

Maplewood Engineering Regulations

May 25, 2015

Maplewood Stormwater Management Standards

The City of Maplewood (City) has developed specific stormwater management standard requirements in this section that apply to development and redevelopment projects. These standards are intended to help achieve the goals of the City's Surface Water Management Plan (SWMP) and help the City maintain compliance with the National Pollutant Discharge Elimination System (NPDES) municipal permit program (which the City holds a permit to participate in). These standards highlight important aspects of the requirements for stormwater quality, discharge rate and volume control, erosion control, and illicit discharge.

These standards do not replace or supersede City ordinances, watershed district regulations, state and federal rules or permits required for the project. For a more detailed listing of requirements see the specific policies of the City's SWMP and the applicable City ordinances, or consult with City staff on your specific project.

To accomplish the goals of the SWMP, it is important that the City have consistent approaches in evaluating proposed development and redevelopment projects. Therefore, all hydrologic, hydraulic and water quality analysis must be prepared and submitted in a format that will allow for a timely and efficient review by City staff.

Project designers and/or developers are encouraged to schedule and complete a pre-design meeting with the City before any data is submitted for review. The purpose of the meeting is to specifically address approvals and permits, detailed design requirements, trunk storm drain analysis, wetland impacts, water quality treatment, erosion control and discharge to lakes and sensitive wetland resources.

The Maplewood Stormwater Management Standards (MSMS) serve as the guiding document for stormwater design within the City of Maplewood. The City Engineer or qualified designated city staff shall use engineering judgment during the design or review of storm sewer systems to determine if the design meets the requirements and/or intent of the MSMS as set forth herein.

1) General

- a) Erosion control standards apply to all land disturbance activity unless specifically exempted by the definition of the term, "land disturbance activity", in the City's Erosion and Sedimentation Control Ordinance.
- b) The City's water quality treatment and rate control requirements apply to projects which result in one-half acre or twenty-one thousand, seven hundred eighty (21,780) square feet or more of disturbed area or five thousand (5,000) square feet or more of new impervious surface.

- c) Projects conducting mill and overlay, full depth mill, or other surface pavement treatments (where aggregate base is not excavated), on existing impervious areas are exempt from the City's water quality treatment and rate control requirements. However, requirements must be met if the project requires excavation and/or removal of the base and/or sub-base materials for 21,780 square feet (one-half acre) or more of disturbed area.
- d) Projects in the Floodplain Overlay District or Shoreland Overlay District may have additional requirements which are defined in the City's Floodplain and Shoreland Ordinances and/or the Watershed District regulations.
- e) Any work within a wetland, surface water, or Federal Emergency Management Agency (FEMA) designated floodplain may require permits to be obtained from, but not limited to, the City, Watershed District, Minnesota Department of Natural Resources (MnDNR) and/or the U.S. Army Corps of Engineers. All applicable permits for the specific project must be obtained prior to commencing land disturbance, construction, grading, clearing, or filling activities.
- f) The owner shall submit the information listed in Section 8 (Stormwater Plan Submittals) of these MSMS to the City for review.

2) Water Quality Treatment.

a) Infiltration/Volume Control Requirement

- 1) For all new impervious portions of a project or all impervious portions of a redevelopment project, a runoff volume of 1.1 inches must be treated through infiltration practices.
- 2) Filtration practices that are designed for partial recharge (e.g., bioretention basin with under drains) shall receive fifty five percent (55%) credit for infiltration/volume control. Trees and shrubs are encouraged to be incorporated into filtration practice designs.
- 3) Filtration practices that incorporate iron-enhanced sand used as a filtration media shall receive eighty percent (80%) credit for infiltration/volume control.

(1) Iron-enhanced media shall include a minimum of 5% of iron filings by weight and shall be uniformly blended with filtration media.

b) Pollutant Removal Requirements. For projects that have met the infiltration/volume control requirements above, the pollutant removal requirements are considered to be met. For projects where infiltration or filtration is not feasible or is prohibited (see Item 5.a.), the following pollutant removal standards (based on a standard Nationwide Urban Runoff Program, NURP, particle size distribution) apply prior to reaching a downstream receiving water:

- 1) For redevelopment portions of a site or new development portions of a site, provide treatment to remove ninety percent (90%) total suspended solids (TSS) and sixty percent (60%) total phosphorus (TP) as modeled on an annual basis.

c) Mitigation Provisions. To the maximum extent practicable post construction management for water quality treatment shall be fully met onsite. For projects where the conditions for post-construction stormwater management for water quality treatment cannot be cost effectively met on site, as determined by the City and described by Item 5.a. and Item 5.b. above, the following mitigation requirements shall be met:

- 1) Mitigation project areas are selected in the following order of preference:
 - (1) Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
 - (2) Locations within the same MnDNR catchment area as the original construction activity.
 - (3) Locations in the next adjacent MnDNR catchment area up-stream.
 - (4) Locations anywhere within the permittee's jurisdiction.
- 2) Approval of mitigation projects, for all that are required to meet the post construction management for water quality treatment with a proposed disturbed area between 0.5 acre and 1 acre, shall be coordinated with the City.
- 3) Approval of mitigation projects, for all that are required to meet the post construction management for water quality treatment with a proposed disturbed area of 1 acre or greater, shall be coordinated with the City and the appropriate watershed district.
- 4) Mitigation projects must involve the creation of new permanent stormwater Best Management Practices (BMPs) or the retrofit of existing permanent stormwater BMPs, or the use of a properly designed regional permanent stormwater BMP.
- 5) Routine required maintenance of existing permanent stormwater BMPs cannot be used to meet mitigation requirements.
- 6) Mitigation projects shall be completed within 24 months after the start of the original construction activity.
- 7) The City shall determine, and document, who is responsible for long-term maintenance on all City approved mitigation projects.
- 8) As a last alternative, on projects that are required to meet the post construction management for water quality treatment with a proposed disturbed area between 0.5 acres and 1 acre, the applicant shall pay into the City's Environmental Utility Fund (EUF) to cover the cost of implementing an equivalent mitigation project in accordance with the above requirements.
 - (1) The required amount to contribute to the EUF shall determined based on the size and scope of each project.
 - (2) Money contributed to the EUF, to offset the post construction management of water quality treatment that was not achieved on the permitted development, shall

be utilized by the City to construct public stormwater projects that address water quality.

- 9) As a last alternative, on projects that are required to meet the post construction management for water quality treatment with a proposed disturbed area of 1 acre or greater, the applicant shall coordinate with the City and the appropriate watershed district to pay into a stormwater impact fund managed by the watershed district.

3) Rate Control.

- a) Discharge rates leaving the site must not exceed the current rates for the 2, 10 and 100-year, critical duration (24-hour) storm events, using antecedent moisture conditions 2 (AMC-2) and the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 rainfall depths and distributions.
- b) On-site rate controls may not be needed if downstream (regional) facilities can be shown to adequately detain/retain the runoff to existing conditions. In this case, the developer or design engineer shall submit a technical evaluation completed by a qualified engineer which must be reviewed and approved by the City Engineer or their designee.
- c) Where a flow rate variance involves inter-community issues or significant water bodies, the regulatory jurisdiction (e.g. watershed district, DNR, adjacent city) shall have a review role. Any variances to the City's MSMS shall be reflected in subsequent plan submittals.

4) Design Computations.

- a) All hydrologic data shall be completed using NRCS methodology; i.e. HydroCAD or TR20/TR55, XP-SWMM or a comparable, City approved, method. Hydraulic calculations will be accepted in the rational method format or in commonly used software packages such as FHWA HY-8, Eagle Point or XP-SWMM or a comparable, City approved, method. These computations shall be submitted to the City upon request.
- b) Rainfall amounts for hydrologic analysis shall be based on Atlas 14 data. Maplewood analyses shall use the values in the following table.

Rainfall Frequency	Rainfall (Inches)
2-Year 24-Hour	2.9
10-Year 24-Hour	4.3
100-Year 24-Hour	7.5

- c) For projects that do not meet the infiltration/volume control requirement, design engineers and developers shall determine the pollutant removal efficiency of the BMPs incorporated into the site plan using the available industry standard models including P8 (and using a standard NURP particle size distribution for the analysis), Win-SLAMM, MIDS or a comparable model approved by the City.
- d) Volume reduction (in cubic feet) calculations shall be submitted to the City for review for all surface infiltration practices.

- e) Local storm sewer systems shall be designed for the 10-year storm event. The Rational Method shall be the preferred methodology for the design of local systems. Culvert crossings or storm systems in County or State right-of-way may have a design frequency which differs from the City's 10-year design storm. The designer shall contact each agency/unit of government to determine the appropriate design frequency for hydrologically-connected systems.
 - f) For culvert outlet velocities less than or equal to four (4) feet per second (fps), check shear stress to determine if vegetation or riprap will be adequate. If vegetation is used, temporary erosion control during and immediately following construction shall be used until vegetation becomes established. For velocities greater than four (4) fps, energy dissipaters shall be designed in accordance with Mn/DOT Design Criteria.
 - g) High water elevations for landlocked areas (basins where no outlet exists) shall be established by first estimating the normal or initial water surface elevation at the beginning of a rainfall or runoff event using a documented water budget, evidence of mottled soil, and/or an established ordinary high water level. The high water level analysis shall be based on runoff volume resulting from a 100-year/10-day event (10.0 inches and saturated or frozen soil conditions [CN=100]) and/or the runoff resulting from a 100-year back-to-back event (7.5 inches followed by 7.5 inches). The high water elevation shall be the higher of these two conditions.
 - h) For all new development and redevelopment projects the lowest floor elevation (LFE) of all buildings shall be set:
 - 1) Utilizing the latest Atlas 14 rainfall frequency data.
 - 2) At least two (2) feet above the 100-year high water elevation and at least one (1) foot above a designated emergency overflow.
 - 3) For landlocked basins, at least five (5) feet above the higher of the elevations determined in Part 4.g.
- 5) Volume Control/Infiltration Practices Design Criteria.
- a) Infiltration systems are prohibited:
 - 1) Where the bottom of the infiltration basin is less than three (3) feet to bedrock or the seasonally high water table;
 - 2) In areas of low permeability soils (i.e., Hydrologic Soil Group D soils) or where a confining layer exists below the proposed basin;
 - 3) Within fifty (50) feet of a public or private "water supply well" as defined by (Minn. Rules, Chapter 4725);
 - 4) In areas where soil has been determined to not meet MPCA unrestricted use criteria or contamination has been identified in groundwater at levels that exceed Minnesota Department of Health (MDH) drinking water standards. Within ten (10) feet of a property line or building foundation;
 - 5) Within thirty-five (35) feet of a septic system tank or drain field.

- 6) Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the MPCA, and:
 - 7) Where vehicle fueling and maintenance occur.
- b) Restrict the use of infiltration techniques, without higher engineering review, sufficient to provide a functioning treatment system and prevent adverse impacts to groundwater, when the infiltration device will be constructed in areas:
- 1) Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features, and;
 - 2) Where soil infiltration rates are more than 8.3 inches per hour.
 - 3) Within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13.
- c) Infiltration practices must be designed to draw down to the bottom elevation of the practice within forty-eight (48) hours. The ponding depth shall be based on the soil infiltration rate determined from site-specific soils-investigation data taken from the location of proposed infiltration practices on the site (e.g., double ring infiltrometer test). The maximum ponding depth, regardless of infiltration rate shall be two (2) feet unless otherwise approved by the City Engineer or their qualified designee. The soils-investigation requirement may be waived for residential property practices where the maximum ponding depth is one (1) foot or less. The following infiltration rates shall be used for the most restrictive underlying soil unless otherwise supported by an *in-situ* infiltration test:

Hydrological Soil Group	Infiltration Rate (inches/hour)	Soil Textures	Corresponding Unified Soil Classification
A	1.6	Gravel, sandy gravel, and silty gravels	GW - Well-graded gravels, sandy gravels
			GP - Gap-graded or uniform gravels, sandy gravels
GM - Silty gravels, silty sandy gravels			
SW - Well-graded, gravelly sands			
	0.8	Sand, loamy sand, or sandy loam	SP - Gap-graded or uniform sands, gravelly sands
B	0.45	Silty sands, silty/gravelly sands	SM - Silty sands, silty gravelly sands
	0.3	Loam, silt loam	MH - Micaceous silts, diatomaceous silts, volcanic ash
C	0.2	Sandy clay loam	ML - Silts, very fine sands, silty or clayey fine sands
D	0.06	Clay loam, silty clay loam, sandy clay, silty clay, or clay	GC - Clayey gravels, clayey sandy gravels
			SC - Clayey sands, clayey gravelly sands
			CL - Low plasticity clays, sandy or silty clays
			OL - Organic silts and clays or low plasticity
			CH - Highly plastic clays and sandy clays
			OH - Organic silts and clays of high plasticity

Source: *Minnesota Stormwater Manual, January 2014.*

- d) Infiltration practices shall have provisions for pretreatment of the runoff. Examples of pretreatment include: a mowed grass strip between a curb-cut and a small rain garden, a sump manhole or manufactured sediment trap prior to an infiltration basin, and a sediment forebay as the first cell of a two-cell treatment system. Where the infiltration system captures only clean runoff (e.g., from a rooftop) pretreatment may not be required at the discretion of the City Engineer or their qualified designee.
- e) The design shall incorporate a diversion or other method to keep construction site sediment from entering the infiltration system prior to final stabilization of the entire contributing drainage area.
- f) The design shall incorporate provisions that will prohibit construction equipment from compacting the soils where infiltration practices are proposed.
- g) A plan for maintenance of the system must be submitted for each infiltration practice on the site. A signed maintenance agreement will be required by the City. The signed maintenance agreement shall:
 - 1) Identify planned maintenance activities and frequency of activities for each BMP.

- 2) Permit the City of Maplewood and any appropriate watershed district access to the site to conduct inspections of identified BMPs, perform necessary maintenance, and assess costs for the necessary maintenance when the City or watershed district determines that the owner has not conducted the necessary maintenance after being notified in accordance with the requirements of the signed maintenance agreement.
 - 3) Include language in the maintenance agreement that states the signed maintenance agreement can be recorded against the property and is considered a covenant that runs with the land until modified by a mutual agreement.
 - 4) If there are proposed changes to the site that will cause a decrease in the effectiveness of the BMPs then additional BMPs may be required, along with a new maintenance agreement to reflect and cover the proposed site changes.
- 6) Pond and Additional Infiltration System Design Criteria. Newly constructed or expanded/modified ponds and basins shall be designed and constructed to meet the following:
- a) All ponds or basins shall:
 - 1) Have a 3:1 maximum slope (above the normal water level [NWL] and below the 10:1 bench, if a wet pond);
 - 2) Maximize the separation between inlet and outlet points to prevent short-circuiting of storm flows;
 - 3) Have an emergency overflow spillway identified and designed to convey storm flows from events greater than the 100-year event; and
 - 4) Be made accessible for maintenance and not be entirely surrounded by steep slopes or retaining walls which limit the type of equipment that can be used for maintenance. Vehicle access lane(s) of at least ten (10) feet shall be provided, at a slope less than fifteen percent (15%) from the access point on the street or parking area to the pond, to accommodate maintenance vehicles. Maintenance agreements will be required when the pond is not located on City property.
 - b) All wet ponds shall:
 - 1) Have an aquatic bench having a 10:1 (H:V) slope for the first ten (10) feet from the NWL into the basin;
 - 2) Have inlets be placed at or below the NWL;
 - 3) Have a skimming device designed to remove oils and floatable materials up to a five (5) year frequency event. The skimmer shall be set a minimum of twelve (12) inches below the normal surface water elevation and shall control the discharge velocity to 0.5 feet per second.
 - 4) Have an average four (4) feet of permanent pool depth (dead storage depth). This constraint may not be feasible for small ponds (less than about three [3] acre-feet in volume or less). In such cases, depths of three to four (3-4) feet may be used. To prevent development of thermal stratification, loss of oxygen, and nutrient recycling

from bottom sediments, the maximum depth of the permanent pool should be less than or equal to ten (10) feet.

7) Erosion and Sediment Control.

- a) The City's Erosion and Sediment Control Ordinance shall be followed for all projects, including those not regulated under the NPDES construction permit.
- b) Prior to the start of any excavation or land disturbing activity of the site, the owner or contractor must have in place a functional and approved method of erosion and sediment control. The contractor must receive authorization from the City prior to commencing construction activities regarding their proposed methods of erosion and sediment control.
- c) Development projects subject to the NPDES Construction Permit shall meet the requirements of the NPDES permit program, including the requirement to prepare and follow a stormwater pollution prevention plan (SWPPP). The owner shall submit proof of receipt and/or approval by Minnesota Pollution Control Agency and/or watershed district of the permit application prior to commencing construction if these permits are required for the project. A copy of the SWPPP prepared in accordance with the NPDES permit requirements, shall be submitted to the City within 48 hours of a request by the City.
- d) The erosion and sediment control plan shall meet the requirements of the MPCA's Construction Stormwater Permit and address the following criteria:
 - 1) Stabilize all exposed soils and soil stockpiles.
 - 2) Establish permanent vegetation.
 - 3) Prevent sediment damage to adjacent properties and other designated areas.
 - 4) Schedule erosion and sediment control practices.
 - 5) Use temporary sedimentation basins.
 - 6) The construction design of steep slopes shall be performed by a licensed Professional Engineer.
 - 7) Control the stormwater leaving a site including any water generated from dewatering activities.
 - 8) Stabilize all waterways and outlets.
 - 9) Protect storm sewers from the entrance of sediment.
 - 10) When working in or crossing water bodies, take precautions to contain sediment.
 - 11) Restabilize utility construction areas as soon as possible.
 - 12) Protect paved roads from sediment and mud brought in from access routes.
 - 13) Dispose of temporary erosion and sediment control measures (e.g. silt fence, construction entrance material, and inlet protection).
 - 14) Maintain all temporary and permanent erosion and sediment control practices.

- e) The erosion and sediment control plan shall meet the requirements of the MPCA's Construction Stormwater Permit and include the following information:
 - 1) Project description: the nature and purpose of the land disturbing activity and the amount of grading involved (total volume of material moved).
 - 2) Phasing of construction: the nature and purpose of the land disturbing activity and the amount of grading, utilities, and building construction.
 - 3) Existing site conditions: existing topography, vegetation, and drainage.
 - 4) Identification of adjacent areas, neighboring streams, lakes, residential areas, roads, etc., which might be affected by the land disturbing activity.
 - 5) Soils: soil names, mapping units, areas present on-site that are susceptible to erosion that will be disturbed.
 - 6) Critical erosion areas: areas on the site that have potential for serious erosion problems.
 - 7) BMPs to minimize erosion, discharge of sediment, and other pollutants: methods to be used to control erosion, discharge of sediment, and other pollutants on the site, both during and after the construction process.
 - 8) Permanent stabilization: how the site will be stabilized after construction is completed, including specifications.
 - 9) Stormwater management: how storm water runoff will be managed.
 - 10) BMP maintenance: schedule of regular inspections and repair of erosion and sediment control structures.
 - 11) Calculations: any made for the design of such items as sediment basins, diversions, waterways, and other applicable practices.
 - 12) BMPs for dewatering activities: methods to be used to filter waters if dewatering activities are planned.
 - 13) Site inspections and records of rainfall events: inspect the entire construction site as described by the MPCA's Construction Stormwater Permit.
 - 14) Management of solid and hazardous wastes on each project site.
 - 15) Temporary sedimentation basins: show locations, maintenance, and removal for all temporary sedimentation basins that are proposed to be utilized.
- 8) Stormwater Plan Submittals.
 - a) Property lines and delineation of lands under ownership of the project proposer.
 - b) Delineation of the subwatersheds contributing runoff from off-site, and proposed and existing subwatersheds on-site.
 - c) Location, alignment and elevation of proposed and existing stormwater facilities.

- d) Delineation of existing on-site wetlands, shoreland and/or floodplain areas. Removal or disturbance of stream bank and shoreland vegetation should be avoided. The plan shall address how unavoidable disturbances to this vegetation will be mitigated per the City's ordinances.
 - e) Existing and proposed inlet and outlet elevations
 - f) The 10-year and 100-year high water elevations on-site. For landlocked basins, the higher of the elevations determined in Part 4.g. of these standards shall also be identified.
 - g) The lowest floor elevation and low opening elevation of all buildings and structures.
 - h) Existing and proposed site contour elevations related to North American Vertical Datum of 1988 (NAVD 88).
 - i) Construction plans and specifications of all proposed stormwater management facilities.
 - j) Stormwater runoff volume and rate analyses for existing and proposed conditions.
 - k) All hydrologic and hydraulic computations completed to design the proposed stormwater quality management facilities. Computations shall include a summary of existing and proposed impervious areas.
 - l) All pollutant removal computations for practices not meeting the volume control/infiltration requirement.
 - m) Provision of outlots or easements for maintenance access to detention basins, retention basins, constructed wetlands, and/or other stormwater management facilities.
 - n) Maintenance agreement between developer and City which addresses sweeping, pond inspection, sediment removal and disposal, etc.
 - o) Inlets to detention basins, wetlands, etc., shown at or below the outlet elevation.
 - p) Identification of receiving water bodies (lakes, streams, wetlands, etc).
 - q) Identification of existing and abandoned wells, and septic tanks on the development site.
 - r) Documentation indicating conformance with these standards.
- 9) Prohibition of Illicit Discharges. No person(s) shall throw, drain, or otherwise discharge, cause, or allow others under their control to throw, drain, or otherwise discharge into the municipal separate storm sewer system any pollutants or waters containing any pollutants other than stormwater, i.e., chemically treated swimming pool water which contains pollutants not found in stormwater. The following discharges are exempt from the prohibition provision above:
- a) Water line flushing performed by a government agency, other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space

pumps, air conditioning condensation, springs, natural riparian habitat or wetland flows, and any other water source not containing pollutants;

- b) Discharges or flows from fire fighting, and other discharges specified in writing by the City as being necessary to protect public health and safety;
- c) The prohibition provision above shall not apply to any non-stormwater discharge permitted under an NPDES permit or order issued to the discharger and administered under the authority of the MPCA and the U.S. Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the (municipal/county) separate storm sewer system.