

Technical Memorandum

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Hennepin County Transportation Project Delivery

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Date: October 21, 2022

Re: Hennepin County – Municipal Separate Storm Sewer System (MS4) Total
Maximum Daily Load (TMDL) Assistance Project

The purpose of this memo is to document Hennepin County’s progress toward meeting its total phosphorus (TP) and total suspended solid (TSS) waste load allocations (WLAs) detailed in completed total maximum daily load (TMDL) studies and Watershed Restoration and Protection Strategy (WRAPS) reports. Pollutant reductions are documented for structural stormwater best management practices (BMPs) as their reductions are quantifiable. The memo also details the evaluation approach applied to ensure transparency and reproducibility. It suggests increasing street sweeping events, where appropriate, and engaging other recognized Municipal Separate Storm Sewer Systems¹ (MS4s) and watershed management organizations to collaborate on regional BMPs as ways to meet the WLAs. Lastly, a one-sheet TMDL position report was created and is appended to the memo for each impaired water resource with its associated WLAs.

1 Background

Defined MS4s are required by Minnesota Rule 7090 to comply with the MS4 general permit. The MS4 general permit required the development of a stormwater pollution prevention program that provides public education and outreach, public participation, illicit discharge management, construction-site and post-construction runoff controls, and implementation of good housekeeping measures for pollution prevention. In addition, it requires implementation of BMPs to minimize the transport of pollutants that cause impairments to lakes, rivers, and stream ecosystems. Once these water resources are impaired for failing to meet one or more water quality standards, as required by the federal Clean Water Act (CWA), they are placed on the

¹ As specified by the Minnesota Pollution Control Agency (MPCA) an MS4 is a conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, storm drains, etc.) that is also owned or operated by a public entity (which can include cities, townships, counties, military bases, hospitals, prison complexes, highway departments, universities, sewer districts, etc.); designed or used for collecting or conveying stormwater; not a combined sewer; or not part of a publicly owned treatment works (MPCA, n.d.).

state's impaired waters list, the CWA 303(d) list, listed in the CWA 305(b) report, and a TMDL study is commissioned. As part of the TMDL studies, MS4s are assessed categorical² and individual³ WLAs required to mitigate pollutant(s) causing the water resource's impairment. Once the TMDL studies have been completed, all MS4s that have impaired waters within their jurisdiction are required to document how they are meeting or planning to meet the WLAs for specified pollutants.

Hennepin County (County), one of 87 counties in the State of Minnesota, is a MS4 and has been assessed individual and categorical WLAs for bacteria or *E. Coli*, chloride, TP and TSS in 23 completed TMDLs studies and WRAPS reports for 68 impaired water resources. The County retained Young Environmental Consulting Group (Young Environmental) to conduct a compliance review documenting whether it is meeting its WLAs for only the TP and TSS impairments and, if it is not, incorporating ways they plan to meet the WLAs and the associated compliance timeframe.

The following sections describe the County's MS4 area, and methods used to conduct the compliance review, and its findings and recommendations.

2 Description of the MS4 Area

The County has an approximate area of 350,000 acres containing nearly 1.3 million people in 45 cities (USCB, 2021; Hennepin County, 2022). Its MS4 area, shown in Figure 1 which is subject to the MS4 general permit requirements, is smaller at approximately 260,000 acres, incorporating mostly the urbanized areas.

2.1 Land Use within the MS4 Boundary

The MS4 area is mainly made up of single residential use which comprises just over 44% and a conglomeration of land uses summarized in Figure 2 and Table 1.

² A categorical WLA assigns a single load to a group of permittees. The group load must be met collectively via reductions from all contributing sources (MPCA, 2013).

³ An individual WLA assigns a single load to each permittee (MPCA, 2013).

Table 1. Land Use within the Hennepin MS4 Boundary

Land Use Description	Land Use Area (Acres)	Land Use Percentage (%)
Single-Family Residential	113,475	44
Park, Recreational, or Preserve	30,948	12
Open Water	25,790	10
Undeveloped	18,053	7
Other ⁴	69,632	27
Total	257,897	100

2.2 TMDL and WRAPS with Hennepin County Assigned TP and TSS WLAs

As noted, there are 68 impaired water resources within the County. Of those, 38 of them are impairments for TP, TSS, a combination of the two, summarized in 13 TMDL and WRAPS reports with assigned WLAs and require reporting. The impaired watersheds with specified impairments are shown in Figure 3.

3 Methodology

The following presents the method used to evaluate Hennepin County’s progress toward meeting its assigned WLAs. Generally, the process included a review of a TMDL or WRAPS document for each TP or TSS impaired watershed, creation of relevant maps, calculation of pre-baseline reductions, and production of one-sheet TMDL position reports for each impaired water resource and pollutant of concern. Pre-baseline reductions were calculated to provide the County with reduction per year data to assess the impact of increases in pre-baseline BMP use.

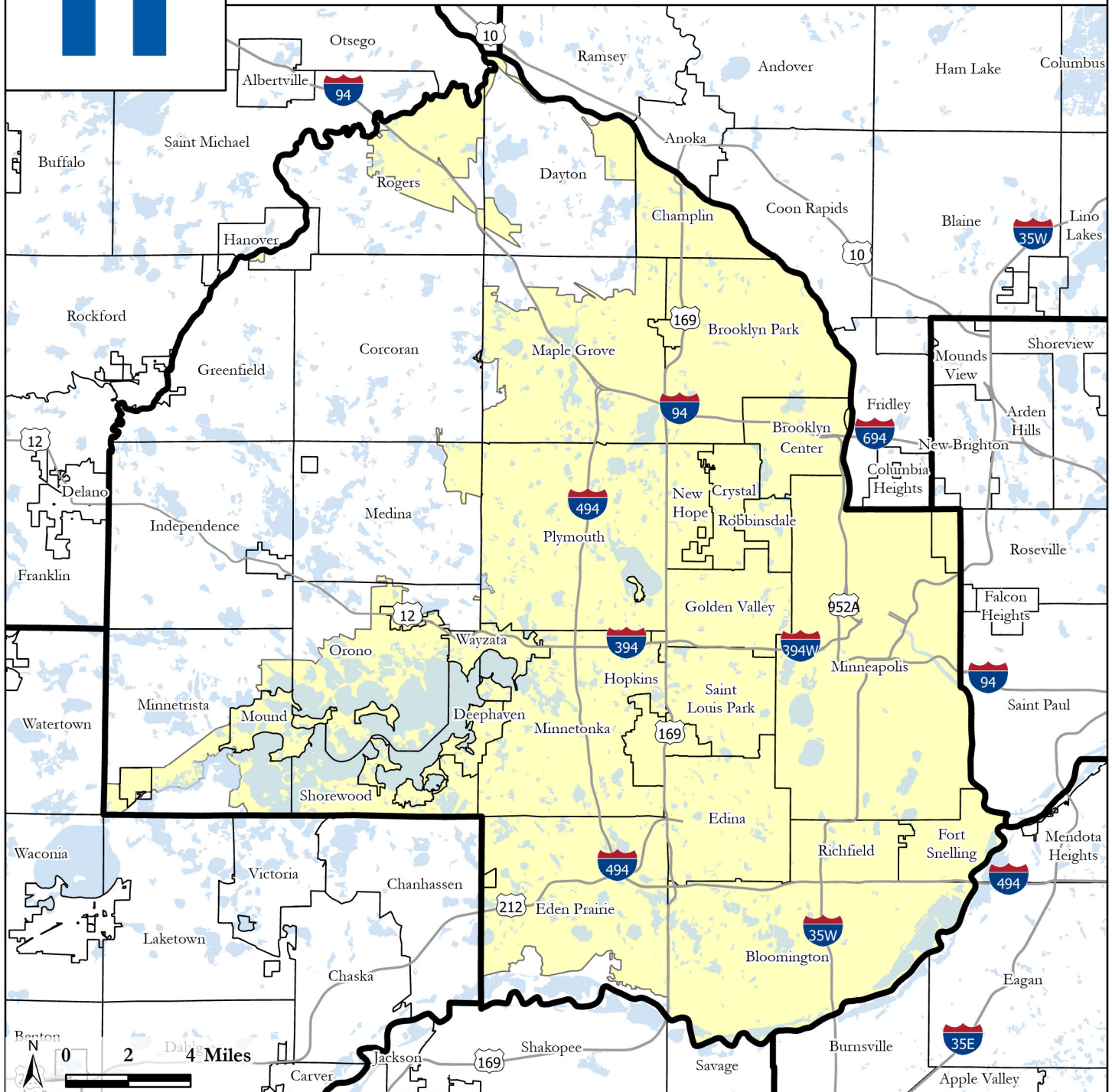
3.1 Document Review

TMDL and WRAPS documents for each impaired water were reviewed to confirm information the MPCA provided in the MS4 Permit TMDL application spreadsheet (spreadsheet) to Hennepin County and to compile other information such as WLA numeric values, required reductions, baseline and target years, watershed land use and drainage area, WLA methodology (water quality modeling such as P8 and BATHTUB, flow/load duration curves, land area approach), current or planned BMPs, and recommendations for future reductions. The information compiled was compared to the County’s spreadsheet, which was assumed most accurate, and all documented differences are captured in Appendix A (Table A).

⁴ Other consists of 5% or less of each of the following land uses: industrial and utility, institutional, single-family attached residential, major highway, retail and other commercial, multifamily residential, golf course, airport, office, agricultural, mixed-use industrial, extractive, major railway, mixed-use commercial, mixed-use residential, seasonal/vacation, farmstead, and manufactured housing park.





Hennepin County MS4 Permit Urbanized Areas



Legend
 MS4 Boundary

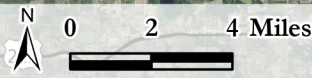
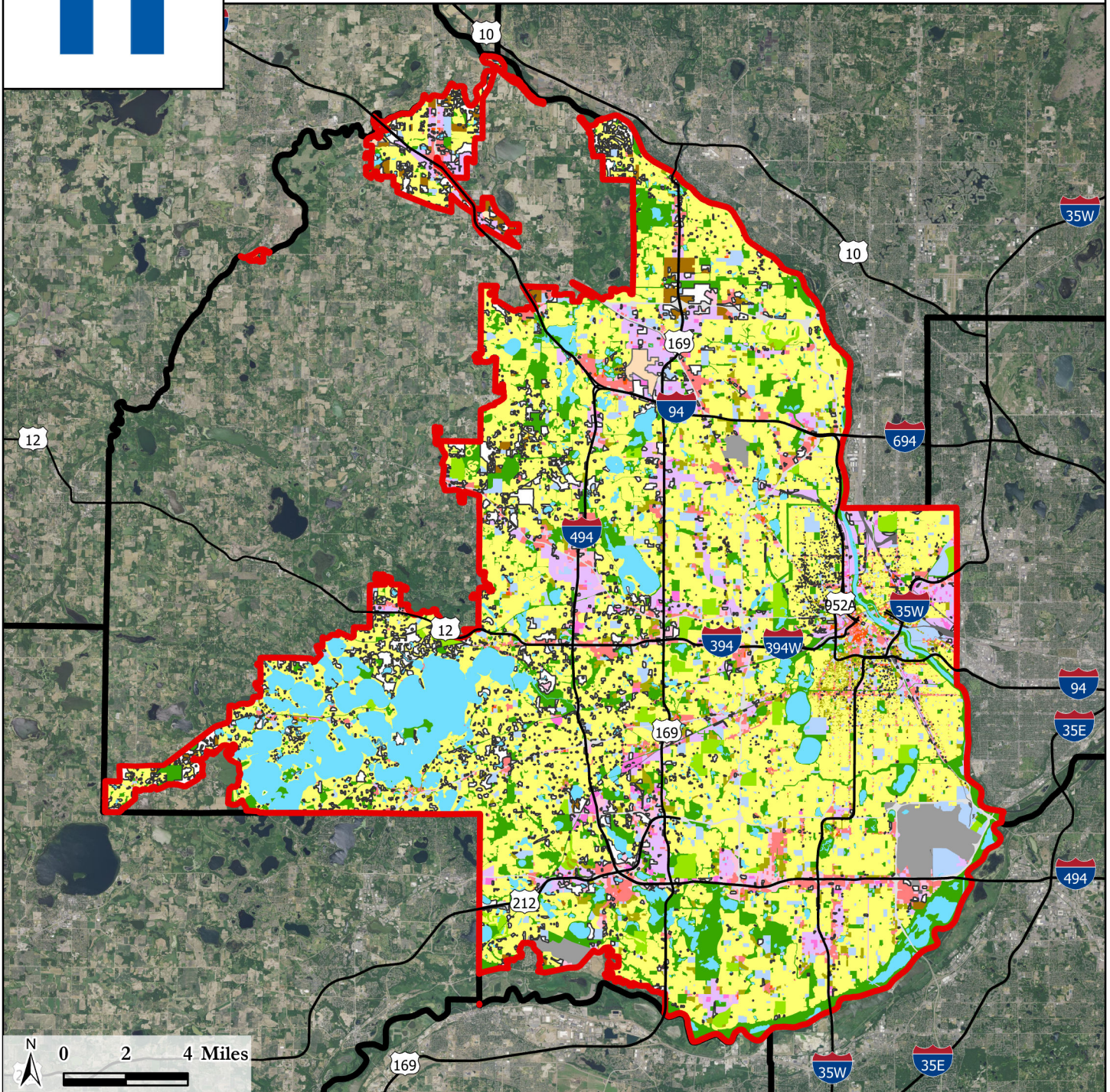
Location Map

Young Environmental Consulting Group, LLC



Land Use within the Hennepin County MS4



Legend

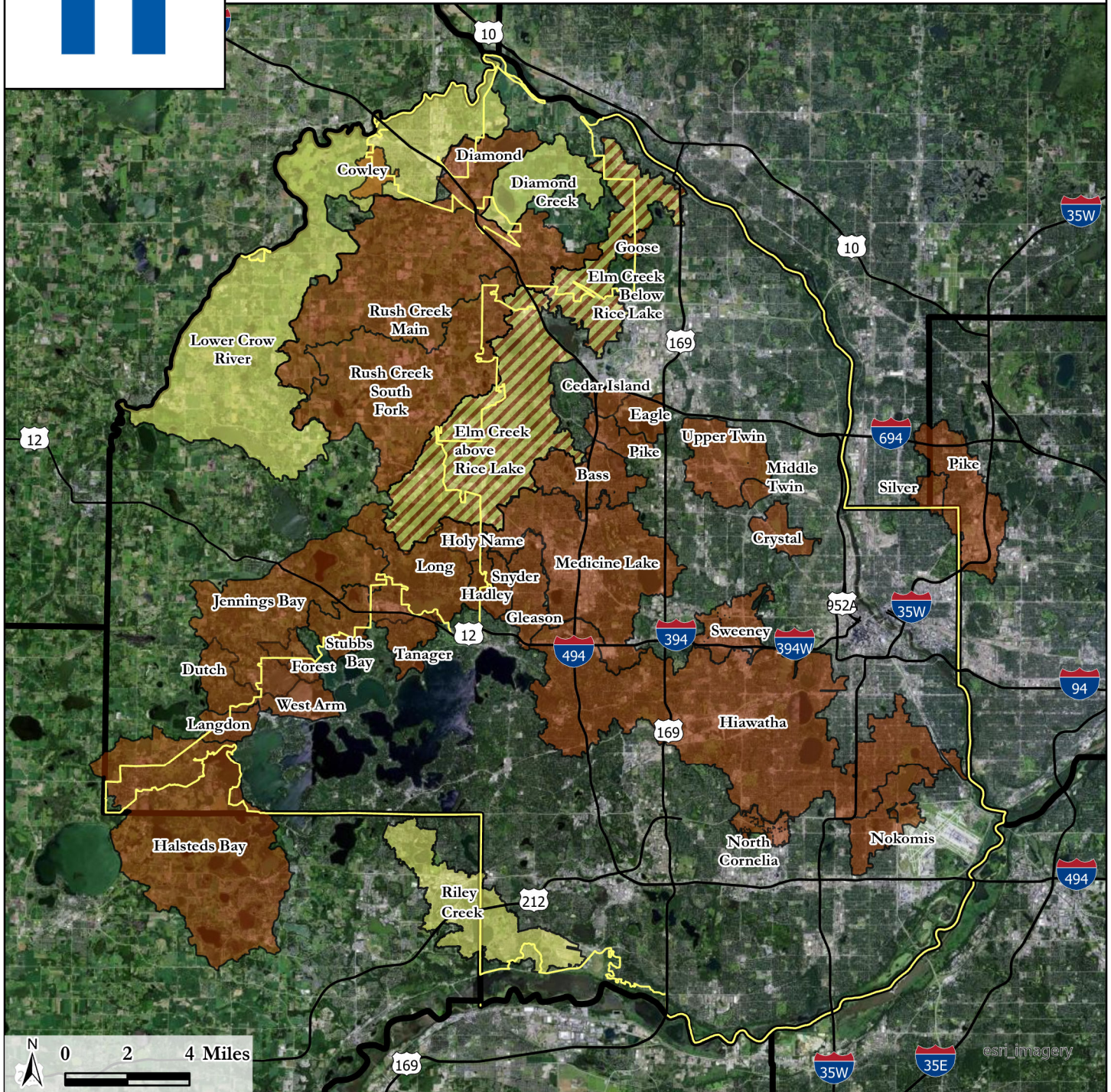
- | | | |
|-------------------------|---------------------------------|---------------------------|
| MS4 Boundary | Golf Course | Mixed Use Industrial |
| Farmstead; Agricultural | Park, Recreational, or Preserve | Seasonal/Vacation |
| Extractive | Office | Manufactured Housing Park |
| Institutional | Retail and Other Commercial | Mixed Use Residential |
| Major Highway | Mixed Use Commercial | Single Family |
| Airport or Airstrip | Industrial or Utility | Multifamily |
| Major Railway | Undeveloped | |
| Open Water | | |

Location Map





Hennepin County MS4 Area Impaired Watersheds



Legend

- MS4 Boundary
- Total Suspended Solids
- Total Phosphorus
- Total Phosphorus & Total Suspended Solids

Location Map

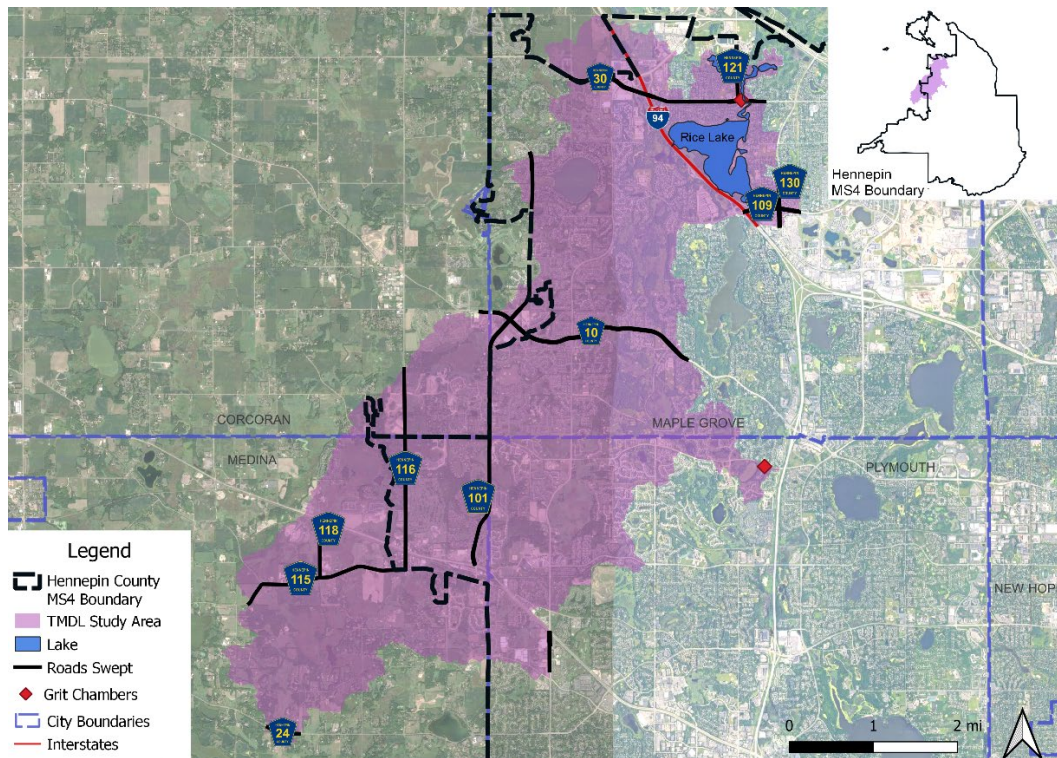


Young Environmental Consulting Group, LLC

3.2 BMPs Maps Development

For each impaired water, a map was generated using QGIS, a free and open-source cross-platform desktop geographic information system (GIS) application that supports viewing, editing, printing, and analysis of geospatial data. QGIS coupled with GIS files received from the County, Minnesota Pollution Control Agency (MPCA), and the Minnesota Geospatial Commons were used to create the maps. Data and data sources used are listed in Appendix A. Maps included layers for waterbody subwatersheds, land use, county road street sweeping, city boundaries, capital improvement projects (CIPs), the Hennepin County MS4 boundary, Hennepin County centerlines, public waterbodies or watercourses, and structural BMP locations. Subwatershed GIS files were compared to TMDL watersheds for accuracy and any differences deemed negligible. Figure 4 of Rice Lake is an example of the QGIS maps generated for each impaired water.

Figure 4. Representative One-Sheet TMDL Position Report Map from Rice Lake



3.3 Calculate TP and TSS Reductions

To calculate pollutant reductions associated with the County's most used BMPs, street sweeping, grit chambers, and stormwater ponds, several pollutant reduction calculation tools listed and described below were investigated for use.

- Street sweeping:
 - Street Sweeping Phosphorous Credit Calculator

- City of Edina Street Sweeping Approach
- Grit chambers
 - Sizing Hydrodynamic Separators and Manholes (SHSAM) model
- Stormwater ponds and infiltration basins
 - MPCA Simple Estimator

3.3.1 Street Sweeping Pollutant Reduction Calculation

The initial tool considered for use to assess TP reduction from street sweeping activities was the MPCA’s Street Sweeping Phosphorus Credit Calculator (Calculator). The Calculator is an MPCA tool that calculates the phosphorus reduction credits associated with street sweeping. The calculator offers a simple method for determining TP reduction credits via curb miles swept data. The method calculates the pounds of phosphorus removed by multiplying the curb miles swept by sweeper width (ft) by areal phosphate removal rate (lbs/acre/pass). The method is based on the P8 model and uses an aerial phosphate removal rate of 0.00017lbs/acre/pass. The removal rate value provides a very conservative estimate of phosphorus removed. More information about the Calculator can be found in the Minnesota Stormwater Manual (MPCA, 2022). The Calculator does not address TSS, and its TP reduction factors appeared overly conservative without accounting for variation in canopy cover that is directly related to the amount of pollutant removed.

The street sweeping methodology applied by the city of Edina is based on the tool developed by Kalinosky et. al. titled Planning Calculator Tool for Estimating Nutrient and Solids Load Recovery through Street Sweeping (Kalinosky et. al., 2014) was used. The Kalinosky et. al. tool was developed using experiments in Prior Lake, Minnesota to determine nutrient removal from street sweeping based on various conditions. The condition of most interest for this application is the amount of over-street canopy cover. The greater the over-street canopy cover, the greater street sweeping pollutant reductions occur. To estimate pollutant reductions, the length of streets swept, and the amount of over-street canopy cover must be known. Table 2 shows canopy cover categories, taken from the City of Edina 2015 street sweeping plan (Edina 2015).

Table 2. Canopy Coverage Categories (Edina, 2105)

Canopy Description		Over-Street Canopy Cover
None	None over street, very few or no immature tree in yards/lots.	0%
Very Low	Immature trees near street, very little/no over street canopy, very low tree density in yards/lots.	2%
Low	Some visible cover over the street, mostly immature trees, general low density of trees.	5%
Medium	Visible cover over portions of the street, mix of immature and mature trees in yards/lots.	10%

Canopy Description		Over-Street Canopy Cover
Medium-High	Visible canopy over portions of the street, fairly dense, uniform canopy across yards, or stands of mature tree in backyards/common areas.	14%
High	Visible canopy along the majority of the street, uniform canopy of mature tree across yards/stands of mature trees in backyards/common areas.	18%
Very High	Very dense canopy, canopy cover fairly continuous across lot and street boundaries on aerial photos.	25%

The Kalinosky et. al. tool provides reduction rates for all over-street canopy cover categories for the baseline (or twice per year in the spring and fall), monthly (between April and October) and biweekly (between April and October) sweeping efforts. Experiments determining the fresh weight of sweeper loads and nutrient content of those loads were used to determine the pollutant reduction rate values. Table 3 shows the pollutant reduction rates for each canopy coverage category at different sweeping efforts based on regenerative air sweepers, taken from the 2015 City of Edina street sweeping plan (Edina 2015).

Table 3. Estimated Pollutant Reduction Rates (lb/curb-mile/yr) for TP and TSS at 3 Effort Levels for Regenerative Air Sweepers (Edina, 2015)

Canopy Cover Description	Over-street % Canopy Cover	Baseline Sweeping		Monthly Sweeping		Bi-weekly Sweeping	
		TS	TP	TS	TP	TS	TP
None	0	522	0.4	1,363	1.0	2,265	1.6
Very Low	2	616	0.5	1,467	1.1	2,439	1.8
Low	5	688	0.6	1,639	1.2	2,725	6.5
Medium	10	827	0.7	1,972	1.5	3,278	2.5
Medium-High	14	959	0.8	2,286	1.8	3,801	3.0
High	18	1,112	1.0	2,651	2.2	4,406	3.5
Very High	25	1,440	1.3	3,433	16.1	5,707	4.8

For the County pollutant removal calculations, the low canopy cover category for all subwatersheds was assumed under baseline conditions. The low canopy cover was selected as it is most representative of the canopy cover over streets swept by the County. At a baseline effort, low canopy cover pollutant reduction rates are 0.6 lbs TP and 688lbs TSS removed per mile per year. Reduction rates were multiplied by miles per sweeping event provided by the County to generate reductions associated with street sweeping each year. Reductions were then divided by 2 street sweeping events to find the reductions associated with each sweeping event.

3.3.2 Grit Chamber Pollutant Reduction Calculation

Over the years the County has used grit chambers on roadway projects to mitigate sediment transport to downstream water and natural resources. Young Environmental planned to use the SHSAM program to calculate the amount of sediment removed by grit chambers.

The SHSAM program is a software developed by Barr Engineering Co. to determine the amount of TSS removed by grit chambers, or hydrodynamic separators and manholes. The program uses a continuous runoff model, a sediment removal response function, and a sediment washout function to calculate removal. To use the SHSAM program the following input data are required: chamber or manhole type and size, precipitation data, sediment particle size distribution, watershed characteristics, temperature data, and influent TSS concentration.

3.3.3 Other BMPs (Stormwater Pond and Infiltration Basin) Pollutant Reduction Calculation Tools

Young Environmental intended to use the MPCA Simple Estimator to determine pollutant reductions for all other BMPs. The MPCA Simple Estimator is generally used to estimate watershed TP and TSS loading to BMPs and quantify load reduction associated with implementing the BMPs. Total load calculations are completed using the Simple Method described in the Minnesota Stormwater Manual (MPCA, 2020). Briefly, the MPCA Simple Estimator multiplies annual rainfall (in) by area (acres) by pollutant concentration (mg/L) by a correction factor and by a runoff coefficient. User inputs include annual rainfall and BMP drainage area according to land use. Load reductions can be calculated for the nine BMP types included in the tool using the following simplified equation.

$$\text{BMP Load Reduction} = \text{Load in} - \text{Load out} = (\text{Pollutant Concentration in} * \text{Volume in}) - (\text{Pollutant Concentration out} * \text{Volume out})$$

The BMP drainage area (acres) according to land use is the only user input for load reduction calculations. Users input the drainage area (acres) for each BMP type according to land use. Full MPCA Simple Estimator details can be found in the Minnesota Stormwater Manual (MPCA, 2021).

3.4 One-Sheet TMDL Position Report Development

For each impaired water, a one-sheet TMDL position report (one-pager) was created per applicable pollutant. Each one-pager contains three sections: an introductory section, a pre-baseline BMPs section, and a TMDL summary and reduction forecast section.

- The introductory section listed the applicable watershed impairment, watershed district or watershed management organization, compilation of land uses within the watershed, and maps.

- Pre-baseline BMPs sections listed the number of miles swept within each watershed along with associated pollutant reduction. The number of grit chambers in each watershed was listed, but no pollutant reduction was calculated.
- The TMDL summary and reduction forecasting sections summarize the applicable WLA, presents the required pollutant reductions, highlights the goal year for reaching the required pollution reduction (thereby meeting the WLA) and provides recommendations for future reductions and collaboration including a table with County roads within the watershed and applicable rehabilitation projects with the potential to incorporate BMPs.

4 Findings

The following presents the findings of each pollutant reduction calculation tool investigation and of the over-arching review of the County's progress toward meeting its TP and TSS WLAs.

4.1 Street Sweeping Pollutant Reduction Calculations

All annual street sweeping completed during the spring and fall began before the baseline year for all impaired waters. Although, BMPs implemented before the baseline year do not count towards current pollutant reduction requirements, rendering reduction calculations unnecessary, the County requested the completion of the calculation to assess the impact of adding additional street sweeping to their road maintenance operations.

4.2 Grit Chamber Pollutant Reduction Calculations

The County does not have the data required to use the SHSAM program to quantify the TSS reductions associated with grit chambers. Additionally, all the grit chambers were assumed to be constructed before the baseline year of all impaired waters. As new grit chambers would require individualized calculations, the calculation of pre-baseline grit chamber reductions is unnecessary. Nevertheless, the grit chambers were added to each BMPs map for reference.

4.3 Other BMPs Pollutant Reduction Calculations

As with grit chambers, all other structural BMPs were assumed to be constructed before the baseline year within all impaired waters rendering the pollutant reduction calculations unnecessary. Stormwater ponds were not included in BMPs map development per the County's request.

4.4 One-Sheet TMDL Position Report

The one-pagers for the 38 impaired water bodies are summarized in Table B, and presented in Appendix B.

5 Future Recommendations

The County's assigned individual and categorical wasteload allocations are not being met. In some instances, to meet the WLA, increasing the street sweeping effort from twice per year to three or four times per year would be sufficient. In addition to considering increasing the street sweeping efforts, the County is encouraged to collaborate with other MS4s and applicable watershed management organizations on regional BMPs to meet required reductions. Because of potential right-of-way constraints, future endeavors should focus on improving watershed infiltration and retrofitting BMPs whenever opportunities arise. These may include native plantings, shoreline and buffer restoration, sumps and grit chambers, stormwater ponds, and stormwater pond improvements with iron enhanced sand. In rural sections of the County, the County could collaborate with landowners and interested agencies and organizations to encourage nutrient management, increased vegetated practices like grassed waterways and filter strips, and structural practices such as wetland restoration and livestock exclusion. Additionally, public education and involvement programs, like those outlined in the Transportation Stormwater Permit Compendium, are encouraged to be included in reports and applications submitted to the MPCA (EPA, 2018). While these programs do not provide quantifiable pollutant reductions, they are counted as County progress. Finally, for all recommendations and to ensure compliance with the TMDLs, detailed records of all BMPs (such as its record plans, pollutant reductions calculations, and maintenance requirements) must be kept.

6 References

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Appendix A: Hennepin County Spreadsheet and TMDL/WRAPS Information

Table A contains the information provided by the MPCA in the MS4 Permit TMDL application spreadsheet for County assigned TSS and TP WLAs. Additional information such as impaired watershed area, existing load, numeric reduction, current County reduction, and goal year are added.

Only water resources requiring reporting were included in Table A and the report analysis. The following lakes from the original spreadsheet were removed from the 303(d) list and did not require reporting or had zero percent reductions listed: Fish, Independence, Riley, Penn, Hyland, Staring, Wing, Rose, Stone, Lower Twin, Ryan, and Wirth. The South Metro Mississippi TMDL is included in Table A but was excluded from analysis as the impaired watershed was greater than 23 million acres.

Several TMDL and WRAPS documents provided atypical data or did not provide sufficient information to determine current or future WLA compliance. These abnormalities are described here. The Lake Hiawatha and Sweeney Lake TMDLs determined their respective WLAs and associated reductions according to a growing season from June 1 through September 30. For the purpose of this analysis, the growing seasons were treated as years. The Upper and Middle Twin Lake TMDL provided percent reduction information as a range for all flow regimes (i.e., 13-35% reduction) rather than specific numeric values and did not provide any existing load information. More loading and required reduction information will be needed to determine future WLA compliance. The Diamond Creek, Elm Creek, Rush Creek, and South Fork Rush Creek WRAPS document did not provide existing load information. Additionally, the document listed medium, low, and/or very low flow regime numeric WLAs as 0 lbs/yr TP while the spreadsheet did not provide numeric WLAs but instead listed them as asterisks for Diamond Creek, Rush Creek, and Rush Creek South Fork. Loading information and numeric WLAs will be required to determine future WLA compliance. The Lower Crow River TMDL did not provide existing load or percent reduction information. Both of these values will be required to determine future WLA compliance.

The County provided Young Environmental with most of the data necessary to complete analysis. Any additional documents or files required to complete analysis were obtained from the MPCA or the Minnesota Geospatial Commons. Data and their associated source are listed below in Table A.

Table A. Data and Their Respective Sources

Hennepin County GIS Data	Hennepin County TMDL or WRAPS Reports	MPCA GIS Data and TMDL Reports	Minnesota Geospatial Commons GIS Data
Hennepin County Centerlines	Cedar Island, Pike, and Eagle Lakes Excess Nutrients TMDL Study	Riley Creek Subwatershed	Hennepin County Municipalities
Curb Sweeping Miles	Crystal Lake Nutrient TMDL Study	South Metro Mississippi River Subwatershed	Minnesota Cities, Townships, and Unorganized Areas
Median Sweeping Miles	Elm Creek Watershed Management Commission 2010 WRAPS Report	Pike Lake (RCWD) Subwatershed	County Boundaries in Minnesota
Grit Chamber Location	Lower Minnesota River 2014 WRAPS Report	Silver Lake Subwatershed	Public Water Basins
All CIP Files	2010 Medicine Lake Excess Nutrients TMDL	North Fork Crow and Lower Crow Bacteria Turbidity and Low DO 2013	Public Water Courses
County Road Shield SVG	Minnehaha Creek Lake Hiawatha TMDL Study	North Fork Crow and Lower Crow Bacteria Turbidity and Low DO 2019	2016 Land Use
MS4 Boundary	Rice Creek Watershed District Southwest Urban Lakes–Excess Nutrients TMDL Study		
Bass Lake Subwatershed	Schmidt, Pomerleau, and Bass Lakes TMDLs Study		
Crystal Lake Subwatershed	South Metro Mississippi TSS TMDL Study		
Middle Twin Lake Subwatershed	Sweeney Lake TMDL Study		

Hennepin County GIS Data	Hennepin County TMDL or WRAPS Reports	MPCA GIS Data and TMDL Reports	Minnesota Geospatial Commons GIS Data
Upper Twin Lake Subwatershed	Twin (Upper, Middle, and Lower) and Ryan Lakes TMDLs Study		
West Arm Subwatershed	Upper Minnehaha Creek Watershed TMDL Study		
Elm Creek Subwatershed			
Rush Creek Subwatershed			
Rush Creek South Fork Subwatershed			
Diamond Creek Subwatershed			
Diamond Lake Subwatershed			
Rice Lake, Main Subwatershed			
Goose Lake Subwatershed			
Cowley Lake Subwatershed			
Medicine Lake Subwatershed			

Hennepin County GIS Data	Hennepin County TMDL or WRAPS Reports	MPCA GIS Data and TMDL Reports	Minnesota Geospatial Commons GIS Data
Sweeney Lake Subwatershed			

Appendix B– One-sheet TMDL position reports

Table B. MS4 Permit TMDL Application Spreadsheet Information

Waterbody Name	Report	Watershed Area (acres)	Pollutant (TP or TSS)	WLA, Individual or Categorical	Existing Load	Required Reduction	Current Reduction	Goal Year	Comments
Baseline Year				Numeric WLA, Unit					
Cedar Island	Cedar Island, Pike, and Eagle Lakes Excess Nutrients TMDL	640	TP	Categorical	111, kg/yr	0.5, kg/yr 1%	0, kg/yr	2075	WLA does not include upstream load from Pike and Cedar Lakes.
1999				48.5, kg/yr 0.133, kg/day					
Eagle		2,900	TP	Categorical	306.6, kg/yr	2.6, kg/yr 1.6%	0, kg/yr	2075	
1999				186.8, kg/yr 0.511, kg/day					
Pike		1,100	TP	Categorical	202.5, kg/yr	1.8, kgs/yr 2.5%	0, kg/yr	2075	
1999				127.7, kg/yr 0.35, kg/day					
Crystal	Crystal Lake Nutrient TMDL	1,300	TP	Categorical	226.4, kg/yr	2.3, kg/yr 1.6%	0, kg/yr	2075	
2003				79.0, kg/yr 0.22, kg/day					
Cowley	Elm Creek Watershed Mgmt. Commission WRAPS 2010	860	TP	Individual	1.0, lbs/yr	0.8, lbs/yr 81%	0, lbs/yr	2075	
2006				0.2, lbs/yr					
Diamond		2,970	TP	Individual	16.2, lbs/yr	11.9, lbs/yr 74%	0, lbs/yr	2075	
2009				4.3 lbs/yr 0.012 lbs/day					
Diamond Creek		6,750	TP	Individual	Unavailable	64%, very high flow 71%, high flow 65%, mid flow 66% low flow 81% very low flow	0, lbs/day	2075	
2010				0.04, lbs/day, very high flow 0.01, lbs/day, high flow **, lbs/day, mid flow **, lbs/day, low flow **, lbs/day, very low flow					
Diamond Creek		6,750	TSS	Individual	Unavailable	0%, very high flow 2%, high flow 0%, mid flow 0%, low flow 0.3% very low flow	0, lbs/day	2075	
2010				13.74, lbs/day, very high flow 4.71, lbs/day, high flow 1.83, lbs/day, mid flow 0.670, lbs/day, low flow 0.14, lbs/day, very low flow					
Elm Creek	20,900	TP	Individual	Unavailable	77%, very high flow 71%, high flow 67%, mid flow 64%, low flow	0, lbs/day	2075		
2010			0.19, lbs/day, very high flow 0.07, lbs/day, high flow						

Waterbody Name	Report	Watershed Area (acres)	Pollutant (TP or TSS)	WLA, Individual or Categorical	Existing Load	Required Reduction	Current Reduction	Goal Year	Comments
Baseline Year				Numeric WLA, Unit					
				0.03, lbs/day, mid flow 0.02, lbs/day, low flow 0.01, lbs/day, very low flow		53%, very low flow			
Elm Creek	Elm Creek Watershed Mgmt. Commission WRAPS 2010	20,900	TSS	Individual	Unavailable	49%, very high flow 64%, high flow 59%, mid flow 64%, low flow 48%, very low flow	0, lbs/day	2075	
2010				78.4, lbs/day, very high flow 34.9, lbs/day, high flow 14.27, lbs/day, mid flow 11.37, lbs/day, low flow 8.4, lbs/day, very low flow					
Goose				Individual					
2010		300	TP	0.2, lbs/yr 0.0, lbs/day	0.9, lbs/yr	0.8, lbs/yr 82%	0, lbs/yr	2075	
Rice Lake, Main		16,000	TP	Individual	79.1, lbs/yr	66.5, lbs/yr 84%	0, lbs/yr	2075	
2010				12.6, lbs/yr 0.035, lbs/day					
Rush Creek		32,600	TP	Individual	Unavailable	0.3, lbs/day, 79%, very high flow 0.1, lbs/day, 76%, high flow 0.03, lbs/day, 75%, mid flow 81%, low flow 93%, very low flow	0, lbs/day	2075	
2010				0.09, lbs/day, very high flow 0.03, lbs/day, high flow, 0.01, lbs/day, mid flow **, lbs/day, low flow **, lbs/day, very low flow					
Rush Creek, South Fork				13,700					
2010		0.06, lbs/day, very high flow, 0.02, lbs/day, high flow 0.01, lbs/day, mid flow **, lbs/day, low flow **, lbs/day, very low flow							
Cornelia, North	Lower Minnesota River WRAPS 2014	860	TP	Individual	8.0, lbs/yr	4.0, lbs/yr 50%	0, lbs/yr	2075	
2015				4.0, lbs/yr 0.033, lbs/day					
Riley Creek		8,180	TSS	Individual	1,220, lbs/day, very high flow 325, lbs/day, high flow 125, lbs/day, mid flow 16.7, lbs/day, low flow 8.3, lbs/day, very low flow	1,074, lbs/day, 88%, very high flow 286, lbs/day, 88%, high flow 110, lbs/day, 88%, mid flow 14.7, lbs/day, 88%, low flow 7.3 lbs/day, 88%, very low flow	0, lbs/day	2075	Overall percent reduction
2011				146, lbs/day, very high flow 39.0, lbs/day, high flow 15.0, lbs/day, mid flow 2.0, lbs/day, low flow 1.0, lbs/day, very low flow					

Waterbody Name	Report	Watershed Area (acres)	Pollutant (TP or TSS)	WLA, Individual or Categorical	Existing Load	Required Reduction	Current Reduction	Goal Year	Comments
Baseline Year				Numeric WLA, Unit					
Medicine	Medicine Lake Nutrients TMDL	12,000	TP	Individual	67.0, lbs/yr	19.0, lbs/yr 28%	0, lbs/yr	2075	
2006				48.0 lbs/yr 0.132 lbs/day					
Hiawatha	Minnehaha Creek Lake Hiawatha TMDL	17,900	TP	Individual	52.9, lbs/yr	18.7, lbs/yr 35%	0, lbs/yr	2075	TMDL based on growing season (June 1 through September 30)
2006				34.2 lbs/yr 0.28, lbs/day					
Nokomis		2,630	TP	Individual	16.0, lbs/yr	5.0, lbs/yr 30%	0, lbs/yr	2075	Site specific standard approved 11/7/13
2003	11.0 lbs/yr 0.03 lbs/day								
Crow River, Lower	North Fork Crow and Lower Crow Bacteria, Turbidity, and Low DO TMDL	88,700	TSS	Individual	Unavailable	Unavailable	0, tons/day	2075	
2004				0.1, tons/day, very high flow 0.1, tons/day, high flow 0.1, tons/day, mid flow 0.1, tons/day, low flow 0.1, tons/day, very low flow					
Pike	Rice Creek Watershed District Southwest Urban Lakes - Excess Nutrients TMDL	5,200	TP	Categorical	685.5, kgs/yr	8.7, kg/yr 2.8%	0, kg/yr	2075	
2003				371.1, kg/yr 1.013, kg/day					
Bass	Schmidt, Pomerleau, and Bass Lakes TMDLs	3,180	TP	Categorical	580.1, kg/yr	1.4, kg/yr 1%	0, kg/yr	2075	Excludes load from upstream lake.
2002				374.8, kg/yr 1.03, kg/day					
Silver	Silver (West) Lake (Metro)	680	TP	Categorical	241.0, lbs/yr	0lbs/yr	0, lbs/yr	County Contribution Met	
2002				201.0, lbs/yr 0.55, lbs/day					
Sweeney	Sweeney Lake TMDL	2,200	TP	Categorical	574.1 lbs/yr	4.1, lbs/yr 0.8%	0, lbs/yr	2075	TMDL based on a 122-day growing season
2004				488.0, lbs/122 day 4.0, lbs/day					
Upper Twin	Twin (Upper, Middle, and Lower) and Ryan Lakes TMDLs	3,680	TP	Categorical	Unavailable	Unavailable	0, kg/yr	2075	
1999				192.0, kg/yr, avg precipitation 1.6, kg/day, avg precipitation 335.0, kg/yr, wet precipitation 2.7, kg/day, wet precipitation 165.0, kg/yr, dry precipitation 1.4, kg/day, dry precipitation					
Middle Twin				Categorical					
1999	1,470	TP	141.0, kg/yr, avg precipitation	Unavailable	Unavailable	0, lbs/yr	2075		

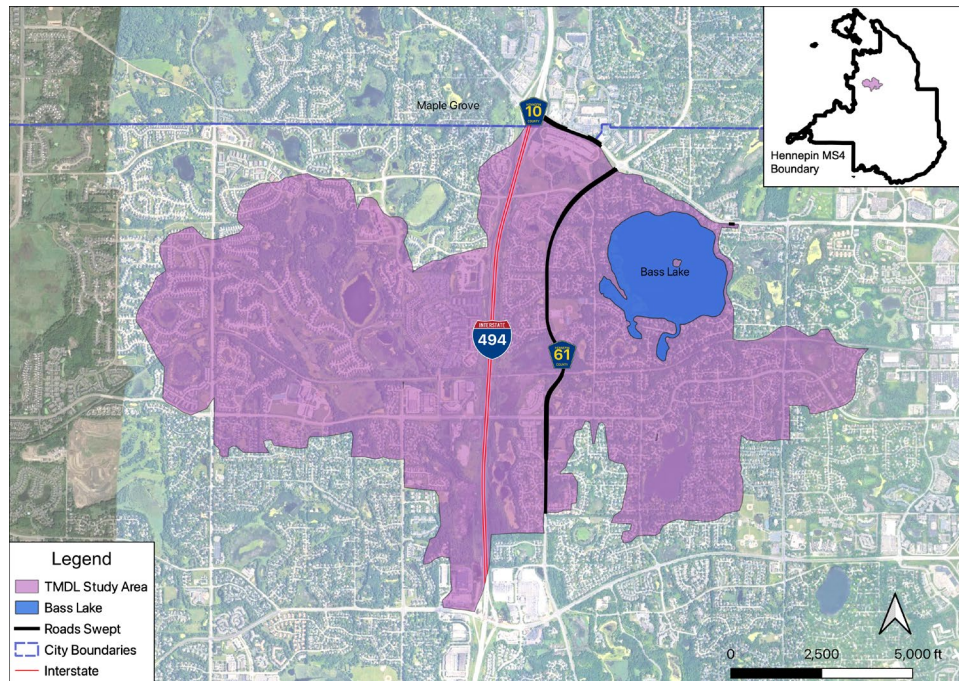
Waterbody Name	Report	Watershed Area (acres)	Pollutant (TP or TSS)	WLA, Individual or Categorical	Existing Load	Required Reduction	Current Reduction	Goal Year	Comments
Baseline Year				Numeric WLA, Unit					
				0.4, kg/day, avg precipitation 263.0, kg/yr, wet precipitation 0.7, kg/day, wet precipitation 130.0, kg/yr, dry precipitation 0.3, kg/day, dry precipitation					
Dutch	Upper Minnehaha Creek Watershed TMDL	1,570	TP	Individual	1.0, lbs/yr	0.8, lbs/yr 64%	0, lbs/yr	2075	
2008				0.47, lbs/yr 0.001, lbs/day					
Forest		855	TP	Individual	8.0, lbs/yr	5.0, lbs/yr 62%	0, lbs/yr	2075	
2008				3.18, lbs/yr 0.009, lbs/day					
Gleason		2,440	TP	Individual	10.0, lbs/yr	7.0, lbs/yr 73%	0, lbs/yr	2075	
2008				2.66, lbs/yr 0.007, lbs/day					
Hadley		500	TP	Individual	6.0, lbs/yr	4.0, lbs/yr 61%	0, lbs/yr	2075	
2007				2.41, lbs/yr 0.007, lbs/day					
Holy Name		388	TP	Individual	0.1, lbs/yr	0.1, lbs/yr 98%	0, lbs/yr	2075	
2007				0.001, lbs/yr 0.0, lbs/day					
Langdon		910	TP	Individual	7.0, lbs/yr	3.0, lbs/yr 45%	0, lbs/yr	2075	
2010				3.94, lbs/yr 0.011, lbs/day					
Long		5,970	TP	Individual	41.0, lbs/yr	36.0, lbs/yr 87%		2075	
2008				6.0, lbs/yr 0.015, lbs/day					
Minnetonka-Halsteds Bay		18,760	TP	Individual	15.0, lbs/yr	9.0, lbs/yr 60%	0, lbs/yr	2075	
2008				5.84, lbs/yr 0.016, lbs/day					
Minnetonka-Stubbs Bay	1,750	TP	Individual	5.0, lbs/yr	20, lbs/yr 45%	0, lbs/yr	2075		
2008			2.63, lbs/yr 0.007, lbs/day						
Minnetonka-West Arm	13,000	TP	Individual	19.0, lbs/yr	18.0, lbs/yr 95%	0, lbs/yr	2075		
2008			0.97, lbs/yr						

Waterbody Name	Report	Watershed Area (acres)	Pollutant (TP or TSS)	WLA, Individual or Categorical	Existing Load	Required Reduction	Current Reduction	Goal Year	Comments
Baseline Year				Numeric WLA, Unit					
				0.003, lbs/day					
Minnetonka – Jennings Bay		11,100	TP	Individual	7.0, lbs/yr	5.0, lbs/yr 71%	0, lbs/yr	2075	
2008	2.15, lbs/yr 0.006, lbs/day								
Mooney		490	TP	Individual	0.7, lbs/yr	0.6, lbs/yr 89%	0, lbs/yr	2075	
2007	0.07, lbs/yr 0.0, lbs/day								
Snyder	Upper Minnehaha Creek Watershed TMDL	360	TP	Individual	0.9, lbs/yr	0.4, lbs/yr 40%	0, lbs/yr	2075	
2007				0.533, lbs/yr 0.001, lbs/day					
Tanager		7,570	TP	Individual	7.0, lbs/yr	5.0, lbs/yr 69%	0, lbs/yr	2075	
2008				2.05, lbs/yr 0.006, lbs/day					
Mississippi River	South Metro Mississippi TSS TMDL	>23 million	TSS	Categorical	Unavailable	Unavailable			
N/A				154.0, lbs/acre/yr					

Bass Lake TMDL

Bass Lake, impaired for total phosphorus (TP), is under the purview of the Shingle Creek Watershed Management Commission. The watershed area to the lake is approximately 3,180 acres and is entirely within the city of Plymouth, Minnesota. Land use in the watershed is 36 percent single-family residential, 24 percent undeveloped, 12 percent parks and recreation, and 9 percent each for agricultural and water with the remaining 10 percent comprising highway, multifamily residential, commercial, and institutional spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Bass Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed kilograms/year
Street sweeping, miles	3.5	1.0

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 22.4 acres, or less than 1 percent of the total TMDL watershed area. Applying the land area approach, the county's expected reduction contribution to meeting the lake's WLA is 1.4 kg per year. Hennepin County has not reduced TP to Bass Lake since the 2002 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Bass Lake

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2002	
Existing Loads, kg per year	580.1
WLA, kg per year	374.8
Required Reduction, kg and %	205.3 and 35%
Hennepin County Required Reduction, kg per year	1.4
Current Hennepin County Reduction, kg per year	0
Goal year of 2075	

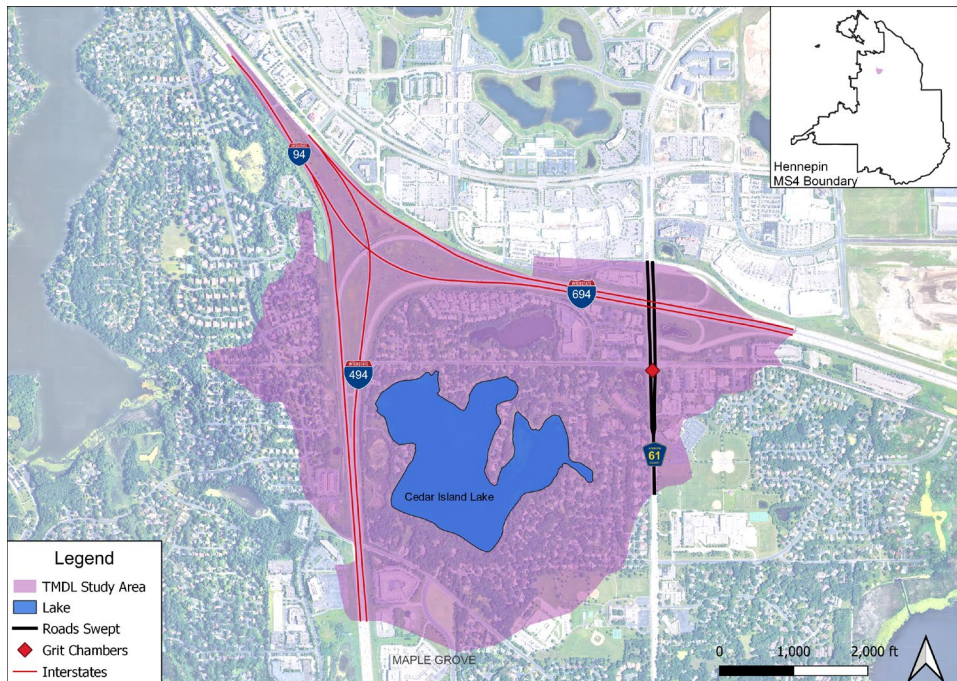
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	0.6				
61	2.9				

Cedar Island Lake TMDL

Cedar Island Lake, impaired for total phosphorus (TP), is under the purview of the Shingle Creek Watershed Management Commission. The watershed area to the lake is approximately 640 acres and is entirely within the city of Maple Grove, Minnesota. Land use within the watershed is 41 percent residential, 23 percent transportation, 15 percent open water, and 8 percent retail and commercial, with the remaining 13 percent comprising retail, commercial, industrial, institutional, undeveloped, parks, and open spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Cedar Island Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed kilograms/year
Street sweeping, miles	1.7	0.5
Grit chambers	1	N/A

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 6.6 acres or 1 percent of the total TMDL watershed area. Applying the land area approach, the county's expected reduction contribution to meeting the lake's WLA is 0.5 kg per year. Hennepin County has not reduced TP to Cedar Island Lake since the 1999 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Cedar Island Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 1999	
Existing Loads, kg per year	111.0
WLA, kg per year	48.5
Required Reduction, kg and %	62.5 and 56%
Hennepin County Required Reduction, kg per year	0.5
Current Hennepin County Reduction, kg per year	0
Goal year of 2075	

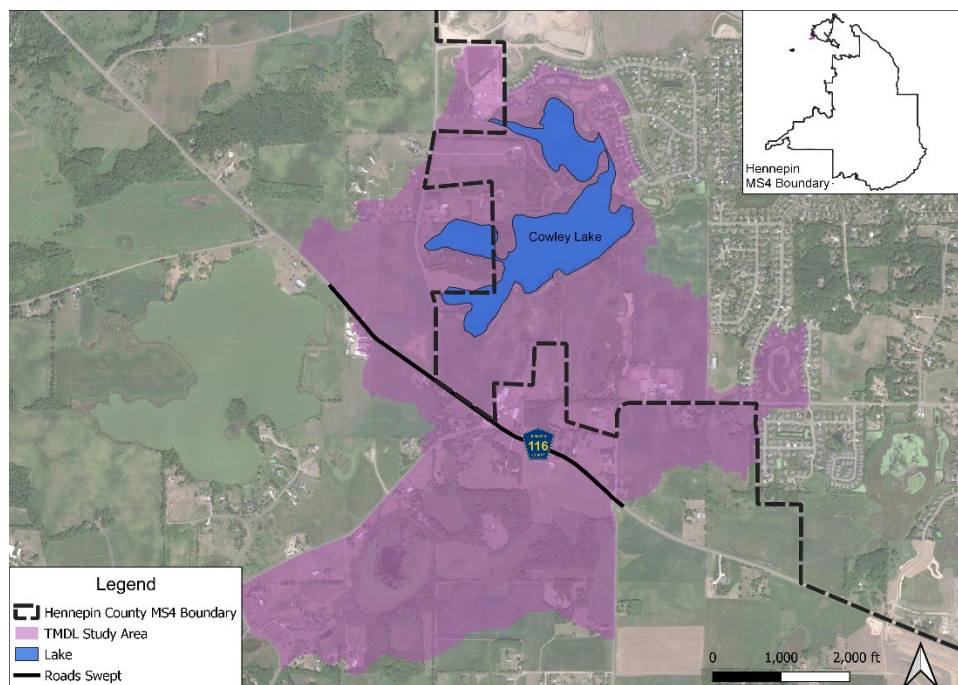
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
61	1.0				

Cowley Lake TMDL

Cowley Lake, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 860 acres and is entirely within the city of Rogers, Minnesota. Land use within the watershed is 47 percent agricultural, 28 percent undeveloped, 12 percent single-family detached residential, and 8 percent open water with the remaining 5 percent comprising extractive, institutional, parks, farmstead, retail and commercial, multifamily residential, and mixed-use residential spaces as well as retail and commercial spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Cowley Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	1.0	0.6

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Cowley Lake since the 2006 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Cowley Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2006	
Existing Loads, lbs. per year	1.0
WLA, lbs. per year	0.2
Required Reduction, lbs. and %	0.8 and 81%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

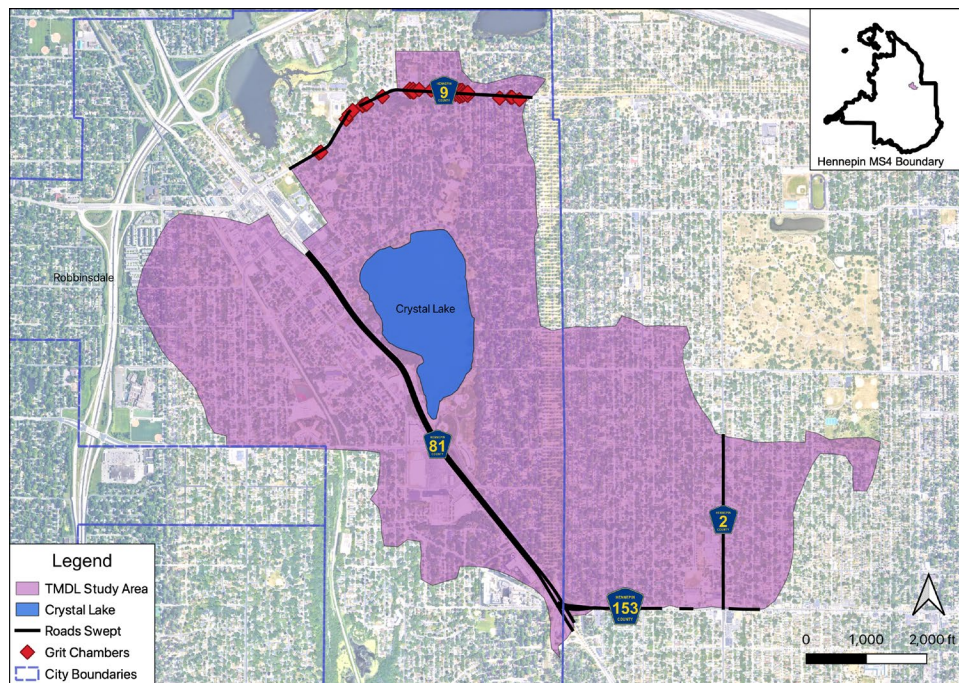
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
116	1.0				

Crystal Lake TMDL

Crystal Lake, impaired for total phosphorus (TP), is under the purview of the Shingle Creek Watershed Management Commission. The watershed area to the lake is approximately 1,300 acres and is in the cities of Robbinsdale and Minneapolis, Minnesota. Land use within its watershed is 67 percent single-family residential, 9 percent parks and recreation, and 6 percent of each of water, commercial, and multifamily residential. The following summarizes the county's existing and proposed effort toward reducing TP to Crystal Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed kg/year
Street sweeping, miles	9.1	2.5
Catch basin sumps/ grit chambers	35	N/A

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 20.5 acres or 1.6 percent of the total TMDL watershed area. Applying the land area approach, the county's expected reduction contribution to meeting the lake's WLA is 2.3 kg per year. Hennepin County has not reduced TP to Crystal Lake since the 2003 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Crystal Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2003	
Existing Loads, kg per year	226.4
WLA, kg per year	79.0
Required Reduction, kg and %	147.4 and 65%
Hennepin County Required Reduction, kg per year	2.3
Current Hennepin County Reduction, kg per year	0
Goal year of 2075	

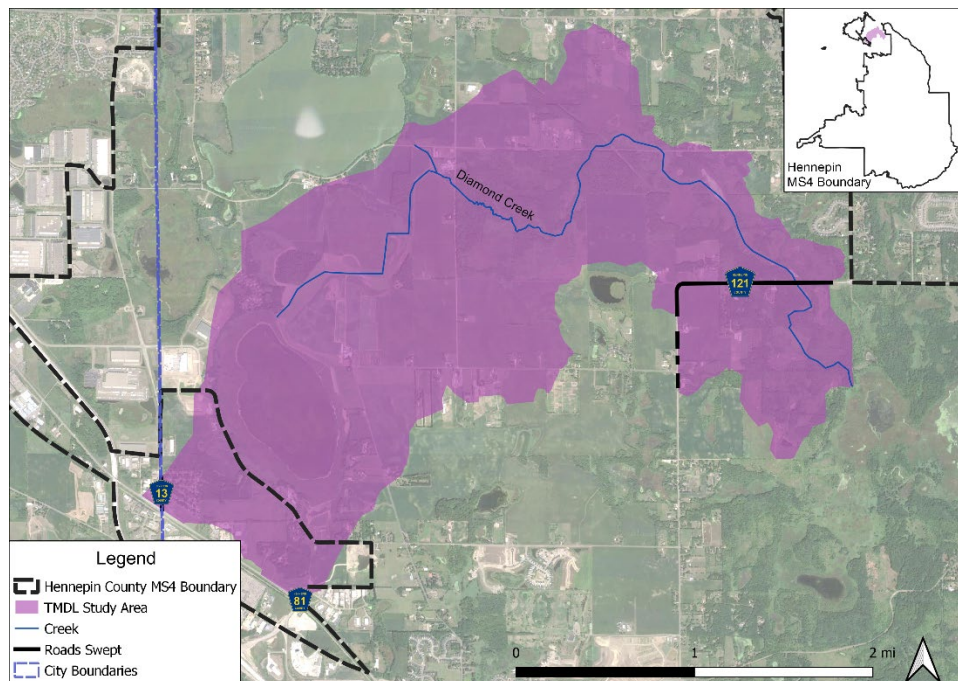
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
2	0.5				
9	0.8				
81	1.4				
153	0.5				

Diamond Creek TP TMDL

Diamond Creek, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 6,750 acres and is in the cities of Dayton and Rogers, Minnesota. Land use within the watershed is 43 percent agricultural, 28 percent parks and open space, and 17 percent undeveloped with the remaining 12 percent comprising open water, major railway, single-family detached residential, farmstead, industrial, utility, golf, retail, commercial, and institutional spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Diamond Creek to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/day
Street sweeping, miles	1.8	0.003

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Diamond Creek since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Diamond Creek.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010					
Flow Regime	Very High	High	Mid	Low	Very Low
Existing Loads, lbs. per day	Existing Load Information Unavailable				
WLA, lbs. per day	0.04	0.01	--	--	--
Required Reduction, %	64%	71%	65%	66%	81%
Current TP Reduction, lbs. per day	0				
Goal year of 2075					

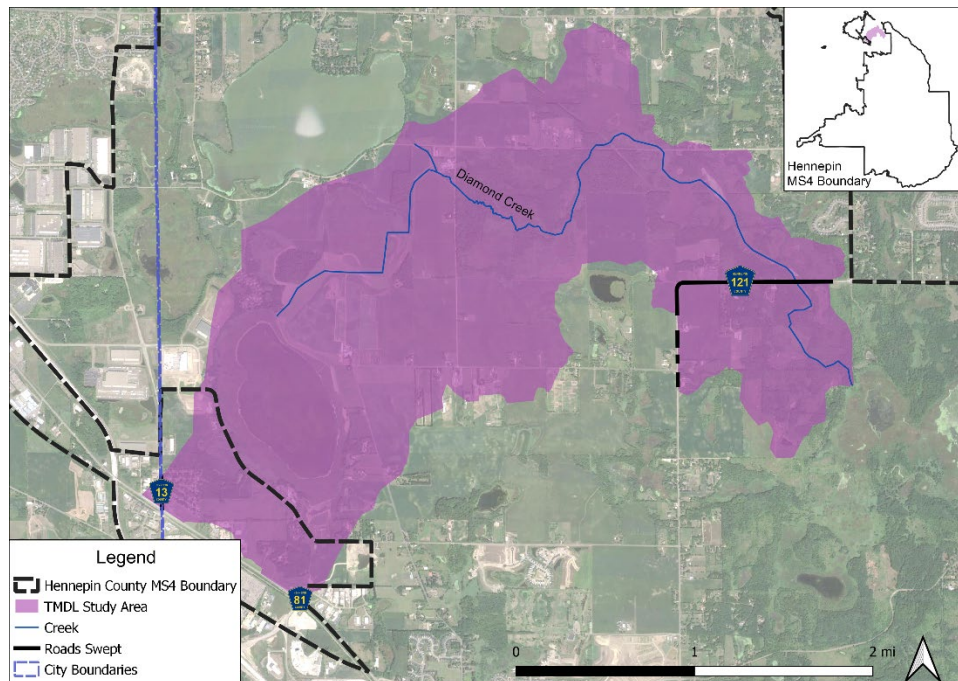
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
13	0.2				
81	0.1				
121	1.2				

Diamond Creek TSS TMDL

Diamond Creek, impaired for total suspended solids (TSS), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 6,750 acres and is in the cities of Dayton and Rogers, Minnesota. Land use within the watershed is 44 percent agricultural, 28 percent parks and open space, and 17 percent undeveloped with the remaining 10 percent comprising open water, transportation, residential, industrial, retail, commercial, and institutional spaces. The following summarizes the county's existing and proposed effort toward reducing TSS to Diamond Creek to meet its individual TSS wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 4: Pre-Baseline Year BMPs and Removals

	Quantity	TSS Removed pounds/year
Street sweeping, miles	1.8	3.4

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TSS to Diamond Creek since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TSS by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TSS reductions to Diamond Creek.

Table 5: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010					
Flow Regime	Very High	High	Mid	Low	Very Low
Existing Loads, lbs. per day	Existing Load Information Unavailable				
WLA, lbs. per day	13.7	4.7	1.8	0.7	0.1
Required Reduction, %	0%	30%	0%	0%	68%
Current TSS Reduction, lbs. per day	0				
Goal year of 2075					

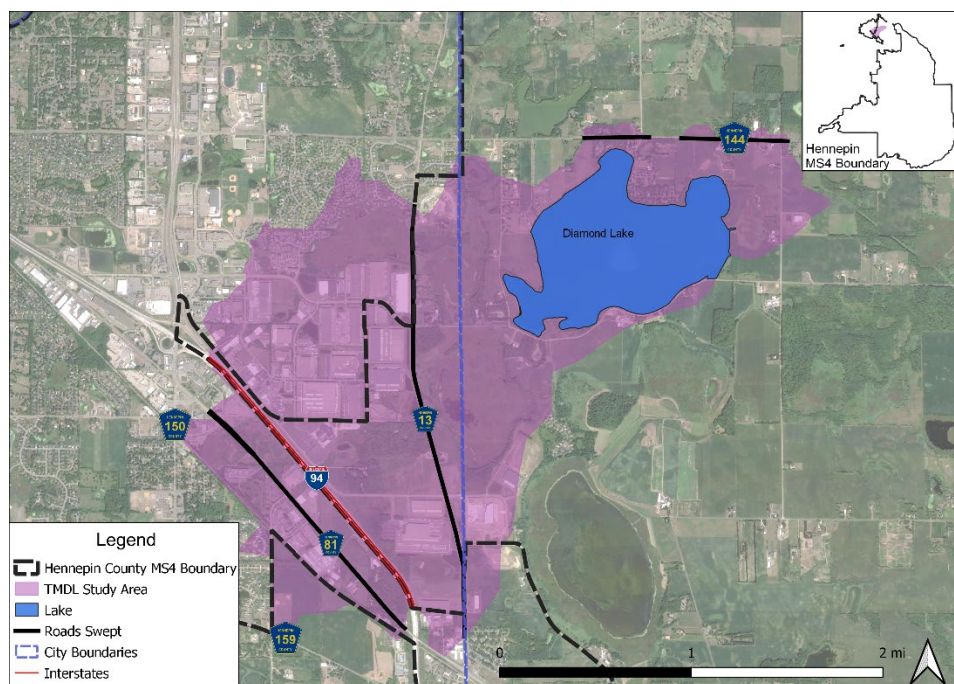
Table 6: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
13	0.2				
81	0.1				
121	1.2				

Diamond Lake TMDL

Diamond Lake, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 2,970 acres and is in the cities of Dayton and Rogers, Minnesota. Land use in the watershed is 35 percent undeveloped, 19 percent agricultural, 17 percent industrial and utility, and 14 percent open water with the remaining 16 percent comprising single-family detached residential, retail, commercial, major highway and railway, park and recreation, single-family attached residential, institutional, farmstead multifamily residential, mixed-use industrial and residential, and manufactured housing park paces. The following summarizes the county's existing and proposed effort toward reducing TP to Diamond Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	5.0	3.0

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Diamond Lake since the 2009 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Diamond Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2009	
Existing Loads, lbs. per year	16.2
WLA, lbs. per year	4.3
Required Reduction, lbs. and %	11.9 and 74%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

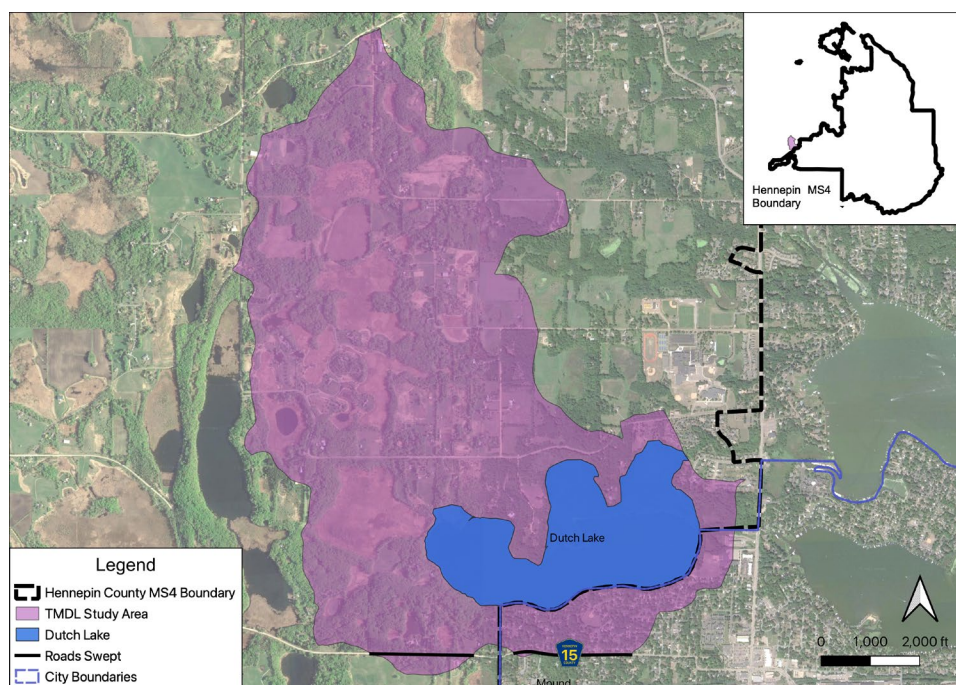
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
13	2.3				
81	1.8				
144	0.9				
150	0.1				

Dutch Lake TMDL

Dutch Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 1,570 acres and is in the cities of Minnetrista and Mound, Minnesota. Land use in the watershed consists of 52 percent undeveloped, 20 percent single family detached, 11 percent agricultural, 10 percent open water, 6 percent parks and recreation, and 1 percent institutional. The following summarizes the county's existing and proposed effort toward reducing TP to Dutch Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	1.1	0.7

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Dutch Lake since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Dutch Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	1.0
WLA, lbs. per year	0.5
Required Reduction, lbs. and %	0.8 and 64%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

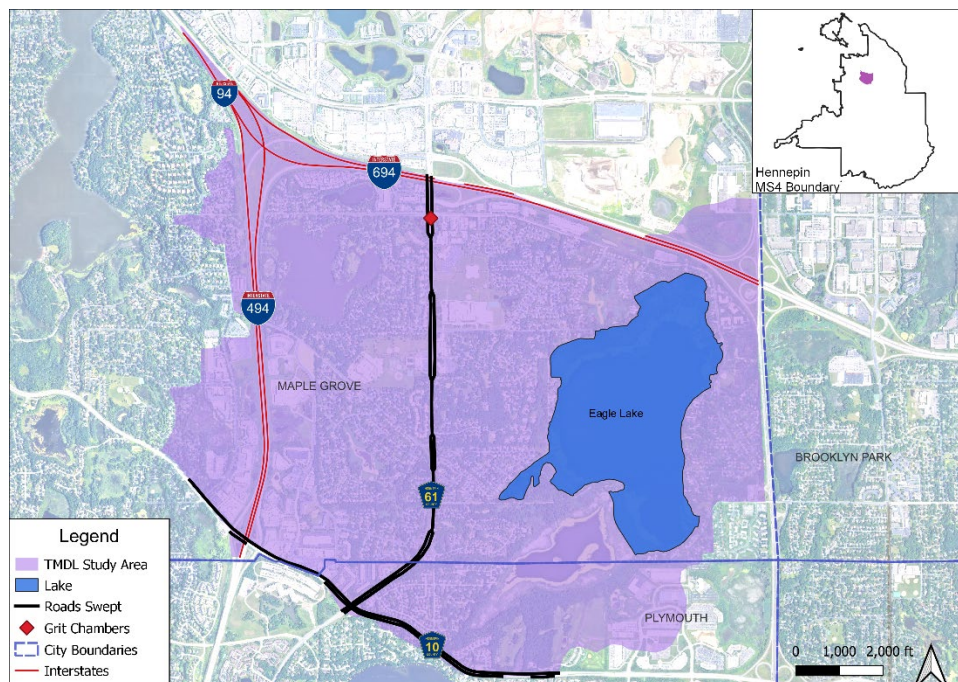
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
15	0.8				

Eagle Lake TMDL

Eagle Lake, impaired for total phosphorus (TP), is under the purview of the Shingle Creek Watershed Management Commission. The watershed area to the lake is approximately 2,900 acres and is in the cities of Maple Grove and Plymouth, Minnesota. Land use within the watershed is 32 percent single-family detached residential, 16 percent open water, and 9 percent each for parks and major highways, 8 percent industrial, and 6 percent each industrial and single-family attached residential spaces with the remaining 14 percent comprising institutional, retail, commercial, golf, multifamily residential, office, mixed-use industrial and commercial, and seasonal and vacation spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Eagle Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed kilograms/year
Street sweeping, miles	11.4	3.1
Grit chambers	1	N/A

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 40.9 acres or 1.4 percent of the total TMDL watershed area. Applying the land area approach, the county's expected reduction contribution to meeting the lake's WLA is 2.6 kg per year. Hennepin County has not reduced TP to Cowley Lake since the 1999 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Eagle Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 1999	
Existing Loads, kg per year	306.6
WLA, kg per year	186.8
Required Reduction, kg and %	119.8 and 39%
Hennepin County Required Reduction, kg per year	2.6
Current TP Reduction, kg per year	0
Goal year of 2075	

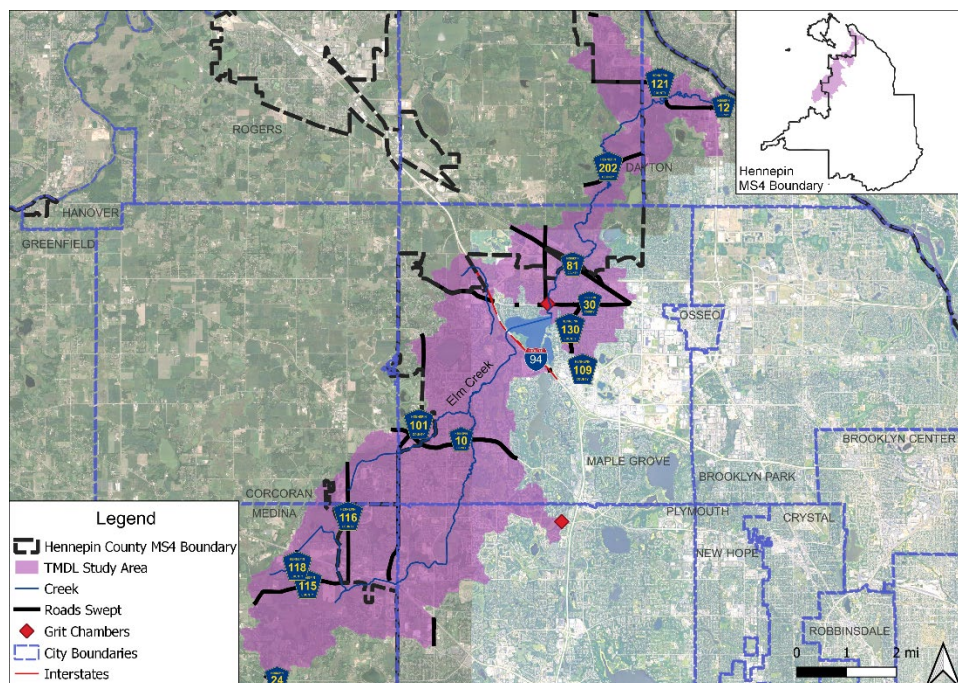
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	2.9				
61	3.4				

Elm Creek TP TMDL

Elm Creek, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 20,900 acres and is in the cities of Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth, and Rogers, Minnesota. Land use within the watershed is 29 percent single-family detached residential, 24 percent undeveloped, 21 percent park and recreation spaces, 8 percent agricultural with the remaining 18 percent comprising single-family attached residential, institutional, open water, golf, retail, commercial, major highway, industrial, utility, multifamily residential, office, farmstead, major railway, and mixed-use industrial and residential spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Elm Creek to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/day
Street sweeping, miles	59.1	0.1
Grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Elm Creek since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Elm Creek.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010					
Flow Regime	Very High	High	Mid	Low	Very Low
Existing Loads, lbs. per day	Existing Load Information Unavailable				
WLA, lbs. per day	0.2	0.1	0.03	0.02	0.01
Required Reduction, %	77%	71%	67%	64%	53%
Current TP Reduction, lbs. per day	0				
Goal year of 2075					

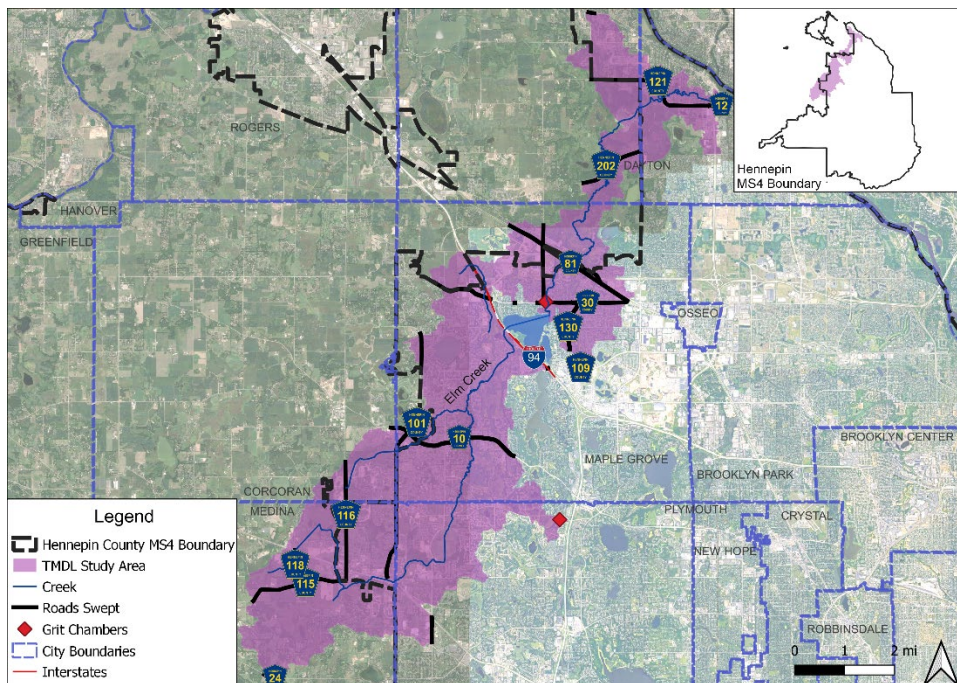
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	5.2				
12	0.3				
24	0.4				
30	4.5				
47	3.3				
81	5.4				
101	5.9				
109	<0.1				
115	2.3				
116	2.5				
118	0.7				
121	4.4				
130	2.0				
202	1.4				

Elm Creek TSS TMDL

Elm Creek, impaired for total suspended solids (TSS), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 20,900 acres and is in the cities of Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth, and Rogers, Minnesota. Land use within the watershed is 29 percent single-family detached residential, 24 percent undeveloped, 21 percent park and recreation spaces, 8 percent agricultural with the remaining 18 percent comprising single-family attached residential, institutional, open water, golf, retail, commercial, major highway, industrial, utility, multifamily residential, office, farmstead, major railway, and mixed-use industrial and residential spaces. The following summarizes the county's existing and proposed effort toward reducing TSS to Elm Creek to meet its individual TSS wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 4: Pre-Baseline Year BMPs and Removals

	Quantity	TSS Removed pounds/day
Street sweeping, miles	59.1	111.4
Catch basin sumps/ grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TSS to Elm Creek since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TSS by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TSS reductions to Elm Creek.

Table 5: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010					
Flow Regime	Very High	High	Mid	Low	Very Low
Existing Loads, lbs. per day	Existing Load Information Unavailable				
WLA, lbs. per day	78.4	34.9	14.3	11.4	8.4
Required Reduction, %	49%	64%	59%	64%	48%
Current TSS Reduction, lbs. per day	0				
Goal year of 2075					

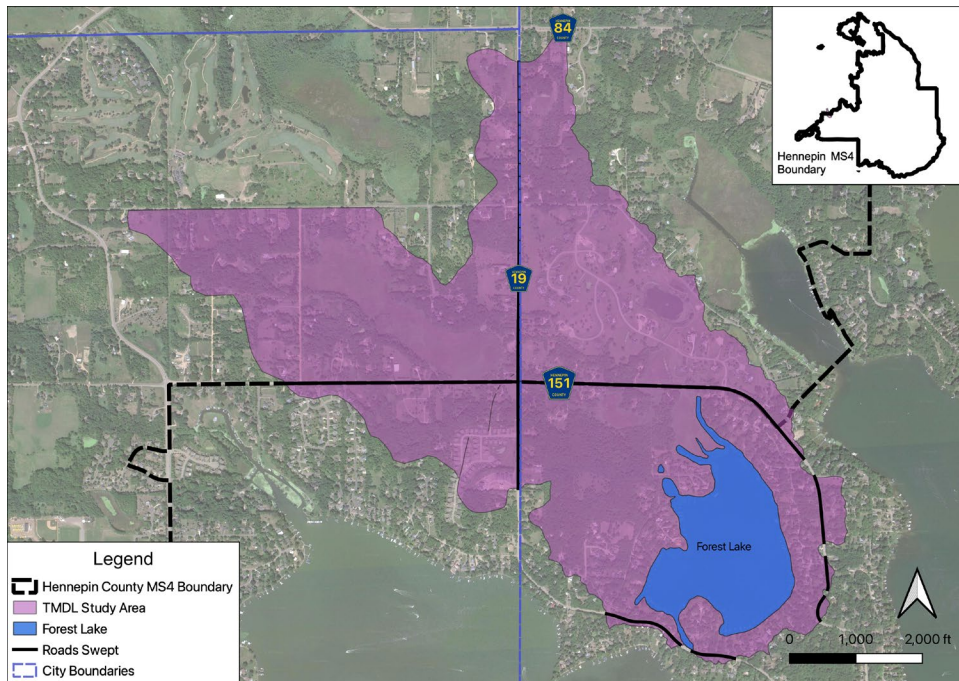
Table 6: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	5.2				
12	0.3				
24	0.4				
30	4.5				
47	3.3				
81	5.4				
101	5.9				
109	<0.1				
115	2.3				
116	2.5				
118	0.7				
121	4.4				
130	2.0				
202	1.4				

Forest Lake TMDL

Forest Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 855 acres and in the cities of Minnetrista and Orono, Minnesota. Land use in the watershed consists of 44 percent undeveloped, 40 percent single-family detached residential, 10 percent open water with the remaining 6 percent comprised of parks and recreation, agricultural, and institutional spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Forest Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	3.6	2.2

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Forest Lake since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Forest Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	8.0
WLA, lbs. per year	3.0
Required Reduction, lbs. and %	5.0 and 62%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

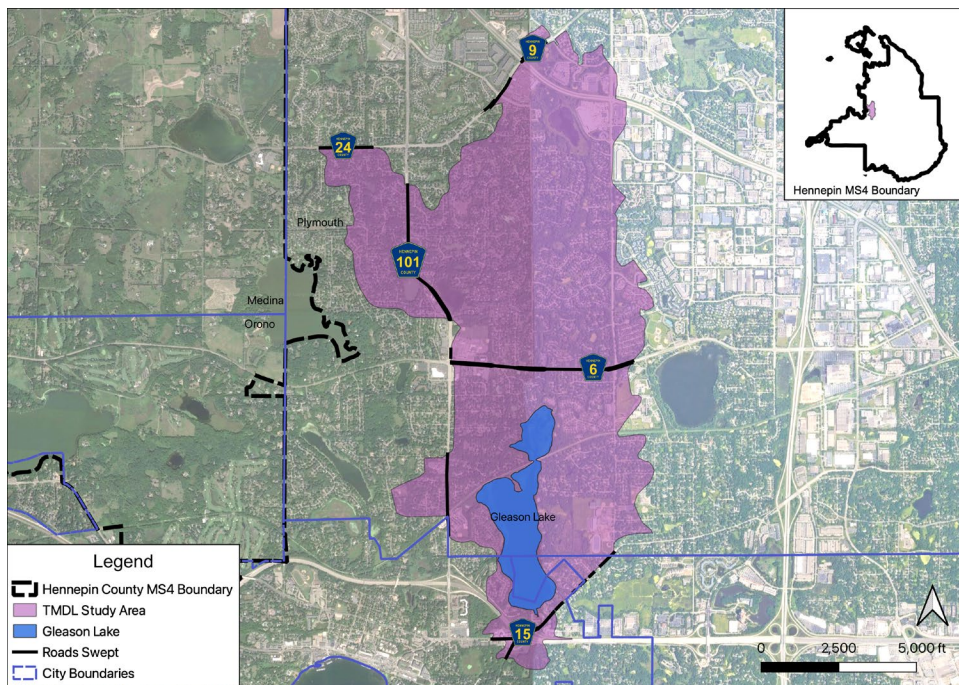
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
19	1.6				
84	<0.1				
151	1.9				

Gleason Lake TMDL

Gleason Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 2,440 acres and in the cities of Plymouth, Wayzata, and Minnetonka, Minnesota Land use in the watershed is 58 percent single-family detached residential, 9 percent single-family attached residential, 8 percent open water, 7 percent parks and recreation, 6 percent institutional with the remaining 12 percent comprising undeveloped, retail, major highway, industrial and utility, multifamily residential, and golf course spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Gleason Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	8.3	5.0

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Gleason Lake since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Gleason Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	10.0
WLA, lbs. per year	3.0
Required Reduction, lbs. and %	7.0 and 73%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

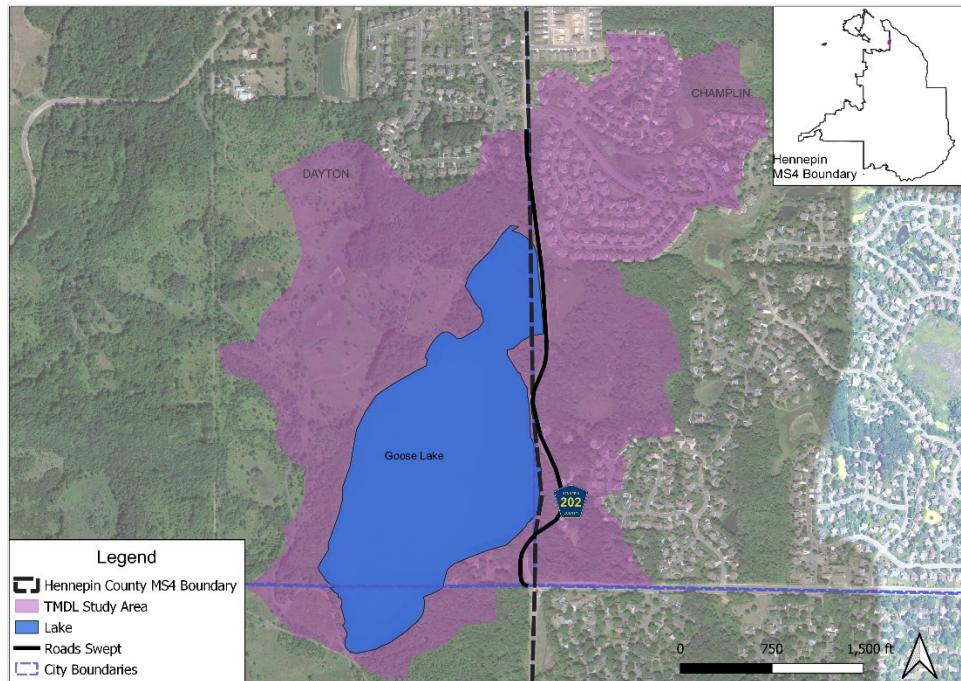
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	1.7				
9	0.4				
15	0.7				
24	0.6				
101	2.0				

Goose Lake TMDL

Goose Lake, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 300 acres and is in the cities of Champlin and Dayton, Minnesota. Land use within the watershed is 49 percent park and recreation space, 22 percent open water, 16 percent single-family detached residential, 9 percent single-family attached residential, and 4 percent undeveloped. The following summarizes the county's existing and proposed effort toward reducing TP to Goose Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	0.7	0.4

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Goose Lake since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Cowley Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010	
Existing Loads, lbs. per year	0.9
WLA, lbs. per year	0.2
Required Reduction, lbs. and %	0.8 and 82%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

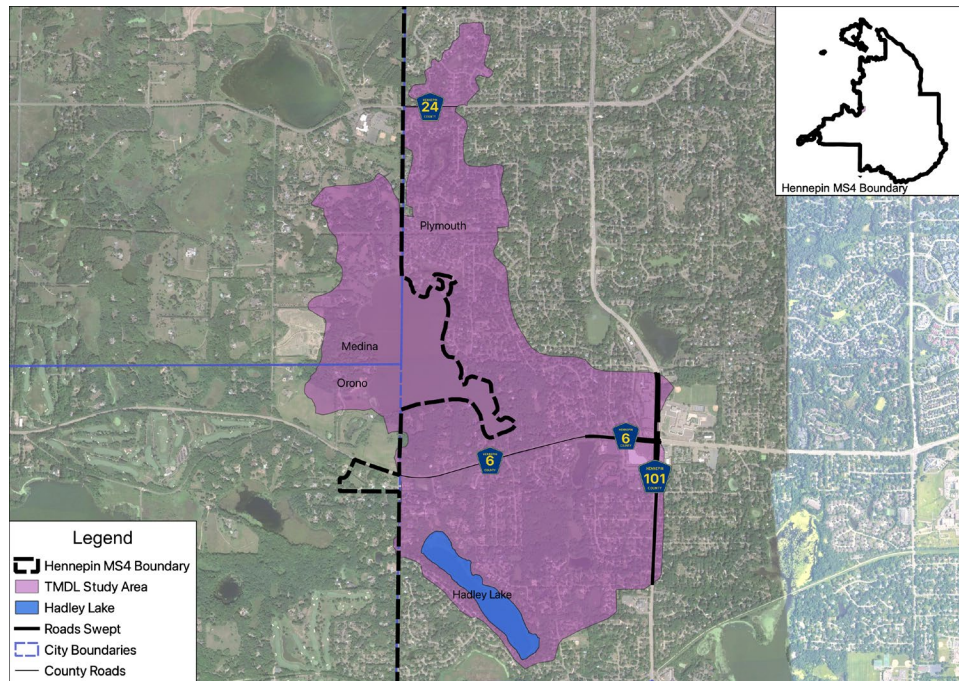
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
202	0.7				

Hadley Lake TMDL

Hadley Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 500 acres and is in the cities of Medina, Orono, and Plymouth, Minnesota. Land use in the watershed consists of 61 percent single-family detached residential, 15 percent open water, 13 percent undeveloped, and 5 percent parks and recreation with the remaining 6 percent comprising multifamily residential, retail, commercial, mixed-use commercial, agricultural, and institutional spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Hadley Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	2.7	1.6

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Hadley Lake since the 2007 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Hadley Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2007	
Existing Loads, lbs. per year	6.0
WLA, lbs. per year	2.0
Required Reduction, lbs. and %	4.0 and 61%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

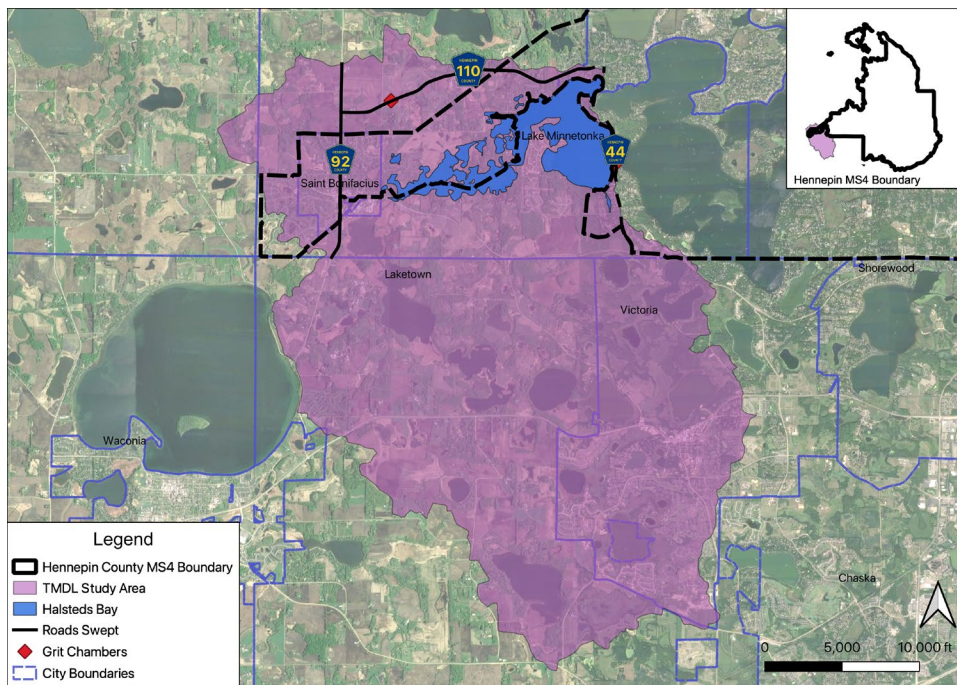
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	1.2				
24	0.2				
101	1.2				

Halsted Bay TMDL

Halsted Bay, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 18,760 acres and is in the cities of Victoria, Laketown, Saint Bonafacius, and Minnetrista, Minnesota. Land use in the watershed consists of 23 percent of both agricultural and undeveloped, 21 percent parks and recreation, 15 percent open water, and 12 percent single-family detached residential with the remaining 6 percent comprising major highway, institutional, golf course, and farmstead spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Halsted Bay to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	5.6	3.4
Catch basin sumps/ grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Halsted's Bay since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Halsted's Bay.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	15.0
WLA, lbs. per year	6.0
Required Reduction, lbs. and %	9.0 and 60%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

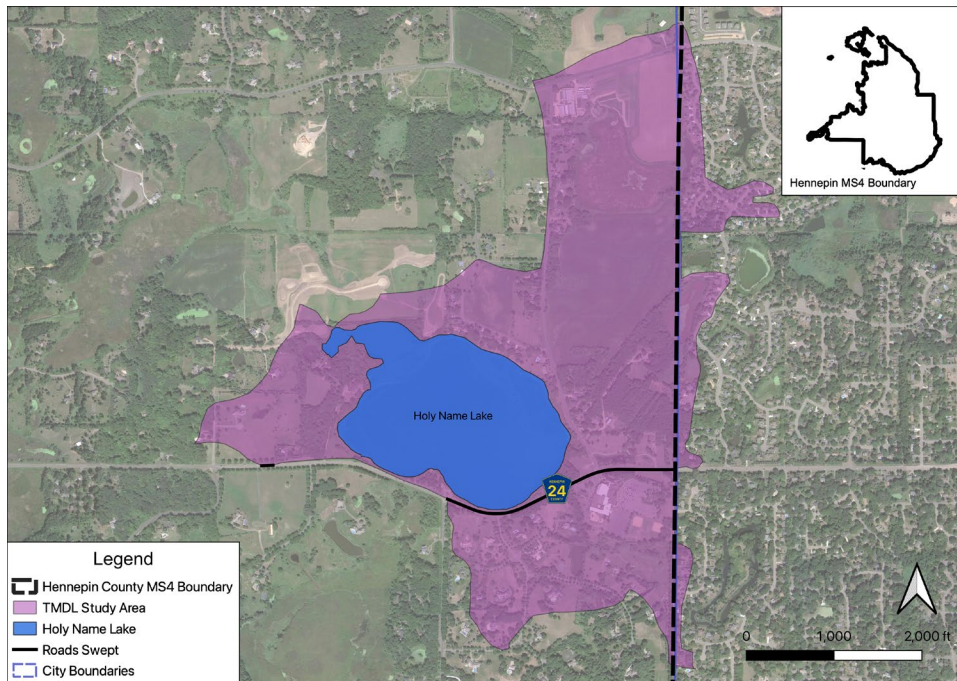
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
44	1.4				
92	2.4				
110	3.3				

Holy Name Lake TMDL

Holy Name Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 388 acres and is in the cities of Medina and Plymouth, Minnesota. Land use in the watershed consists of 30 percent undeveloped, 23 percent agricultural, 22 percent single-family detached residential, 16 percent open water, and 6 percent institutional with the remaining 3 percent comprising parks and recreation, industrial, and utility spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Holy Name Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	0.5	0.3

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Holy Name Lake since the 2007 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Holy Name Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2007	
Existing Loads, lbs. per year	0.1
WLA, lbs. per year	0
Required Reduction, lbs. and %	0.1 and 98%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

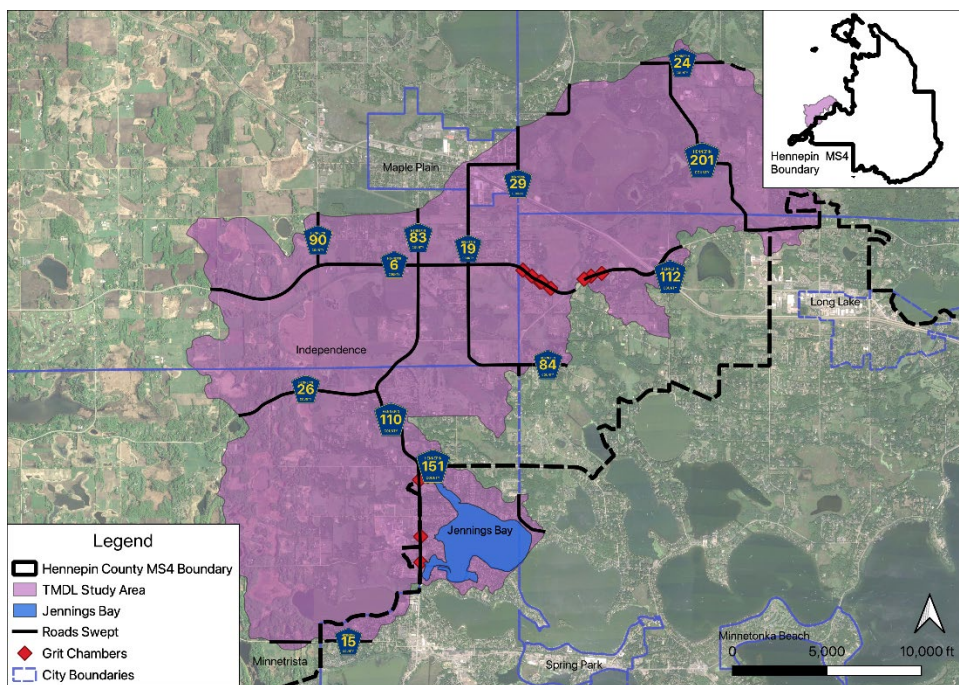
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
24	0.5				

Jennings Bay TMDL

Jennings Bay, a bay area of Lake Minnetonka, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 11,100 acres and in the cities of Independence, Maple Plain, Medina, Minnetrista,, and Orono, Minnesota. Land use in the watershed consists of 37 percent undeveloped, 20 percent single-family detached residential, 16 percent agricultural, 13 percent parks and recreation, 8 percent open water with the remaining 6 percent being comprising golf course, farmstead, and major highway spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Jennings Bay to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	24.6	14.8
Catch basin sumps/ grit chambers	11	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Jennings Bay since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Jennings Bay.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	7.0
WLA, lbs. per year	2.0
Required Reduction, lbs. and %	5.0 and 71%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

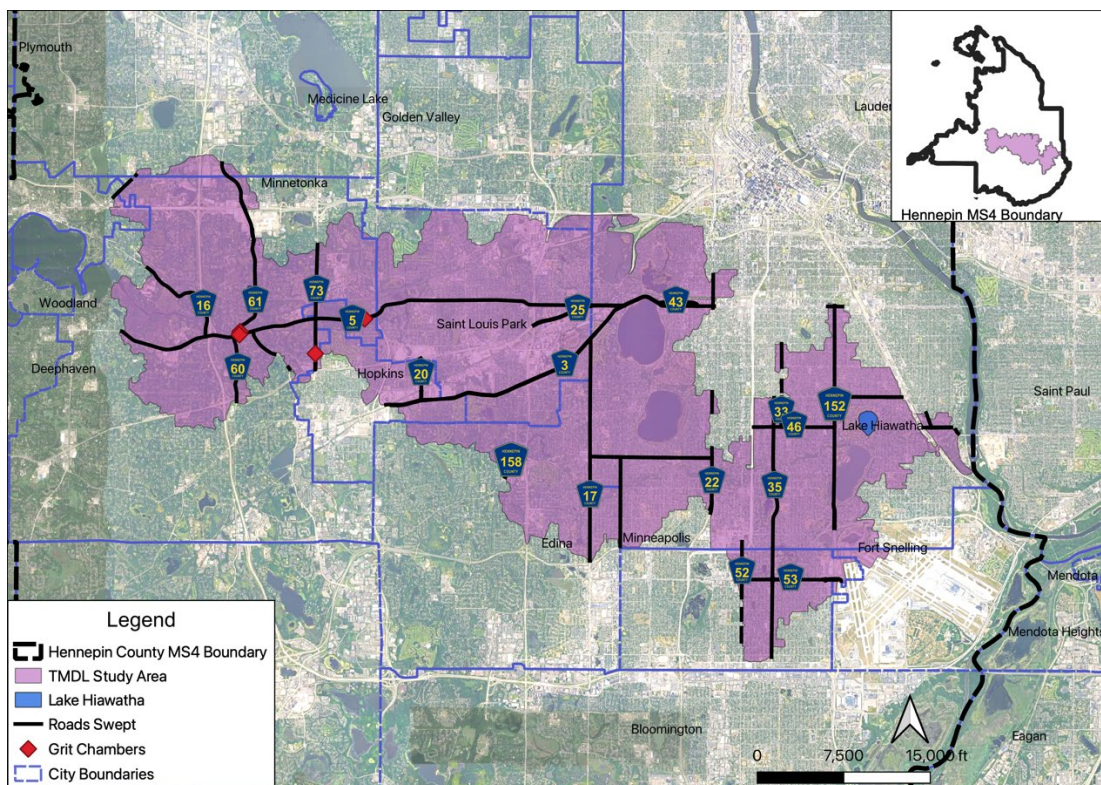
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	6.0				
15	0.8				
19	4.4				
24	0.9				
26	0.4				
29	0.2				
83	0.6				
84	0.4				
90	0.5				
110	3.5				
112	0.3				
151	0.3				
201	2.1				

Lake Hiawatha TMDL

Lake Hiawatha, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District (MCWD). The watershed area to the lake is approximately 17,900 acres in the cities of Minnetonka, Edina, Hopkins, St. Louis Park, Minneapolis, Richfield, and Fort Snelling, Minnesota. Land use in the watershed is 51 percent single-family detached residential, 12 percent parks and recreation, 6 percent open water, 5 percent institution, 4 percent of each undeveloped, single-family attached residential, multi-family residential, and retail spaces. The remaining 10 percent is comprised of major highway, golf course, office, and airport spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Cowley Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	103.4	62.0
Catch basin sumps/ grit chambers	5	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Lake Hiawatha since the 2006 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually and BMPs as part of the future roadway project(s) described in Table 3. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Lake Hiawatha.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2006	
Existing Loads, lbs. per year	52.9
WLA, lbs. per year	34.2
Required Reduction, lbs. and %	18.7 and 35%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

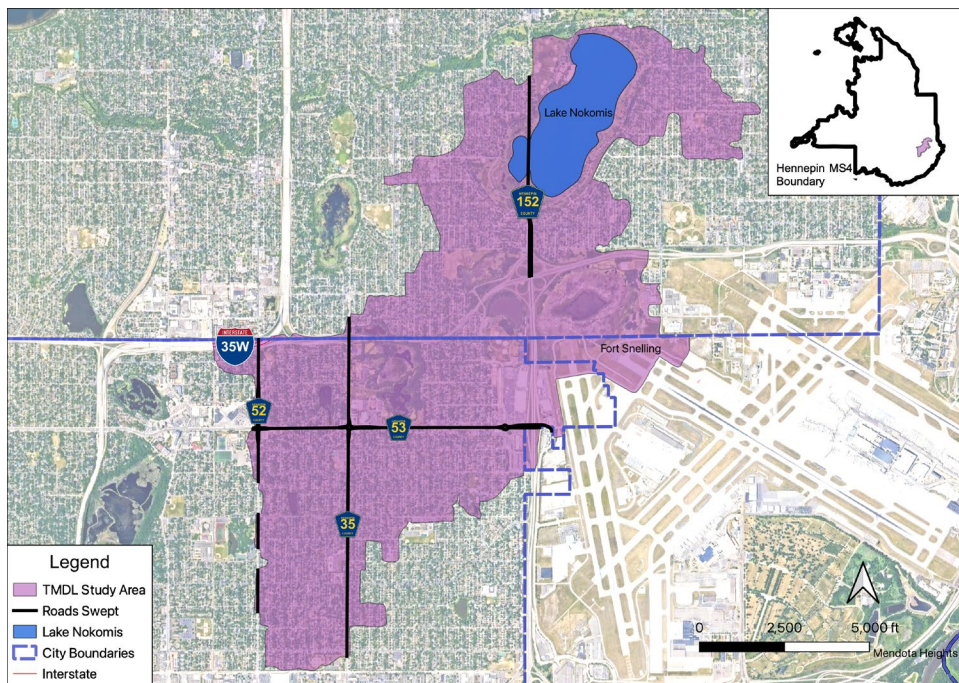
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
3	10.4				
5	8.6	2024	2168100	0.9	Reconstruction
15	0.3				
16	1.7				
17	3.7				
20	1.0				
21	1.9				
22	2.5				
25	3.0				
31	1.5				
33	1.0				
35	4.4				
42	1.1				
43	0.8				
46	2.3		2210401	0.1	Concrete Rehabilitation
48	0.3				
52	1.7				
53	2.1				
60	1.1				
61	4.0				
73	2.4				
152	4.0				
158	1.1		2176600	0.1	Reconstruction

Lake Nokomis TMDL

Lake Nokomis, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 2,630 acres and is in the cities of Fort Snelling, Minneapolis, and Richfield, Minnesota. Land use in the watershed includes 52 percent single-family detached residential, 15 percent parks and recreation, 11 percent airport, 8 percent open water, and 5 percent open water with the remaining 9 percent comprising retail, commercial, office, institutional, single-family attached residential, multifamily residential, and undeveloped spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Lake Nokomis to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	12.7	7.6

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Lake Nokomis since the 2003 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Lake Nokomis.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2003	
Existing Loads, lbs. per year	16.0
WLA, lbs. per year	11.0
Required Reduction, lbs. and %	5.0 and 30%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

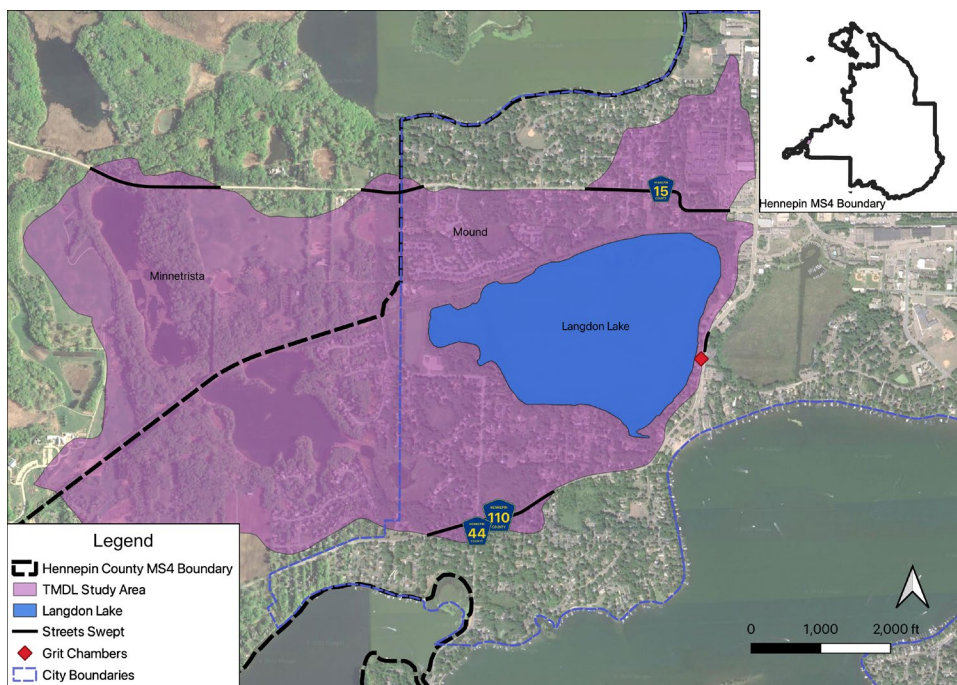
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
35	2.0				
52	1.5				
53	2.1				
152	1.5				

Langdon Lake TMDL

Langdon Lake, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 910 acres and is in the cities of Minnetrista and Mound, Minnesota. Land use in the watershed consists of 32 percent single-family detached residential, 22 percent open water, 21 percent parks and recreation, 18 percent undeveloped, 2 percent agricultural, and 1 percent each of industrial and utility, institutional, retail and other commercial, and single-family attached residential spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Langdon Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	2.0	1.2
Catch basin sumps/ grit chambers	1	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Langdon Lake since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Langdon Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010	
Existing Loads, lbs. per year	7.0
WLA, lbs. per year	4.0
Required Reduction, lbs. and %	3.0 and 45%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

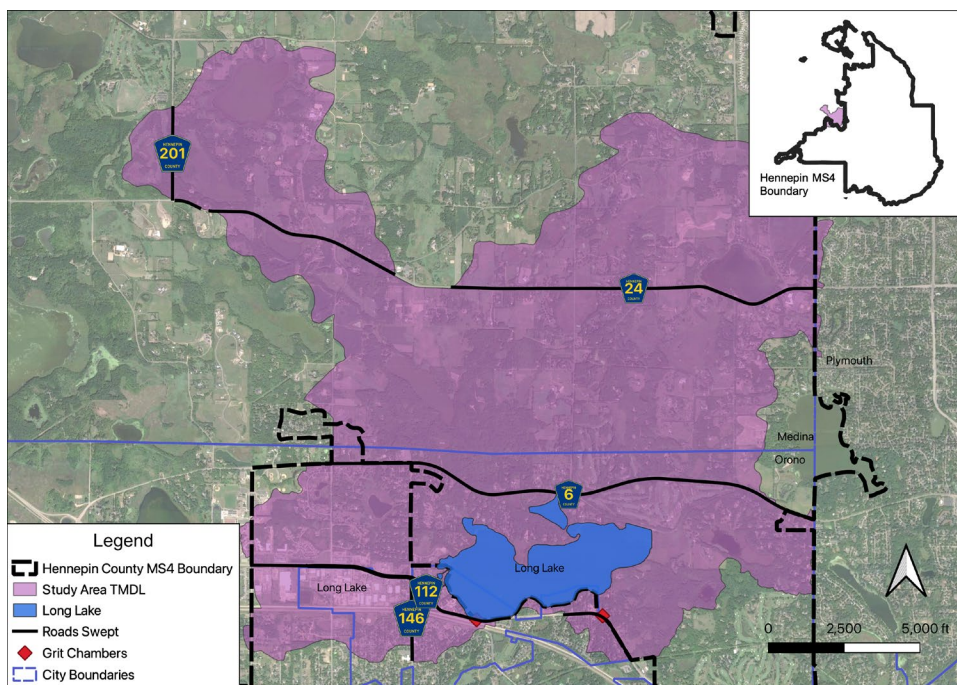
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
15	0.9				
44	<0.1				
110	0.4				

Long Lake TMDL

Long Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 5,970 acres and is in the cities of Long Lake, Medina, Orono, and Plymouth, Minnesota. Land use in the watershed consists of 37 percent undeveloped, 24 percent single-family detached residential, 12 percent agricultural, 9 percent open water, 6 percent parks and recreation, and 4 percent golf course with the remaining 8 percent comprising institutional, industrial and utility, retail and other commercial, and major highway spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Cowley Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	11.6	7.0
Catch basin sumps/ grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Long Lake since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually and BMPs as part of the future roadway project(s) described in Table 3. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Long Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	41.0
WLA, lbs. per year	6.0
Required Reduction, lbs. and %	36.0 and 87%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

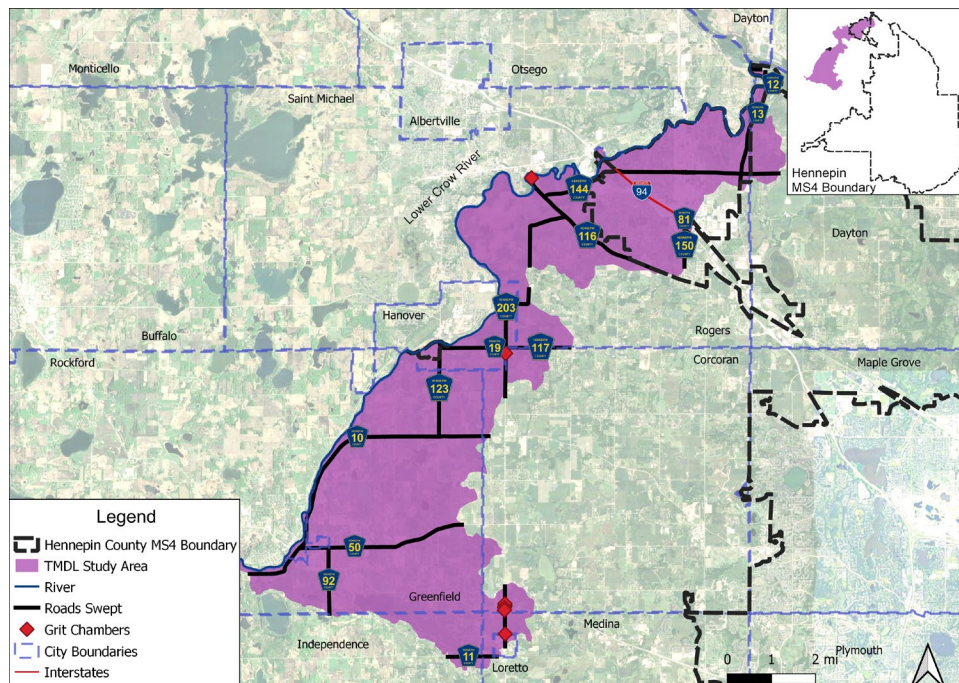
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	3.3				
24	3.7				
112	3.1		2091103	0.5	Reconstruction
146	0.5				
201	0.6				

Lower Crow River TMDL

Lower Crow River, impaired for total suspended solids (TSS), is under the purview of the Crow River Organization of Water. The Lower Crow River watershed area is approximately 88,700 acres and is within Wright and Hennepin Counties. The Hennepin County drainage area to the lake is approximately 28,200 acres and is in the cities of Corcoran, Dayton, Hanover, Independence, Loretto, Medina, and Rogers, Minnesota. Land use within the watershed is 30 percent agricultural, 29 percent undeveloped, 16 percent single-family detached residential, and 13 percent parks and recreation with the remaining 12 percent comprising open water, industrial, utility, retail, commercial, major highway and railway, farmstead, extractive, office, institutional, seasonal and vacation, single-family attached residential, multifamily residential, manufactured housing park, and mixed-use residential spaces. The following summarizes the county's existing and proposed effort toward reducing TSS to the Lower Crow River to meet its individual TSS wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TSS Removed tons/day
Street sweeping, miles	41.1	0.04
Grit chambers	9	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TSS to Lower Crow River since the 2004 baseline year as summarized in Table 2. The existing load and numerical required reduction are not available for this TMDL, so more data is needed to determine when Hennepin is meeting TMDL reductions towards the Lower Crow River. There is an opportunity to reduce TSS by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TSS reductions to Lower Crow River.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2004					
Flow Regime	Very High	High	Mid	Low	Very Low
Existing Loads, tons per day	Existing Load Information Unavailable				
WLA, tons per day	0.1	0.01	0.1	0.1	0.1
Required Reduction, tons per day	Required Reduction Information Unavailable				
Current TSS Reduction, tons per day	0				
Goal year of 2075					

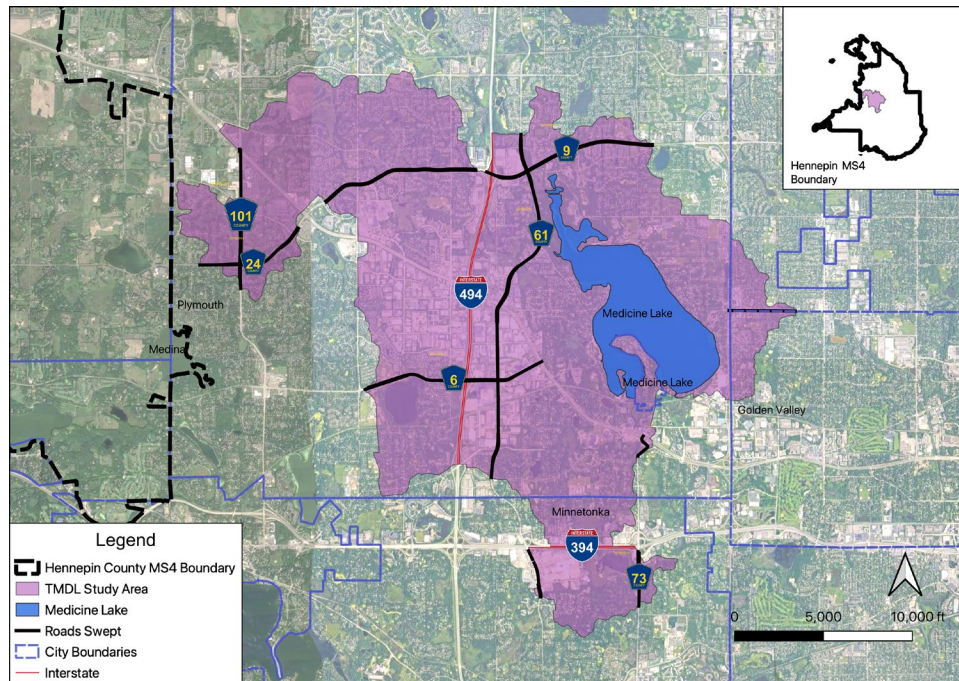
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	6.0				
11	1.0				
12	0.6				
13	2.6				
19	4.1				
50	5.2				
81	0.8				
92	1.5				
116	3.9				
117	1.4				
123	2.0				
144	5.9				
150	0.9				
203	3.5				

Medicine Lake TMDL

Medicine Lake, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 12,000 acres and is in the cities of Golden Valley, Medicine Lake, Minnetonka, New Hope, and Plymouth, Minnesota. Land use within its watershed is 61 percent single-family residential, 16 percent industrial and utility, and 8 percent institutional, with the remaining 15 percent being comprised of major highway, multifamily, and golf course spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Medicine Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	38.7	23.2

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Medicine Lake since the 2006 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Medicine Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2006	
Existing Loads, lbs. per year	67.0
WLA, lbs. per year	48.0
Required Reduction, lbs. and %	19.0 and 28%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

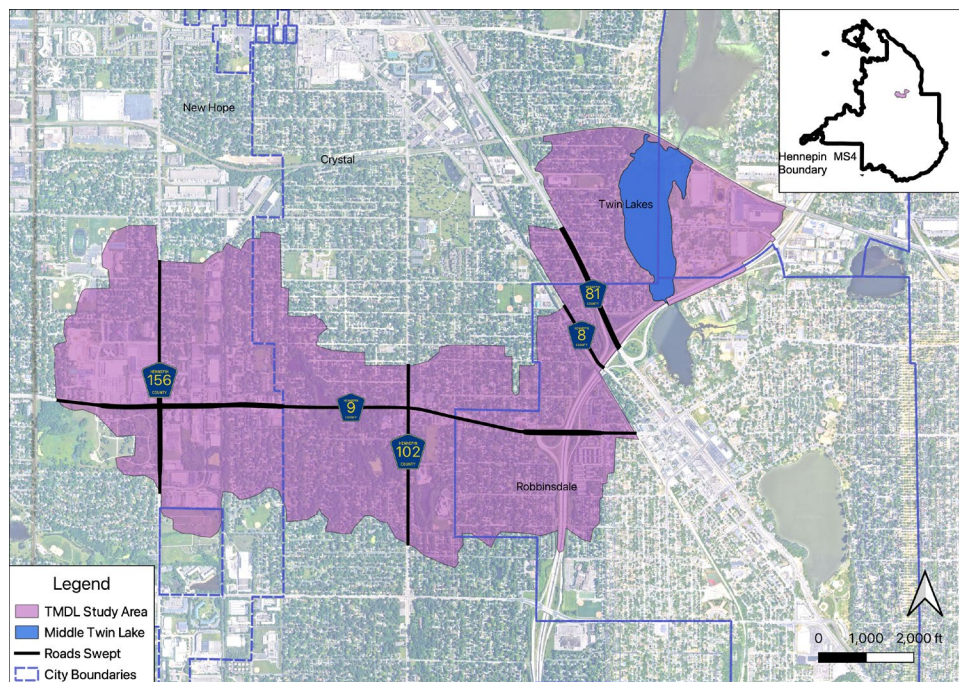
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	3.2				
9	7.0				
24	1.8				
61	6.0				
70	0.7				
73	1.1				
101	2.3				

Middle Twin Lake TMDL

Middle Twin Lake, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 1,470 acres and is in the cities of Brooklyn Center, Crystal, New Hope, and Robbinsdale, Minnesota. Land use in the watershed consists of 52 percent single-family detached residential, 8 percent institutional, 7 percent industrial and utility, 6 percent major highway, 6 percent retail and other commercial, 5 percent of each multifamily residential, open water, and parks and recreation with the remaining 6 percent comprising undeveloped, single-family attached residential, and mixed-use industrial spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Middle Twin Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	11.2	6.7

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 42.3 acres or 2.9 percent of the total TMDL watershed area. The existing load and numerical required reduction are not available for this TMDL, so more data is needed to determine when Hennepin is meeting TMDL reduction contributions towards Middle Twin Lake. Hennepin County has not reduced TP to Middle Twin Lake since the 1999 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Middle Twin Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 1999			
Annual Precipitation	Dry	Average	Wet
Existing Loads, lbs. per year	Existing Load Information Unavailable		
WLA, lbs. per year	130	141	263
Required Reduction, lbs. and %	Between 13% - 33% Reduction		
Hennepin County Required Reduction	Required Reduction Information Unavailable		
Current TP Reduction, lbs. per year	0		
Goal year of 2075			

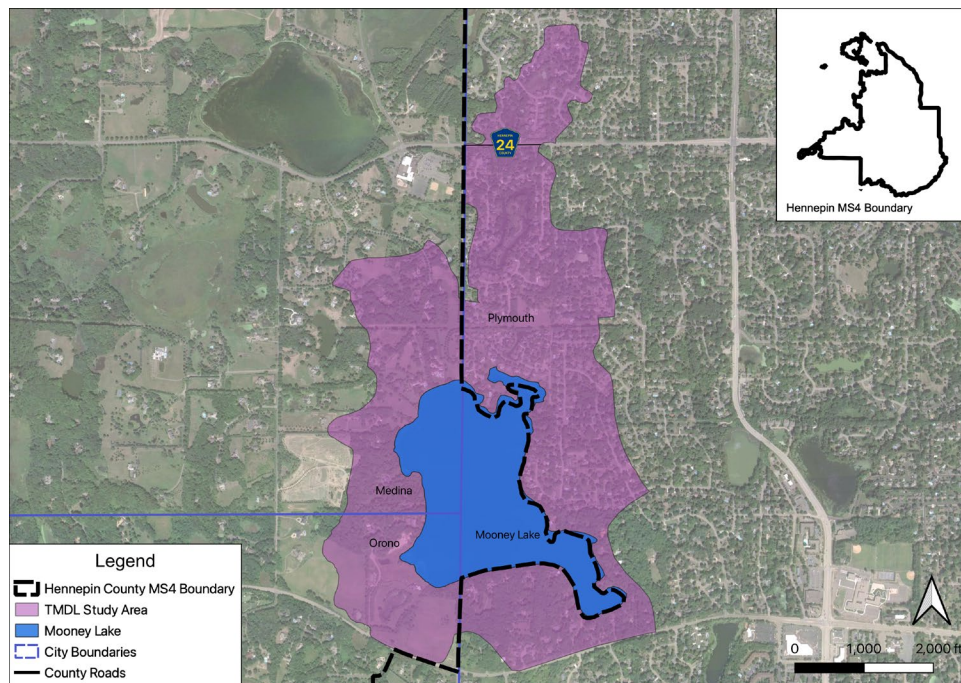
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
8	0.3				
9	3.4				
81	1.0				
102	0.7				
156	1.3				

Mooney Lake TMDL

Mooney Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 490 acres and is in the cities of Medina, Orono, and Plymouth, Minnesota. Land use in the watershed consists of 52 percent single-family detached residential, 22 percent undeveloped, 20 percent open water, and 3 percent of both parks and recreation and agricultural spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Mooney Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County does not currently sweep its curbed and non-curbed roads within the Mooney Lake watershed. Therefore, there are no pre-baseline BMPs within this watershed.

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Mooney Lake since the 2007 baseline year as summarized in Table 1. There is an opportunity to reduce TP by incorporating annual street sweeping. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Mooney Lake.

Table 1: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2007	
Existing Loads, lbs. per year	0.7
WLA, lbs. per year	0.1
Required Reduction, lbs. and %	0.6 and 89%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

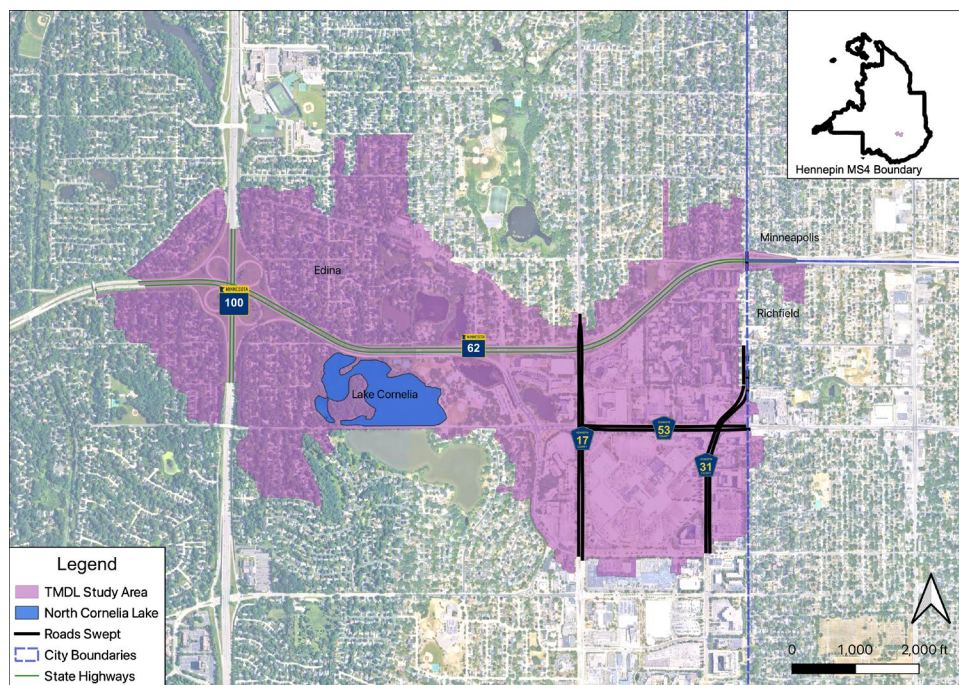
Table 2: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
24	0.2				

North Lake Cornelia TMDL

North Lake Cornelia, impaired for total phosphorus (TP), is shallow and under the purview of the Nine Mile Creek Watershed District. The watershed area to the lake is approximately 860 acres and is in the cities of Edina, Minneapolis, and Richfield, Minnesota. Land use within its watershed consists of 39 percent single-family detached residential, 15 percent retail, 12 percent major highway, 9 percent office, and 7 percent parks and recreation with the remaining 18 percent comprising multifamily residential, single-family attached residential, institutional, mixed-use, and undeveloped spaces. The following summarizes the county's existing and proposed effort toward reducing TP to North Lake Cornelia to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	6.2	3.7

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Cowley Lake since the 2015 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Cowley Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2015	
Existing Loads, lbs. per year	8.0
WLA, lbs. per year	4.0
Required Reduction, lbs. and %	4.0 and 50%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

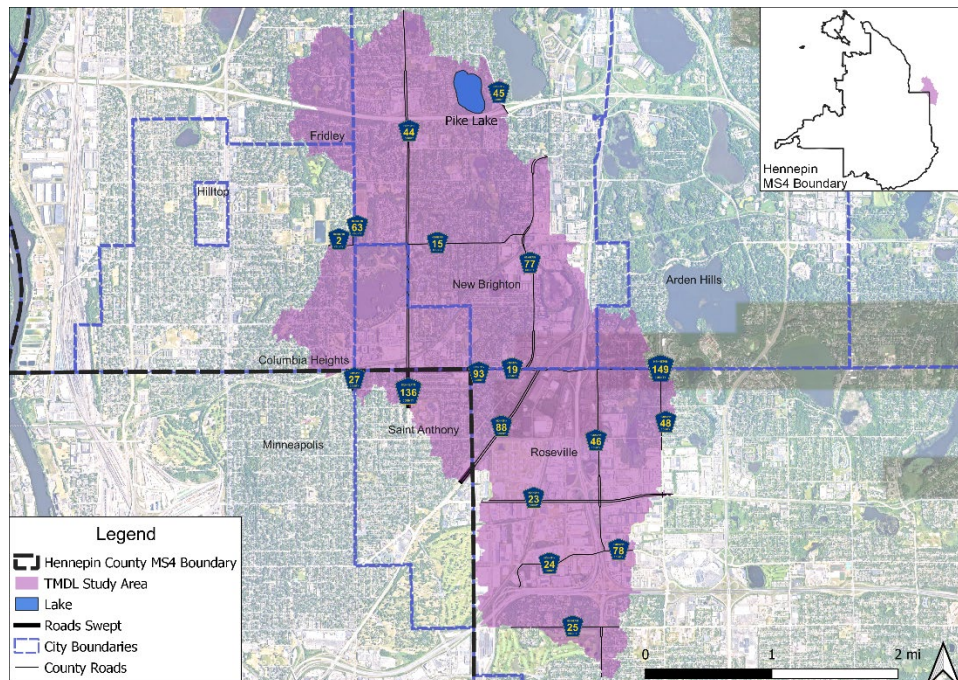
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
17	0.7				
31	0.6				
53	0.5				

Pike Lake TMDL

Pike Lake, impaired for total phosphorus (TP), is under the purview of the Rice Creek Watershed District. The watershed area to the lake is approximately 5,200 acres and is entirely within the cities of Arden Hills, Columbia Heights, Fridley, New Brighton, Roseville, and St Anthony, Minnesota. Land use within the watershed is 37 percent single-family detached residential, 17 percent industrial, 6 percent retail and commercial, 6 percent park and recreation spaces, 6 percent multifamily residential, and 6 percent major highway, with the remaining 22 percent comprising single-family attached residential, open water, institutional, undeveloped, office, mixed industrial, manufactured housing park, golf, major railway, and mixed commercial and residential spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Pike Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed kilograms/year
Street sweeping, miles	1.6	0.4

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 144.3 acres or 2.8 percent of the total TMDL watershed area. Applying the land area approach, the county's expected reduction contribution to meeting the lake's WLA is 8.7 kilograms per year. Hennepin County has not reduced TP to Pike Lake since the 2003 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Pike Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2003	
Existing Loads, kgs per year	685.5
WLA, kgs per year	371.1
Required Reduction, kgs and %	314.4 and 46%
Hennepin County Required Reduction, kgs per year	8.7
Current TP Reduction, kgs per year	0
Goal year of 2075	

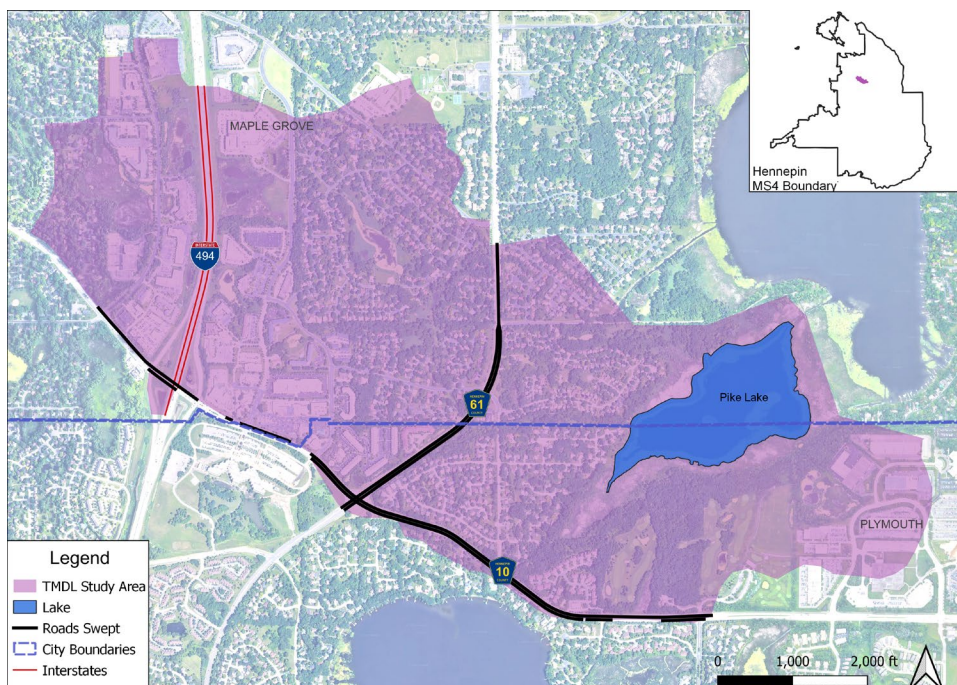
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
2	0.1				
15	1.4				
19	2.0				
23	2.9				
24	0.9				
25	0.8				
27	0.1				
44	5.2				
45	0.2				
46	2.6				
48	0.7				
63	0.1				
77	2.5				
78	0.2				
88	2.1				
93	0.3				
136	0.4				
149	<0.1				

Pike Lake TMDL

Pike Lake, impaired for total phosphorus (TP), is under the purview of the Shingle Creek Watershed Management commission. The watershed area to the lake is approximately 1,100 acres and is in the cities of Maple Grove and Plymouth, Minnesota. Land use within the watershed is 33 percent single-family detached residential, 13 percent parks and recreation, 13 percent industrial and utility, 7 percent undeveloped, 6 percent golf course, 6 percent open water, and 6 percent retail and commercial, with the remaining 15 percent comprising multifamily residential, single-family attached residential, major highway, office and institutional spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Pike Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed kilograms/year
Street sweeping, miles	7.9	2.1

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 26.7 acres or 2.5 percent of the total TMDL watershed area. Applying the land area approach, the county's expected reduction contribution to meeting the lake's WLA is 1.8 kilograms per year. Hennepin County has not reduced TP to Pike Lake since the 1999 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Pike Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 1999	
Existing Loads, kgs per year	202.5
WLA, kgs per year	127.7
Required Reduction, kgs and %	74.8 and 37%
Hennepin County Required Reduction, kgs per year	1.8
Current TP Reduction, kgs per year	0
Goal year of 2075	

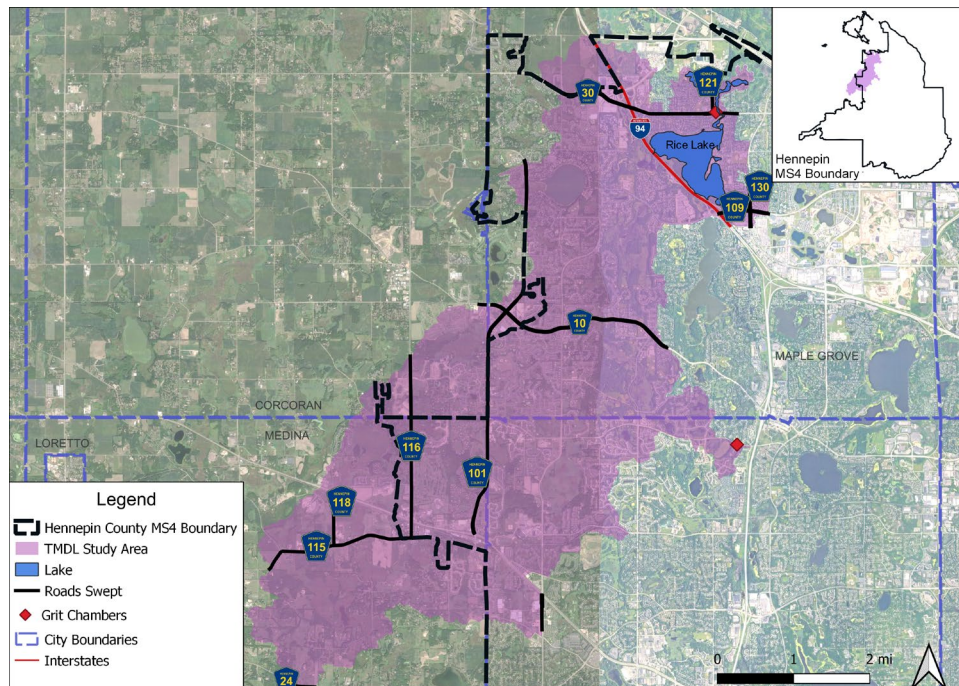
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	1.5				
61	2.7				

Rice Lake TMDL

Rice Lake, impaired for total phosphorus (TP), is shallow and under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 16,000 acres and is in the cities of Corcoran, Maple Grove, Medina, and Plymouth, Minnesota. Land use within the watershed is 30 percent single-family detached residential, 28 percent undeveloped, 12 percent parks and recreation, and 10 percent agricultural, with the remaining 20 percent comprising single-family attached residential, open water, institutional, golf course, retail, commercial, major highway, industrial, utility, multifamily residential, farmstead, office, and mixed industrial and residential spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Rice Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	40.0	24.0
Catch basin sumps/ grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Rice Lake since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Rice Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010	
Existing Loads, lbs. per year	79.1
WLA, lbs. per year	12.6
Required Reduction, lbs. and %	66.5 and 84%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

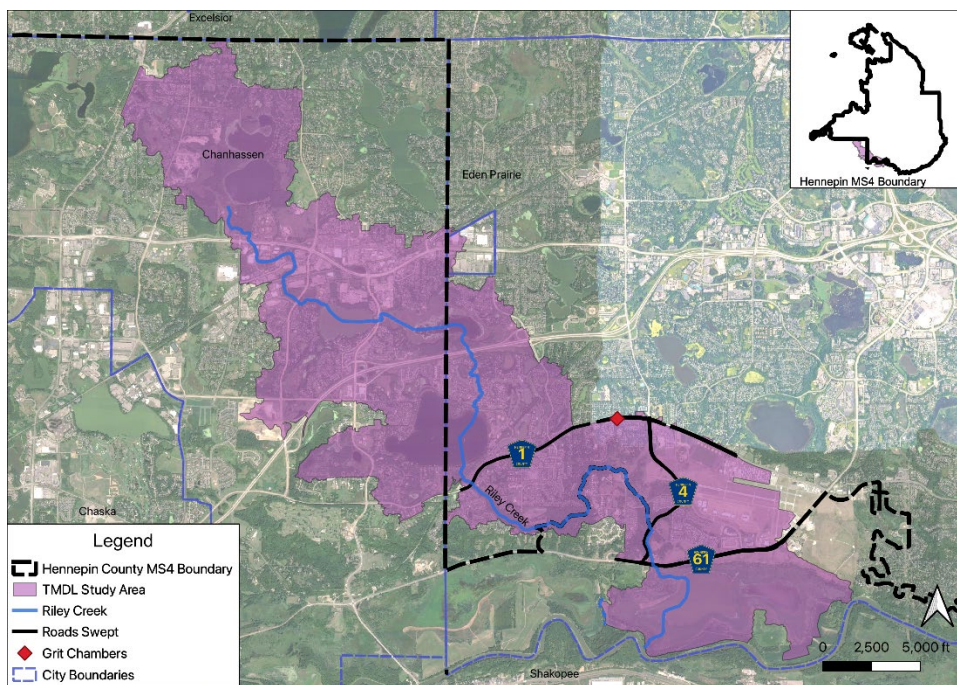
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	5.2				
24	0.4				
30	3.8				
101	6.4				
109	1.9				
115	2.0				
116	2.4				
118	0.7				
121	0.5				
130	1.7				

Riley Creek TMDL

Riley Creek, impaired for total suspended solids (TSS), is under the purview of the Lower Minnesota River Watershed District. The watershed area to the lake is approximately 8,180 acres and is in the cities of Chanhassen and Eden Prairie, Minnesota. Land use in the watershed consists of 25 percent single family detached, 20 percent undeveloped, 18 percent parks and recreation, 14 percent open water, 5 percent airport, 3 percent major highway, with the remaining 15 percent comprising of agricultural, retail and other commercial, golf course, industrial and utility, institutional, and single family attached. The following summarizes the county's existing and proposed effort toward reducing TSS to Riley Creek to meet its individual TSS wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TSS Removed pounds/day
Street sweeping, miles	13.3	25.1
Catch basin sumps/ grit chambers	1	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TSS to Riley Creek since the 2011 baseline year as summarized in Table 2. There is an opportunity to reduce TSS by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TSS reductions to Riley Creek.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2006						
Flow Condition	Very High	High	Mid	Low	Very Low	
Existing Loads, lbs. per day	1,220	325	125	16.7	8.3	
WLA, lbs. per day	146	39	15	2	1	
Required Reduction,	lbs.	1,074	286	110	14.7	7.3
	%	88				
Current TSS Reduction, lbs. per day	0					
Goal year of 2075						

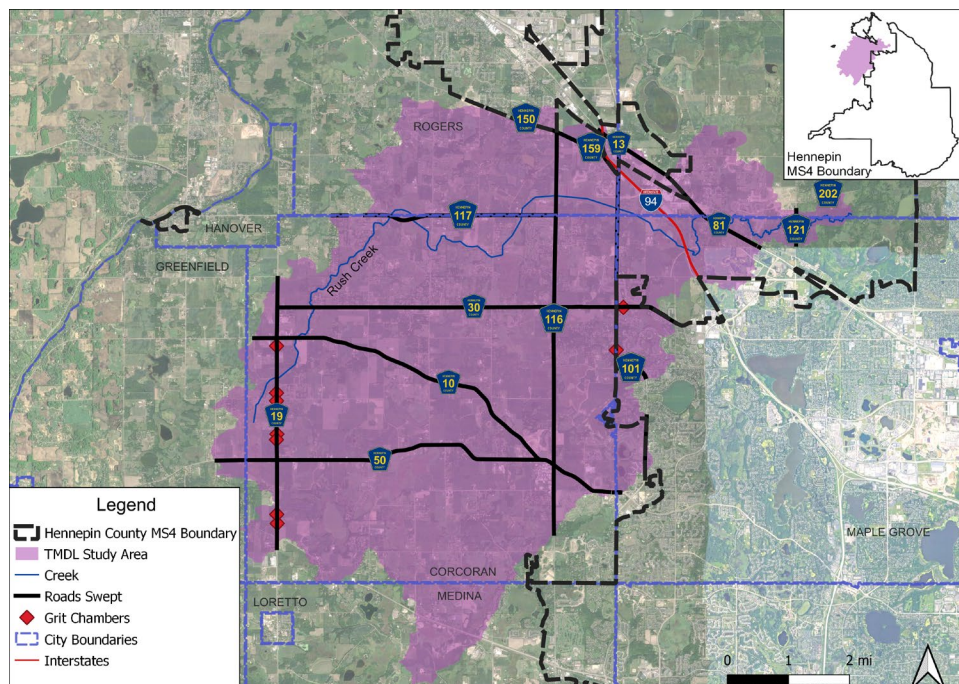
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
1	4.0				
4	2.5				
61	2.4				

Rush Creek TMDL

Rush Creek, impaired for total phosphorus (TP), is shallow and under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 32,600 acres and is in the cities of Corcoran, Dayton, Maple Grove, Medina, and Rogers, Minnesota. Land use within the watershed is 47 percent agricultural, 32 percent undeveloped, and 12 percent single-family detached residential, with the remaining 10 percent comprising park and recreation, golf course, industrial, utility, farmstead, open water, major highway and railway, institutional, single-family attached residential, manufactured housing park, office, and mixed-use residential spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Rush Creek to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/day
Street sweeping, miles	48.6	0.1
Grit chambers	9	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Rush Creek since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Rush Creek.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010					
Flow Regime	Very High	High	Mid	Low	Very Low
Existing Loads, lbs. per day	Existing Load Information Unavailable				
WLA, lbs. per day	0.09	0.03	0.01	--	--
Required Reduction, lbs. per day and %	0.3, 79%	0.1, 76%	0.03, 75%	81%	93%
Current TP Reduction, lbs. per day	0				
Goal year of 2075					

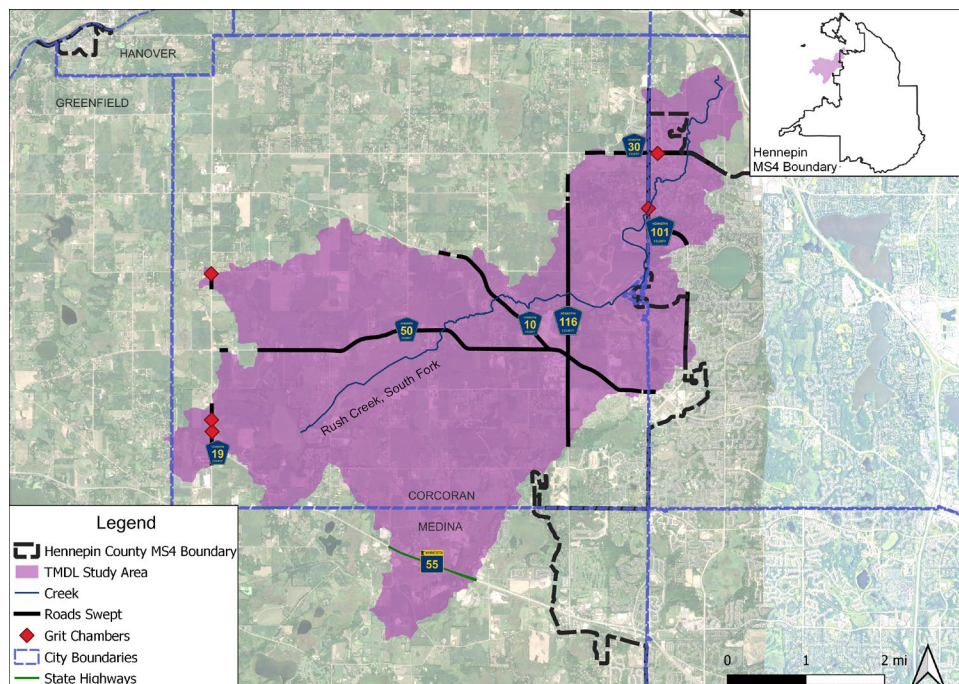
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	6.8				
13	<0.1				
19	4.4				
30	7.4				
50	5.5				
81	3.1				
101	5.5				
116	7.4				
117	3.4				
121	0.6				
150	0.2				
159	1.2				
202	<0.1				

Rush Creek, South Fork TMDL

Rush Creek, South Fork, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 13,700 acres and is in the cities of Corcoran, Maple Grove, and Medina, Minnesota. Land use within the watershed is 46 percent agricultural, 32 percent undeveloped, and 12 percent single-family detached residential with the remaining 10 percent comprising park and recreation, golf course, open water, farmstead, industrial, utility, single-family attached residential, institutional, retail, commercial, major highway, manufactured housing park, office, and mixed-use residential and industrial spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Rush Creek, South Fork to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/day
Street sweeping, miles	19.2	0.03
Catch basin sumps/ grit chambers	5	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Rush Creek, South Fork since the 2010 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Rush Creek, South Fork.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2010					
Flow Regime	Very High	High	Mid	Low	Very Low
Existing Loads, lbs. per day	Existing Load Information Unavailable				
WLA, lbs. per day	0.06	0.02	0.01	--	--
Required Reduction, lbs. per day and %	0.09, 61%	0.07, 77%	0.04, 81%	85%	66%
Current TP Reduction, lbs. per day	0				
Goal year of 2075					

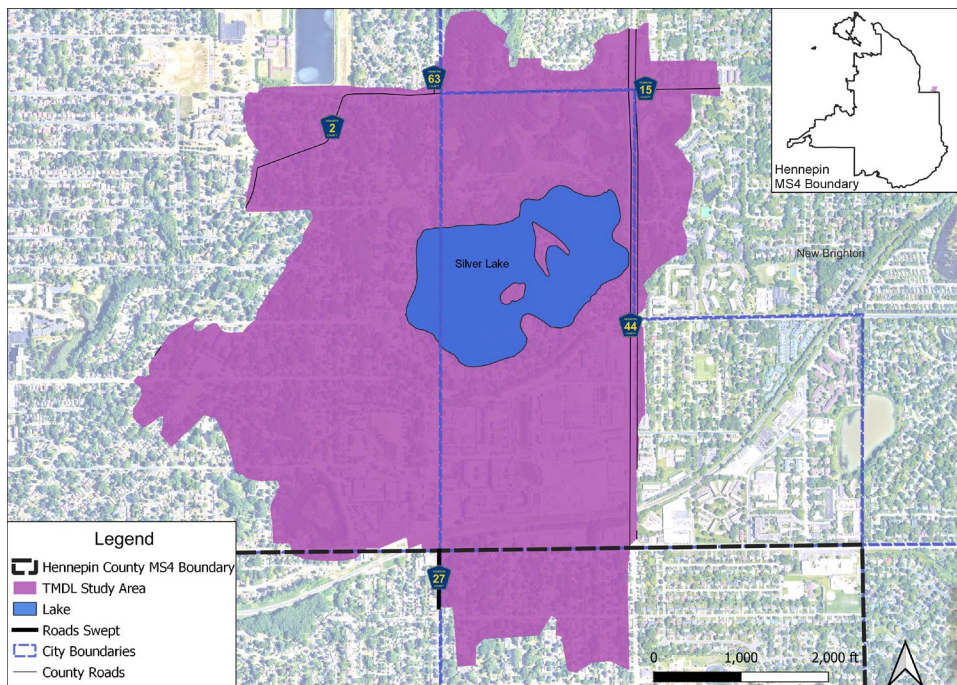
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
10	3.2				
19	1.0				
30	2.4				
50	3.9				
101	3.6				
116	3.2				

Silver Lake TMDL

Silver Lake, impaired for total phosphorus (TP), is shallow and under the purview of the Rice Creek Watershed District. The watershed area to the lake is approximately 680 acres and is in the cities of Columbia Heights, Minneapolis, New Brighton, and St. Anthony, Minnesota. Land use within the watershed is 40 percent single-family detached residential, 15 parks and recreation, 12 percent open water, 10 percent retail and commercial, and 10 percent multifamily residential, with the remaining 41 percent of the land comprising single-family attached residential, undeveloped, institution, industrial, utility, and office spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Silver Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	0.3	0.2

TMDL Summary and Reduction Forecast

In the Silver Lake TMDL Implementation plan from 2011, it was determined that Hennepin County’s expected reduction contribution to meeting the WLA is 0.7 pounds per year and is being met. The WLA required reductions are summarized in Table 2. There is an opportunity to reduce additional TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Silver Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2002	
Existing Loads, lbs. per year	241.0
WLA, lbs. per year	201.0
Required Reduction, lbs. and %	40.0 and 17%
Hennepin County Required Reduction, lbs. per year	0.7
Current TP Reduction, lbs. per year	0.7
Hennepin County Contribution to the Goal is Being Met	

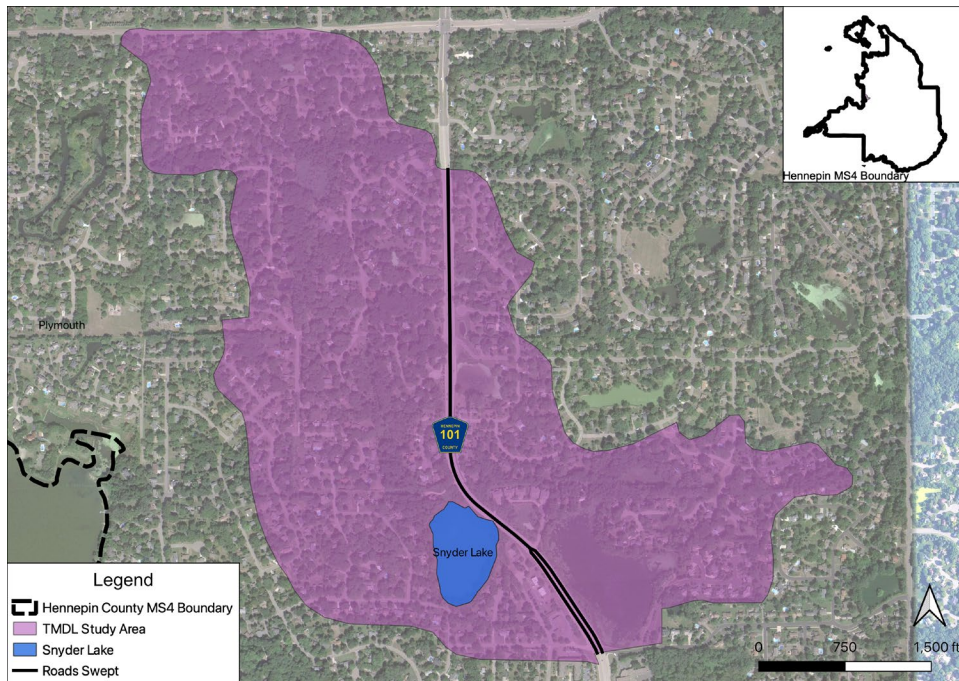
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
2	0.6				
15	0.6				
27	0.1				
44	2.1				
63	0.1				

Snyder Lake TMDL

Snyder Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 360 acres and is entirely within the city of Plymouth, Minnesota. Land use in the watershed is 81 percent single-family detached residential, 7 percent open water, and 6 percent undeveloped with the remaining 6 percent comprising parks and recreation, retail and commercial, single-family attached residential, office, multifamily residential, and institutional spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Snyder Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	2.1	1.3

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Snyder Lake since the 2007 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Snyder Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2007	
Existing Loads, lbs. per year	0.9
WLA, lbs. per year	0.5
Required Reduction, lbs. and %	0.4 and 40%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

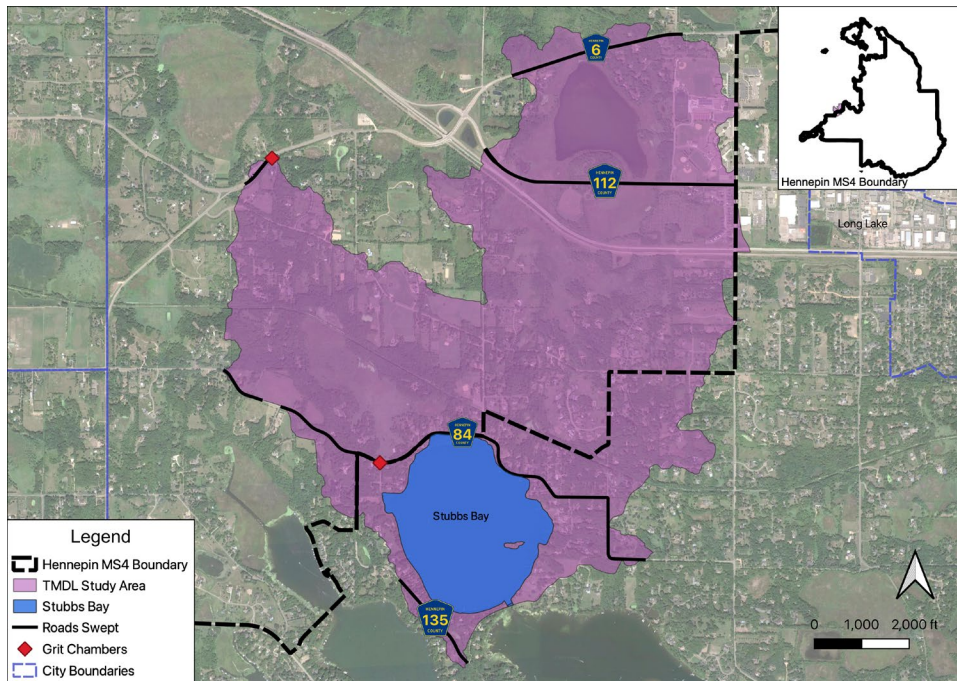
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
101	1.1				

Stubbs Bay TMDL

Stubbs Bay, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 1,750 acres and is entirely within the city of Lake Minnetonka, Minnesota. Land use in the watershed is 34 percent undeveloped, 33 percent single-family detached residential, 15 percent open water, 7 percent parks and recreation, and 6 percent agriculture with the remaining 5 percent comprising institutional and major highway spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Stubbs Bay to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	4.5	2.7
Catch basin sumps/ grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Stubbs Bay since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually and BMPs as part of the future roadway project(s) described in Table 3. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Stubbs Bay.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	5.0
WLA, lbs. per year	3.0
Required Reduction, lbs. and %	2.0 and 45%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

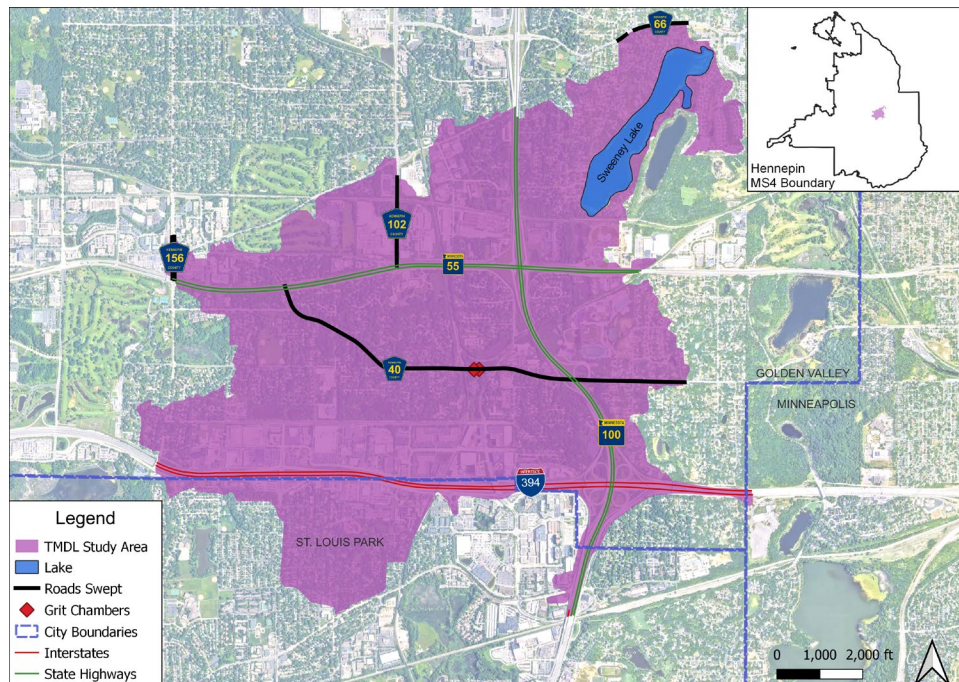
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	0.9				
84	2.1				
112	1.1	2023	2091103	0.8	Reconstruction
135	0.7				

Sweeney Lake TMDL

Sweeney Lake, impaired for total phosphorus (TP), is under the purview of the Bassett Creek Watershed Management Commission. The watershed area to the lake is approximately 2,200 acres and is in the cities of Golden Valley and St. Louis Park, Minnesota. Land use within the watershed area is 41 percent single-family attached residential, 13 percent major highway, 7 percent institutional, 6 percent retail and commercial, 6 percent industrial and utility, and 6 percent office spaces with the remaining 120 percent comprising park and recreation, undeveloped, multifamily residential, golf course, single-family attached residential, open water, major railway, seasonal, vacation, and mixed-use industrial and residential spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Sweeney Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but were added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	5.8	3.5
Catch basin sumps/ grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 18.7 acres or 0.8 percent of the total TMDL watershed area. Applying the land area approach, the county's expected reduction contribution to meeting the lake's WLA is 4.1 pounds per year. Hennepin County has not reduced TP to Sweeney Lake since the 2004 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Sweeney Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2004	
Existing Loads, lbs. per year	574.0
WLA, lbs. per year	488.0
Required Reduction, lbs. and %	86.0 and 15%
Hennepin County Required Reduction, lbs. per year	4.1
Current TP Reduction, lbs. per year	0
Goal year of 2075	

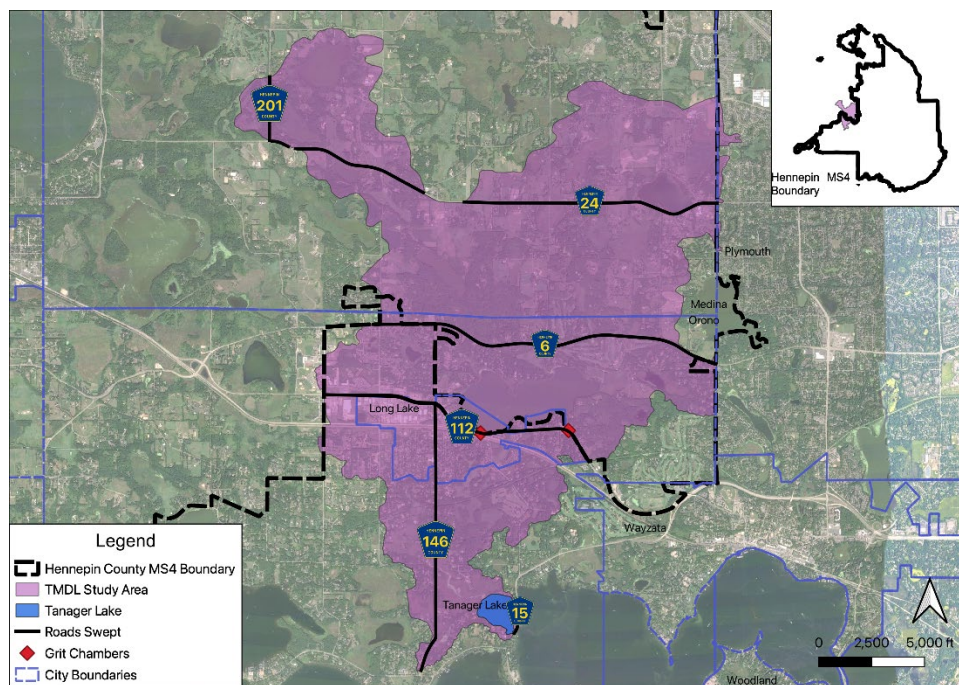
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
40	1.9				
66	0.2				
102	0.4				
156	0.4				

Tanager Lake TMDL

Tanager Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 7,570 acres and is in the cities of Long Lake, Medina, Orono, and Plymouth, Minnesota. Land use in the watershed consists of 37 percent undeveloped, 28 percent single-family detached residential, 10 percent agricultural, 9 percent open water, 6 percent parks and recreation, and 4 percent golf course with the remaining 6 percent comprising industrial, utility, institutional, major highway, retail, and other commercial spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Tanager Lake to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	14.1	8.5
Catch basin sumps/ grit chambers	2	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to Tanager Lake since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Tanager Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	7.0
WLA, lbs. per year	2.0
Required Reduction, lbs. and %	5.0 and 69%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

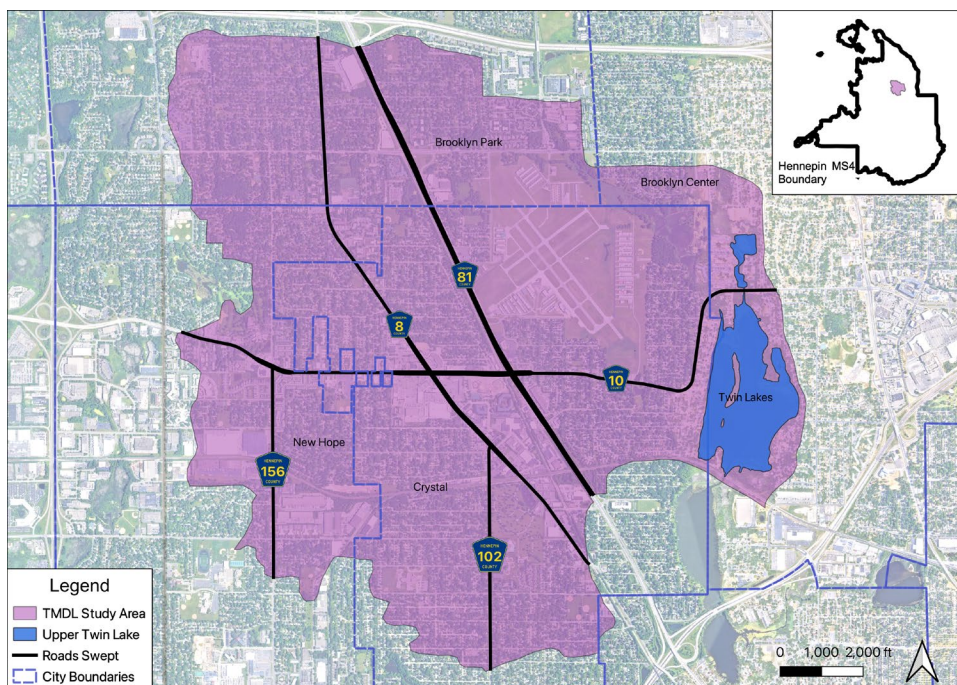
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	3.3				
15	0.2				
24	3.7				
112	3.5				
146	2.4				
201	0.6				

Upper Twin Lake TMDL

Upper Twin Lake, impaired for total phosphorus (TP), is under the purview of the Elm Creek Watershed Management Commission. The watershed area to the lake is approximately 3,680 acres and is in the cities of Brooklyn Center, Brooklyn Park, Crystal, and New Hope, Minnesota. Land use in the watershed is 52 percent single-family residential, 9 percent multifamily residential, 7 percent of each of commercial, industrial & utility, and public/semi-public spaces, 9 percent airport, and 6 percent is parks and recreation with the remaining 3 percent comprised of open water, highway, and agriculture spaces. The following summarizes the county's existing and proposed effort toward reducing TP to Upper Twin Lake to meet its categorical TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Sweeping that began before the baseline year used in the total maximum daily load study was not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	25.5	15.3

TMDL Summary and Reduction Forecast

Hennepin County's rights-of-way are approximately 90.2 acres or 2.5 percent of the total TMDL watershed area. The existing load and numerical required reduction are not available for this TMDL, so more data is needed to determine when Hennepin is meeting TMDL reduction contributions towards Upper Twin Lake. There is an opportunity to reduce TP by incorporating supplementary sweeping events annually. Hennepin County has not reduced TP to Upper Twin Lake since the 1999 baseline year as summarized in Table 2. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to Upper Twin Lake.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 1999			
Annual Precipitation	Dry	Average	Wet
Existing Loads, kg per year	Existing Load Information Unavailable		
WLA, kg per year	165.0	192.0	335.0
Required Reduction, %	Between 16% - 72% Reduction		
Hennepin County Required Reduction	Required Reduction Information Unavailable		
Current TP Reduction, kg per year	0		
Goal year of 2075			

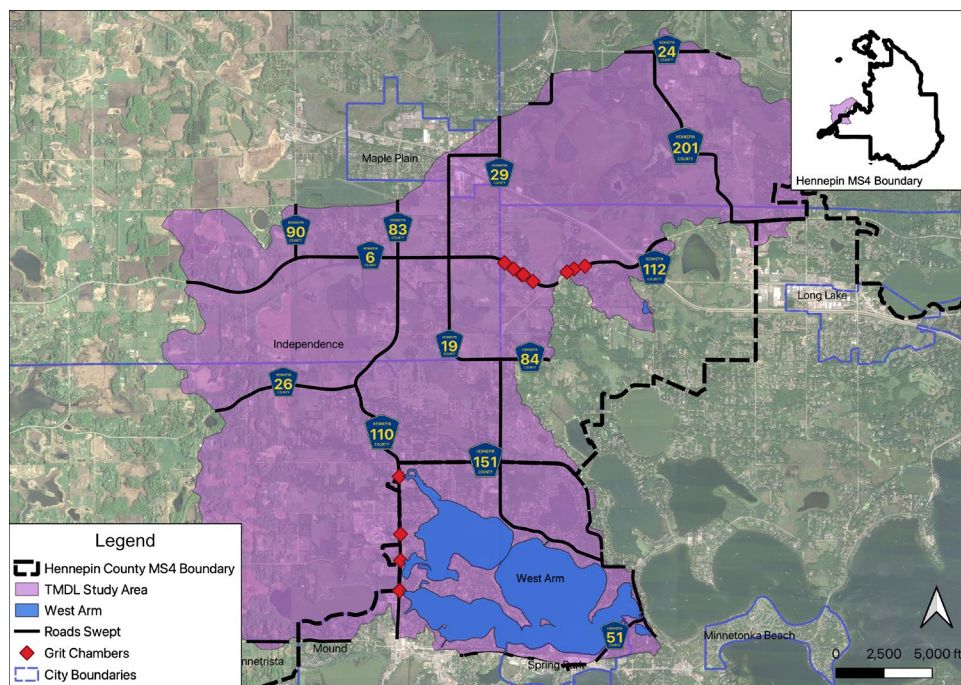
Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
8	3.6				
10	3.9				
81	4.6				
102	1.0				
156	1.0				

West Arm Lake TMDL

West Arm Lake, impaired for total phosphorus (TP), is under the purview of the Minnehaha Creek Watershed District. The watershed area to the lake is approximately 13,000 acres and is in the cities of Independence, Lake Minnetonka, Maple Plain, Medina, and Minnetrista, Minnesota. Land use in the watershed is 34 percent undeveloped, 22 percent single-family detached residential, 13 percent of both agricultural and open water, and 12 percent parks and recreation with the remaining 6 percent comprising golf course, major highway, and farmstead spaces. The following summarizes the county's existing and proposed effort toward reducing TP to West Arm to meet its individual TP wasteload allocation (WLA).

Study Area Map with County Roads



Pre-Baseline Best Management Practices (BMPs)

Hennepin County has grit chambers and sweeps both of its curbed and non-curbed roads twice per year: spring and fall. Grit chambers and sweeping began before the baseline year used in the total maximum daily load study were not included in reduction calculations to meet the WLA but was added in Table 1 for reference.

Table 1: Pre-Baseline Year BMPs and Removals

	Quantity	TP Removed pounds/year
Street sweeping, miles	33.4	20.0
Catch basin sumps/ grit chambers	13	N/A

TMDL Summary and Reduction Forecast

Hennepin County has not reduced TP to West Arm since the 2008 baseline year as summarized in Table 2. There is an opportunity to reduce TP by incorporating a supplementary sweeping event annually and BMPs as part of the future roadway project(s) described in Table 3. Additionally, Hennepin County and MS4s listed in the TMDL intend to collaborate on construction and maintenance for added TP reductions to West Arm.

Table 2: Hennepin County Total Maximum Daily Load Summary to Date

Baseline Year 2008	
Existing Loads, lbs. per year	19.0
WLA, lbs. per year	1.0
Required Reduction, lbs. and %	18.0 and 95%
Current TP Reduction, lbs. per year	0
Goal year of 2075	

Table 3: Hennepin County Roads within the TMDL Watershed Area

County Road	Watershed Centerline Miles	Future Rehabilitation (Rehab)/Rebuild			
		Year	Project Number	Length, mile	Project Type
6	6.0				
15	1.4				
19	7.3				
24	0.9				
26	1.4				
29	0.3				
51	0.6	2023	2182000	0.4	Reconstruction
83	0.6				
84	0.4				
90	0.5				
110	4.1				
112	0.3				
151	2.6				
201	2.1				