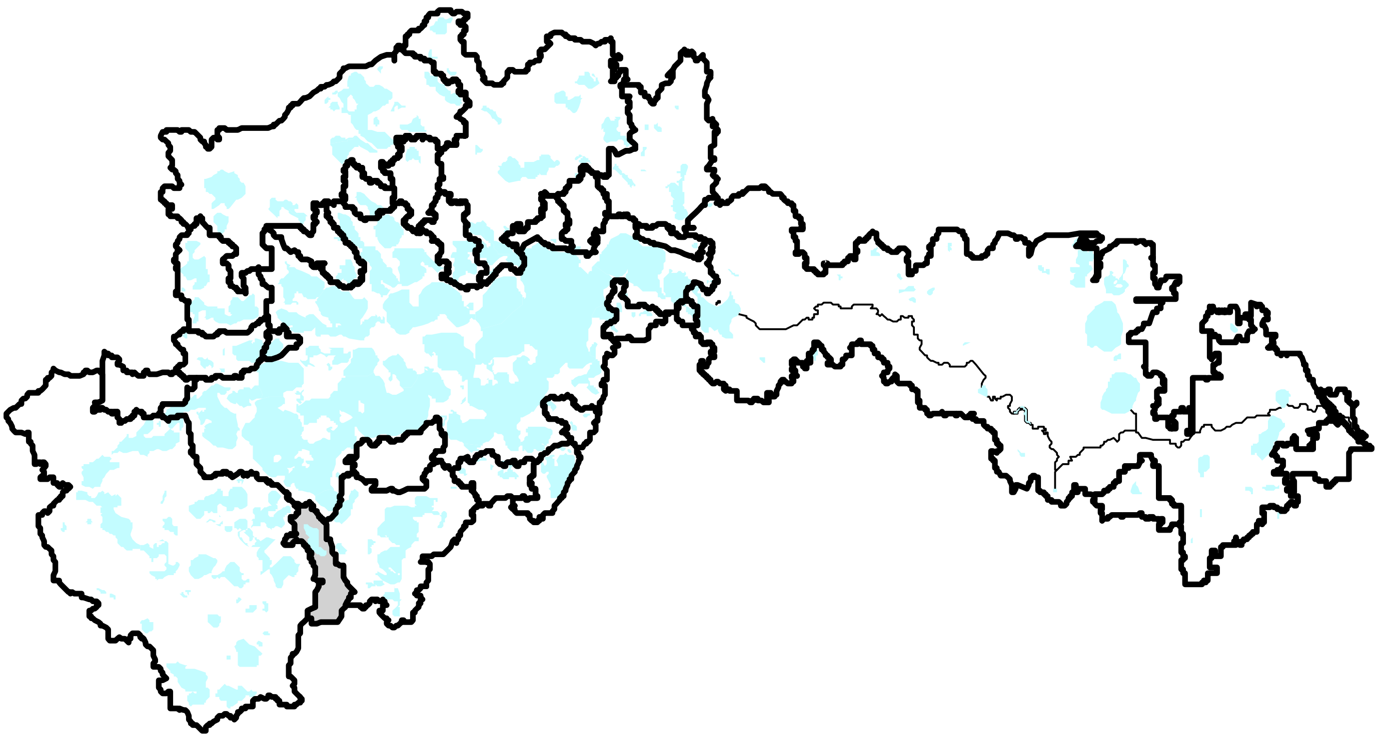


SCHUTZ

LAKE

Schutz lake

Table of Contents

G. Schutz Lake

G.1. General Description

The Schutz Lake watershed is located along the southern boundary of the MCWD and within the city of Victoria (Figure IV.G.1-1). The watershed is 969 acres in size (about 1.5 sq. miles), and includes four subwatershed units (designated SL-1 through SL-4). Figure IV.G.1-2 shows the subwatersheds and their drainage configuration.

Geographically, the Schutz Lake watershed is sandwiched between the Six Mile Creek and Lake Virginia/Lake Minnewashta Creek watersheds. Each of the four subwatersheds defined flows nearly due north until its outlet under Hwy 7 into Lake Minnetonka.

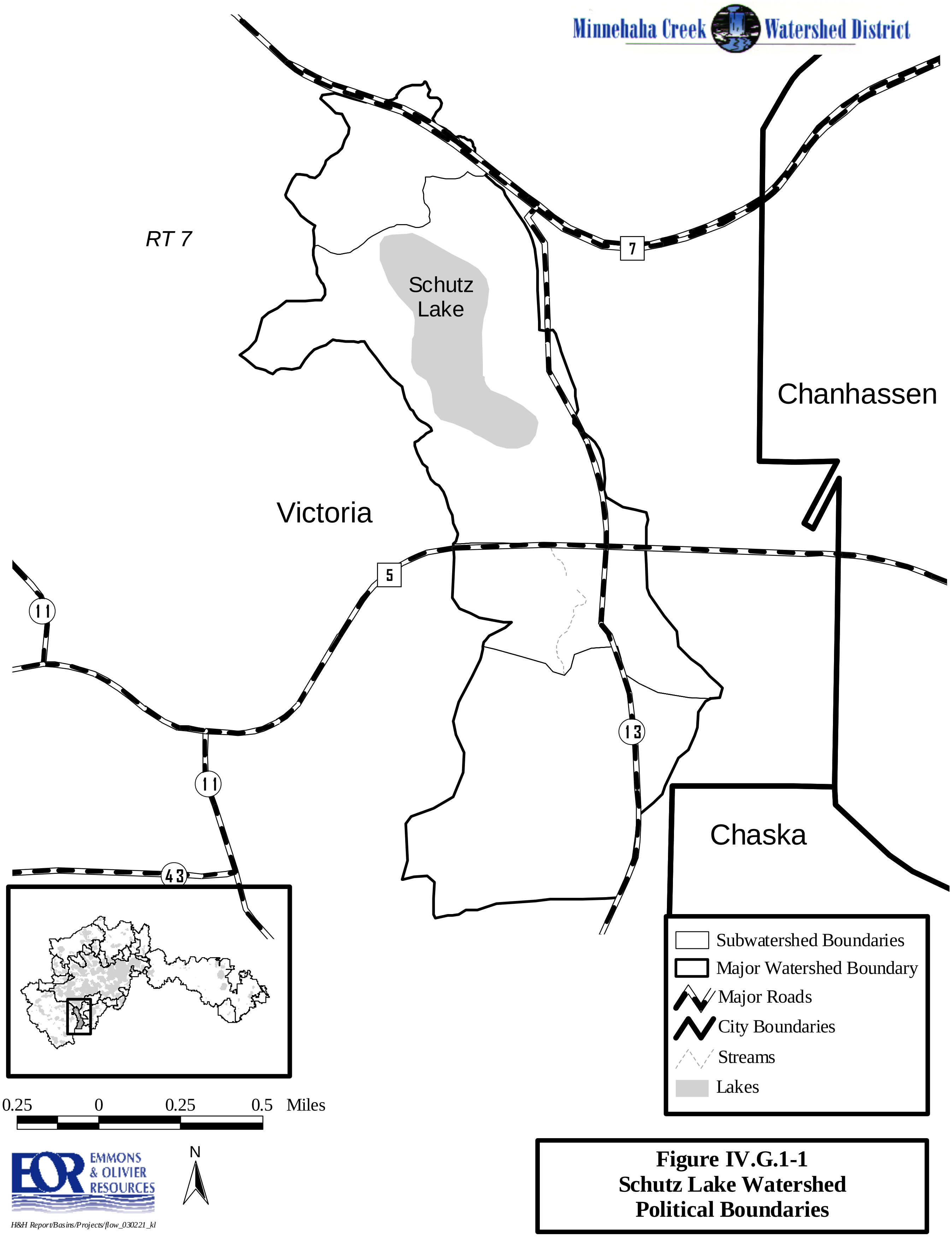


Figure IV.G.1-1
Schutz Lake Watershed
Political Boundaries

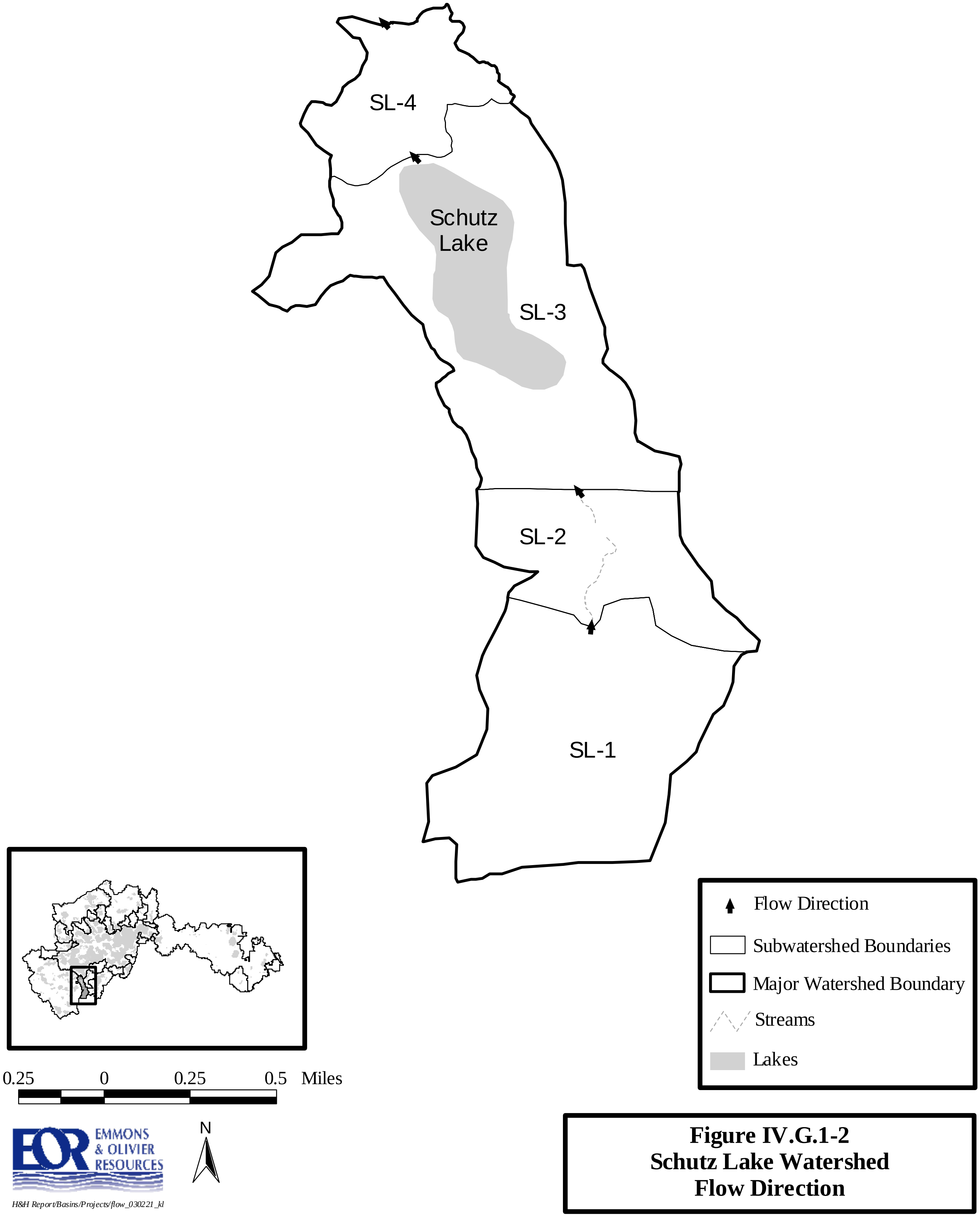


**Figure IV.G.1-2
Schutz Lake Watershed
Flow Direction**

G.2. Physical Features

The following sections detail the MLCCS, geology, soils, and groundwater of the Schutz Lake watershed.

G.2.a. Land Cover/Land Use

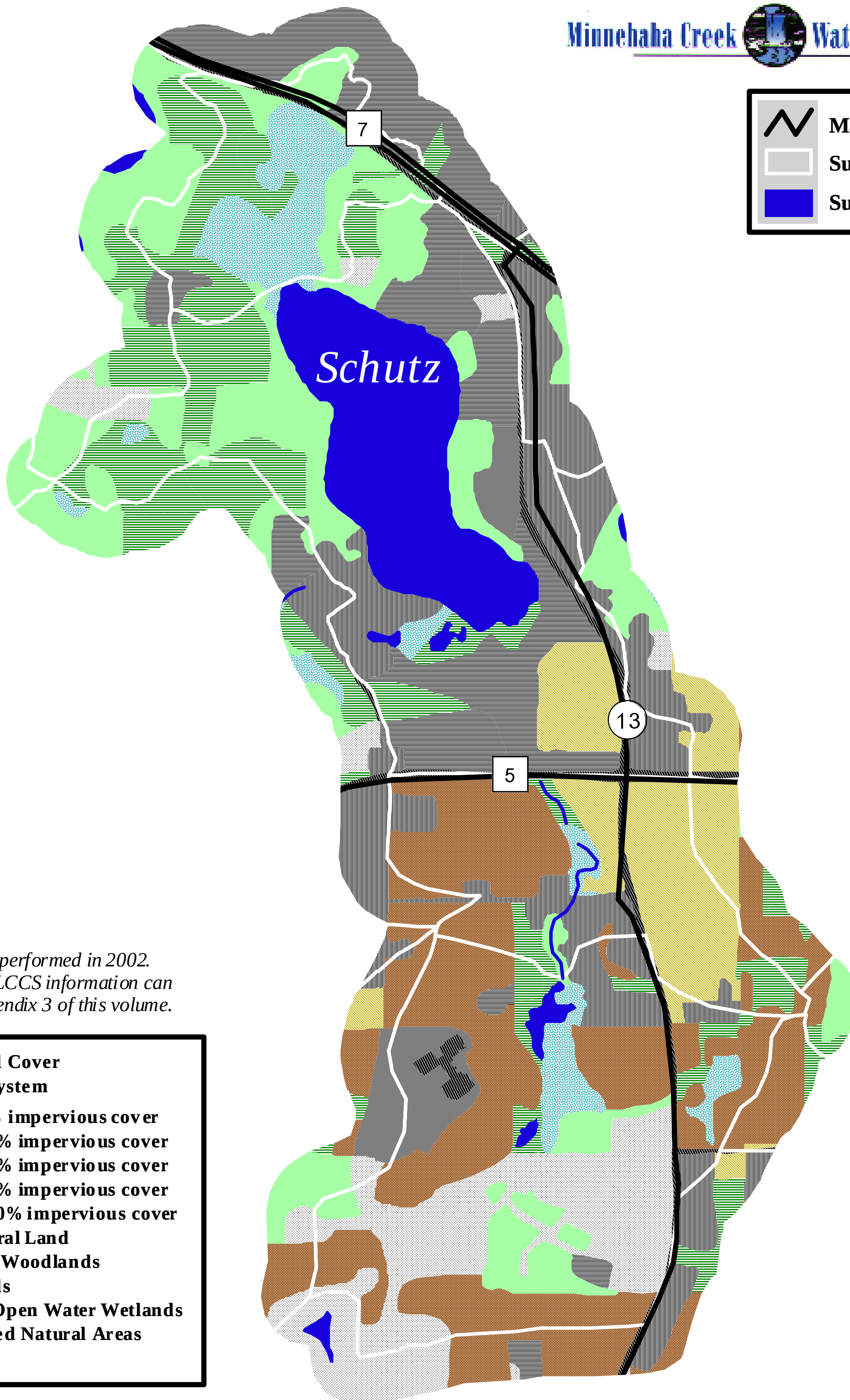
For comparison purposes, the various MLCCS land cover classifications have been combined into five impervious surface area categories and six vegetative cover type categories (Figures IV.G.2-1 and IV.G.2-2). Although not shown here, each of the impervious surface area categories was further broken down with respect to type of land use and vegetative cover found on non-impervious surface areas. A more detailed map showing MLCCS cover types to Level 3 for the entire MCWD is included in Appendix 3 (Figure IV.Appendix.3-1). A description of all MLCCS cover types is also included in Appendix 3 and is incorporated into the District's interactive GIS tool.

Land use in the northern part of the Schutz Lake watershed is split fairly evenly between the open space found in Carver Park Reserve and residential land use types found in the east. The southern part of the watershed is dominated by agricultural and residential land uses.

Currently in the Schutz Lake watershed, agricultural land use dominates the landscape, making up 17% of the landscape (Figure IV.G.2-2). Forests, woodlands, and grasslands together make up over 20% of the landscape. Under 2020 land use conditions, “11% to 25% impervious cover” becomes the most dominant category (28%), far surpassing any of the other land use categories. The biggest percent increase (Table IV.G.2-1) is in the “11% to 25% impervious cover” category. The biggest percent decreases were found in the agricultural land and forests and woodlands categories.

Minnehaha Creek Watershed District

Major roads	
Subwatersheds	
Surface water	



-MLCCS analysis performed in 2002.
-More detailed MLCCS information can be found in Appendix 3 of this volume.

Minnesota Land Cover Classification System

- **0% to 10% impervious cover**
- **11% to 25% impervious cover**
- **26% to 50% impervious cover**
- **51% to 75% impervious cover**
- **76% to 100% impervious cover**
- **Agricultural Land**
- **Forests & Woodlands**
- **Grasslands**
- **Lakes & Open Water Wetlands**
- **Maintained Natural Areas**
- **Wetlands**

1000 0 1000 Feet

EMMONS & OLIVIER RESOURCES

N

H&H Report/Basins/Dutch_schutz.apr___030225aps

Figure IV.G.2-1
Schutz Lake Watershed
Minnesota Land Cover
Classification System

Figure IV.G.2-2
Schutz Lake Watershed Land Cover

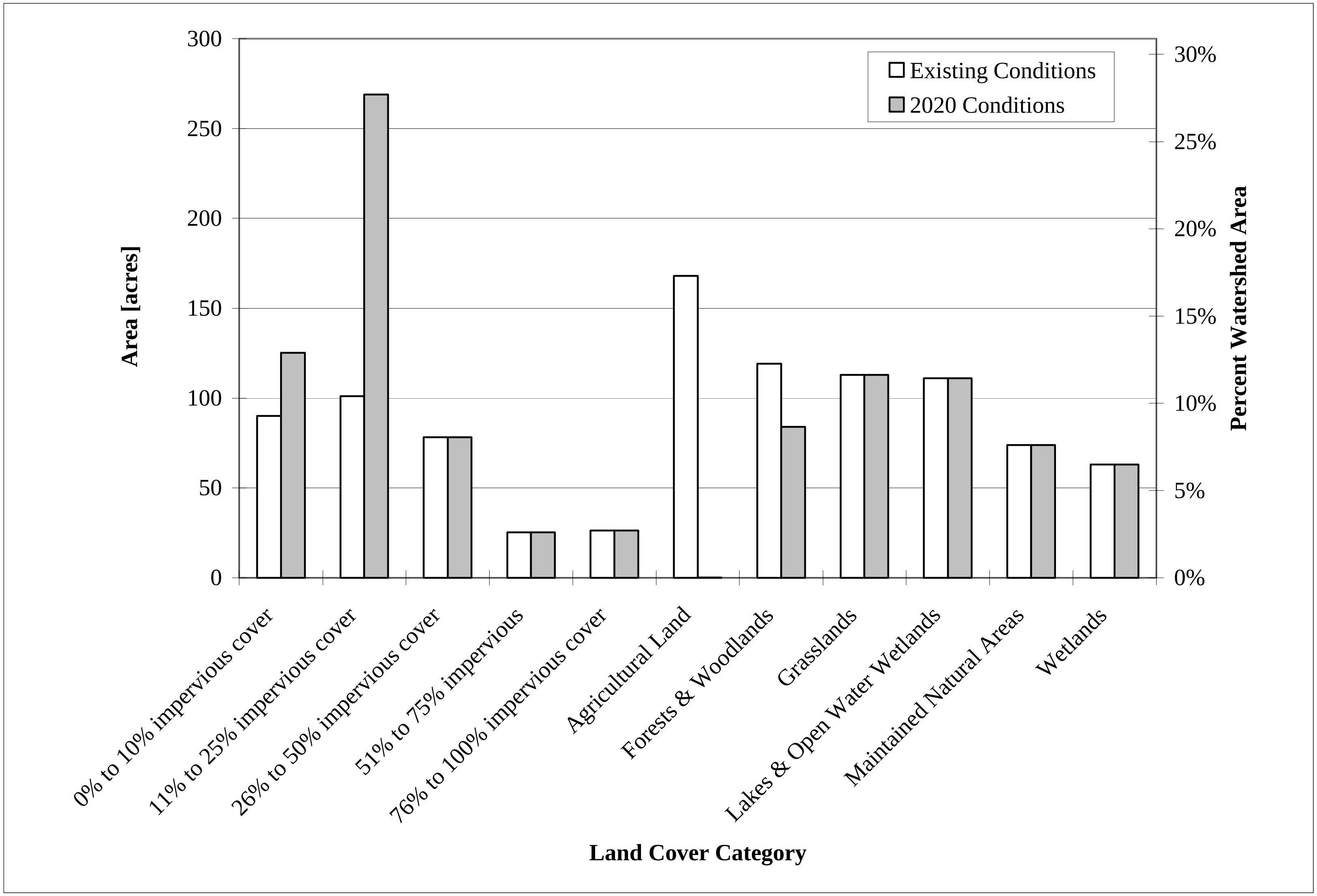


Table IV.G.2-1
Schutz Lake Watershed Land Cover Percent Change

Land Cover Category	Percent Change (from existing to 2020 conditions)
0% to 10% impervious cover	39%
11% to 25% impervious cover	166%
26% to 50% impervious cover	0%
51% to 75% impervious cover	0%
76% to 100% impervious cover	0%
Agricultural Land	-100%
Forests & Woodlands	-29%
Grasslands	0%
Lakes & Open Water Wetlands	0%
Maintained Natural Areas	0%
Wetlands	0%

G.2.b. Geology

The Jordan Sandstone is the uppermost bedrock unit within the majority of Schutz Lake watershed.

The Quaternary deposits are associated with the Des Moines Lobe glaciation. They are composed primarily of loamy till in hummocky and irregular topography. Other deposits of peat and muck are located around Katrina Lake in the east and other marshlands and ponds throughout the watershed. Peat and muck is partially decomposed plant matter and fine-grained organic matter. There are deposits of lake clay and silt in southwest portions of the watershed.

(See *Volume II: Framework and Methodology, D. Groundwater* for a description of methodology for sections G.2.b through G.2.d.)

G.2.c. Soils

Soil Hydrologic Groups are shown on Figure IV.G.2-3. The predominant hydrologic groups are B (moderate infiltration rate when wet) and D (very slow infiltration rate). The group D soils are found in low-lying areas that have a seasonably high water table or in areas with clayey soils. Group B soils have moderately fine to moderately coarse texture. Some group C (slow infiltration rate) soils are present and are composed of fine-grained material. The soil figure should be used as a guide for further soil examination at the site of inquiry.

G.2.d. Groundwater

Water table elevation contours are shown on Figure IV.G.2-4. Shallow groundwater flow is generally from the south and towards Schutz Lake, and from there towards Lake Minnetonka. Figure IV.G.2-5 shows depth to the water table. The water table is deep throughout much of this watershed due to the large amount of hilly topography that does not have surface water features. Areas near Schutz Lake have a high water table.

Infiltration potential for the watershed is represented on Figure IV.G.2-6 and is generally medium to low. Infiltration potential is generally lower than in other parts of MCWD because of the presence of Type C and D soils in the south part of the watershed. Due to the variable composition of soils that have been classified as “Organic”, areas that contain these soils have variable infiltration potential as well.

Further geology and groundwater discussion can be found in *Volume V: Watershed Issues Integration*.

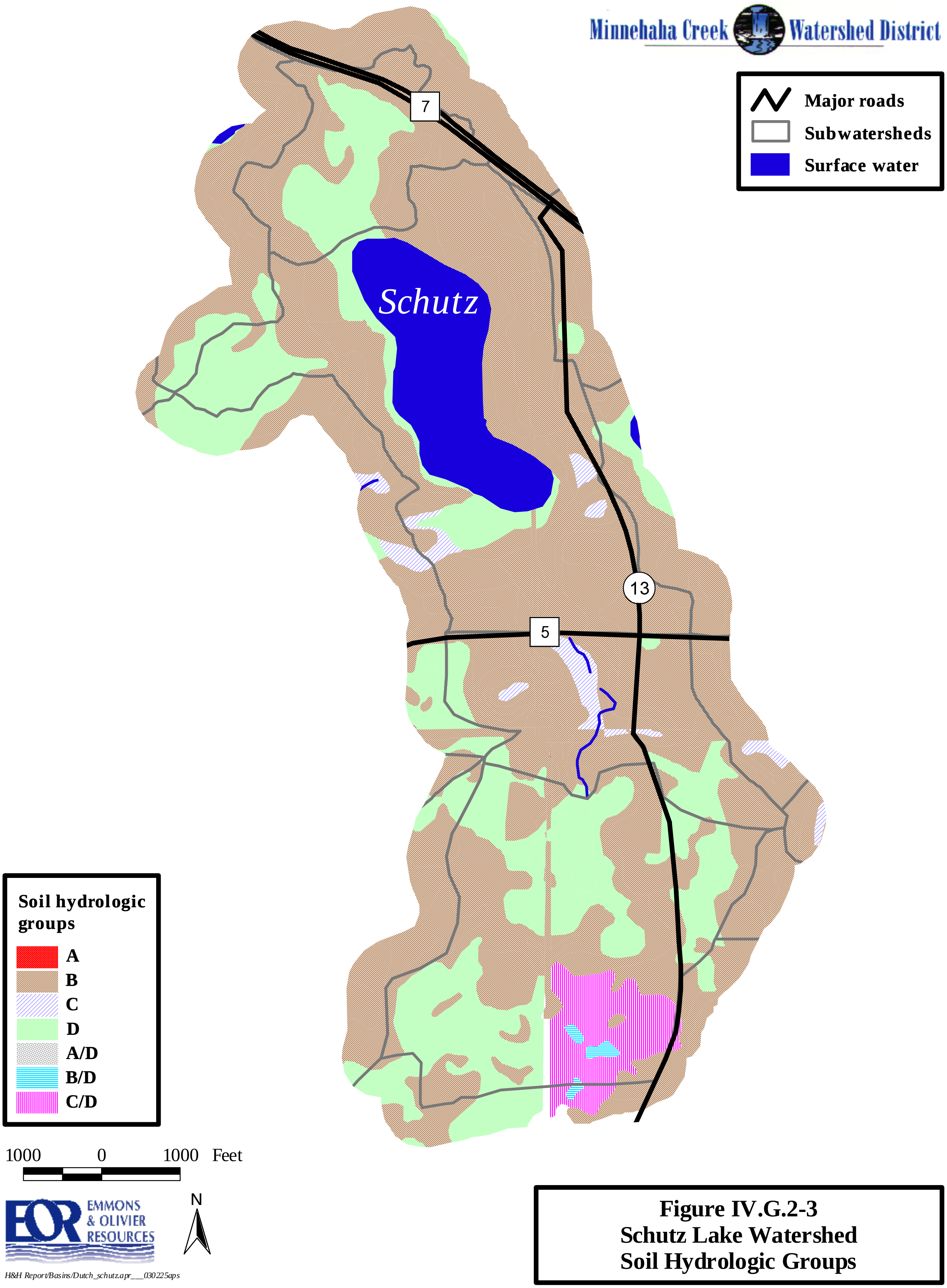


Figure IV.G.2-3
Schutz Lake Watershed
Soil Hydrologic Groups

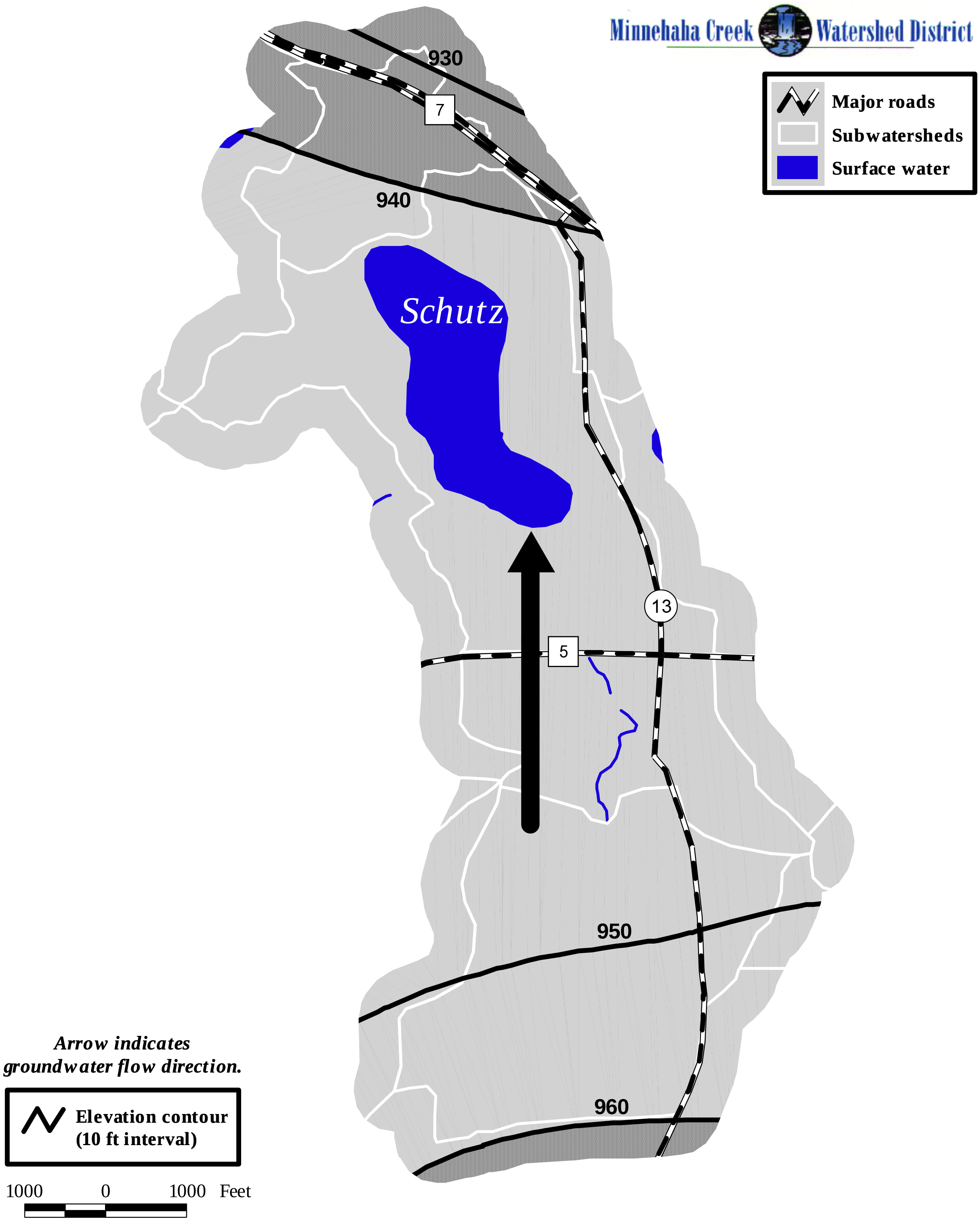


Figure IV.G.2-4
Schutz Lake Watershed
Water Table Elevation Contours

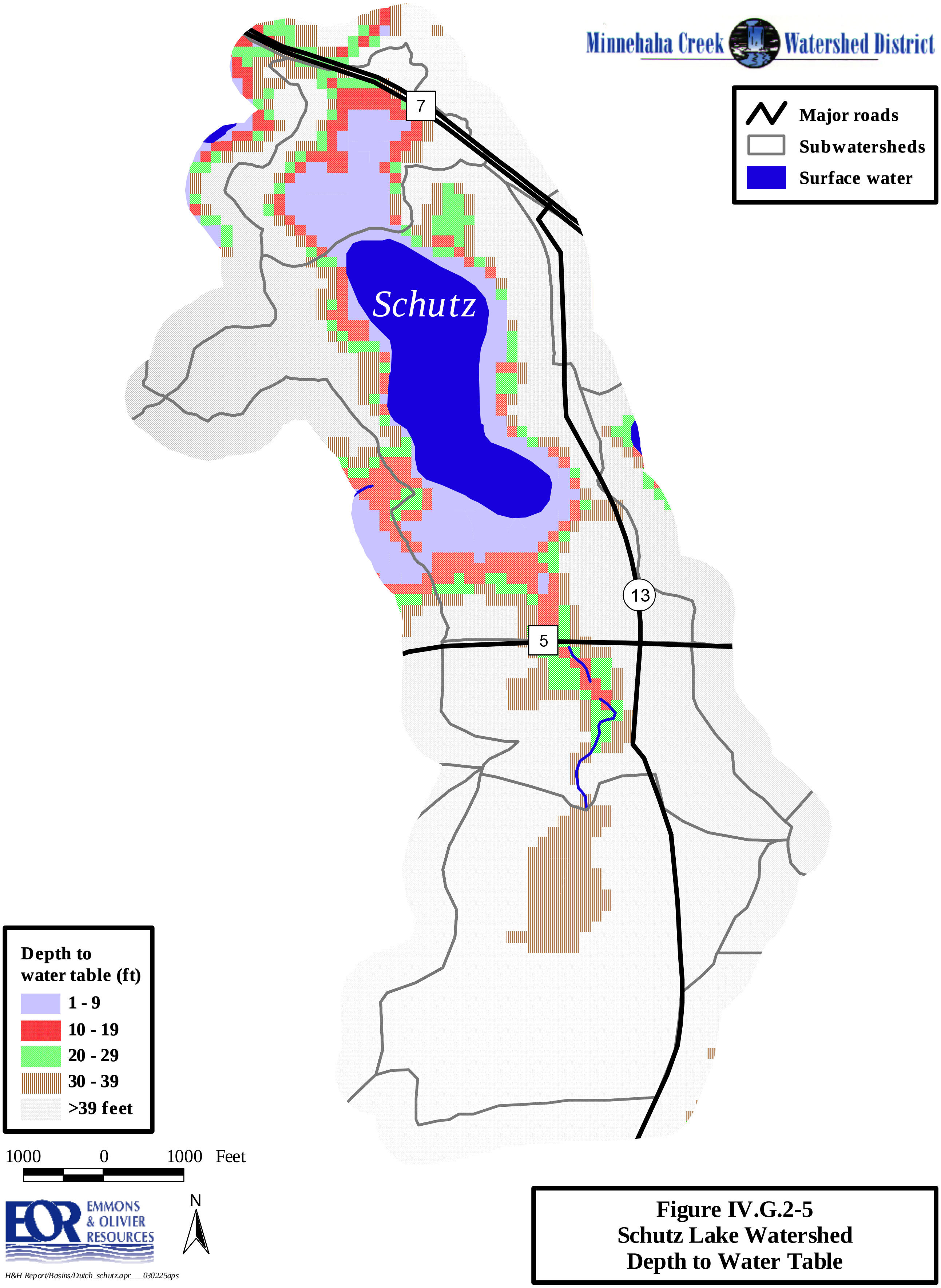


Figure IV.G.2-5
Schutz Lake Watershed
Depth to Water Table

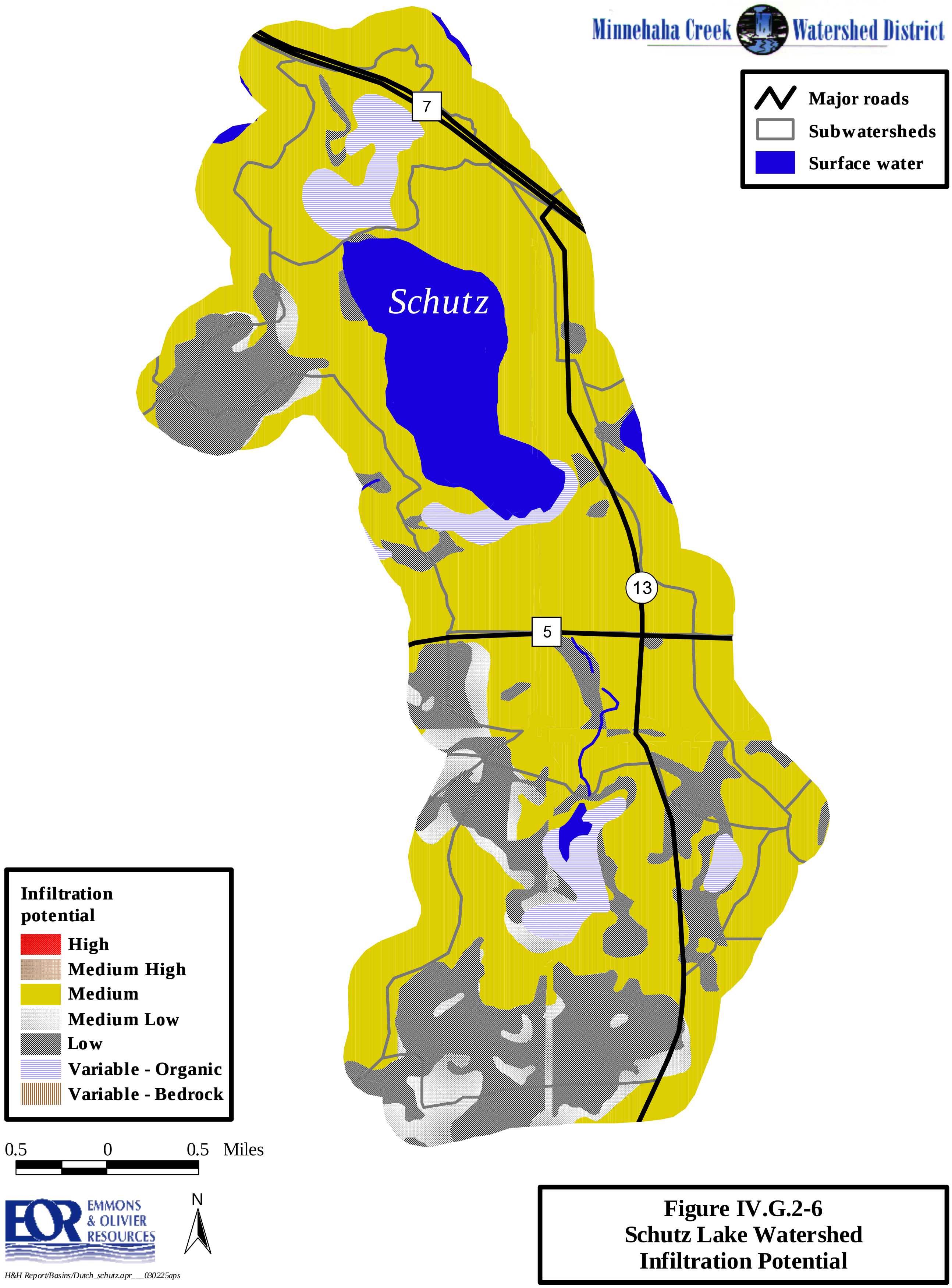


Figure IV.G.2-6
Schutz Lake Watershed
Infiltration Potential

G.3. Water Quantity

G.3.a. Watershed Hydrology

A description of the watershed morphology, drainage, land use, land cover, and soils exists under Schutz Lake sections G.1. and G.2.. For labeling of modeled features and XP-SWMM diagram, refer to the Schutz Lake Watershed Figure IV.Appendix.1-G1 in the Appendix.

Input Parameters:

The hydrology of the Schutz Lake watershed is influenced by a combination of established rural and new urban development areas. Hydrologic input parameters include: area, slope, width, percent impervious, depression storage, hydraulic conductivity, capillary suction, and initial soil moisture deficit. The methodology used to generate these parameters is described under the model methodology section (II.F.1). The input parameter values for Schutz Lake are shown on Table IV.Appendix.1-G1 .

Subwatershed Boundaries:

The Schutz Lake watershed, tributary to Lake Minnetonka, was subdivided into a total of 4 subwatersheds. The average subwatershed size in the Schutz Lake watershed is 242 acres.

The largest subwatershed, with a total area of about 404 acres, contains Schutz Lake (SL-3), for which the watershed is named. The surface area of Schutz Lake, approximately 100 acres, makes up about 25 percent of the total area in the subwatershed. The open water portion of Schutz Lake outlets through a narrow channel into a sloping wetland (SL-4). The wetland in SL-4 appears to fall under the same DNR jurisdiction ID at Schutz Lake but, is distinctly separated from the main body of Schutz Lake by the berm. The wetland on the north end of Schutz Lake outlets through (and around) a severely damaged culvert just south of Hwy 7 and then under Hwy 7 before flowing a short distance to Lake Minnetonka.

The subwatershed boundaries drawn were aided by the use of new MCWD topography (10 foot resolution, generated with 5 foot interpolated intervals), USGS 10 foot topography, and 2 foot topographic contours provided by the Carver County Park Reserve. Where applicable and reasonable, subwatershed boundaries were matched with those already in use by others (i.e. city subwatershed boundaries), for consistency with work by others, and for comparability. Boundary definition was relatively straight forward for this watershed.

Boundary considerations:

- SL-1: Available topography did not reflect new development along the south/western border of this subwatershed. It was assumed that the overall landscape drainage direction (prior to development) was preserved.

Subwatershed growth:

The subwatershed area and percent impervious for all Schutz Lake subwatersheds (SL) for existing and 2020 conditions are listed in Table IV.G.3-1.

As highlighted by the last column of Table IV.G.3-1, it is apparent that the greatest increases in impervious surfaces (indicative of development) are predicted to occur in subwatershed SL-2. Care should be taken to ensure development does not negatively impact the small creek running down the center of SL-2 and carrying drainage to Schutz Lake. The overall predicted percent increase in year 2020 for the entire Schutz Lake watershed is 3.6 percent. Easy access from Hwy 7 along with the watersheds natural features and close proximity to Lake Minnetonka make the Schutz Lake watershed an attractive location for development. Specific recommendations concerning development in Schutz Lake watershed are located in section *G.6: Recommendations*.

Table IV.G.3-1
Schutz Lake Growth by Subwatershed

Subwatershed I.D.	Area (acres)	Percent Impervious* (%)	2020 Percent Impervious* (%)	Change in Percent Impervious (%)
SL-1	312	17	21	4
SL-2	145	10	19	9
SL-3	404	41	43	2
SL-4	107	38	39	1
Average **	**242**	**28.3**	**31.9**	**3.6**
Total Area	**969**			

* Includes open water and saturated wetlands.

** Percent impervious average is weighted on area.

G.3.b. Watershed Hydraulics

Input Parameters:

Table IV.Appendix.1-G2 in the Appendix shows a summary of the hydraulic input parameters for all the modeled links. More specific input information such as cross section slopes, friction coefficients, or entrance/exit conduit losses (minor losses) can be found under the hydraulic mode of the XP-SWMM model.

Stage/area information for all the storage nodes modeled (lakes, wetlands, ponds, road crossings, etc.) are also available in the model.

Drainage Routing:

The Schutz Lake watershed drainage is characterized by a mixture of an aging system of ditch and culverts intermixed with pockets of stormsewer typical of new development and a relatively new control structure at the outlet of the unnamed wetland (DNR ID 10-195W).

G.3.c. Water Quantity Findings and Discussion

A summary of subwatershed findings and notes resulting from the modeling effort are compiled in Table IV.G.3-2. Additional modeling specific comments pertaining to the individual subwatershed basins are in Table IV.Appendix.1-G5.

Results Summary:

The normal water level (NWL), high water level (HWL), peak discharge, and peak velocities predicted for the 100-year events are listed in Table IV.Appendix.1-G3 and Table IV.Appendix.1-G4 of this volume. Hydrographs and time dependent stages and velocities for continuous simulations and other event runs can be found in the provided XP-SWMM models. Figure IV.Appendix.1-G1 in the Appendix shows the XP-SWMM model diagram depicting the names of the links and nodes representing the hydraulics (water routing) of the watershed.

Subwatershed Critical Event:

The modeled 100-year, 10-day snowmelt runoff event produced the "critical" or greater HWL in Schutz Lake (SL-3) and the wetland on the north end of Schutz Lake (SL-4). The 100-year, 24-hour storm event produced "critical" results in the unnamed wetland, DNR ID 10-195W (SL-1) and the small creek draining to Schutz Lake (SL-2). Table IV.G.3-2 and Table IV.Appendix.1-G3 should be referenced for each subwatershed's "critical" event and HWL.

Table IV.G.3-2
Summary of Water Quantity Findings for Schutz Lake Watershed

Subwatershed I.D.	100-year Critical Event	Significant 2020 Impacts	Infrastructure notes	Flooding Issues	Landlocked Issues	Boundary Issues	Backwater conditions	Flow Velocities/Erosion Issues	Named water body	DNR jurisdiction	Water Quantity Improvement Priority	Additional H/H Modeling Notes (see Table IV. Appendix.1-C5)
SL-1	Rainfall		outlet drop structure			✓			Unnamed Wetland	10-195W	low	✓
SL-2	Rainfall										low	
SL-3	Snowmelt								Schutz Lake	10-18P	low	
SL-4	Snowmelt		PD culvert damaged	✓					Wetland north of Schutz Lake	10-18P	low	

2020 Impacts:

Modeled land use changes associated with predicted 2020 conditions did not produce significant runoff impacts in the Schutz Lake watershed. The greatest flow impacts predicted are in the creek running through SL-2.

As this area continues to develop (perhaps beyond 2020) standard peak rate and volume controls should be implemented to ensure the quality of resources are preserved.

Special Subwatershed Issues:

Schutz Lake runout:

The runout of Schutz Lake is at a high point in the small channel through the berm on the north end of the lake. Although 2020 conditions did not predict a significant increase in discharge rates, flow velocities could be sufficient to shift the runout elevation during large storm events. Modeled flow velocities at the runout reached a peak of 3.1 feet per second during the 100-year 10-day snowmelt event. The Schutz Lake watershed was not selected for an erosion and scour analysis. Further investigation will be required to assess the potential for erosion at the outlet.

North Schutz Lake wetland outlet:

The outlet structure of the wetland on the north end of Schutz Lake is an aging and severely damaged culvert. Field investigation revealed that the culvert, although exposed and broken in multiple locations, still functioned. An eroded channel running just to the side of the culvert operates simultaneously with the culvert when water levels reach approximately ½ the depth of the culvert.

Flow Velocities/Erosion Issues:

The modeled storm events did not result in any pipe velocities greater than 10 ft/s, which is used throughout the rest of the report as the criteria for significant conduit velocities. All Schutz Lake peak conduit velocity and discharge are available in Table IV.Appendix.1-G4.

The following Table IV.G.3-3 shows the results for the more significant conduit velocities predicted in the Schutz Lake watershed.

Table IV.G.3-3
Significant Conduit Velocities in Schutz Lake Watershed

		Peak Velocity (ft/s)			
		Existing		2020	
Description	**Link or Multi Link Name**	**1.5-year, 24-hour**	**100-year, 24-hour**	**100-year, 24-hour**	**Snow-melt Event 100-year, 10-day**
Outlet pipe of control structure of unnamed wetland 10-195W	SL-1 outC	2.9	9.0	9.6	8.8
Hwy 5 culvert	SL-2 US5	6.6	9.1	9.4	9.0
Hwy 7 culvert	SL-4 US7	5.9	6.7	6.8	7.3

Flooding Issues:

The damaged culvert under the minor drive off Hwy 7 (Figure IV.G.3-1) and controlling discharge from the north Schutz Lake wetland is predicted to overtop during all modeled 100-year events. An existing eroded channel exists along the side of the exposed culvert. If erosion is significant in this channel, it is possible that the runout elevation of the wetland could be altered.

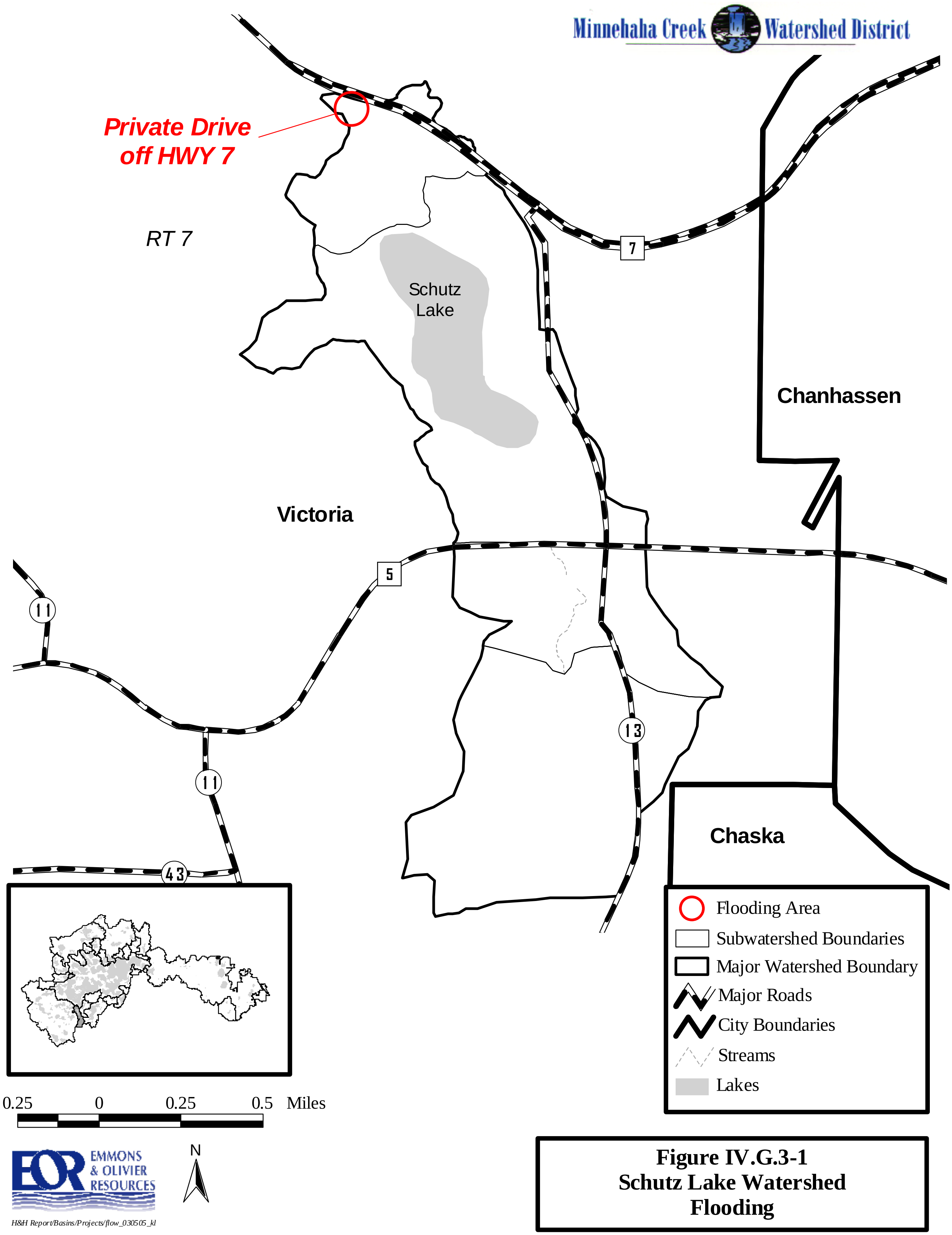


Figure IV.G.3-1
Schutz Lake Watershed
Flooding

G.3.d. Watershed Recommendations

Recommendations specific to water quantity issues can be found in *G.6: Recommendations*, along with recommendations relevant to other aspects of Schutz Lake water resources.

G.3.e. Watershed References

Pertinent information available to aid model construction and to compare and contrast XP-SWMM model results included:

- MCWD hydrodata
- MCWD Water Resource Plan
  - TR-20 Model results
- MNDNR historical water elevations
  - Schutz Lake (SL-3)
- MNDNR lake file data
  - Copy of development grading plans adjacent to west side of Schutz Lake
  - 2 foot topographic contours and control structure configuration for unnamed wetland 10-195W
- MNDNR Hydrographic Survey Reports
  - Schutz Lake (10-18P)
- Surface Water Management Plans
  - Carver County Park Reserve (minor application)
- Mn/DOT / Hennepin County Road Plans
  - Hennepin County Project No. 9323, May 2001 (CSAH 110)
  - T.H. 7 2 foot topography
- USGS Quadrangle Maps

This information was used to aid model construction and also for model validation where applicable. That engineering and modeling judgment was used to assess and resolve conflicting information. Additional field information was gathered when necessary to fill in gaps, update and/or resolve conflicting information.

The XP-SWMM model results were calibrated against measured data and compared to other models for general results validation.

G.4. Scour and Erosion-Prone Areas

G.4.a. Streams

The Schutz Lake watershed does not contain one of the six main creeks selected for a more detailed erosion analysis. Therefore, no scour analysis has been performed in the watershed.

G.4.b. Lakeshore

The identification of lakeshore erosion areas was conducted primarily at the Regional Team meetings, when participants were asked to locate any known erosion areas on a map of the area represented. The RT 7 meetings did not identify any locations. This, however, does not necessarily mean that none exist; rather, it indicates that the members have not seen specific problems. The District should remain vigilant in locating lakeshore erosion because of the direct threat that these problems present through sediment delivery into lakes.

G.5. Water Quality

G.5.a. Watershed Pollutant Load Analysis

The pollutant loads for the Schutz Lake watershed are illustrated in Figure IV.G.5-1 through -3. The remaining model results, including runoff volume and pollutant loads, are listed in Appendix 2 of this volume.

As the Schutz Lake watershed develops, increases are expected in the pollutant loads generated from the changing land uses, as summarized in Table IV.G.5-1. Impervious cover is expected to increase (Figure IV.G.2-2). In order to maintain current pollutant loading rates, about 66 lbs. per year of phosphorus will need to be removed in the watershed. Similar relative increases in total nitrogen and total suspended solids will also have to be eliminated (Table IV.G.6-1). These load reduction targets should be spread out over the entire watershed to avoid the detrimental cumulative effects of development.

Table IV.G.5-1
Schutz Lake Watershed Pollutant Load Summary

TP load (lbs/yr)				TN load (lbs/yr)				TSS load (lbs/yr)			
Existing	2020	Increase	% Increase	Existing	2020	Increase	% Increase	Existing	2020	Increase	% Increase
145	211	66	46%	1369	1898	529	39%	48,972	60,014	11,042	23%

Under current conditions, TP loads (per unit area) in the Schutz Lake watershed are relatively low, with slightly lower loads in the northern subwatershed (SL-4), the majority of which is located within Carver Park Reserve (Figure IV.G.5-1). TP loads are predicted to increase in the southern portion of the watershed (SL-1 and SL-2), due to a portion of the "vacant/agricultural" land being planned for single family residential land use by the year 2020.

The TN and TSS loads follow a similar pattern (Figures IV.G.5-2 and IV.G.5-3), with higher loads in the southern portion of the watershed. Total nitrogen also shows increases around

Schutz Lake itself (SL-2), due to an increase in the acreage of both single family residential and multi-family residential land uses by the year 2020. Management implications for these modeling results are discussed in *Section G.6: Recommendations*.

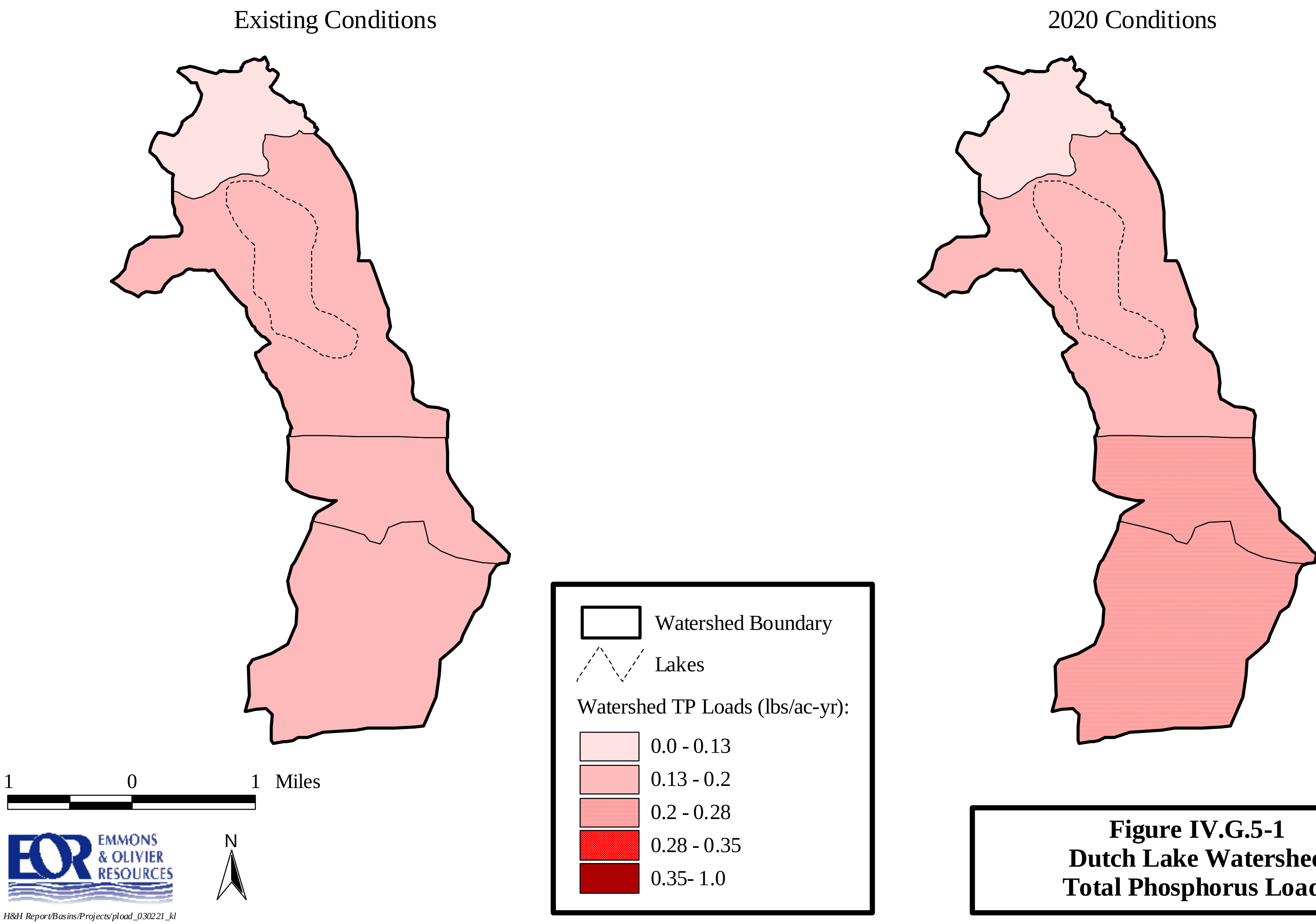
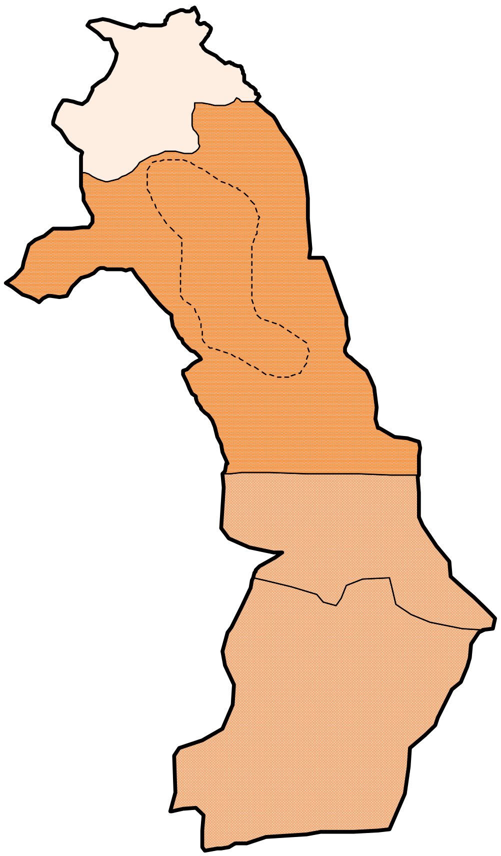


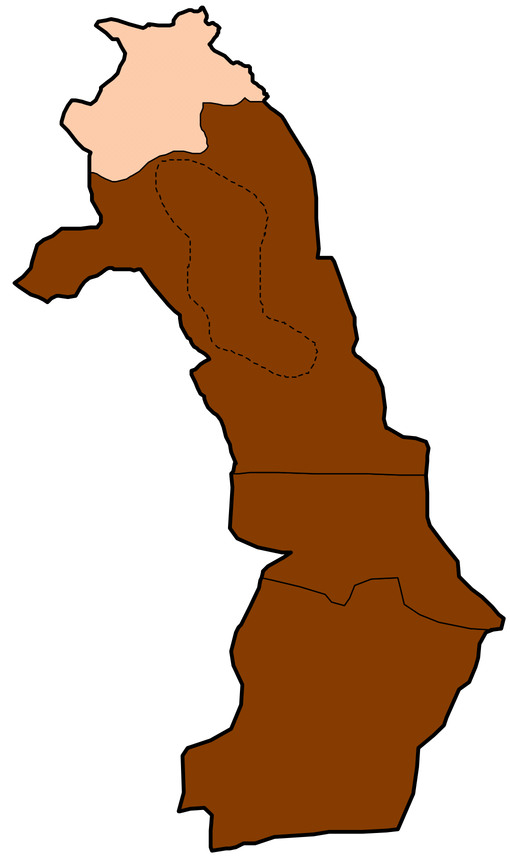
Figure IV.G.5-1
Dutch Lake Watershed
Total Phosphorus Loads

Minnehaha Creek Watershed District

Existing Conditions



2020 Conditions



0.5 0 0.5 Miles

N

EMMONS & OLIVIER RESOURCES

H&H Report/Basins/Projects/pload_030221_kl

Watershed Boundary

Lakes

Watershed TN Loads (lbs/ac-yr):

0.0 - 0.9
0.9 - 1.2
1.2 - 1.5
1.5 - 2.0
2.0 -7.8

Figure IV.G.5-2
Schutz Lake Watershed
Total Nitrogen Loads

Minnehaha Creek Watershed District

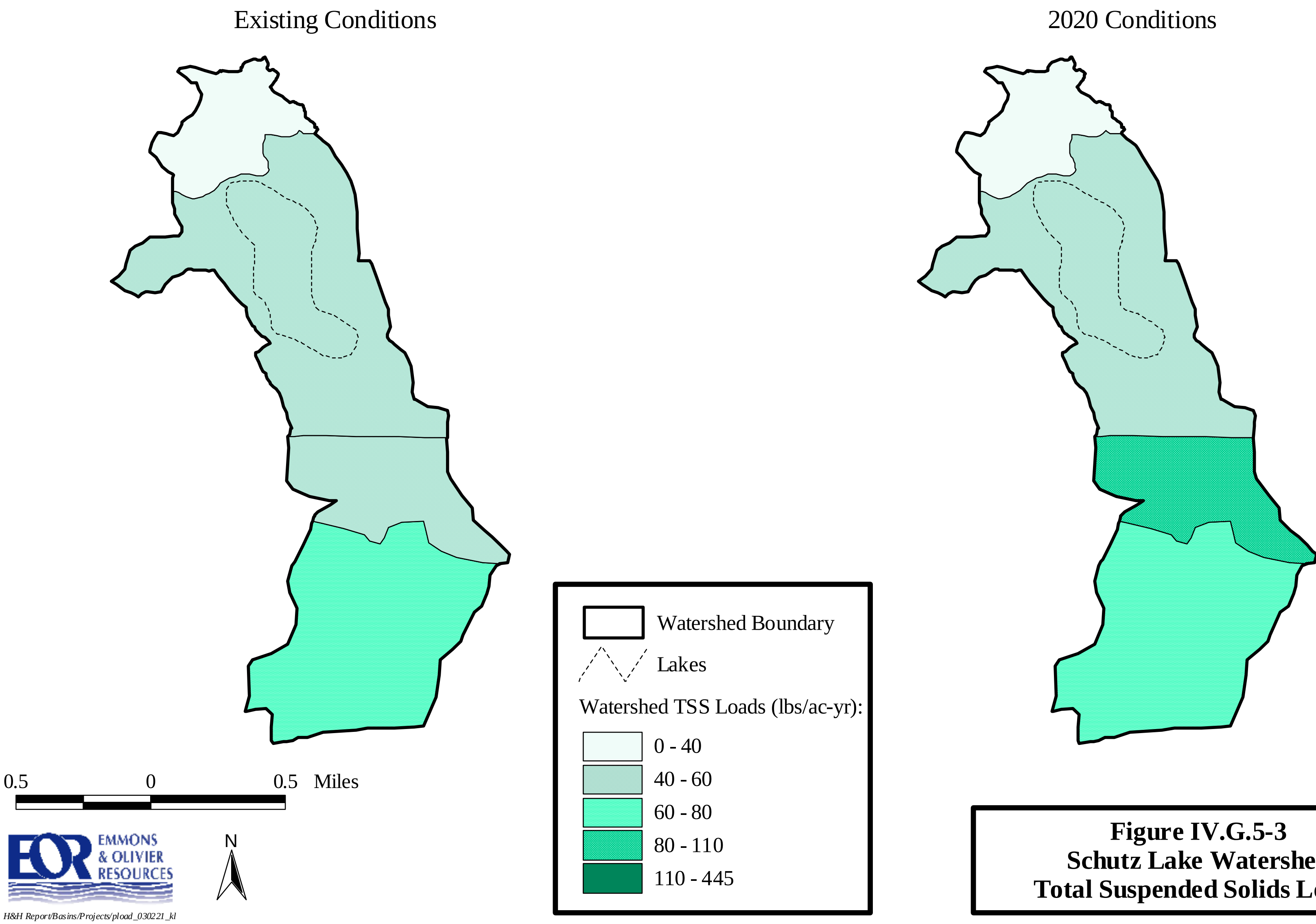


Figure IV.G.5-3
Schutz Lake Watershed
Total Suspended Solids Loads

G.5.b. Lake Modeling and Associated Goals

This section summarizes the lake modeling results for Schutz Lake. WiLMS input parameters (see *Volume II: Framework and Methodology*) are presented in Table IV.G.5-2, and the lake modeling results are presented in Table IV.G.5-3.

There are no in-lake TP concentration data for Schutz Lake. Therefore, the existing and 2020 watershed loads to the lake were estimated from the watershed pollutant modeling results based on land use/land cover (see *Volume II. Framework and Methodology, Section F* for a complete explanation). The mean annual runoff used for the lake modeling was 4.2 inches for existing conditions and 4.65 inches for 2020 conditions, the same values used in the watershed pollutant loading model. The runoff volume increases as development fills in currently undeveloped parts of the watershed.

The lake model predicts that current in-lake TP concentrations are approximately 43 μg/L, and that TP is predicted to increase to 52 μg/L, as a result of land use changes (Table IV.G.5-2).

Table IV.G.5-2
WiLMS Input Parameters

Lake	Lake Area (acres)	Volume (ac-ft)	Mean Depth (ft)	Drainage Area (ac)	Watershed TP Load to Lake (lbs./year)	
					Existing	2020
Schutz	105	2100	20	862	135	199

Table IV.G.5-3
Lake Modeling Results

Lake	Observed (μg/L)		Predicted 2020 TP (μg/L)	
	Observed TP (June-Sept mean)	Years averaged	Based on modeled watershed loadings	"Adjusted 2020" estimate**
Schutz	--*	--	52	--

*Predicted current in-lake TP concentration = 43 μg/L.
**See methodology, Volume II, section F.2: Modeling, water quality.

Table IV.G.5-4 reviews the lake goal recommended by Regional Team 7 and identifies the load to Schutz Lake that corresponds to the RT recommendation. (More information regarding the RT7 goal recommendations can be found in *Volume III: Public Involvement, G. Regional Team 7*.) Additionally, the percent load reduction necessary to achieve the desired goal is presented.

Table IV.G.5-4
Schutz Lake Watershed Goal and Target Load

Lake	**TP Goal (µg/L)**		**TP Load to Lake (lbs/yr)**		**Required % Reduction in Load** (current vs. goal)
	MCWD 1997 Goal	**Proposed Regional Team 7 TP Goal**	**Current Load** (calculated from either PLOAD estimate or observed in-lake concentration)	**Load Goal** (calculated from RT goal)	
Schutz	50	40	135	123	9

Schutz Lake has a mean depth of 20 feet and a relatively small watershed:lake area ratio of 8:1. There are no TP monitoring data available; however, there are some Secchi transparency data available from the MPCA. The 1981 – 1991 Secchi disk average is 1.6 meters, which corresponds to a TP concentration of approximately 30 µg/L based on Carlson's Trophic Status Index. There are no public access sites for the lake.

The following discussion briefly summarizes the phosphorus load reduction scenario for Schutz Lake. Within the lake's watershed, the loads were divided up among six general categories:

Agricultural (all cultivated and maintained grasses, in addition to crops)
Residential
Natural (woodlands and grasslands)
Water
Wetlands
Other – The remaining land uses/covers are included in this category. Due to the manner in which the data were summarized, "other" contains some residential land cover, in addition to commercial, industrial, and public land uses. This is due to the manner in

which the data were mapped. The mapped roads and lakes typically contain adjacent areas that are commonly residential land use.

Across-the-board load reductions were then applied to these categories. One can look at the distribution of the total load among the different sources (watershed loads, "upstream" loads from upstream lakes, and internal loads) and make decisions regarding where to concentrate management efforts. This approach to pollutant load allocation emphasizes the need to take a holistic, watershed-based approach to meeting water quality goals.

Our evaluation of future conditions (2020 land use) assumes that load reduction goals will first be met for existing conditions. Load reductions attributable to future conditions are then met through a no net-increase in pollutant loading over existing conditions, as new development occurs. Although the pollutant load reduction analysis is specific to land use types and where possible, references specific actions that can be taken, water resource managers have a great deal of latitude in implementing these load reduction goals. For example, greater load reductions in one location may lesson the load reduction required elsewhere.

In order to reach the TP loading goal for Schutz Lake, phosphorus loads need to be reduced by 12 lbs, a 9% reduction from 135 lbs. to 123 lbs. Table IV.G.5-5 summarizes the following load reduction scenario:

A) The load from the existing residential areas is 42 lbs. Through lakeshore and residential BMPs, this load can be reduced by 15%, leading to a reduction of 6 lbs.

B) A substantial amount of the remaining loading source is in the "other" category (see above). If the residential portions of this area were targeted, and loads were decreased by 10%, the resulting load would be 75 lbs, a reduction of 8 lbs.

These practices cumulatively lead to a reduction in TP loading of 14 lbs., thus helping Schutz Lake attain its water quality goal of 40 µg/L.

Table IV.G.5-5
Load reduction scenario for Schutz Lake

	Source	Management strategy	Initial load (lbs)	% reduction	Load reduction (lbs)
A	Residential	Lakeshore, residential BMPs	42	15	6
B	Other (targeting the residential portion)	Lakeshore, residential BMPs	83	10	8
					14 lbs. total reduction

G.5.c. MPCA Impaired Waters and Point Source Permits

Within the Schutz Lake watershed, there are no water bodies on the MPCA's 303(d) list of impaired waters.

Today, very few point source discharges of any treated material occur in the Minnehaha Creek Watershed. Of the six discharges that currently exist, none are located in the Schutz Lake watershed.

G.6. Recommendations

Based on limited data, Schutz Lake received a lake grade of “B” in 2002, suggesting that the lake is fully supporting of swimming. Recent lake transparency data and a small lake to watershed ratio suggest that with good management, Schutz Lake could continue to have good water quality in the future. However, the Schutz Lake watershed is in transition and based on projected 2020 land uses, will lose existing agricultural areas to residential development. For this reason, good stormwater management will be critical to maintaining or improving the quality of Schutz Lake in the future.

As described in Section G.5.a, changes in Schutz Lake water quality are primarily expected to result from the conversion of vacant/agricultural land to residential land uses. Because load reductions are also required under existing conditions, recommendations are made to address existing development and agricultural land uses as well. To address the load reduction needs identified in Table IV.G.5-4 and to incorporate the management alternatives in Tables III.G-3 and III.H-3 (*Volume III. Public Involvement, G. Regional Team 7 and H. Regional Team 8*), the management scheme outlined in Table IV.G.6-1 is proposed for the Schutz Lake watershed. Details of the recommendations follow the table. Recommendations applicable to the entire MCWD are discussed in *Volume V: Watershed Issues Integration*.

Table IV.E.6-1
Schutz Lake Watershed Recommended Actions

Recommended Action	Receiving Water Body	Priority	Category: Capital Improvement	Category: Maintenance	Category: Information /Education	Category: Permitting/Enforcement	Category: Monitoring/Investigation	Responsible Party*
1) Schutz Lake homeowners stormwater management	Schutz Lake	High	X	X	X			A, B, F
2) Maintain pollutant loading from new development at predevelopment levels	Schutz Lake	High	X	X		X	X	A, B,
3) Expand MCWD monitoring program to Schutz Lake	Schutz Lake	Medium					X	A, C
4) Encourage the use of Agricultural BMPs	Schutz Lake	Medium	X		X			A, D, E, F
5) Conduct tile and ditch inventory	Schutz Lake	Medium					X	A, D, F
6) Install and/or protect lake and wetland buffers	Schutz Lake	Medium	X	X				A, B, C, D, E, F,
7) Assess damaged culvert at wetland outlet	Schutz Lake	Low	X	X				A, B, C

*Responsible party: A – MCWD, B – City, C – Three Rivers Park District, D – SWCD, E - UM Extension, F – Private Landowners, G – DNR

1) Schutz Lake homeowners stormwater management.

The MCWD should work with residents living within the Schutz Lake Shoreland District (1000 feet from OHW) to implement stormwater management practices. Stormwater ponding, infiltration, rain gardens, and riparian buffers are among the practices that should be emphasized. Stormwater management should also be incorporated into reconstruction of roads and other common infrastructure as improvements are made.

2) Maintain pollutant loading from new development at predevelopment levels.

New development should not result in a net increase in stormwater rate, volume or pollutant loading. Developments should be planned to provide on-site treatment of stormwater with the objective of avoiding or minimizing additional stormwater runoff to the extent possible. Offsite mitigation, where necessary, should be provided concurrent with the new development.

3) Expand MCWD water quality monitoring program to include Schutz Lake.

In-lake water quality sampling should be conducted to develop baseline trend information on Schutz Lake water quality. These data will enable more accurate calibration of the lake model as well as provide an indicator of the success of stormwater management efforts.

4) Encourage the use of agricultural BMPs.

Increasing the application of conservation practices such as minimum tillage, contour farming, terracing, riparian buffers and vegetative filter strips should be evaluated as part of a farm management plan (unless recently completed). Agricultural BMPs should be focused on reducing the discharge of stormwater and associated sediments and pollutants north to Schutz Lake.

5) Conduct tile and ditch inventory.

It is not clear what the extent of existing tiles within the Schutz Lake watershed is. A survey of tiles should be made to locate and map tile/ditch locations, verify drainage area boundaries, estimate discharge rates, and where appropriate, collect grab samples for water quality analysis. Rock inlets should be installed where vertical riser pipes convey water from depressions. Based on local monitoring (Carver County SWCD, personal communication), rock inlets can reduce TSS by up to 70%, TP by 50%, and can substantially reduce peak flow rates and volumes of stormwater runoff. Tiles may also be broken to restore wetlands and/or create water quality treatment wetlands.

6) Install and/or protect lake and wetland buffers.

Encourage naturally vegetated buffers and "lakescaping", especially on steep slopes and where shoreline erosion is occurring. A special case of this is where lake properties contain wetland fringe areas separated from the lake by narrow beach ridges. These wetland swales provide an excellent, natural vegetated swale that can intercept stormwater runoff draining to the lake from residential areas and should ideally be maintained in a natural state. Yard waste (e.g., leaves, woody debris) should not be dumped into wetlands or wetland buffers. In addition to constituting fill into public waters, this organic material introduces additional nutrient inputs to the lake. Organic waste should be composted and properly applied to plantings and landscaping where it will not be washed off into the lake.

7) Assess damaged culvert at wetland outlet.

The culvert controlling the wetland north of Schutz Lake is severely damaged and has an eroded channel that formed alongside. The channel and culvert operate simultaneously when water depth reaches approximately ½ of the culvert depth. Continued erosion in the channel and/or further degradation to the culvert has the potential to alter the runout elevation of the wetland. The small road the culvert passes under appears to be an old access and may no longer be used. This situation should be assessed to determine if it is appropriate to repair, replace or remove. Any work at this location should be in coordination with the MNDNR since this wetland is shown as being under the jurisdiction of Schutz Lake 10-18P.

These recommendations emerged out of discussions as part of the Regional Team 7 public involvement process. Additional issues and management recommendations were identified as part of this process. A complete presentation of the recommendations can be found in *Volume III: Public Involvement, Regional Team 7* , which includes information regarding the priority of each issue, who would be responsible for undertaking each suggested management approach, and a recommendation of when the approach should be undertaken.