2.0 STORMWATER MANAGEMENT

2.1 Purposes and Policy. It is the policy of the District to:

2.1.1 Preserve natural infiltration, groundwater recharge and subsurface flows that support groundwater dependent resources including lakes, streams, channels, wetlands, plant communities and drinking water supplies.

2.1.2 Preserve existing water storage capacity within wetlands and landlocked basins in the watershed to minimize the frequency and severity of high water.

2.1.3 Work toward restoration of natural hydrology.

2.1.4 Limit off-site stormwater flow volume to prevent down-gradient flooding and impacts to waters within the Comfort Lake - Forest Lake watershed.

2.1.5 Require management of stormwater flow to limit sediment, nutrient and other pollutant concentrations conveyed to ground and surface waters and promote water quality.

2.1.6 Minimize connectivity of impervious surfaces to stormwater conveyance systems and preserve the natural hydrology of landlocked basins to minimize basin and downgradient flood risk.

2.1.7 Assure that property owners control rate and volume of stormwater runoff originating from their property so that surface water and groundwater quantity and quality is protected, soil erosion is minimized, flooding potential is reduced, and thermal impacts are reduced.

2.1.8 Encourage land use practices that consider the groundwater, surface water and associated natural resources in the decision making process.

2.1.9 Work with all communities and non-community public water supply systems as they develop and implement their wellhead protection plan.

2.1.10 Limit activities that result in the loss of locally unique groundwater dependent resources.

2.1.11 Follow general recommendations presented in the applicable county groundwater plan.

2.2 Applicability.

2.2.1 Permit Required. An approved stormwater management permit is required before land disturbance that meets any of the following criteria. The District encourages applicants to confer at the concept stage.

(a) Residential subdivision of a tract into three or more lots, with or without development.

(b) Non-residential or multifamily-residential development that creates at least 5,000 square feet of new or reconstructed impervious surface.

(c) A public linear project that creates at least 5,000 square feet of new or reconstructed impervious surface.

(d) Any project on a parcel riparian to a public water requiring a variance from the current local impervious surface requirements for the property.

2.2.2 Impervious Surface to be Treated. If a project disturbs more than 50 percent of the site or reconstructs more than 50 percent of the existing impervious surface, the standards of section 2.3 will apply to all impervious surface on the site. Otherwise, the standards will apply only to new and reconstructed impervious surface. Notwithstanding, for public linear projects, the standards will apply only to new and reconstructed impervious surface.

2.2.3 Cumulative and Future Development. The thresholds of 2.2.1 above are cumulative for a common plan of development on a parcel or contiguous parcels. A permit may contain conditions applicable to future development on the site subject to the permit.

2.2.4 Site Design. An applicant will use best efforts to incorporate Better Site Design techniques, as described in Appendix 2.2, into project design to the extent practicable.

2.3 Standards. An applicant must demonstrate that the proposed land disturbance is designed to meet the standards of this subsection.

2.3.1 Peak Flow. Peak stormwater flow rate at each point of site discharge may not increase from the pre-development condition for the 24-hour precipitation event with a return frequency of 2, 10, and 100 years and shall be calculated in accordance with subsection 2.3.10.

2.3.2 Stormwater Volume. Volume at each point of site discharge must be managed as follows:

(a) New Development: Volume may not increase from the pre-development condition, calculated in accordance with subsection 2.3.10, for the 24-hour precipitation event with a return frequency of two years, or five years if the site is within a landlocked basin, or an area that drains to a landlocked basin.

(b) Redevelopment: The volume equal to 1.1 inches of runoff from new and reconstructed impervious surface must be captured and treated. This volume is calculated as follows:

(i) If the project will disturb more than 50 percent of the site or reconstruct more than 50 percent of existing impervious surface:

Required Treatment Volume (ft3) = Entire Site Impervious Surface (ft2) x 1.1 (in) ÷ Volume Conversion Factor ÷12 (in/ft)

(ii) If the project will disturb 50 percent or less of the site and reconstruct

50 percent or less of the existing impervious surface:

Required Treatment Volume (ft3) = Area of New and Reconstructed Impervious Surface (ft2) x 1.1 (in) ÷ Volume Conversion Factor ÷12 (in/ft)

(c) Public Linear: The volume equal to either 0.55 inches of runoff from all new and reconstructed impervious surfaces, or 1.1 inches of runoff from the net increase in impervious area, whichever greater, must be captured and treated. This volume is calculated as follows:

Required Treatment Volume (ft3) = Area of New and Reconstructed Impervious Surface (ft2) x 0.55 (in) ÷ Volume Conversion Factor ÷12 (in/ft), or

Required Treatment Volume (ft3) = Net increase in Impervious Surface (ft2) x 1.1 (in) ÷ Volume Conversion Factor ÷12 (in/ft)

(d) In all cases, Appendix 2.3 must be used to model infiltration performance.

(e) The volume standard must be met, to the extent feasible, by one or more volume reduction practices including infiltration, rainwater reuse and harvesting, canopy interception and evapotranspiration, and other practices included in the MIDS calculator and the Minnesota Stormwater Manual. In assessing feasibility, the applicant must consider site design that allows the siting of effective volume reduction practices. The following are among the factors that may make some or all volume reduction practices infeasible:

(i) Karst geology

(ii) Shallow bedrock

(iii) High groundwater

(iv) Contaminated soils

(v) Proximity to a Drinking Water Source Management Area or drinking water well

(vi) Land use constraints under local code

(vii) Poor soils (infiltration rates that are too low such as Hydrologic Soil Group C and D, too high, or problematic urban soils)

The applicant must document the basis for infeasibility. If a claim of infeasibility rests on inconsistency with a local ordinance or state standard, a reasonable attempt to gain permission to incorporate the practice must be documented. Satisfactory documentation includes denial of an exception or variance or a written statement by the authority that an exception or variance would be unlikely to be granted.

(f) If the volume standard is not fully met by a volume reduction practice, other stormwater management practices must be used to provide the remaining volume equivalent. The volume conversion factor for alternative techniques is as follows:

Table 2.3.2 VOLUME CONVERSION FACTORS FOR PROPERLY DESIGNED BMPS

BMP	**BMP Design Variation**	**Volume Conversion Factor***
Infiltration **	Infiltration Feature	1.00
Water Reuse **	Irrigation	1.00
Biofiltration	Underdrain	0.65
Filtration	Iron-Enhanced Sand	0.70
	Sand Filter	0.50
Stormwater Wetlands	Shallow Wetland	0.40
	Pond/Wetland	0.55
Stormwater Ponds ***	Wet Pond	0.50
	Multiple Pond	0.60

Source: Adapted from Table 7.4 from the Minnesota Stormwater Manual, MPCA.

* Refer to MPCA Stormwater Manual for additional information on BMP performance. Volume conversion factors shown reflect comparative average annual total phosphorus percentage removal efficiencies to compare water quality treatment among various BMPs.

** These BMPs reduce runoff volume.

*** Stormwater ponds must also provide 2.5" of dead storage.

For alternative practices not found in Table 2.3.2, or to deviate from a volume conversion factor found in Table 2.3.2, the applicant may submit a volume conversion factor, expressed as annual percentage removal efficiency, with supporting technical data, for District approval.

(g) To the extent an applicant has not met the volume standard by application of paragraphs 2.3.2(e) and (f), the applicant may pay into the District's Stormwater Impact Fund or, if the applicant is a Public Road Authority, may utilize District approved volume credits. Regardless, total suspended solids in runoff from regulated impervious surface must be reduced to the maximum extent practicable.

The required amount to contribute to the Stormwater Impact Fund will be set by resolution of the District Board, and amended from time to time, as the estimated cost of creating equivalent volume management and water quality benefit within the subwatershed under generally favorable conditions.

(i) Funds contributed to the Stormwater Impact Fund will be spent within the subwatershed where the project impact occurred. If the Board finds no reasonable opportunity to use the funds in that manner, it may in writing direct use of the funds to serve similar water resource purposes within the same geographic area.

(ii) Funds contributed to the Stormwater Impact Fund will be allocated to volume reduction and water quality treatment by the District according to a fund implementation plan as approved by the District Board and amended from time to time.

2.3.3 Water Quality. The following additional water quality standards apply:

(a) For new development, in addition to meeting the standard of 2.3.2(a), the applicant must incorporate one or more stormwater management practices listed in Table 2.3.2, sized to capture the volume of stormwater runoff that the developed site will generate in the 24-hour precipitation event with a return frequency of two years. The order of preference for practices is infiltration, enhanced filtration, biofiltration, stormwater ponds, and stormwater wetlands. The applicant must justify use of a less preferred practice.

(b) For any impervious surface subject to regulation under subsection 2.3.2, total suspended solids in runoff that is not captured by a practice under paragraph 2.3.2(e) or (f) must be reduced to the maximum extent practicable.

2.3.4 Wetland Bounce and Inundation Period. A project must remain within the limits stated below for bounce in water level and duration of inundation, for a 24-hour precipitation event for each specified return period and for the downgradient wetland or lake management class. The analysis must use NOAA Atlas 14 data for the drainage area in which the site is located.

Table 2.3.4 WETLAND BOUNCE AND INUNDATION PERIODS BY WETLAND MANAGEMENT CLASS

Wetland Management Class	**Permitted Bounce for 2-Year and 10-Year Events**	**Inundation Period for 2-Year event**	**Inundation Period for 10-& 100-Year Events**
Preserve Wetland	Pre-development	Existing	Existing
Manage 1 Wetland	Pre-development + 0.5 feet	Existing plus 1 day	Existing plus 2 days
Manage 2 Wetland	Pre-development + 1.0 feet	Existing plus 2 days	Existing plus 14 days
Manage 3 Wetland and Lakes	No limit	Existing plus 7 days	Existing plus 21 days

Source: State of Minnesota Stormwater Advisory Group, "Stormwater and Wetlands Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Stormwater and Snowmelt Runoff on Wetlands" (June 1997).

2.3.5 Flood Elevation Freeboard. Proposed development subject to Rule 2.0 must meet freeboard requirements of Rule 7.3.

2.3.6 Obligation to Ensure Performance. To find that the standards of this rule have been met, the District may require as-built drawings or impose additional requirements as a specific condition of approval. The District may require monitoring or performance evaluation as a condition of approving a stormwater management practice that has not been adequately demonstrated in the proposed application.

2.3.7 Assurance of Downgradient Capacity. An applicant may be required to demonstrate that downgradient stormwater conveyance structures and features will be adequate to handle proposed peak flow or flow volume from the site.

2.3.8 Off-Site Stormwater Management. One or more of the applicable standards of

section 2.3 may be met by use of an off-site stormwater management practice upgradient of downstream receiving waters, provided there are no local rate, volume, water elevation or water quality impacts. An applicant must document permission to use capacity of the practice and that it is in maintained condition, and the practice must be subject to a maintenance obligation under paragraph 2.4. The practice must provide volume reduction to the same extent as would be feasible on the site.

2.3.9 Local Stormwater Management Plan. A unit of government may prepare a plan by which regional stormwater management facilities may be constructed in anticipation of, or concurrent with, land disturbing activity within the jurisdiction of that unit of government. On finding that the standards of this Rule 2.0 are met, the District will approve or approve with conditions. Thereafter, the plan will apply to subsequent applications for permits according to its terms.

2.3.10 Calculating Off-Site Stormwater Flow. This paragraph will govern calculation of site discharge under this section 2.3. To calculate discharge, Soil Conservation Service TR-20 method shall be used. For New Development projects, the following curve numbers will be used for the pre-development condition:

Hydrologic Soil Group	**Curve Number**
A	30
B	58
C	71
D	78

For Redevelopment and Public Linear projects, curve numbers from NRCS Technical Release #55 (TR-55) representative of existing conditions, including impervious surfaces, may be used for the pre-development condition.

A distributed curve number approach must be used to calculate flows; i.e., runoff from pervious and impervious areas must be modeled separately.

To determine curve numbers for the post-development condition, the Hydrologic Soil Group (HSG) of areas within the construction limits must be lowered one classification for HSG B (to HSG C) and one-half classification for HSG A (to midway between HSG A and HSG B) to account for the impacts of grading on soil structure, unless the project specifications incorporate soil amendment or other method approved by the District to restore soil structure. This requirement only applies to that part of a site that has not been disturbed or compacted prior to the proposed project.

2.3.11 Pretreatment. An infiltration or filtration facility must be designed and maintained so that particulates settle before the stormwater discharges into the infiltration or filtration portion of the system. A pretreatment device such as a vegetated filter strip, small sedimentation basin, or water quality inlet (e.g., grit chamber) must be included in the design and sized according to MPCA Stormwater Manual guidance.

2.3.12 Basin in Contributing Area to Groundwater-Dependent Natural Resource. As the District develops the data to do so, it will by resolution of the Board adopt maps of the surface contributing areas to high-priority groundwater-dependent natural resources. If a stormwater basin is proposed within a mapped surface contributing

area, it must contain and infiltrate the volume generated by a 2-year, 24-hour storm event, if feasible. The basin bottom must be at least three feet above the seasonally high water table. If this infiltration standard is not met, basin outflow must be non-erosive and routed through a subsurface system, flow spreader or other device that discharges water through or across the ground to lower discharge temperature to that of the ambient soil.

2.3.13 Wetland and Landlocked Basin Storage. Fill within the wetland and landlocked basin floodplain is prohibited unless compensatory floodplain storage volume is provided within the floodplain of the same water body, and within the permit term. If offsetting storage volume will be provided off-site, it shall be created before any floodplain filling by the applicant will be allowed.

2.3.14 Facility Construction Schedule. The applicant must submit a construction schedule showing that stormwater management facilities required for compliance with Rule 2.0 will be constructed concurrent with the work authorized by the permit. The District may use financial assurances in accordance with Rule 10.0 to provide for the timely completion of the facilities or to complete their construction if the approved schedule is not met.

2.4 Stormwater Management Facility Maintenance. The permittee, and all successors in title, are responsible to maintain in perpetuity all stormwater management facilities used to meet the standards of section 2.3. Unless the Board specifies otherwise, as a condition of permit issuance, the permittee must submit a maintenance instrument specifying the methods, schedule and responsible parties for maintenance for District review and, after District approval, provide for the instrument to be recorded or registered on the property title. In place of a recorded instrument, a public permittee may execute with the District a maintenance agreement that achieves the same purposes as an instrument on the title and provides that such an instrument will be recorded or registered if the public land is conveyed into private ownership. The District will make standard maintenance instruments and agreements available for permittee use.

2.5 Required Submittals. The following are to be prepared and certified by a professional engineer registered in the State of Minnesota, registered land surveyor, or other appropriate professional, and submitted to the District with the application for stormwater management permit. All submittals shall be in both electronic format and hard copy. Exhibits for flowage and drainage easements shall be submitted as shapefiles.

2.5.1 Property lines and delineation of lands under applicant's ownership;

2.5.2 For existing and proposed conditions, topography showing all off-site and on-site catchments contributing to surface flows onto or from the site;

2.5.3 The location, alignment and elevation of proposed and existing stormwater facilities;

2.5.4 Delineation of existing on-site wetland, shoreland, drain tiling and floodplain areas as defined in the Washington County FEMA base flood elevation mapping study (2008), or the most current District information which can be obtained by contacting the District offices or visiting the District website at clflwd.org;

2.5.5 Existing and proposed normal and 100-year water elevations on site;

2.5.6 Existing and proposed site contour elevations at two-foot intervals, related to NGVD 1929 datum;

2.5.7 Elevation of the OHWL of each public water on the site, if determined by the Minnesota Department of Natural Resources, and of any legal buffer associated with the public water;

2.5.8 Construction plans and specifications for all proposed facilities including construction sequence;

2.5.9 A maintenance schedule for all proposed facilities;

2.5.10 Stormwater runoff rate analyses for the 2-,, 10-, and 100-year critical events and runoff volume for the 2-year critical event (or 5-yr event if tributary to a landlocked basin) under pre-development and proposed conditions, using Appendix 2.3 to simulate infiltration losses in designed practices;

2.5.11 All hydrologic, water quality and hydraulic computations completed to design the proposed facilities, including a demonstration of conformance to standards in subsection 2.3 in the site aggregate;

2.5.12 Delineation of any flowage and drainage easements and other property interests dedicated to stormwater management purposes including, but not limited to, viable and current county or judicial ditches;

2.5.13 Documentation as to the status of a National Pollutant Discharge Elimination System stormwater permit for the project from the Minnesota Pollution Control Agency, with the Storm Water Pollution Prevention Plan (SWPPP) being provided when it becomes available;

2.5.14 Geotechnical information including soil maps, borings, site-specific recommendations, and other information necessary to evaluate the proposed stormwater management design; and

2.5.15 Wetland function and value assessment for all impacted wetlands pursuant to the most current version of Minnesota Routine Assessment Method (MnRAM) or other method approved by the District.

2.6 Exceptions.

2.6.1 Linear trail no more than 10 feet wide, bordered downgradient by vegetated soil or filter strip at least 5 feet wide, is not considered impervious surface under Rule 2.0.

STORMWATER MANAGEMENT APPENDICES

APPENDIX 2.1

Inventory of Site Design Practices and Guidance on Their Use for Stormwater Management.

- Avoid conversion of high-permeability soils.
- Avoid soil compaction.
- Target high-permeability soils for infiltration.
- Use natural depressions and swales, except wetlands, for runoff storage and infiltration, with overflow to vegetated areas.
- Crown roads and driveways to encourage runoff to swales.
- Increase stormwater flow path length to waterbody or wetland.
- Use filter strips at edges of impervious surfaces, property boundaries, waterbodies and wetlands.
- Avoid curbs and gutters on roadways.
- Direct rain gutter downspouts to pervious surfaces or below-grade tiles.
- Use pervious surfaces for roads, driveways, parking areas and walkways.
- Design street widths less than 26 feet and appropriate for projected traffic load.
- Design streets for parking on one side only.
- Design streets with sidewalk on one side only.
- Limit road and driveway lengths.
- Design smaller (e.g., 9' x 18') parking stalls.
- Design for shared parking stalls and driveways.
- Reduce cul de sac radius and use pervious center; use T or V turnaround.
- Design with reduced structure setback from road frontage.
- Preserve vegetation.
- Store stormwater runoff on-site.
- Decrease flow frequency, duration, and peak runoff rates.
- Avoid channel erosion

APPENDIX 2.2

Better Site Design

- To the maximum extent practicable, development projects shall be designed using the Better Site Design Techniques of the current version of the Minnesota Stormwater Manual.[1] Better Site Design involves techniques applied early in the design process to preserve natural areas, reduce impervious cover, distribute runoff and use pervious areas to more effectively treat stormwater runoff. Site design should address open space protection, impervious cover minimization, and runoff distribution, minimization, and utilization through considerations such as:

    1. Open space protection and restoration
        - conservation of existing natural areas (upland and wetland)
        - reforestation
        - re-establishment of prairies
        - restoration of wetlands
        - establishment or protection of stream, shoreline and wetland buffers
        - re-establishment of native vegetation into the landscape
    2. Reduction of impervious cover
        - reduce new impervious through redevelopment of existing sites and use of existing roadways, trails etc.
        - minimize street width, parking space size, driveway length, sidewalk width
        - reduce impervious surface footprint (e.g. two story buildings, parking ramp)
    3. Distribution and minimization of runoff
        - utilize vegetated areas for stormwater treatment (e.g. parking lot islands, vegetated areas along property boundaries, front and rear yards, building landscaping)
        - direct impervious surface runoff to vegetated areas or to designed treatment areas (roofs, parking, driveways drain to pervious areas, not directly to storm sewer or other conveyances)
        - encourage infiltration and soil storage of runoff through grass channels, soil compost amendment, vegetated swales, raingardens, etc.
        - plant vegetation that does not require irrigation beyond natural rainfall and runoff from the site
    4. Runoff utilization
        - capture and store runoff for use for irrigation in areas where irrigation is necessary

[1] Available at http://stormwater.pca.state.mn.us/index.php/Better_site_design.

APPENDIX 2.3

Design Infiltration Rates

Hydrologic Soil Group	Soil Textures*	Corresponding Unified Soil Classification**	Infiltration Rate [inches/hour]
A	Gravel, Sandy Gravel, Silty Gravel	**GW** - Well-graded gravel or well-graded gravel with sand **GP** – Poorly graded gravel or poorly graded gravel with sand **GM** - Silty gravel or silty gravel with sand **SW** - Well-graded sand or well-graded sand with gravel	1.6
	Sand, Loamy Sand, Sandy Loam	**SP** – Poorly graded sand or poorly graded sand with gravel	0.8
B	Loam, Silt Loam	**SM** - Silty sand or silty sand with gravel	0.45
		MH – Elastic silt or elastic silt with sand or gravel	0.3
C	Sandy Clay Loam	**ML** – Silts, very fine sands, silty or clayey fine sands	0.2
D	Clay Loam Silty Clay Loam Sandy Clay Silty Clay Clay	**GC** – Clayey gravel or clayey gravel with sand **SC** – Clayey sand or clayey sand with gravel **CL** – Lean clay or lean clay with sand or gravel or gravelly lean clay **OL** – Organic silt or organic silt with sand or gravel or gravelly organic silt **CH** – Fat clay or fat clay with sand or gravel or gravelly fat clay **OH** – Organic clay or organic clay with sand or gravel or gravelly organic clay	0.06

Source: Adapted from the "Design infiltration rates" table from the Minnesota Stormwater Manual, MPCA, (January 2014).

*U.S. Department of Agriculture, Natural Resources Conservation Service, 2005. National Soil Survey Handbook, title 430-VI. (Online) Available: http://soils.usda.gov/technical/handbook/.

**ASTM standard D2487-00 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).