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STORMWATER MEMORANDUM

June 4, 2025

Maggie Menden

Permitting Technician
Minnehaha Creek Watershed District

Re: Mound 2025 Street Improvements
City of Mound, MN
Project No.: 24X.136583.000

Project Overview/Background

The City of Mound is proposing to reconstruct the streets of Resthaven Lane, Paradise Lane, Heron Lane, Enchanted Road, Gull Lane, Crestview Road, and Woodland Road. Currently the stormwater drains into a variety of catch basins located along the roads, through stormwater pipes, and out into Lake Minnetonka, specifically Jennings Bay. There are currently no stormwater BMPs within the project area. In order to treat runoff from the reconstructed roadway to the maximum extent practicable, a stormwater filtration basin will be constructed on a city owned parcel along Enchanted Lane. The filtration basin will provide approximately 4,880 cubic feet of water quality volume. This is less than the standards set by the Minnehaha Creek Watershed District. The required treatment is outlined below, and the infeasibility assessment of the site to reach those standards follows.

- Table 2: Requirements for Linear Projects (3(a(2))):
    - For sites that have a greater than 1 acres of new and reconstructed impervious area and a less than 10,000 sqft of net increase in impervious area, the volume required is equal to the larger of: one inch of volume from the new impervious surface OR 0.5 inches of volume from the new impervious and reconstructed impervious area.
- Phosphorus Control (Non – Volume – Reduction Practice Credit Schedule) Appendix A– Must be twice the required volume reduction. The Phosphorus credit volume must be below the overflow elevation of the filtration BMP.
- Rate Control (3(a)) – An action may not increase the peak runoff rate from the site, in aggregate, for design storm events. An applicant proposing to increase peak runoff at a specific point of site discharge must demonstrate no adverse local impact on water resource values or infrastructure. Aggregate compliance for all site boundary discharge will be determined with respect to runoff not managed in a regional facility.

- Flood Separation (6) – There must be two feet of vertical separation between the 100-year high water elevation of a waterbody or stormwater practice and the low opening of any structure, unless the structure opening is hydraulically disconnected from the waterbody or practice.

Hydrologic and Hydraulic Modeling

HydroCAD was the modeling software used to analyze the existing and proposed conditions for the project area. HydroCAD utilizes SCS TR-20 methodologies to hydrodynamically route stormwater through the drainage system. The 1-, 10-, and 100-year design storms were based on the NOAA Atlas 14 rainfall data and MSE Type 3 24-hour rainfall distributions. The corresponding depths for the 2-, 10-, and 100-year events are 2.85 in, 4.23 in, and 7.25 in, respectively.

A geotechnical report was completed for the project area and has been attached for reference, with the approximate locations of the borings being shown on the boring location map. The geotechnical report identified silty and clayey soils in the area of the proposed stormwater basin and throughout the project area. As the soils on site are not conducive to infiltration, a filtration BMP is proposed to provide stormwater treatment.

Existing Conditions Narrative

The existing drainage pattern for the site flows north or west towards Lake Minnetonka (Jennings Bay). Overall, there are a variety of catch basins with curb and gutter located along the streets mentioned previously, collecting the stormwater runoff, then pipes convey the stormwater north and west off site and into the Lake. There are currently no BMPs to treat the impervious stormwater runoff area before it enters Jennings Bay. The streets are surrounded by residential lots and pervious area comprised of trees, grass, and a variety of shrubs. See Figures 1 and 2 in Appendix A for the existing drainage conditions and Appendix B for existing HydroCAD modeling report.

Proposed Conditions Narrative

The general drainage patterns will match the existing drainage patterns of the site and there will be no increase of impervious area following construction. A summary of the impervious and disturbance area can be found in Table 1.

Table 1. Summary of Impervious

Disturbed Areas	Unit	Area
Total Disturbance Area	acres	2.2
Existing Impervious Areas	acres	1.95
Reconstructed Impervious Area	acres	1.95
New Impervious Area	acres	0
Total Impervious Requiring Treatment	acres	1.95

As shown in Table 1, there will be no increase in the total impervious area as a result of the project. Stormwater treatment for reconstructed areas will be provided for Table 2 summarizes the area routing to the proposed BMP location each outlet and the differences in runoff areas from existing to proposed conditions.

Table 2. Summary of Existing and Proposed Runoff Area (Acres)

Outfall	Existing Conditions		Proposed Conditions	
	Impervious Area (Acres)	Pervious Area (Acres)	Impervious Area (Acres)	Pervious Area (Acres)
Direct to Lake	3.817	4.014	2.471	1.74
To BMP Location (5P/6P)	0.517	1.185	1.862	3.459

As shown in Table 2, approximately 3.619 acres of additional runoff area will be directed to the treatment area compared to existing conditions. The total reconstructed area and existing impervious area runoff flowing through the filtration basin is 0.573 acres and 1.289 acres respectively. Area rerouting was completed to maximize treatment area and flood attenuation, as well as to accommodate other utility improvements proposed in the project area.

Rate Control

Hydraulic modeling was generated to assess compliance with the watershed's rate control rule. Rate control is proposed to be met through a filtration basin and deferral of drainage area. The following table summarizes the existing and proposed conditions runoff rates for the 2-, 10-, and 100-year events.

Table 3: Summary of peak stormwater runoff rates (cfs).

Rain Event	2-Year		10-Year		100-Year	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
4L (Lake Minnetonka)	11.94	11.37	21.58	20.191	42.56	40.78

As shown in Table 4, rate control is met through the constructed filtration basin. There is no increase in runoff rate comparing existing to proposed conditions from the project site.

Water Quality Capacity

The MCWD requires that 0.5 inch of rainfall over the reconstructed area is required for volume treatment. This will be provided through a filtration basin located southwest of Enchanted Road. Below is a summary of the required and provided water quality treatment for the project site. The theoretical BMP models the requirements of water quality and phosphorus volume standards set by the MCWD if all the reconstructed area was able to be routed to a filtration BMP. The Filtration Basin (6P) summarizes the actual water treatment provided.

Table 4: BMP Capture Volume Summary

BMP	Impervious area draining to BMP (acres)	WQV (cuft)	Phosphorus Volume (cuft)
Theoretical BMP	1.95	3539.25	7078.5
Filtration Basin (6P)	1.86	4,880	4,880
Difference	0.09	1340.75	2198.5

As shown in Table 4, 4,880 cubic feet of the required phosphorus control volume needed to meet the 0.55-inch standard is provided by the proposed BMP. As discussed in the Feasibility Assessment section below, further expansion of the basin is infeasible. As this is a linear project, phosphorus control must be met. Due to the project limitations outlined in the feasibility section of the report the MCWD standards were not met, see Table 4. The basin design will treat the surrounding impervious to the fullest extent practicable and will improve the water quality of the runoff entering Jennings Bay.

The 4 foot sump addition to catch basin upstream of the lake outlet to add additional Total Suspended Solids (TSS) treatment to the stormwater runoff prior to discharge to the lake. A pretreatment sump will also be installed upstream of the filtration basin.

Feasibility Assessment

MCWD rules require the following;

(d) For a Linear Transportation Project, if the required volume reduction cannot be provided within existing right-of-way, the permittee must make a reasonable attempt to obtain additional right-of-way, easement or other permission to site the required volume. Volume reduction is not required to the extent it cannot be provided cost-effectively. If the volume reduction of paragraph 3.a.2 is not fully met, equivalent phosphorus control must be provided to the fullest extent feasible.

Several design constraints prohibit this project from reaching the phosphorus reduction standards set by the MCWD.

1. A geotechnical investigation on the site identified clayey soils with poor infiltration capacity. As such, infiltration is not feasible on site.
2. There is limited right-of-way available to install a BMP, and two feet of freeboard must be provided by the proposed BMP per MCWD rules. Due to the low elevation of adjacent property, the maximum allowable water surface elevation is 950.7’. See Table 5 for the relevant freeboard information, and Figures 1 and 2 for the existing stormwater infrastructure and critical spot elevations.

The following Alternative Compliance methods were considered to meet treatment requirements:

Soil Amendment
MCWD allows for a soil amendment to be counted towards volume abstraction for the site, but not for phosphorus reduction. As such, this would not assist in meeting district standards.

Gray-Green Conversion
Roadway width reduction and removal of impervious was considered; however, the roadways are already at 12’ lane widths with 2’ curb and gutter. Further reduction would not allow for safe vehicle travel as required by state standards, and conversion to a rural section would inhibit runoff conveyance towards BMPs/cause localized flooding.

Filtration
A filtration basin is proposed to be installed on the city owned parcel that has been maximized in size while still meeting MCWD freeboard requirements. Additional locations were considered to provide additional treatment.

Rain Gardens – Boulevard gardens were considered within the project area; however, there is limited right-of-way and slopes inconducive to BMP placement within the boulevard, as well as numerous utility conflicts/setbacks that must be met.

Underground Filtration – Underground filtration features were considered; however, there are numerous utility conflicts, including watermain that has a 10' setback requirement, that precludes the installation of UGS systems. Additionally, for a UGS filtration system to function a minimum of five feet of vertical drop is required to accommodate; the minimum of 18-inches of cover, 12-inch chambers, the 6-inch cover and bottom stone, and an 18-inch section of filter media. Additionally, if these chambers are placed beneath the street they will likely need to meet firetruck outrigger standards, which would increase the minimum cover required. Most storm sewer around the project area has less than five feet of depth from the top of bituminous to the structures invert and so is unsuitable for an underground filtration system.

Acquisition of Additional Property

Acquisition of adjacent properties or property located elsewhere in the project area for new BMP installation would involve; property acquisition, potential demolitions and removals, modification of existing municipal storm sewer to divert flows to the new BMP(s) and to convey runoff downstream, potential tree removal, and additional wetland delineation and geotechnical investigation. Many of the locations within the project area cannot feasibly be connected to the existing storm sewer due to adverse grades, minimum pipe slope requirements, and cover requirements.

Flood Control

Stormwater Rule 3(e) requires that applicants provide at least two vertical feet of separation between low openings of adjacent/upstream structures and the 100-year high water elevations of stormwater BMPs and waterbodies. The filtration basin was constructed to provide the required vertical separation while maximizing the water quality volume. Please refer to the construction plans for the building low floor elevations and HWLs of the BMPs. The proposed basin has lower water levels compared to the existing drainage ditch.

Table 5 summarizes the impacts of the filtration basin on flooding within the area with relation to the existing drainage ditch in the area. The drainage ditch has higher flood elevations compared to the filtration basin, therefore the filtration basin poses no increased flooding effect on the adjacent properties and increases the runoff treated.

Table 5: Freeboard Summary

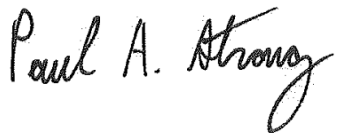
		Existing Conditions		Proposed Conditions	
BMP ID	Lowest Structure Elev or Hydraulic Disconnect	100-yr HWL	Freeboard	100-yr HWL	Freeboard
6-P	952.88	951.79	1.09	**950.63**	**2.25**

As shown in table 5, the freeboard under proposed conditions is 2.0, which meets the MCWD requirements and significantly reduces the flood level compared to existing conditions. The proposed HWL also does not exceed the parcel boundaries and flood adjacent properties (950.7').

Enclosed please find the associated figures, model output files, and the draft plan set. Please feel free to contact me at 651-247-8789 or at paul.strong@bolton-menk.com if you have questions or need additional information.

Sincerely,

Bolton & Menk, Inc.



Paul A. Strong, P.E.

Water Resources Project Engineer