SAINT PAUL
MINNESOTA

Stormwater Management Design Standards

City of St. Paul

March 2023

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

APPENDICES

SECTION 1

1. DESIGN OVERVIEW

1.1. Context

The City of Saint Paul has regulated stormwater runoff from parcels since 1982. Zoning code mandated controlling the rate of discharge from development activity greater than one-quarter acre. The singular goal was preserving conveyance capacity of the separated storm sewer system and preventing flooding.

Nonpoint Source Pollution from the City's separate storm sewer system has been regulated under the Clean Water Act since 2000. This compelled the City of Saint Paul to adopt, in 2004, a legislative code chapter to address erosion and sediment control from Construction Activity greater than 1 acre, which included the rate control requirement for Sites greater than one-quarter acre.

Due to continued decline in local water quality and absence of robust municipal controls, two local Watershed district agencies – covering 90% of the City – jointly implemented Stormwater rules in 2006. This created an external agency permit program to mitigate Stormwater runoff volume and pollution from Construction Activity greater than 1 acre.

To align regulations for water quality and rate control both on small and large Sites, in 2010 the City adopted Ordinance 63.319.b that requires "Stormwater landscaping" on parking lots. That same year the City adopted sustainable building policies including a Stormwater overlay. The overlay required that eligible projects conform with Watershed volume control standards on Sites greater than one-quarter acre.

Flood control became a key topic again when in 2013 the National Weather Service released NOAA Atlas 14, Volume 8. The information in Atlas 14 supersedes precipitation frequency estimates from decades ago upon which the City's original rate control requirements were based.

In 2018, the City of Saint Paul's Clean Water Act permit authorizing Stormwater discharge from the City's separate storm sewer system was reissued. This again compels updated local controls for Stormwater.

1.2. Intent

The subject of controlling Stormwater runoff has evolved to be lengthy and complex. Engineering analysis, layers of regulation and agency programs, and a wide range of Site development constraints all factor into Stormwater permitting decisions. The City of Saint Paul has chosen to simplify its City ordinance and rely upon an official Stormwater Design Standards publication to convey the thorough and precise requirements necessary for effective Stormwater regulation. This approach provides a nimble framework to respond to any future regulatory changes.

The purpose of the Design Standards is to fully align the City's obligations and technical resources pertaining to surface water management. This includes the National Pollutant Discharge Elimination System program (Clean Water Act), Local Surface Water Management Plans (Minnesota Statute 103B) and engineering best practices such as the Minnesota Stormwater Manual.

SECTION 1

The goal of the Design Standards is to consolidate the City's various Stormwater controls to a single authoritative location, unify the various permitting thresholds and development requirements to a common platform, and streamline development permitting procedures.

2. DEFINITIONS

The following definitions describe the meaning of the terms used in this Design Manual. Definitions are consistent with those listed in the NPDES Construction Stormwater General Permit, the current version of the City of St. Paul MS4 Phase 1 Permit, and the Capitol Region Watershed/Ramsey-Washington Metro Watershed District Rules.

Applicant means any person or entity that applies for a building permit, subdivision approval, or a permit to allow construction activities. Applicant also means that person's agents, employees, and others acting under this person's direction.

Best Management Practices (BMPs) means the most effective and practicable means of erosion prevention and sediment control, and water quality management practices that are the most effective and practicable means of to control, prevent, and minimize degradation of surface water, including avoidance of impacts, construction-phasing, minimizing the length of time soil areas are exposed, prohibitions, pollution prevention through good housekeeping, and other management practices published by state or designated area-wide planning agencies. Individual BMPs are described in the current version of the MPCA Minnesota Stormwater Manual. BMPs must be adapted to the Site and can be adopted from other sources. However, they must be similar in purpose and as effective and stringent as the MPCA's BMPs.

Common Plan of Development or Sale means a contiguous area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one proposed plan. One plan is broadly defined to include design, permit application, advertisement or physical demarcation indicating that land disturbing activities may occur within a 5-year time period.

Construction Activity means activities including clearing, grading, and excavating, that result in Land Disturbance of equal to or greater than one acre, including the disturbance of less than one acre of total land area that is part of a larger Common Plan of Development or Sale if the larger common plan will ultimately disturb equal to or greater than one acre. This includes a disturbance to the land that results in a change in the topography, existing soil cover, both vegetative and nonvegetative, or the existing soil topography that may result in accelerated Stormwater runoff that may lead to soil erosion and movement of sediment. Construction Activity does not include a disturbance to the land of less than five acres for the purpose of routine maintenance performed to maintain the original line and grade, hydraulic capacity, and original purpose of the facility. Routine maintenance does not include activities such as repairs, replacement, and other types of non-routine maintenance. Pavement rehabilitation that does not disturb the underlying soils (e.g., mill and overlay projects) is not Construction Activity.

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

Discharge means “discharge of a pollutant” as defined in Minn. R. 7001.1020, subp. 12.

Erosion Prevention means measures employed to prevent erosion such as soil Stabilization practices, permanent cover, or construction phasing.

Final Stabilization means that all soil disturbing activities at the Site have been completed and a uniform, evenly distributed perennial vegetative cover with a density of seventy (70) percent of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent Stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

Fully Reconstructed means areas where Impervious Surfaces have been removed down to the underlying soils. Activities such as structure renovation, mill and overlay projects, and other pavement rehabilitation projects that do not expose the underlying soils beneath the structure, pavement, or activity are not considered Fully Reconstructed. Maintenance activities such as catch basin and pipe repair/replacement, lighting, and pedestrian ramp improvements are not considered Fully Reconstructed.

Gross Pollutant means larger particles of litter, vegetative debris, floatable debris and coarse sediments in Stormwater runoff.

Impervious Surface means a constructed hard surface that either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development. Examples include rooftops, sidewalks, driveways, parking lots, and concrete, asphalt, or gravel roads. Bridges over Surface Waters are Impervious Surfaces.

Land Disturbance means any activity on property that results in a change or alteration in the existing ground cover (both vegetative and non-vegetative) and/or the existing soil topography including the cumulative disturbance that is part of a larger Common Plan of Development or Sale. Land disturbing activities include, but are not limited to: development, redevelopment, demolition, construction, reconstruction, clearing, grading, filling, stockpiling, excavation, and borrow pits. Routine vegetation management, and pavement rehabilitation activities that do not disturb the material beneath the pavement base will not be considered Land Disturbance. In addition, in-kind catch basin and pipe repair/replacement done in conjunction with a pavement rehabilitation project shall not be considered Land Disturbance.

Linear Project means construction of new or Fully Reconstructed roads, trails, sidewalks, or rail lines that are not part of a Common Plan of Development or Sale. Rehabilitation is not considered reconstruction. Rehabilitation includes mill and overlay and other resurfacing activities within existing right-of-way that do not expose underlying soils.

Maintenance Agreement means a document recorded against the property which provides for long-term maintenance of best management practices.

Minimal Impact Design Standards (MIDS) means design requirements such that the rate and volume control and water quality standards of predevelopment Stormwater reaching receiving waters is unchanged compared to the runoff from developed land.

MPCA means the Minnesota Pollution Control Agency.

Municipal Separate Storm Sewer System (MS4) means a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains:

a. Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, Stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district, or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management Agency under section 208 of the federal Clean Water Act, United States Code, Title 33, section 1288, that discharges into waters of the state.

b. Designed or used for collecting or conveying Stormwater.

c. That is not a combined sewer.

d. That is not part of a Public Owned Treatment Works as defined at 40 CFR § 122.2.

Municipal separate storm sewer systems do not include separate storm sewers in very discrete areas, such as individual buildings (Minn. R. 7090.0080, subp. 8).

National Pollutant Discharge Elimination System (NPDES) means the program for issuing, modifying, revoking, reissuing, terminating, monitoring, and enforcing permits under the Clean Water Act, as amended (33 U.S.C. 1251 et seq. Section 1342 and 40 CFR parts 122, 123, 124 and 450). [Minn. R. 7090]

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.

Owner means the person or party possessing the title of the land on which the Land Disturbing Activity will occur; or if the Land Disturbing Activity is for a lease holder, the party or individual identified as the lease holder; or the contracting government agency responsible for the Land Disturbing Activity.

Responsible Party means the entity which will be responsible for Ownership and maintenance of Best Management Practices (BMPs).

Sediment Control means the methods employed to prevent sediment from leaving the Site. Sediment Control practices include, but are not limited to, silt fences, sediment traps, earth dikes, drainage swales, check dams, subsurface drains, pipe slope drains, storm drain inlet protection, and temporary or permanent sedimentation basins.

Site means any tract, lot, or parcel of land or combination of tracts, lots, or parcels of land, which are in one Ownership or are contiguous and in diverse Ownership, where development is to be performed

as part of a unit, subdivision, or project. Final determination of the applicable area for Stormwater management shall be made by the City.

Stabilization means the exposed ground surface has been covered by appropriate materials such as mulch, staked sod, riprap, erosion control blanket, mats or other material that prevents erosion from occurring. Grass seeding, agricultural crop seeding, or other seeding alone is not Stabilization. Mulch materials must achieve approximately 90 percent ground coverage (typically 2 ton/acre).

Standard Plates mean general drawings having or showing similar characteristics or qualities that are representative of a construction practice or activity.

Stormwater Management Plan means a plan, prepared by the Applicant by or under the direction of a licensed professional engineer, for Stormwater discharge that includes Erosion and Sediment Control measures that, when implemented, will decrease soil erosion on a parcel of land and decrease Off-Site pollution.

Stormwater Pollution Prevention Plan (SWPPP) means 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. This plan will be consistent with NPDES requirements.

Stormwater means precipitation runoff, Stormwater runoff, snowmelt runoff, and any other surface runoff and drainage.

Surface Waters means all streams, lakes, ponds, marshes, Wetlands, reservoirs, springs, rivers, drainage systems, waterways, Watercourses, and irrigation systems.

Watercourse means a natural or improved stream, river, creek, ditch, channel, culvert, drain, gully, swale, or wash in which waters flow continuously or intermittently in a defined direction.

Watershed means the region draining to a specific Watercourse or water basin.

Water Quality Volume means for Construction Activity, one and one-tenth (1.1) inches of runoff from the sum of the new and Fully Reconstructed Impervious Surfaces created by the project (calculated as an instantaneous volume).

Wetlands (as defined in Minn. R. 7050.0186, subp. 1a.B.) means those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Constructed wetlands designed for wastewater treatment are not waters of the state. Wetlands must have the following attributes:

a. a predominance of hydric soils; and
b. inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in a saturated soil condition; and

c. under normal circumstances support a prevalence of such vegetation. [Minn. R. 7050.0186, Subp. 1a.B]

3. PROCEDURE FOR REVIEWING STORMWATER MANAGEMENT PLANS

These Design Standards are an official statement of City policy and rules pursuant to Saint Paul Legislative Code 52.02.

Any Applicant proposing a Land Disturbance greater than one-quarter (1/4) acre that triggers a Site plan review per City code or Construction Activity of equal to or greater than one (1) acre within the City shall submit a Stormwater Management Plan to the City for approval. A Stormwater Pollution Prevention Plan (SWPPP) may also be required based on the applicability outlined below.

Stormwater Management Plans shall be consistent with the current NPDES Construction Stormwater General 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 City permits.

3.1. Regulation

3.1.1. Volume Control and Water Quality Threshold

Any Construction Activity, including new development, redevelopment, and Linear Projects, with a Land Disturbance of greater than or equal to one (1) acre, including smaller individual Sites that are part of a Common Plan of Development or Sale, within the City's jurisdiction and that discharge to the City's MS4, must meet the volume control and water quality requirements of Section 5.3 and 5.4.

3.1.2. Rate Control Threshold

Any Land Disturbance greater than one-quarter (1/4) acre (10,890 square feet) that triggers a Site plan review per City code or Construction Activity of equal to or greater than one (1) acre within the City must meet the requirements of Section 5.5 and 5.6.

3.1.3. Erosion and Sediment Control Threshold

Any Land Disturbance greater than one-quarter (1/4) acre (10,890 square feet) that triggers a Site plan review per City code or Construction Activity of equal to or greater than one (1) acre within the City must submit a Stormwater Management Plan and meet the requirements of Section 6 of this document. A NPDES Construction Stormwater General Permit and SWPPP will be required for Construction Activity that results in Land Disturbance of equal to or greater than one (1) acre, or if a project is part of a Common Plan of Development or Sale that ultimately will disturb equal to or greater than one (1) acre.

The table below summarizes the City regulations for Stormwater management.

Stormwater Thresholds Summary	
Land Disturbance > 0.25 acres	**Construction Activity (Land Disturbance ≥ 1 acre)**
Project must meet following requirements: 1) Rate Control (Sec 5.5 and 5.6) 2) Long Term Inspection and Maintenance Requirements (5.9) 3) Erosion and Sediment Control (Sec. 6) Includes new development, redevelopment, and Linear Projects. A Flood Response Plan (Section 5.6) might be required, as determined by the City.	Project must meet following requirements: 1) Volume Reduction (Sec 5.3) 2) Water Quality (Sec 5.4) 3) Rate Control (Sec 5.5 and 5.6) 4) Long Term Inspection and Maintenance Requirements (5.9) 5) Erosion and Sediment Control (Sec. 6) Includes new development, redevelopment, and Linear Projects. A Flood Response Plan (Section 5.6) might be required, as determined by the City.

3.2. Exemptions

The following activities are exempt from submitting a Stormwater Management Plan (Erosion and Sediment Control Plan may still be required):

1. A Land Disturbance that post-construction creates 100% pervious surfaces unless the Land Disturbing Activity alters the existing drainage boundaries.
2. Installation of fence, sign, telephone and electric poles and other kinds of posts or poles.
3. Any projects outside the ROW that are not subject to Site plan review pursuant to SPLC 62.400.
4. Emergency work to protect life, limb, or property and emergency repairs, unless the Land Disturbance would have otherwise required an approved erosion and Sediment Control plan, except for the emergency. If such a plan would have been required, then the disturbed land area shall be shaped and stabilized in accordance with the City's requirements as soon as possible.
5. Utility improvement projects that have a Land Disturbance less than 1 acre in size.
6. Location within a green infrastructure Stormwater management district. Properties within these districts shall meet the requirements of the district.
7. The Erosion and Sediment Control requirements outlined in these Standards will apply to all Sites with Land Disturbance greater than or equal to one-quarter (¼) acre.

Unless otherwise exempted, Applicants are required to follow requirements of these Design Standards and/or the Watershed District requirements.

3.3. Review Process

Preliminary review or early staff consultation is available and recommended for potential Applicants. Site plan review is codified in SPLC 61.402. The City shall not grant Site plan approval, nor by extension a building permit, unless the Applicant is considered by staff as having satisfied the requirements of these Standards. The Departments of Public Works and Safety and Inspections shall

jointly review the Stormwater Management Plan for conformance with the Standards. The following is an outline of the Site plan review process:

1. Applicant is to submit Site plan and completed Site Plan Review Application form to the Department of Safety and Inspections.
2. City staff reviews the Site plan. Various City departments will review including Sewers, Water, Traffic, Zoning, Parks, and Fire.
3. Applicant is to meet with the District Council for the neighborhood in which the project is proposed. District Councils have an advisory role and send comments to City staff to be considered during the Site plan review.
4. Applicant is to meet with City staff to discuss the project and any needed revisions to the plans.
5. City staff is to submit comments to the Applicant following the meeting.
6. Applicant is to make any needed revisions to the Site plan. The revised plans will be reviewed against the comments City staff had from the Site plan meeting. This review takes about one week. Another meeting with City staff is not usually needed.
7. City staff is to issue a letter approving the Site plan if all comments have been addressed.
8. Applicant is to apply for building permits. No private 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.

The City's Public Works department will review the following:

- Erosion/Sediment Control associated with utility upgrades and street reconstruction occurring within City Right-of-Way.
- Rate control for all development.
- Storm sewer connections to and modifications to public storm sewer system.
- Water quality and volume reduction for street reconstruction occurring within City Right-of-Way.
- Construction and design of Stormwater best management practices constructed within City Right-of-Way.

The City's Department of Safety and Inspections will review the following:

- Erosion/Sediment Control associated with developments occurring outside of City Right-of-Way.
- Water quality and volume reduction for development outside the City Right-of-Way.
- Construction and design of Stormwater best management practices constructed outside the City Right-of-Way.
- Long Term Inspection and Maintenance Agreements.

If the City determines that the Stormwater Management Plan and the SWPPP meet the requirements of these standards, the City shall issue a permit for erosion and sediment control, rate control, and other Stormwater management requirements. The permit shall be valid for a specified period of time that authorizes the Land Disturbance contingent on the implementation and completion of this plan.

3.4. Permit Review Requirements if in Ramsey-Washington Metro Watershed District (RWMWD) or Capitol Region Watershed District (CRWD)

Any Applicant proposing a Land Disturbance for which a permit is required under the RWMWD and CRWD Rules shall first obtain an approved permit from the District that has jurisdiction over the Land Disturbance Activity prior to the issuance of any City permits.

Additional permit requirements can be found on the CRWD and RWMWD websites.

3.5. Permit Review Requirements if in Mississippi Watershed Management Organization (MWMO) or Lower Mississippi River Watershed Management Organization (LMRWMO)

The City will complete the permitting for all projects located within the MWMO and LMRWMO in accordance with the requirements of these Design Standards.

3.6. Other Agency Requirements

Some projects may require approvals beyond those required by the City and the Watershed agencies. The Applicant is responsible for obtaining all required permits and approvals. Examples of potential additional permits include (but are not limited to):

Minnesota Department of Natural Resources (MNDNR)

- Water Appropriations Permit
- Public Waters Work Permits
- Floodplain Impact Permit
- Mississippi River Corridor Critical Area (MRCCA) Vegetation Clearing and Restoration Permit
- MRCCA Land Alteration Permit

Minnesota Pollution Control Agency (MPCA)

- NPDES Construction Stormwater General Permit
- Petroleum and brownfields programs for the cleanup of contaminated Sites for redevelopment
- NPDES Industrial Stormwater Permit
- Sanitary Sewer Extension Permit

Metropolitan Council Environmental Services (MCES)

- MCES Direct Connection Permit
- Industrial Waste Discharge Permit
- Encroachment agreements

Minnesota Department of Transportation (MnDOT)

- Drainage Permit
- Utility Accommodation Permit

Ramsey County

- Excavation or Obstruction Permit

United States Army Corps of Engineers (USACE)

- Permits for work in US waters and Wetlands
- Section 404 Clean Water Act Permit (Wetlands)

- Section 408 Permission for alterations to a USACE Civil Works project (levee, dam, navigable waterway)

Minnesota Board of Water and Soil Resources (BWSR)

- Wetland Conservation Act (WCA) Local Government Unit (LGU) Approval

3.7. Modification of the Plan

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

The Applicant must amend the Stormwater Management Plan and/or SWPPP 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 of pollutants to Surface Waters or underground waters.
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.
3. The plan is not achieving the general objectives of minimizing pollutants in Stormwater discharges associated with the Land Disturbance.
4. The plan is not consistent with the terms and conditions of these standards, or other permitting authority standards.

4. SUBMITTAL REQUIREMENTS

Stormwater Management Plan Requirements

The Applicant shall include all Stormwater design information as part of the official Site plan review process. Materials shall be provided to the City in accordance with the City's electronic plan review and approval program. All Site plan applications are pre-screened by staff to assess adequacy and completeness. The Stormwater Management Plan should include the following at a minimum, or as required by the City's Public Works Department:

- The name, address, and telephone number of the following individuals:
    - Owner(s)
    - Applicant
    - Person responsible for the preparation of the Stormwater Management Plan and/or SWPPP.
    - Onsite person responsible for implementation, inspection, and maintenance of the requirements of the Management Plan and/or SWPPP.
    - Person responsible for the long-term operation and maintenance of the permanent Stormwater management system.
- Project description that includes the nature and purpose of the Land Disturbance, the amount of grading, utilities, and building construction involved and the location of the project.
- Stormwater management plan summary sheet (Appendix C) including:
    - Disturbed area in acres.
    - Existing, proposed, and fully reconstructed impervious areas in acres.
    - Water quality volume required in cubic feet.
    - Water quality volume provided in cubic feet.
    - Proposed total suspended solids (TSS) load reduction in tons/year and % TSS reduction.
    - Proposed total phosphorus (TP) load reduction in lbs/year and % TP reduction.
    - Existing and proposed peak discharge rates at each discharge point for the 2-, 10-, and 100-year storm events.
- Total existing and proposed site drainage areas in acres.
- Information for each separate drainage area including:
    - Outline within the Site property lines or improvement limits, including roofs and all other surface areas.
    - Area in acres.
    - Separate pervious and impervious curve numbers along with descriptions.
    - Pervious and impervious areas.
    - Time of concentration in minutes.
- Tables as shown in Appendix B.
- Map of existing Site conditions that includes existing topography, property information, steep slopes, existing drainage areas and any BMPs, waterways, Wetlands, vegetative cover and 100-year floodplain boundaries.
- Soils information including Ramsey County Soil Survey or logs of borehole investigations that may have been performed along with supporting geotechnical report.
- Site construction plan that includes the location of the proposed Land Disturbance and the plan for the maintenance and inspection of the Stormwater BMPs, including the plan for disposal of collected sediment and floating debris.

- Construction plan details for all structures used to control the stormwater discharge rate from the site. These include catch basins, manholes, pipes, weirs, orifices, curb openings and control flow roof drains. Rim and invert elevations must be provided.
- Grades or contours to define the routing of stormwater and stormwater detention areas.
- Location and elevation of Emergency Overflows (EOFs) routes.
- Outline of each separate onsite detention area. Ponding may be provided in parking lots, green areas, roof tops or underground storage.
- Hydrologic and hydraulic (H&H) electronic models and design calculations for all structural components of the Stormwater system (i.e., storm drains, open channels, swales, BMPs, etc.) for the predevelopment and post development conditions must be submitted. The City's preferred software programs are HydroCAD and XP-SWMM for H&H modeling and the MIDS Calculator (available on the MPCA's website) for water quality modeling. The developer/engineer shall determine the appropriate H&H modeling software to account for any tailwater conditions that impact the site. Other programs may be used with approval by the City. Such calculations shall include:
    - Existing and proposed condition analysis for runoff rates, volumes, velocities, and water surface elevations showing methodologies used, design parameters, and supporting calculations. Atlas 14 rainfall data and MSE 3 distributions must be used. Any existing BMPs must be included in the existing runoff rate analysis.
    - Final sizing calculations for structural Stormwater management practices including contributing drainage area, storage (including BMP area, depth, and volume), normal and high-water levels, peak inflow and outflow, outlet configuration, and overflow route. Drainage areas must include any Off-Site drainage.
    - Stage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities (e.g., Stormwater ponds and Wetlands).
    - Analysis, computations, and supporting materials indicating that volume control, water quality, and rate control design criteria are being met.
- Location of streams, lakes, or Wetlands which may be impacted by the Land Disturbance and final analysis of potential downstream impact/effects of project, where necessary.
- Provisions for preventing sediment discharge to adjacent properties and other designated areas such as streams, Wetlands, and lakes.
- Location of temporary and permanent Stormwater BMPs.
- Standard Plates and/or specifications for all Stormwater BMPs.
- A plan to stabilize utility construction areas as soon as possible.
- A plan for permanent Stabilization including how the Site will be stabilized after construction is completed, including specifications and schedules.
- A plan for removal of temporary erosion and Sediment BMPs at the end of the project.
- Construction phasing that includes time frames and schedules for the project's various aspects including erosion and Sediment Control practices.

Projects disturbing less than one (1) acre and requiring Site plan review must provide erosion and Sediment Controls (SPLC 61.402(c)11). These controls must be shown within the submitted Site plan package and at minimum must be consistent with the MPCA's Minnesota Stormwater Manual and NPDES Construction Stormwater General Permit.

5. STORMWATER MANAGEMENT REQUIREMENTS

5.1. Guidance on Stormwater Treatment Practices (BMPs)

The Stormwater Management Plan shall meet the volume control, water quality, and rate control requirements of these Standards. Deviations from Standards 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 H&H modeling and water quality modeling to demonstrate that the performance goals of these Standards have been met.

5.2. List of Acceptable Stormwater Treatment Practices

The Minnesota Stormwater Manual identifies a number of potential BMPs that can be used during design to meet Stormwater management requirements. 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. Volume reduction can be met with any combination of BMPs with the highest preference given to green infrastructure techniques and practices. Low Impact Design (LID) practices are encouraged when they can be functionally incorporated into the design. Specific design standards for BMPs can be found in Section 7 of this document and in the Minnesota Stormwater Manual.

5.3. Volume Control

1. A Construction Activity that requires volume reduction shall retain Stormwater runoff onsite to the maximum extent practicable (not discharge to a surface water) a Water Quality Volume of one and one-tenth (1.1) inches times the new and/or Fully Reconstructed Impervious Surfaces, unless precluded by Section 5.3.3. The required Water Quality Volume shall be calculated as follows:

   Water Quality Volume (ft^3) = New and Fully Reconstructed Impervious Surfaces (ft^2) x 1.1(in) x 1/12 (ft/in)

2. Volume reduction practices must first be considered to meet volume control requirements. Highest preference is given to green infrastructure techniques and practices (e.g., infiltration, evapotranspiration, harvest and use, urban forestry, green roofs, or other volume reduction practices).

3. The use of infiltration techniques shall be prohibited in any of the following areas:

   a. That receive discharges from vehicle fueling and maintenance, regardless of the amount of new and/or Fully Reconstructed Impervious Surface.

b. That receive Stormwater runoff from entities regulated under NPDES for industrial Stormwater: automobile salvage yards; scrap recycling and waste recycling facilities; hazardous waste treatment, storage, or disposal facilities; or air transportation facilities that conduct deicing activities.

c. Where high levels of contaminants in soil or groundwater may be mobilized by the infiltrating Stormwater. To make this determination, the Owners and/or operators of Construction Activity must complete the MPCA's Site screening assessment checklist, which is available in the Minnesota Stormwater Manual, or conduct their own assessment. The assessment must be retained with the Site plans.

d. Where soil infiltration rates are more than 8.3 inches per hour unless soils are amended to slow the infiltration rate below 8.3 inches per hour.

e. Of predominately Hydrologic Soil Group D (clay) soils.

f. Within 1,000 feet up-gradient or 100 feet down gradient of active karst features.

g. Outside of an Emergency Response Area (ERA) within a Drinking Water Supply Management Area (DWSMA) (Minn. R. 4720.5100, subp. 13.) classified as high or very high vulnerability as defined by the Minnesota Department of Health, unless the Applicant performs or approves a higher level of engineering review sufficient to provide a functioning treatment system and to prevent adverse impacts to groundwater.

h. In an ERA within a DWSMA classified as high or very high vulnerability as defined by the Minnesota Department of Health.

i. In an ERA within a DWSMA classified as moderate vulnerability as defined by the Minnesota Department of Health, unless the Applicant performs or approves a higher level of engineering review sufficient to provide a functioning treatment system and to prevent the adverse impacts to groundwater.

j. 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 bedrock.

k. Where Stormwater infiltration would cause erosion or effect the stability of bluff lines, steep slopes, or levee systems.

4. Infiltration shall be restricted on Sites that are located adjacent or upgradient to the levee systems, bluff lines, steep slopes, or No Infiltration Zones identified in **Figure 1** in **Appendix A.** Applicant coordination with the City will be required to identify these areas and the post construction Stormwater management requirements.

5. Projects within CRWD or RWMWD that are not able to incorporate infiltration must follow the Alternative Compliance Sequencing in Rule C of the Watershed rules.

6. Projects within MWMO or LMRWMO that are not able to incorporate infiltration must follow the Alternative Compliance Sequencing listed below:

Alternative Compliance Sequence #1:
First, the Applicant shall comply or partially comply with the volume reduction standard to the maximum extent practicable onsite through alternative volume reduction methods as listed below and in the application guidance materials, or as approved by the City. If the Applicant meets these requirements, the project is compliant, and no further sequencing steps are necessary.

- If filtration of the Water Quality Volume is deemed necessary through alternative compliance sequencing, the required Stormwater runoff volume shall be multiplied by 1.82 (i.e., 55% filtration credit) and the filtration BMP shall provide this storage volume below the invert of the low overflow outlet of the BMP (perforated drain pipes for filtration will not be considered the low overflow outlet).
- If iron-enhanced sand is used as a filtration media, the required Stormwater runoff volume shall be multiplied by 1.25 (i.e., 80% filtration credit), and the filtration BMP shall provide this storage volume below the invert of the low overflow outlet of the BMP (perforated drain pipes for filtration will not be considered the low overflow outlet).
- Iron-enhanced media shall include a minimum of 5% of iron filings by weight and shall be uniformly blended with filtration media.
- Other enhanced filtration media or water quality treatment structural devices may be considered and credited at the sole discretion of the City.

Alternative Compliance Sequencing #2:
Second, for the remaining volume reduction required to fully meet the standard, the Applicant shall comply with the volume reduction standard at an Off-Site location as outlined in the mitigation requirements of Section 5.8.

5.4. Water Quality

1. Developments shall incorporate effective non-point source pollution reduction BMPs to achieve 90% TSS removal from the disturbed area of the project on an annual basis. Runoff volume reduction BMPs may be considered towards compliance with the 90% TSS removal requirement.
2. Water quality calculations, documentation, and/or water quality modeling shall be submitted to verify compliance with the standard and to document the TP load reduction.
3. Drainage areas that directly discharge to a Wetland, river, lake, or stream shall meet the water quality standard onsite.
4. Projects utilizing Off-Site mitigation to meet the volume reduction standard, shall meet the water quality standard onsite to the maximum extent practical. At a minimum, BMPs shall be in each onsite drainage area of a development to remove Gross Pollutants.
5. Linear construction projects shall meet the above water quality policy to the maximum extent practical.
6. The City encourages the reduction of Impervious Surface upon development or redevelopment.
7. 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.

8. For new Stormwater discharge points/outfalls, the City and/or developer shall provide pretreatment (at least grit removal) of Stormwater prior to its discharge to Wetlands and other water resources.

5.5. Rate Control

1. Proposed runoff rates for each discharge point shall not exceed existing runoff rates for the 2-year, 10-year, and 100-year 24-hour storm events using Atlas 14 precipitation depths and MSE 3 storm distributions. Runoff rates may be restricted to less than the existing rates when the capacity of downstream conveyance systems is limited.
2. Atlas 14 24-hour rainfall events used for rate control analysis shall use the depths listed in the table below:

Event	Rainfall/Snowmelt Depth (inches)
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

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 shorter duration, critical events other distributions may be used with the approval of the Public Works - Sewers Department.
4. Detention systems shall be designed with capacity for the 100-year 24-hour rainfall event or the 10-day snowmelt runoff event, whichever is greater.
5. Drainage and Utility Easements over 100-year High Water Levels (HWLs), emergency overflows (EOFs), floodplains, detention areas, Wetlands, ditches, and all other parts of the Stormwater system as areas develop or redevelop are required.
6. All drainage system analyses and designs shall be based on proposed full development land use patterns.
7. Any existing BMPs shall be accounted for in the existing runoff rate analysis.
8. All drainage area contributing to the proposed Site and/or BMP shall be accounted for in the rate control analysis. This includes areas Off-Site and beyond the public right-of-way that will be contributing to the Site and/or BMP.

5.6. Freeboard and Flood Response Plans

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

1. New Habitable Buildings
    a. Waterbodies with piped outlets and the Mississippi River: Low floor must be a minimum of 2 feet above the 100-year flood elevation.
    b. Waterbodies without piped outlets: Low floor must be a minimum of 5 feet above the 100-year flood elevation.
    c. Subsurface Stormwater management BMPs:

i. Low floor must be a minimum of 2 feet above the 100-year flood elevation or one foot above the emergency overflow elevation unless flood proofing measures are constructed with the building; and
ii. Low opening must be a minimum of 2 feet above the 100-year flood elevation or one foot above the emergency overflow elevation.

2. Existing Habitable Buildings – Adjacent to and Potentially Affected by Flood Waters
    a. Waterbodies with piped outlets and the Mississippi River: Low opening must be a minimum of 2 feet above the 100-year flood elevation.
    b. Waterbodies without piped outlets: Low opening must be a minimum of 5 feet above the 100-year flood elevation.
    c. Subsurface Stormwater management BMPs:
        i. Low floor must be a minimum of 2 feet above the 100-year flood elevation or one foot above the emergency overflow elevation unless flood proofing measures are constructed with the BMP; and
        ii. Low opening must be a minimum of 2 feet above the 100-year flood elevation or one foot above the emergency overflow elevation.

3. Underground Parking Structures
    a. Waterbodies with piped outlets and the Mississippi River: Low opening must be a minimum of 2 feet above the 100-year flood elevation.
    b. Waterbodies without piped outlets: Low opening must be a minimum of 5 feet above the 100-year flood elevation.
    c. Subsurface Stormwater management BMPs:
        i. Low opening must be a minimum of 2 feet above the 100-year flood elevation or one foot above the emergency overflow elevation.

4. Public Roadway
    a. Roadway shall not flood when adjacent to a Stormwater storage basin designed to store the 100-year storm event.
    b. Freeboard requirement will be set by the road authority.

In some areas, where street access and storm or sanitary service could be impacted during Mississippi River flood events, a detailed flood response plan (FRP) will be required, as determined by the City. The FRP shall encompass private flood protection efforts (gates/valves/berms/floodwalls/etc.), temporary sewer service provisions, and alternate property access/egress and be prepared by a professional engineer licensed in the state of Minnesota.

5.7. Cost Cap

For Linear Projects, costs specific to satisfying the volume reduction and water quality standards on Linear Projects need not exceed a cost cap which will be set by the City based on current CRWD/RWMWD Policies. The cap shall apply to costs directly associated with the design, testing, land acquisition, and construction of the volume reduction and water quality Stormwater BMPs only. Unit costs for construction shall be used to determine the cost of the volume reduction and water quality BMPs and must be reviewed and approved by the City. The City may contribute an amount above the cap in order to meet the volume reduction and water quality standards or it may allow the Applicant to partially comply with the standards when the cap is met.

5.8. Mitigation Requirements

Under certain circumstances, some construction projects cannot cost effectively meet the conditions for post construction Stormwater management in sections 5.3 and 5.4 on the Site of the original Construction Activity. All methods must be exhausted prior to considering alternative locations where mitigation projects can be completed. If the City has determined that all methods have been exhausted, the Applicant will be required to identify alternative locations where Stormwater discharges not addressed on the Site of the original Construction Activity can be addressed through mitigation and, at a minimum, must ensure the following requirements are met:

1. 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 St. Paul.
2. Mitigation projects must involve the establishment of new structural Stormwater BMPs or the retrofit of existing structural Stormwater BMPs, or the use of a properly designed regional structural Stormwater BMPs.
3. Previously required routine maintenance of structural Stormwater BMPs cannot be considered mitigation.
4. Documentation of who is responsible for long-term maintenance of the mitigation BMP must be included in the Applicant's submittal.

5.9. Long Term Inspection and Maintenance of Stormwater Facilities

The purpose of a Long-Term Inspection and Maintenance plan is to inform property Owners about the system components on their properties, so that they will know the locations and maintenance needs of the project post-construction.

All Stormwater BMPs must have a plan of operation and maintenance that ensures continued effective removal of the pollutants carried in Stormwater runoff. [SPLC 52.04 subpart f(5)]

The plan shall address schedules for inspections and techniques for operation and maintenance including vegetation clearing or mowing and removing accumulated trash, debris, sediment pollutants and other forms of pollution.

The City's MS4 permit requires a legal mechanism(s) between the municipality and Owners or operators responsible for the long-term maintenance of structural Stormwater BMPs not owned or operated by the City. This applies to Stormwater BMPs installed to meet the volume control and water quality requirements of Section 5.3 and 5.4 and rate control requirements of section 5.2.

Refer to Appendix F for an agreement template(s). The agreement requires a legal description, a depiction of the facilities, and stipulates the Owner shall submit annually a report to the City that includes the inspection date(s) of the Facilities, conditions of the Facilities, and any corrective actions taken. The City will require a unilateral agreement for all Stormwater BMPs located within the City.

6. EROSION AND SEDIMENT CONTROL STANDARDS

6.1. Erosion and Sediment Control for Small Sites (>0.25 acres to <1 acre)

1. Erosion and Sediment Control measures for small Sites must be shown on the Site plan, including the location and details of how they will be constructed and installed.
2. Measures to be used include but are not limited to perimeter controls, inlet protection for catch basins and sewers, stabilized construction entrances, and street sweeping.
3. Erosion and Sediment Control measures must be installed before grading, clearing and construction begins and must be maintained in good condition until the construction Site is stabilized.
4. Small sites should generally follow the same requirements outlined in Section 6.2 that would be applicable to the Land Disturbance Activity.

6.2. Erosion and Sediment Control for Large Sites Requiring an NPDES Permit (≥1 acre)

Site plans shall incorporate erosion, sediment, and waste controls as specified in the MPCA's NPDES Construction Stormwater General Permit and the City's MS4 Permit. At a minimum the Site plans shall incorporate the following categories of erosion, sediment, and waste controls as described in the above referenced permits:

6.2.1. Erosion Prevention Practices

1. Erosion and Sediment Control measures shall be consistent with standards listed in the NPDES Construction Stormwater General Permit.
2. The Applicant 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.
3. Applicants must minimize the need for disturbance of portions of the project with steep slopes. When steep slopes must be disturbed, applicants must use techniques such as phasing and Stabilization practices designed for steep slopes (e.g., slope draining and terracing).
4. Applicants must stabilize all exposed soil areas, including stockpiles. Stabilization must be initiated immediately to limit soil erosion when Construction Activity has permanently or temporarily ceased on any portion of the Site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed no later than 14 calendar days after the Construction Activity has ceased. Temporary stabilization is not required on constructed base components of roads, parking lots and similar surfaces. Stabilization is not required on temporary stockpiles without significant silt, clay, or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) but applicants must provide Sediment Controls at the base of the stockpile. Stabilization must occur no later than 7 days after Construction Activity if 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.
5. 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.

6. Applicants must stabilize the normal wetted perimeter of the last 200 linear feet of temporary or permanent drainage ditches or swales that drain water from the Site within 24 hours after connecting to a surface water or property edge. Applicants must complete Stabilization of remaining portions of temporary or permanent ditches or swales within 14 calendar days after connecting to a surface water or property edge and construction in that portion of the ditch temporarily or permanently ceases.
7. Temporary or permanent ditches or swales being used as a sediment containment system during construction (with properly designed rock-ditch checks, bio rolls, silt dikes, etc.) do not need to be stabilized. Applicants must stabilize these areas within 24 hours after their use as a sediment containment system ceases.
8. Applicants must not use mulch, hydromulch, tackifier, polyacrylamide or similar Erosion Prevention practices within any portion of the normal wetted perimeter of a temporary or permanent drainage ditch or swale section with a continuous slope of greater than 2 percent.
9. Pipe outlets must have temporary or permanent energy dissipation within 24 hours after connecting to a surface water or permanent Stormwater treatment system.
10. When possible, all slopes must be graded in such a fashion so that tracking marks made from heavy equipment are perpendicular to the slope.
11. All areas disturbed during construction must be restored as detailed in the NPDES Construction General Permit.
12. 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.
13. 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

6.2.2. 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 downgradient Sediment Controls are overloaded, based on frequent failure or excessive maintenance requirements, applicants must install additional upgradient Sediment Control practices or redundant BMPs to eliminate the overloading and amend the SWPPP to identify these additional practices as required in the NPDES Construction Stormwater General Permit. 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.
3. Temporary or permanent drainage ditches and sediment basins designed as part of a sediment containment system (e.g., ditches with rock-check dams) require Sediment Control practices only as appropriate for Site conditions.
4. 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.

5. Rock construction entrances should be at least 6 inches thick of aggregate and at least 50 feet long. Geotextile fabric may be needed under the rock to prevent migration of mud from the underlying soil into the aggregate.
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. Dust control measures, such as application of water must be performed periodically due to weather, Construction Activity, and/or as directed by the City.
9. 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.
10. 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.
11. 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.
12. Additional Sediment Control measures shall be added as necessary to effectively protect the natural resources of the City. The temporary and permanent erosion and sediment control plans shall be revised as needed based on current Site conditions and to comply with all applicable requirements.
13. Restrict clearing and grading adjacent to an existing Wetland boundary to provide for a protective buffer strip of natural vegetation as per Section 8.

6.2.3. 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 land Owners. The Applicant 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.

6.2.4. Inspections and Maintenance

1. The Applicant shall be responsible for inspecting and maintenance of the BMPs.
2. The Applicant must routinely inspect the construction project once every 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:
    a. Date and time of inspections.
    b. Name of person(s) conducting the inspections.
    c. Findings of inspections, including recommendations for corrective actions.
    d. Corrective actions taken (including dates, times, and the party completing the maintenance activities).
    e. Date and amount of all rainfall events 0.5 inches or greater in 24-hours.
    f. Documentation of changes made to SWPPP.
4. Inspections of the stabilized areas can be reduced to one month when parts of the construction Site have achieved Final Stabilization, but work continues on other parts of the Site. If work has been suspended due to frozen ground conditions, the required inspections and maintenance must take place as soon as runoff occurs or prior to resuming construction, which ever 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 Applicant shall investigate and comply with the following inspection and maintenance requirements:
    a. All silt fences and other perimeter controls must be repaired, replaced, or supplemented when they become nonfunctional, or the sediment reaches half of the height of the fence. These repairs shall be made within 24-hours of discovery, or as soon as field conditions allow access.
    b. Temporary and permanent sedimentation basins must be drained, and the sediment removed when the depth of sediment collected in the basin reaches half of the storage volume. Drainage and removal must be completed within 72-hours of discovery, or as soon as field conditions allow access.
    c. Surface Waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment being deposited by erosion. The Applicant 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 7 days of discovery unless precluded by legal, regulatory, or physical access constraints. The Applicant shall use all reasonable efforts to obtain access. If precluded, removal and Stabilization shall take place within 7 calendar days of obtaining access. The Applicant is responsible for contacting all local, regional, state, and federal authorities and receiving any applicable permits, prior to conducting any work.
    d. 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.
    e. The Applicant 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 Applicant is responsible until another Applicant has assumed control over all areas of

the Site that have not been finally stabilized or the Site has undergone Final Stabilization, and a Notice of Termination (NOT) has been submitted to the MPCA.

f. 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.

6.2.5. Pollution Management Measures/Construction Site Waste Control

The Applicant 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 onsite.
4. The City of 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 Applicant must comply with all other pollution prevention/good housekeeping requirements of the MPCA NPDES Construction General Permit.

6.2.6. Final Stabilization

1. The Applicant must ensure Final Stabilization of the project. Final Stabilization is not complete until the following is completed:
    a. 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 of expected final growth over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions.
    b. All drainage ditches, constructed to drain water from the Site after construction is complete, must be stabilized to preclude erosion.
    c. 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.
    d. The Applicant 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:
    a. Temporary erosion protection and down gradient perimeter control for individual lots has been completed and the residence has been transferred to the homeowner.
    b. The Applicant has distributed the MPCA “Homeowner Fact Sheet” to the homeowner, so the homeowner is informed for the need, and benefits, of Final Stabilization.

6.2.7. 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 Applicant 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 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 Applicant must consider public safety and may consider factors such as Site soils, slope, and available area onsite. This determination must be documented in the SWPPP.
7. The Applicant shall maintain the sedimentation basins’ function 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 project’s 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.

6.2.8. 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, and permanent Stormwater management and must relate to the work that the trainee is responsible for managing.

7. STORMWATER FACILITIES DESIGN STANDARDS

This section was developed by the City of St. Paul Public Works Department with the purpose of identifying governing Standards and Specifications for Stormwater facilities that are to become public as part of any permitting process or formal agreement(s). It is recommended that all Applicants adopt these design standards to the maximum extent practical as part of their Site plan designs and construction activities. The list herein may be updated as needed.

7.1. Applicable Standards and Specifications

1. Local:
    a. Department of Public Works; City of St. Paul, Minnesota; Standard Supplemental Specification for Construction
    b. City Standard Plates
    c. City Municipal Code
    d. City of Saint Paul Standard Specifications for Constructing and Repairing Private Sewer Connections
    e. City of St. Paul Policies
    f. Public Works Department Policies
    g. City of Saint Paul Stormwater Management Requirements
    h. Local Watershed District Requirements
2. State:
    a. State Statutes, Rules, and Laws.
    b. National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (MS4) Permit Requirements
    c. General permit to Discharge Stormwater Associated with Construction Activity
    d. Minnesota Stormwater Manual
    e. MnDOT Standard Specifications for Construction
    f. MnDOT Approved/Qualified Products
    g. MnDOT Standard Plates
    h. MnDOT Drainage Manual
3. Other:
    a. City Engineers Association of Minnesota (CEAM) Standard Specifications
    b. Great Lakes Upper Mississippi River Board 10 States Standards for Wastewater

7.2. Storm Sewers

1. Storm sewer pipes shall be designed utilizing the SCS Method or other approved method by the City. Channel design shall be hydrograph method only. All methods are subject to the Public Works - Sewers Department approval. XPSWMM modeling may be required.
2. State Aid roadway storm sewer shall be designed per the State Aid requirements. Catch basin leads shall be designed to accommodate the 10-year Atlas 14 MSE 3 rainfall using the SCS Method or another approved method by the City. New trunk storm sewers should be designed to the 10-year design flow for directly tributary areas; and at a minimum designed to carry the 100-year storm event pond discharge. Exceptions to be reviewed on a case-by-case basis.

3. Minimum storm pipe diameters are 15-inches for catch basin lead pipes and 8-inches for perforated piping. Utility conflicts may necessitate smaller pipe diameters for catch basin lead pipes. Minimum storm pipe slopes are 2% for catch basin lead pipes.
4. Manhole spacing shall not exceed 400 feet.
5. Where more than one pipe enters a structure, a catch basin/manhole shall be used.
6. 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.
7. 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 6 fps.
8. Transient street ponding will occur for rainfall events greater than the 10-year event, and in the case of plugged inlets. For safety reasons, the maximum depth in streets should not exceed 1.5 feet at the deepest point. For reconstructed or new City streets the number and spacing of catch basin inlets should be in compliance with MnDOT State Aid inlet spread calculations.
9. Catch basin castings used on all streets shall be consistent with City Standard Plates.
10. The maximum design flow at a catch basin for the 10-year storm event shall be 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 Public Works - Sewers Department.
11. All structures located in the street shall be consistent with City Standard Plates.
12. Private Storm sewer connections are not permitted to City catch basins or sanitary sewer.
13. Any connections to existing manholes shall be core drilled or the opening cut out with a concrete saw. No jack hammering or breaking the structure with a sledgehammer or mallet is permitted. All connections to an existing system will require a manhole for access.
14. Storm sewer connections must be no deeper than 5 feet to invert at the property line.
15. PVC pipe if used must be SDR 26. SDR 35 is not allowed.
16. To the greatest extent possible, manholes shall be placed in paved surfaces or other readily accessible areas.
17. The submitted plan must include a note stating that “Connections to public sewers must be done by a Licensed House Drain Contractor under a permit from Saint Paul Department of Public Works.”
18. To promote efficient hydraulics within manholes, manhole benching shall be provided to 1/2 diameter of the largest pipe entering or leaving the manhole.
19. Set the tailwater elevation equal to the invert elevation of the connecting point of the City sewer plus pipe diameter times 0.7 to account for assumed 70% of full flow. If the peak discharge time of the private connecting pipe coincides with that of the City sewer, the City may require that the tailwater effects on the proposed onsite storage be investigated. The connecting point to be at or above the spring line of the existing pipe, as approved by Public Works - Sewers Department.
20. Storm sewer infrastructure passing within 10 feet of a building are governed by the MN Plumbing Code.
21. Developments must have primary rain leaders directly connected to storm and secondary discharge to permeable surface at grade.

7.3. Outlet and Inlet Pipes

1. Inlet pipes of Stormwater ponds shall be extended to the pond normal water level whenever possible.

2. In the case of discharge to channels or basins, riprap shall be provided on all outlets consistent with MnDOT Standard Plates.
3. Steel sheet pile headwalls under FES aprons and concrete grouted riprap shall be installed at all pipe outlets 24” in diameter or larger.
4. Aprons or flared end sections shall be placed at all locations where the storm sewer outlets into a ponding area. All aprons or flared end sections shall be tied to the last three (3) pipe joints. The City standard for aprons or flared end sections is the latest revision of MnDOT Standard Plate for Concrete Apron for Reinforced Concrete Pipe. The use of safety aprons and safety grates shall be used based on roadway clear zone requirements.
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.

7.4. Channels and Overland Drainage

1. Overland drainage routes where velocities exceed 4 fps shall be reviewed by the Public Works - Sewers Department and approved only when suitable Stabilization measures are proposed.
2. 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.
3. Effective energy dissipation devices shall be provided at all conveyance system discharges to prevent bank, channel, or shoreline erosion.
4. Open channels shall be designed to convey the critical 100-year event.
5. Channel side slopes should be a maximum of 4:1 (horizontal to vertical) with gentler slopes being desirable.
6. The minimum grade in all unpaved areas shall be 2%.

7.5. Ponds

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 onsite infiltration of runoff is achieved. Design of onsite detention basins, as described in the Site's runoff water management plan, shall incorporate the design requirements below as well as any additional requirements from the NPDES Construction Permit and/or the Minnesota Stormwater Manual.

1. Permanent pool depths must be a minimum of 3 feet and maximum of 10 feet at the deepest points. Mean depth for wet ponds shall be a minimum of 4 feet. Mean depth is defined as the area at outlet elevation divided by the wet volume.
2. Maximum allowable pond slopes above the outlet elevation are 4:1.
3. All constructed ponds and Wetland mitigation areas shall have an aquatic/maintenance bench around the entire perimeter. The aquatic/maintenance bench is defined as follows:
    a. Cross-slope no steeper than 10:1.
    b. Minimum width of 10 feet.
    c. Located one foot below the pond outlet elevation and normal water level.
4. Basin outlets must be designed to prevent short-circuiting and the discharge of floating debris. Basin outlets must have energy dissipation.

5. Applicants must configure the basin to minimize scour or resuspension of solids.
6. Applicants must design basins using an impermeable liner if located within areas where infiltration is prohibited.

7.6. Infiltration Practices

1. Infiltration options include, but are not limited to: infiltration basins, infiltration trenches, rainwater gardens, bioretention areas without underdrains, swales with impermeable check dams, and natural depressions. If Applicants utilize an infiltration system to meet the City's volume control requirements, they must incorporate the design parameters below. Other sizing and design elements shall be in conformance with the volume control requirements of this manual, the *Minnesota Stormwater Manual*, and applicable watershed district requirements.
2. Applicants must design infiltration systems such that pre-existing hydrologic conditions of Wetlands in the vicinity are not impacted (e.g., inundation or breaching a perched water table supporting a Wetland).
3. Applicants must not excavate infiltration systems to final grade, or within three (3) feet of final grade, until the contributing drainage area has been constructed and fully stabilized unless they provide rigorous Erosion Prevention and Sediment Controls (e.g., diversion berms) to keep sediment and runoff completely away from the infiltration area.
4. When excavating an infiltration system to within three (3) feet of final grade, applicants must stake off and mark the area so heavy construction vehicles or equipment do not compact the soil in the infiltration area.
5. Infiltration design must include a pretreatment device such as a vegetated filter strip, forebay, or water quality inlet (e.g., grit chamber) to remove solids, floating materials, and oil and grease from the runoff, to the maximum extent practicable, before the system routes Stormwater to the infiltration system. City staff and *Minnesota Stormwater Manual* recommendations shall be utilized for determining the appropriate level of pretreatment on a case-by-case basis.
6. Applicants must design the infiltration system to discharge all Stormwater (including Stormwater in excess of the Water Quality Volume) routed to the system through the uppermost soil surface or engineered media surface within 48 hours. Additional flows that cannot infiltrate within 48 hours must be routed to bypass the system through a stabilized discharge point.
7. Applicants must provide a means to visually verify the infiltration system is discharging through the soil surface or filter media surface within 48 hours or less.
8. Applicants must provide at least one soil boring, test pit and/or infiltrometer test in the location of the infiltration practice for determining infiltration rates. The soil boring is required to go to a depth of at least five feet below the proposed bottom of the BMP.
9. For design purposes, Applicants must divide field measured infiltration rates by 2 as a safety factor or applicants can use soil-boring results with the infiltration rate chart in the Minnesota Stormwater Manual to determine design infiltration rates. When soil borings indicate type A soils, applicants should perform field measurements to verify the rate is not above 8.3 inches per hour. This permit prohibits infiltration if the field measured infiltration rate is above 8.3 inches per hour.
10. Applicants must employ appropriate onsite testing ensure a minimum of three (3) feet of separation from the seasonally saturated soils (or from bedrock) and the bottom of the proposed infiltration system.

11. Vegetation of infiltration practices shall be included in the submitted plans as shown in the Minnesota Stormwater Manual. A plan for management for vegetation shall also be included in the Stormwater Pollution Prevention Plan.
12. Rock storage beds shall be constructed using crushed angular granite, field stone, or river rock (non-carbonate rock) that has been thoroughly washed to remove all fine particles that could result in clogging of the system.

7.7. Filtration Practices

1. Filtration options include, but are not limited to: sand filters with underdrains, biofiltration areas, swales using underdrains with impermeable check dams and underground sand filters. If applicants utilize a filtration system to meet the permanent Stormwater treatment requirements of this permit, they must incorporate the design parameters below. Other sizing and design elements shall be in conformance with the volume control requirements of this manual and the Minnesota Stormwater Manual.
2. Applicants must not install filter media until they construct and fully stabilize the contributing drainage area unless they provide rigorous Erosion Prevention and Sediment Controls (e.g., diversion berms) to keep sediment and runoff completely away from the filtration area.
3. Applicants must use a pretreatment device such as a vegetated filter strip, small sedimentation basin, water quality inlet, forebay or hydrodynamic separator to remove settleable solids, floating materials, and oils and grease from the runoff, to the maximum extent practicable, before runoff enters the filtration system.
4. Applicants must design the filtration system to discharge all Stormwater (including Stormwater in excess of the Water Quality Volume) routed to the system through the uppermost soil surface or engineered media surface within 48 hours. Additional flows that the system cannot filter within 48 hours must bypass the system or discharge through an emergency overflow.
5. Applicants must design the filtration system to provide a means to visually verify the system is discharging through the soil surface or filter media within 48 hours.
6. Applicants must employ appropriate onsite testing to ensure a minimum of three (3) feet of separation between the seasonally saturated soils (or from bedrock) and the bottom of the proposed filtration system.
7. Applicants must ensure that filtration systems with less than three (3) feet of separation between seasonally saturated soils or from bedrock are constructed with an impermeable liner.

7.8. Underground Retention and Infiltration/Filtration Systems

1. Applicants must provide a detail for all underground basins that calls out pertinent elevations (e.g., outlet, bottom of chambers, bottom of media, drain tile if applicable), materials used, and system dimensions.
2. All cleanouts, access ports, and view ports must be clearly identified on the plans.
3. Applicants must Include gradation and/or applicable ASTM/AASHTO standards for all filtration and backfill materials and for all underground structures, geotextile fabric, impermeable liners, and underdrain piping.
4. To reduce potential for resuspension of sediment in isolator rows, the system must have high flow bypass/diversion structure(s) to bypass large storm events around the system when feasible. The high flow bypass/diversion structures must be modeled to ensure design water quality event is captured by BMP and not bypassed downstream.

5. The system must be designed for non-erosive velocities (less than 6 fps) at the discharge point into the underground chamber to reduce resuspension of settled material
6. Piped connections between the isolator rows and chambers are highly recommended over permeable isolator rows.
7. Applicants must follow manufacturer recommendations for design, installation, and maintenance.
8. At a minimum provide sump manholes at each inflow point
9. Install underdrains with a minimum slope of 0.5 percent and a minimum pipe diameter of 8 inches.
10. Construct underdrains with perforated Schedule 40, SDR 26 Smooth Wall PVC pipe, or Dual Wall HDPE pipe
11. Include at least 2 observation/cleanouts for each underdrain; cleanouts should be installed every 200 feet or at all corners for systems with an underdrain
12. Filter sock around underdrains is not recommended due to clogging potential.
13. 48-inch manholes are recommended at each end of isolator rows.
14. Cleanouts or access ports are recommended at each end of non-isolator rows.
15. If non-isolator rows are longer than 200-feet, access ports or cleanouts are recommended at the mid-point in addition to the ends.
16. Isolator rows must be solid wall pipe and be sumped (preferable sump depth is a minimum of 3-feet)
17. Maintenance of the isolator rows must be clearly outlined in the Applicant's operation and maintenance plan.
18. Underground systems must be at least 10 feet from building foundations per the MN Plumbing Code.

7.9. BMP Accessibility for Maintenance

1. Applicants shall include defined access routes on grading plans for maintenance purposes to all manholes, lift stations, inlets, and/or outlets at ponding areas that are outside of public right of way. Access routes shall be paved with an 8% maximum grade, 2% cross slope, a minimum width of 10 feet and a turnaround where applicable. Access easements shall be dedicated at the time of final platting if necessary.
2. Maintenance access locations shall be accessible by vactor truck with overhead areas clear of obstacles and have pavement section rated for maintenance truck loads.

7.10. Emergency Overflow Paths

1. EOFs shall be sized with a minimum bottom width of 5 feet and 4:1 side slopes or as required by the City.
2. EOFs for low points on paved surfaces must be designed for the 100-year rainfall event.
3. 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.
4. All ponds shall have a stabilized EOF to accommodate storm events in excess of the basin's hydraulic design.

8. DESIGN EXAMPLES

The design process for each of the acceptable Stormwater Treatment Practices is detailed in the Minnesota Stormwater Manual.

9. CONSTRUCTION SPECIFICATIONS

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

Additional specifications will follow the City of St. Paul's Governing Specifications manual, Standard Specifications for Constructing and Repairing Private Sewer Connections, and any other specifications deemed applicable by the City.

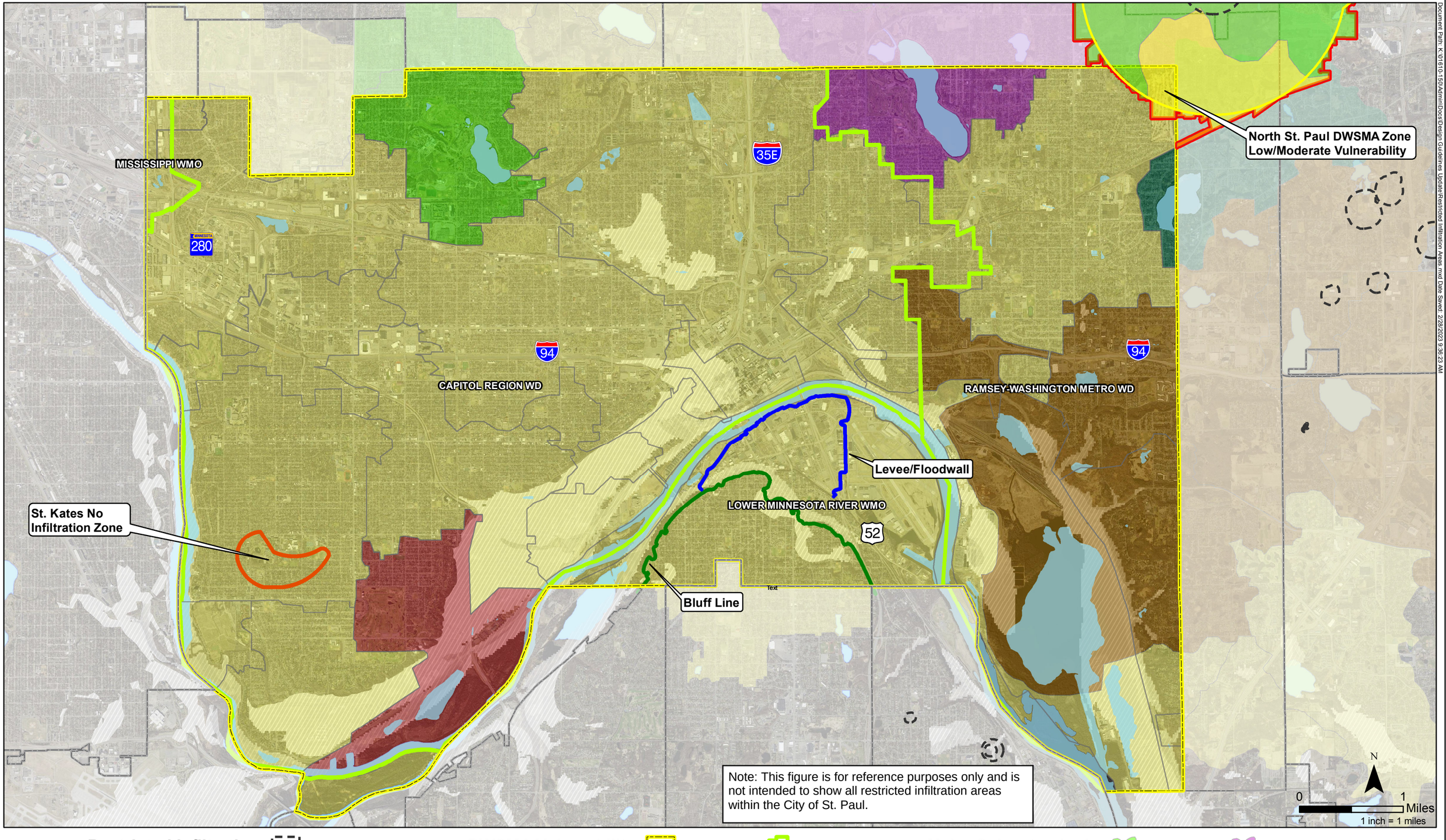
10. CHECKLISTS

Refer to Appendix C& D for:

- Stormwater Management Plan Checklist.
- Checklists for Construction Site Stormwater Inspection Checklist.
- Construction Inspection and Operation & Maintenance Checklists for each of the approved Stormwater Treatment Practices are available in the *Minnesota Stormwater Manual*. Applicants should consult with BMP manufactures for specific Operation & Maintenance procedures and checklists for the devices proposed.

APPENDIX A

Figure 1: Restricted Infiltration Areas



SAINT PAUL
MINNESOTA

Restricted Infiltration Areas
Design Guidelines
City of St. Paul

- Emergency Response Area
- WHPA
- DWSMA

DWSMA Vulnerability
- Low
- Moderate

- St. Paul
- Other Cities
- Active Karst
- Watershed Agency
- Minor Subwatersheds
- Water Bodies

Major Subwatersheds
- Beaver Lake
- Como Lake
- Crosby Lake
- Lake Phalen
- Mississippi River
- Pigs Eye

wsb

APPENDIX B

Example Stormwater Management Plan Tables

Example Stormwater Management Plan Tables

Table 1. Drainage Area Information

Drainage Area Name	Description	Area (ac)	Impervious Area (ac)	Pervious Curve Number (CN)	Time of Concentration (min)	Drains To
	Total					

(Provide separate tables for existing & proposed conditions)

Table 2. Drainage Area Runoff Information

	Existing Peak Discharge Rate (cfs)	Existing Discharge Volume (ac-ft)	Proposed Peak Discharge Rate (cfs)	Proposed Discharge Volume (ac-ft)
2-year				
10-year				
100-year				

(Provide for each discharge point, Include existing BMPs in analysis)

Table 3. On-site Detention BMP Information

Elevation (ft)	Surface Area (ac)	Incremental Storage (ac-ft)	Cumulative Storage (ac-ft)

(Provide for each detention BMP)

Table 4. Summary of Water Quality

	Existing Drainage Area Runoff	Proposed Drainage Area Runoff	Load/Volume Removed by BMP	Proposed Site Discharge
TP (lbs/yr)				
TSS (tons/yr)				
Volume (ac-ft)				

Table 5. Connections to City Sewer

Pipe Name	Length (ft)	Diameter (in)	Type/ Material	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Maximum Discharge (cfs)	Downstream Water Elevation (ft)

APPENDIX C

Stormwater Management Plan Cover Pages and Checklist

Stormwater Management Plan Summary

For Development and Redevelopment Projects

SAINT PAUL
MINNESOTA

Project Name: _____

Project Type: ☐ Development ☐ Redevelopment

Site Address/PID: _____

Site Size: _____ ac

Disturbed area: _____ sf

If ≥ 1 acre was a SWPPP submitted? ☐ Yes ☐ No ☐ N/A

Existing Impervious: _____ sf

Proposed Impervious: _____ sf

Fully Reconstructed Impervious: _____ sf

Rate Control Trigger: Land Disturbance ≥ 0.25 acres		
	Existing Peak Discharge Rate	Proposed Peak Discharge Rate
2-year	cfs	cfs
10-year	cfs	cfs
100-year	cfs	cfs

Note: If there are multiple discharge points, include a table of the peak rate comparison for all of them in the Stormwater Management Plan.

Water Quality Trigger: Construction Activity (Land Disturbance ≥ 1 acre)			
Water Quality Volume (WQV) Required			cf
Water Quality Volume Provided			cf
WQV Breakdown	Unrestricted	As Infiltration	cf
	Alt Seq 1	As Filtration (WQV_F = WQV * 1.82) As IESF (WQV_IESF = WQV * 1.25) As MTD (WQV_MTD = WQV* Approved factor)	cf
	Alt Seq 2	Off-site	cf
	Alt Seq 3	Via Payment into Stormwater Impact Fund (CRWD and RWMWD only)	cf
Proposed TSS load reduction			ton/yr
% TSS reduction			%
Proposed TP load reduction			lb/yr
% TP reduction			%

Note: **WQV (ft^3) = New and Fully Reconstructed Impervious (ft^2) x 1.1(in) x 1/12 (ft/in)**

Signature: _____ Date: _____

Name: _____ PE license number: _____

Title: _____ Company: _____

Stormwater Management Plan Summary

For Linear Projects

SAINT PAUL
MINNESOTA

Project Name: _____

Site Address/PID: _____

Site Size: _____ ac

Disturbed area: _____ sf

If ≥ 1 acre was a SWPPP submitted? ☐ Yes ☐ No ☐ N/A

Existing Impervious: _____ sf

Proposed Impervious: _____ sf

Fully Reconstructed Impervious: _____ sf

Rate Control Trigger: Land Disturbance ≥ 0.25 acres		
	Existing Peak Discharge Rate	Proposed Peak Discharge Rate
2-year	cfs	cfs
10-year	cfs	cfs
100-year	cfs	cfs

Note: If there are multiple discharge points, include a table of the peak rate comparison for all of them in the Stormwater Management Plan.

Water Quality Trigger: Construction Activity (Land Disturbance ≥ 1 acre)			
Water Quality Volume (WQV) Required			cf
Water Quality Volume Provided			cf
WQV Breakdown	Unrestricted	As Infiltration	cf
	Alt Seq 1	As Filtration (WQV_F = WQV * 1.82) As IESF (WQV_IESF = WQV * 1.25) As MTD (WQV_MTD = WQV *Approved factor)	cf
	Alt Seq 2	Off-site	cf
	Alt Seq 3	Via Payment into Stormwater Impact Fund (CRWD and RWMWD only)	cf
Proposed TSS load reduction			ton/yr
% TSS reduction			%
Proposed TP load reduction			lb/yr
% TP reduction			%

Note: **WQV (ft^3) = New and Fully Reconstructed Impervious (ft^2) x 1.1(in) x 1/12 (ft/in)**

Signature: _____ Date: _____

Name: _____ PE license number: _____

Title: _____ Company: _____

Stormwater Management Plan Checklist

SAINT PAUL
MINNESOTA

Project Name: _____
Reviewed By: _____
Date: _____

Submittals Received

Date	Document	Author

Procedural

☐ Plans signed by a licensed professional engineer
☐ Permits
- ☐ Watershed District – RWMWD or CRWD
- ☐ NPDES Construction Stormwater General Permit
- ☐ BWSR – Wetland Conservation Act Permit
- ☐ DNR
- ☐ USACE
- ☐ MnDOT
- ☐ Ramsey County
- ☐ MRCCA – Vegetation Clearing Permit, Land Alteration Permit

City Doing Work: ☐ Yes ☐ No

Site Plan

☐ Easements
☐ Maintenance Agreement
☐ Maintenance Access

Grading Plan

☐ Datum
☐ Floodplain Boundary and elevation
☐ Basin NWL and HWLs
☐ EOF locations and elevations
☐ 4:1 Slope Max
☐ Building Elevations
☐ Grading Limits
☐ As-builts once project is complete

Utility Plan

☐ Storm Sewer Design
☐ City Standard Detail Plates
☐ Construction details for any special structures, BMPs, etc.
☐ Storm structure rim and invert elevations
☐ Casting Types
☐ Cleanouts

Erosion Control Plan

☐ SWPPP/NPDES Permit (sites ≥ 1 acre)
☐ Silt Fence
☐ CB Inlet Protection
☐ Rock Entrance
☐ Street Sweeping
☐ Restoration
☐ Erosion Control Contact Person

Stormwater Management Plan

☐ Existing and proposed drainage area maps
☐ Existing BMPs included
☐ Off-site drainage included
☐ Modeling Calculations
    ☐ 2-, 10-, 100-year 24-hr Atlas 14 MSE 3, 100-yr 10-day snowmelt
    ☐ If landlocked, 100-yr back-to-back and 10-day snowmelt events
☐ Wetlands shown on plans and wetland permitting completed
☐ Pretreatment
☐ Skimmer
☐ Soil Borings
    ☐ Design Infiltration Rate Determination
    ☐ Seasonal High Water Elevation
    ☐ Wellhead Protection

Water Quality

Required Water Quality Volume: _____

- WQV (ft3) = New and Fully Reconstructed Impervious (ft^2) x 1.1(in) x 1/12 (ft/in)

Provided Water Quality Volume: _____

Required Vs. Provided Water Quality Volume:_____ ☐ Surplus ☐ Deficit

Alternative Sequencing

- Infiltration prohibited: ☐ Yes ☐ No
- Sequencing notes:

☐ 90% TSS removal

Rate Control

☐ Peak Discharge Rates < Existing
☐ Existing Rate Control BMPs accounted for

Freeboard

☐ Groundwater Separation

Low Floor of New Habitable Buildings

- ☐ Waterbodies with piped outlets/Mississippi River: At least 2' above 100-yr HWL
- ☐ Waterbodies with piped outlets: At least 5' above 100-yr HWL
- ☐ Subsurface BMPs: At least 2' above 100-yr HWL or 1' above the EOF unless floodproofing is constructed.
  - ☐ Low opening: At least 2' above 100-yr HWL or 1' above the EOF

Low Opening of Existing Habitable Buildings

- ☐ Waterbodies with piped outlets/Mississippi River: At least 2' above 100-yr HWL
- ☐ Waterbodies with piped outlets: At least 5' above 100-yr HWL
- ☐ Subsurface BMPs: At least 2' above 100-yr HWL or 1' above the EOF
  - ☐ Low floor: At least 2' above 100-yr HWL or 1' above the EOF unless floodproofing is constructed.

Low Opening of Underground Parking Structures

- ☐ Waterbodies with piped outlets/Mississippi River: At least 2' above 100-yr HWL
- ☐ Waterbodies with piped outlets: At least 5' above 100-yr HWL
- ☐ Subsurface BMPs: At least 2' above 100-yr HWL or 1' above the EOF

Public Road

- ☐ Stormwater BMPs adjacent to a road shall not flood in the 100-year event
- ☐ Freeboard as required by the road authority

☐ Flood response plan, if required

Inspection and Maintenance

☐ Operations and maintenance plan
☐ Maintenance agreement

Storm Sewer Design

☐ 10-year design capacity and 100-year pond discharge
☐ Minimum pipe diameter: 15"
☐ Minimum catch basin lead slope: 2%
☐ Minimum perforated pipe diameter: 8"
☐ Manhole spacing: 400 ft or less
☐ Match top of pipe to top of pipe unless grade constraints
☐ Private connections at or above spring line of existing/public pipe
☐ Private connections to a public manhole (not catch basin)
☐ Minimum velocity: 3 fps, Maximum velocity: 10 fps, Maximum velocity into a pond: 6 fps
☐ Maximum design flow at CB: 3 cfs, Maximum ponding in streets: 1.5'
☐ Storm sewer connections: $\leq$ 5' at property line
☐ "Licensed House Drain Contractor" note
☐ Tailwater: Invert + Pipe Diameter * 0.7
☐ Sheet pile headwalls under 24" or larger FES

☐ Tie last three joints

Channels and Overland Drainage

☐ 100-year design capacity
☐ Velocities over 4 fps reviewed by Public Works
☐ Maximum channel side slopes: 4:1
☐ Minimum grade in unpaved areas: 2%

Ponds

☐ Permanent pool: 3-10', Minimum average: 4'
☐ Maximum pond slopes above outlet: 4:1
☐ Maintenance bench – Minimum width: 10', Maximum cross slope: 10:1
☐ Impermeable liner if infiltration is prohibited

Infiltration Practices

☐ Pretreatment
☐ 48-hour drawdown
☐ Soil boring/test pit for infiltration rate
☐ 3' separation from seasonally saturated soils or bedrock

Filtration Practices

☐ Pretreatment
☐ 48-hour drawdown
☐ 3' separation from seasonally saturated soils or bedrock OR impermeable liner

Underground BMPs

☐ Maximum velocity into system: 6 fps
☐ Sump manholes or pretreatment at inflow points
☐ Underdrains – Minimum slope: 0.5%, Minimum diameter: 8"
    ☐ Cleanouts – Minimum: 2 per drain and at all corners, Maximum spacing: 200'
☐ Minimum separation from building foundation: 10'

EOFs

☐ Minimum bottom width: 5'
☐ 100-year design capacity for low points on paved surfaces
☐ Maximum flow depth: 1' for 100-year back-to-back event

APPENDIX D

Construction Inspection and BMP Operation and Maintenance Checklists
(See Minnesota Stormwater Manual for addition reference examples)

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

Construction stormwater inspection checklist

Construction Stormwater Program

Doc Type: Permitting Checklist

Note: This inspection checklist is an option for small construction sites. Large construction sites and linear projects require more extensive/more location specific inspection requirements. This inspection report does not address all aspects of the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Construction Stormwater Permit (Permit) issued on August 1, 2018. The completion of this checklist does not guarantee that all permit requirements are in compliance; it is the responsibility of the Permittee(s) to read and understand the permit requirements.

Facility information

Site name: _____

Site address: _____ Permit number: _____

City: _____ State: _____ Zip code: _____

Inspection information

Inspector name: _____ Phone number: _____

Organization/Company name: _____

Date (mm/dd/yyyy): _____ Time: _____ ☐ am ☐ pm

Is the inspector trained in sediment and erosion control and is it documented in the Stormwater Pollution Prevention Plan (SWPPP)?
☐ Yes ☐ No

Is this inspection routine or in response to a storm event: ☐ 7 day ☐ Rain

Rainfall amount (if applicable): _____

Is site within one aerial mile of special or impaired water that can potentially receive discharge from the site? ☐ Yes ☐ No

If yes, follow Section 23 and other applicable permit requirements.

Note: If NA is selected at any time, specify **why** in the comment area for that section.

Erosion prevention requirements (Section 8.1)

		Yes	No	NA
1.	Are soils stabilized where no construction activity has occurred for 14 days (including stockpiles)? (7 days where applicable, or 24 hours during Minnesota Department of Natural Resources [DNR] Fish Spawning restrictions)	☐	☐	☐
2.	Has the need to disturb steep slopes been minimized?	☐	☐	☐
3.	If steep slopes are disturbed, are stabilization practices designed for steep slopes used?	☐	☐	☐
4.	All ditches/swales stabilized 200' back from point of discharge or property edge within 24 hours? (Mulch, hydromulch, tackifier, or similar best management practices [BMPs] are not acceptable in ditches/swales if the slope is greater than 2%)	☐	☐	☐
5.	Do pipe outlets have energy dissipation (within 24 hours of connection)?	☐	☐	☐
6.	Is construction phasing being followed in accordance with the SWPPP?	☐	☐	☐
7.	Are areas not to be disturbed marked off (flags, signs, etc.)?	☐	☐	☐

Comments:

Sediment control requirements (Section 9.1))

	Yes	No	NA
1. Are perimeter sediment controls installed properly on all down gradient perimeters?	☐	☐	☐
2. Are appropriate BMPs installed protecting inlets, catch basins, and culvert inlets?	☐	☐	☐
3. Is a 50 foot natural buffer preserved around all surface waters during construction?	☐	☐	☐
If No, have redundant sediment controls been installed?	☐	☐	☐
4. Do all erodible stockpiles have perimeter control in place?	☐	☐	☐
5. Is there a temporary sediment basin on site, and is it built as required in Section 14 of the permit?	☐	☐	☐
6. Is soil compaction being minimized where not designed for compaction?	☐	☐	☐
7. Is topsoil being preserved unless infeasible?	☐	☐	☐
8. If chemical flocculants are used, is there a chemical flocculant plan in place?	☐	☐	☐

Comments:

Maintenance and inspections (Section 11)

	Yes	No	NA
1. Are all previously stabilized areas maintaining ground cover?	☐	☐	☐
2. Are perimeter controls maintained and functioning properly, sediment removed when one-half full?	☐	☐	☐
3. Are inlet protection devices maintained and adequately protecting inlets?	☐	☐	☐
4. Are the temporary sediment basins being maintained and functioning properly?	☐	☐	☐
5. Are vehicle tracking BMPs at site exists in place and maintained and functioning properly?	☐	☐	☐
6. Is all tracked sediment being removed within 24 hours?	☐	☐	☐
7. Have all surface waters, ditches, conveyances, and discharge points been inspected?	☐	☐	
8. Were any discharges seen during this inspection (i.e., sediment, turbid water, or otherwise)?	☐	☐	

If yes, record the location of all points of discharge. Photograph and describe the discharge (size, color, odor, foam, oil sheen, time, etc.). Describe how the discharge will be addressed. Was the discharge a sediment delta? If yes, will the delta be recovered within seven days and in accordance with item 11.5 of the permit?

Comments:

Pollution prevention (Section 12)

	Yes	No	NA
1. Are all construction materials that can leach pollutants under cover or protected?	☐	☐	☐
2. Are hazardous materials being properly stored?	☐	☐	☐
3. Are appropriate BMPs being used to prevent discharges associated with fueling and maintenance of equipment or vehicles?	☐	☐	☐
4. Are all solid wastes being properly contained and disposed of?	☐	☐	☐
5. Is there a concrete/other material washout area on site and is it being used?	☐	☐	☐
6. Is the concrete washout area marked with a sign?	☐	☐	☐
7. Are the concrete/other material washout areas properly maintained?	☐	☐	☐

Comments:

Other

	Yes	No	NA
1. Is a copy of the SWPPP, inspection records, and training documentation located on the construction site, or can it be made available within 72 hours?	☐	☐	☐
2. Has the SWPPP been followed and implemented on site, and amended as needed?	☐	☐	☐
3. Is any dewatering occurring on site?	☐	☐	☐
If yes, what BMPs are being used to ensure that clean water is leaving the site and the discharge is not causing erosion or scour?			
4. Will a permanent stormwater management system be created for this project if required and in accordance with Section 15 of the permit (if adding an acre or more of new impervious surface)?	☐	☐	☐
If yes, describe:			
5. If infiltration/filtration systems are being constructed, are they marked and protected from compaction and sedimentation?	☐	☐	☐

6. Description of areas of non-compliance noted during the inspection, required corrective actions, and recommended date of completion of corrective actions:

7. Proposed amendments to the SWPPP:

8. Potential areas of future concern:

9. Additional comments:

Disclosures:

- After discovery, the permit requires many of the deficiencies that may be found on site be corrected within a specified period of time. See permit for more details.
- The Permittee(s) is/are responsible for the inspection and maintenance of temporary and permanent water quality management BMPs as well as erosion prevention and sediment control BMPs until another Permittee has obtained coverage under this Permit according to Section 3, or the project has met the termination conditions of the permit and a Notice of Termination has been submitted to the Minnesota Pollution Control Agency.

APPENDIX E

ESC for Utility Projects in the Right-of-Way

CITY OF SAINT PAUL
Christopher B. Coleman, Mayor

Public Works
Right-of Way Division

Telephone: 651-266-6151
Facsimile: 651-266-9765
Email: PW-ROWpermits@ci.stpaul.mn.us

EROSION AND SEDIMENT CONTROL FOR UTILITY PROJECTS IN THE RIGHT-OF-WAY

It is essential to prevent dirt, debris, oils and other waste from entering storm drains or water resources.

Erosion and sediment control devices are **REQUIRED** for any utility construction or grading project that will result in significant land disturbing activity in the public right-of-way.

- Sediment control practices (inlet protection and perimeter control /silt fence) must be installed **BEFORE** any land disturbance activities begin.
- Temporary land stabilization practices should be installed:
  - Daily over all temporary stockpiles on or near street (including plastic cover and temporary down drains); *and*,
  - Within 7 days after work is completed over all disturbed areas not on or near the street (including temporary seeding of spoil piles though seeding and mulching).

Refer to the Mn/DOT Pocketbook Guide (June 2009) for guidance to preventing pollutants from leaving construction sites. Note: general operations, including dewatering and concrete washout, begin on page 57.
http://www.dot.state.mn.us/environment/pdf_files/erosion-sediment-control-handbook.pdf

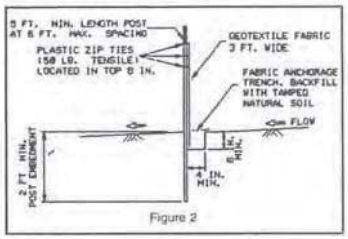


Figure 2

SILT FENCE

Silt fence is used as perimeter control to keep sediment on-site and away from areas you want to protect. For work in the right-of-way, silt fence can be installed between the top of the curb and the disturbed boulevard.

TEMPORARY SEEDING AND MULCHING OR PLASTIC COVER

Temporary seeding and mulching is to quickly provide temporary cover that will protect the soil from erosion until establishment of permanent stabilization. Applicable areas include any topsoil stockpiles and any areas disturbed by grading activities.

For areas that must be stabilized each day (located on or near the street) plastic cover should be used instead.

STORM DRAIN INLET PROTECTION

Storm drain inlet protection prevents sediment from entering a storm drain by surrounding or covering the inlet with a filtering material. This allows sediment-laden runoff to pond and settle before entering the storm drain.

The type of filter used will depend on inlet type (curb inlet or drop inlet), slope, and amount of flow. Some commercial inlet filters are placed in front of or on top of an inlet, others are placed inside the inlet and under the grate.

DAILY AND AS-NEEDED STREET SWEEPING

Street sweeping is used to clean the pavement and curb-line area on a regular basis to remove sediment, debris, and other pollutants from road and parking lot surfaces that are a potential source of pollution to waterways.

APPENDIX F

Long-Term Inspection and Maintenance Agreement Example

MAINTENANCE AGREEMENT

This Maintenance Agreement (this "Agreement") is made this _____day of _____, 20__, by and between _____ (hereinafter referred to as "Owner"), and the City of Saint Paul, a municipal corporation under the laws of the State of Minnesota (hereinafter referred to as the "City") to provide for the maintenance of the stormwater facilities (hereinafter referred to as the "Facilities") constructed pursuant to City of Saint Paul Project xx-xx.

1. Owner owns the property legally described on Exhibit "A" attached hereto t (the "Property"); and

2. Owner is intending to construct certain storm water facilities on the Property as depicted in Exhibit "B" attached hereto (the "Facilities"); and

In order to meet the City's permitting requirements, said Facilities are necessary and it is reasonable for the City to require Owner and all subsequent owners of said parcel to inspect and maintain the Facilities on a regular basis to ensure that the Facilities function as intended.

3. Now, therefore, it is mutually agreed by and between all parties:

A. Owner, at its expense, shall be responsible for the inspection and maintenance of the Facilities so that the Facilities function properly.

i. Owner shall inspect the Facilities at least annually.

ii. Owner shall maintain and repair the Facilities:

a. In the case of basins and other facilities where sediment collects, to preserve the storage or capacity at or above the design volume or, where no design storage volume or capacity is incorporated into the permit, the volume or capacity recommended by the manufacturer.

b. In the case of conveyances and other structures, to preserve design hydraulic capacity.

c. In the case of facilities relying on soils and vegetation for stormwater management or treatment, to preserve healthy vegetation and design soil permeability.

d. In the case of all facilities, as necessary to preserve the integrity and intended function of the facility.

iii. On an annual basis, Owner shall submit a report to the City that includes the inspection date(s) of the Facilities, conditions of the Facilities, and any corrective actions taken.

B. The City shall have discretion to determine the need to clean the Facilities, either in conjunction with the annual inspection or more often as deemed necessary. The City shall notify the Owner in writing if it reasonably determines that the Facilities require cleaning. The Owner shall clean the Facilities within sixty (60) days of receipt of notice from the City. The City shall act reasonably in exercising said discretion.

In the event Owner fails to clean said Facilities in accordance with the City's request, the City may have the Facilities cleaned either through its own employees or through an outside third party, the cost of which shall be the responsibility of Owner. Owner shall indemnify the for any and all costs incurred by the City for cleaning the Facilities, as well as for costs and fees incurred by the City to enforce this Agreement.

C. This Agreement shall be binding on the Owner of said real estate as described in the Exhibit "A" attached hereto, and its representatives, heirs, transferors, successors and/or assigns. This Agreement shall run with the land.

[Signature page(s) follow]

IN WITNESS WHEREOF, the parties hereto execute this Maintenance Agreement.

DATE:_____ OWNER

By:_____

STATE OF MINNESOTA)
) ss.
COUNTY OF _____)

The foregoing instrument was acknowledged before me this _____ day of _____, _____, by _____ .

_____
Notary Public

DATE:_____ CITY OF SAINT PAUL

By:_____
_____, its _____

STATE OF MINNESOTA)
) ss.
COUNTY OF _____)

The foregoing instrument was acknowledged before me this _____ day of _____, _____, by _____, the _____, a municipal corporation under the laws of the State of Minnesota, on behalf of said municipal corporation.

_____
Notary Public

Exhibit A
to Maintenance Agreement

Legal Description of the Property

Exhibit B
to Maintenance Agreement

Depiction of Facilities