilized to address the special or impaired waters.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stormwater pollution mitigation measures to be utilized as a result of an environmental review.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional measures needed at the site to address karst or drinking water supply management areas.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training documentation for all individuals required to be trained in associated duties in regard to the SWPPP.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A site map showing both the existing and final grades, including direction of flow and pre and post drainage area divides. The site map must also include locations of steep slopes, impervious surfaces, soil types, and pollutant-generating activities (building products, pesticides, herbicides, fertilizer, treatment chemicals, hazardous materials, solid waste, portable toilets, etc.).				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estimated quantities of all erosion prevention and sediment control BMPs to be used for the life of the project.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timing of installation for all erosion prevention and sediment control BMPs and permanent stormwater management systems.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location and type of all permanent and temporary erosion prevention and sediment control BMPs to be installed at the site along with procedures to establish additional BMPs as necessary.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A description of methods to be used for site dewatering and basin draining.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Areas not to be disturbed on the site, including the location of buffer zones.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Locations of areas to be phased to minimize duration of exposed soils.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Methods to minimize soil compaction and preserve top soil at the site.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Methods used to achieve final stabilization.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timing of installation for all erosion prevention and sediment control BMPs and permanent stormwater management systems.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A description of pollution prevention measures for storage, handling and disposal of hazardous materials, solid waste, concrete and equipment wash water, portable toilets, construction products and materials.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A description of inspection and maintenance activities and record keeping.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procedures for terminating permit coverage.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>						

Temporary Erosion Control BMPs			
	Yes ✓	No ✓	NA ✓
Does the plan show the location of erosion control measures (with standard detail plates and maintenance information for each)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are temporary rock entrances/exits for all vehicle access points shown on plan (provide detail)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the perimeter silt fence shown? Silt fence and/or rock checks should also be placed along swales or slopes greater than 50 feet in length (flare ends of silt fence up slope).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the type of each storm sewer inlet protection and location graphically shown?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are temporary sediment basins shown?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the plan provide temporary stabilization measures to stabilize the soils no later than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, and no later than seven (7) days after construction activity in that portion of the site has temporarily or permanently ceased when discharge points on the project are within one mile of a special or impaired water and flows to that special or impaired water? Options for temporary or permanent stabilization may include: erosion control mat, fiber blankets, netting, temporary seed, or temporary mulch.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are soil stockpile areas (indicate temporary stabilization measures) shown?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is street sweeping required?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the plan include a note indicating that all adjacent streets will be swept daily, or as directed by the City, to remove all accumulated materials? Failure to perform any street sweeping within six hours of notice by the City will result in the work being performed by the City and all associated costs billed. The City also requires removal of accumulated materials on streets during winter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the SWPPP include an erosion and sediment control inspection schedule along with a person responsible for conducting inspections and ensuring maintenance is being performed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>			
Stormwater Management Plan			
	Yes ✓	No ✓	NA ✓
Has a subwatershed delineation map been provided for the existing and proposed conditions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have modeling calculations been provided comparing the existing and proposed runoff conditions for the 2-year, 10-year, and 100-year 24-hour storm event using Atlas 14?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has the directly connected impervious been modeled separately (Composite CN Approach)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has off-site drainage been included and accounted for with modeling calculations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are skimmer structures being proposed on the outlets of all ponds?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has a maintenance plan been provided to satisfy the requirements of the City's maintenance agreement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>			
Volume Control			
	Yes ✓	No ✓	NA ✓
Does the plan provide volume control?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What is the required volume?			
What is the proposed volume?			
Soil Borings: a. Do the design infiltration rates match the soil conditions? b. Is there at least three feet of separation to seasonally high groundwater or bedrock?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has pretreatment been provided for prior to the discharge to all proposed infiltration/filtration features?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the plan prohibit infiltration when the system will receive discharges from the areas identified in <i>Section 8.2</i> of the Stormwater Management Design Standards for Stormwater Management?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>			
Water Quality			
	Yes ✓	No ✓	NA ✓
Is volume control provided? If yes, then water quality requirements satisfied.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If volume control is not provided, does the plan have the required total phosphorus removal from runoff leaving new development and redevelopment projects that exceed one acre of land disturbance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>			
Final Stabilization			
	Yes ✓	No ✓	NA ✓
For new resident construction, is required vegetated stabilization from the front curb line to the back of the structure for the entire width of the lot present? Show seeding and/or turf establishment locations and specifications, including: type of seeding (permanent, temporary, dormant); seed type and application rate; fertilizer type and application rate; mulch type, application rate, and method of anchoring; specifications for installation and maintenance of erosion control mats, blankets, or netting; note requiring seeding/restoration to be completed within 48 hours of final grading; location of all areas to be vegetated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>			



## Construction ESC Inspection Form

Date & Time of Inspection:	
Weather Conditions:	
Reason for Inspection:	<input type="checkbox"/> Routine <input type="checkbox"/> Rainfall > 0.5" in 24 Hours
24hr Precipitation:	

Project Name:	Project Number:
NPDES Permit #	Owner / Permittee:
MN State Duty Officer: 651.649.5451 or 800.422.0798	Contractor / Permittee:

General Site Activities:

  
  

Inspection Findings: NA = Not Applicable, C = Compliant, D = Deficient, NC = Non-Compliant

		NA	C	D	NC			NA	C	D	NC
1	Buffer Zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	Construction Entrance / Access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Concrete Washout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	Construction Phasing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Dewatering / Bypass Pumping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6	Dewatering NTU Reading	TBD = Inflow		TBD = Treated	
7	Polymer / Flocculent Application	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8	Ditch Checks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Dust Control / Wind Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10	Grading / Earthwork	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	ESC BMP Maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12	Inlet Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Inclement Weather Ready	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	14	Outlet Control Structure (24 hrs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Offsite Discharges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16	Perimeter Sediment Controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Directional Drilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	18	Redundant Perimeter Controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Secondary / Hazard Containment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20	Stabilization Measures / 24 Hour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Soil Stockpile Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	22	Stabilization Measures / 7 Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Silt Fence / Filter Log	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24	Stabilization Measures / 14 Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Detention / Sediment Pond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	26	Turbidity Curtain / Fence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Inspection Log / Amendments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	28	Waste / Trash Containment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Inspector Signature:	Date:    /    /
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