SHOREWOOD
2040 Comprehensive Plan

The City of Shorewood wishes to acknowledge and thank the following individuals for their time and dedication in completing the City's 2040 Comprehensive Plan Update.

Their commitment, cooperation and contributions are greatly valued and appreciated.

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INTRODUCTION

The City of Shorewood has undertaken an update of its current 2030 Comprehensive Plan both in response to a mandate received from the Metropolitan Council and to identify community issues and concerns. In part, these considerations will serve to direct and focus the work effort.

As a means of obtaining input and gaining insight into local needs and opinions, a series of interviews were undertaken with City Council members, Planning Commissioners, and City staff. The interviews provided significant and valued perspectives on objectives and needs to be addressed in planning the future of Shorewood. This information is summarized in the "Planning Tactics" section of this document (attached as Appendix A). To be stressed however, is that this initial feedback process does not end, but rather will be a continuing theme of the Plan Update process.

Additionally, the city held three open houses and completed a community survey to allow residents and property owners to voice their opinions on what they desire for the City and their respective areas of interest.

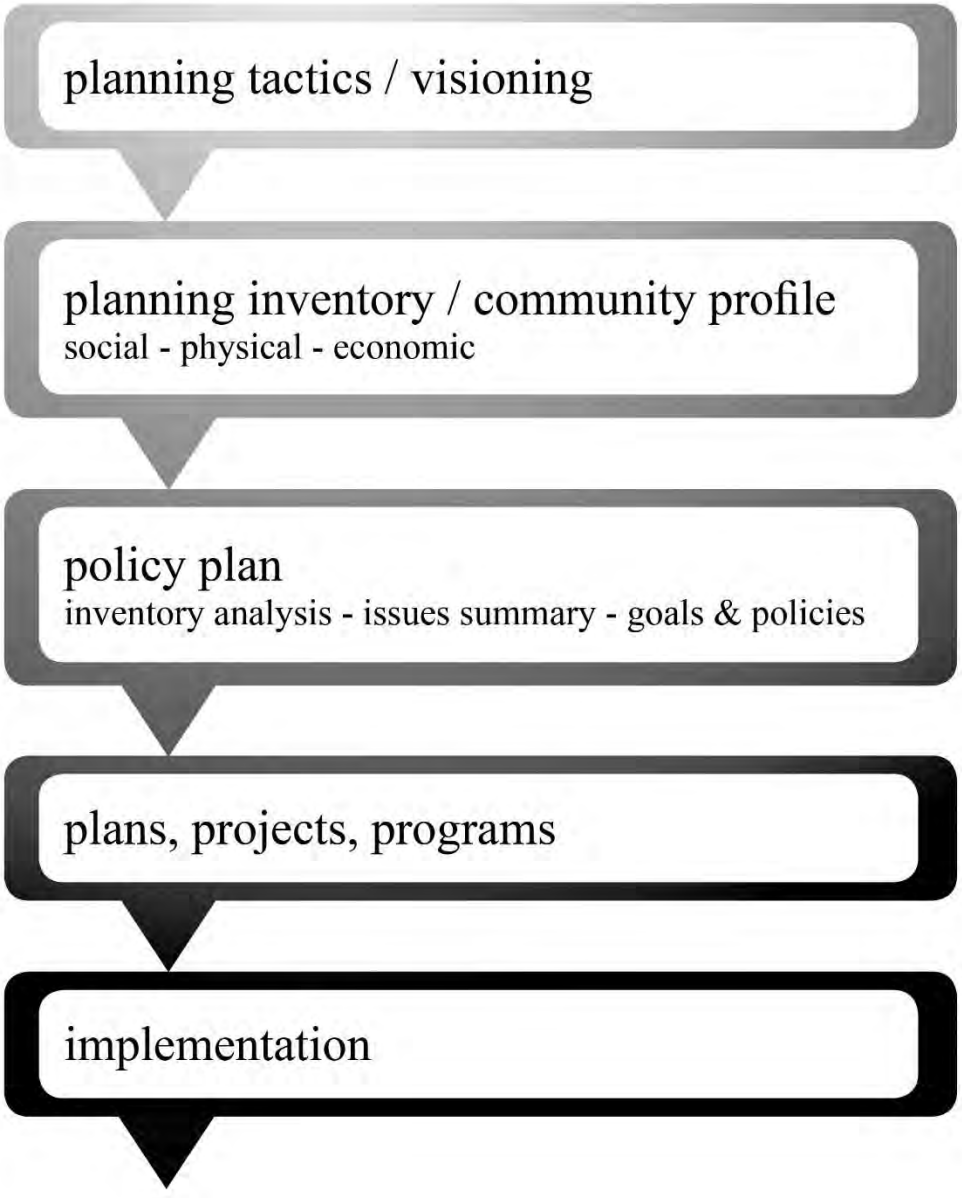
Following this input from citizens and property owners, "draft" materials were presented to the Planning Commission and City Council prior to conducting formal and required public hearings. It is through this participation process that community concerns were raised and addressed.

Beyond the desires and needs of the local representatives, it is important to note that the regional planning directives of the Metropolitan Council will also influence the content of the Comprehensive Plan Update. More specifically, the Metropolitan Council's *Thrive MSP 2040* Regional Development Guide establishes a regional context within which the City of Shorewood must define its role and direct its future. *Thrive MSP 2040* mandates specific regional criteria that must be addressed in the 2040 Comprehensive Plan Update.

In the material that follows, a description of the Comprehensive Plan Update process is provided first. Next, a discussion of local and regional planning history is presented. The major component of this Plan is dedicated to the comments, opinions, needs, and issues that were identified through a series of interviews held to receive input from community officials and City staff. Again, a summary of this information is provided in the "Planning Tactics" report which is attached as Appendix A. The report concludes with a summary of key issues and focus areas that will be further reviewed and refined during the Visioning process of the 2040 Comprehensive Plan Update.

PLANNING PROCESS

Comprehensive planning is a broad base problem solving process. As such, the effort involves well-defined steps, beginning with problem and objective identification and progress to proposed solutions and actions. The diagram on the following page graphically illustrates the general series of stages which have been undertaken in planning for the City's future.



The general comprehensive planning process must, however, be specifically tailored and designed for the jurisdiction it serves. In the case of Shorewood, the 2040 Comprehensive Planning work

program has been divided into five phases with various sub-components intended to cover both macro and micro perspectives of the community.

The first phase was the Planning Tactics which identified local concerns and needs. Through the Tactics interviews, open houses and survey, input was received from City Council members, Planning Commission members, and residents.

The second phase of the planning process involved the assembly of a technical Inventory to document the City and its facilities as they currently exist. The Inventory addresses social, environmental and physical conditions of the City.

Phase three involved the formulation of a Policy Plan. Following the Inventory and Issues Identification, the City defined desired community planning goals that it wishes to accomplish over the next 20-year period. In this regard, policies have been formulated to define actions for accomplishing the desired community goals.

Phase four involved the formulation of the Community Framework guide plan which provides specific plan recommendations for natural resources, land use, housing, transportation, utilities, and community facilities.

The fifth and final stage is Implementation, which involved an analysis of the City's implementation tools (development regulations and capital improvement plans) to ensure that they will effectively serve to implement the Comprehensive Plan goals.

Subsequently, the draft Plan will be sent to adjacent jurisdictions and affected school districts for comment and the Metropolitan Council for review and approval.

To ensure that the City's Comprehensive Plan is truly reflective of the community's interests and objectives and is responsive to constituent concerns, the work must be directed from the outset by the views and opinions of officials, citizens, and property owners. As one of the initial phases of Shorewood's Comprehensive Plan Update, a broad cross-section of individuals was consulted to gain a portion of this local perspective and orientation. Additionally, comments from surrounding and affected units of government will be solicited. This information, when combined with the pending technical community inventory, will establish the basis for Plan formulation.

PLANNING HISTORY

The Lake Minnetonka area, of which the City of Shorewood is a part, was a major tourist destination in the late 19th Century. The area was characterized by luxurious hotels and inns and was accessible via the railroad and State Highway 7.

The City of Shorewood was organized as a village in 1956. Prior to that time, it was part of the former Excelsior Township, as were the nearby Cities of Excelsior, Tonka Bay and Deephaven. The former Village of Shorewood became a statutory City in 1974. Incorporation efforts were

prompted by concerns that remaining property in Excelsior Township would be "lost" by ongoing annexation activities.

Shorewood is primarily a residential community and includes shorelines on Lake Minnetonka, Christmas Lake, Como Lake, Galpin Lake, Silver Lake, Lake Virginia, and Lake William.

The City of Shorewood took its initial steps to control its destiny in 1956 with the development of a Zoning Ordinance. The City adopted its first Comprehensive Plan in 1981, which outlined the type community that the City of Shorewood desired to become. In this regard, the Plan established related goals and policies, as well as a Land Use Plan.

Since 1981, the Plan has undergone several amendments (updates) and, most recently in 2009, as the City's 2030 Comprehensive Plan.

REGIONAL PLANNING

As part of the mandated comprehensive planning process, the City of Shorewood is required to coordinate its Comprehensive Plan in a manner consistent with the *Thrive MSP 2040* Regional Development Guide, as adopted by the Metropolitan Council.

To build the foundation for a prosperous, equitable, livable, and sustainable future, the *Thrive MSP* document identifies seven general policies to guide land use and regional development. These policies are as follows:

Orderly and Efficient Land Use: Align land use, development patterns, and infrastructure to make the best use of public and private investment.

Natural Resources Protection: Conserve, restore, and protect the region's natural resources to ensure availability, support public health, and maintain a high quality of life.

Water Sustainability: Conserve, restore, and protect the quality and quantity of the region's water resources to ensure ongoing availability, support public health, and maintain a high quality of life.

Housing Affordability and Choice: Promote housing options to give people in all life stages and of all economic means viable choices for safe, stable, and affordable homes.

Access, Mobility and Transportation Choice: Sustain and improve a multimodal transportation system to support regional growth, maintain regional economic competitiveness, and provide choices and reliability for the system's users.

Economic Competitiveness: Foster connected land use options to provide businesses and industries with access to materials, markets, and talent.

Building in Resilience: Promote sensitive land use and development patterns to achieve Minnesota's adopted greenhouse gas emissions goals at the regional scale, and to develop local resiliency to the impacts of climate change.

The Metropolitan Council has classified the City of Shorewood as a "Suburban" community. The *Thrive MSP 2040* Regional Development Guide provides the following specific growth strategies for "Suburban" communities to ensure orderly and efficient land use:

- *Plan for forecasted population and household growth at overall average densities of at least five units per acre, and target opportunities for more intensive development near regional transit investments at densities and in a manner articulated in the 2040 Transportation Policy Plan.*

- *Identify areas for redevelopment, particularly areas that are well-served by transportation options and nearby amenities and that contribute to better proximity between jobs and housing.*

- *In collaboration with other regional partners, lead major redevelopment efforts.*

- *Lead detailed land use planning efforts around regional transit stations and other regional investments.*

- *Plan for and program local infrastructure needs (for example, roads, sidewalks, sewer, water, and surface water), including those needed to accommodate future growth and implement local comprehensive plans.*

INVENTORY

2040 Comprehensive Plan

INTRODUCTION

The starting point for the Shorewood Comprehensive Plan Update is to document existing conditions and trends within the City that influence the City's future growth. The purpose of the Shorewood Inventory is to identify the type, amount, and pattern of growth that has taken place within the City. To this end, an inventory of existing conditions has been conducted. This Inventory encompasses seven general categories of information as highlighted below:

Socio-Economic Profile – This profile provides demographic information on population, households, age characteristics, income, and employment.

Natural Resources Profile – This profile identifies the characteristics of Shorewood's natural environment that influence land use development including topography, soils, watersheds, lakes, streams, and wetlands.

Land Use Profile – This profile describes, locates, and quantifies the various land uses within the City of Shorewood.

Housing Profile – This profile describes Shorewood's housing stock by age, tenure, value, and type.

Transportation Profile – This profile describes the transportation infrastructure available in Shorewood. The transportation profile includes functional classification of roadways, traffic volumes, aviation, and transit opportunities.

Utilities Profile – This profile provides insight on public utilities (waste water and municipal water

Community Facilities Profile – This profile provides insight on parks, schools, other utilities and public safety.

The sources of Inventory data have been gathered from a wide range of agencies, printed documents, and interviews. All the maps and tables have been provided with a source. Additional information regarding the source of any of the Inventory data can be obtained by contacting the City.

Together, these categories that make up the Shorewood Inventory provide an informational base which will be used to identify issues and set up a hierarchy of planning policies. These policies will help the community address a broad base of land use and development issues. With the help of a solid information base, decision-makers can evaluate and guide proposals in the short term to benefit the residents Shorewood and the surrounding area, while fulfilling the City's long-term goals and objectives.

POPULATION AND HOUSEHOLD GROWTH TRENDS

The statistics in the following table illustrate the trends in population within Shorewood, surrounding cities, and Hennepin County. Between 2010 and 2020, the City is expected to grow at a rate of 1.3 percent, while Hennepin County is expected to grow at an 8.9 percent rate. From 2020 to 2040, Shorewood is expected to grow at a rate of 1.3 percent, while Hennepin County is expected to grow at a rate of 12.1 percent. The faster growth rate in Hennepin County is due to the amount of undeveloped and vacant land and the amount of redevelopment projects in the County.

The population of Shorewood is projected to stay relatively stable due to the following:

1. With the recent redevelopment of the Minnetonka Country Club property, the City has no large tracts of available vacant land for development and few clustered properties that may be suitable for redevelopment with higher residential densities.

2. An aging population with outmigration of young adults.

3. Impact of the lack of affordable starter homes and ability to "age in place."

4. The impact of shoreland regulations, which restrict development densities within 1,000 feet of a lake.

Population Growth 2000 – 2040

	2000 Census	2010 Census	2020 Met Council Estimate	2000-2020 % Change	2010-2020 % Change	2030 Met Council Estimate	2040 Met Council Estimate	2020-2040 % Change
Shorewood	7,400	7,307	7,600	2.7%	3.9%	7,800	8,000	5.0%
Mound	9,435	9,052	9,000	-4.6%	-0.6%	9,300	9,400	4.4%
Tonka Bay	1,547	1,475	1,520	-1.7%	3.1%	1,550	1,560	2.6%
Minnetonka Beach	614	539	520	-15.3%	-3.5%	490	510	-1.9%
Hennepin County	1,116,200	1,152,425	1,255,220	12.5%	8.9%	1,329,580	1,406,640	12.1%

Source: Metropolitan Council, U.S. Census Bureau

The table below represents the Metropolitan Council's population forecast for Shorewood through 2040. Population is shown to increase by approximately six percent from 2010 to 2040.

Population Projections, 2010 – 2040 City of Shorewood				
	2010 Census	**2020 Forecast**	**2030 Forecast**	**2040 Forecast**
Population	7,307	7,600	7,800	8,000
Households	2,658	2,800	2,910	3,000
Employment	1,113	1,600	1,600	1,600
Source: Metropolitan Council				

The following table indicates that the number of households in Shorewood has increased while the average number of persons per household has slightly decreased (from 2.75 in 2010 to 2.53 persons per household expected in 2040). This is likely reflective of an increase in persons aged 65 and over. It also reflects the natural trend of people having fewer children and the dynamics of the modern family. If this trend is correct, the City will need to encourage additional new housing to accomplish the Metropolitan Council's forecasted population and household growth. However, as the baby boomer generation continues to age and look for alternative housing options, single family homes in Shorewood could be available to younger families, providing more housing options and increasing the average household size. Throughout the next decade, the City of Shorewood should monitor the movement of baby boomers, to help predict future housing needs.

Population and Household Projections, 2010 – 2040 City of Shorewood			
Year	**Population**	**Households**	**Persons Per Household**
2010	7,307	2,658	2.75
2015	7,458*	2,724*	2.74*
2020	7,600	2,800	2.71
2030	7,800	2,910	2.68
2040	8,000	3,000	2.67
*Metropolitan Council Estimates Source: Metropolitan Council, US Census Bureau			

The following table illustrates 2000 and 2010 household type for the City of Shorewood. As the table indicates, the number of family households has increased from 2000 to 2010. In 2000, 83 percent of households were family households. In 2010, the number of family households decreased to 80 percent. The number of non-family households increased from 2000 to 2010, from 423 to 508. The Census does not provide data for non-family households with children in 2000 or 2010.

Household Type City of Shorewood				
Household Type	**Total Number of Households**		**Households With Children**	
	2000	**2010**	**2000**	**2010**
Family-Married Couple	1,914	2,000	1,035	1,000
Family- Male Householder	69	33	20	24
Family- Female Householder	123	58	79	28
Total Family	2,106	2,091	1,134	1,052
Non-Family Households	423	508	-	-
Total Households	2,529	2,599	1,134	1,052

*The U.S. Census Bureau defines a family as two or more people (not necessarily including a householder) residing together and related by birth, marriage, or adoption.
Source: U.S. Census Bureau, 2000 and 2010

AGE CHARACTERISTICS

The following table illustrates Shorewood's population by age group. School-aged population (under 18) decreased between 2000 and 2010 by 4.5 percent. In both 2000 and 2010, the labor force represented the largest age group, at just over 60 percent in each year. The retired age group represented 7.9 percent of the total population in 2000, and 12.5 percent in 2010, an increase of 4.6 percent. It is expected that the retired age group will become the fastest growing segment of the population in the forthcoming decade. Changes in the City's demographics and surrounding areas will have significant planning implications for the future.

Age Characteristics, 2000 – 2010 City of Shorewood				
	2000		2010	
Age Group	**Number**	**%**	**Number**	**%**
Under 5	526	7.1%	354	4.8%
5 to 9	758	10.2%	525	7.2%
10 to 14	712	9.6%	632	8.6%
15 to 19	475	6.4%	643	8.8%
Total: School Aged Children	**2,339**	**31.6%**	**1,977**	**27.1%**
20 to 24	200	2.7%	241	3.3%
25 to 29	168	2.3%	186	2.5%
30 to 34	340	4.6%	209	2.9%
35 to 39	719	9.7%	300	4.1%
40 to 44	870	11.8%	529	7.2%
45 to 49	764	10.3%	744	10.2%
50 to 54	660	8.9%	881	12.1%
55 to 59	339	4.6%	628	8.6%
60 to 64	283	3.8%	523	7.2%
Total: Labor Force	**4,475**	**60.5%**	**4,418**	**60.5%**
65 to 69	194	2.6%	285	3.9%
70 to 74	199	2.7%	237	3.2%
75 to 79	112	1.5%	168	2.3%
80 to 84	58	.80%	147	2.0%
85 to 89	17	.20%	54	.70%
90 +	6	.10%	21	.30%
Total: Retirement Age	**586**	**7.9%**	**912**	**12.5%**
Total	**7,400**	**100.0%**	**7,307**	**100%**
Source: US Census Bureau 2000, 2010				

As shown in the table below, Shorewood has a lower median age than Spring Park, Tonka Bay, and Minnetonka Beach, and a higher median age than Mound. All adjacent communities also have a much higher median age when compared to Hennepin County. The cost of homes in the referenced communities plays a key role in the age of the populations which reside within them.

Median Age of Population Compared to Surrounding Communities (Years), 2010	
Shorewood	45.3
Spring Park	49.2
Mound	42.6
Tonka Bay	47.8
Minnetonka Beach	46.7
Hennepin County	35.9
Source: U.S. Census Bureau, 2010	

EDUCATION

The following table illustrates education levels for residents ages 25 and over in 2010. An overall comparison of Shorewood to Hennepin County illustrates that Shorewood residents have attained a higher level of education than Hennepin County residents as a whole (according to the U.S. Census 2015 estimates). Shorewood has a high percentage of high school graduates or higher, at over 98 percent, compared to Hennepin County's 92.6 percent. Shorewood also has a higher percentage of residents with a Bachelor's degree or higher.

2015 Educational Attainment for Ages 25 and Over
Shorewood and Hennepin County

	Shorewood		Hennepin County	
	2015	**Percent**	**2015**	**Percent**
<9th Grade	1	0%	28,166	3.5%
9th to 12th Grade (no diploma)	71	1.4%	32,337	3.9%
High School Graduate	504	10.1%	146,311	17.8%
Some College (no degree)	926	18.5%	160,152	19.5%
Associate Degree	359	7.2%	68,370	8.3%
Bachelor's Degree	2,087	41.7%	249,057	30.3%
Graduate Degree	1,060	21.2%	136,969	16.7%
Total	5,008	100%	821,362	100%
% of High School Graduate (or higher)	98.6%		92.6%	
% of Bachelor's Degree (or higher)	62.8%		47.0%	
Source: U.S. Census Bureau American Community Survey				

EMPLOYMENT

The following table represents the 2010 employment demographics for Hennepin County and the City of Shorewood. The table shows that in 2010, Shorewood had a similar breakdown of jobs as compared to Hennepin County. The biggest occupational sectors in both Hennepin County and Shorewood in 2010 were professional and business services and education/health services. The smallest sectors in both Hennepin County and Shorewood were natural resources and mining occupations.

Occupation by Industry Breakdown, 2010
Shorewood and Hennepin County

	Shorewood		Hennepin County	
	Number	**Percent**	**Number**	**Percent**
Natural Resources and Mining	-	-	823	0.1%
Construction	51	6.2%	18,201	2.4%
Manufacturing	16	1.9%	70,933	9.2%
Trade, Transportation and Utilities, Wholesale Trade	39	4.7%	69,774	9.0%
Information and Retail	70	8.4%	90.752	11.8%
Financial Activities	80	9.7%	86,861	11.3%
Professional and Business Services	155	18.7%	170,201	22.0%
Education and Health Services	199	24.1%	164,310	21.3%
Leisure, Arts, and Hospitality	105	12.7%	59,905	7.8%
Other Services	90	10.9%	23,591	3.1%
Government	22	2.7%	17,235	2.2%
Total	827	100.0%	772,586	100.0%
Source: U.S. Census Bureau 2010, On the Map – QCEW data				

As illustrated in the table below, the Metropolitan Council is predicting that Shorewood will have expanding employment opportunities within the community, increasing almost 70 percent from 2010 to 2040. These estimates appear unrealistic recognizing that Shorewood has limited commercial and industrial land uses within the City. Further, the City of Shorewood is considered fully developed with very few vacant parcels which have the potential to generate new jobs.

Employment Projections
City of Shorewood

	2010 Estimate	**2020 Forecast**	**2030 Forecast**	**2040 Forecast**
Shorewood	827	1,600	1,600	1,600
Source: Metropolitan Council				

TRAVEL TIME TO WORK

As shown in the table below, approximately 36 percent of Shorewood residents have a commute time of 30 minutes or longer. The average (median) travel time to work for Shorewood residents is 26 minutes.

Travel Time to Work, 2015 City of Shorewood		
	Number of Residents	**Percent**
Less than 10 minutes	331	9.7%
10 to 14 minutes	423	12.4%
15 to 19 minutes	468	13.7%
20 to 24 minutes	539	15.8%
25 to 29 minutes	423	12.4%
30 to 34 minutes	509	14.9%
35 to 44 minutes	253	7.4%
45 to 59 minutes	352	10.3%
60 or more	116	3.4%
Total	3,414	100%
Worked at home	321	
Average travel time to work	26.1 minutes	
Source: U.S. Census Bureau, 2015		

HOUSEHOLD INCOME

The U.S Census data regarding median family income for Shorewood and Hennepin County is illustrated in the following tables. The household income table indicates household income ranges for Shorewood. The per capita income and median family income for the City is significantly greater than that of Hennepin County.

Per Capita, Family, and Household Incomes Shorewood and Hennepin County				
	Per Capita Income	**Median Family Income**	**Median Household Income**	**Percent in Poverty**
2000				
Shorewood	$44,425	$104,100	$96,589	1.7%
Hennepin County	$28,789	$65,985	$51,711	8.3%
2010				
Shorewood	$59,861	$134,698	$118,495	2.0%
Hennepin County	$35,902	$81,043	$61,328	12.1%
Source: US Census, ACS 2000, 2010, and 2015 Five-Year Estimates				

Household Income City of Shorewood				
	2000		**2010**	
	Number of Households	**Percent of Households**	**Number of Households**	**Percent of Households**
Less than $10,000	33	1.3%	28	1.1%
$10,000 to $14,999	24	.9%	24	.9%
$15,000 to $24,999	126	5.0%	86	3.3%
$25,000 to $34,999	151	6.0%	96	3.7%
$35,000 to $49,999	168	6.6%	157	6.0%
$50,000 to $74,999	427	16.9%	302	11.6%
$75,000 to $99,999	377	14.9%	424	16.3%
$100,000 to $149,999	555	22.0%	492	18.9%
$150,000 to $199,999	204	8.1%	393	12.4%
$200,000 or more	463	18.3%	597	23.0%
Total	2,528	100.0%	2,599	100.0%
Source: US Census Bureau, 2000, 2010				

LAKES

Lake Minnetonka is the largest natural resource within the City of Shorewood. As a large recreational lake, it is of prime importance to the citizens of the community and their lifestyle. Shorewood has six named lakes (as classified by the Department of Natural Resources, including Christmas Lake, Silver Lake, Lake Como, Lake Virginia, Lake William, and Galpin Lake, which provide recreational opportunities for residents.

All areas of Lake Minnetonka have been classified as impaired by the Minnesota Pollution Control Agency. This classification is a result of development which surrounds the lake and the amount of direct stormwater runoff channeled into the waters.

There are many government agencies that have jurisdiction, in one form or another, over the City's lakes, including: individual municipalities, the Army Corps of Engineers, the Riley Purgatory Bluff Creek Watershed District, the Lake Minnetonka Conservation District, The Minnehaha Creek Watershed District, and the Minnesota Department of Natural Resources. Historically, the City manages its shoreland development while stormwater drainage is reviewed and approved by the Watershed Districts.

TOPOGRAPHY

There are several areas within Shorewood which exhibit slopes in excess of 18 percent. In these areas, there is a cause for concern because disruption of the existing ground cover or unauthorized grading may result in destabilization of the slope and result in erosion and sedimentation into lakes and/or adjacent wetlands. Those areas classified as bluffs within shoreland districts have additional protection.

SOILS

Many areas of Shorewood have been built upon soils that have questionable to moderate limitation in terms of building site suitability. Since Shorewood is fully serviced by sanitary sewer, the primary consideration regarding the soils is their suitability for new and existing building sites. Factors such as slope, depth to water table, bearing capacity, volume change (shrink-swell potential and potential for frost heave have definite influence on the development capability of a given site. In areas of questionable soils, soil testing and special construction techniques will be necessary to overcome the construction limitations.

TREE PRESERVATION

The City of Shorewood contains significant numbers of oak, elm and other deciduous trees which contribute to the aesthetic quality of the community. In addition, these trees play an important role in the function of the City's natural systems. The City Code includes a tree preservation ordinance which is intended to preserve or replace trees in new developments or redevelopments.

WETLANDS

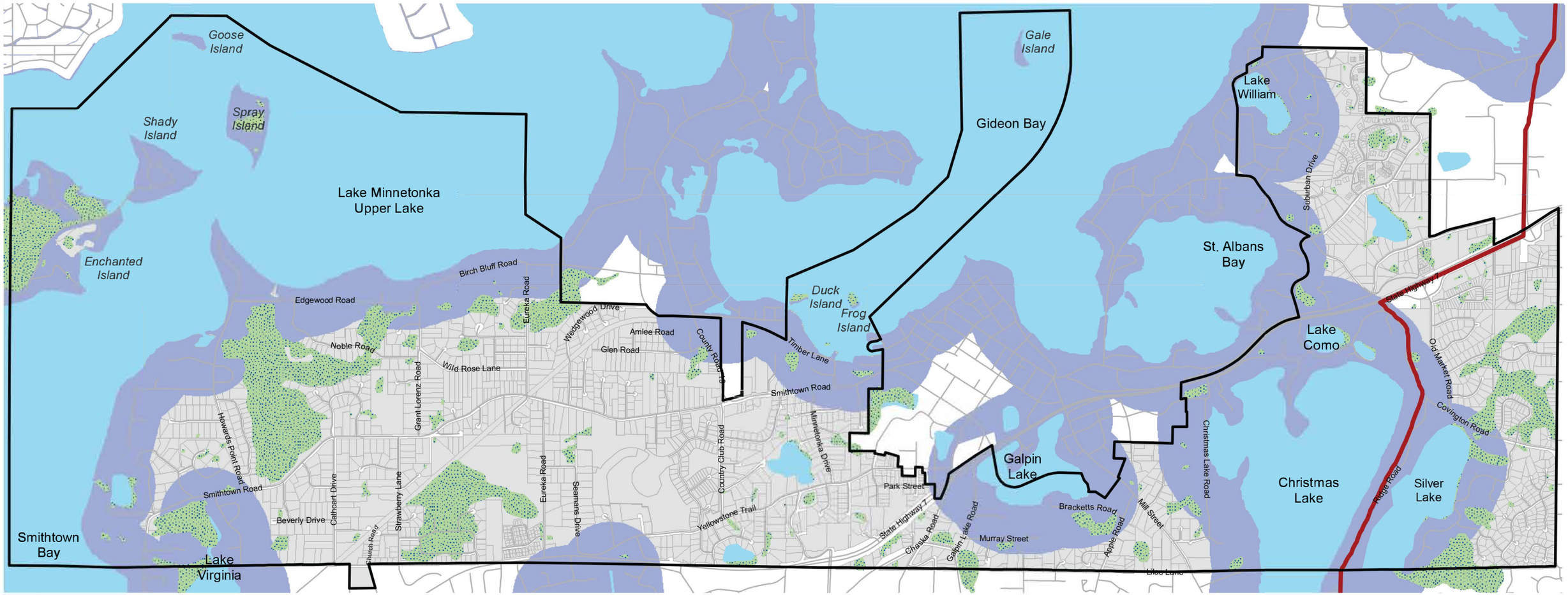
The Water Resources Map on the following page illustrates wetlands and natural buffer areas throughout the City. The wetlands serve an important buffer to the lakes which helps with water quality and preserve the natural environment in the City.

AGGREGATE RESOURCES

According to the Metropolitan Council's aggregate resources inventory contained in Minnesota Geographical Survey Information Circular 46, there are no known viable aggregate resource deposits available for extraction within the City of Shorewood.

Water Resources

City of Shorewood
2040 Comprehensive Plan



Legend

- Shorewood Boundary
- Watershed Boundaries
- Wetlands (National Wetland Inventory)
- Shoreland Protection Zone (1000' from Lake)
- Lakes

Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council

0 0.25 0.5 1
Miles

N

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LAND USE

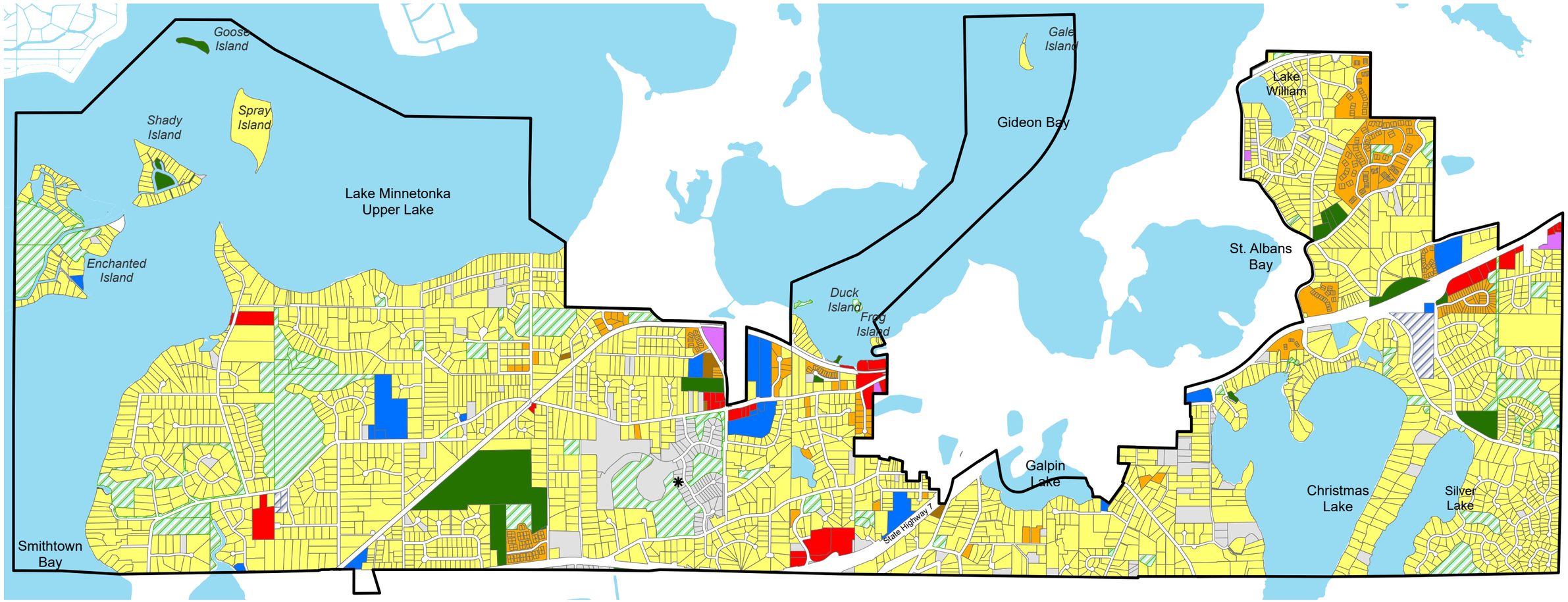
Shorewood is a fully developed City with 100 percent of the land within its municipal boundaries lying within the Metropolitan Urban Service Area (MUSA). The 3,000 acres of City land has an unusual boundary due to numerous abutting cities and lakes. The City boundary touches the cities of Chanhassen, Orono, Mound, Minnetrista, Victoria, Minnetonka, Greenwood, Deephaven, Tonka Bay and Excelsior. Most land use is classified as residential or commercial. There is a very limited amount of vacant land available for development in Shorewood. Most of the residential land is comprised of single-family homes with few other alternatives. A summary of 2017 land uses is provided in the table below.

Existing Land Use - 2017			
Land Use	**Acres**	**Percent of Total**	**Percent of Total without Open Water**
Minimum Density Residential	-	-	
Low Density Residential	2,128	41%	64%
Low to Medium Density Residential	-	-	
Medium Density Residential	137	3%	4%
High Density Residential	5	<1%	<1%
Commercial	55	1%	2%
Industrial	9	<1%	<1%
Public/Semi-Public	67	1%	2%
Parks	95	2%	3%
Cemetery	18	<1%	<1%
Open Space	238	7%	11%
Right of Way	384	7%	11%
Vacant	202	2%	4%
Open Water	1,874	36%	NA
Total	5,212	100.0%	100%
Source: City of Shorewood, Metropolitan Council, analyzed via GIS			

Parks: Public parks only.
Open Space: Land not suitable for development, including ponds, conservation easements, etc.
Vacant land: Includes lands that may be developed in the future or lots within developments that have no structure as of June, 2018.

Existing Land Use

City of Shorewood
2040 Comprehensive Plan



✱ Platting and construction for the Minnetonka Country Club Development has begun, which inlcudes 142 units of low density residential

Existing Land Use

- Single-Family Residential
- Two-Family Residential
- Multiple-Family Residential
- Commercial
- Industrial
- Public/Institutional
- Parks
- Open Space
- Cemetary
- ROW
- Vacant
- Open Water

Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council & Hennepin County

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ZONING DISTRICTS

The following summarizes the various districts of the Zoning Ordinance and how they are applied in the City. The zoning map follows these descriptions.

R-1A, Single-Family Residential District. The R-1A District is intended to provide a district which will allow suitable areas of the City to be retained and utilized for low density residential, open space and/or agricultural uses.

R-1B, Single-Family Residential District. The R-1B District is intended to provide a district which will retain a low density residential character, yet enable greater flexibility in design and provide economy in public expenditures for public utilities and service.

R-1C, Single-Family Residential District. The R-1C District is intended to allow a greater concentration of single-family dwellings in areas served by municipal utilities and where appropriate reservations for open space have been established by means other than individual lot areas.

R-1D, Single-Family Residential District. The R-1D District is intended to allow a greater concentration of single-family dwellings in areas served by municipal utilities and where appropriate reservations for open space have been established by means other than individual lot areas. The District also recognizes the existence of older areas of the community in which smaller lots exist.

R-2A, Single and Two-Family Residential District. The R-2A District is intended to provide suitable areas of the City which will allow construction of single-family and two-family homes, yet maintain the character and amenities of low density single-family residential areas.

R-2B, Single and Two-Family Residential District. The R-2B District is intended to provide suitable areas of the community which will allow construction of single-family and two-family homes of a more compact nature, while maintaining the character and amenities of low density single-family residential areas.

R-2C, Single and Two-Family Residential District. The R-2C District is intended to provide suitable areas of the community which will allow construction of single-family and two-family homes of a very compact nature while retaining a low to medium density of approximately five units per acre.

R-3A, Multiple-Family Residential District. The R-3A District is intended to provide a greater variety in the type of housing units available within the community, while retaining the

environment and character of less intensive residential areas through carefully established bulk and lot area requirements.

R-3B, Multiple-Family Residential District. The R-3B District is intended to provide a greater variety in the type of housing units available within the community by allowing construction of two-family, townhouse, quadraminium and apartment dwellings at a density ranging up to ten units per acre.

R-C, Residential/Commercial District. The R-C District is intended for a gradual transition between commercial and residential uses. More specifically, the R-C District is established to buffer residential uses from adjacent high intensity use areas by permitting residentially compatible service- oriented commercial uses and controlling those uses which can be compatible with residential areas given adequate control.

C-1, General Commercial District. The purpose of the C-1, General Commercial District is to provide for low to moderately intense retail or service outlets that deal directly with the customer to whom the goods or services are furnished. The uses allowed in this district are to provide goods and services on a limited community market scale and located in areas that are well served by collector or arterial street facilities.

C-2, Commercial Service District. The C-2 District is intended to recognize areas containing preexisting businesses that provide services primarily for the community and surrounding area. It is further intended that the location of the C-2 District may take advantage of transportation routes with existing high traffic volumes; however, activities allowed in the District will not create additional traffic.

L-R, Lakeshore Recreational District. The L-R District is intended to recognize the desirability for areas to serve the lakeshore recreational needs of the City which of their very nature are by geographic necessity located in proximity and adjacent to residential areas of this community.

Lake Minnetonka is the largest single park and recreational facility available for use by Shorewood's citizens, providing of an opportunity for access to that facility is, in the opinion of the City, an adjunct of zoning by the City. Recognizing the primary residential nature of Shorewood, it behooves the City to subject the possible areas available for access to the lake to close scrutiny and limitation so as to insure that use of the land does not unduly infringe upon property rights and public health, safety and welfare of others residing on nearby residential sites.

PUD, Planned Unit Development District. This District is established to provide comprehensive procedures and standards designed for district planned unit development to allow the development of neighborhoods or portions thereof incorporating a variety of residential types and nonresidential uses. Recognizing that traditional density, bulk, setbacks, use and subdivision regulations which may be useful in protecting the character of substantially developed areas may not be appropriate to control development in less developed areas. Specifically, PUD is intended to encourage:

a. Innovations in residential development to the end that the growing demands for housing at all economic levels may be met by greater variety in tenure, type, design and siting of dwellings and by the conservation and more efficient use of land in the developments;

b. Higher standards of site and building design through the use of trained and experienced land planners, architects and landscape architects;

c. More convenience in location of commercial and service areas within a given project or area, allowing more efficient and desirable transitions between residential and nonresidential land uses;

d. The preservation and enhancement of desirable site characteristics such as natural topography and geologic features and the prevention of soil erosion;

e. A creative use of land and related physical development which allows a phased and orderly transition of land from rural to urban uses;

f. An efficient use of land resulting in smaller networks of utilities and streets thereby lowering housing costs and public investments;

g. A development pattern in harmony with the objectives of the City Comprehensive Plan;

h. A more desirable environment than would be possible through the strict application of zoning and subdivision regulations of the City;

i. To give the landowner and developer reasonable assurance of ultimate approval before expending complete design monies while providing city officials with assurances that the project will retain the character envisioned at the time of concurrence;

j. To allow variation from the provisions of this chapter, including setbacks, height, lot area, width and depth, yards and the like internally within the project. Provisions of this chapter shall generally be maintained at the periphery of the project area.

S, Shoreland District. Shorelands within the City are designated as shoreland districts and the requirements set forth in this chapter shall govern development and other activities within these districts. The classification of the shoreland areas shall govern the use, alteration and development of these areas according to the classification as per M.S., Chapter 105, and Minnesota Regulations parts 6120.2500 - 6120.3900.

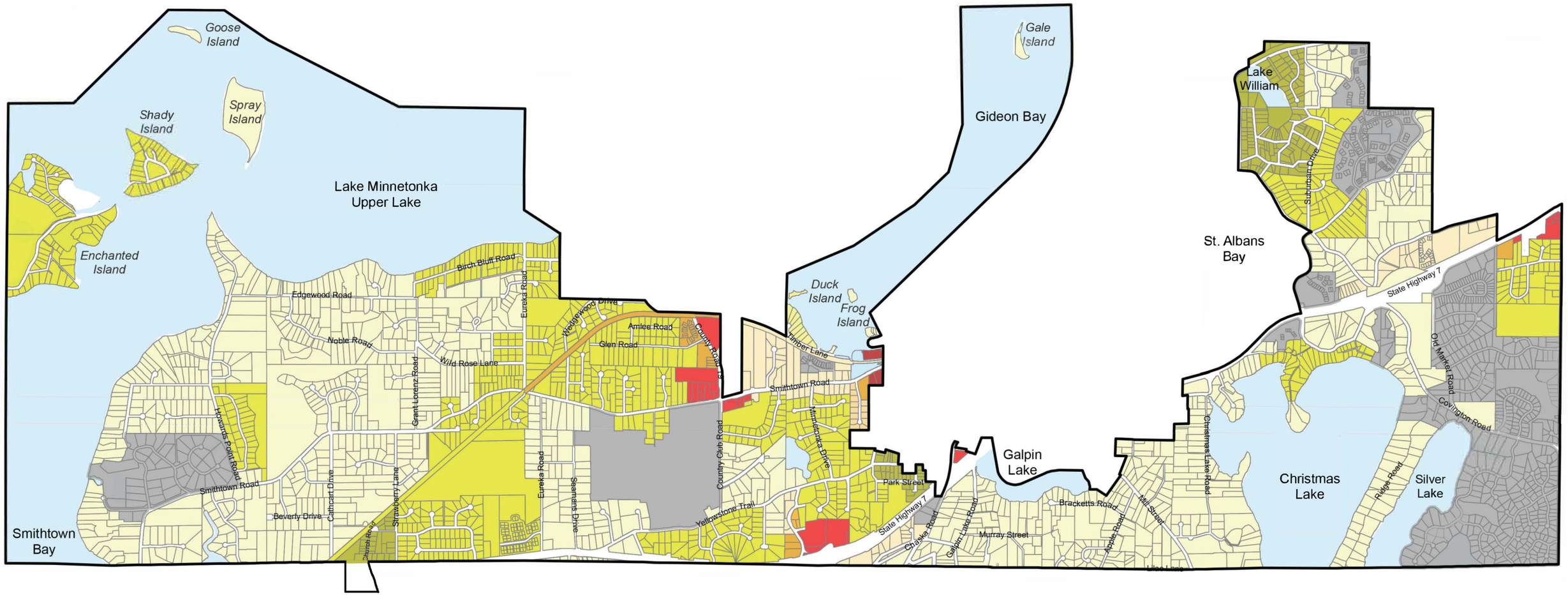
The S District is applied to and superimposed upon all zoning districts as contained herein as existing or amended by the text and map of this chapter. The regulations and requirements imposed by the S District shall be in addition to those established for districts which jointly apply. Under the joint application of districts, the more restrictive requirements shall apply.

HISTORIC PRESERVATION

The City of Shorewood does not contain any buildings or structures which are listed on the National Register of Historic Places or that have been identified by the Minnesota Historical Society as being eligible for the National Register. The City is, however, committed to preservation of its history. As opportunities arise and funding is available, the City will evaluate appropriate steps toward preservation.

Zoning

City of Shorewood
2040 Comprehensive Plan



Legend

- C-1
- C-2
- L-R
- PUD
- R-1A
- R-1B
- R-1C
- R-1D
- R-2A
- R-2B
- R-3A
- R-C
- Shorewood Boundary

Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council

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HOUSING TYPES

As seen in the following table, the City of Shorewood is largely single-family residential, with 94 percent of the total housing units either detached or attached single family homes. Multi-family (medium and high-density units) account for less than 5 percent of the total housing in Shorewood.

Housing Units by Type City of Shorewood			
Type	**Number of Units**	**Percent of Total**	
1 unit, detached	2,373	81.9%	93.9%
1 unit, attached	349	12.0%	
2, 3 or 4 units	81	2.8%	2.8%
5 to 9 units	0	0.0%	3.3%
10 to 19 units	43	1.5%	
20 units or more*	53	1.8%	
Total	2,899	100.0%	
Source: U.S. Census Bureau 2015 ACS estimates			

*The above table represents 2015 estimates from the U.S. Census Bureau. It does not include units from Shorewood Landing, a senior housing development built in 2017 on 3.67 acres with 28 independent living units, 52 assisted living units and 25 memory care units. This will add 105 total units, increasing the total units in buildings with 20 or more units to 158.

As is true in most cities, the majority of the single-family homes in Shorewood are owner occupied and the majority of the multiple family dwellings are renter occupied. Of the existing housing units which exist within the City, 84 percent are owner-occupied, 10 percent are renter-occupied, and 6 percent are vacant. The average rent in 2015 was $978.

Housing Tenure, 2015 City of Shorewood		
	Number	**Percent**
Owner-Occupied	2,455	84.2%
Renter-Occupied	293	10.0%
Total Occupied Housing Units	2,748	94.2%
Vacant Housing Units	168	5.8%
Total Housing Units	2,916	100.0%
Average Household Size of Owner-Occupied Unit	2.79	
Average Household Size of Renter-Occupied Unit	2.25	
Source: U.S. Census Bureau, 2015		

HOUSING COST

The table below illustrates rent rates within the City in 2015.

Gross Rent, 2015 City of Shorewood		
Gross Rent Per Month	**Number of Units**	**Percent of Total**
Less than $500	24	9.8%
$500 to $999	110	44.9%
$1000 to $1,499	52	21.2%
$1,500 to $1,999	29	11.8%
$2,000 to $2,499	10	4.1%
$2,500 to $2,999	8	3.3%
More than $3,000	12	4.9%
Total	245	100.0%
Median Rent	$978	
Source: U.S. Census Bureau, 2015		

The following table illustrates the estimated market value for owner-occupied housing units within Shorewood. The vast majority of these homes are above $300,000 with the median value of homes being $401,400. The City of Shorewood has few options for existing single-family homes to be considered low income housing.

Estimated Market Value of Owner Occupied Housing Units, 2015 City of Shorewood		
Value	**Properties**	**Percent**
Less than $50,000*	18	.7%
$50,000 to $99,999*	7	.3%
$100,000 to $149,999	15	.6%
$150,000 to $199,999	73	3.0%
$200,000 to $299,999	558	22.7%
$300,000 to $499,999	943	38.4%
$500,000 to $999,999	678	27.6%
$1,000,000 or more	163	6.6%
Total	2,455	100.0%
Median Value	$401,400	

Source: U.S. Census Bureau, 2015 ACS

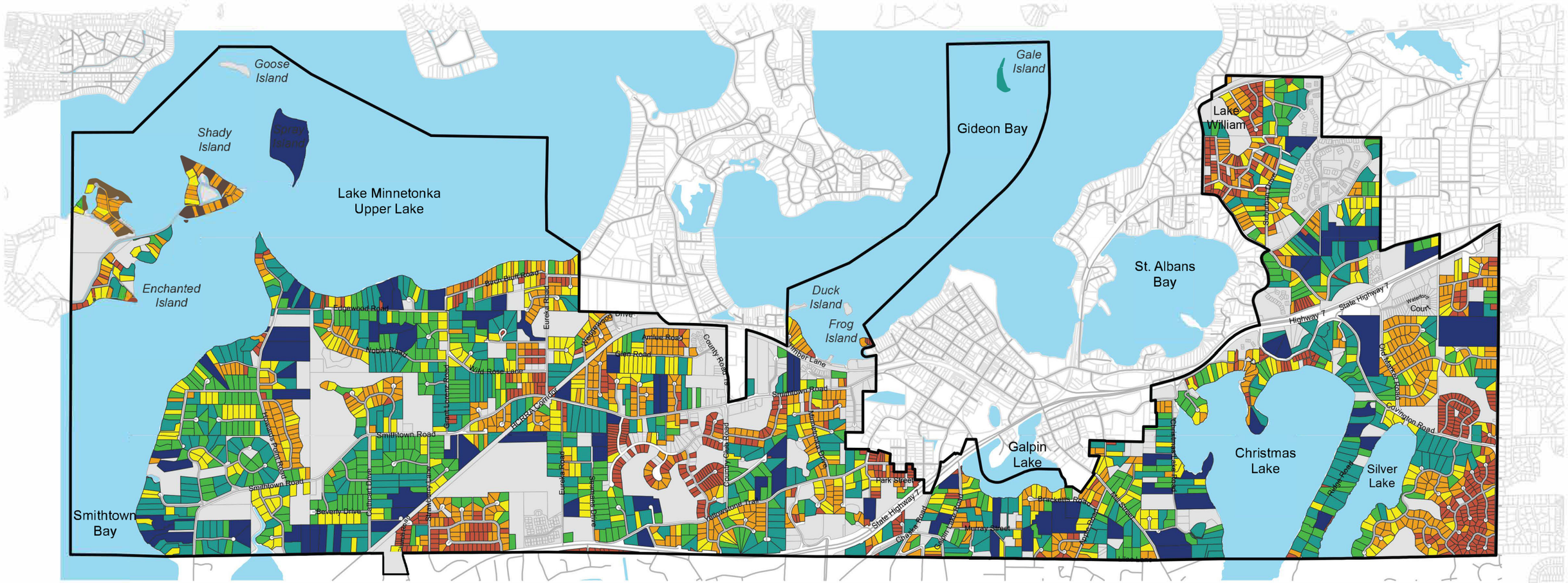
*These numbers are estimates from the Census, and the margin of error for these statistics is +/- 26 properties for those less than $50,000 and +/- 11 properties for those under $99,999. The number of properties in both these categories is likely closer to zero.

The City of Shorewood has a wide range of lot size options for residents. Municipal water supply is not available to all lots in Shorewood, which increases the need for larger lot sizes to accommodate private water supply. The strong demand for new lots has encouraged property owners with existing large lots to subdivide them into smaller lots. The City anticipates this trend will continue in the future. The average lot size (mean) is 38,000 square feet. Average single-family density is 1.31 units per acre (2,736 units on 2,095 acres.)

Area of Single Family Lots (Square Feet) City of Shorewood		
Area	**Properties**	**Percent**
< 20,000 sq. ft.	549	22.7%
20,000 – 30,000 sq. ft.	687	28.4%
30,000 – 40,000 sq. ft.	371	15.3%
40,000 – 50,000 sq. ft.	390	16.1%
50,000 – 100,000 sq. ft.	337	13.9%
> 100,000 sq. ft.	88	3.6%
Total	2422	100.0%
Source: Hennepin County, City of Shorewood, DNR, NAC, analyzed via GIS		

Single Family Lot Sizes

City of Shorewood
2040 Comprehensive Plan



Lot Size, Square Feet

- < 20,000
- 20,000 - 30,000
- 30,000 - 40,000
- 40,000 - 50,000
- 50,000 - 100,000
- > 100,000
- Non-Residential or Vacant
- City Boundary

Map created: December 2022
Data: NAC, MNDNR, Metropolitan Council

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YEAR BUILT

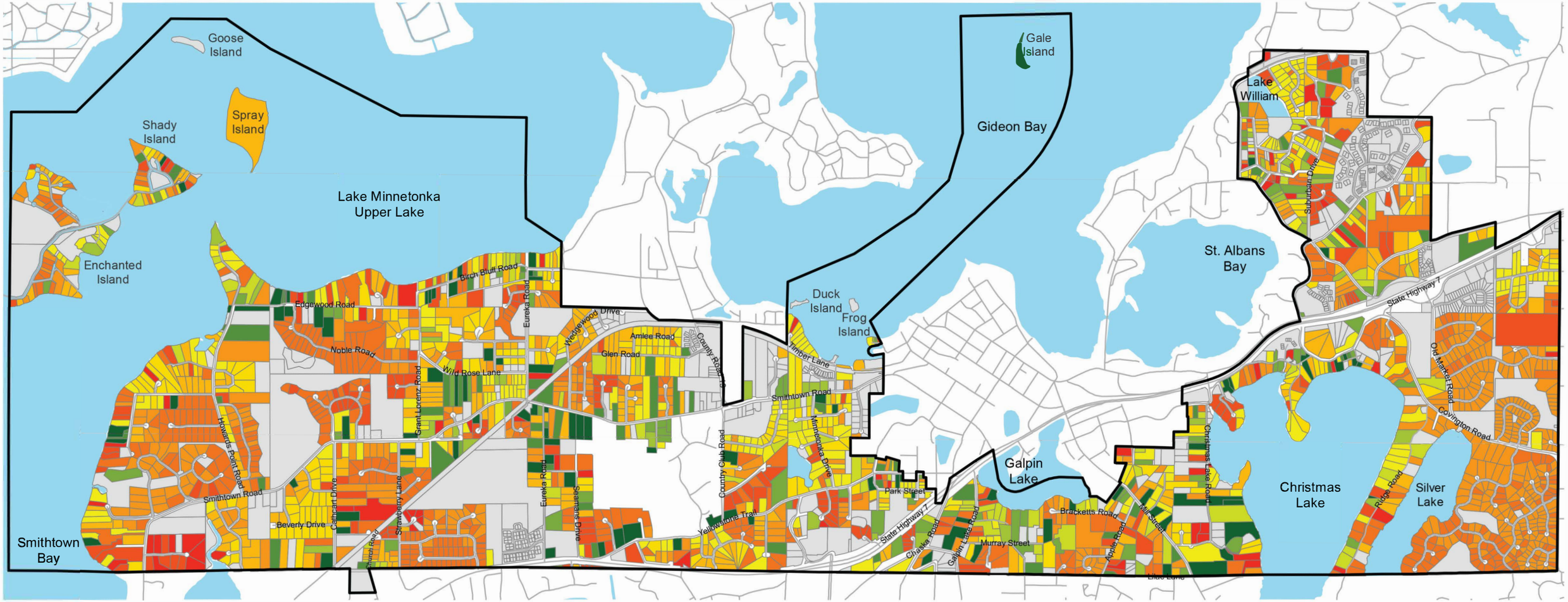
Shorewood is a community with a mix of single-family homes. As shown in the table below, approximately 52% of homes in Shorewood were built since 1980.

Age of Single Family Housing Stock City City of Shorewood		
Year Built	**Number of Units**	**Percent of Total**
Pre-1900	8	0.3%
1900s	89	3.7%
1910s	63	2.6%
1920s	84	3.5%
1930s	45	1.9%
1940s	84	3.5%
1950s	279	11.6%
1960s	237	9.8%
1970s	260	10.8%
1980s	540	22.4%
1990s	471	19.5%
2000s	186	7.7%
Post-2010	66	2.7%
Total	2,412	100.0%
Source: U.S. Census Bureau, 2010		

Single Family Housing Year Built

City of Shorewood

2040 Comprehensive Plan



Legend

Year Built

- Pre 1910
- 1910s
- 1920s
- 1930s
- 1940s
- 1950s
- 1960s
- 1970s
- 1980s
- 1990s
- 2000s
- Post 2010
- Shorewood Boundary
- Non-Residential/No Data Parcels
- Lakes

Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council & Hennepin County

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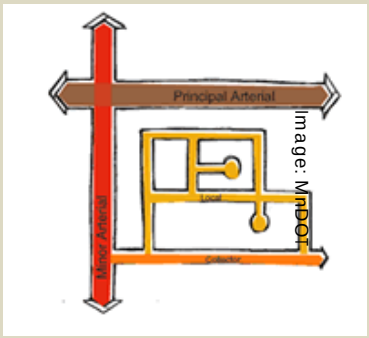
EXISTING ROADWAY SYSTEM

The sections below provide information about the existing roadway system in Shorewood, including existing number of lanes, existing roadway jurisdiction, existing functional classification, existing traffic, existing safety, and access management.

Functional Classification

The **functional classification system** groups roadways into classes based on roadway function and purpose. It organizes the roadway and street network that distributes traffic from local neighborhood streets to collector roadways, then to minor arterials and ultimately the principal arterial system. Roads are placed into categories based on the degree to which they provide access to adjacent land and mobility for through traffic. Functional classification is based on both transportation and land use characteristics, including roadway speeds, access to adjacent land, connection to important land uses, and the length of trips taken on the roadway.



The Seven-County Metropolitan Area's functional classification system includes 4 classifications of roadways: principal arterials, minor arterials, collector streets, and local streets. The figure on the following page shows the existing functional classification of each road in the City of Shorewood.

The following sections describe each functional class in greater detail and indicate which roadways fall into each classification.

Principal Arterials

Principal arterials are roadways that provide the greatest level of mobility and access control. Within the metropolitan area, the great majority of principal arterials are under MnDOT jurisdiction. Principal arterials are typically Interstate highways or other state or US freeways or expressways. These roads are usually for trips greater than 8 miles and express transit trips. Spacing between principal arterials varies within developing areas of the metropolitan area. Typically, these facilities are spaced between two and six miles apart and connect regional business and commercial concentrations, transportation terminals, and large institutions within the metropolitan areas. Principal arterials also connect to other cities, regions, and states outside of the metropolitan area.

These roadways are designed to maintain average speeds of 40 mph during peak traffic periods. To maintain mobility and speeds on principal arterials, driveway and other road connections are limited. There is little to no direct land access from driveways. Connection points are typically grade-separated or controlled with a signal and are spaced approximately one to two miles apart and include intersections with other interstate freeways, other Principal Arterials, and A Minor Arterials.

Within the City of Shorewood, TH 7 is the one existing principal arterial and no others are proposed. TH 7 generally traverses the city from the eastern border with Minnetonka to Chanhassen. TH 7 is an important metropolitan highway that serves east-west vehicular movements throughout the region.

Minor Arterials

Minor arterials maintain a focus on mobility but provide more land access than principal arterials. Within Shorewood, all minor arterials are under the jurisdiction of Hennepin County. Minor arterials are intended to serve trips of four to eight miles in length. Within developing areas of the metro, these facilities are spaced between one and two miles apart. Minor arterials connect cities and towns within the region and link to regional business and commercial concentrations. Access points along minor arterials are generally at-grade and typically controlled with signals or stop signs.

During peak traffic, minor arterials in developing areas are intended to maintain 30 mph average speeds. As a result, transportation system connections are limited to interstate freeways, other principal arterials, other minor arterials, collectors, and some local streets. Land access is limited to concentrations of commercial and industrial land uses. The Metropolitan Council has established a system of "A" Minor and "B" Minor arterials. "A" Minor arterials are eligible for federal funding administered by the Metropolitan Council. The Metropolitan Council has further split "A" Minor arterials into four types, described below:

- Relievers: Arterials located parallel to congested principal arterials. The purpose of "A" Minor Relievers is to provide additional capacity in congested corridors.
- Augmenters: Arterials that supplement the principal arterials system within urban centers and urban communities.

- Expanders: Arterials that supplement principal arterials in less-densely developed areas of the metro area.
- Connectors: Arterials that provide connections between rural towns and connect rural areas with the principal arterial system.

Given the purpose of "A" Minor Augmenters and Connectors, there are no existing or planned augmenters, connectors or relievers within the city. "A" Minor arterials in Shorewood include the following roadways:

"A" Minor Expanders

- CSAH 82 (Mill Street)
- CSAH 19 (Oak Street and Manitou Road)

"B" Minor arterials have a similar focus on mobility above land access. These roadways connect major traffic generators in the region. "B" Minor arterials are not eligible for federal funding. "B" Minor arterials are also referred to as "Other" arterials in the 2040 Transportation Policy Plan. There are no "B" Minor or "Other" arterials within the City.

Major and Minor Collectors

Major and minor collector roadways provide linkages to larger developments and community amenities. They generally do not link communities to one another. Collector roadways generally favor access to the system over mobility but try to balance the two competing needs. Collector roadways are generally lower speed than the principal or minor arterial routes. Collector roadways are often owned and operated by cities, although counties operate some of these facilities. Collectors link minor arterials, other collectors, and local streets.

Major collectors typically serve higher density residential areas and concentrations of commercial and industrial land uses. These facilities tend to serve longer trips than minor collectors. The Major Collectors in Shorewood include the following roadways:

Major Collector Roadways

- Smithtown Road
- Galpin Lake Road
- Minnetonka Boulevard

There are no minor collectors identified within the City.

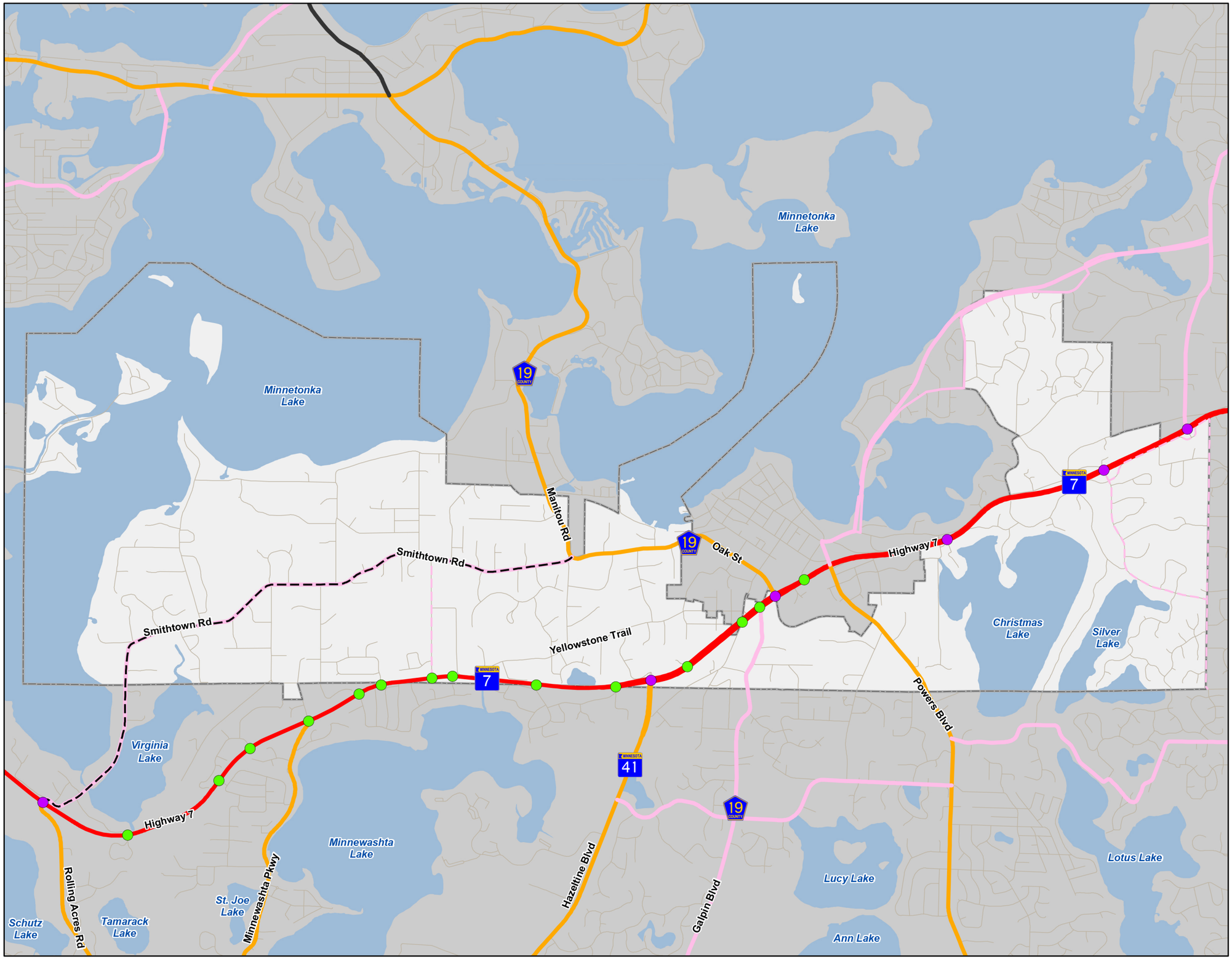
Local Roadways

The primary function of local roadways is land access. Local roadways connect individual land parcels with other local roadways and collectors. Trips on local roadways are typically under two miles. Speeds on local roadways are typically low. Longer trips are facilitated by local roadway connections to the collector and arterial systems. Local roadways are under the jurisdiction of the City of Shorewood. Local roadways are all roadways that are not arterials or collectors.

CITY OF SHOREWOOD

Shorewood Comprehensive Plan

Functional Classification Map
Shorewood, MN



- City Boundary
- Controlled Full Access Intersection
- Uncontrolled Full Access Intersection
- Principal Arterial
- A Minor Expander
- Other Arterial
- Major Collector
- Future Major Collector
- Future Other Arterial

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1 inch = 2,500 feet

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Jurisdictional Classification / Municipal State Aid Streets

Roadways are classified on the basis of which level of government owns and has jurisdiction over the given facility. The three levels of government that have involvement are the State of Minnesota (Mn/DOT, Hennepin County, and the City of Shorewood. Mn/DOT owns/maintains the Trunk Highway (TH system and Hennepin County the County State Aid Highway (CSAH and County Road (CR system. The City owns/maintains the local streets, including Municipal State Aid (MSA streets**.**

Cities in Minnesota with populations greater than 5,000 are eligible to receive Municipal State Aid (MSA funding from the state Highway User Tax Distribution Fund. The basic purpose of this program is to help local governments construct and maintain collector and arterial roadways which have consistent design standards, and which are well integrated into the overall network of collector and arterial roadways. The State Aid system typically consists of a maximum of 20% of the City's roadway mileage.

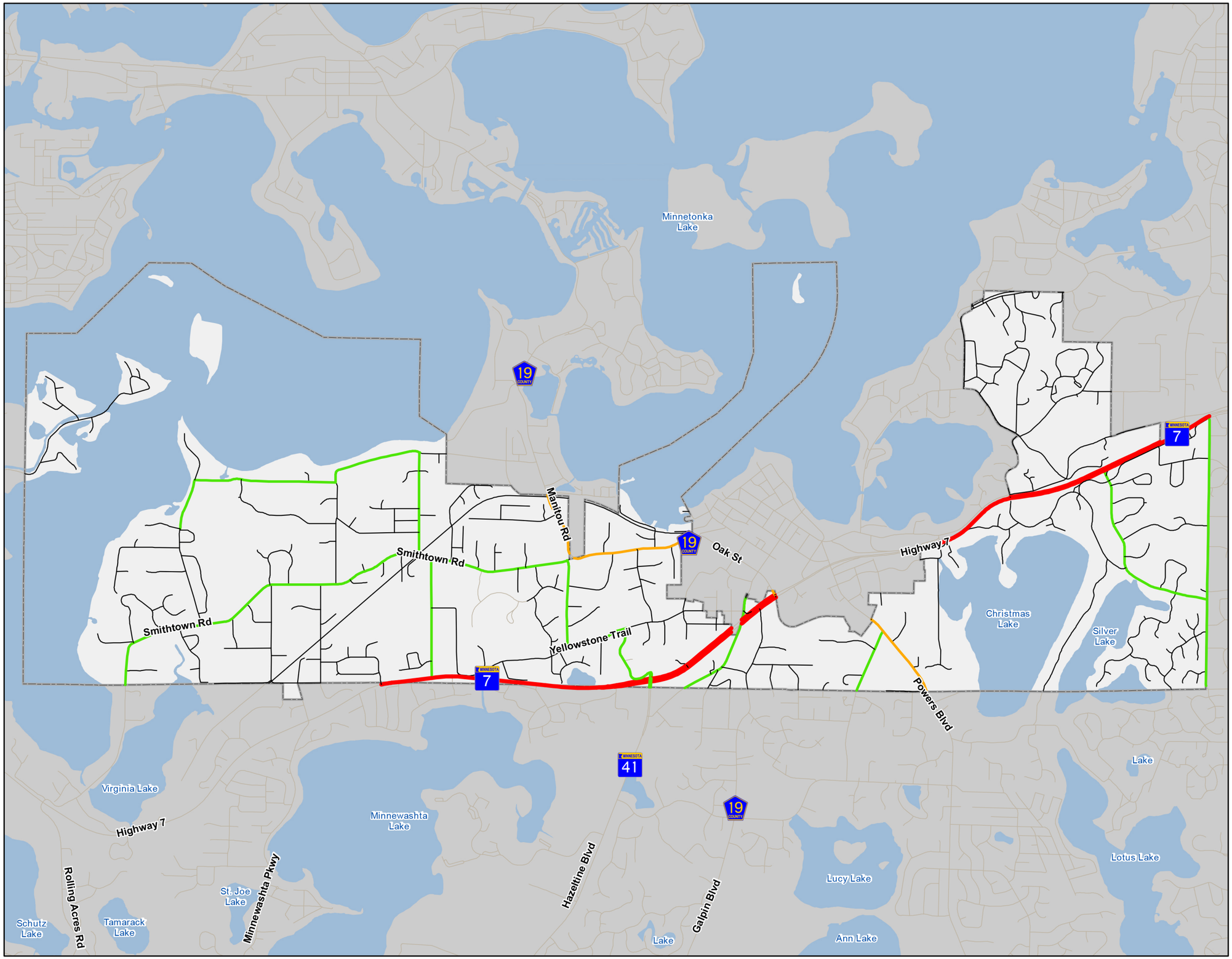
The State Aid office of MnDOT has established clearly defined design requirements for MSA streets. These requirements ensure that capacity, operational, and safety goals are met in a uniform manner from community to community, and that street systems are well coordinated with each other. Based on State Statute, Sections 169.80 and 169.87, MnDOT does not allow cities to restrict truck traffic on MSA streets.

The map on the following page depicts the jurisdictional classification of the overall roadway network serving Shorewood and its residents and businesses.

CITY OF SHOREWOOD

Shorewood Comprehensive Plan

Jurisdictional / MSA Map
Shorewood, MN



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MASS TRANSIT

The City of Shorewood is served by Metro Transit bus routes 670 and 671. Route 670 is an express bus that runs to downtown Minneapolis through Hopkins, Minnetonka, and Excelsior; and has 10 morning pickup times and 10 evening pickup times Monday through Friday. There is no weekend service.

The City of Shorewood is also served by route 671, an express bus which runs from Orono to downtown Minneapolis through Tonka Bay, Excelsior, Greenwood, Deephaven, and Minnetonka. The route has 10 morning pickup times and 10 evening pickup times. There is no weekend service.

At present, the City of Shorewood and surrounding communities have sufficient transit stops along main transportation corridors.

PARK AND RIDE

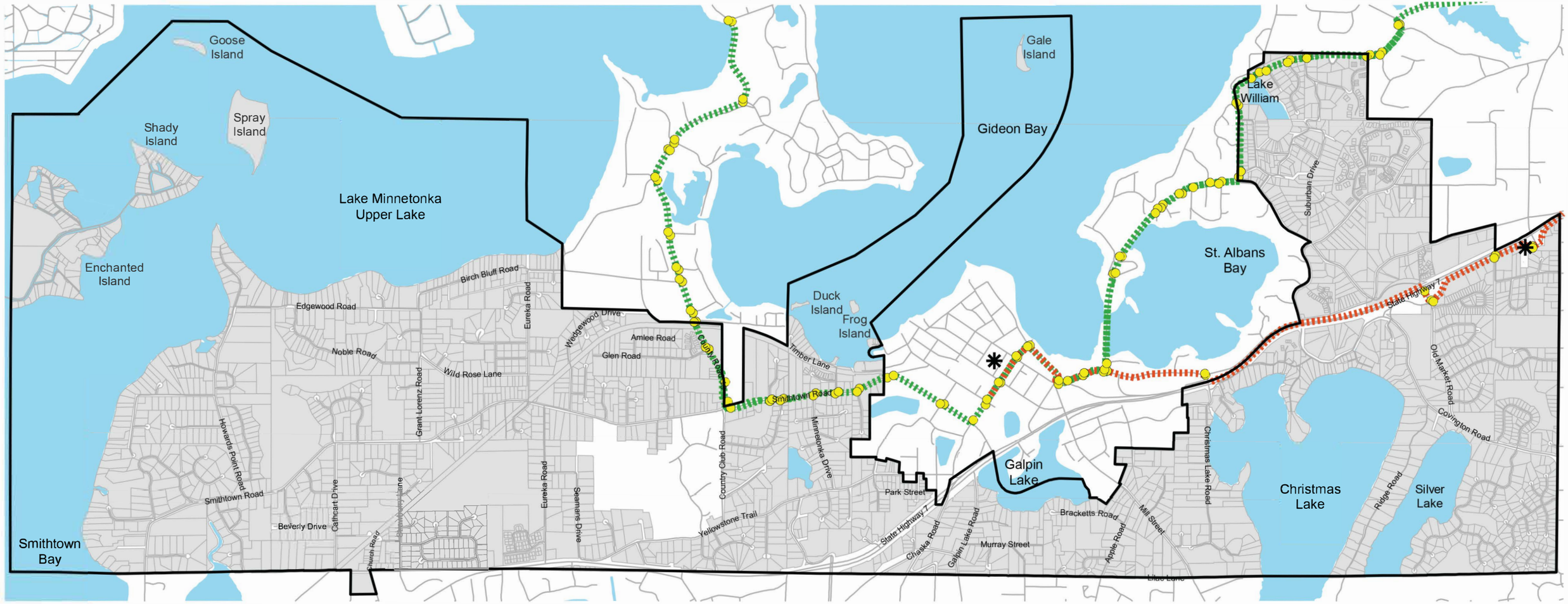
Shorewood has one main bus stop with a Park and Ride, located off Highway 7 on Delton Avenue and Vine Hill Road. The Park and Ride is located at the southwest corner of the intersection. Route 670 serves this station.

AIRPORT TRAFFIC

The Minneapolis-St. Paul International Airport (MSP serves as the area's primary scheduled commercial airline passenger facility. However, MSP does not have any direct effect on the Shorewood community. The Flying Cloud Airport in Eden Prairie is the closest airport to Shorewood and serves small and business aircrafts. Lake Minnetonka is occasionally accessed by sea planes, though these are not of major concern.

Transit

City of Shorewood
2040 Comprehensive Plan



Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council
Metro Transit & Hennepin County

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Legend

Transit Route
- Route 670
- Route 671

Transit Stops
- Park and Ride
- Transit Stop

- Parcels
- Lakes
- Shorewood Boundary

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PEDESTRIAN/BICYCLE TRAILS

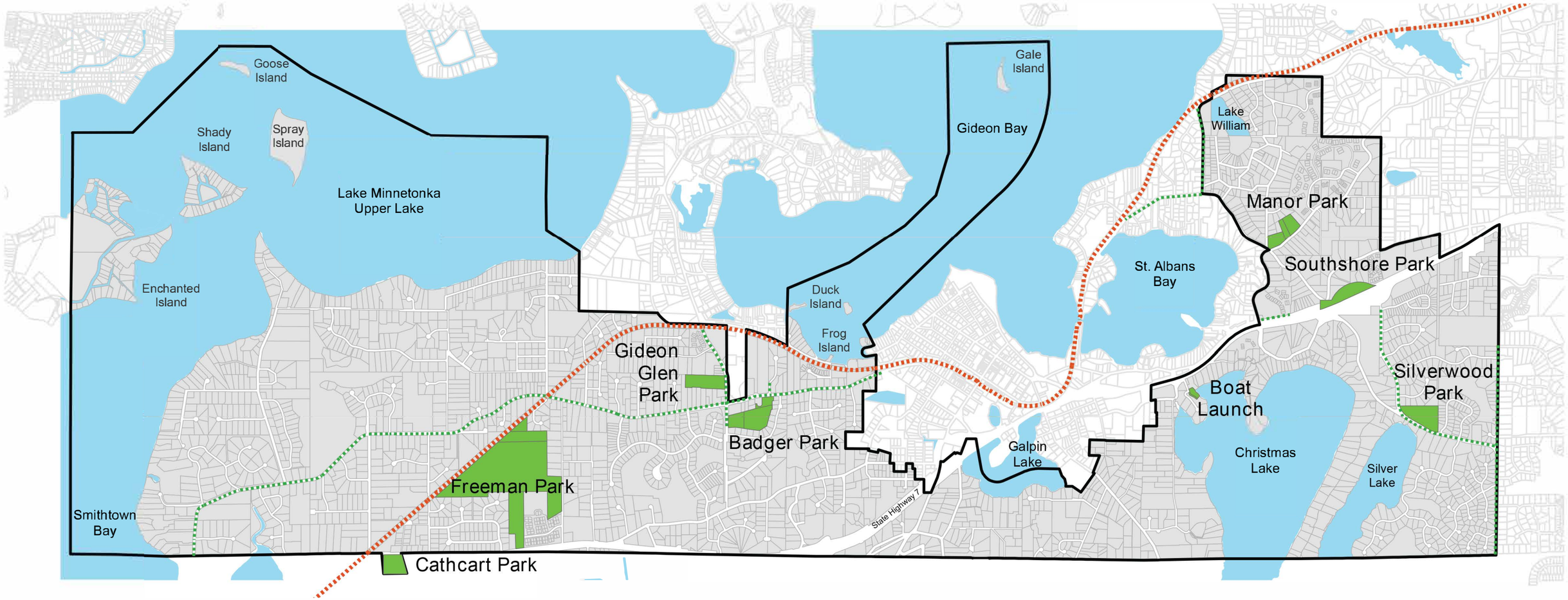
Existing sidewalks and trails in the City are illustrated on the map on the following page.

The Lake Minnetonka Light Rail Transit (LRT) Regional Trail runs east / west through the City of Shorewood. The trail links the City of Hopkins and the Carver Park Reserve and is constructed of crushed stone.

Also, to be noted, is that the Lake Independence Extension Regional Trail search corridor extends through the City of Shorewood. This regional trail search corridor was added to the Regional Parks System as part of the 2040 Regional Parks Policy Plan. The search corridor travels through Orono, Tonka Bay, and Shorewood as it extends the Lake Independence Regional Trail south connecting Luce Line State Trail, Dakota Rail Regional Trail, Lake Minnetonka LRT Regional Trail and Highway 41 Regional Trail Search Corridor in Chanhassen. Three Rivers Park District will lead a planning process in the future to determine the alignment of the regional trail.

Local Parks and Trail System

City of Shorewood
2040 Comprehensive Plan



Local Park and Trail System

- Local Trail
- Lake Minnetonka LRT Regional Trail
- Parks
- City Boundary

Map created: December 2022
Data: NAC, MNDNR, Metropolitan Council

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Miles

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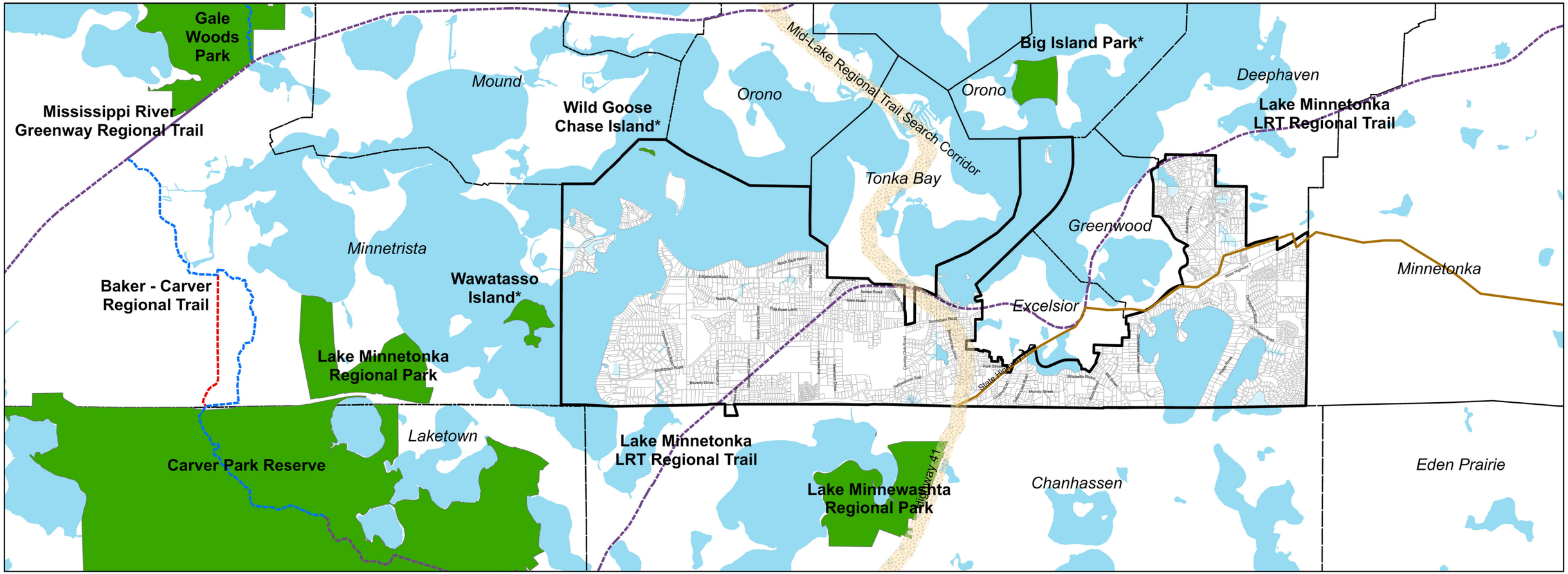
Telephone: 763.231.2555 Website: www.nacplanning.com

Regional Parks and Trails

City of Shorewood

2040 Comprehensive Plan



Legend

Regional Trails

- Alternate
- Existing
- Planned

RBTN Corridor

- Tier 1 Corridor
- Tier 2 Corridor
- Regional Trail Search Corridors

* RBTN: Regional Bicycle and Transportation Network

- Regional Parks
- Lakes And Rivers
- Municipal Boundaries
- Shorewood Boundary

* Part of the Lake Minnetonka Islands Regional Park

* Regional park search areas as general areas and locations that will be defined through future master planning.

Map created: February 2023
Data: NAC, Hennepin County, Metropolitan Council

0 0.5 1 2
Miles

N

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WATER SUPPLY

About half of the homes are currently served by municipal water; the other half, including the islands, are served by private wells. Shorewood's water distribution system provides approximately 145 million gallons of water each year to nearly 1,500 service connections.

The existing water distribution system is shown on the following page. The overall system includes 30 miles of main and includes two separate water distribution systems (known as the West and East systems) operated by the City, and three small service areas supplied by the cities of Chanhassen, Excelsior, and Tonka Bay. Shorewood's west system provides service primarily to the developments to the west of Excelsior and the east system provides service to the developments to the east of Excelsior.

Each of Shorewood's two distribution systems is served by three groundwater wells and one water tower.

The population of the City has increased over the last ten years but the average daily water demand and the per capita water demand are decreasing as indicated below**.** Improved appliances, reduced irrigation, general attitudes toward conservation, and rainfall likely all play a role in this reduction.

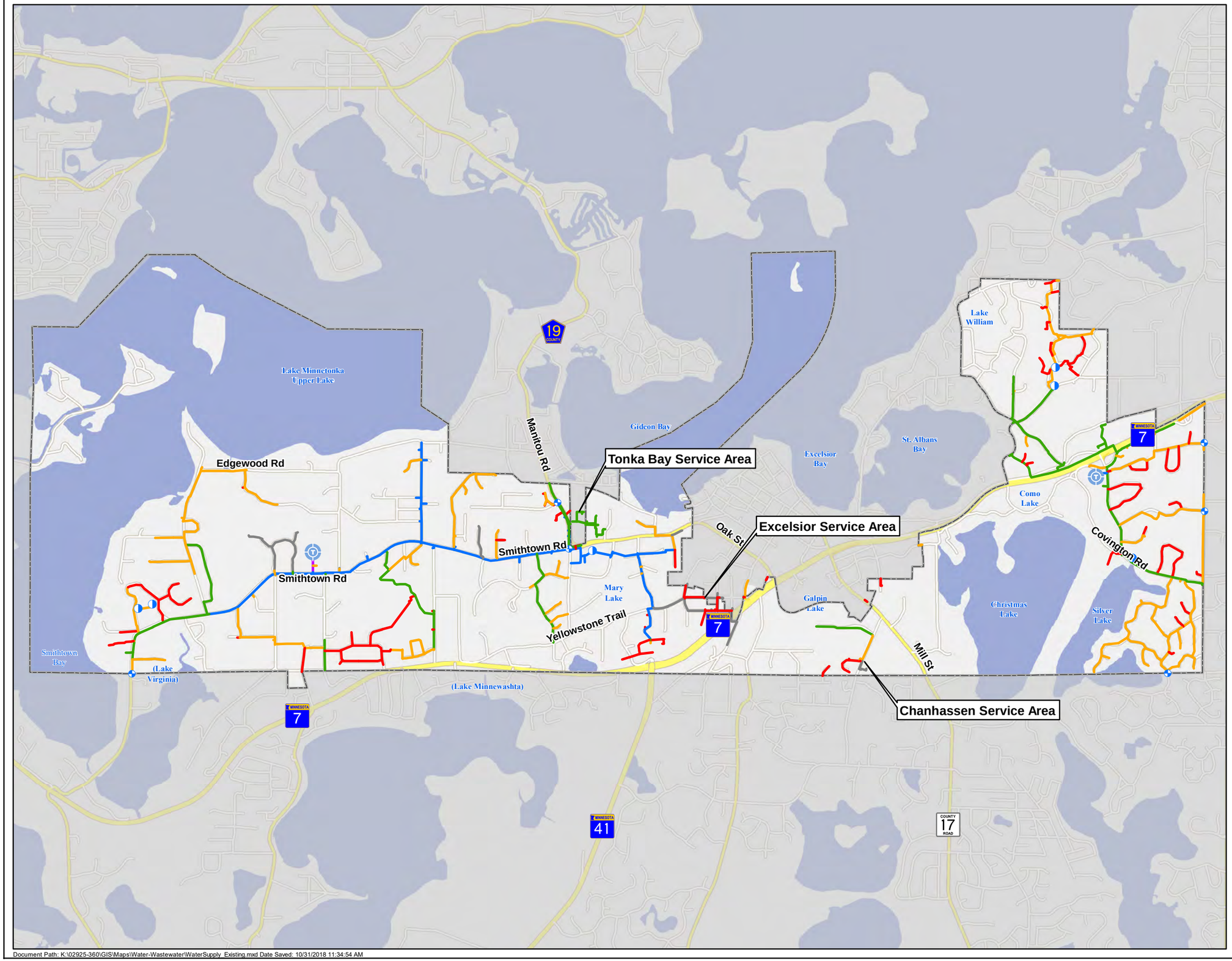
Year	Pop. Served	Total Connections	Total Water Use (MG)	Total Water Pumped (MG)	Percent Unmetered/ Unaccounted	Average Daily Demand (MGD)	Max. Daily Demand (MGD)	Date of Max. Demand	Residential Per Capita Demand (GPCD)	Total Per Capita Demand (GPCD)
2005	3,463	1,195	154.4	152.3	-	0.42	-	-	110	120
2006	3,423	1,195	191.2	180.1	-	0.49	-	-	131	144
2007	3,383	-	-	-	-	-	-	-	-	-
2008	3,343	1,221	176.7	176.2	-	0.48	-	-	139	144
2009	3,751	1,320	170.7	177.7	3.9%	0.49	4.30	5/26/2009	118	130
2010	3,721	1,329	136.0	141.1	3.6%	0.39	0.62	7/16/2010	89	104
2011	3,721	1,332	162.7	164.4	1.0%	0.45	1.04	7/5/2011	104	121
2012	3,634	1,300	182.3	187.9	2.1%	0.51	1.40	7/11/2012	126	140
2013	3,562	1,374	156.0	156.0	0.0%	0.43	1.19	8/14/2013	109	120
2014	3,853	1,372	145.3	145.3	0.0%	0.40	1.40	8/7/2014	99	103
2015	3,865	1,388	130.2	133.2	2.2%	0.37	0.59	7/23/2015	79	94
2016	3,870	1,400	111.6	123.8	0.0%	0.34	0.85	8/3/2016	73	88
Avg. 2012-2016	3,757	1,367	145.1	148.9	0.9%	0.41	1.09	-	97	109

MG = million gallons **MGD** = million gallons per day **GPCD** = gallons per capita per day

CITY OF SHOREWOOD

Shorewood Comprehensive Water Supply Plan

Existing Water Supply System



City Boundary
Interconnection
Production Well
Water Tower

Watermain Diameter

- 6"
- 8"
- 12"
- 16"
- 20"
- Unknown

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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Water Conservation Policies

Although Minnesotans benefit from the state's abundant water supplies, those supplies are finite and potential threats exist that could impact the quality of our drinking water. Factors that can potentially limit water supply include population increases, economic trends, uneven statewide availability of groundwater, climate change, and degraded water quality. There are many benefits to enacting water conservation policies and many practical, feasible objectives the City has already and will continue to pursue.

The Minnesota DNR has established eight water conservation objectives and strategies. These are listed below with comments on the City of Shorewood's progress towards the completion of each.

1. Reduce unaccounted (non-revenue) water loss to less than 10%.
    - The City's average unaccounted water use from 2012 to 2016 was 0.9%, which is well below the recommended target of 10%. The City has an automated meter system to notify the City of leaky fixtures, and leak detection surveys are performed as needed.
    - There are a total of over 1,400 metered connections in Shorewood. The City completed meter replacement projects in 2007 and 2009. Meter replacement efforts consisted of converting the majority of the meters (1,393 or 99.5%) into automatic meters. Residential and commercial meters are tested as requested by the owner.
2. Achieve residential demand of less than 75 gallons per capita per day.
    - The average residential per capita water demand for the City of Shorewood from 2012 to 2016 was 97 gallons per capita per day (gpcd), which is greater than the DNR's 75 gpcd target. Data from the DNR and the City indicates that residential water demand has been decreasing since 2012. As previously discussed, the decrease in residential per capita demand may be attributed to improved appliances, reduced irrigation, general attitudes toward conservation, and rainfall.
    - In order to continue reducing residential demand, the City will review its ordinances on water efficient landscaping and water reuse annually, consider revising its ordinance to limit irrigation in 3-6 years, continue to make water system improvements, provide incentives for installing water efficient appliances and fixtures in 1-3 years, and provide incentives to reduce outdoor water use in 1-3 years following adoption of this plan. The City will also continue water conservation education and outreach.
3. Achieve at least a 15% reduction in per capita daily demand across all customer categories over the next 10 years.
    - The City of Shorewood will conduct facility water use audits annually, install enhanced water meters capable of automated readings to detect spikes in consumption,

install conservation fixtures and appliances, repair leaking system components, investigate water reuse, and reduce outdoor water use.

4. Achieve a decreasing trend in total per capita demand.
    - Residential water usage shows a fluctuating trend, although it has steadily decreased since 2012. Commercial, institutional, and industrial (C/I/I) water use follows a similar trend. Decreases in water usage since 2012 may be attributed to water efficient fixtures and public education on the importance of water conservation.
5. Reduce peak day demand so that the ratio of maximum to average day demand is less than 2.6.
    - The City's ten-year average (2005-2014) ratio of maximum to average day demand is 3.3. The position of the DNR has been that a peak day/average day ratio that is above 2.6 indicates that the volume of water being used for irrigation in a community is too high and that efforts should be made to reduce the peak day use by the community.
    - The City limits which hours of the day water may be used for irrigation in the summer to reduce peak day demand
6. Implement a conservation water rate structure
    - The water rates in Shorewood are based on an increasing block rate structure. This rate structure promotes water conservation because the price is volume-tiered. Water billing in Shorewood is on a quarterly schedule.
    - The City has also implemented restricted summertime lawn watering hours to reduce peak day demands during months of high water usage.
7. Additional strategies to reduce water use and support wellhead protection planning
    - The City of Shorewood will consider implementing a rebate program for water efficient appliances and fixtures.
8. Tracking success
    - The City will continue to monitor water usage by customer category, including the City's regular maintenance activities (hydrant flushing, street sweeping, etc.).

The following table lists the top water users by volume, from largest to smallest, for the City of Shorewood.

Large Volume Users

Customer	Category	Use (gallons per year)	Percent of Total Water Use
Kraus-Anderson, Inc.	Commercial	1,600,000	1.29%
Cub Foods	Commercial	1,096,000	0.89%
Minnetonka School District No. 276	School	1,052,900	0.85%
Shorewood Ponds Homeowners Association	Residential	715,262	0.58%
Shorewood Oaks Partnership	Residential	677,000	0.55%
Waterford Center LLP	Commercial	504,000	0.41%
New Horizon Academy	Commercial	484,102	0.39%

Water Sources and Treatment

Well information by system is provided in the following table. The total well pumping capacities in the west and east systems are 1,750 gpm and 1,850 gpm, respectively. The west system has a firm capacity (capacity with the largest well out of service) of 1,000 gpm, and the east system has a firm capacity of 850 gpm.

Well Name and ID	System	Year Installed	Capacity (gpm)	Depth (feet)	Aquifer	Status	Treatment
Well 1 #232331	East	1973	750	528	Prairie du Chien - Jordan	Active	Chlorine & Fluoride
Well 3 #161414	West	1981	750	359	St. Peter - Jordan	Active	Chlorine & Fluoride
Well 4 #171020	West	1981	500	640	Tunnel City - Wonewoc	Active	Chlorine & Fluoride
Well 5 #171023	West	1981	500	640	Tunnel City - Wonewoc	Active	Chlorine & Fluoride
Well 6 #122298	East	1982	100	280	Prairie du Chien Group	Active	Chlorine & Fluoride
Well 7 #416160	East	1986	1,000	415	Prairie du Chien - Jordan	Active	Chlorine, Fluoride, & Iron Removal

Chemicals are applied to the raw water in each well house. Chlorine is applied for disinfection, and fluoride is applied to prevent tooth decay. Well House No. 7 also has filters for iron removal.

A city's treatment or production capacity should be equal to at least the maximum day demand with the largest well out of service (firm capacity). Since the City has two separate systems, each should be able to satisfy this constraint individually.

- The west system's firm capacity is 1,000 gpm. The daily demand for this system is projected to reach a maximum of 366 gpm by the year 2040. Thus, maximum day demand for this system is not projected to exceed its firm capacity by the end of the planning period.

- The east system's firm capacity is 850 gpm. The daily demand for this system is projected to reach a maximum of 414 gpm by the year 2040. Thus, maximum day demand for this system is not projected to exceed its firm capacity by the end of the planning period.

Water Storage/Distribution

The west system has one 500,000 gallon steel elevated storage tank located on Smithtown Road beside the Minnewashta Elementary School that was constructed in 1995. Pipe diameters in this half of the system range from 6-inch to 20-inch of ductile iron watermain, with most mains between 6 and 12 inches.

The east system has one 400,000 gallon steel elevated storage tank located on Old Market Road where it meets MN State Highway 7 that was constructed in 1986. This half of the system includes pipe diameters from 6-inches to 16-inches of ductile iron watermain, with most mains between 6 and 8 inches.

A system's total storage capacity should equal or exceed its average day demand.

- The west system's storage capacity of 500,000 gallons exceeds its projected 2040 average day demand of 203,000 gallons.
- The east system's storage capacity of 400,000 gallons also exceeds its projected 2040 average day demand of 229,000 gallons.

SANITARY SEWER SERVICES

The City's sanitary sewer system was first installed in the early 1970's. Capacity limitations in the Metropolitan Council Environmental Services (MCES) sewer system created service issues for Shorewood in the mid 1980's, but improvements to the regional interceptor system resolved those issues. Today, Shorewood is fully built-out and is served completely by the municipal sanitary sewer system. Given that no further expansion of the system is required, the City currently focuses on system maintenance and upgrades.

The City of Shorewood's existing sanitary sewer system collects and conveys wastewater to ten MCES interceptors and eight MCES meters. It includes fourteen local lift stations, see below. In this report, the system has been divided into service areas based on the receiving lift stations and MCES interceptors. A map of the existing sanitary sewer system and service areas is shown on the following pages.

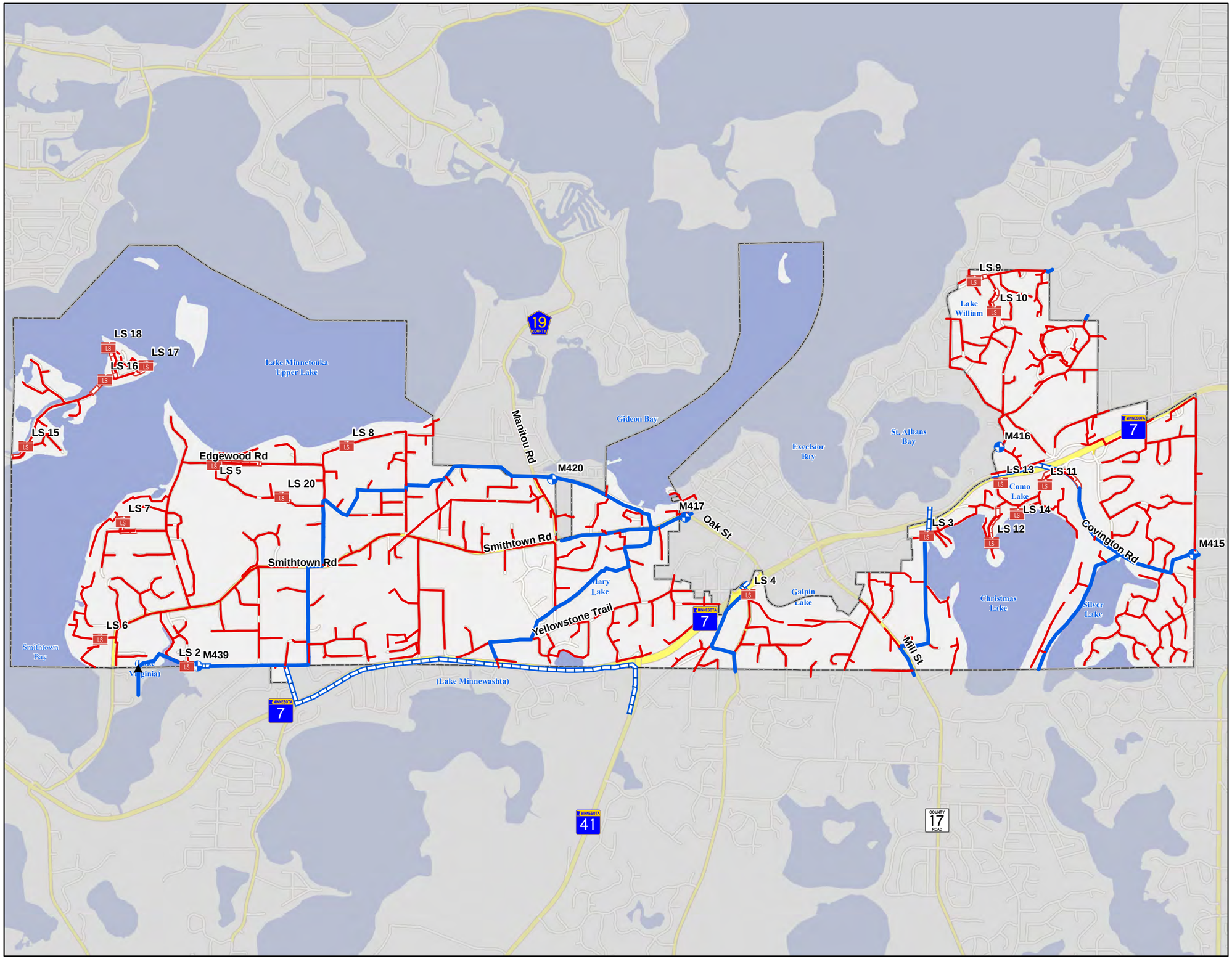
Lift Station No.	Lift Station Location	Year Constructed	Year Rehabilitated	Pumping Capacity (gpm)
5	Edgewood Road	1970	2012	250
6	Smithtown Road	1972	2012	90
7	Woodside Road	1972	-	90
8	Birch Bluff Road	1972	2004	250
9	Minnetonka Boulevard	1972	-	92
10	Lakeway Terrace	1972	-	150
11	Radisson Road	1972	-	200
12	Christmas Lake Point	1972	2007	95
13	Radisson Entrance	1972	-	30
15	Enchanted Lane	1973	2010	135
16	Shady Island Road	1973	2008	110
17	Shady Island Circle	1973	-	100
18	Shady Island Point	1973	2004	110
20	Noble Road	1994	-	80

All wastewater collected in the City of Shorewood is conveyed through the MCES system to the MCES Blue Lake Wastewater Treatment Plant (WWTP) in the City of Shakopee. The Blue Lake WWTP has a capacity of 38 MGD, provides primary and secondary treatment, and discharges treated effluent to the Minnesota River.

CITY OF SHOREWOOD

Shorewood Comprehensive Sanitary Sewer Plan

Figure 1: Existing Sanitary Sewer System



City Boundary
MCES Meter
Lift Station

Forcemain

City Owned
MCES Owned

Gravity Sewer

City Main
MCES Interceptor

N

0 2,500 Feet

1 inch = 2,500 feet

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CITY OF SHOREWOOD

Shorewood Comprehensive Sanitary Sewer Plan

Figure 2: Sanitary Sewer Districts

Lake Minnetonka
Upper Lake
Gideon Bay
Excelsior Bay
St. Albans Bay
Lake William
Como Lake
Christmas Lake
Silver Lake
Galpin Lake
Mary Lake
Smithtown Bay
(Lake Virginia)
(Lake Minnewashta)
Edgewood Rd
Smithtown Rd
Manitou Rd
Oak St
Yellowstone Trail
Mill St
Covington Rd
19
7
41
COUNTY 17 ROAD
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
LS

City Boundary
MCES Meter
Lift Station

Forcemain
City Owned
MCES Owned

Gravity Sewer
City Main
MCES Interceptor

MCES Meter
M412
M415
M416
M417
M420
M424
M439
M455
Sewer Sub-District

N
0 2,500 Feet
1 inch = 2,500 feet

WSB

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Individual Sewage Treatment Systems

The City of Shorewood requires that all new development connect to the sanitary sewer system and prohibits the installation of new individual sewage treatment systems (ISTS), or septic systems. The only ISTS that remain in use are on the following properties

- 6185 Mill Street
- 26750 Smithtown Road
- Gale Island
- Spray Island

The islands are not served by the public system. The section of Shorewood City Code regarding ISTS, Chapter 904: Sewer Code, is consistent with Minnesota Pollution Control Agency (MPCA) regulations (Minnesota Rules Chapters 7080-7083). The provisions, excerpted below, specify connection to the public sewer and abandonment of ISTS.

> *Subd. 3. Connection to public sewer, abandonment of systems.*
>
> *a. The owners of all houses, buildings or properties which abut upon or are served by a public sewer and where cesspools and septic tanks have been in existence prior to the construction of the sanitary sewer shall connect with the public sewer when public sewer becomes available to the property. Shoreland property shall be further governed by Minn. Rules § 6120.3400. Any septic tanks and cesspools and private sewage disposal facilities then existing shall be abandoned and filled with suitable material.*
>
> *b. At the time as a public sewer becomes available to a property served by a private sewage disposal system, as provided in § 904.05 of this chapter, a direct connection shall be made to the public sewer in compliance with this chapter. Any septic tanks, cesspools and similar private sewage disposal facilities then existing shall be abandoned and filled with suitable material.*

The City of Shorewood has delegated the responsibility of permitting, inspecting, maintenance management, and compliance enforcement of remaining ISTS in the City in accordance with Hennepin County Ordinance 19. Therefore, Hennepin County actively oversees the City's subsurface sewage treatment system program.

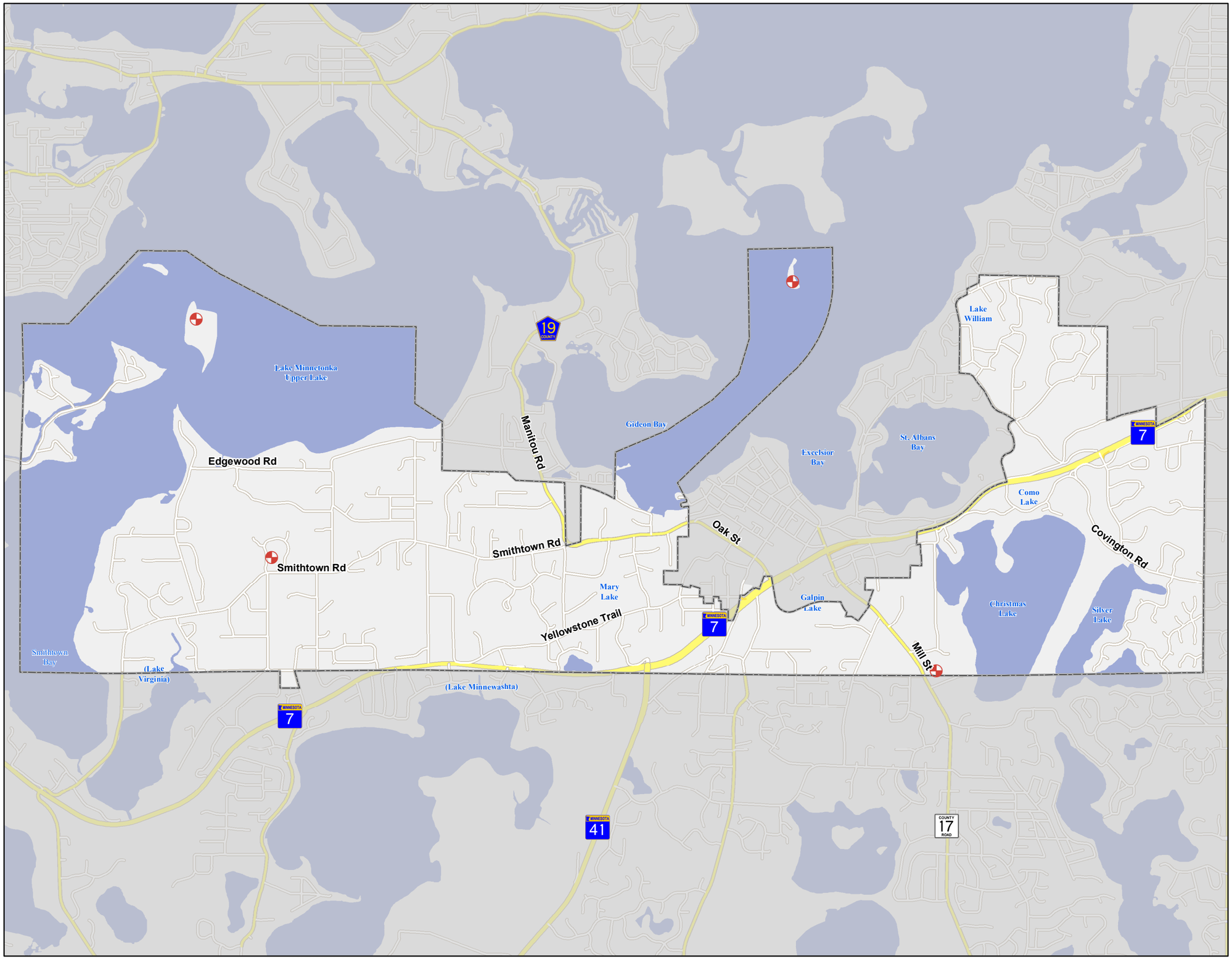
Community Treatment Systems

There are no public or private community treatment systems within the City of Shorewood. All of the properties within the City are served by the public collection system or by individual sewage treatment systems, as described above.

CITY OF
SHOREWOOD

Shorewood Comprehensive Sanitary Sewer Plan

Individual Sewage Treatment Systems (ISTS)



ISTS

City Boundary

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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INFLOW AND INFILTRATION

Inflow is water, typically stormwater, which enters the sewer system through broken manhole covers, sewer cleanouts, sump pumps, foundation drains, and rain leaders. ***Infiltration*** is water, typically groundwater, which leaks into the sewer system through cracks in the sewer mains, laterals, joints, and manholes.

Water from inflow and infiltration (I/I can consume available capacity in the wastewater collection system and increase the flow into treatment facilities. In extreme cases, the added flow can cause bypasses or overflows of raw wastewater. This extra flow also requires a larger capacity in the city's collection and treatment components, which results in increased capital, operation and maintenance, and replacement costs. As a sewer system ages and deteriorates, I/I can become an increasing burden on a City's system. Therefore, it is imperative that I/I be reduced whenever it is cost effective to do so.

In 2006, the MCES began an Ongoing I/I Program which requires communities within their service area to eliminate excessive I/I. The MCES establishes annual I/I goals for each community discharging wastewater into the Metropolitan Disposal System (MDS based on average daily flows, adjustments for community growth, and I/I mitigation peaking factors.

Flow metering data is available for the metersheds within Shorewood, and an analysis of this data as it relates to I/I is presented on the following page. The City completed a three-year I/I reduction program in the early 1990's which included the televising, sealing, and repair of older sections of the system located in wet soils. In the 1990's, the City also began an aggressive sump pump inspection program to eliminate the discharge of stormwater from private properties to the sanitary sewer system. In the 2000's and 2010's, several segments of the sanitary sewer system were rehabilitated or replaced as part of the City's regular street and utility improvement projects. More information on these projects and the City's strategies, programs, investments, and goals for reducing I/I are listed in Chapter 3 (Community Framework.

Community facilities include those lands and buildings required to support suburban development and densities. They are essential for establishing and sustaining a quality life style in a suburban environment.

MUNICIPAL BUILDINGS

City Hall. First built in 1981, then expanded in 1988, the City's Administrative Offices were renovated and expanded in 2008. The renovation/expansion project included accessibility upgrades, increased office space and a new City Council Chambers. No expansion of the facility is anticipated at this time.

Public Works Facility. The City completed construction of the public works facility in 1992. The facility has more and better space for outdoor storage which is screened from view of nearby residential properties. The facility was designed to be expanded and that expansion is anticipated to occur prior to 2040, but an exact timeframe has yet to be determined.

Shorewood Community and Event Center. The facility was first constructed as joint venture between the cities of Shorewood, Tonka Bay, Excelsior, Greenwood and Deephaven in 1996. The City of Shorewood purchased the Center in 2017 and now owns and runs facility. The facility continues to provide meeting space for community groups, private events, and activities for area seniors.

PUBLIC SAFETY

The communities along the south shore of Lake Minnetonka realized the benefit of combining resources for provision of public safety services. Shorewood receives police service from the South Lake Minnetonka Police Department (SLMPD through a joint powers agreement between four communities - Shorewood, Tonka Bay, Excelsior and Greenwood. Cost sharing is based on a formula that includes demand, population, and tax capacity. The City intended to continue its joint powers agreement with the three above-mentioned communities in the foreseeable future.

The Excelsior Fire District (EFD is provided through a joint powers agreement between five communities – Shorewood, Deephaven, Excelsior, Greenwood, and Tonka Bay. The department has a full-time fire chief and 45 paid on call firefighters and operates out of two stations. Station 1 is located in Shorewood and Station 2 is located in the City of Deephaven. Fire Station 1 and South Lake Minnetonka Police Department occupy the South Lake Public Safety building located in Shorewood. The EFD provides service to all of the mainland portion of the City.

Shorewood's islands (Enchanted and Shady are protected by the Mound Fire Department. To enhance protection on the Enchanted Island and Shady Island, a system of dry hydrants has been installed which utilizes lake water and pumper trucks. Placement of three hydrants, as shown on the following page, is intended to reduce the need to backtrack to Mound to fill tank trucks.

The City considers the intergovernmental cooperation for public safety a models for exemplary intergovernmental cooperation and intends no change to these services for the foreseeable future.

PARKS AND RECREATION

At present, Shorewood's park system contains approximately 110 acres or one percent of total land, with 100 acres of usable recreation land. Existing parks include Freeman Park, Manor Park, Badger Park, Gideon Glen Park, Silverwood Park, Cathcart Park, South Shore Park, Crescent Beach (shared with Tonka Bay and one public boat launch (Christmas Lake and 10 public lake access points (called fire lanes to Lake Minnetonka and Lake William. There are also numerous privately-owned facilities throughout the City including homeowners association facilities, two

yacht/sailing clubs, and a marina. These private park facilities are not identified as parks on the Existing Land Use map nor included in the calculation of total land area for parks.

Classification System

Shorewood has a variety of park types which are components of the City's overall park system. As a basis for examining existing parks and projecting future park needs, a regional system of park classification is utilized. The classification table from the Metropolitan Council's Thrive 2040 Regional Parks Policy Plan is provided in Appendix D and provides a description of various types of regional and local park facilities.

Existing System Analysis

Shorewood is fully developed. Given the fact that the City is not expected to see significant additional residential growth and that few vacant land parcels remain in the community, Shorewood is not expected to add new park sites. The City's existing parks are considered adequate in size and location to meet the future needs of the community, as shown in Figure XX.

Shorewood residents are generally well-served by the existing park system. With the exception of the islands and a small pocket south of Galpin Lake, most areas of the community are within a one-half to one-mile radius of neighborhood park facilities. As a result, the focus of future park planning will be on developing existing parks, as opposed to acquiring more land, with one possible exception. The City remains open to considering organization-supported expansion of Freeman Park as well as other existing sites. Also, as land becomes available through tax forfeiture, vacation of public right-of-way, donations and/or other means, it will be examined for possible inclusion in the park system.

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CITY OF SHOREWOOD

Shorewood Comprehensive Plan

Local Park and Trail System
Shorewood, MN

Minnetonka Lake
Lake Minnetonka Regional Park
Manor Park
Silverwood Park
Badger Park
Freeman Park
Carver Park Reserve
Lake Minnewashta Regional Park
Christmas Lake
Silver Lake
Virginia Lake
Minnewashta Lake
St. Joe Lake
Schutz Lake
Tamarack Lake
Lucy Lake
Lotus Lake
Ann Lake
Lake

Manitou Rd
Smithtown Rd
Oak St
Highway 7
Yellowstone Trail
Powers Blvd
Hazeltine Blvd
Galpin Blvd
Minnewashta Pkwy
Rolling Acres Rd

19 COUNTY
MINNESOTA 7
MINNESOTA 41

City Trails
Regional Trail
City Parks
Regional Parks
City Boundary

N
0 2,500 Feet
1 inch = 2,500 feet

WSB

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Existing Park Classifications

A considerable amount of planning has gone into Shorewood's park system as master plans for each of the City's parks have been developed. These master plans considered the classification system for local and regional parks which were previously identified. The following is an overview of Shorewood's existing park classifications:

Neighborhood Parks. Four of Shorewood's existing parks; Cathcart, Badger, Manor and Silverwood fall into this category. In addition, facilities at Freeman Park also serve the nearby neighborhoods, as do facilities at Minnewashta School.

Community Playfields. The Minnetonka School District has historically been heavily involved in providing playfields for local recreation. Within the City of Shorewood, Minnewashta Elementary School functions in part as a community playfield. Freeman Park is viewed as satisfying the majority of the community's need for playfields, but Badger, Cathcart and Manor Parks also satisfy this need.

Community Park. Besides its neighborhood functions, Freeman Park is the only community park in Shorewood's park system. Given the proximity of various regional parks, the need for an additional community park in Shorewood is not anticipated.

Regional Parks. There are no regional parks in the City of Shorewood.

Conservancy Lands. Shorewood's wetland system, while not suitable for active recreation, is preserved for its aesthetic value, as well as its environmental benefit.

Special Uses. Crescent Beach along Lake Minnetonka and the Christmas Lake access on Merry Lane are essentially single-purpose recreational facilities (or special use parks). Crescent Beach is used exclusively for swimming, while the Christmas Lake access is used for fishing and the launching of boats. Both sites provide winter access to the lakes.

South Shore Community Park was previously used as a skate park, but the community found that purpose was no longer needed. A new master plan should be prepared to determine the appropriate role for such park.

Gideon Glen Park also fulfills a function of a special use park as it serves as a natural / environmental interpretive center.

Linear Park. While not a City-owned park, the Lake Minnetonka LRT Regional Trail fulfills a linear park function by providing walking / bicycle trail linkages within and outside of the City's municipal boundary.

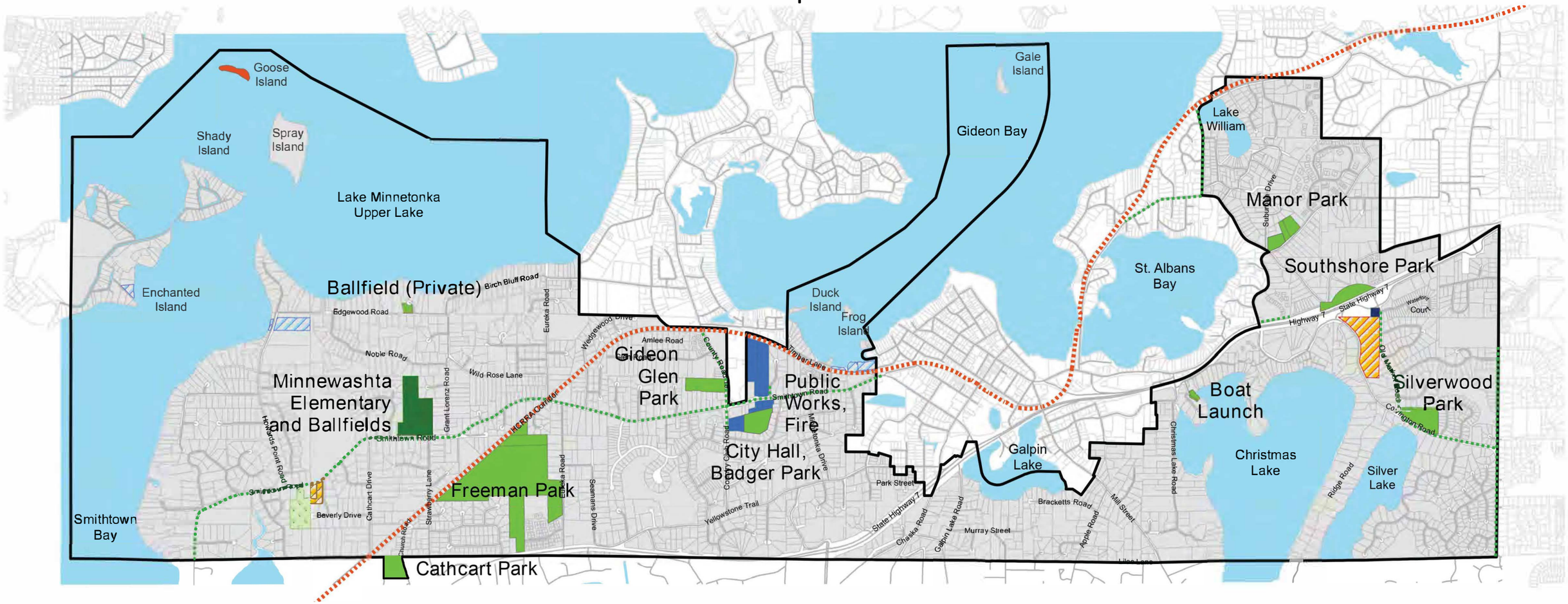
SCHOOLS

Residents of Shorewood are served by two school districts, the Minnetonka School District #276 and Westonka School District #277. Minnetonka School District #276 operates Minnewashta Elementary School in Shorewood and has approximately 9,600 students enrolled district-wide. Westonka School District #277, which serves approximately 2,200 students.

Population growth in the last several years has resulted in the need for expanded facilities throughout District 276. The City of Shorewood has one school located within its boundaries, Minnewashta Elementary School (District 276). The District has expanded Minnewashta Elementary School to meet the needs of the population and has not identified any additional land or locations for new facilities in Shorewood. Given that the city is fully built-out, the need for additional school facilities in Shorewood is considered unlikely.

Community Facilities

City of Shorewood
2040 Comprehensive Plan



Legend

- Regional Trail
- Trails
- Regional Park
- Nursery (Private)
- Marina (Private)
- Cemetery
- City Buildings
- Marina (Private)
- Park
- Public School
- Water Tower
- City Boundary

Map created: December 2022
Data: NAC, MNDNR, Metropolitan Council

0 0.275 0.55 1.1
Miles

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WATERSHED DISTRICTS

The City has two watershed districts that operate within its boundaries, the Minnehaha Creek Watershed District (MCWD) and Riley Purgatory Bluff Creek Watershed District (RPBCWD). The watersheds are shown on the following map.

Both watershed districts have permitting jurisdiction over all construction projects within their respective boundaries, including Wetland Conservation Act administration.

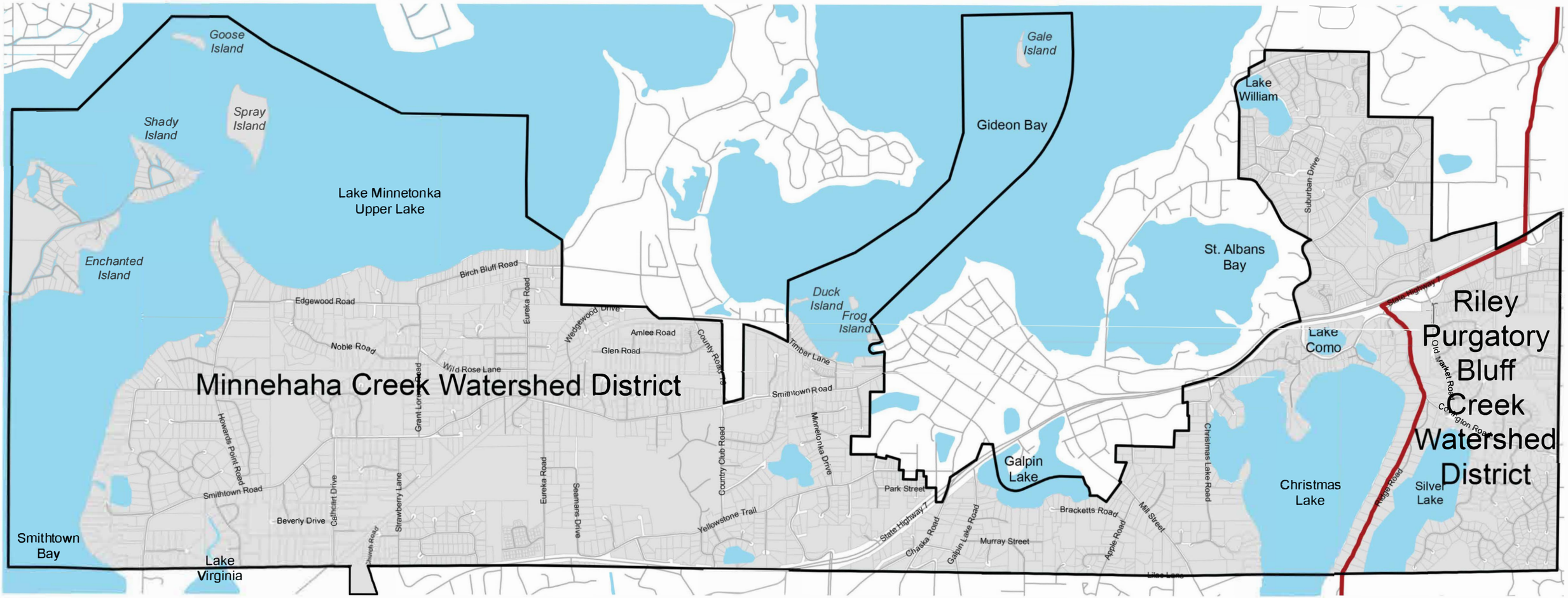
If a permit is required for construction projects both the City and the watershed district reviews the permittee's application for compliance with the rules and regulations. The City of Shorewood has adopted the watershed districts' rules and regulations. A City issued building permit requires both City and watershed district approval of the projects stormwater management components.

Construction phase erosion control inspection and enforcement and post construction storm water management facility and erosion control administration duties are shared and coordinated between the City and the watershed.

Watersheds

City of Shorewood

2040 Comprehensive Plan



Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council

Legend

- Lakes
- Parcels
- Watershed Boundaries
- Shorewood Boundary

0 0.25 0.5 1
Miles

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POLICY PLAN

2040 Comprehensive Plan

INTRODUCTION

The intent of the Policy Plan portion of the comprehensive planning process is to outline in written form what the community desires to be produced or accomplished relative to the physical environment. Secondly, the Policy Plan is intended to set forth guidelines as to how these desires are to be achieved. This chapter identifies general goals and supporting policies. These elements comprise a review and decision-making process and the basis upon which plans, programs and actions can be formulated and initiated.

It is emphasized that these goals, objectives and policies are the basic and fundamental plan for the development of Shorewood. In this regard, their purpose is to provide a decision-making framework to guide all public and private actions and the development of the City. In addition to the active function of guiding response and action, the goals, objectives and policies also serve the more passive function of establishing evaluation criteria for the development and change which subsequently occurs.

This Policy Plan should not be interpreted as an implementation program of actions and/or responses as no time framework or priority of action is intended or stated. The Policy Plan is a guide which directs action of the part of the public and private sectors of the community when responding to needs, problems and opportunities.

The policies are to be considered and utilized collectively. While in some instances a single policy may define and outline a course of action or decision, it is more commonly the case that several policies apply to a given situation. Reactions to individual policies should therefore be tempered pending consideration of all applicable statements.

Policy plans are used as the basis of graphic plans and decision-making due to their flexibility and adaptability. Policies can be applied and used for the basis of decision-making when unanticipated situations emerge. Such is not the case with a map plan in that it is static and fixed. Further, there may be instances when the policies contained in the Policy Plan do not reflect a change in policy direction or address an unanticipated issue. In such cases, the Plan should be amended to include policy statements which reflect the new direction or issue. Operating in such a fashion, the Comprehensive Plan will retain a current and effective status and will not become outdated.

The term “shall” within the framework of the Policy Plan is not to be considered an absolute regulation such as the case in the City’s Zoning and Subdivision Ordinances.

The Policy Plan portion of the Comprehensive Plan is based upon an analysis of the preceding Planning Tactics and Inventory Chapters. To ensure that the Policy Plan reflects the desired ends

of the local community and that such ends are to be accomplished, the Plan has been subjected to detailed and thorough review by the Planning Commission, City Council and City Staff.

To ensure a proper understanding and clarification, the terms utilized are defined as follows:

Goals: The generalized end products which ultimately result in achieving the kinds of living, working and play areas that are desired.

Objectives: Conditions which must be attained in order to accomplish a particular goal.

Policies: Definite courses of action which lead toward goal achievement.

Many goals, objectives, and policy statements are generalized in nature and are directed simply toward community health and welfare. In this regard, many of the policies of the City's 2030 Comprehensive Plan remain valid and have been reiterated in this 2040 Plan. Certain Comprehensive Plan policies are more specific in nature and reflect different courses of action than those contained in the 2030 Plan. In those instances, specific policies have been added in response to new and/or higher priority issues raised as part of the community engagement process.

NATURAL RESOURCES

Goal:

The City will update (amend) its guidelines and regulations and enforce existing standards to ensure preservation and protection of the natural environment.

Objectives:

1. Development which occurs is to be compatible with features of the natural environment and preserve environmental features and natural amenities.

2. The natural and aesthetic quality of Shorewood's lakeshore is to be maintained and, where feasible, improved through the protection of shoreland impact zones, landscaping and shoreland buffers.

3. Creative development design to ensure the protection and enhancement of those portions of the community containing unique physical features (e.g. topography, woodlands, wetlands, etc.) is to be encouraged.

4. Natural wildlife habitats are to be provided protection to avoid loss where possible.

5. The environmental balance between natural and man-made physical features is to be maintained through land use development policy.

6. Shorewood's trees and vegetation are valuable assets and consideration is to be given to the preservation and protection of significant trees.

7. All environmentally sensitive areas (e.g. wetlands, shorelands and floodplains) are to be protected.

8. Area lakes' ecological systems are to be conserved and protected for future generations.

9. Where feasible, control over natural open space areas shall be obtained through conservation easements, acquisition or development regulation.

Policies:

1. All development in naturally or environmentally sensitive areas shall conform to state and federal regulations.

2. State and federal environmental regulations shall be incorporated into local policy.

3. Environmental regulations shall be formulated, updated and enforced to ensure the proper protection of natural environmental resources.

4. Environmental assessment worksheets and, when required, environmental impact statements, shall be prepared for developments of the type described in Minnesota Environmental Quality Board's Environmental Review Program, as may be amended.

5. The use of planned unit development cluster concepts shall be considered where protection of natural features is important to the community.

6. New development and the expansion of existing activities shall be restricted and regulated where environmental damage may result.

7. Development on or near shorelands, wetlands, floodplains and other natural features which perform important environmental functions in their natural state shall be restricted or prohibited.

8. Natural drainage patterns shall be preserved whenever feasible.

9. Development on, or alteration of, natural drainage system components shall be restricted so that the need for construction of storm sewer will be minimized.

10. Any adverse impact from increased surface water runoff to adjoining properties shall be avoided to the extent possible.

11. A drainage plan shall be established which utilizes intermediate ponding areas and provides municipal procedures for the acquisition, dedication, or control of areas so designated.

12. Environmentally sensitive areas such as wetlands and wooded areas are to be acquired or publicly controlled, when necessary to preserve their integrity as funds are available.

13. Conservation easements and similar methods of preserving open space shall be pursued to ensure that such areas remain in open space indefinitely.

14. Support shall be given to efforts aimed at reducing lake pollution.

15. Protect surface and ground water quality by continuing programs to educate the public and regulate the use of chemical lawn fertilizers.

16. Water bodies and watercourses shall be classified and zoned for specific uses giving due consideration to DNR and LMCD recommended regulations.

17. All reasonable measures shall be taken to mitigate adverse impacts resulting from development on natural wildlife habitats.

18. The location, condition and species of existing significant vegetation shall be indicated in all development requests.

19. Programs designed to protect Shorewood's trees through disease control measures and reforestation shall be encouraged.

20. Preserve existing wooded areas and develop programs and regulations to replace lost tree cover.

21. Incorporate the goals and policies of the Shorewood Surface Water Management Plan into the development review process.

22. Use available natural resources inventories and environmental data.

23. Review existing tree preservation regulations to ensure that such ordinance provisions adequately reflect desired preservation objectives.

24. Consider increased funding for stormwater management efforts in the City.

25. Consider the adoption of regulations which protect bluffs which lie outside of the City's shoreland districts.

LAND USE

Goals:

- The City shall continue a pattern of land uses which is consistent with the residential and recreational functions of the community.

- The land use plan shall promote harmonious relationships between various land uses (e.g. homes, commercial outlets, churches, parks, schools, etc.) through proper development and application of transitions between different land uses.

- Land use regulations shall discourage land uses which are inconsistent with the residential and natural character of the community.

Objectives:

1. A cohesive land use pattern that ensures compatibility and functional relationships among activities is to be formulated and implemented.
2. Community planning and development is to consider the impact to surrounding neighbors, neighborhoods and cities and mitigate the impact with transitions (landscaping, berming, etc.) where possible.

3. Development that is not accompanied by a sufficient level of supportive services and facilities (utilities, parking, access, etc.) is to be prevented.

4. Land uses and environmental quality are to be maintained and, where necessary, upgraded.

5. Community development is to be compatible with features of the natural environment and is to be accommodated without destroying environmental features and natural amenities.

7. Neighborhoods are to be maintained and where necessary, strengthened in character, while at the same time improving and reinforcing community identity.

8. A creative approach to the use of land and related residential development is to be encouraged.

9. Commercial development shall be safe, convenient, attractive, and compatible with the residential character of the community.

10. Establish and maintain a consistent approach to the development of fragmented land parcels (i.e. larger lots having the potential to be subdivided) which encourages cooperation between landowners and provides for access and utility service which complies with City standards.

11. Identify parcels of land with the potential to be set aside as permanent open space and explore means of obtaining conservation easements or financing the acquisition of such parcels.

12. As opportunities present themselves, attempts shall be made to satisfy the Metropolitan Council's minimum residential density directives for "suburban" communities (at least five units per acre for new development and redevelopment).

Policies:

General

1. Whenever possible, the impact of physical barriers shall be reduced in order to increase relationships between isolated areas and reinforce continuity and a sense of community.

2. Major streets are to border, not penetrate, neighborhoods.

3. All development proposals shall be analyzed on an individual basis from a physical, economic and social standpoint to determine the most appropriate uses within the context of the planning district in which it is located and within the community as a whole.

4. Land use development shall be related to and reflect transportation needs, desired development and community priorities.

5. Land use development shall be planned so as not to isolate or create landlocked parcels.

6. The use of easements and private streets for the purpose of lot access is to be discouraged.

7. "Flag lot" development shall not be permitted. Adequate access must be established and provided to avoid creating nonconforming property.

8. Intensification of land use activity and development will only be allowed if accompanied by sufficient corresponding increases in related supportive and service facilities such as parks, off-street parking, fire and police protection, etc.

9. Transitions between distinctly differing types of land uses shall be accomplished in an orderly fashion which does not create a negative (economic, social or physical) impact on adjoining developments.

10. Wherever possible, changes in types of land use shall occur either at center, mid-block points so that similar uses front on the same street, or at borders of areas separated by major manmade or natural barriers.

11. The removal of land from the tax rolls shall be considered only when it can be clearly demonstrated that such removal is in the public interest (e.g. the preservation of greenspace).

12. Programs and incentives for continuing privately initiated maintenance, improvements for energy conservation, and redevelopment of existing land use development shall be created and implemented.

13. Where practical, problems with conflicting and non-complementary uses shall be resolved through removal and relocation.

14. To the maximum extent possible, development policies and regulations shall be applied consistently and uniformly.

16. Shorewood's land planning and development shall be on a cooperative basis with neighboring communities, when consistent with Shorewood's adopted goals.

17. Shorewood's lakeshore shall be protected from over-intensification of use and development.

18. Shorewood shall consistently enforce ordinances related to property (and structure) maintenance.

Residential

1. Low density residential neighborhoods shall be protected from encroachment or intrusion of higher density residential uses and non-residential development via the use of buffering and separation techniques.

2. Residential neighborhoods shall be protected from penetration by through traffic.

3. Access to major streets shall be provided on the periphery of residential neighborhoods.

4. Residential development shall be protected from adverse environmental impacts, including noise, air and visual pollution.

6. Housing styles and development techniques that conserve land and increase energy efficiency shall be encouraged.
7. All new housing shall adhere to the highest community design, planning and construction standards.

8. Innovation in subdivision design and housing development shall be considered through the use of devices such as the cluster and planned unit development concepts.

9. Residential development shall be prohibited on floodplains, bluffs, wetlands and other natural features that perform important protection functions in their natural state.

10. New residential development shall maintain the natural environmental character of Shorewood through the preservation of significant trees, protection of bluffs and wetlands, and maintenance of shoreland impact zones.

11. Integration of housing types or styles within a development shall be allowed when applicable provided the total number of units conforms to the prescribed density for the total development.

12. Shorewood's housing planning and development shall be in cooperation with neighboring south shore communities.

13. City regulations related to “teardowns” and “rebuilds” of single family homes shall be examined, and modified if determined necessary, to ensure that adequate provisions are in place to ensure neighborhood compatibility.

14. In consideration of new or redeveloped housing projects, the minimum density directives of the Metropolitan Council (five units per acre) shall be given due attention.

15. To limit on-street parking and protect adjoining properties from nuisance concerns associated with construction projects, staging plans shall be required for all infill development projects. Minimally, such plans shall address contractor parking locations, construction material storage, construction hours and keeping the streets clean.

Commercial

1. The City of Shorewood's commercial development shall be oriented towards "convenience" type of shopping geared toward neighborhood or community scale markets.

2. Commercial and service centers shall be developed as cohesive, highly interrelated units with adequate off-street parking.
3. Existing and proposed service and commercial uses shall be adequately and appropriately landscaped according to community requirements as may be amended.

4. All existing and proposed service and commercial uses shall be adequately screened or buffered from any adjacent residential development.

5. Orderly transitions between commercial and residential areas shall be established and maintained.

6. Uncoordinated linear commercial development shall be strongly discouraged in favor of a unified development pattern.

7. Joint utilization of parking, access, and other related supportive services shall be promoted in service and commercial districts and individual developments.

8. Safe and convenient pedestrian movement shall be provided within service and commercial developments.

9. When possible or when opportunities arise, major street access for service and commercial development shall be at the periphery of the area.

10. Locate neighborhood convenience centers along minor arterial or major collector streets.

11. Commercial development at street intersections shall be limited and restricted. Development of one quadrant does not indicate or dictate commercial use of the remaining quadrants.

12. Ensure that neighborhood convenience centers are provided with safe and convenient accessibility for both motorists and pedestrians.

13. It shall be the responsibility of higher density residential and non-residential developments to buffer or provide transitions to protect lower density residential uses.

14. Redevelopment of the Smithtown Crossings commercial area shall occur in a manner which promotes Shorewood's community identity.

15. Future commercial development in the City shall consider the character of the community and adhere to the highest possible standards of quality (in terms of both design and finish materials).

Commercial Services

1. The existing commercial service development in Shorewood shall be upgraded and improved to the highest possible standards of operation.

2. It shall be the responsibility of existing commercial service developments to assume the burden of making necessary improvements to ensure compatibility with surrounding residential uses.

HOUSING

Goals:

- Healthy and quality housing shall respect the natural environment of the community.

- Maintain the present variety of housing options and provide sufficient housing types, sizes and values to meet the needs of varying segments of the population.

- Maintain and strengthen, where necessary, the character of individual neighborhoods within the community.

- Address local and sub-regional housing issues through cooperative efforts with neighboring communities.

- The City shall promote safe, healthy and affordable housing options.

Objectives:

1. Review local development regulations, and amend as necessary, to promote a balanced housing supply.

2. As opportunities present themselves, attempts shall be made to satisfy the Metropolitan Council's affordable housing directives (48 new units between 2021 and 2030).

3. Identify locations for alternative residential housing types and densities.

4. Make available to residents and property owners educational programs on such topics as renter/landlord rights, home buying, home maintenance, etc.

5. Continue the City's rental housing license program to maintain current standards for rental housing.

6. Promote private sector maintenance, rehabilitation and redevelopment of existing properties through improved communication of available community services and financial assistance programs.

7. Continue to allow accessory apartments to allow seniors to remain in their single family homes.

8. Encourage housing types that are designed to appeal to senior citizens to allow existing residents to downsize and remain in the City of Shorewood.

Policies:

<u>Maintenance, Rehabilitation and Redevelopment</u>

1. Programs for housing structural condition maintenance shall be pursued to protect the health and safety of residents and ensure stability of neighborhoods within the community.

2. Maintenance problems and code violations shall be addressed to improve and strengthen the character of neighborhoods and avoid spreading the impact of deterioration.

3. Substandard housing units shall be rehabilitated whenever possible.

4. Work with Hennepin County to administer programs which provide financial assistance for the rehabilitation of substandard housing units within the community (as funding sources and market conditions permit).

5. Residential redevelopment of substandard housing within the community shall be encouraged whenever compatible with adjacent land uses and economically feasible.

6. Appropriate regulations shall be established for development upon lawful nonconforming lots.

7. Staging plans shall be required for all residential infill projects. Minimally, such plans shall address contractor parking locations, construction material storage and construction hours.

Compatibility

1. Low density residential neighborhoods within the community shall be protected from encroachment or intrusion of incompatible higher density residential land uses, as well as nonresidential use categories, through adequate buffering and separation.

2. The character of individual residential neighborhoods shall be respected and maintained.

3. Residential developments shall be protected from and located away from sources of adverse environmental impacts including noise, air and visual pollution.

4. Home occupations, commercial and other nonresidential activities shall be minimized and are not to be evident within residential neighborhoods.

5. Accessory buildings within the community shall be of a compatible design and size to maintain a residential character. These buildings shall be limited exclusively to residential use related activities.

6. Outdoor storage is to be minimized and, in those instances, when it is acceptable, it shall be conducted in an orderly, confined and limited fashion which is consistent with City Code requirements.

7. Violations of property maintenance standards that infringe upon residential neighborhood quality, pose public health and safety problems and threaten neighboring property values shall be aggressively eliminated.

Variety of Housing

1. Owner occupied housing shall be encouraged.

2. Shorewood's housing needs, as well as the needs of the overall Lake Minnetonka sub-region, shall be addressed by providing and maintaining a variety of housing types, styles and values.

3. The emergence of a polarizing age distribution within the Lake Minnetonka sub-region is to be prevented through the provision of diverse housing that reflects life-cycle stages and economic considerations.

4. A range of property values and rent rates within the Lake Minnetonka sub-regional housing stock shall be encouraged as a means of diversifying the population and sustaining individual communities in the area.

5. Adequate living space and fully utilized housing are to be encouraged and promoted through the provision of a range of choices among housing types and values throughout the Lake Minnetonka sub-region.

6. The development of housing for special needs populations (e.g., elderly, physically challenged) within the Lake Minnetonka sub-region shall be supported by financial assistance programs that may be available as funding sources and market conditions allow.

7. In consideration of new or redeveloped housing projects, the affordable housing directives of the Metropolitan Council (48 units by 2040) shall be given due attention.

TRANSPORTATION

Goals:

- The City shall provide and maintain a safe and efficient system of transportation, sensitive to the needs of residents and the environment of the community.

- The City should establish a plan for an interconnected system of trails, enhancing the safe movement of pedestrians, bicyclists and other modes of non-motorized travel.

Objectives:

1. Reduce the need for transportation facilities by combining or concentrating various land use activities, when and where feasible.

2. Promote regional transportation facilities that are safe, direct, convenient and environmentally sound and coordinate plans with other jurisdictions.

3. Design safe, efficient and economical local transportation facilities based upon the needs of neighborhoods, integrating these facilities into the community and regional systems.

4. Utilize a comprehensive system and approach to transportation, giving due attention to all modes and related facilities.

5. Assign priorities to various travel routes, modes and programs, then formulate and implement a corresponding action and development effort.

6. Provide safe trail connections to points of interest in the community and link to trails provided by Hennepin County and adjacent municipalities.

7. Implement trail segments on an incremental basis consistent with an overall plan.

8. Explore all outside funding resources to implement local transportation plans.

9. Address automobile traffic, pedestrian movements, on-street parking and stormwater management within local street right-of-way improvements, where feasible.

Policies:

General

1. Transportation facilities shall be planned and improved to function in a manner compatible with adjacent land use.

2. All means of transportation and related facilities shall be considered as one system and therefore coordinated and related comprehensively.

3. Transportation facilities shall be planned and designed to conserve natural resources and minimize ongoing public investment.

4. The transportation system shall be developed to focus on activity centers of Shorewood and neighboring south shore communities, and to promote safe and efficient movement of traffic through and out of the city to the Metro Area.

5. Transportation planning and implementation shall be coordinated with neighboring and affected jurisdictions.

6. Special consideration and attention shall be given to persons who must rely on means other than the automobile for transportation.

7. Dependency upon automobile-oriented transportation shall be reduced where feasible, and where possible higher priorities shall be assigned to pedestrian/bicycle and mass transit travel.

8. The State and County highway systems shall complement and facilitate local movements provided by local streets, bicycle trails and pedestrian facilities. A line of communication shall be maintained with County and State highway officials in order to ensure that planned improvements are consistent with the goals and objectives of the community.

9. Early and continuing citizen involvement shall be provided for and encouraged in transportation planning and implementation projects.

Streets

1. A functional classification system for the street system in Shorewood has been established and shall be maintained, giving due consideration to the Metropolitan Council's Functional Classification System for streets and highways, as may be amended.

2. The classification system should be monitored as needed to revise the classification of streets as traffic and land use patterns evolve.

3. All local or residential streets shall be designed to limit penetration of through traffic and shall direct traffic to collector or arterial streets.

3. Land access onto expander and arterial streets shall be limited or prevented wherever possible.

4. Vehicular access onto arterials~~s~~ streets shall be minimized and limited to points of adequate distances between intersections with proper signalization and/or merging.

5. Street parking shall be prohibited or limited on arterial streets.

6. All intersections shall have proper visibility, design, and control to prevent accidents and violations.

7. Service roads paralleling major arterials shall be controlled to reduce traffic conflicts, hazards and resulting accidents.

8. Single-loaded frontage roads shall be discouraged in the future.

9. Street improvement shall be related to, and phased with, area land development to avoid interrupted or inadequate access.

10. Curb and gutter shall be required in new development and reconstruction of existing streets. Other drainage solutions may be considered where more economical and practical.

11. In those areas where incomplete street facilities exist, action shall be taken to plan, design and develop a street system that reflects the highest standards and relates land use to transportation needs and policies. Action shall be taken immediately to reserve required rights-of-way to prevent redundant additional cost and difficulties.

12. Where feasible and practical, provisions for other transportation modes (i.e. pedestrian, bicycles, etc.) shall be included in street and highway improvement plans.

13. The City shall strive to minimize damage to City streets and prevent premature street decay by enforcing seasonal weight restrictions and by considering options to reduce the number of regularly scheduled heavy vehicles on such streets, including, but not limited to, those utilized for organized trash collection.

14. The City shall work with State and/or County officials to explore possible solutions to ongoing traffic congestion issues at Highway 7 access points.

15. Maintain a system of evaluating street conditions and prioritizing street maintenance/improvement efforts.

16. Timeframes for street improvement/replacement efforts shall be identified within the City's capital improvement program (CIP).

17. A design template for local street right-of-way improvements shall be developed which addresses automobile traffic, pedestrian movements, on-street parking and stormwater management.

18. As opportunities present themselves, existing unpaved public streets shall be paved in compliance with City street standards.

Parking

1. No development or expansion of activities and uses shall be permitted unless adequate off-street parking is provided.

2. Parking requirements imposed by the City shall be periodically reviewed and studied to ensure supply is reflective of demand.

3. Parking shall be developed in a fashion that conserves land, allows joint utilization and minimizes conflicts with moving vehicular traffic, pedestrians and cyclists.

4. Parking lot access to public streets shall be limited to the functional minimums.

5. The City shall enforce standards for parking lot landscaping.

6. The City shall seek reduction in the demand and resulting space requirements for parking through improved pedestrian and transit facilities and land use development coordination.

7. Consideration shall be given to limiting on-street parking to one side of the street in areas determined by the City to address problematic parking conditions on narrow streets. Alternatively, staggered parking on alternating sides of a street may also be considered.

Mass Transit

1. Increased service and the use of mass transit shall be encouraged by the City of Shorewood.

2. The City shall work with adjacent City of Excelsior, as determined necessary, to ensure that Shorewood residents are provided reasonable access to transit services.

3. Strive to develop transit service for those who do not have other transportation alternatives.

4. Transit service, through related improvements and land use policies, shall be encouraged by the City during non-peak, non-rush hour periods in addition to peak and rush hour periods.

5. Shorewood business districts shall be encouraged to establish themselves as transit "stations" or suburban collection points through provisions for park and ride, transfer routes and direct express service to other commercial and employment activity centers of the metropolitan area and southwestern sub-region.

6. Availability of transit service, notably during rush hours, to activity areas and regional centers in other communities shall be encouraged.

7. All potential means and methods of providing and improving transit service (school buses, taxis, etc.) shall be explored.

Pedestrian/Bicycle

1. Where possible and economically feasible, a separated traveled surface shall be provided for pedestrians and cyclists.

2. Special attention shall be directed toward and facilities provided for pedestrian movement and access in areas in and surrounding schools, churches, parks, commercial and service centers.

3. Pedestrian street crossings on heavily traveled streets shall be clearly marked and lighted.

4. All street improvement programs and projects shall take into consideration facilities for pedestrians and bicycles as identified in the City's Trail Concept Plan.

5. Non-local streets in Shorewood shall be designed to protect pedestrian and bicycle movement paralleling traffic.

6. New development shall be encouraged to respect the pedestrian/bicycle system and, where possible, contribute to the City right-of-way and development costs.

7. Construction and maintenance of trails shall be based on established standards and specifications to ensure safe conditions.

8. Shorewood will establish development standards for the construction of trails, as well as maintenance standards and programs, to ensure safe conditions.

9. Trail segments shall be established within parks to provide connections between various facilities and to accommodate recreational usage.

10. Priorities for the funding of the construction of trails shall be established based on safety concerns, funding conditions and neighborhood acceptance.

11. Shorewood will explore all funding sources, including outside grant funds for the construction of trails, provided that such funding sources accommodate local needs and design criteria.

12. Shorewood will cooperate with other jurisdictions, including the School Districts and Hennepin County, in providing a trail system that meets local and regional needs.

13. Shorewood will work with other area communities to investigate the establishment of a trail network that could provide connections to points of interest and environmental features, including continuous access around Lake Minnetonka.

14. Shorewood will work with other area communities to investigate the establishment of bicycle and mass transit linkages that would serve bicycle commuters.

15. As part of street improvement/reconstruction planning, due consideration shall be given to the construction of trails and/or sidewalks.

16. Shorewood will identify and prioritize incomplete trail links within the City and develop a plan to improve pedestrian trail connections.

17. Shorewood will collaborate with the adjacent City of Excelsior to improve inter-city vehicle and pedestrian connections.

18. As part of the development of the City's trail system, due consideration shall be given to pedestrian and bicyclist safety.

19. Shorewood will strive to implement sidewalk and trail directives of its Transportation Plan and Park and Recreation Plan.

COMMUNITY FACILITIES

Goals:

- The City shall provide those basic facilities and services that ensure the health, safety and general welfare of the public, the cost of which facilities and services are most efficiently shared by the general public.

- The efforts of varying government agencies shall be coordinated to avoid duplication of efforts, unnecessary expense and improper location of public facilities.

- Maintain a sound financial planning program for capital improvements, relating such improvements to actual need, proper location and timing.

Objectives:

1. Existing services are to be maintained and improved where needed.

2. New community facilities and services are to be developed to meet the needs and interests of the Shorewood community.

3. Public facilities and services are to be planned and provided in a comprehensive coordinated and economic fashion.

4. Full utilization of existing facilities and services is to be accomplished prior to additional investment.

5. Implement policies to provide City water service where financially feasible and where demand can be demonstrated.

6. Facilities and services on a joint-use basis between units of government is to be promoted, improved and increased.

7. Each individual in the community is to be assured safe, equitable and easy access to public facilities and services.

8. Shorewood residents are to continue to have safe, reliable energy services to meet their needs.

9. Energy service conservation is to be constantly promoted and facilitated.

10. Efforts shall be made to improve the City's water supply and stormwater management systems.

11. When opportunities arise, efforts shall be made to promote Shorewood's community identity through public improvements.

Policies:

Parks and Recreational Open Space

1. Shorewood's park and recreational open space system shall be classified in accordance with standards established by the Metropolitan Council.

2. Funding for park maintenance and necessary improvements (as determined by the City) shall be considered a community priority.

3. The allocation of funds for park improvements for specific facilities will be made on the basis of balancing overall community park needs of Shorewood residents with the specific needs of each facility.

4. The community shall provide for an appropriate balance among active, passive, and cultural recreational areas and activities, tailored to the needs of the total population.

5. Recreational facilities and a year-round program of activities suited to the varied recreational needs of all age groups within the community shall be provided.

6. Parks and recreational facilities shall be distributed throughout the community, based upon neighborhood needs and characteristics of each planning and development district.

7. Sufficient park land to fulfill the needs of the present and projected future population of the community shall be acquired and reserved. Park development shall be undertaken as residential development demands and as funds are available.

8. Recreational open space improvements shall be programmed in accordance with a capital improvement program, updated on an annual basis.

9. Parks shall be designed and maintained with proper lighting, landscaping, shelter design, etc., to ensure a high degree of public safety and protection of public property.

10. Where necessary parks shall be screened, fenced and/or buffered for the safety and protection of the user as well as adjacent property owners.

11. Parks shall be improved and developed to take maximum advantage of natural features of the Shorewood.

12. Safe and convenient pedestrian, bicycle and vehicular access and adequate parking to serve recreational facilities shall be provided.

13. The use of motorized recreational vehicles shall be limited to designated areas.

14. Park and open space facilities and programming shall be planned and developed in cooperation and coordinated with similar services of surrounding communities, the school district, private organizations and the metropolitan area as a whole.

15. Studies shall be undertaken on a periodic basis to analyze the effectiveness and comprehensiveness of the community recreation program. These studies shall serve as the basis for recreation open space planning and programming.

16. Continual citizen participation in the planning, development and operation of recreational open space shall be maintained.

17. The City shall employ a pro-active approach to park development.

18. When opportunities arise, Shorewood shall consider the acquisition of parcels adjacent to the City's existing public beach (Crescent Beach) and conversion of such parcels to park land.

Lakeshore Use

1. Lake Minnetonka shall be considered a community recreational facility and appropriate actions shall be taken to permit utilization of the lake by all City residents.

2. Regulations shall be enforced to ensure accessibility to area lakes while at the same time minimizing any potential impact on surrounding uses and adjacent property owners.

3. In order to protect and preserve the amenity provided by area lakes, the City shall encourage uniform land use regulation and enforcement of lakeshore use.

Governmental Buildings and Facilities

1. Cooperation and coordination shall be promoted and actively pursued between governmental units in the provision of public facilities and services.

2. The full utilization of investments in public facilities and services shall be achieved prior to making new public investments.

3. Public facilities and services shall be located to the greatest extent possible so as to offer ease of access and minimal response time.

4. All public facilities shall be developed, improved and maintained according to the highest adopted standards of design and performance to serve as examples for private development.

5. All public buildings shall be designed and maintained to be safe, secure and resistant to vandalism while maximizing public and City usability.

6. Those areas, places, buildings, structures and other objects such as Indian mounds having significant architectural, historical, community or aesthetic interests and values shall be restored and preserved, as defined under the Minnesota Historic Sites Act of 1965, as may be amended.

7. Adequate screening, landscaping, and buffering of facilities shall be accomplished in order to minimize their impact on surrounding uses and enhance the community and areas in which they are located.

8. As part of future community facility improvement efforts, consideration shall be given to the creation or establishment of a visible and identifiable physical feature which distinguishes the City of Shorewood from the Cities of Excelsior and Tonka Bay.

9. The City shall examine alternatives and develop a plan for the future use of the Shorewood Community and Event Center.

10. The City of Shorewood shall seek and implement creative ideas for its public spaces which pay homage to the community's history and identity.

11. The City shall strive to make efficient use of its various municipal buildings by evaluating, on a periodic basis, the space needs of various City functions (to ensure adequacy).

Public and Semi-Public Utilities

1. City public utilities will be reviewed at the same time that the Capital Improvement Program (CIP) is reviewed each year.

2. Demand for urban services shall be anticipated, with emphasis to conserving existing facilities, in order to facilitate orderly, fiscally responsible extension of service systems.

3. Easements for utility systems shall be located according to uniform standards, providing for ease of access for maintenance and repair and minimal disruption of other activities or areas.

4. All utility systems and possible utility and service needs shall be periodically monitored, and all existing systems shall be maintained to assure a safe and high quality standard of service on an ongoing basis and to reduce inflow and infiltration into the city's sanitary sewer mains.

5. The impact of required utility facilities and services shall be minimized upon surrounding uses.

6. Underground installation of all new utility services shall be required and when economically feasible, existing overhead systems shall be converted to underground.

7. Coordination among all utility improvement programs shall be constantly pursued.

8. Telecommunication facilities shall utilize existing tower structures where feasible.

9. Gravity sewer systems are to be encouraged, and sewer lift stations should only be allowed when it is technically infeasible to achieve gravity flow.

10. Separate sanitary and storm sewer systems shall be maintained.

11. Run-off shall be managed to protect the groundwater recharge areas.

12. Benefiting property owners shall assume the burden of improvements made by the City in their behalf.

13. Natural drainage shall be preserved to the extent possible in order to minimize storm sewer costs.

14. Commercial development shall provide adequate water systems to insure proper fire protection.

15. To improve stormwater management within the City, Shorewood shall consider installing curb along problematic streets when opportunities arise.

16. Shorewood shall work toward the eventual connection of all properties to the City's municipal water system and all extensions shall be consistent with the overall plan for City water (i.e. pipe sizes).

17. Properties used for commercial purposes or residential uses involving four or more dwellings shall connect to the municipal water system. Residential developments of three or fewer dwellings shall connect to the municipal water system where it is available. The City reserves the right to deny permission for a subdivision development or redevelopment for subdivision if City water is not available at that property.

18. The overall water system is to remain financially self-supporting.

19. Allow water main extensions to provide water to residents where technically and financially feasible and where demand can be demonstrated. A super-majority of residents shall be considered a demand for water extensions.

20. In addition, the City will consider encouraging property owners with private wells to connect to the public system and will review funding mechanisms to assist this transition.

21. When opportunities present themselves, the City will consider the burying of existing and new power lines to reduce the frequency of power loss during storm events.

22. As part of the update of the City's Water Supply Plan and/or Wellhead Protection Plan, various requirements recommended by the Minnesota Department of Health to protect Shorewood's drinking water supply shall be incorporated.

23. Stormwater drainage facilities and underground utilities shall be considered integral elements of the City's street improvement projects.

Energy

1. Encourage use of alternative energy forms in new construction.

2. Continue to disseminate information on governmental energy conservation programs and helpful ideas on personal energy conservation methods.

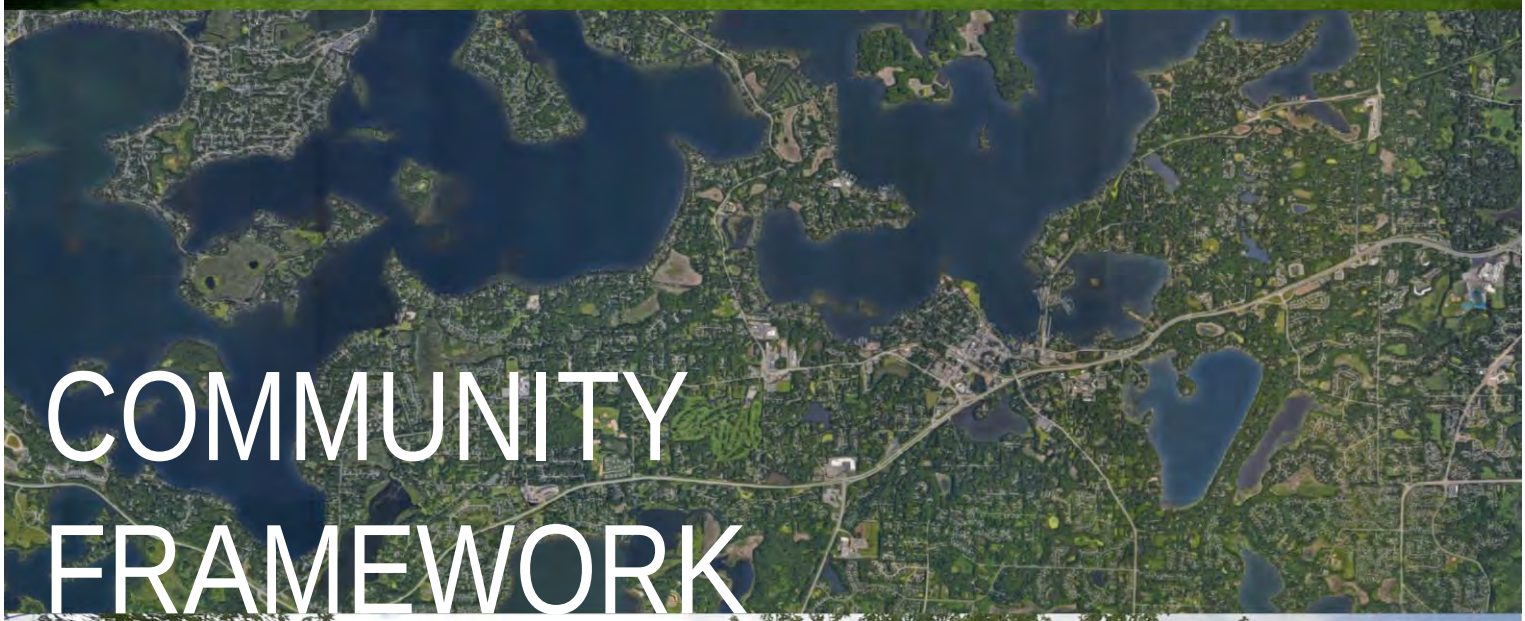
3. Where practical, promote overall energy conservation in the community development process.

4. The City of Shorewood will, by example, attempt to become a more energy efficient community via future investment in such systems.

5. Establish regulations to accommodate the installation of alternative energy systems (solar and geothermal) and clarify procedures.

Collaboration

1. To the extent possible, the City of Shorewood shall collaborate with nearby lake communities in regard to the handling of shared services.



COMMUNITY FRAMEWORK

2040 Comprehensive Plan

INTRODUCTION

The Metropolitan Council requires that comprehensive plans for cities in the seven-county Metropolitan Area include a Natural Resources Plan. Such plan must address community goals, intentions and priorities concerning preservation, conservation or restoration of natural resources. Goals, objectives and policies related to the natural environment are provided in the Policy Plan chapter of this Plan.

Perhaps above all other characteristics of the community, Shorewood residents value the natural setting in which it is located and have found that protecting sensitive features such as wetlands, shorelands, floodplains and wooded areas has an aesthetic, economic, health and even psychological benefit to the community as a whole.

The natural setting makes Shorewood a very attractive place to live. Ironically, this attraction creates pressure for new development which can threaten natural amenities. Shorewood is committed to maintain its high quality natural environment.

NATURAL RESOURCES PLAN

Soils

Shorewood has numerous areas where poor soil conditions impose limitations on development. As prime land becomes developed, there is increasing pressure to develop on more marginal parcels. Most of the on-site sewer systems which pose environmental problems due to poor soil conditions have been connected to the public sanitary sewer system. Only a few such systems remain out of reach of City sewer, and all new development is required to connect to the City's system.

Bearing capacity for construction has been, and continues to be, an area of concern. The City requires testing in areas known for poor soil conditions or where poor soils are discovered during construction. Areas found to have questionable soils are subject to the recommendations of qualified soils engineers, as well as the requirements of the State Building Code.

The City of Shorewood has adopted standards for the control of erosion and sedimentation. In this regard, the following documents serve as a guide for the development of Shorewood's own local controls:

- MPCA Construction Stormwater Permit (Minnesota Stormwater Manual)
- MCWDs Erosion Control Permit
- MnDOT Erosion Control Handbook
- MS4 SWPPP Program

Going forward, the City will strive to use the most up-to-date standards for erosion control and sedimentation.

Slopes

The protection of the steep slopes and specifically bluffs which lie outside of the City's shoreland districts have been identified as an issue of community importance.

The type of slopes, along with surficial soil types, should be taken into consideration in the review of all development requests. Each site should be examined for problems of this nature, and in identified problem areas, the City will require test soils to determine if soil types are a problem on lesser slopes.

The Metropolitan Council has established two policies relative to development on erodible slopes:

- Slopes which because of their surficial soil type are susceptible to severe erosion should be maintained in a natural state. Counties and municipalities should adopt regulations to maintain or replace vegetative cover of these slopes to reduce erosion and slippage.

- Slopes subject to moderate erosion should be managed to minimize erosion and slippage; management may include special design and construction methods for development or appropriated vegetative or other cover.

Considering the amount of sloping land in Shorewood, 12 percent grades will be considered a "warning flag." While development may be allowed on slopes greater than 12 percent, such development shall be subjected to special scrutiny and examined for any potential environmental impact which might occur as a result of the proposed development. The City shall evaluate grading activities based on the following criteria:

- Development on slopes greater than 12 percent shall be reviewed and approved by the City Engineer. Any documentation needed to evaluate the development shall be provided by the developer.

- On large projects development activities shall be conducted and staged to minimize soil erosion. The smallest practical increment of land shall be developed at any one time; that increment shall be subjected to erosion for the shortest period of time, not to exceed a single construction season.

- Sufficient control measures and retention facilities shall be put in place prior to commencement of each development increment to limit soil loss.

- During construction, wetlands and other water bodies shall not be used as sediment traps.

- Except in extraordinary situations, development which results in disturbed slopes exceeding 3:1 (three horizontal to one vertical) shall not be allowed. Where unavoidable, steeper slopes must be designed by qualified professionals and will be subject to review and approval by the City Engineer.

Tree Preservation and Reforestation

The City of Shorewood recognizes trees and vegetation as valuable assets and that preservation and protective measures are a necessary community standard.

Shorewood's zoning regulations presently contain provisions for limiting the removal of vegetation in shoreland areas and requirements for landscaping of certain new developments. The City has adopted a tree preservation and reforestation policy which establishes the following three-part program:

1. Preservation
    - identifies which developments require tree preservation
    - identifies size and species of trees to be saved
    - adopts construction protection measures
    - considers residential clustering to preserve trees
2. Replacement
    - requires replacement of those trees identified for preservation which must be removed for road and buildings
    - establishes a required ratio between removed and replacement trees
3. Landscaping
    - increases the types of development where landscaping is required
    - increases size specifications for required landscaping
    - establishes minimum quantity requirements
    - amend subdivision regulations to require tree planting for all developments

- provides protection against invasive plant species and species which are susceptible to disease

During the development process, developers are required to submit tree inventories that become the basis for tree preservation and replacement plans. In certain instances where it is impractical or undesirable to replace trees on site, an alternative is provided that would allow developers and builders to contribute to a City fund. This fund would be used for placing trees on public property (e.g. City parks).

To ensure that existing Ordinance provisions adequately reflect desired preservation objectives, it is recommended that a review of existing tree preservation requirements be conducted.

Wetlands

The City of Shorewood has been a leader in preserving its wetlands, having adopted protective regulations in the early 1970's. These rules have been updated to include the provisions of the Wetland Conservation Act (WCA). The City has also adopted regulations protecting natural buffers adjacent to wetlands and establishing building setbacks from these buffers.

As illustrated on the map on the following page, nearly 10 percent (312 acres) of Shorewood's total land area exists as designated wetlands. Also, the City has begun enforcing the no-net-loss requirements of the Wetland Conservation Act of 1991 (WCA91).

The City has taken numerous steps to enhance the wetland protection program:

1. Adoption of the Minnesota Department of Natural Resources wetland classification system.

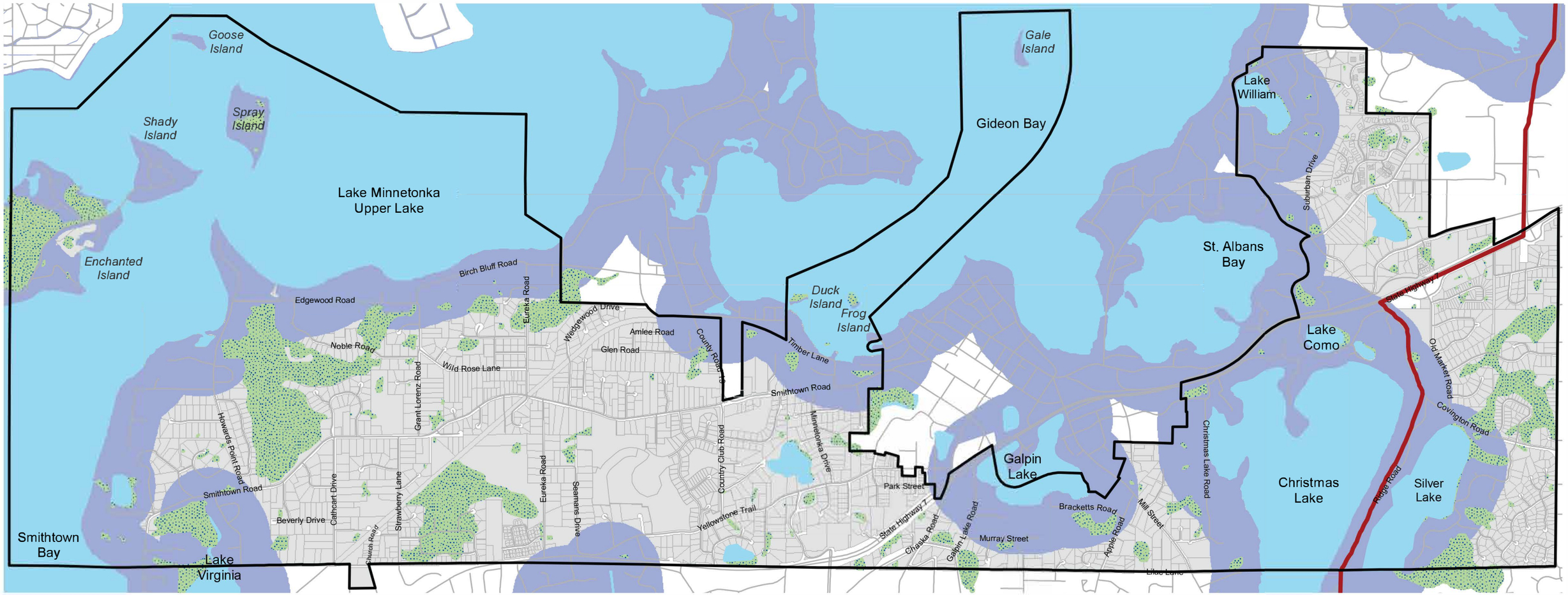
2. Requirement that all development proposals locate, identify and classify both City-designated wetlands and WCA91 wetlands.

3. Wetland delineations must be prepared by professionals certified by the State of Minnesota.

4. The applicable watershed districts will be the local governing unit (LGU) for administering the standards of the WCA91.

Water Resources

City of Shorewood
2040 Comprehensive Plan



Legend

- Shorewood Boundary
- Watershed Boundaries
- Wetlands (National Wetland Inventory)
- Shoreland Protection Zone (1000' from Lake)
- Lakes

Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council

0 0.25 0.5 1
Miles

N

NORTHWEST ASSOCIATED CONSULTANTS, INC.
4150 Olson Memorial Highway, Ste. 320, Golden Valley, MN 55422
Telephone: 763.231.2555 Website: www.nacplanning.com

5. The City will continue to work with the applicable watershed district and the Department of Natural Resources to enforce wetland protection laws.

6. The City may consider establishing minimum setbacks for construction adjacent to wetlands where no buffer has been dedicated. Shorewood's wetland regulations include a 35-foot natural buffer adjacent to wetlands in new development, plus a 15-foot building setback from the natural buffer area.

7. Requirement of retention ponds upstream of wetlands to collect and filter pollutants in storm water runoff before it reaches the wetlands.

Surface Water Quality

The management of surface water in the City has been highlighted by community residents as a high priority issue. The City of Shorewood partners extensively with other local, regional, and state agencies to ensure the protection of surface water quality.

The City of Shorewood contains portions of two watershed districts, Minnehaha Creek Watershed District (MCWD) and the Riley-Purgatory Bluff Creek Watershed District (RPBCWD). Each watershed district has various programs and permitting related to managing and improving surface water quality. The City also works with the Minnesota Department of Natural Resources (DNR), the Minnesota Pollution Control Agency (MPCA), and various other jurisdictions to maintain and improve surface water quality and flooding control where possible.

The City of Shorewood's Local Surface Water Management Plan (Appendix B) includes the following goals, strategies, and policies for the management of stormwater within the City and to complement those of our partners at other local, county, regional, or the state agencies. The goals of the City are as follows:

1. Minimize public capital expenditures needed to correct flooding and water quality problems.
2. Identify and plan for means to effectively protect and improve surface and groundwater quality.
3. Prevent erosion of soil into surface water systems.
4. Promote groundwater recharge.
5. Protect and enhance fish and wildlife habitat and water recreational facilities.
6. Secure the other benefits associated with the proper management of surface and ground water.

To implement these goals, the Local Surface Water Management Plan also includes an assessment of existing and potential water resource-related problems and corrective actions, including storm

water pond maintenance, discharging to impaired waters and aquatic invasive species. Specifically the problems and proposed corrective actions include:

Problem	Corrective Action
Needed stormwater pond maintenance for improved water quality treatment, flood control, and aesthetics at Manor Park Pond.	The City, in cooperation with MCWD, will complete a feasibility study to identify methods to improve Manor Park Pond as funds are available.
Storm water discharge to the following impaired waters: Lake Minnetonka, Christmas Lake, Lake Virginia, Silver Lake, and Lake Minnewashta	The City will work with MCWD and RPBCWD to develop and implement any necessary total maximum daily loads for the impaired waters within its boundaries.
A stream in the upper Christmas Lake subwatershed that is not listed as impaired for nutrients but has a total phosphorus concentration significantly higher than state river eutrophication standards.	The City will work with MCWD to look into potential projects to reduce the total phosphorus concentration of the stream by improving the water quality of the runoff entering the stream.
An established zebra mussel population in Christmas Lake and Lake Virginia.	The City will work with MCWD to continue to educate its residents on the importance of proper boat maintenance and boat draining to reduce the spread of invasive species. The City will also consider continuing to help the Christmas Lake association fund the inspection of boats entering and leaving the Lake.
Silver Lake has been identified as an impaired water for nutrients/eutrophication due to a high phosphorus load.	The City will work with RPBCWD to implement projects to reduce the phosphorus load concentration entering the lake.

The Local Surface Water Management Plan also includes numerous goals and detailed policies relative to review of development proposals regarding stormwater runoff. All new developments are required to construct sedimentation ponds designed to National Urban Runoff Program (NURP) standards or contribute toward the construction of sub-regional NURP facilities. Because the majority of Shorewood developed prior to the adoption of these standards and because of the number of wetland and shoreland areas in Shorewood, the City has adopted impervious surface requirements for all lots. Shorewood limits the amount of hardcover on all non-shoreland residential properties to 33 percent with nonresidential properties limited to 66 percent. Redevelopment within the City, such as tear-down and rebuilds and additions, require an infiltration feature, if the soils are conducive.

Shorewood has also committed to assisting in greater education relative to stormwater runoff. The Local Surface Water Management Plan includes an education strategy to foster responsible

water quality management practices by educating residents, business owners, City staff, City Council, and developers about proper stormwater management. Strategies include the following:

- Implementing a public education program as part of the National Pollutant Discharge Elimination System (NPDES) Phase II program.
- Updating the City's website for water resource management information.
- Developing and distributing an annual newsletter in other City mailings aimed at fostering responsible water quality management practices. Topics may include, but are not be limited to, wetland buffers, groundwater quality and protection, controlling invasive species, water conservation and the water cycle, proper hazardous waste disposal, yard waste management, the importance of pet waste disposal, and illicit discharge.
- Collaborating with MCWD, RPBCWD, and Lake Minnetonka Conservation District (LMCD) in stormwater management education efforts.
- Providing annual training opportunities to City staff regarding maintenance and construction of best management practice (BMP) and the NPDES permit requirement.
- Conducting pre-construction meetings with contractors to review erosion control methods and inspections for projects that disturb one acre or more for City projects.
- Encouraging programs aimed at fostering responsible water quality management practices by its residents, including educating residents on the proper use of fertilizer as identified in the City's NPDES Storm Water Pollution Prevention Plan.
- Submitting a public notice 30 days in advance for an annual public meeting to review the storm water pollution prevention plan (SWPPP), SWMP, and BMPs.
- Maintaining a means to report (by phone and/or website) construction site erosion control concerns and waste disposal infractions.
- Working with landowners through public education efforts to reduce the amount of animal or pet waste entering local water bodies.
- Preparing and distributing information on pertinent water management issues to residents at least once per year, as required as part of the NPDES Phase II program, in the City's newsletters. This would include providing an opportunity for residents to participate in watershed management activities.

Shorelands and Floodplains

A primary objective of this Comprehensive Plan is the maintenance and, where feasible, improvement of Shorewood's lakeshore through the protection of shoreland impact zones, landscaping and shoreland buffers.

Shorewood first adopted shoreland regulations consistent with Minnesota Department of Natural Resources standards in 1985 and amended them in 1992 to reflect changes in state guidelines. The City included land within 1000 feet of lakes or 300 feet from Purgatory Creek (see Wetlands and Shorelands map) in the shoreland overlay zoning district. That overlay imposes shoreland

requirements in addition to the underlying zoning requirements. These water bodies have been classified by the Department of Natural Resources as Natural Environment (NE), Recreational Development (RD), or General Development (GD), based upon their development characteristics. Lake Minnetonka, Lake William, Galpin Lake, and Purgatory Creek are all classified GD. The remaining lakes are classified RD with the exception of Silver Lake which has a NE classification.

Having been among the first of the Lake Minnetonka communities to adopt shoreland regulations, Shorewood is committed to keeping the shoreland areas as natural as possible. Development in the shoreland district is closely monitored for compliance with site alteration requirements, hard cover restrictions and building setbacks.

Shorewood's floodplain regulations date back to 1979. These rules are intended to protect life as well as property in areas which are subject to periodic flooding. The most recent amendments were completed in 2016 to reflect changes in Federal requirements.

Air and Noise Pollution

The Minnesota Pollution Control Agency (MPCA) establishes the standards for permissible levels of noise and air pollution. The only source of noise or air quality problems in Shorewood is vehicular traffic. Recorded levels have not exceeded State or Federal standards.

In several cases, air quality standards as set by the State of Minnesota are more restrictive than Federal standards. In this regard, two sets of air quality standards have been adopted. The "primary standards" are those ambient air quality levels necessary to protect public health with an adequate margin of safety. Secondary standards refer to those ambient air quality levels necessary to protect public welfare, such as prevention of air pollution damage to crops, natural vegetation, materials and structures.

Although the sources of noise and air pollution in Shorewood are limited, the City does regulate these pollutants through adoption of Minnesota Pollution Control Agency standards by reference in the Zoning Ordinance.

State standards for noise levels suggest that decibel measures of 65 dBA are the point at which action may be taken to reduce noise. No permit system has been established to control noise resulting from existing or future sources. Within the City of Shorewood, State Highway 7 has been and continues to be a primary source of noise pollution.

The Minnesota Department of Transportation (MnDOT) has two programs under which the construction noise barriers along State highways are studied.

> Major Reconstruction Projects. The first program applies to major reconstruction projects in which roadways are expanded with additional lanes of traffic or are modified to have

significantly changes to the vertical or horizontal alignment of the roadway. This type of project usually requires an in-depth environmental review process in which many issues are examined, one of which is noise and noise mitigation. Under this type of project, existing and future noise levels are modeled and if levels exceed Federal Standards then mitigation is analyzed.

To have an area be eligible for mitigation, it must meet MnDOT criteria of a 5-dBA reduction with at least one home receiving at least a 7-dBA reduction in noise and meet with our cost-effectiveness of $78,500/benefited home. As an example, if a barrier costs $700,000 and would reduce noise levels by 5 decibels for 10 homes, the total calculated cost-effectiveness would be $70,000, which would meet the cost effectiveness criteria and the barrier would be proposed as part of the project. It should be noted that even with a 20' high barrier, noticeable noise reductions are limited to usually 300-400' away from the barrier.

Retro-Fit Projects. The second program is commonly referred to retro-fit projects. It applies to stand-alone noise walls where major reconstruction is not planned in the near future. In this study, highway segments in the Metropolitan Area are ranked by existing noise levels, length of barrier, and number of homes adjacent to the highway. Typically funding for this program allows MnDOT to construct 1-3 sites per year. The most recent priority ranking in the Metropolitan Area was conducted in 2016, the results of which are available on the following website:

https://www.dot.state.mn.us/environment/noise/metro.html

Aggregate Resources

There are no known aggregate resources in the City of Shorewood.

Renewable Energy Systems

It is the intent of the City of Shorewood to provide a sustainable quality of life for its residents, making careful and effective use of available natural, human and economic resources and ensuring that resources exist to maintain and enhance the quality of life for future residents. In accordance with this intent, the City has chosen to encourage and promote, rather than restrict, development of renewable energy sources which have a positive impact on energy production and conservation while not adversely impacting the community or where the economic and social impacts can be mitigated.

While the City's Zoning Ordinance specifically recognizes solar, wind and geothermal (ground source heat pump) energy systems, only solar energy and geothermal systems are currently permitted. Shorewood 2040 Comprehensive Plan

Solar Resources

As noted in the Policy Plan chapter of this document, the City of Shorewood promotes energy conservation and encourages the use of alternative energy systems in new construction. In this regard, it is important on both a regional and local scale that solar resources, and specifically the solar access be protected for the development of solar energy systems.

The City of Shorewood is also committed to becoming a more efficient community via future investment in alternative energy systems.

Recognizing the regional importance of solar energy, the Metropolitan Council requires comprehensive plans for Metropolitan Area communities to include the following information:

1. A map which illustrates the City's gross solar potential.

2. A calculation of the City's solar resources.

3. A policy (or policies) which relate to the development of access to direct sunlight for solar energy systems.

4. Strategies to be applied to implement established solar resource policies.

Solar Potential. The map below, developed by the University of Minnesota and provided by the Metropolitan Council, illustrates annual sun energy dispersed throughout the City with "high end" potential areas shown in yellow and areas having "low end" energy potential illustrated in black. Such information can be used to predict the productivity of solar installations. According to the Metropolitan Council, the primary issue in the consideration of solar energy installations is intermittent shading due to nearby structures and trees. In this regard, areas which are shown to have "high end" potential in the City are those areas with very little tree cover.

Solar Resource Calculations. The following table provides an approximation of Shorewood's solar potential expressed in megawatt hours per year (Mwh/yr). To be noted is that the calculations estimate the current potential resource of the City (prior to the removal of areas considered unsuitable for solar development or factors related to solar efficiency).

Shorewood: Gross Solar Potential (Megawatt Hours per Year)			
Gross Potential (Mwh/yr)	**Rooftop Potential (Mwh/yr**	**Gross Generation Potential (Mwh/yr)**	**Rooftop Generation Potential (Mwh/yr)**
3,156,882	282,655	315,688	28,265

Metropolitan Council Notes:

- In general, a conservative assumption for panel generation is to use 10 % efficiency for conversion of total insolation into electric generation.
- The rooftop generation potential does not consider ownership, financial barriers or building-specific structural limitations.

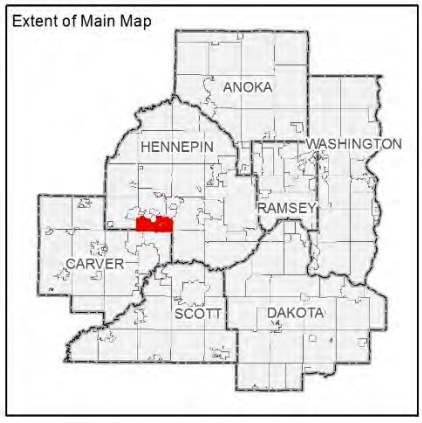
Source: Metropolitan Council, 2017

The estimated gross solar generation potential and gross solar rooftop potential are intended to convey how much electricity could be generated in the City of Shorewood using existing technology and assumptions on the efficiency of conversion. According to the Metropolitan Council, for most cities, the rooftop generation potential is equivalent to between 30 and 60 percent of a community's total electric energy consumption. There is no minimum amount of solar resource development required for cities in the Metropolitan Area.

Gross Solar Potential

City of Shorewood, Hennepin County

1/9/2017



Gross Solar Potential
(Watt-hours per Year)

High : 1277688

Low : 900001

Solar Potential under 900,000 watt-hours per year

County Boundaries

City and Township Boundaries

Wetlands and Open Water Features

Source: University of Minnesota U-Spatial Statewide Solar Raster.

Policy. The City of Shorewood recognizes that providing adequate solar (sunlight) access to properties is a priority not only for potential solar energy systems, but for the protection of property and aesthetic values as well. In this regard, the City will promote reasonable access to solar energy by controlling artificial blockage of solar radiation for optimum long-term economic and environmental benefits. Related to this issue, it should be recognized that tree preservation is also a considered a community priority.

Implementation. Solar access protection is provided for by the uniform implementation of the City's land management tools. Specifically, such protections are provided via lot and building performance standards contained within Shorewood's Zoning Ordinance. Requirements such as maximum building height and yard setback standards are implemented for the purpose of creating separation between structures and allowing equal sunlight access such that a property is not in the shadow of an adjacent building.

As noted, the City established specific regulations which accommodate solar energy systems. Such systems are a permitted accessory use in all zoning districts subject to various conditions to mitigate adverse impacts (limitations related to height, location, size, aesthetics etc.).

NATURAL RESOURCES PLAN SUMMARY

Shorewood is committed to all efforts at maintaining the high quality of its natural environment. The City's goal in this regard is as follows:

> **The City will update (amend) its guidelines and regulations and enforce existing standards to ensure preservation and protection of the natural environment.**

Shorewood has made considerable progress in natural resource protection. As a supplement to the goals, objectives and policies included in the Policy Plan chapter of this document, the following practices would continue, as indicated below:

1. Soil conditions will continue to be taken into consideration in all types of development proposals.

2. Ordinances incorporating Hennepin Conservation District standards related to filling, grading and excavating will continue to be enforced.

3. The City will continue to enforce standards regulating development on steep slopes. For example, grading or construction which results in disturbed slopes of 3:1 (three horizontal to one vertical) shall be restricted.

4. The City will continue to require tree preservation and replacement and site landscaping for all developments.

5. The requirements of the Wetland Conservation Act will continue to be actively enforced.

6. A 35-foot buffer will continue to be required adjacent to all wetlands in new developments. A 15-foot building setback from the natural buffer shall be required.

7. New developments will continue to be required to construct sedimentation ponds designed to National Urban Runoff Program (NURP) standards.

8. Shorewood will continue to expand its environmental educational programs, such as buckthorn removal, raingardens, organics collection, and recycling.

9. Shorewood's shoreland regulations will continue to be enforced in order to preserve and restore the natural character of area lakes.

10. Shorewood's floodplain regulations will be updated as necessary to reflect any changes in State or Federal requirements.

11. Shorewood will consider the establishment of regulations pertaining to wind energy systems.

INTRODUCTION

The Land Use Plan is formulated to show logical relationships between a variety of major land use types, including residential, public, semi-public, commercial, and undeveloped open space. The locations of various land uses are a result of applying the general planning concepts and the specific policies contained in the Policy Plan. For the most part, land use patterns in the City are well-established. In this regard, it is the City's intention to implement desired future uses through zoning. In deciding the amount which is desired of each land use type, the following factors have been considered:

Community Function. Within the context of the Metropolitan Area, the primary role of Shorewood has been the provision of housing. As such, planning must be geared toward providing a quality living environment with adequate supportive services (i.e. park and recreational facilities, neighborhood convenience commercial areas, etc.).

Community Character. Shorewood's current character is primarily single family residential. Shorewood will strive to maintain its character.

Housing. Current residential development in Shorewood consists mainly of single family units. Few new housing units are available to young singles and newly married couples. While housing opportunities for the elderly have increased over the past decade, demand for such housing types continues to exist. As land becomes increasingly scarce, market forces often conflict with what would be considered affordable housing by Metropolitan Area standards. Given Shorewood's desire to maintain its low density residential character, the Land Use Plan attempts to preserve the community's present variety of housing.

Preservation of Open Space. Past planning efforts in the City assumed that any land that is not set aside for wetland protection or parks will ultimately be developed. This does not necessarily need not be the case. This section of the Comprehensive Plan explores means of establishing permanent green space areas such as the use of zoning tools, assisting neighborhoods in purchasing land, obtaining conservation easements, or outright land acquisition by the City.

Regional Growth Management Objectives. As indicated in the Policy Plan, an established goal of the City of Shorewood is to satisfy the Metropolitan Council's minimum residential density objectives for "suburban" communities. It is further the intent of the City to promote growth strategies for orderly and efficient land use which are consistent with the Metropolitan Council's *Thrive MSP 2040* regional development guide. In this regard, the Metropolitan Council has established certain land use-related expectations for designated "suburban" communities such as the City of Shorewood. These expectations are as follows:

- *Plan for forecasted population and household growth at overall average densities of at least five units per acre.*

- *Target opportunities for more intensive development near regional transit investments at densities and in a manner articulated in the 2040 Transportation Policy Plan.*

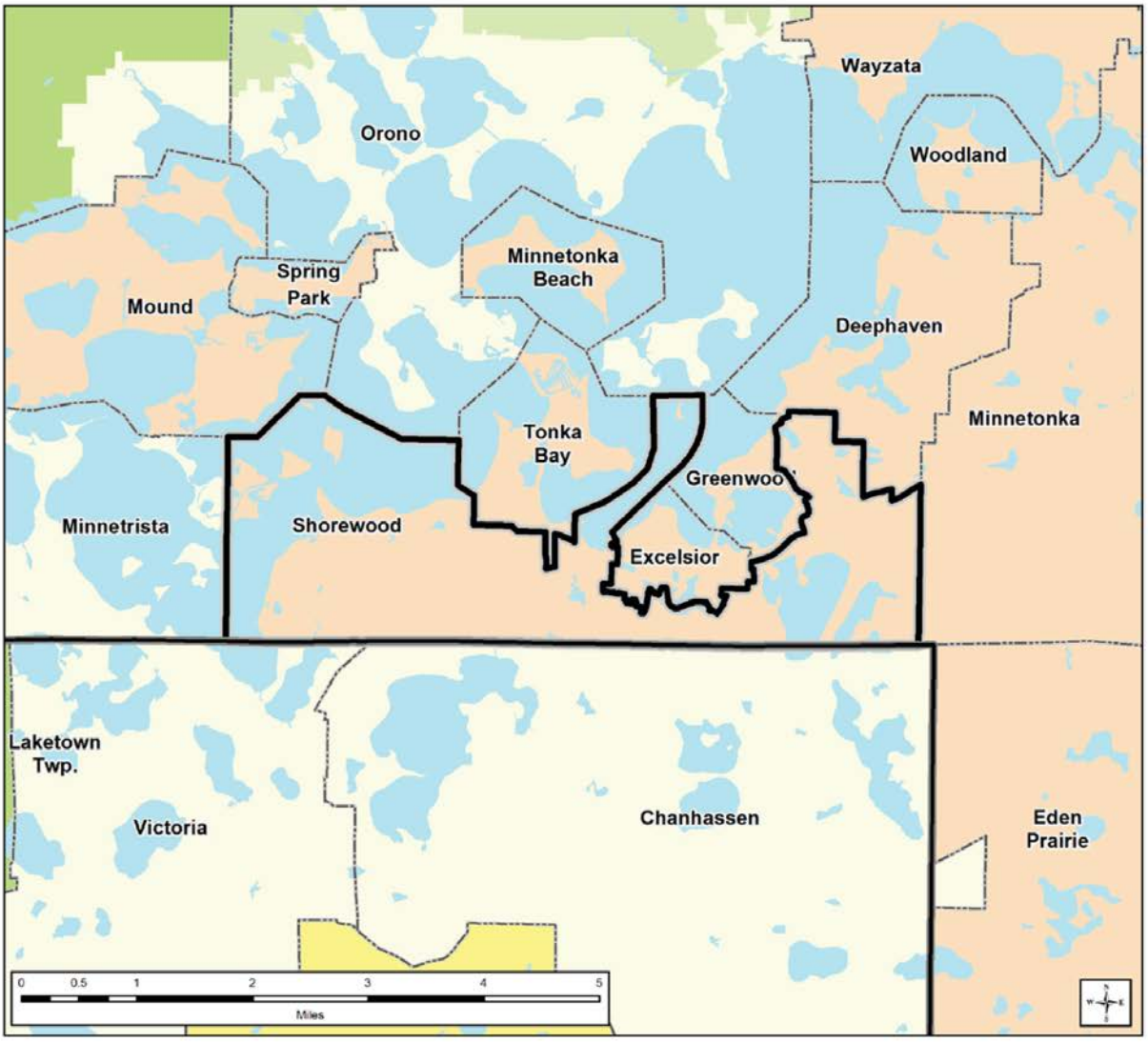
- *Identify areas for redevelopment, particularly areas that are well-served by transportation options and nearby amenities, that contribute to better proximity between jobs and housing.*

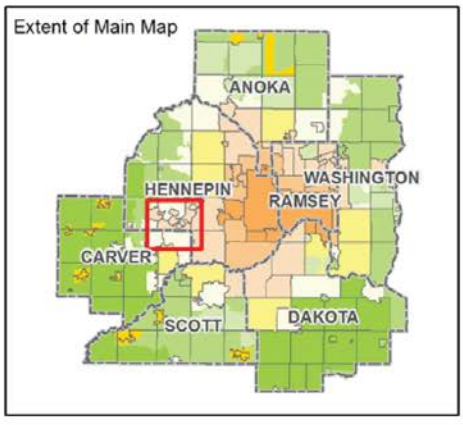
- *In collaboration with other regional partners, lead major redevelopment efforts.*

- *Lead detailed land use planning efforts around regional transit stations and other regional investments.*

- *Plan for and program local infrastructure needs (for example, roads, sidewalks, sewer, water, and surface water), including those needed to accommodate future growth and implement the comprehensive plans.*

Shorewood recognizes its role and responsibility in the attainment of the Metropolitan Council's regional planning objectives.





Community Designations

- Outside Council planning authority
- Agricultural
- Rural Residential
- Diversified Rural
- Rural Center
- Emerging Suburban Edge
- Suburban Edge
- Suburban
- Urban
- Urban Center

- County Boundaries
- City and Township Boundaries
- Lakes and Major Rivers

CONCEPT PLAN

The preceding principles serve as an initial reference guiding community or neighborhood planning and improvement. The next reference point is the Concept Plan. The Concept Plan forms the basis from which categorical elements of the Comprehensive Plan are developed. The plans for environmental protection, land use, transportation and community facilities will relate to the concepts set forth in this section of the document. The physical development and design concepts are derived from the established goals, objectives and policies and an assessment of the community's function within the context of the Metropolitan Area.

Shorewood has adopted as one of its goals the preservation of the community's residential and natural character. For the purpose of this Plan, a community is defined as an entity possessing a common likeness or character. Since the basic character of Shorewood is that of a residential community, it is essential that each residential neighborhood be maintained as a unit with a sense of continuity and focus. Moreover, as certain supportive services and facilities are required in order for a residential community to function properly, nonresidential uses should be likewise maintained. Thus, proper attention to each constituent part of the community is essential to the establishment of an identity or sense of community.

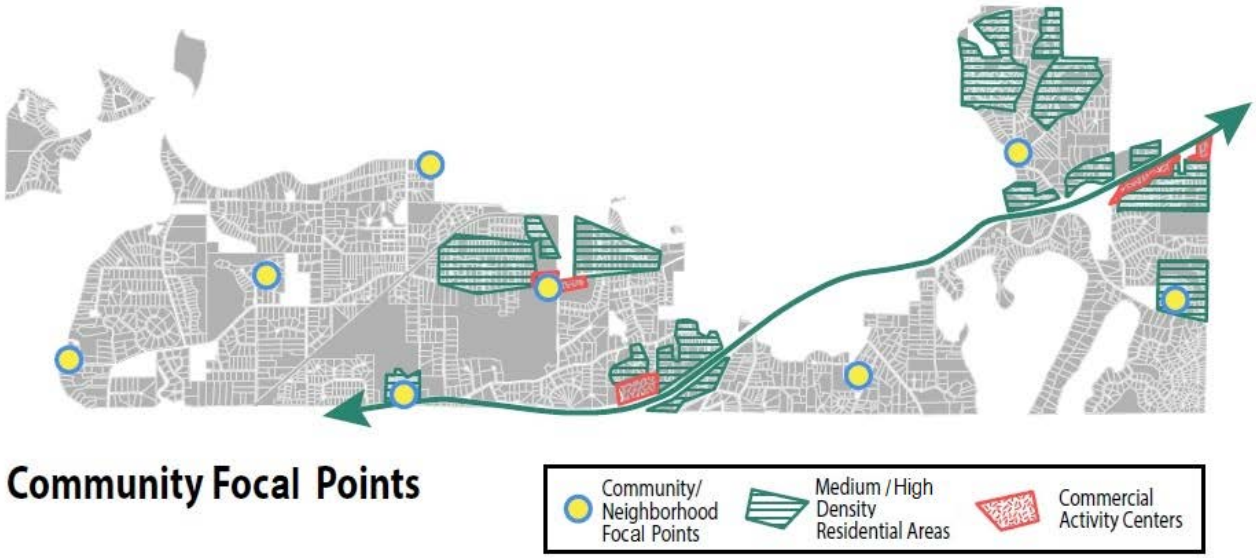
In order to enhance or reinforce the sense of community identity in Shorewood, it is essential that a strong sense of place be provided. In this regard, it is proposed that neighborhood parks ranging in size depending on the circumstance serve as focus or unifying elements. This concept is illustrated on the sketch shown on the following page.

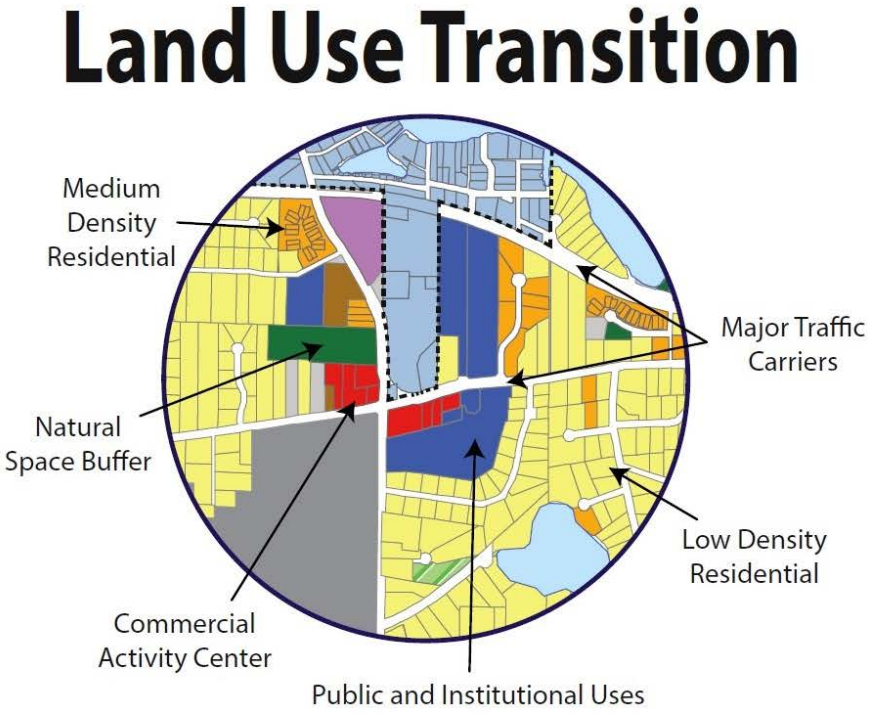
In order to relate neighborhoods on a community scale, community focal points should be developed (see concept plan sketch). Typically, a community would have one central activity center to serve this purpose. However, given the elongated shape of the City of Shorewood, multiple activity centers are proposed. While these focal points already exist to a certain extent, planning for the community should recognize and attempt to enhance these activity centers.

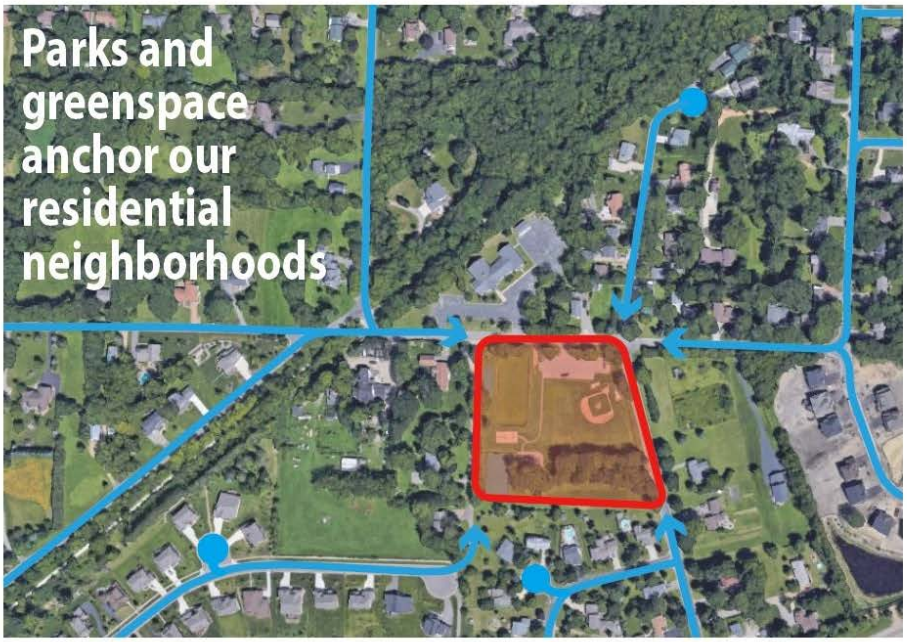
The commercial center should remain easily accessible to all residential districts. The center should also project a unified image with individual components of the center arranged so as to create functional and complementary use relationships. Circulation within the core should be, to the extent possible, largely pedestrian-oriented. In order to increase the continuity of the center, while at the same time increasing pedestrian safety, major traffic flow should be routed around the periphery of the center, penetrating it as little as possible. Finally, commercial property maintenance should represent and reflect the vitality and stability of the entire community.

The shopping center at Lake Linden Drive and Highway 7 is a primary commercial focus for the City. More recently, the commercial areas abutting County Road 19 have come to the forefront. The City's County Road 19 Corridor Study emphasizes the issue of identity, going so far as to identify the corner of Smithtown Road and County Road 19 as "Smithtown Crossing." Smithtown Crossing is another significant entry point into the City and efforts to enhance the area should continue.

The Waterford commercial area located south of Highway 7 between Vine Hill Road and Old Market Road is also considered a commercial focal point. Neighborhood and/or convenience type commercial as well as office uses should continue to be encouraged in this area.




Land Use Transition
Medium Density Residential
Major Traffic Carriers
Natural Space Buffer
Low Density Residential
Commercial Activity Center
Public and Institutional Uses


Parks and greenspace anchor our residential neighborhoods

The City Hall and surrounding City property is another community focal point and serve as the civic center for Shorewood. Development of this area should be representative of community attributes and set an example for private development in the community.

Community parks have been developed within the community to serve the recreational needs of the City. Additionally, trails developed as a result of the trail planning process serve to tie the community together.

Land Use Classifications

The following maps illustrate Existing Land Use in Shorewood and the Land Use Plan for the community. The Land Use Plan map shows the proposed juxtaposition of a variety of land use types and densities. These land uses are described in general below.

Open Space. This category consists primarily of wetlands, conservation areas and other areas set aside from development. Open Space areas are indicated on the Existing Land Use Map. These areas are scattered throughout the community and range in size from small wetlands/ponds to large tracts of land found near Howard's Point Road and east of Christmas Lake. Protection of these natural areas is considered important, both in terms of Shorewood's natural drainage system and retention of community aesthetics.

As undeveloped land in Shorewood becomes scarcer, there is increasing interest in preserving at least some of it as permanent open space. Given the high cost of remaining land in Shorewood, the focus of the City's efforts should be acquisition of conservation easements versus outright purchase of land.

Minimum Density Residential. While the City has recognized a need for providing areas that allow a somewhat higher density than one-acre lots, there is still demand for large lots. The areas indicated on the Land Use Plan map consist of land where such development is already prevalent. Any residential infill development should be compatible with existing neighborhood densities to retain the character of neighborhoods. This is consistent with past City practices and approved comprehensive plans.

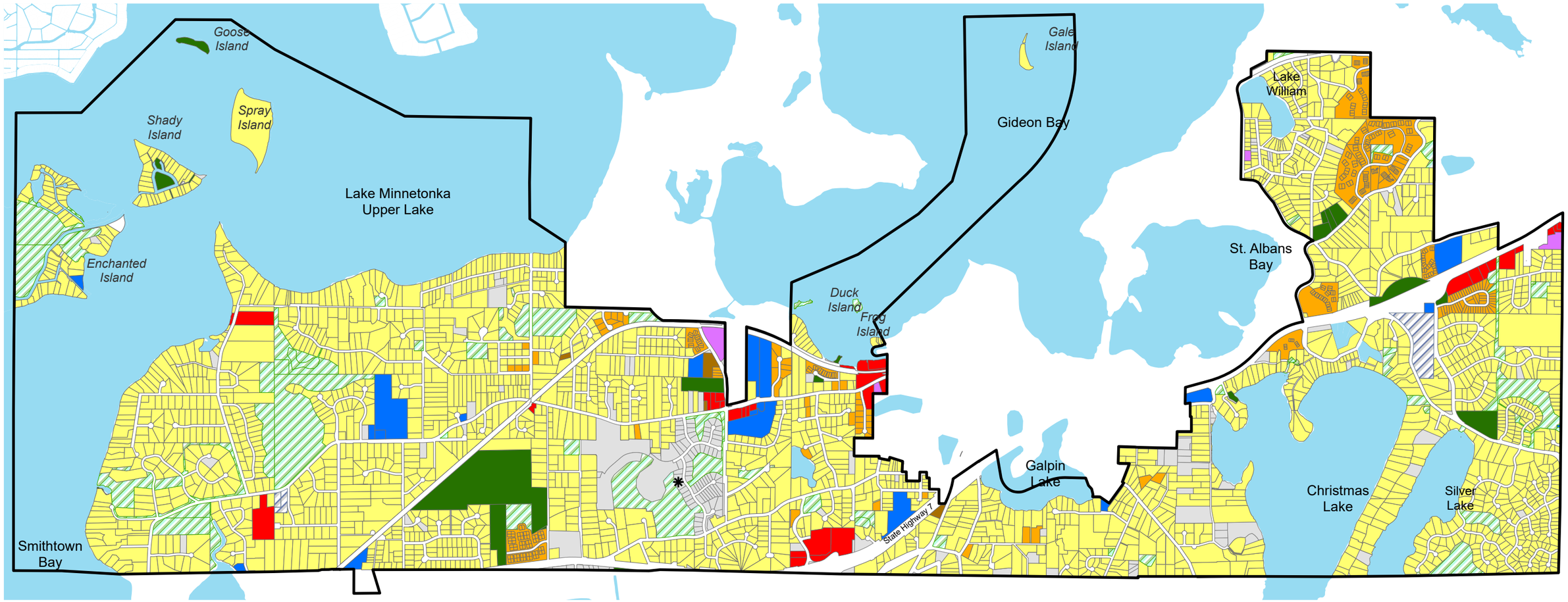
Overall density is proposed at .1 to 1 unit per acre. Most of the areas proposed as minimum density are near natural areas, such as lakes or wetlands. The City must ensure that any changes in density to surrounding areas have a minimum of impact on the lower intensity use.

The following is a summary of the City's single family residential zoning districts and the minimum lot sizes which could be applied within the Minimum Density Residential land use category. The City Council may also find other districts, including the Planned Unit Development district, consistent with the Comprehensive Plan.

R-1A, Single-Family Residential District	40,000 square feet
R-1B, Single-Family Residential District	30,000 square feet

Existing Land Use

City of Shorewood
2040 Comprehensive Plan



✱ Platting and construction for the Minnetonka Country Club Development has begun, which inlcudes 142 units of low density residential

Existing Land Use

- Single-Family Residential
- Two-Family Residential
- Multiple-Family Residential
- Commercial
- Industrial
- Public/Institutional
- Parks
- Open Space
- Cemetary
- ROW
- Vacant
- Open Water

Map created: December 2022
Data: NAC, MnDNR, Metropolitan Council & Hennepin County

0 0.25 0.5 1
Miles

N

NORTHWEST ASSOCIATED CONSULTANTS, INC.
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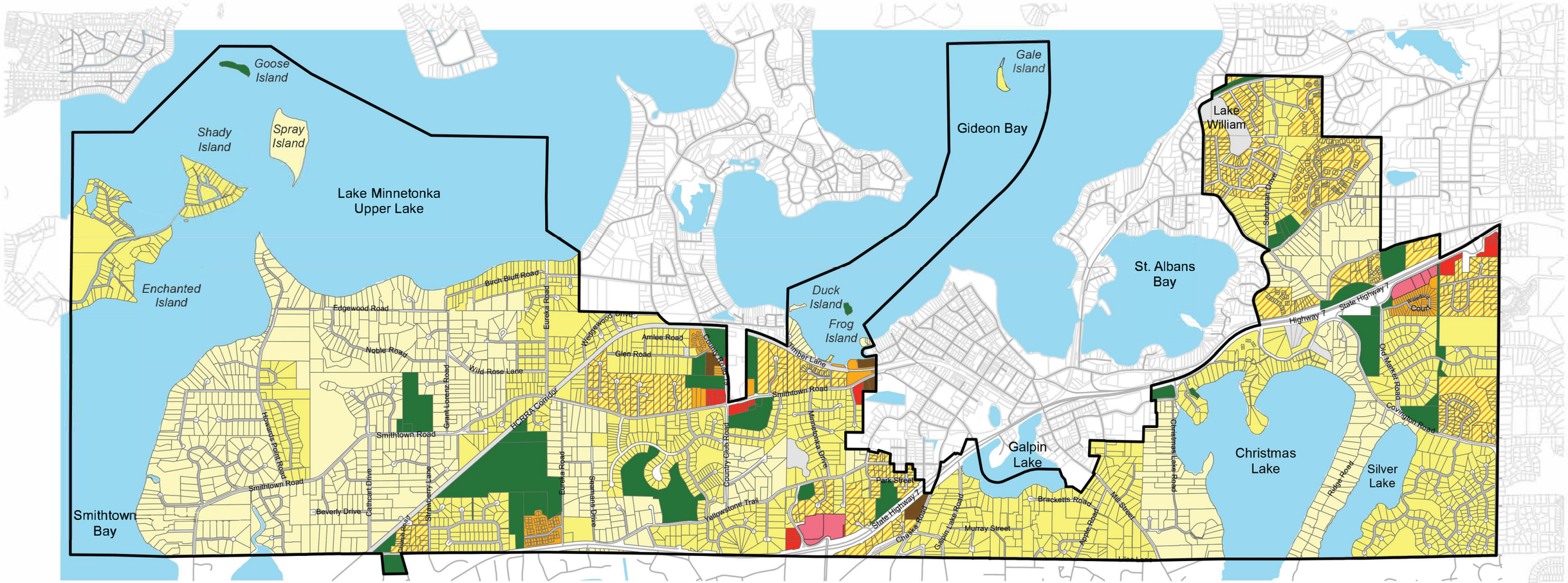
Telephone: 763.231.2555 Website: www.nacplanning.com

Future Land Use

City of Shorewood
2040 Comprehensive Plan



Future Land Use

- Minimum Density Residential
- Low Density Residential
- Low to Medium Residential
- Medium Density
- High Density Residential
- Commercial
- Commercial-Mixed Use
- Public/ Semi- Public; Public/Semi-Public
- City Boundary

Map created: December 2022
Data: NAC, MNDNR, Metropolitan Council

0 0.275 0.55 1.1
Miles

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4150 Olson Memorial Highway, Ste. 320, Golden Valley, MN 55422
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Low Density Residential. This land use category basically consists of single or two family residential uses at a density of one to two units per acre. Most of the area designated as low density residential on the Land Use Plan is already zoned for this type of development. The following is a summary of the City's single family residential zoning districts and the minimum lot sizes which could be applied within the Low Density Residential land use category. The City Council may also find other districts, including the Planned Unit Development district, consistent with this Comprehensive Plan.

R-1A, Single-Family Residential District	40,000 square feet
R-1B, Single-Family Residential District	30,000 square feet
R-1C, Single-Family Residential District	20,000 square feet
R-2A, Two-Family Residential District	20,000/30,000 square feet
R-2B, Two-Family Residential District	15,000/20,000 square feet

Low to Medium Density Residential. This category of land use is provided to allow residential development at a density of three to six units per acre. This density begins to allow a greater variety of housing types. Small lot single family residential, two-family homes and medium density townhouse development may be permitted in these areas.

Residential development at this density is viewed as serving two purposes: 1) proper location creates a transitional area between lower density residential uses and higher intensity uses such as commercial (see concept plan), and 2) applies the concept of locating a greater density of population nearer to activity centers and major traffic carriers.

The following is a summary of the City's residential zoning districts and the minimum lot sizes which could be applied within the Low to Medium Density Residential land use category. The City Council may also find other districts, including the Planned Unit Development district, consistent with this Comprehensive Plan:

R-1D, Single-Family District	10,000 square feet
R-2A, Single and Two-Family District	20,000/30,000 square feet
R-2B, Single and Two-Family District	15,000/20,000 square feet
R-2C, Single and Two-Family District	10,000/15,000 square feet
R-3A, Multiple Family District	20,000/30,000 square feet
R-3B, Multiple Family District	15,000/20,000 square feet

Medium Density Residential. This land use category directs residential uses at densities of six to eight units per acre. Types of housing allowed in these areas would include medium density townhouse development and potentially small-scale apartment or condominium units.

The areas proposed for medium density residential are relatively limited in area and number so as to have a minimum effect on the overall density of the community. These areas include primarily the properties immediately adjacent to the existing commercial uses. Once again, the concepts of land use transition and higher density near activity centers have been applied.

The following is a summary of the City's residential zoning districts and the minimum lot sizes which could be applied within the Medium Density Residential land use category. The City Council may also find other districts, including the Planned Unit Development district, consistent with this Comprehensive Plan.

R-3A, Multiple Family Residential District (dwellings with up to four units)	20,000/30,000 square feet
R-3B, Multiple Family Residential District (up to 10 dwelling units per acre)	15,000/20,000 square feet

High Density Residential. This land use category represents the highest density residential use proposed within the City of Shorewood. Specifically, the category makes an allowance for residential densities ranging from eight to 30 units per acre. It is anticipated that greater densities could potentially be accommodated via planned unit development for projects which fulfill PUD development objectives and for which adequate services can be provided.

This category is applied to the existing "Shorewood Landing" senior housing facility and Shorewood Place Apartments sites. Additionally, potential redevelopment sites near the intersection of County Road 19 and Smithtown Road may be considered for high density residential use in the future. The Planned Unit Development district would likely be used to implement this district, although other options are also discussed.

Commercial. This land use category includes locations where commercial retail and service uses are desired. As in the case of the City 2030 Comprehensive Plan, the City prefers commercial uses in Shorewood be confined to cohesive, compact activity centers.

Existing commercial development in Shorewood is relatively limited. While Shorewood lacks a traditional downtown commercial center, adjacent commercial centers located in abutting communities supplement the commercial needs of Shorewood residents. Nearby Downtown Excelsior and the Tonka Village commercial strip center located in Tonka Bay are two primary examples. In recognition of such neighboring commercial uses, the demand for additional commercial services in the City of Shorewood may be limited.

The only existing commercial uses shown in the western portion of the community are an existing marina on Howard's Point Road and an auto repair operation on Smithtown Road near Eureka Road. Both uses presently exist as lawful non-conforming activities.

While the City's marinas are lawful non-conforming uses (which lie within residential zoning districts), they are viewed as community amenities. In this regard, the City will investigate zoning mechanisms which make an allowance for the uses in a manner which is compatible with surrounding residential neighborhoods.

Most of the commercial land use in Shorewood is located near the center of the community (along the County Road 19 corridor) and on the east end between Vine Hill Road and Old Market Road. The area near the intersection of Smithtown Road and County Road 19 is devoted primarily to auto-oriented commercial uses. The shopping center lies within the City of Tonka Bay, but serves as a general commercial area for Shorewood residents as well.

Commercial development along the County Road 19 corridor through Shorewood is prime for redevelopment. The City has expressed a strong preference to see the northwest quadrant of Smithtown Road and County Road 19 redeveloped in a unified manner. This may require the assembly of various parcels and is well-suited for a combination of multiple family residential and commercial uses. The auto-oriented strip of commercial uses on the south side of County Road 19, adjacent to Smithtown Crossing, could be redeveloped with more retail or office uses as well.

Shorewood's has a shopping district located on Highway 7 north of the intersection with Highway 41. A portion of this site is guided for future Mixed Use development, and the area surrounding the shopping center has been designated for low to medium density residential use on the Land Use Plan.

The area located on the south side of Highway 7, between Vine Hill Road and Old Market Road is primarily neighborhood and convenience-type commercial. A portion of this area is also guided for future Mixed Use.

Commercial Mixed Use. While the City aims to maintain vibrant commercial areas to serve community residents, certain commercial areas have been identified as being appropriate for the Commercial Mixed Use designation. The City has identified certain key existing commercial areas that are capable of providing for housing units in conjunction with maintaining commercial activity. These housing units would provide adequate density to aid in increasing the commercial customer base while also providing for a greater range of housing choice within the community.

These sites may merit redevelopment into mixed use, provided the development plan is appropriate for the context of the area, traffic issues are properly mitigated, and it fits within the goals and policies of the City. The City requires a minimum of 50% of the site to be maintained as a Commercial land use, to continue the important commercial presence within these areas.

Residential uses with a minimum of 15 units per acre and a maximum of 30 units per acre shall be used for a minimum of 40% of the site, provided it can be established in a manner that is consistent with the character of the immediate vicinity.

Public/Semi-Public. This land use classification includes all existing public buildings, a school, parks and recreational facilities in the community. It also includes semi-public uses like churches, cemeteries and the Xcel property on County Road 19. All areas so designated on the Land Use Plan map are already in existence. No new areas are proposed for semi-public use nor are any existing semi-public uses proposed to be eliminated. Since light rail is not anticipated in the

foreseeable future, the former Chicago and Northwestern rail right-of-way will continue to be operated by Three Rivers Park District and used for regional trail purposes.

Land Use/Zoning Changes

As in the case of the Shorewood's 2030 Land Use Plan, the City's zoning map must be consistent with the proposed 2040 Land Use Plan map. To achieve such consistency, some changes to the zoning map may be necessary to implement the Land Use Plan:

Going forward, it is anticipated that the following issues should be addressed through future Zoning Code amendments:

High Density Residential Zoning District. As previously indicated, the City's zoning ordinance does not presently include a high density residential zoning district. While the City's R-3B, Multiple Family Residential zoning district makes an allowance for apartment buildings, it establishes a density cap of 10 units per acre. Considering that the "High Density Residential" land use category provided on the City's 2040 Land Use Plan makes reference to a density range of eight to 30 units, the following processing alternatives may wish to be considered to accommodate future high density residential housing projects in the City:

1. Amend the City's R-3B, Multiple Family Residential District to accommodate residential densities up to 30 units per acre.

2. Utilize PUD, planned unit development to accommodate residential development densities which exceed those allowed in the City's base zoning districts.

3. Establish a new "High Density Residential" zoning district which corresponds with the density range identified on the 2040 Land Use Plan.

Teardown and Rebuild Regulations. Like many communities throughout the country, Shorewood has become concerned about the construction of very large homes on existing lots in existing neighborhoods. While the City cannot do much about the seemingly increasing market for large homes, it can, through its zoning regulations, attempt to maintain the scale of existing neighborhoods. In this regard, the City could consider incorporating FAR (floor area ratio) into its Zoning Code. This establishes a maximum amount of building area relative to lot area, further addressing the issue of residential scale.

Alternative Energy Regulations. While the City's Zoning Code specifically recognizes solar, wind and geothermal (ground source heat pump) energy systems, specific regulations have only been stablished for solar and geothermal energy systems at this point. In the future, the City may also consider regulations that would allow wind systems.

While the City encourages solar energy systems, it is important that the allowance of such systems be balanced with the community's desire to protect and preserve significant trees. As noted on the

Planning Tactics chapter of this Plan, the preservation of significant trees in the community is considered a community priority.

Construction Staging Plans. As noted in the Policy Plan, efforts should be made to limit on-street parking and protect adjoining properties from nuisance concerns associated with construction projects. In this regard, staging plans should be required for all infill development projects. Minimally, such plans should address contractor parking locations, construction material storage, construction hours, and street cleaning.

Commercial Mixed Use Zoning. The City will need to determine how to properly implement the Commercial Mixed Use land use designation. This may include modifications of existing zoning districts, establishment of new districts, or the use of innovative planning tools.

Residential Development Density

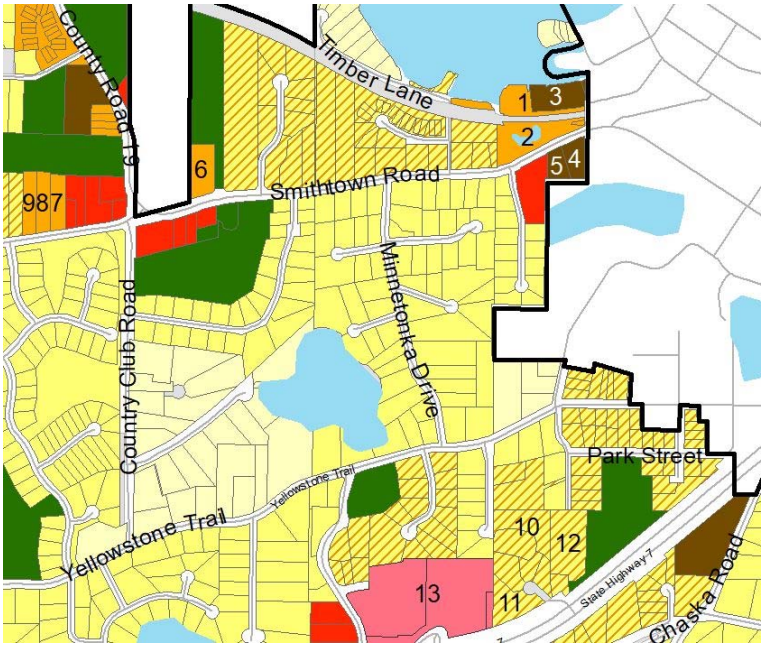
As previously indicated, the Metropolitan Council's Thrive MSP 2040 regional development guide stipulates that "suburban" communities such as Shorewood should plan for forecasted population and household growth at overall average densities of at least five units per acre. In this regard, such minimum densities apply to new residential subdivisions or redevelopment projects. To the extent possible, densities of new projects will be sensitive to and compatible with surrounding residential densities. The regional development guide also notes that higher densities are expected in locations with convenient access to transportation corridors and adequate sewer and water capacity.

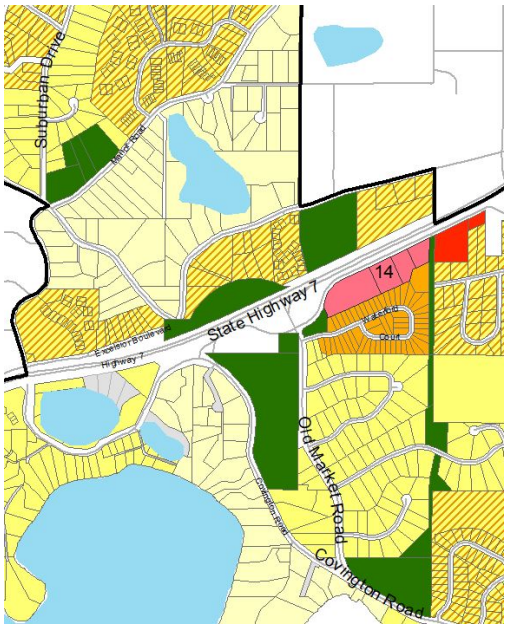
The City has established certain areas for development and redevelopment that will provide additional housing units for the City in this planning period. For the purposes of this table, the areas classified as Commercial Mixed Use are established as 40% residential at 15 units per acre. Therefore, the acreages in the table only is the residential portion.

Shorewood Staging of Residential Land Use Development				
	2021-2030		2031-2040	
Land Use Category	Units	Acres	Units	Acres
Low-Medium Density Residential	6	1.7	15	4.7
Medium Density Residential	12	2.0	32	5.2
High Density Residential	30	3.7	0	0.0
Commercial Mixed Use	42	2.8	75	5.0
Totals	90	10.2	122	14.9

Shorewood Development Capacity			
Property	Net Acres	Minimum Density	Minimum Units
1	1.7	6	11
2	1	6	6
3	1.7	8	14
4	1	8	8
5	1	8	8
6	1.5	6	9
7	1	6	6
8	1	6	6
9	1	6	6
10	1.8	3	6
11	1.7	3	6
12	2.9	3	9
13	12.5 (5 residential)	15	75
14	7 (2.8 residential)	15	42
Totals	25.1	8.4 units per acre	212

The location of the development sites are noted in the graphics below:





Land Subdivision

Controlling the way land is subdivided goes hand in hand with zoning regulations in ensuring the quality of urban development. As Shorewood's larger tracts become developed, increasing pressure will occur to re-subdivide smaller parcels and land once considered to be marginal. The City's subdivision regulations should periodically be reviewed and updated to better address these situations. Further, all subdivisions of land should be examined for opportunities to preserve open space.

The current Subdivision Code requires developers to extend streets and utilities as necessary to accommodate the development of adjacent properties. Also, the Code prohibits private streets except where determined "to be absolutely essential to the enjoyment of property rights." With these rules in mind, the review of all subdivision requests should consider how nearby land might develop in the future. In all cases, steps should be taken to ensure that new subdivisions do not negatively impact surrounding neighborhoods and street systems.

To address City concerns related to narrow street widths, related on-street parking and sidewalks/trails, Shorewood could develop a local street template.

More often than not, when one landowner is ready to subdivide its property, the adjoining landowner is not. Timing then becomes an obstacle to avoid detrimental, piece-meal development. The City can, in certain instances, overcome such obstacles by carefully crafting development agreements and restrictive covenants that provide for future development. For example, public right-of-way can be required for future streets with provisions that further development will result in street and utility assessments. Also, planned unit development can be used as a tool to accommodate the different timing of various landowners' development requests.

As smaller pieces of land are re-subdivided, lot configurations become a problem. Backlot divisions, flag lots and gerrymandered property lines undermine the benefits of building setbacks and disrupt continuity of open spaces. All subdivisions, regardless of size, should adhere to good planning and design principles. To this end, the use of formal platting procedures will be encouraged, while lot splits with metes and bounds descriptions will be approved only in the very simplest of cases.

Tree Preservation

As previously noted, the preservation of Shorewood's natural features is considered a community priority. With this in mind, the City's should periodically review the Tree Preservation and Reforestation Policy to ensure that existing policies adequately reflect desired preservation objectives.

Presently, the terms and provisions of the Tree Preservation and Reforestation Policy apply to all activities which require the issuance of a Land Disturbance Permit. At some point, the City should

consider formerly incorporating the "policy" provisions into the City's Zoning and Subdivision Codes.

Housing Variety/Affordability

Shorewood's attempts to provide affordable housing have been thwarted in the past by market forces. The desirability of the area, coupled with scarcity of available land make it very difficult to achieve housing that is considered affordable by Metropolitan Area standards. The City's efforts have been focused on preserving the existing housing stock. For example, limitations have been imposed relative to combining small buildable parcels of land into larger lots. With respect to housing variety, the City may consider updating its current zoning regulations to accommodate and encourage senior housing that includes dependent living such as assisted living and dependent care facilities.

The Metropolitan Council has forecast affordable housing needs for all cities and townships within the seven-county Metropolitan Area for the period from 2021-2030. The housing plan element of local comprehensive plans is required to reflect the allocated portion of the forecasted demand for affordable housing. Shorewood's share of this affordable housing allocation is 48 units for the referenced time period.

The City has guided 3.7 acres for development as High Density Residential at 8 units per acre (30 units). The City has guided an additional 19.5 acres as Commercial Mixed Use, which allows for a minimum of 40% and a maximum of 50% residential development at 15 units per acre. This results in a minimum of 7.8 acres (40% of 19.5) for residential uses (117 units). In total, these land use designations will provide for 147 units of affordable housing based on density. Of the Mixed Use Areas, 2.8 acres (42 units) are anticipated for redevelopment within the 2021-2030 staging period, which gives the City 72 units of affordable housing based on density during this stage.

Programs, initiatives, and actions relative to housing are included in the Housing chapter of this Plan.

Lake Access

In 1988, after considerable study, the City adopted zoning controls that addressed the use of old existing fire lanes within the community. Originally platted as public rights-of-way leading to Lake Minnetonka and Lake William, these lanes have been classified and regulated based upon their historic use. This effort concluded that the fire lanes should not be vacated, but rather should be preserved for public use.

Access to Shorewood's lakes is also provided by a marina and two yacht clubs as described below:

> Howard's Point Marina. While limited in size, Howard's Point Marina is considered a community amenity. In this regard, its continuance as a functional marina is encouraged.

Upper Minnetonka Yacht Club. Like Howard's Point Marina, the Upper Lake Minnetonka Yacht Club located on Enchanted Island is considered a community amenity.

Shorewood Yacht Club. The City recently relaxed a restriction on the mooring of power boats at the Shorewood Yacht Club, located on the north side of County Road 19, east of Timber Lane. Over the next several years, the City will monitor activity at the Yacht Club to determine if such activities are compatible with surrounding residential uses.

While the marina and yacht clubs are lawful non-conforming uses (which lie within residential zoning districts), they are viewed as community amenities. In this regard, they should continue to function as they have in the past, but not be expanded due to their residential neighborhood context and limited accessibility. In this regard, the City will investigate zoning mechanisms which make an allowance for the uses in a manner which is compatible with surrounding residential neighborhoods.

The Minnesota Department of Natural Resources and the LMCD continue to search for lake access parking spaces adjacent to Lake Minnetonka. The City should cooperate with these agencies to provide small, scattered facilities compatible with nearby land uses.

Historic Preservation

From a land use perspective, historic structures oftentimes have not only local significance but regional importance as well. In this regard, The Metropolitan Council suggests that 2040 comprehensive plan updates include a plan for the protection of historic sites.

The City of Shorewood recognizes that historic assets help to promote community pride and create a sense of community. In this regard, the City of Shorewood should consider the creation of an inventory of historically significant features, landmarks and buildings and evaluate tools for preserving these areas and structures. Where feasible, the City could potentially assist with the acquisition of historically significant sites or structures, in order to provide educational or recreational opportunities.

Population and Household Projections Based Upon Land Use Plan

The following table shows the acreages of various categories of land use based upon the Existing Land Use Map and the 2040 Land Use Plan.

Shorewood Forecasts					
	2010 Census	2018 Estimate	2020	2030	2040
Population	7,307	7,693	7,600	7,800	8,000
Households	2,658	2,845	2,800	2,910	3,000
Employment	1,113	1,600	1,600	1,600	1,600
Source: Metropolitan Council					

Shorewood Existing Land Use		
Land Use	Acres	Pct
Single-Family Residential	2169.5	72.86%
Two-Family Residential	137.2	4.61%
Multiple-Family Residential	7.1	0.24%
Commercial	54.7	1.84%
Industrial	8.8	0.30%
Public/Institutional	69.4	2.33%
Parks	99.3	3.33%
Open Space	280.5	9.42%
Cemetery	2.6	0.09%
ROW	35.6	1.20%
Vacant	85.7	2.88%
Open Water	27.2	0.91%
	2977.6	100%

Shorewood Future Land Use		
Land Use	Acres	Pct
Minimum Density Residential	1141.703	38.34%
Low Density Residential	1110.797	37.31%
Low to Medium Residential	349.7	11.74%
Medium Density Residential	37.8	1.27%
High Density Residential	9.7	0.33%
Commercial	18.7	0.62%
Commercial Mixed Use	19.5	0.65%
Public/Semi-Public	226.7	7.61%
ROW	35.6	1.20%
Open Water	27.4	0.92%
	2977.6	100%

The amount of land shown as undeveloped is somewhat deceiving in that there is a considerable amount of land included in developed categories which has potential for additional development. For example, an existing home on a three-acre lot could eventually, and often likely will be, re-subdivided into several residential lots. Therefore, the best way to project future land use, and ultimately population, is by comparing the Vacant and Underdeveloped Land map with the 2040 Land Use Plan. The Vacant and Underdeveloped Land map illustrates not only undeveloped land, but also "underdeveloped" land, that is, land already accounted for in a land use category, but which has potential for further development.

The Metropolitan Council provides forecasts for population, households, and employment which are shown on the table below. The Metropolitan Council forecasts that Shorewood has the potential for 3,000 households (or 155 additional households) by the year 2040.

Population Projections, 2010 – 2040
City of Shorewood

	2010 Census	2018 (estimate)	2020 Forecast	2030 Forecast	2040 Forecast
Population	7,307	7,693	7,600	7,800	8,000
Households	2,658	2,845	2,800	2,910	3,000
Household Size	2.75	2.70	2.71	2.68	2.67
Employment	1,113	1,600	1,600	1,600	1,600

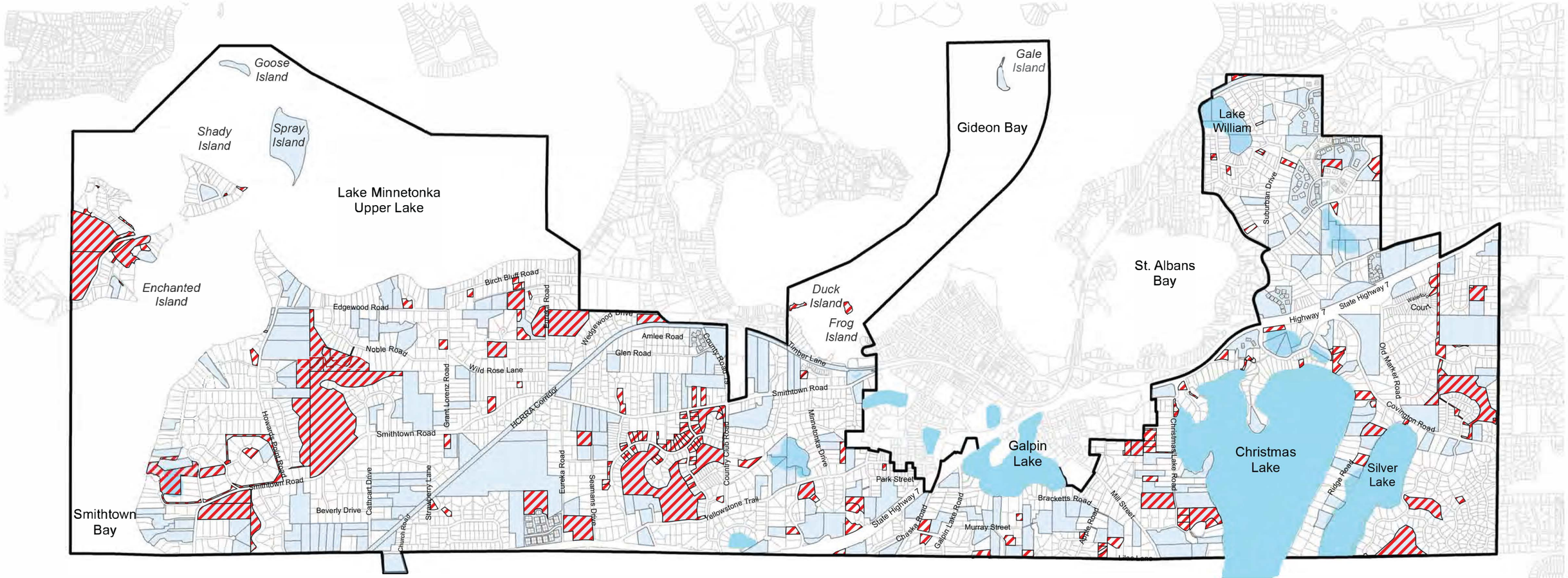
Source: Metropolitan Council

The Metropolitan Council estimates that the 2018 average household size for Shorewood was 2.70 persons per household. For the seven-county region, the Metropolitan Council projects a decline in household size to 2.46 persons per household in 2020 and 2.43 in 2030 and 2040. While this may be true for the region as a whole, the decline in household size in Shorewood is expected to be less considering the City is predominantly comprised of single-family homes.

The projections referenced above do not account for redevelopment where several existing lots are combined then re-subdivided to create additional lots. While this requires extraordinary cooperation between property owners, it will increasingly occur as land prices continue to outstrip the value of some of the older housing stock.

Vacant and Undeveloped Land

City of Shorewood
2040 Comprehensive Plan



Vacant and Undeveloped

Vacant or Open Space | Parcels over 80,000 SQFT | City Boundary

Map created: December 2022
Data: NAC, MNDNR, Metropolitan Council

0 0.275 0.55 1.1
Miles

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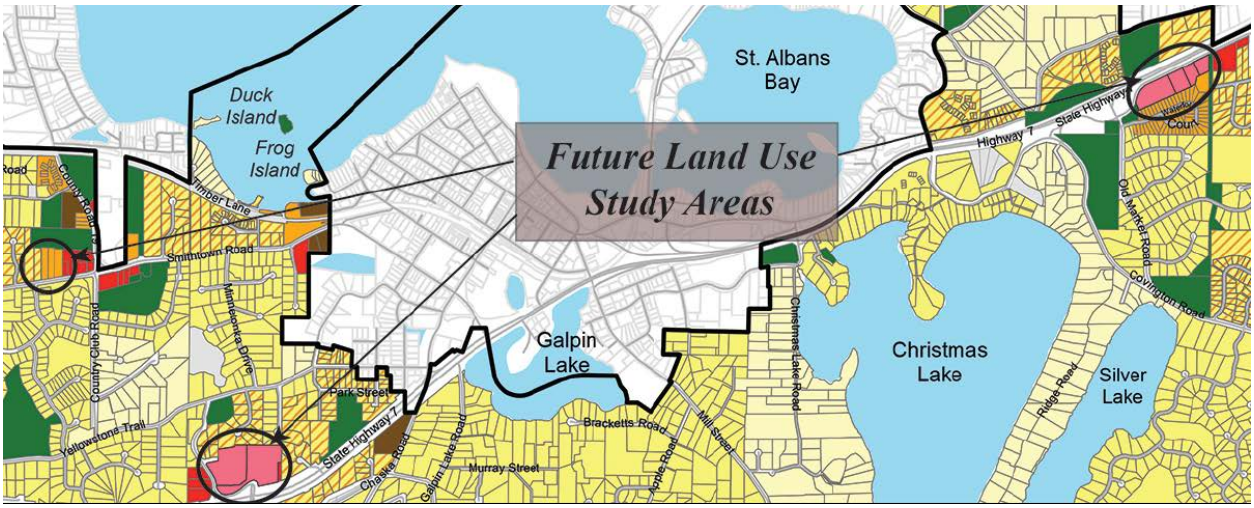
Future Study Areas

Prior to establishing establishing development plans for certain areas, the City may need to conduct specific area plans. The three acre Medium Density area west of County Road 19 needs to be reviewed to confirm the site can accommodate this density due to its location and configuration. Prior to establishing firm controls regarding the Mixed Use areas, the City will need to conduct studies related to land use and traffic.



CHAPTER SUMMARY

The Land Use Chapter sets forth goals, objectives and policies which serve as a guide for how land within the City is to be developed and used. Shorewood has established itself as a predominantly residential community. Any nonresidential activities which are allowed should be located and designed to support a quality living environment. The City's land use goals are as follows:

- **The City shall establish a pattern of land uses which is consistent with the residential and recreational functions of the community.**

- **The land use plan shall promote harmonious relationships between various land uses (e.g. homes, commercial outlets, churches, parks, schools, etc.) through proper development and locational planning.**

- **Land use regulations shall discourage land uses which are inconsistent with the residential and natural character of the community.**

The following summary of recommendations is reflective of the City's goals, objectives and policies:

1. Create and enhance focal points within City neighborhoods.

2. Concentrate commercial development in the following primary locations:

   A. Smithtown Road / County Road 19
   B. Lake Linden Drive / Highway 7
   C. South of Highway 7 between Vine Hill Road and Old Market/Road

3. Require commercial development to be consistent with the residential character of the community.

4. Allow for mixed use development within commercial areas where appropriate for the site.

5. Promote the use of sound planning and design principles, including planned unit development.

5. Coordinate the development of small land parcels to ensure that access and utility service comply with City standards.

6. Maintain a Land Use Plan to illustrate the relationship of various densities of residential development and non- residential uses.

7. Keep the City's land use controls (e.g. Zoning and Subdivision Ordinances) up to date as a means to implement the Land Use Plan.

8. Identify areas which are best suited for planned unit developments.

9. Require formal platting procedures for the subdivision of land, allowing metes and bounds divisions only in the simplest of cases.

10. Establish zoning provisions which are intended to accommodate the continuance of the City’s marinas in a manner which is compatible with surrounding neighborhoods.

11. Promote and implement programs for the preservation of open space.

INTRODUCTION

Shorewood is a suburban, residential community. Less than one percent of the City is devoted to commercial uses. As a predominantly residential community, housing is an important aspect of this Comprehensive Plan.

Past planning efforts in Shorewood have focused on housing quality and maintaining the character of existing neighborhoods. Residential densities have historically been kept low to minimize the demand for public utilities and services. This has also resulted in low traffic volumes relative to other suburban communities in the Metropolitan Area.

Over the past several years, attention has been given to the lack of housing options, particularly to accommodate an increasing elderly population. Shorewood's zoning regulations have been amended to address senior housing.

Also, to be noted is that the City of Shorewood is willing to work with other Lake Minnetonka cities to address housing issues from a sub-regional perspective.

As in the case of other Development Framework chapters of this Plan, the Housing Plan considers housing-related issues identified in the Planning Tactics chapter and the goals, objectives and policies included in the Policy Plan.

HOUSING PLAN

Housing Condition and Maintenance

While some minor housing maintenance issues exist in the City, housing conditions are not considered significant enough to warrant the preparation and adoption of a maintenance code at this time. Nevertheless, the City may want to consider the adoption of a "point of sale" ordinance in the future. This type of regulation attempts to identify certain deficiencies in housing at the time of sale, putting buyers on notice of problems. The objective is to create an incentive for property sellers to improve maintenance conditions prior to the sale.

Often more noticeable than the condition of structures is the outside maintenance of property. Shorewood has historically addressed problem sites on a complaint basis. Although this "neighborhood standard" method has worked reasonably well, it is recommended that local nuisance ordinances be reviewed and periodically updated. The City's annual spring clean-up event is also viewed as an effective tool for encouraging residents to maintain their properties.

In 1993, the City adopted a rental housing code that presently affects approximately 300 rental units in the City. This code establishes standards and a licensing procedure for all types of rental dwellings. The program has been successful in that a number of rental units were improved. The

City has received no tenant complaints since the adoption of the code. Continuation of this effort is recommended.

For many years, Shorewood has allocated a portion of its Community Development Block Grant (CDBG) funds for rehabilitation of substandard housing. The CDBG program is administered by Hennepin County. Since the early 1990's, the City has had seven households which received a total of $90,000 to fund home repairs for persons in need of assistance. Not only is it suggested that the CDBG program be continued, it is recommended that it and other assistance programs be better publicized on the City's website.

Other housing/renovation programs which are available to the City include the following:

- Minnesota Fix Up Fund. Through this statewide program, funds are available to City residents that offer loans at below market interest rates to homeowners. The fix up fund was established to improve the basic livability and/or energy efficiency of the borrower's home. Eligible project included interior or exterior improvements, general remodeling or maintenance items.

- Minnesota Housing Rehabilitation Loan Program. This Statewide program assists low income homeowners in financing basic home improvements that directly affect the safety, habitability, energy efficiency or accessibility of their homes. Eligible improvements include, but are not limited to, electrical wiring, furnace replacement and plumbing repairs.

Variety of Housing Options

Shorewood's housing stock consists primarily of large lot, single-family homes. While the City's development regulations have historically encouraged this type of housing, a strong market for larger single-family homes has had an even greater influence on housing type in Shorewood.

The City has attempted to introduce some variety in lot size, housing type, and value in the past. For example, in the mid 1980's, the Near Mountain development in the southeast area of the City was approved which called for a mixture of single-family homes on lots ranging from one quarter to three-quarters of an acre in size. The project also included quadraminiums and townhouses in the original plan. Citing a very strong market for single-family homes, the developer ultimately requested that the quadraminiums and townhouses be eliminated from the project, resulting in 70 fewer units by the time it was completed. Similarly, houses in the Covington Vine Ridge neighborhood were built larger and were more expensive than originally suggested by the developer, this despite quarter acre lot sizes.

Some variety of housing types was achieved in the 1990's. A number of two-family dwellings were built in the Waterford area and on Lawtonka Drive, west of Timber Lane. The Seasons senior housing project offers low-maintenance twinhomes for residents who qualify under Federal Fair

Housing Act guidelines. Shorewood Ponds provides "step down" single-family, attached cottages in four-unit buildings as an option to seniors 62 years of age and older. This community currently has a waiting list of households eager to purchase dwellings in the subdivision.

More recently, the City approved the Minnetonka Country Club housing project which involved the redevelopment of the former 117-acre Minnetonka Country Club golf course site located south of Smithtown Road and west of Country Club Drive. The project was approved in 2016 and calls for the construction of 142 single family residential homes upon the property. Of the 142 homes, 103 are considered traditional and 39 are targeted toward empty-nesters. Lot sizes within the project range from 7,200 square feet to 45,780 square feet.

Although these projects have increased the variety of housing types in Shorewood to some degree, housing values remain high relative to Metropolitan Area standards, even though higher densities have been allowed. Housing values in Shorewood have risen steadily over the years. In 2014, the median housing value for owner-occupied units was $391,600. In 2015, housing values had risen to $401,400 and by 2017, the median value increased to $428,000. Given the limited amount of land remaining for development in the City, the relatively high cost of utilities and often soil correction, the high value of land in the Lake Minnetonka area, this trend is anticipated to continue.

Future opportunities for increasing housing variety in Shorewood are limited. Consequently, maintenance of the existing mixture of housing will be important. In this regard the City's policy of keeping house sizes proportionate to lot size should continue to be implemented. This simply means that smaller lots will accommodate smaller houses.

The City acknowledges that the City of Shorewood, within its municipal boundaries, is not necessarily consistent with regional housing goals. When the City of Shorewood is viewed as part of a larger South Lake Minnetonka community, a relatively traditional model town emerges. Excelsior serves as the downtown core, with multiple-family housing and small, urban lots. Shorewood, Tonka Bay, Greenwood and Deephaven exist as surrounding suburbs with larger lots and lower densities. Higher density project in any of the adjacent communities, like new proposals in Tonka Bay on County Road 19 directly adjacent to Shorewood properties, also affect the market for higher-density residential in Shorewood.

Senior Housing

In the early 1990's, the City recognized that there was shortage of housing options in Shorewood and that senior citizens who were no longer able remain in their single-family homes, were not able to relocate to a senior housing facility within the Shorewood. In 1991, a study was prepared for the City which demonstrated that a market existed for senior housing in the Lake Minnetonka area. In response to an increasing elderly population and recognizing the importance of keeping senior citizens in the community, the City set a goal to promote the development of safe, healthy and affordable housing options for seniors.

In conjunction with the referenced study, Shorewood updated its zoning regulations to address senior housing. It was determined that the impact of senior housing on streets, parks and utility services was less than that of other types of residential development. Consequently, senior housing is now allowed to be built at somewhat higher densities than otherwise provided by existing zoning. The City also reduced the park dedication fees and sewer connection charges for senior housing in order to minimize development costs.

The City then actively sought developers of senior housing to build in Shorewood. Response was limited, however, due to several factors: 1) limited funding resources; 2) relatively high land costs in the area; 3) lack of municipal water; and 4) conflict with many residents' desire to retain a low-density character throughout the City. Nevertheless, the following senior housing projects presently exist in the City:

- The Seasons (24 units)
- Shorewood Ponds (62 units)
- Shorewood Landing (105 units)

In total, 191 senior housing units are provided within the preceding facilities. This accounts for approximately seven percent of the City's total housing units.

It is important to note that, as part of a recent cooperative effort, land which previously straddled a municipal boundary shared by the Cities of Shorewood and Excelsior was recently conveyed to the City of Excelsior to accommodate *The Waters of Excelsior* senior housing project. *The Waters of Excelsior* project includes 115 units and, due its location adjacent to the City of Shorewood, is expected to supplement the community's senior housing needs.

In administering the current zoning regulations, a number of issues have arisen. For example, there is some question, given land and development costs, as to the feasibility of developing senior housing on land zoned for one-acre lots (R-1A zoning district). Finally, the site analysis used to identify sites suitable for senior housing is considerably outdated. Some land previously considered as suitable has since been developed. New sites for affordable housing will be considered as they become available.

Many seniors wish to stay in their homes as long as possible. Their ability to do so is enhanced by services provided within the community. For example, programs such as "Meals on Wheels" are administered through Senior Community Services. Transit services such as "Metro Mobility" and "Dial-a-Ride" are also available. The City will continue to work with surrounding communities and various agencies to ensure that these services remain available to seniors.

Affordability

The City of Shorewood recognizes its responsibility to provide opportunities for its share of the region's need for low and moderate-income housing. Affordable housing provides housing options for a diverse population.

As noted in the Inventory chapter of this Plan, the Metropolitan Council defines the terms "affordable housing" and "low income" as follows:

> Affordable Housing. *Housing is "affordable" for low and moderate-income households when they pay no more than 30 percent of gross household income on housing.*
>
> Low Income. *A household is considered "low income" if it makes 80% or less of the median income of the seven-county region.*

The tables below depict the number affordable housing units, publicly subsidized units and the number of households burdened by housing costs in the City of Shorewood. Such numbers, as provided by the Metropolitan Council, relate to a 2016 housing count of 2,857 units.

AFFORDABILITY		
Units affordable to households w income at or below 30% of AMI	Units affordable to households with income 31% to 50% of AMI	Units affordable to households with income 51% to 80% of AMI
79	51	306

PUBLICLY SUBSIDIZED UNITS			
All publicly subsidized units	Publicly subsidized senior units	Publicly subsidized units for people with disabilities	Publicly subsidized units – all others
0	0	0	0

HOUSING COSTS BURDENED HOUSEHOLDS		
Income at or below 30% of AMI	Income 31% to 50% of AMI	Income 51% to 80% of AMI
127	93	108

Source: Metropolitan Council 2016 Housing Estimates

The Metropolitan Council's Thrive MSP 2040 Plan (Housing Element) assigns a low and moderate-income housing need for the City of Shorewood for the decade of 2021 through 2030. Specifically, the Council has identified a need for 48 new affordable units within this timeframe. Of these new units, 23 need to be affordable to households earning at or below 30 percent of the area median income, 16 need to be affordable to households earning 31 to 50 percent of the area medium income and 9 need to be affordable to households earning 51 to 80 percent of the area median income. These needs are summarized in the table below:

AFFORDABLE HOUSING NEED ALLOCATION (2021-2030)		
Income at or below 30% of AMI	Income 31% to 50% of AMI	Income 51% to 80% of AMI
23	16	9

The City has guided 3.7 acres for High Density Residential development at a minimum of 8 units per acre or more. This would provide for 30 units of affordable housing by acreage. An additional 19.5 acres are identified as Commercial Mixed Use which requires a minimum of 40% of the property (7.8 acres) to be residential development at a minimum of 15 units per acre. Of this 7.8 acres, 2.8 (42 units) is staged for development within the 2021-2030 timeframe. This results in 72 units of affordable housing being provided by density within the 2021-2030 staging period.

In regard to rental units, the definition of an affordable unit varies depending upon the number of bedrooms in the unit. Like owner-occupied housing, the affordability limit for renter-occupied housing is 80 percent of the area median income (AMI). For rental units, affordability is based upon the number of bedrooms in the unit. For the year 2017, the Metropolitan Council's affordability rates were as follows:

Rental Housing Affordability Limits, 2017 City of Shorewood	
Number of Bedrooms	**80 % AMI**
Efficiency	$1,265
1 Bedroom	$1,356
2 Bedroom	$1,627
3 Bedroom	$1,880
4 Bedroom	$2,097
Source: Metropolitan Council	

According to the Metropolitan Council, the median rent paid in the City of Shorewood in 2016 was $1,139. Consequently, most of the rental housing is affordable based on the standards in the above table.

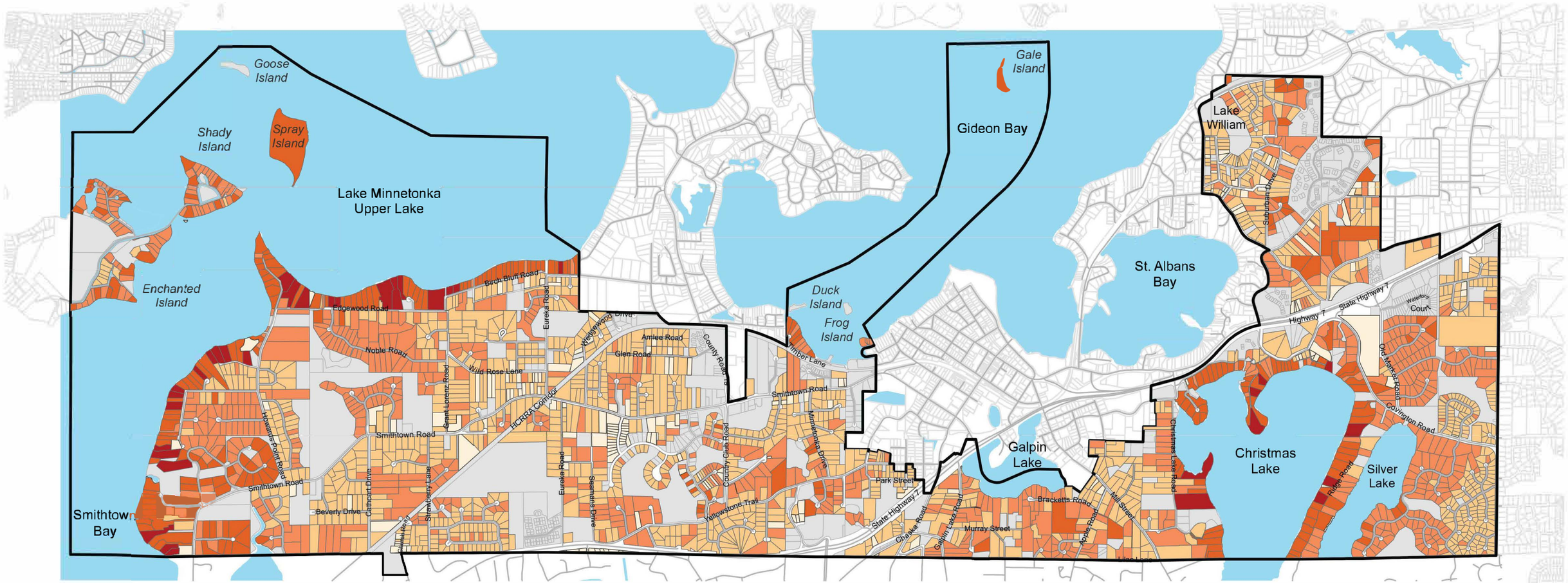
With the preceding Metropolitan Council directives in mind, the City finds it important to understand the number of affordable housing units which presently exist in the City. For 2017, the Metropolitan Council has determined that homes with a purchase price of $243,500 or less are considered "affordable" in the seven-county metropolitan area. According to the Metropolitan Council, 2,770 housing units existed in the City in 2016. Of these units, 2,527 were owner-occupied. Of these, 478 units had a value of $243,500 or less. As a result, 17 percent of the City's existing owner-occupied housing stock at that time was considered "affordable."

Between 2008 and 2016, the City added 105 owner-occupied housing units and 105 renter-occupied units. While the owner-occupied units were added at a relatively consistent rate over this time period, all 105 renter-occupied units were added in 2016. Within this time period, none of the added housing units (owner and renter-occupied) were considered affordable.

Housing values within the City are depicted on the map on the following page. The map specifically identifies locations of single family homes which exceed the affordable housing threshold ($243,500) and locations of homes which are considered affordable. The City of Shorewood routinely encounters teardowns of lower value single family homes and replacement with new, higher value homes. This activity results in a reduction in the number of affordable single-family homes in the City. Between 2008 and 2016, 52 units were demolished and new homes built on the lots. Not all of the homes demolished met the criteria for affordable as several were on riparian lots on Lake Minnetonka, but the number of demolitions speaks to a trend to redevelop affordable homes in Shorewood.

Estimated Market Value of Single Family Homes

City of Shorewood
2040 Comprehensive Plan



Estimated Market Values

- $250,000 or Less
- $250,000 - $500,000
- $500,000 - $1,000,000
- $1,000,000 - $2,500,000
- Over $2,500,000
- Parcels
- City Boundary

Map created: December 2022
Data: NAC, MNDNR, Metropolitan Council

0 0.275 0.55 1.1
Miles

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The City of Shorewood understands the intent of the Metropolitan Council's affording housing allocation (48 units between 2021 and 2030) and supports the idea of providing alternative housing choices in the community. There are, however, conditions which are unique to the Shorewood which raise questions related to the ability of the community to realistically reach the noted affordable housing objectives. These include the following:

1. A limited amount of land exists within the City for development (vacant parcels and redevelopment sites).

2. Current market conditions and land values in the City are such that new rental housing would likely demand higher rents.

3. Much of the City of Shorewood is not served by mass transit. This condition is not expected to change in forthcoming years.

4. Presently, the City Shorewood has a limited amount of commercial land. With no plans to increase the amount of land devoted to such uses, minimal employment opportunities exist for persons to live and work in the City.

Housing Programs

To achieve the housing goals of this Plan, the following will be considered:

Programs which provide for the maintenance, management and preservation of existing housing stock:

Rental Licensing and Inspection Program.

The City of Shorewood has an active rental licensing and inspection program to ensure that its rental housing stock is maintained and provides a safe living environment.

City Ordinances. The City's Zoning Ordinance establishes minimum performance standards which are intended to ensure continued property maintenance.

The City of Shorewood will continue to enforce its ordinances which relate to property upkeep/maintenance.

Local Funding Sources. The City of Shorewood may, if deemed appropriate by City Officials, explore programs offered through the Twin Cities Habitat for Humanity and Minnesota Housing and Finance Agency.

Repair and Rehabilitation Support. The Community Action Partnership of Suburban Hennepin (CAPSH) provides home repair and rehabilitation assistance to County residents who meet certain eligibility requirements.

The City of Shorewood recognizes the existence of this program and is supportive of residents who choose to pursue program assistance.

Programs which provide access to public programs and financial programs:

Referrals. One of the simplest and most cost-effective ways to serve households in need of affordable housing is by making effective referrals. Being aware of programs and services or being able to provide appropriate references is considered beneficial.

Shorewood's Planning Department will strive to remain familiar with the relevant programs and provide effective referrals.

Homebuyer Assistance Programs. Homebuyer assistance programs funded directly by Hennepin County HRA are currently not available.

The City of Shorewood encourages residents to contact the Minnesota Homeownership Center regarding homebuyer assistance programs which are currently available.

Foreclosure Prevention. The Community Action Partnership of Suburban Hennepin (CAPSH) provides foreclosure counseling to County residents.

The City of Shorewood recognizes the existence of this service and is supportive of residents who choose to pursue foreclosure counseling.

Energy Assistance. The Community Action Partnership of Suburban Hennepin (CAPSH) administers the energy assistance program for County residents who meet the eligibility requirements.

The City of Shorewood recognizes the existence of this program and is supportive of residents who choose to pursue program assistance.

Programs which support senior housing:

Tax Increment Financing. Cities may create a housing district to create a tax increment financing district. The tax increment financing bonds issued on the district are used to support the construction of affordable housing. Property taxes received above the original tax value (increment) from the development are utilized to finance these bonds. The property tax revenue that otherwise would be available to pay for City services would be restricted and not available to pay for the services.

Considering that two large senior housing projects have recently opened within or near the City of Shorewood, the market may not support additional senior housing developments at this time. The City may, however, support the use of tax increment financing in the future depending on the project location, the extent of the request, etc.

Referrals. Shorewood's Planning Department will strive to have the ability to refer residents to applicable senior housing programs which are outside of the City's scope of services.

Programs which expand housing options:

Comprehensive Planning. As stated in the Policy Plan, the City of Shorewood will strive to present a variety of housing options which meet the needs of varying segments of its population. In this regard, the Land Use Plan directs a variety of residential densities (housing types) through future development or redevelopment.

Zoning and Subdivision Ordinances. The City's Zoning and Subdivision Ordinances will be used to implement the land use directives of the Comprehensive Plan. In this regard, opportunities for land uses which are promoted in the Plan are provided via the establishment of zoning districts which make an allowance for the directed land uses.

To be noted is that the City has the ability to provide "flexibility" from its zoning and subdivision regulations through planned unit development (PUD). Through PUD, the City specifically has the ability to allow increased residential densities for projects which fulfill a variety of PUD objectives which are intended to result in a higher quality development project than that which would otherwise be allowed through standard zoning.

Land Banking and Site Assembly. Land banks are nonprofit or governmental entities created to acquire, manage, maintain, and repurpose properties that are vacant, abandoned, underutilized, or foreclosed to a productive use. Banking and site assembly can provide an opportunity to ensure that vacant property is maintained and does not negatively impact the area. Such efforts also provide an opportunity to influence the ultimate use of the property.

There is very little vacant or abandoned property within the City of Shorewood which is in need of assembly, holding or maintenance. As a result, the City does not anticipate utilizing land banking and site assembly and cannot anticipate precise circumstances in which it would do so. The City may, however, consider doing so if opportunities arise and City Officials determine that such an effort is appropriate (to support economic development, including potential opportunities for affordable housing).

Programs which promote affordable housing needs:

Comprehensive Planning. As stated in the Policy Plan, the City of Shorewood will attempt to satisfy the Metropolitan Council's affordable housing directives of 48 new units between 2021 and 20130. The Land Use Plan directs high density residential use upon a number of undeveloped sites and sites which are expected to be redeveloped at some future point. In this regard, the Land Use Plan provides opportunities for future affordable housing.

Zoning and Subdivision Ordinances. As previously indicated, the City's zoning and subdivision regulations will be used to implement the land use directives of the Comprehensive Plan. As a result, uses directed for high density residential use by the Plan, will be implemented via the application of corresponding zoning districts.

Development Authorities. The Hennepin County Housing and Redevelopment Authority (HRA) provides services for affordable housing and redevelopment.

While the City of Shorewood has not utilized such services in the recent past, it would consider partnering with the HRA in the future.

Tax Abatement. Local governments are permitted to offer tax abatement for a public benefit, including the creation of housing which is affordable to low and moderate-income households. If a portion of the tax collected from a property is abated, such amount would need to be offset through increased taxes levied on other properties.

Recognizing the of administrative needs and potential impacts on the City's remaining tax capacity, the City of Shorewood does not anticipate using tax abatement.

Livable Communities Act Programs. Livable Communities Act programs are intended to provide incentives for addressing various issues facing the seven-county Metropolitan Area. Metropolitan Area municipalities which elect to participate in the Livable Communities Program are eligible to compete for funding for community development activities.

Unlike many other Lake Minnetonka communities, the City of Shorewood does not participate in the Livable Communities Program. Such current exclusion is based upon Shorewood's lack of available building sites. The City may, however, consider the possible benefits of program participation at some future date.

Minnesota Housing Consolidated Request for Proposals. The Minnesota Housing Finance Agency provides a request for proposal (RFP) on an annual basis whereby developers of affordable housing projects can apply for funding to construct such housing.

The City of Shorewood is supportive of developers who apply for funds to support the development of housing units which meet the City's needs for affordable housing.

Community Development Block Grants (CDBG). The U.S. Department of Housing and Urban Development (HUD) provides CDBG funds to communities with over 45,000 residents for the use of providing and maintaining affordable housing. Hennepin County HRA administers these CDBG funds through a pool with various communities. The City of Shorewood pools its Community Development Block Grant funds into the Hennepin County program for housing rehabilitation assistance.

The City of Shorewood believes that addressing housing issues in a cooperative manner with other Hennepin County communities is worthwhile and is therefore willing to participate in such cooperative efforts.

Home Investment Partnerships Program (HOME). The HOME is a flexible federal grant program that allows Hennepin County to fund affordable housing activities for very low and low-income families or individuals, homeless families, and persons with special needs.

The City of Shorewood recognizes the importance of this program and is supportive of residents who choose to pursue program assistance.

Affordable Housing Incentive Funds (AHIF). AHIF funds are administered by the Hennepin County Housing and Redevelopment Authority. This loan program funds the development of affordable housing units for very low-income households.

The City of Shorewood recognizes the existence of AHIF funds and is supportive of developers who apply for such funds to support development of housing units which meets the City's affordable housing needs.

4(d) Tax Program. The 4(d) Tax Program provides a property tax rate reduction for rental properties which include affordable housing units. This program is administered through the Minnesota Housing Finance Agency.

The City of Shorewood encourages owners of eligible rental properties which include affordable housing units to seek 4(d) Tax program assistance.

Fee Waivers or Adjustments. Cities have the ability to waive or reduce fees to reduce the cost of construction of affordable housing. Conversely, State rules require that city fees must correlate to the cost of providing the services.

Fee waivers or reductions could create a deficiency in the funding for services, causing the City to rely on general funds to make up the deficiency. For this reason, the City of Shorewood will not consider a fee waivers or reduction for affordable housing projects.

West Hennepin Affordable Housing Land Trust. The mission of the West Hennepin Affordable Housing Land Trust (dba Homes Within Reach) is to use the Community Land Trust practice to provide permanently affordable homeownership for low to moderate income working families that would otherwise be unable to purchase a home in the suburban communities of Hennepin County; offering both communities and homebuyers the ability to sustain long-term affordable homeownership. The Land Trust service area is the 44 communities of suburban Hennepin County and is currently active in twelve (12) suburban communities in Hennepin County.

If approached, the City Shorewood will evaluate and determine if joining the West Hennepin Affordable Housing Land Trust is an appropriate partnership (to meet the City's housing affordable housing objectives).

Housing Bonds. A Housing Redevelopment Authority (HRA) has the ability to issue bonds that help administer affordable housing developments or programs. Cities and counties may make or purchase loans using the proceeds of the bond sales for activities such as new construction, acquisition, and rehabilitation, or refinancing bond debt. The City does not plan to issue housing bonds but rather rely on the other programs noted within this chapter.

Educational Programs:

Organizations, Partnerships and Initiatives. Participation in housing-related organizations, partnerships and initiatives with other stakeholders provides learning opportunities. In this regard, discussions of housing needs with other cities, counties, the Metropolitan Council is considered beneficial for all involved. Recognizing the value of such collaborations, the City of Shorewood has taken the following steps:

- The City of Shorewood partners with the Hennepin County Housing and Redevelopment Authority.
- City Staff are members of various professional organizations which provide resources and educational opportunities related to housing including the Minnesota Chapter of the American Planning Association.
- City Officials routinely take part in trainings related to land use and housing and are active in groups with other city officials.

CHAPTER SUMMARY

As a predominantly residential community, housing and issues related to housing are an important aspect of Shorewood's Comprehensive Plan. Following are the City's goals relative to housing:

- **Provide safe, healthy and quality housing that respects the natural environment of the community.**
- **Maintain the present variety of housing options and provide sufficient housing types, sizes and values to meet the needs of varying segments of the population.**
- **Maintain and strengthen, where necessary, the character of individual neighborhoods within the community.**
- **Address local and sub-regional housing issues through cooperative efforts with neighboring communities through organizations such as the Lake Minnetonka Area Cooperating Cities.**
- **Promote safe, healthy and affordable housing options.**

Following are recommendations intended to achieve these goals:

1. Review local development regulations, and amend as necessary, to promote a balanced housing supply.
2. As opportunities present themselves, attempts shall be made to satisfy the Metropolitan Council's affordable housing directives (48 new units between 2021 and 2030).
3. Identify locations for alternative residential housing types and densities.
4. Make available to residents and property owners educational programs on such topics as renter/landlord rights, home buying, home maintenance, etc.
5. Continue the City's rental housing license program to maintain current standards for rental housing.
6. Consider the adoption of a "point of sale" ordinance to address housing maintenance issues.
7. Promote private sector maintenance, rehabilitation and redevelopment of existing properties through improved communication of available community services and financial assistance programs.

8. Continue to allow accessory apartments to allow seniors to remain in their single family homes.

9. Encourage housing types that are designed to appeal to senior citizens to allow existing residents to downsize and remain in the City of Shorewood.

10. Maintain programs for housing condition to protect the health and safety of residents and ensure stability of neighborhoods.

11. Maintain code enforcement programs to improve and strengthen the character of neighborhoods.

12. Undertake both proactive and reactive code enforcement to maintaining the City's existing housing stock.

13. Rehabilitate substandard housing units whenever possible.

14. Work with Hennepin County to administer programs which provide financial assistance for the rehabilitation of substandard housing units within the community (as funding sources and market conditions permit).

15. Redevelop of substandard housing whenever compatible with adjacent land uses and economically feasible.

16. Establish and maintain regulations for development upon lawful nonconforming lots.

17. Require construction management plans for all residential infill projects. Minimally, such plans shall address contractor parking locations, construction material delivery and storage, street cleaning and construction hours.

18. Protect lower density residential neighborhoods from encroachment or intrusion of incompatible land uses as well as nonresidential use categories, through adequate buffering and separation.

19. Respect and maintain the character of individual residential neighborhoods.

20. Protect residential developments from and locate them away from sources of adverse environmental impacts including noise, air and visual pollution.

21. Minimize home occupations, commercial and other nonresidential activities so as to be invisible within residential neighborhoods.

22. Accessory buildings within the community shall be of a compatible design and size to maintain a residential character. These buildings shall be limited exclusively to residential uses and related activities.

23. Minimize outdoor storage where possible and allow it only conducted in an orderly, confined and limited fashion which is consistent with City Code requirements.

24. Aggressively eliminate violations of property maintenance standards that infringe upon residential neighborhood quality, pose public health and safety problems and threaten neighboring property values.

25. Encourage owner occupied housing.

26. Address Shorewood's housing needs, as well as the needs of the overall Lake Minnetonka sub-region, by providing and maintaining a variety of housing types, styles and values.

27. Prevent polarizing age distribution within the Lake Minnetonka sub-region through the provision of diverse housing that reflects life-cycle stages and economic considerations.

28. Encourage a range of property values and rent rates within the Lake Minnetonka sub-regional housing as a means of diversifying the stock and sustaining individual communities in the area.

29. Develop housing for special needs populations (e.g., elderly, physically challenged) within the Lake Minnetonka sub-region and provide financial assistance programs as funding sources and market conditions allow.

30. Give due attention to the directives of the Metropolitan Council for new or redeveloped housing projects.

INTRODUCTION

The purpose of the Transportation Plan is to set a multimodal transportation vision through the year 2040. The City's multimodal transportation system includes facilities for vehicles, freight, walking, bicycling and transit. Facilities are operated by a number of agencies, including the City of Shorewood, Hennepin County and the Minnesota Department of Transportation (MnDOT).

As the owners of the transportation network in Shorewood (i.e. City of Shorewood, Hennepin County and MnDOT) advance their respective Capital Improvement Programs (CIPs), this Plan is intended to serve as an important resource and reference in establishing priorities and advancing transportation projects for implementation. Advancing these projects from a planning to implementation phase will require collaborative discussions among the City, County, MnDOT, adjacent communities, Metropolitan Council, residents and others to conduct traffic studies, finalize designs, preserve rights-of-way, obtain environmental clearances and leverage necessary financial resources.

Effective transportation planning is an important part of the City's Comprehensive Plan. Residents must be provided with transportation facilities and services which meet mobility needs in an efficient and safe manner. Transportation facilities, at the same time, need to be planned and constructed so as to limit negative social, environmental, and aesthetic impacts to the greatest degree feasible. In addition, residents who cannot or choose not to drive need to have transportation options to meet their daily needs.

This transportation chapter has been prepared in compliance with State of Minnesota Statutes and applicable Metropolitan Council guidelines. As part of this Plan, the City has reviewed existing and future conditions for each mode and identified safety, operations, and network improvements that will be important to address over the 2040 planning horizon. Goals, objectives and specific strategies have been identified collaboratively by the City, Hennepin County, MnDOT and citizens within the framework of Metropolitan Council requirements.

Although emphasis in this element of Shorewood's Comprehensive Plan is placed on the street circulation plan, there are a number of other transportation related components that deserve consideration. They include mass transit, pedestrian/bicycle circulation, freight, railroads and aviation.

The vision and associated strategies outlined in this Plan were established by considering existing and forecasted conditions, City of Shorewood priorities and regional travel patterns.

Objectives

There are three primary objectives of this Transportation chapter:

- To provide guidance for City staff and elected officials regarding the planning and implementation of effective transportation facilities and systems.
- To give private citizens and businesses background on transportation issues and allow them to be better informed regarding the City's decision-making on transportation issues.
- To communicate Shorewood's perspectives and intentions regarding transportation planning issues to other government agencies.

The preparation of the document also has provided stakeholders with the opportunity to have input into the transportation planning process.

Transportation Glossary

CIP: Capital Improvement Program – five-year plan for capital investments in the transportation system and in other capital assets owned by the City (equipment, buildings, etc.).
CR: County Road – county-owned roadway that does not receive State funding.
CSAH: County State Aid Highway – county-owned roadway that receives State Aid funding.
LRT: Light Rail Transit – public transportation mode consisting of rolling train stock on an exclusive right-of-way
MnDOT: Minnesota Department of Transportation.
RBTN: Regional Bicycle Transportation Network – existing and planned regional bicycle network established by the Metropolitan Council.
TH: Trunk Highway – State highway owned and operated by MnDOT.
TPP: Transportation Policy Plan – Regional transportation plan for the Twin Cities metropolitan region, developed by the Metropolitan Council.

SUMMARY OF REGIONAL STRATEGIES

This plan has been prepared to be consistent with the regional transportation strategies outlined in the Metropolitan Council 2040 Transportation Policy Plan (TPP). The TPP is a regional plan that evaluates the existing transportation system, identifies transportation challenges to the region, and sets regional goals, objectives, and priorities to meet the transportation needs of current residents while accommodating the region's anticipated growth. The TPP also guides local agencies in coordinating land use and transportation and established regional performance measures and targets.

The TPP is guided by the following goals:

- **Transportation system stewardship:** Sustainable investments in the transportation system are protected by strategically preserving, maintaining, and operating system assets.
- **Safety and Security:** The regional transportation system is safe and secure for all users.
- **Access to Destinations:** People and businesses prosper by using a reliable, affordable, and efficient multimodal transportation system that connects them to destinations throughout the region and beyond.
- **Competitive Economy:** The regional transportation system supports the economic competitiveness, vitality, and prosperity of the region and State.
- **Healthy Environment:** The regional transportation system advances equity and contributes to communities' livability and sustainability while protecting the natural, cultural, and developed environments.
- **Leveraging Transportation Investment to Guide Land Use:** The region leverages transportation investments to guide land use and development patterns that advance the regional vision of stewardship, prosperity, livability, equity, and sustainability.

The TPP acknowledges funding is a key constraint. Current transportation revenue will not meet the region's transportation needs through 2040. As a result, the TPP includes two long-term investment scenarios: a fiscally-constrained scenario that identifies projects anticipated to be

funded based on current revenue projections, and an increased revenue scenario that identifies project priorities should additional transportation funding become available.

Under the current fiscally constrained revenue scenario, the TPP is focused on operations and maintenance of the existing transportation system. Investments in highway mobility and access are limited to those that address multiple TPP goals and objectives.

The increased revenue scenario would allow additional investments in operations and maintenance, as well as regional mobility, access, safety, and bicycle/pedestrian improvements. However, congestion cannot be greatly reduced under even the increased revenue scenario. Under both scenarios, proposed investments are focused on areas of the metro with the greatest existing and future challenges and anticipated growth.

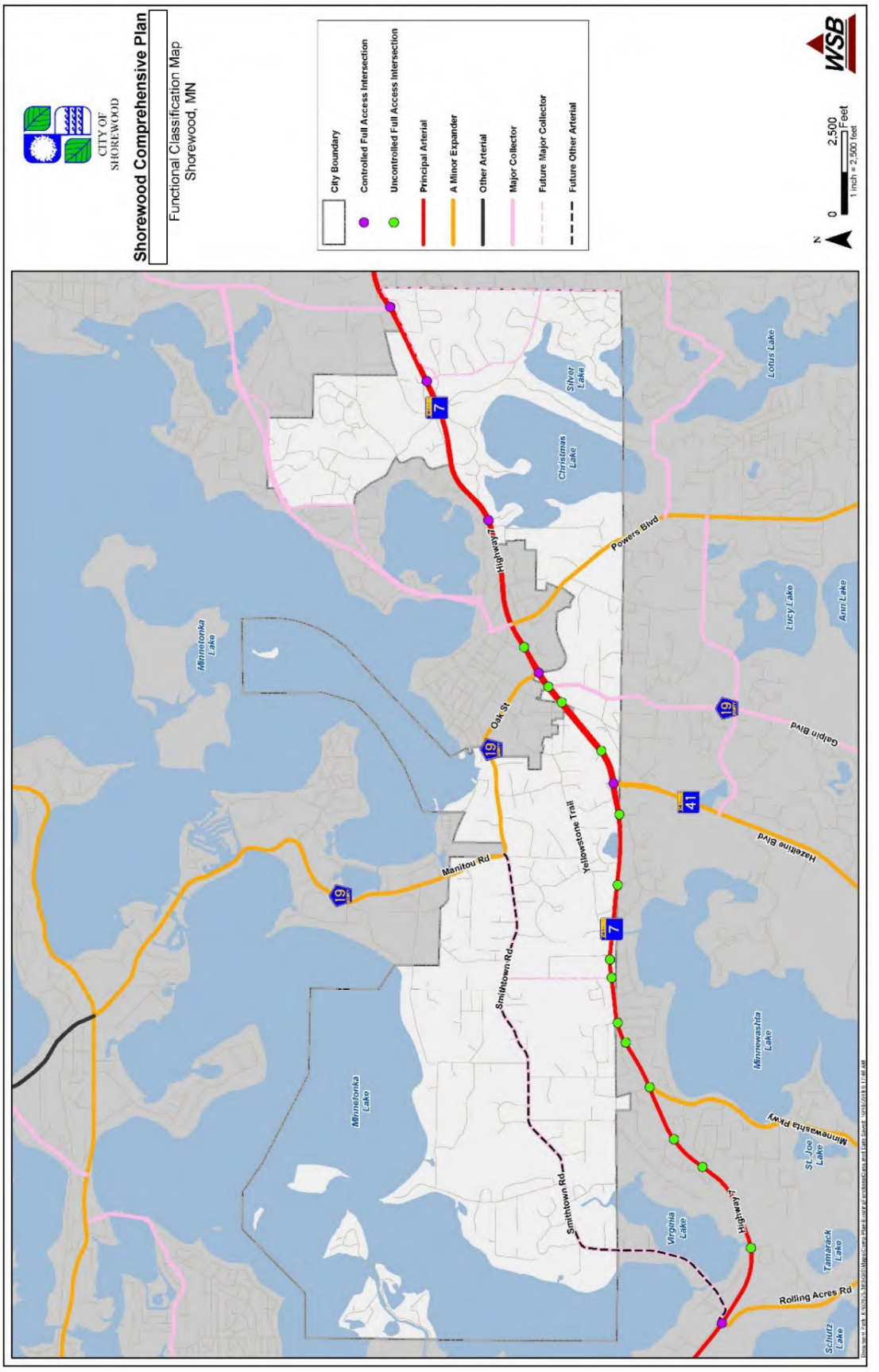
The Metropolitan Council classifies Shorewood under the Suburban Community Designation. Based on *Thrive MSP 2040*, Suburban areas are expected to plan for forecasted population and household growth at average densities of at least five units per acre for new development and redevelopment. These communities are also expected to target opportunities for more intensive development near regional transit investments. The TPP does not include any planned regional investments in Shorewood.

Planned Functional Classification

Recommended changes to the functional classification system will be adopted by the City as part of the adoption of the overall Comprehensive Plan Update. Changes that involve "Other" Minor arterials, Major Collectors or Minor Collectors may be made without the approval of another agency, provided these changes are consistent with State and County Plans. However, the changes and the resulting functional classification should be officially reported to the Metropolitan Council under separate communication to ensure that the Metropolitan Council has the opportunity to update their records. The City is proposing the following changes:

- Smithtown Road: CASH 19 to City Limits – Major Collector to "Other" Arterial
- Vine Hill Road: TH 7 to City Limits - Local Street to Major Collector
- Old Market Road: TH 7 to Vine Hill Road – Local Street to Major Collector
- Eureka Road: Smithtown Road to TH 7 – Local Street to Major Collector
- Delton Avenue: Minnetonka City limits to Old Market Road – Local Street to Major Collector

Any proposed change to a Principal Arterial or 'A' Minor Arterial designation will need to be approved by the Transportation Advisory Board (TAB) of the Metropolitan Council. Since these changes are likely to involve either State or County roadways, the City should work closely with these agencies to ensure that the process of approval is carried forward. No functional classification changes are recommended within the city at this time.


Shorewood Comprehensive Plan
Functional Classification Map
Shorewood, MN
CITY OF SHOREWOOD
City Boundary
Controlled Full Access Intersection
Uncontrolled Full Access Intersection
Principal Arterial
A Minor Expander
Other Arterial
Major Collector
Future Major Collector
Future Other Arterial
WSB
N
0
2,500 Feet
1 inch = 2,500 feet
Minnetonka Lake
Silver Lake
Christmas Lake
Lotus Lake
Lucy Lake
Ann Lake
Powers Blvd
Highway 7
Oak St
Manitou Rd
Yellowstone Trail
Smithtown Rd
Galpin Blvd
Hazeltine Blvd
Minnewashta Pkwy
St. Joe Lake
Virginia Lake
Tamarack Lake
Rolling Acres Rd
Schultz Lake

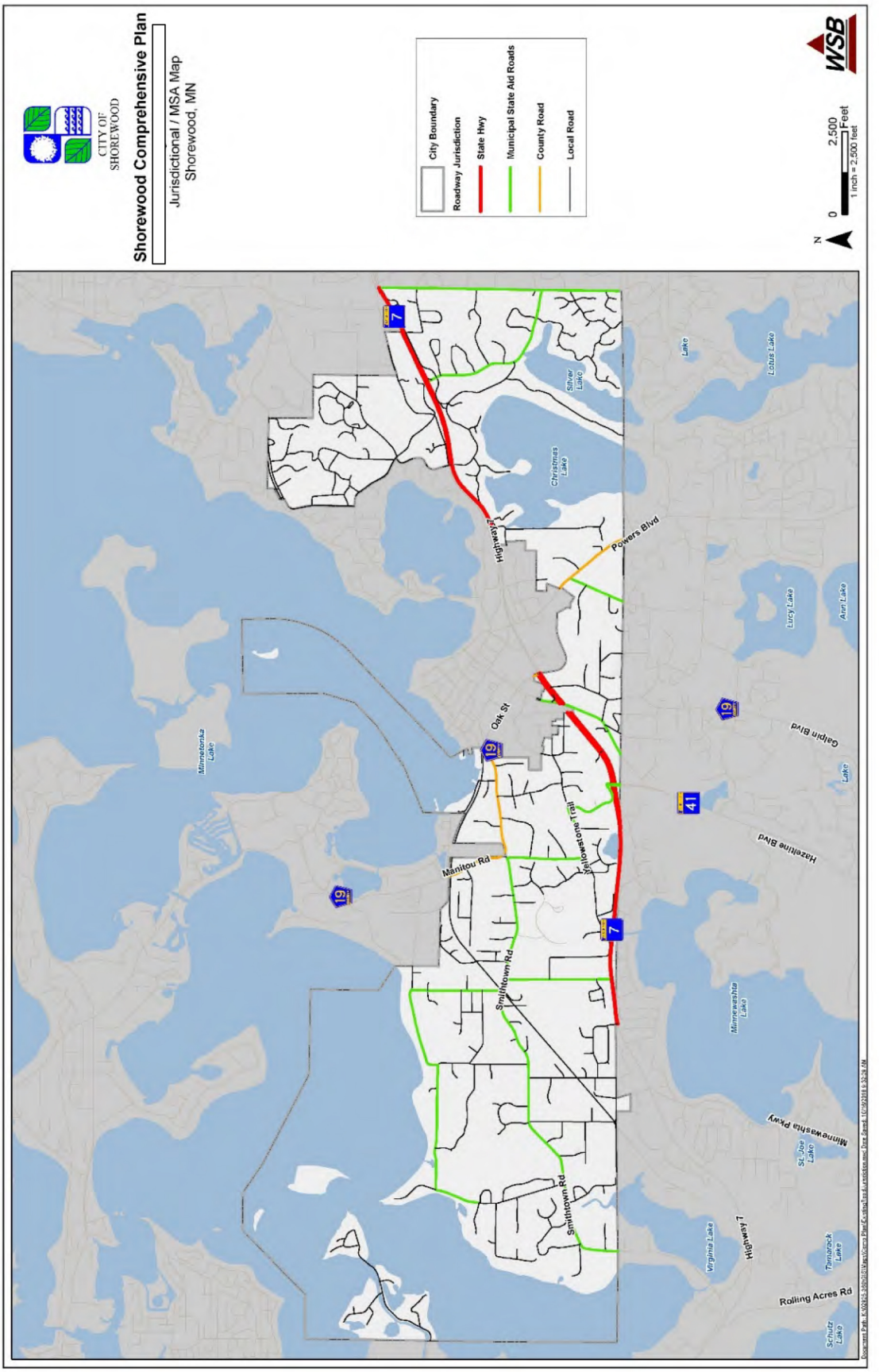
Jurisdictional Classification / Municipal State Aid Streets

Roadways are classified on the basis of which level of government owns and has jurisdiction over the given facility. The three levels of government that have involvement are the State of Minnesota (Mn/DOT), Hennepin County, and the City of Shorewood. Mn/DOT owns/maintains the Trunk Highway (TH) system and Hennepin County the County State Aid Highway (CSAH) and County Road (CR) system. The City owns/maintains the local streets, including Municipal State Aid (MSA) streets**.**

Cities in Minnesota with populations greater than 5,000 are eligible to receive Municipal State Aid (MSA) funding from the state Highway User Tax Distribution Fund. The basic purpose of this program is to help local governments construct and maintain collector and arterial roadways which have consistent design standards, and which are well integrated into the overall network of collector and arterial roadways. The State Aid system typically consists of a maximum of 20% of the City's roadway mileage.

The State Aid office of MnDOT has established clearly defined design requirements for MSA streets. These requirements ensure that capacity, operational, and safety goals are met in a uniform manner from community to community, and that street systems are well coordinated with each other. Based on State Statute, Sections 169.80 and 169.87, MnDOT does not allow cities to restrict truck traffic on MSA streets.

Figure 2 provides a map depicting the jurisdictional classification of the overall roadway network serving Shorewood and its residents and businesses


CITY OF SHOREWOOD
Shorewood Comprehensive Plan
Jurisdictional / MSA Map
Shorewood, MN
City Boundary
Roadway Jurisdiction
State Hwy
Municipal State Aid Roads
County Road
Local Road
WSB
N
0
2,500
Feet
1 inch = 2,500 feet
Highway 7
Powers Blvd
Oak St
Manitou Rd
Smithtown Rd
Yellowstone Trail
Minnetonka Lake
Christmas Lake
Silver Lake
Lake
Lotus Lake
Lucy Lake
Ann Lake
Galpin Blvd
Lake
Hazeltine Blvd
Minnewashta Lake
Minnewashta Pkwy
St. Joe Lake
Virginia Lake
Tamarack Lake
Rolling Acres Rd
Schutz Lake
7
19
41

Existing Roadway Capacity and Safety

Roadway capacity and roadway safety are two key indicators of how well the roadway system is meeting the city's transportation needs. The sections below provide information to better understand capacity and safety issues within Shorewood.

Existing Roadway Capacity

A roadway's capacity indicates how many vehicles may use a roadway before it experiences congestion. Capacity is largely dependent upon the number of lanes. The table below lists planning-level thresholds that indicate a roadway's capacity (measured in annual average daily traffic, AADT). Additional variation (more or less capacity) on an individual segment is influenced by a number of factors including: amount of access, type of access, peak hour percent of traffic, directional split of traffic, truck percent, opportunities to pass, and amount of turning traffic, the availability of dedicated turn lanes, parking availability, intersection spacing, signal timing and a variety of other factors.

Planning-level Urban Roadway Capacities

Arterial Roadways	Daily Two-way Volume	
	Lower Threshold	Higher Threshold
Two-lane Undivided	10,000	12,000
Two-lane Divided or Three-lane Undivided	15,000	17,000
Four-lane Undivided	18,000	22,000
Four-lane Divided or Five-lane Undivided	28,000	32,000

Source: FHWA Highway Capacity Manual and WSB Experience from Previous Projects

Existing Capacity Problems on Arterial Roads

At the planning level, capacity problems are identified by comparing the existing number of lanes with current traffic volumes. The table on the following page shows existing number of lanes on collector and arterial roadways within the city.

Daily traffic volumes are based on 2016 conditions from the MnDOT State Aid traffic volume maps supplemented with 2017 data from the City of Shorewood and Hennepin County.

As shown in the table, TH 7 has either four or five lanes (with turn lanes) and CSAH 19 has 2 or 3 lanes (with turn lanes) throughout the City. All other Arterial or Major Collector roadways have two lanes.

Existing number of lanes on arterial roads

Functional Classification	Roadway Name	Location	Number of Lanes
Principal Arterial	TH 7	Minnetonka Border to Chanhassen Border	4 / 5
"A" Minor Expander	CSAH 82 (Mill St)	Chanhassen Border to Excelsior Border	2
	CSAH 19 (Oak St/Smithtown Rd/Manitou Rd	Excelsior Border to Tonka Bay Border	2 / 3
Major Collector	Smithtown Road	CSAH 19 to Victoria Border	2
	Galpin Lake Road	Chanhassen Border to TH 7	2
	Minnetonka Blvd	Deephaven Border to Greenwood Border	2

The only roadway that is approaching capacity is CSAH 19 north of Smithtown Road. All other Arterials and Major Collectors in Shorewood currently exhibit traffic volumes below or within the range of the planning level capacity thresholds shown in the previous table. This indicates that these roadways are typically not experiencing high levels of congestion.

The methodology described above is a planning-level analysis that uses average daily traffic volumes and is not appropriate for all traffic conditions. Traffic conditions that do not fit the average daily traffic criteria (i.e., weekend travel, holiday travel, special events, etc.) are likely to produce different levels of congestion. Further, this methodology does not take into account specific geometric conditions that exist at the intersection nodes, potential peaking characteristics of these roadways or directional flow disparities, which can greatly impact the order of magnitude of the deficiency (either meaning there is not a deficiency, or it is more significant than what is indicated by the ADT alone). However, for purposes of the transportation planning process, this volume to capacity (v/c) methodology is widely accepted and applicable. For detailed design consideration of access management, intersection traffic control and congestion

mitigation, the city may require a traffic study providing detailed operational analysis for specific developments.

Identified Capacity and Safety Concerns

The primary issue locations are identified below:

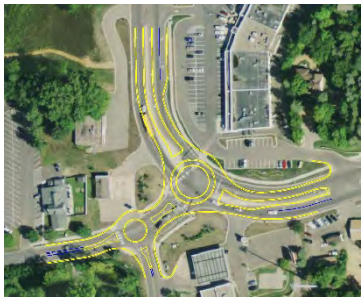
1. **Trunk Highway System Congestion:** Peak-period congestion occurs on the Trunk Highway segments passing or adjacent to the City including TH 7 and TH 41.

   Current traffic volume on TH 7 ranges from 20,000 to 35,000. With the number of streets and access locations, together with the traffic volume levels, the mainline congestion and queuing at existing signalized and un-signalized intersections provides a source of localized congestion on the City street system.

   The City will continue to work with MnDOT, Hennepin County and adjacent Cities in reviewing and improving traffic flow on TH 7. Specific intersections that the City will continue to monitor and support future improvements include:

   - TH 7 at Minnewashta Parkway/Church Road
   - TH 7 at Vine Hill Road

2. **Traffic Committee:** In 2015 and 2017 the City Council established a "Traffic Committee" to advise the City Council on traffic issues, with an initial focus on the review of the Smithtown Rd., Country Club Road, Yellowstone Trail and Lake Linden Drive corridors. A summary of the findings and improvement alternatives include:

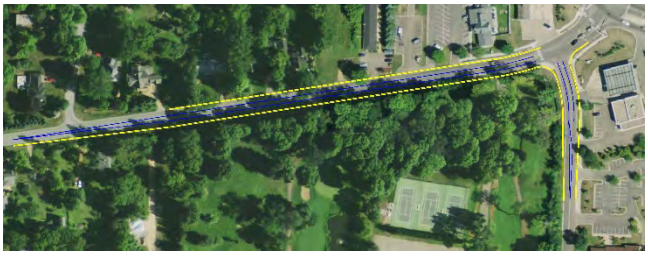


<u>Smithtown Road at County Club Road</u>
Dual Roundabout (Country Club Road and CSAH 19) - Includes reconstruction of both CSAH 19 and County Club Rd with two interconnected roundabouts. This improvement would involve significant design, right of way impacts and coordination with Hennepin County.

Signalized intersection coordinated with CSAH 19 - Includes a traffic signal at the intersection of Smithtown Road and Country Club Road with additional lanes on Country

Club Road and Smithtown Road. Signal coordination with CSAH 19 intersection would require review and approvals with Hennepin County.

Smithtown Road



Widen roadway from Wooden Cleek to Country Club Road - Includes addition of a left turn lane, a through/right turn lane and a separated bike/pedestrian path without addition of any traffic control at Country Club Road.

Country Club Road

Widen roadway approaching Smithtown Rd - Includes addition of a left turn lane and right turn lane without addition of any traffic control at Country Club Rd.

Widen add bike lanes with 25 mph Speed Limit - Includes widening Country Club Road to provide a through lane in each direction with a minimum 6 foot on road bike lanes with a 25mph speed limit. An off road bike trail was added adjacent to County Club Road from Smithtown Road to Lake Mary Trail as part of the Mattamy development.

Yellowstone Trail – County Club Rd to Lake Linden Drive

Stop Sign Enhancements - Change existing stop signs to Blinker Stop signs at County Club Road and Lake Linden Drive intersections

Improve Sight Lines - Cut back trees along corridor especially at intersections

Intersection Improvements - At the Lake Linden Drive intersection add a street light, a pedestrian crosswalk, and pedestrian crossing signs.

Yellowstone Trail – West of Lake Linden Drive

Improve Sight Lines - Trim trees and add additional curve signing at Seamans Drive (delineate curve).

Improve Sight Lines - Realign Yellowstone Trial at Seamans Drive to a 90 degree intersection with Blinker Stop signs.

Lake Linden Drive

Improve Sight Lines - Fix grade changes north of Cub development access for left turning vehicles.

Lake Linden Drive at Cub Entrance/TH 7/TH 41

Access Improvements - Close Cub development exit from the east at frontage road (Lake Linden Drive) maintaining inbound movement.

Roadway Improvement - Widen Lake Linden Drive eastbound to two approaching lanes (one right turn/through to westbound TH 7 and to TH 41 and one left turn to eastbound TH 7) and one exiting lane westbound.

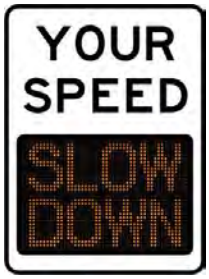
Roadway Realignment - Move the westbound right turn lane from the intersection at TH 41 to a free right with acceleration lane at approximately the existing Lake Linden Drive extended. (Movement would be removed from the TH 7/TH 41 intersection)

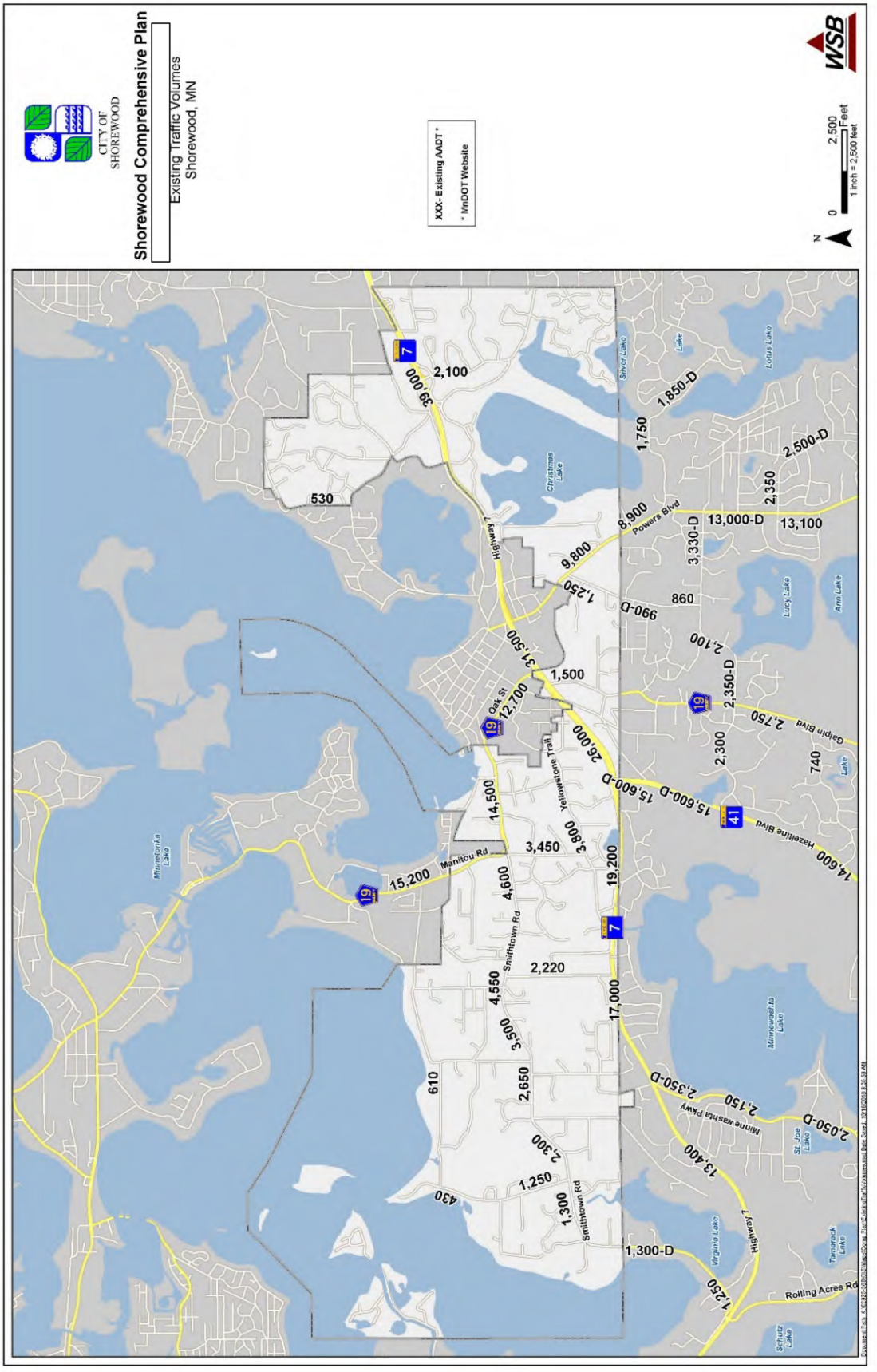
Miscellaneous

Technology Improvements - Remove use of Country Club Road, Yellowstone Trail and Lake Linden Drive from Google Maps directions.

Enforcement - Improve/Enhance enforcement of speeding and traffic control on area roadways.

Traffic Calming - Add Driver Feedback speed control signs at selected locations on Yellowstone Trail and Lake Linden Drive




Shorewood Comprehensive Plan
Existing Traffic Volumes
Shorewood, MN
CITY OF SHOREWOOD
XXX- Existing AADT *
* MnDOT Website
WSB
N
0
2,500 Feet
1 inch = 2,500 feet
39,000
2,100
530
1,850-D
1,750
2,500-D
2,350
13,000-D
13,100
8,900
Powers Blvd
3,330-D
9,800
1,250
860
990-D
2,100
37,500
1,500
2,350-D
12,700
Oak St
2,750
Galpin Blvd
26,000
2,300
740
15,600-D
14,500
Yellowstone Trail
3,800
14,600
Hazeltine Blvd
3,450
Manitou Rd
15,200
4,600
19,200
Smithtown Rd
2,220
4,550
17,000
3,500
610
2,650
2,350-D
2,150
2,050-D
Minnewashta Pkwy
2,300
13,400
1,250
430
1,300
Smithtown Rd
1,300-D
Highway 7
1,250
Rolling Acres Rd
Christmas Lake
Silver Lake
Lotus Lake
Lucy Lake
Ann Lake
Minnetonka Lake
Minnewashta Lake
St Joe Lake
Tamarack Lake
Schutz Lake
Minnetonka Lake

Access Management

The purpose of access management is to provide adequate access to adjacent land development while maintaining acceptable traffic flow on higher level roadways. Access management consists of carefully controlling the spacing and design of public street intersections and private access points to the public roadway system. Arterials, being designed for higher speed and longer distance trips, generally have reduced or restricted access while local streets can accommodate much greater access. Collector roadways fall in between arterials and local roadways regarding the amount of access that is permitted.

The agency with jurisdiction over a roadway sets access management guidelines. Access to TH 7 must meet MnDOT access management guidelines and is permitted subject to conditions. See the table on the following page for MnDOT Access Management Guidelines.

Hennepin County has established access management guidelines for urban areas (within the 20-year MUSA boundary) and rural areas (outside the MUSA boundary). Hennepin County access management guidelines are displayed in the table on page 148. Hennepin County requires permits for new driveway access to county roads and when land uses change at a site adjacent to a county road. Hennepin County typically requires that new access points meet its guidelines; however, the county can make exceptions to the guidelines with sufficient justification.

Driveway Access on City Streets (Collectors and Local Roads)

Driveways contribute to accidents and reduced traffic flow on major streets in municipalities because they add to the number of locations where vehicle conflicts can occur. Hence, it is desirable to have guidelines in place that:

- Limit the number of driveways to those that are actually needed to safely accommodate the traffic generated by each development.
- Provide adequate spacing between driveways so conflicts (and resulting accidents) between vehicles maneuvering at adjacent driveways do not arise.
- Ensure proper design to accommodate driveway traffic and minimize vehicle conflicts without significantly reducing roadway capacity.

Occasionally topographic features of a particular site or the needs of a particular land use may require special access features in a proposed development. The City may wish to withhold approval of these developments or site changes until a study has been made of the potential

impacts on the affected roadways and the adequacy of the proposed access design is determined. The City may require that the following steps be included in the traffic study for the site:

- Estimate site traffic generation and future non-site traffic.
- Determine directional distribution of trips.
- Estimate turning movements at driveway and the resulting level of service.
- Analyze current and future access requirements.
- Provide necessary geometric and operational improvements to safely accommodate the site's access requirements without negative impacts to traffic operation on the adjoining roadways

MnDOT Access Management Manual

Summary of Recommended Street Spacing for IRCs

Category	**Area or Facility Type**	**Typical Functional Class**	**Public Street Spacing**		**Signal Spacing**
			Primary Full-Movement Intersection	**Secondary Intersection**	
3	**Regional Corridors**				
3AF	Non-Interstate Freeway	Principal and Minor Arterials	Interchange Access Only (see Section 3.2.7 for interim spacing)		Interim
3A	Rural		1 mile	1/2 mile	See Section 3.2.5
3B	Urban/Urbanizing		1/2 mile	1/4 mile	1/2 mile
3C	Urban Core		300-660 feet, dependent upon block length		1/4 mile

Hennepin County Access Spacing Guidelines

Access Type	Movements Allowed	Rural Arterial			Urban and Urbanizing Arterial		
		Greater than 7,500 ADT	Less than 7,500 ADT	Collector	Undivided	Divided	Collector
Single family residential driveway or farm field entrance	Full movements allowed	1/4 mile (1,320 feet)	1/8 mile (660 feet)	1/8 mile (660 feet)	Not allowed	Not allowed	1/8 mile (660 feet)
	Limited access	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed	1/16 mile (330 feet)
Low Volume Driveway (less than or equal to 500 trips per day)	Full movements allowed	1/4 mile (1,320 feet)	1/8 mile (660 feet)	1/8 mile (660 feet)	Not allowed	Not allowed	1/8 mile (660 feet)
	Limited access	Not allowed	Not allowed	Not allowed	Not allowed	1/8 mile (660 feet)	1/16 mile (330 feet)
High Volume Driveway (greater than 500 trips per day)	Full movements allowed	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)	1/8 mile (660 feet)	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)	1/8 mile (660 feet)
	Limited access	Not allowed	Not allowed	Not allowed	Not allowed	1/8 mile (660 feet)	Not allowed
Low Volume Public Street (less than or equal to 2,500 ADT)	Full movements allowed	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)	1/8 mile (660 feet)	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)	1/8 mile (660 feet)
	Limited access	Not allowed	Not allowed	Not allowed	Not allowed	1/8 mile (660 feet)	Not allowed
High Volume Public Street (greater than 2,500 ADT)	Full movements allowed	1/2 mile (2,640 feet)	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)	1/4 mile (1,320 feet)
	Limited access	Not allowed	Not allowed	Not allowed	Not allowed	1/8 mile (660 feet)	Not allowed

FUTURE ROADWAY SYSTEM

This section addresses future roadway improvement needs and roadway design guidelines.

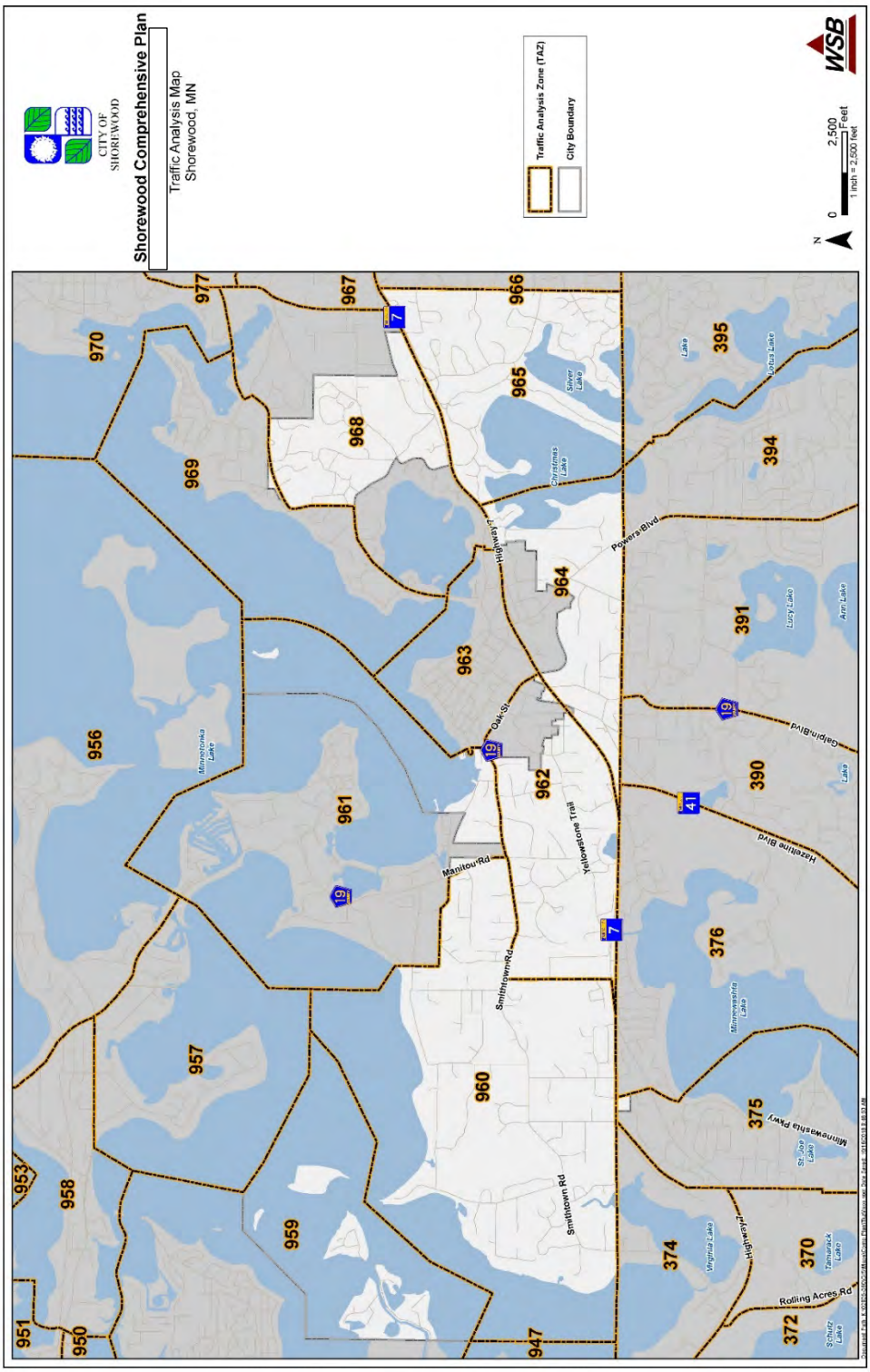
Roadway Capacity – Traffic Forecasting

To determine future roadway capacity needs, year 2040 traffic forecasts were prepared using the Metropolitan Council travel demand model. The model was refined for application specifically for Shorewood. The 2040 projections were compared against the assumed 2040 roadway network to see where roadway segment capacity deficiencies may result. The 2040 roadway network assumed for this analysis is the same as the current roadway network, as the City and County Capital Improvement Programs (CIPs) do not include any projects that add significant capacity to the roadway network.

While the travel demand model is a valuable tool for identifying future traffic based on the proposed land use impacts, it is not meant for use in detailed traffic operations studies. For a more accurate representation of the transportation impacts from specific developments, detailed traffic studies should be conducted to determine the operational impacts on adjacent roadways and intersections.

A central concept of travel demand forecasting is the use of Transportation Analysis Zones (TAZs). Each forecast study area, in this case the City of Shorewood, is divided into a series of TAZs. Each TAZ has land use data which indicates trip generation and trip attraction including population, household, and employment data. The map on the next page displays Metropolitan Council TAZs within Shorewood.

The results of the Shorewood modeling process are summarized on page 151, which displays 2040 projected average daily traffic volumes. The table on page 152 provides the initial population, household, and employment allocations by TAZ assumed in the Metropolitan Council model.


CITY OF SHOREWOOD
Shorewood Comprehensive Plan
Traffic Analysis Map
Shorewood, MN
Traffic Analysis Zone (TAZ)
City Boundary
WSB
0
2,500
Feet
1 inch = 2,500 feet
N
970
977
967
966
965
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947
395
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376
375
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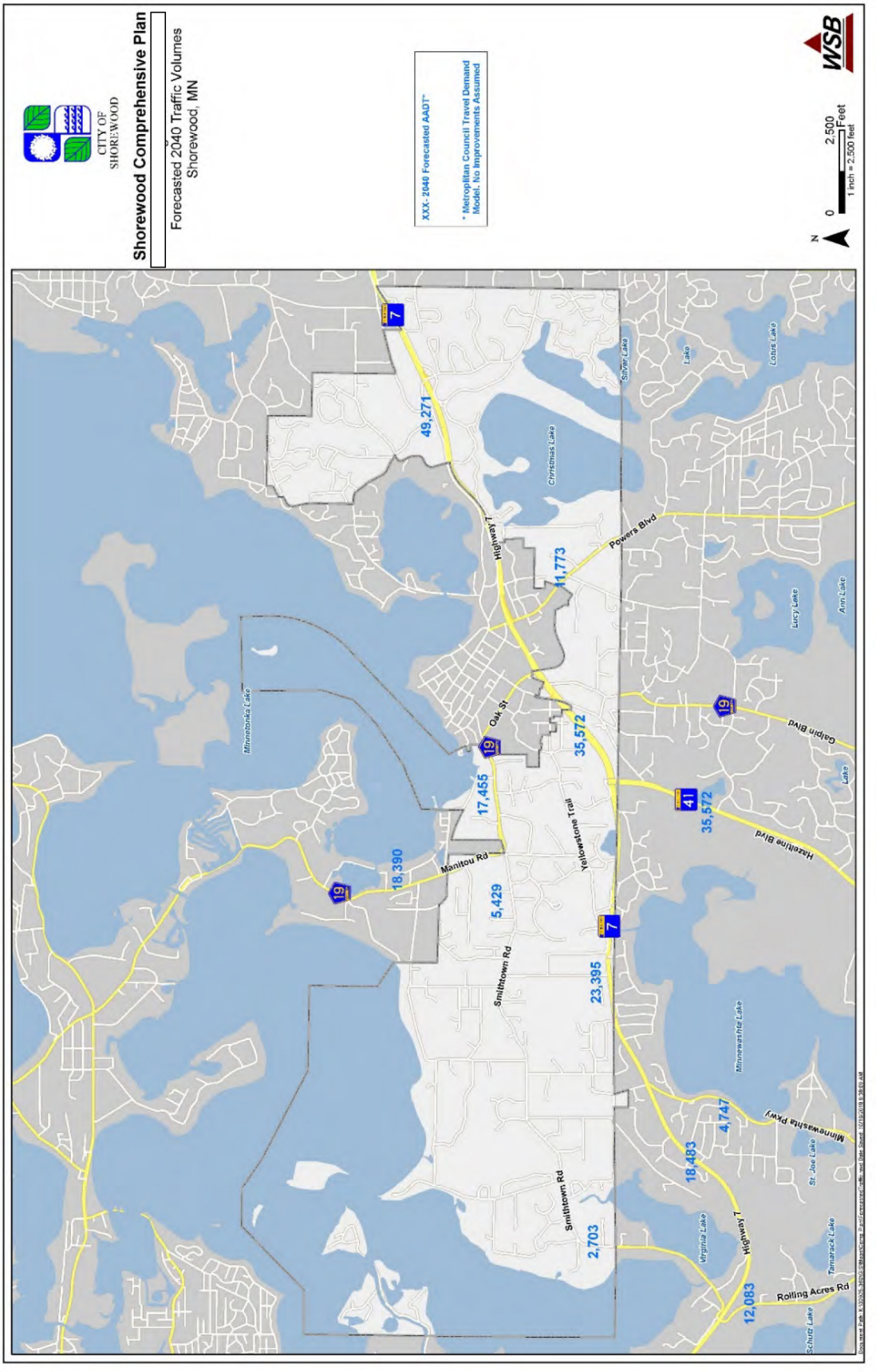
370
372
Powers Blvd
Highway 7
Oak St
Manitou Rd
Smithtown Rd
Yellowstone Trail
Galpin Blvd
Hazeltine Blvd
Minnewashta Pkwy
Rolling Acres Rd
Minnetonka Lake
Christmas Lake
Silver Lake
Lotus Lake
Lucy Lake
Ann Lake
Minnewashta Lake
Virginia Lake
Tamarack Lake
Schutz Lake
St. Joe Lake
Lake
7
19
41


Shorewood Comprehensive Plan
Forecasted 2040 Traffic Volumes
Shorewood, MN
CITY OF SHOREWOOD
XXX- 2040 Forecasted AADT*
* Metropolitan Council Travel Demand Model. No Improvements Assumed
WSB
N
0
2,500 Feet
1 inch = 2,500 feet
49,271
11,773
35,572
17,455
18,390
5,429
23,395
2,703
35,572
4,747
18,483
12,083
Highway 7
Powers Blvd
Oak St
Manitou Rd
Yellowstone Trail
Smithtown Rd
Hazeltine Blvd
Minnewashta Pkwy
Rolling Acres Rd
Oxford Blvd
Christmas Lake
Minnetonka Lake
Lucy Lake
Ann Lake
Lotus Lake
Silver Lake
Minnewashta Lake
St. Joe Lake
Virginia Lake
Tamarack Lake
Schutz Lake

Metropolitan Council Current TAZ Data - City of Shorewood (Raw Data - Unadjusted)

	2010 Census			2020 Forecast			2030 Forecast			2040 Forecast		
TAZ	Population	Households	Employment	Population	Households	Employment	Population	Households	Employment	Population	Households	Employment
959	184	72	32	217	72	168	221	74	168	226	76	168
960	2920	1012	251	2844	1012	207	2880	1038	207	2924	1059	207
961	116	49	3	123	49	72	128	52	72	133	54	72
962	892	341	481	1092	397	600	1122	413	600	1151	426	600
964	616	226	7	746	311	16	766	323	16	785	333	16
965	1688	580	135	1607	576	286	1686	612	286	1760	642	286
968	891	378	54	973	383	251	998	398	251	1023	410	251
969	0	0	0	0	0	0	0	0	0	0	0	0
972	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0
	7307	2658	963	7602	2800	1600	7801	2910	1600	8002	3000	1600

2040 Future Roadway Capacity Improvement Needs

To identify the need for potential future capacity improvements, Metropolitan Council 2040 forecasts were compared to planning-level roadway capacities for Principal and A-Minor Arterial Roadways. Planning-level roadway capacities used for this analysis were discussed previously. Based on this comparison, the only roadways that will be experiencing congestion are: TH 7 east of TH 41 and CSAH 19 through the City. All other local City roadways have adequate capacity to accommodate forecasted Metropolitan Council 2040 travel demands.

As noted previously, this methodology is a planning-level analysis and some traffic conditions do not fit the average daily traffic criteria (i.e., weekend travel, holiday travel, special events, etc.) and are likely to produce different levels of congestion. For detailed design consideration of access management, intersection traffic control and congestion mitigation, the city may require a traffic study providing detailed operational analysis for specific developments.

Roadway Design and Right of Way Standards

This Transportation Plan does not attempt to show locations of new local streets other than those that exist currently. Location of new local streets would be determined with the development. However, in reviewing development requests, the City should carefully consider the following recommendations:

1. In new subdivisions, as opposed to simple re-subdivisions, all lots should abut on a publicly dedicated street. Exceptions should only be approved by PUD or Variance, subject to the following criteria. While it is the City's policy to discourage private streets, in certain limited cases of lot re-subdivision, the City has adopted the policy that as many as three lots may be allowed access by private easement, subject to the following criteria:

    a. The land to be subdivided is not capable of being divided into more than three lots.
    b. Consideration is given to surrounding undeveloped property.
    c. A 50-foot easement and adequate turn-around must be provided.
    d. Legal provisions are made for the use and maintenance of the road.
    e. Where private roads are approved, protective covenants will be required stating that the City will not take over or maintain them.

f. The minimum width of the paved surface for private streets shall be 20 feet where adequate off-street parking is provided. Where the potential exists for on-street parking the minimum shall be 24 feet.

2. Subdivision circulation patterns should be examined from a broader perspective than just the individual site. In this regard, consideration must be given to surrounding undeveloped property as well as existing street patterns to ensure that the most efficient transportation network is achieved.

3. All streets should meet the minimum design standards established by the City. Existing standards such as minimum road width and length of cul-de-sac streets have been evaluated in terms of safety (emergency vehicles access) and street maintenance (snowplowing). The minimum right-of-way width for local streets is 50 feet and that the maximum length for cul-de-sac streets should be 700 feet.

4. In areas where existing streets have substandard right-of-way widths, the City shall acquire, to the extent possible, additional right-of-way through the subdivision process

For local streets the following criteria should be used to evaluate appropriate pavement widths:

<u>24-foot street</u>

- use in areas where zoning requires lots to be 20,000 square feet in area or larger
- on-street parking restricted to one side
- consider additional parking restrictions for through streets

<u>28-foot street</u>

- use in areas where zoning allows lots smaller than 20,000 square feet in area
- on-street parking restricted to one side

<u>32-foot street</u>

- use in areas where abutting properties are occupied or zoned for two-family or multiple-family dwellings or on through streets where on-street bicycle/pedestrian traffic is a factor
- if on-street parking is allowed on both sides of street, consider separated bicycle/pedestrian facilities

It should be noted that streets currently exist which are less than 24 feet in width. While substandard streets may be maintained at their current design, in no case shall streets be reconstructed at width less than 20 feet. Substandard streets shall be evaluated based on their use characteristics (i.e. land use intensity, on-street parking, bicycle/pedestrian traffic, etc.).

The City recognizes that it may not be feasible to reconstruct existing streets to the preceding standards. Specifically, existing streets may be rebuilt to their existing width (but not less than 20 feet). Curb and gutter will be installed where necessary for drainage purposes or where traffic dictates.

The City has completed a long-term pavement inventory which quantifies and prioritizes improvements and establishes a long-term strategy for financing those improvements. The plan includes a process for evaluating reconstruction projects, including early identification of project obstacles (i.e. lack of right-of-way) and early neighborhood involvement. In this regard, the City's standard Planning Process of strategy, inventory, policy planning, project planning, and implementation should be employed.

Based on the City's Subdivision Regulation minimum street right of way width has been established as follows:

- Arterial Street = 100 feet
- Collector Street = 60 feet
- Local Street = 50 feet

Traffic Calming

Traffic calming is an approach which is generally used to accomplish one or more of the following primary objectives:

- Reduce speeds on local streets.
- Reduce cut-through (non-local) traffic levels on local streets.
- Improve safety and usability for non-motorized traffic.

Under certain circumstances, traffic calming can be used on collector level roadways to reduce speeds, primarily at intersections. However, the focus is on "returning neighborhood streets to the neighborhood."

Traffic calming measures are best evaluated and implemented within the context of the overall transportation network serving the City. However, the types of measures identified below should be kept in mind as possible "tools in the toolbox:"

- Traffic circles/roundabouts

- Lateral lane shifts – roadway striping

- Curb extensions/neckdowns at intersections

- Raised crosswalks

- Diverters – close access to street

- Driver feed-back (dynamic) speed signs

Traffic calming measures should be reviewed on a case-by-case basis but should be evaluated within the context of the overall street network and from the perspective broad based policy objectives.

The City has developed and adopted an evaluation process to document processes and procedures for locating and installing traffic devices, to include: signage, pavement markings and traffic calming devices specifically within neighborhoods to address speeding, traffic control (stop signs) and cut through traffic issues.

EXISTING AND PLANNED NON-MOTORIZED TRANSPORTATION NETWORK

This section addresses network needs for walking and bicycling within the City of Shorewood. This section also addresses the needs of people using wheelchairs and assistive mobility devices such as mobility scooters, as they are considered pedestrians.

Enhancing the non-motorized elements of Shorewood's transportation system is a key goal in terms of improving transportation sustainability in the city and in the region. This approach gives residents an alternative to driving, supports transportation options for people who do not have consistent access to a personal vehicle, and encourages healthy activities and lifestyles

Complete streets are a process for developing a transportation network that best accommodates all modes of transportation. Planners and designers must systematically consider all modes when developing their long-range plans and short-term maintenance and construction projects. The City of Shorewood supports considering implementing a complete street process in roadway reconstruction projects where appropriate and feasible.

"**Complete Streets**" are **streets** that are designed, built and operated to enable safe access for all users, in that pedestrians, bicyclists, motorists and public transportation users of all ages and abilities are able to safely move along and across the street right-of-way.

Existing and Planned Non-Motorized Transportation Network

The non-motorized transportation network in Shorewood consists of sidewalks and multi-use paved trails. Sidewalks are located along selected local streets, providing connections to the trail system. Multi-use paved trail segments are also located along several key roadways. Existing Bicycle and Pedestrian Network facilities are illustrated on page 160**.**

Sidewalks and/or trails are recommended to be located adjacent to all new roadways within Shorewood to accommodate pedestrian and other non-motorized movement in a safe manner, separate from vehicular traffic. The City supports completing gaps in the system network when consistent with the City's trail plan as funding is available.

Planned Regional Non-Motorized Transportation Network

The Metropolitan Council 2040 TPP encourages the use of bicycles as a mode of transportation and establishes a Regional Bicycle Transportation Network (RBTN) to establish an integrated network of on street bikeways and off-road trails that complement each other to improve conditions for bicycle transportation at the regional level. The RBTN identifies Tier 1 and Tier 2 alignments where existing regional or other trails exist or where a specific alignment has been identified. The RBTN also identifies Tier 1 and Tier 2 corridors where specific alignments have not yet been defined.

Within Shorewood, the RBTN includes two Tier 1 RBTN corridors and one Tier 2 RBTN corridor. The Tier 1 corridors include: The Lake Minnetonka LRT Regional Trail running east/west through the City, linking the City of Hopkins and Carver Park Reserve, and; CSAH 19 north of Lake Minnetonka LRT Regional trail to the City of Tonka Bay. The Tier 2 corridor generally extends east-west along the TH 7 corridor and is consistent with planned improvements identified in Hennepin County's 2040 Bicycle Transportation Plan. With both of these corridors, existing land use patterns and major roadway barriers do not provide other opportunities for an efficient and successful bikeway route.

Non-Motorized Transportation Design Considerations

Design dimensions for sidewalks are recommended to be five-feet or wider, with a minimum of a four-foot wide boulevard between the sidewalk and the curb. Increased separation improves pedestrian comfort and provides space for street signs and snow storage.

Several types of bicycle facilities exist within the metropolitan area, with each having its own benefits and limitations depending on the surrounding environment and intended audience. Bicycle facilities include: off-street facilities, protected bikeways, buffered bicycle lanes, conventional bicycle lanes, bicycle boulevards, and wide paved shoulders.

Multi-use trails are recommended to be a minimum of eight-feet wide. Regional trails are recommended to be a minimum of ten-feet wide due to higher use and the design requirements to comply with federal funding. Trails must have a two-foot wide clear zone on either side to reduce hazards for bicyclists and provide a recovery zone if a bicyclist leaves the edge of the trail. The clear zone can be paved or turf surface. No signs, furnishings, trees, or other obstructions can be in the clear zone.

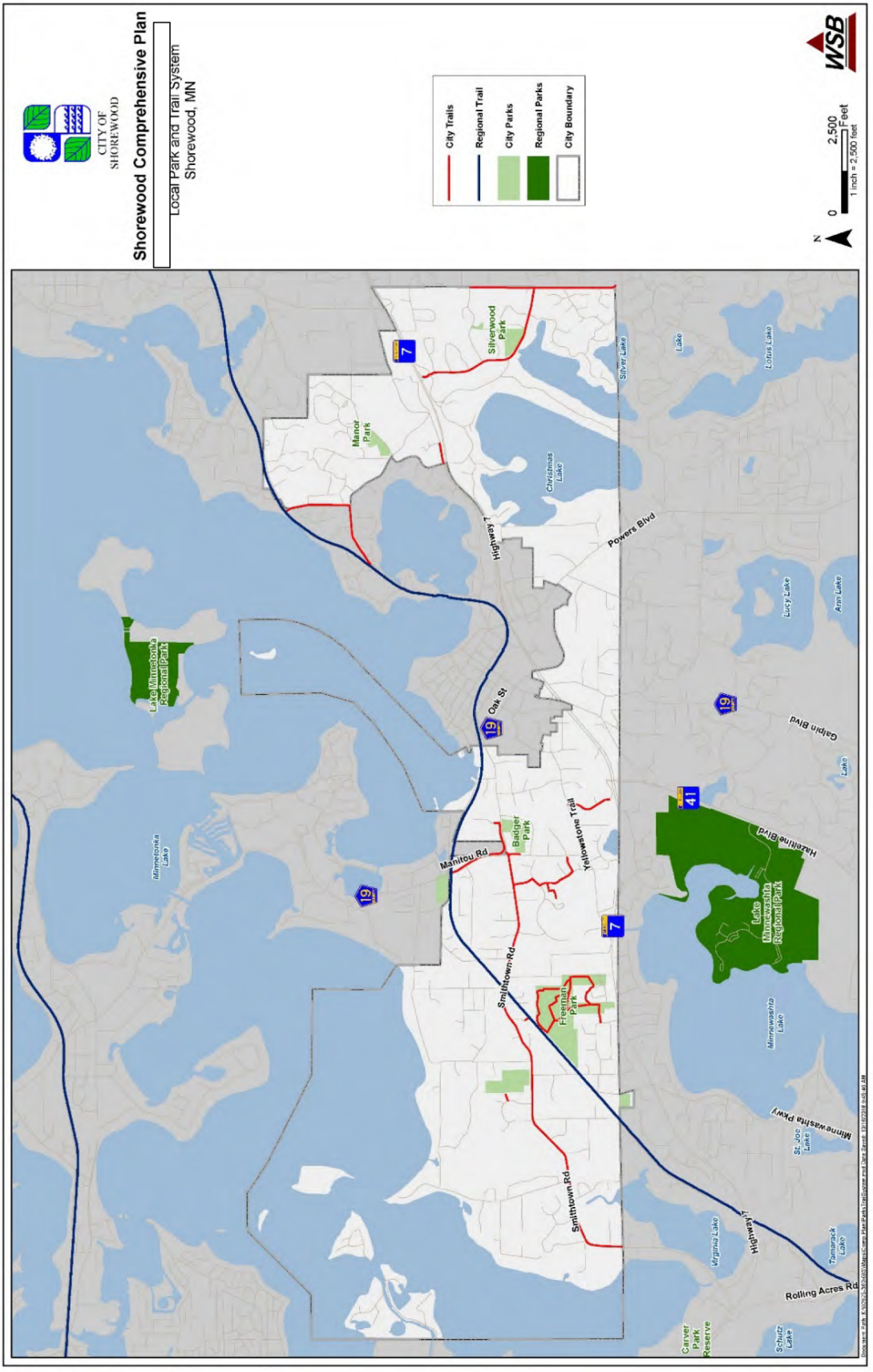
Paved shoulders should be a minimum of four-feet wide if intended for bicycle and pedestrian use. Four-foot wide shoulders are adequate on streets with traffic volumes below 1,000 vehicles per day. Six- to eight-foot shoulders are recommended when traffic volumes exceed 1,000 vehicles per day. A wider shoulder improves pedestrian and bicyclist safety and comfort when vehicle traffic speeds and volumes are higher.

As non-motorized facilities are planned and designed, the City should consult additional planning and design resources, including:

- Hennepin County Bicycle Transportation Plan
- Hennepin County Pedestrian Plan
- Hennepin County Bottineau LRT/Metro Blue Line Extension Bicycle Study
- MnDOT Bikeway Facility Design Manual
- MnDOT Complete Streets Implementation Resource Guide
- Minnesota Manual on Uniform Traffic Control Devices
- Guide for the Development of Bicycle Facilities – American Association of State Highway and Transportation Officials
- Guide for the Planning, Design, and Operation of Pedestrian Facilities – American Association of State Highway and Transportation Officials
- Public Rights of Way Accessibility Guidelines (PROWAG) – US Access Board

Accessibility is a very important consideration for non-motorized design. All new pedestrian and bicycle facilities must meet the ADA (Americans with Disabilities Act) accessibility guidelines established in PROWAG. The guidelines in PROWAG address the design needs of people with physical and/or visual impairments. Accessibility will become increasingly important over the next 20 years due to demographic changes. Baby boomers are aging and the population over age 65 is increasing. People over 65 are more likely to have physical and/or visual impairments that affect their ability to get around. To address accessibility issues, it is recommended that the City

develop and implement an ADA transition plan to bring sidewalks, trails, and intersections into compliance with ADA.


Shorewood Comprehensive Plan
Local Park and Trail System
Shorewood, MN
CITY OF SHOREWOOD
City Trails
Regional Trail
City Parks
Regional Parks
City Boundary
WSB
N
0
2,500
Feet
1 inch = 2,500 feet
Lake Minnetonka Regional Park
Silverwood Park
Manor Park
Badger Park
Freeman Park
Lake Minnewashta Regional Park
Carver Park Reserve
Christmas Lake
Silver Lake
Lotus Lake
Lucy Lake
Ann Lake
Minnetonka Lake
Minnewashta Lake
St. Joe Lake
Virginia Lake
Tamarack Lake
Schultz Lake
Powers Blvd
Oak St
Manitou Rd
Yellowstone Trail
Smithtown Rd
Highway 7
Galpin Blvd
Hazeltine Blvd
Minnewashta Pkwy
Rolling Acres Rd

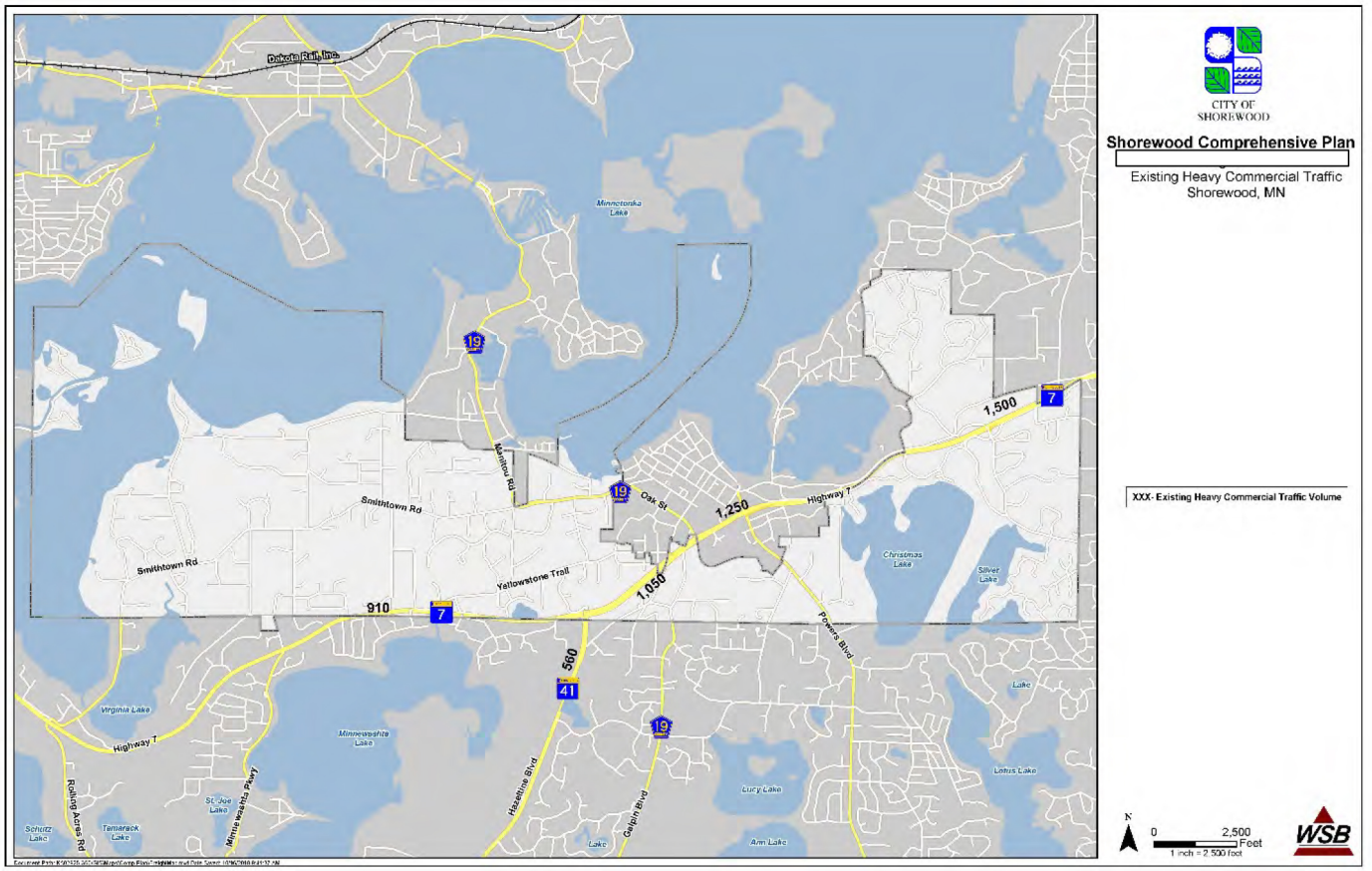
FREIGHT

Freight transportation in Shorewood is primarily served by arterial roadways. The graphic below shows the City's freight system and potential freight generators.

There are no large freight traffic generators or intermodal facilities within the city. Most truck is passing through Shorewood on trips to, from, and through the Twin Cities. Freight traffic generators within Shorewood are located along the TH 7. Freight generators include concentrations of commercial land uses along TH 7.

The graphic below also shows Heavy Commercial Average Annual Daily Traffic (HCAADT) within the City of Shorewood. TH 7 carries a number of heavy commercial vehicles (1250/1500 east of TH 41 and 910 west of TH 41).

The Metropolitan Council 2040 TPP acknowledges several freight challenges that impact the city and the region. Freight traffic is expected to increase and place pressure on the region's highway and rail systems. While land use adjacent to the city's primary freight routes is generally compatible with these uses (industrial, commercial, etc.), there are several areas of existing and planned single-family residential housing or mixed use that lie adjacent to the arterial roadways.



TRANSIT

Existing Transit Service

The City of Shorewood is located within Transit Market Areas 4 and 5 in the Transit Capital Levy District, as shown in the 2040 Transportation Policy Plan (TPP). Dial-a-ride services from Metro Mobility and Transit Link are both available in Shorewood.

Scheduled transit service for Shorewood residents is currently provided by Metro Transit (a division of the Metropolitan Council). The table below outlines the existing transit service in the City of Shorewood.

Existing Transit Serving Shorewood

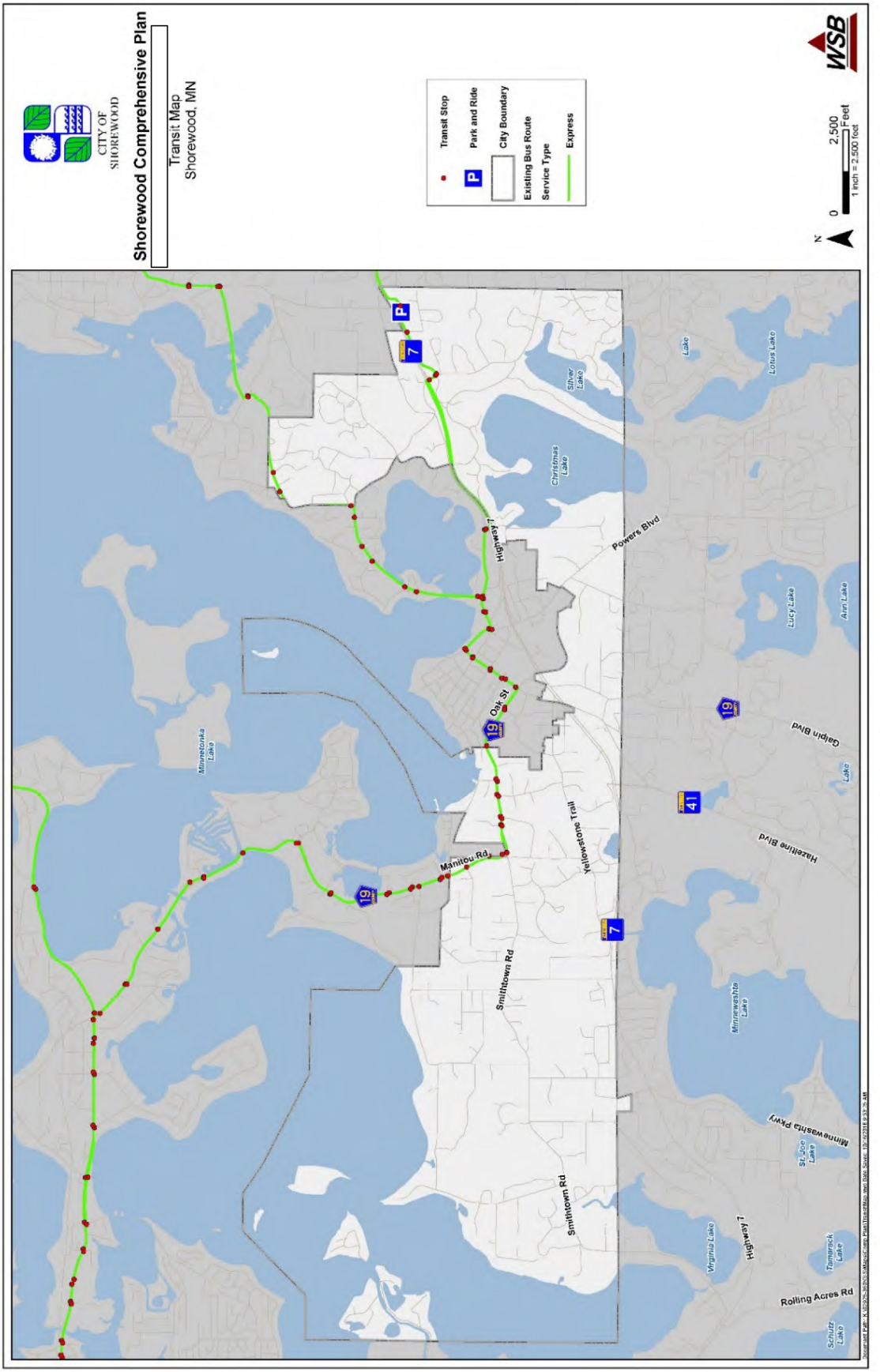
Route Number	Service Route/Area	Service Description
670	Minnepolis, Hopkins, Minnetonka and Excelsior	Express
671	Minneapolis, Tonka Bay, Excelsior, Greenwod, Deephaven and Minnetonka	Express

One Park and Ride facility is located within the City of Shorewood. The facility is located off of TH 7 on Denton Avenue and Vine Hill Road. shows the existing Transit Facilities in and adjacent to the City of Shorewood.

Transitway Service

LRT projects are very capital intensive because they require dedicated right-of-way with rail and electric power installations, and the cars themselves are expensive. Due to the costs involved, LRT corridors generally need to be on a regional scale to justify the necessary investments. Therefore, the planning and implementation of LRT systems are primarily the responsibility of the Metropolitan Council and the metro-area counties. Because of their size, the cities of Minneapolis and St. Paul have also been very involved in the planning process for certain corridors.

The TPP's transit investment plan does not show any transitway investments planned for the City of Shorewood in the current revenue scenario. The transitway corridor which has the most relevance for City of Shorewood is the Green Line Extension (Southwest Light Rail Corridor). This corridor is a 15-mile route between Eden Prairie and downtown Minneapolis that passes through Minnetonka, Hopkins and St. Louis Park approximately 7 miles from the City of Shorewood.


Shorewood Comprehensive Plan
Transit Map
Shorewood, MN
CITY OF SHOREWOOD
Transit Stop
Park and Ride
City Boundary
Existing Bus Route
Service Type
Express
WSB
N
0
2,500 Feet
1 inch = 2,500 feet
Powers Blvd
Oak St
Manitou Rd
Yellowstone Trail
Smithtown Rd
Gaylin Blvd
Hazeltine Blvd
Minnewashta Pkwy
Rolling Acres Rd
Highway 7
Minnetonka Lake
Christmas Lake
Silver Lake
Lotus Lake
Lucy Lake
Auri Lake
Minnewashta Lake
St. Joe Lake
Virginia Lake
Tamarack Lake
Schutz Lake

AVIATION

Cities are responsible for airspace protection to reduce hazards to air travel within its part of the region. There are no existing or planned aviation facilities within the City of Shorewood. The closest airport to Shorewood is the Flying Cloud Airport; one of seven publicly owned airports in the Metropolitan Airports Commission (MAC) system. The airport's role in the MAC system is to serve as a reliever to the Minneapolis-St. Paul International Airport, and serve personal, recreational, and some business aviation users in the northwest metropolitan area. MAC is updating the airport's long-term comprehensive plan to align with existing and forecasted activity levels. Due to the distance from Shorewood, no existing or future impacts from the airport are forecasted that may otherwise affect the City of Shorewood.

Given the distance to the nearest airports, there are no radio beacons or other air navigation aids located in off-airport locations in Shorewood. The city is not within the area of influence of any of the airports identified above, and is therefore not subject to associated land use restrictions.

Any proposed structure over 200 feet shall require notification to the Federal Aviation Administration (FAA) at least 30 days prior to construction, using FAA Form 7460-1 "Notice of Proposed Construction or Alteration," as defined under code of federal regulations CFR - Part 77. The City's zoning code limits structure height; therefore, it is unlikely that any structures in the city will require FAA notification. The City will support, as necessary, compliance with FAA and Metropolitan Council requirements concerning visual and/or electronic interference with airport communications, air traffic operations, and other aviation land-use capability guidelines. There are currently no heliports in Shorewood any known plans to construct one.

Seaplane and ultra-light operations are allowed on the surface water of Lake Minnetonka. Seaplane traffic in Shorewood has not been identified as a problem at the present time. However, as use of Lake Minnetonka increases, the potential for problems to arise also increases. This use of the lake should be monitored and at such time it is determined to be a problem, a regional study on the topic should be conducted to determine if there is a need for a specialized area of the lake to handle seaplane operations. This study should be a joint effort between all lake communities and may best be handled by the Lake Minnetonka Conservation District.

CONCLUSION AND NEXT STEPS

The purpose of this Transportation Plan is to set a multimodal transportation vision for the City of Shorewood through the year 2040. Goals and specific strategies have been identified

collaboratively by the City, Hennepin County, MnDOT and citizens within the framework of Metropolitan Council requirements. The vision and associated strategies outlined in this plan were established by considering existing and forecasted conditions, City of Shorewood priorities, regional travel patterns and a variety of other factors.

As the owners of the transportation network in the City of Shorewood (i.e. City of Shorewood, Hennepin County and MnDOT) advance their respective Capital Improvement Programs (CIPs), this plan is intended to serve as an important resource and reference in establishing priorities and advancing transportation projects for implementation. Advancing these projects from a planning to implementation phase will require collaborative discussions among the City, County, MnDOT, adjacent communities, Metropolitan Council, residents and others to conduct traffic studies, finalize designs, preserve rights-of-way, obtain environmental clearances and leverage necessary financial resources. The following are key objectives the City should consider with this transportation plan:

1. Revise the existing roadway Functional Classification system as follows:
    a. Smithtown Road: CASH 19 to City Limits – Major Collector to "Other" Arterial
    b. Vine Hill Road: TH 7 to City Limits - Local Street to Major Collector
    c. Old Market Road: TH 7 to Vine Hill Road – Local Street to Major Collector
    d. Eureka Road: Smithtown Road to TH 7 – Local Street to Major Collector
    e. Delton Avenue: City of Minnetonka Boarder to Old Market Road – Local Street to Major Collector

2. The only roadway that is approaching capacity is CSAH 19 north of Smithtown Road. All other Arterials and Major Collectors in Shorewood currently exhibit traffic volumes below or within the range of the planning level capacity thresholds. The City should work with Hennepin County on future design considerations for CSAH 19.

3. As development or re-development continues, the City should determine detailed design consideration of access management, intersection traffic control and congestion mitigation, the City should require a traffic study providing detailed operational analysis be completed.

4. The City should continue to work with MnDOT, Hennepin County and adjacent Cities in reviewing and improving traffic flow on TH 7. Specifically at Minnewashta Parkway/Church Road and at Vine Hill Road.

5. The conclusions and recommendations identified by the "Smithtown Rd., Country Club Road, Yellowstone Trail and Lake Linden Drive" Traffic Committee should continue to be implemented.

6. Roadway design and right of way standards will follow the requirements outlined in the City's Subdivision Ordinance.

7. Traffic calming can be used on some local and collector level roadways to reduce speeds, primarily at intersections. Traffic calming measures should be reviewed on a case-by-case basis but should be evaluated within the context of the overall street network and from the perspective broad based policy objectives.

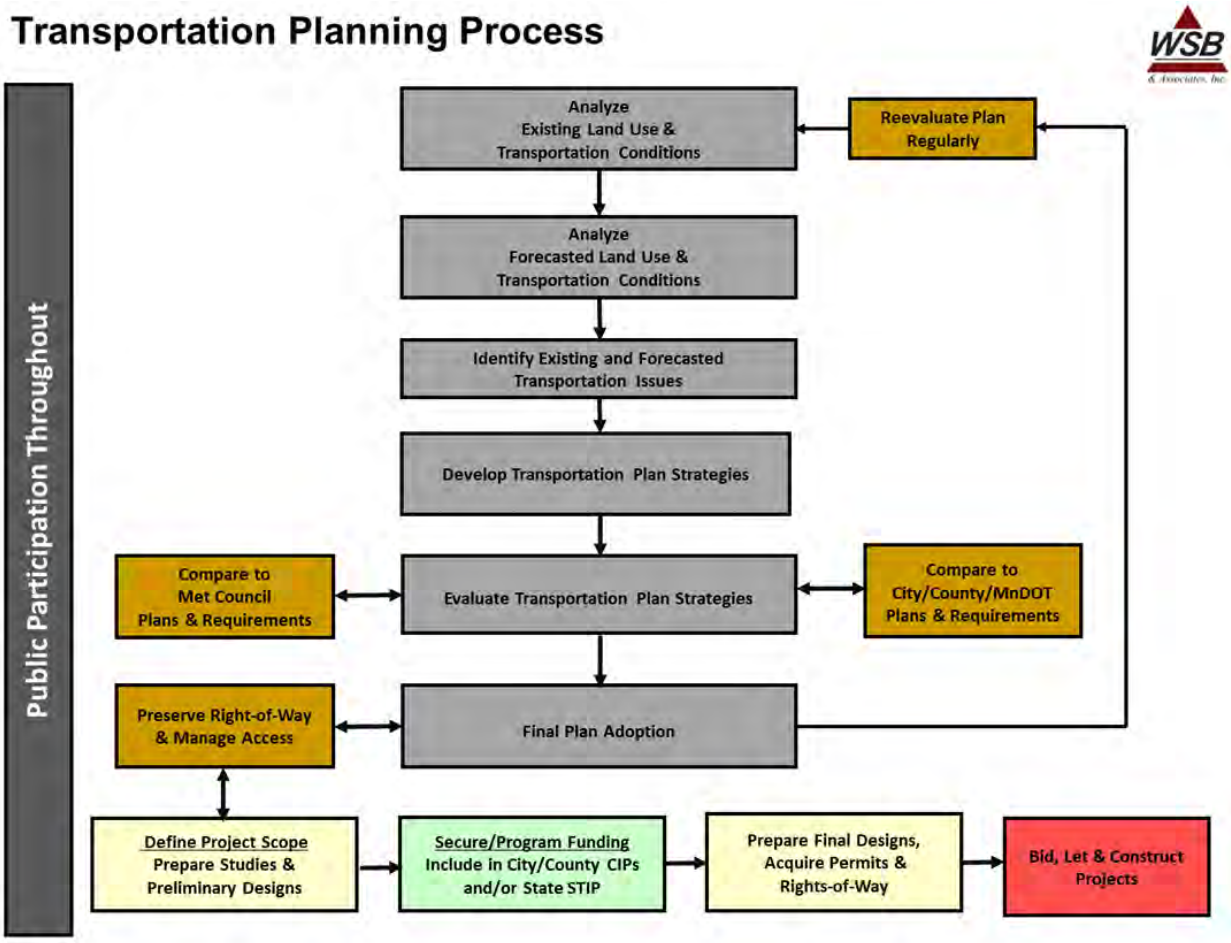
8. The City has developed and adopted an evaluation process to document processes and procedures for locating and installing traffic devices, to include: signage, pavement markings and traffic calming devices specifically within neighborhoods to address speeding, traffic control (stop signs) and cut through traffic issues.

9. The City of Shorewood supports considering implementing a complete street process in roadway reconstruction projects where appropriate and feasible.

10. Sidewalks and/or trails should to be located adjacent to all new roadways within Shorewood to accommodate pedestrian and other non-motorized movement in a safe manner, separate from vehicular traffic when consistent with the City's trail plan as funding is available.

11. Design and construction for sidewalks and trails will follow City, Hennepin County and MnDOT standards.

The figure below outlines the entire planning and project development process required for transportation projects from concept plans to construction implementation.


Transportation Planning Process
WSB & Associates, Inc.
Public Participation Throughout
Analyze Existing Land Use & Transportation Conditions
Reevaluate Plan Regularly
Analyze Forecasted Land Use & Transportation Conditions
Identify Existing and Forecasted Transportation Issues
Develop Transportation Plan Strategies
Compare to Met Council Plans & Requirements
Evaluate Transportation Plan Strategies
Compare to City/County/MnDOT Plans & Requirements
Preserve Right-of-Way & Manage Access
Final Plan Adoption
Define Project Scope
Prepare Studies & Preliminary Designs
Secure/Program Funding
Include in City/County CIPs and/or State STIP
Prepare Final Designs, Acquire Permits & Rights-of-Way
Bid, Let & Construct Projects

INTRODUCTION

Purpose

The Water Plan describes the City's existing water distribution system and water demand, projects future water demand through the year 2040, and proposes infrastructure improvements to accommodate that demand. This Plan has been prepared according to the guidelines established by the Metropolitan Council and the Minnesota Department of Natural Resources (DNR). The Water Supply Plan (included here by reference) follows the template provided by the DNR, while this Comprehensive Water Plan expands upon the template and provides further information for City and Metropolitan Council planning.

This Comprehensive Water Supply Plan has been prepared according to the guidelines established by the Metropolitan Council and the Minnesota Department of Natural Resources (DNR) per Minnesota Statute 473.859, which requires water supply plans to be completed by all local units of government in the seven-county Metropolitan Area. The Shorewood Water Supply Plan is included by reference and conforms to the template provided by the DNR, while this Comprehensive Plan expands upon the template and provides further information for City and Metropolitan Council planning.

Background

The scope of this study includes the population projections from the City's overall Comprehensive Plan, consistent with the Metropolitan Council Environmental Services (MCES) City System Statement, to project water system demands for the City of Shorewood through the year 2040. The 2040 service area was defined based on the Land Use Plan prepared for the City's 2040 Comprehensive Plan. Existing and future water demands were calculated for the City based on the historical data and the Thrive MSP 2040 Plan population projections.

Data Available

The following sources of information were used to prepare this report:

- Water Supply Plan for the City of Shorewood, prepared by WSB & Associates, Inc.
- MCES System Statement for the City of Shorewood
- Water usage data as reported by the City to the DNR's Minnesota Permitting and Reporting System (MPARS)

- Wellhead Protection Plan for the City of ShorewoodWater Use Categories and Definitions

General water use categories and definitions used in this report, as defined by the Department of Natural Resources, are as follows:

- ***Residential*** uses consist of water being used for normal household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens.
- ***Institutional*** uses consist of those for hospitals, nursing homes, day care centers, and other facilities that use water for essential domestic requirements. This includes public facilities and public metered uses. Institutional water-use records are typically maintained for emergency planning and allocation purposes.
- ***Commercial*** uses consist of water used by motels, hotels, restaurants, office buildings, and commercial facilities.
- ***Industrial*** uses consist of water used for thermoelectric power (electric utility generation) and other industrial uses such as steel, chemical and allied products, food processing, paper and allied products, mining, and petroleum refining.
- ***Wholesale deliveries*** consist of bulk water sales to other public water suppliers.
- ***Unaccounted water*** is the volume of water withdrawn from all sources minus the volume sold.
- ***Non-essential water uses*** as defined by Minnesota Statutes 103G.291, include lawn sprinkling, vehicle washing, golf course and park irrigation, and other non-essential uses. Some of the above categories also include non-essential uses of water.

Community Engagement

The City of Shorewood has implemented regulation to reduce demand and improve efficiency in its water system. During May 1st through September 30th each year, residents can water lawns only before 11:00 a.m. and after 4:30 p.m. per Shorewood City Code, Chapter 9: Section 903.12 Subd. 2. This regulation helps prevent wasteful irrigation and reduces summer season water demands. A critical water deficiency ordinance has also been established in Shorewood City Code, Chapter 9: Section 903.12 Subd. 1.

The Minnehaha Creek Watershed District (MCWD) provides education about rain gardens and native and drought tolerant landscaping and has a cost share program to encourage clean-water landscaping.

The City has implemented the following education and outreach programs:

- Consumer Confidence Reports prepared annually
- Shore Report, the City newsletter, prepared each month
- Information available at utility and public buildings and on the City website (http://www.ci.shorewood.mn.us/)

Wellhead Protection

Long-term preventative programs and measures for the City's existing water system will help reduce the risk of emergency situations. The City of Shorewood has a number of programs to help reduce these risks. This includes a Wellhead Protection Plan (WHPP) that was adopted in December of 2015 and is due to be updated in 2025. It lists the following goals:

1. Maintain or improve the current level of water quality so that the municipal water supply will continue to meet or exceed all applicable state and federal water quality standards.
2. Continue to supply sufficient water quantity for system users and emergency needs.
3. Provide and promote activities that protect the source water aquifer that provides water to the municipal system. This will include increased public awareness of the Wellhead and Source Water Protection Program and groundwater-related issues as well as management of the identified potential contaminant sources and conveyance mechanisms within the Drinking Water Supply Management Area (DWSMA).
4. Continue to collect data to support future wellhead and source water protection efforts.

In order to achieve these objectives, the WHPP lists the following measures to be implemented:

- Well Management
    - Promote proper sealing of abandoned, unused, unmaintained, or damaged wells
    - Identify remaining unlocated wells within the DWSMA
    - Educate the public about proper well management
    - Identify new high-capacity wells within the DWSMA
    - Continue to monitor the water quality from the City's wells
    - Update the Inner Wellhead Management Zone (IWMZ) surveys
    - Monitor and work to minimize impacts within the IWMZ area
- Public Education
    - Foster public support for and understanding for the WHPP
    - Develop an understanding for the location of the gas and oil pipelines within the DWSMA

- Storage Tank Management
  - Educate owners of the nine (9) storage tanks greater than 1,100 gallons within the moderate vulnerability area of the DWSMA on the importance of spill prevention
- Data Collection
  - Continue to collect and maintain local geologic and hydrogeologic data
  - Evaluate the water quality monitoring strategy and results
  - Maintain up to date information about wells and potential contaminant sources within the DWSMA
- Land Use Planning and Zoning
  - Consider the location of the DWSMA during land use planning and zoning
- Implementation
  - Track and report WHPP activities
- Evaluation
  - Evaluate the WHPP

GROWTH AND DEMAND PROJECTIONS

The City of Shorewood is projected to experience gradual growth and development. The City's projected population and water demands are listed in the following table. The population projections were calculated using the Metropolitan Council estimated rate of growth through the year 2040 for the City of Shorewood and the known population and population served values from 2016. As of 2016, any new population growth will be serviced by the municipal water system. The total per capita water demand of 109 gallons per capita per day was calculated from the average 2012-2016 demand. A peaking factor of 2.6, which is the City's average 2012-2016 peaking factor, was applied to calculate maximum day demand. The maximum day demand is expected to reach 1.165 million gallons per day by the year 2040.

It is important to note that there are several connections located in the south-central part of Shorewood that receive water from the Cities of Chanhassen, Excelsior, and Tonka Bay. The City estimates that 151 persons are served by intercommunity connections. Given the peaking factor and the total per capita water demand used in this study, the connections supplied by neighboring communities require an estimated maximum day demand of 0.043 million gallons per day. This maximum demand flow was removed from the City-wide maximum demand displayed in the table on the following page, prior to distributing total maximum demand between the East and West systems based on historical water pumping data.

The expected increase in demand through the year 2040 was assigned to each system based on the location of expected development or redevelopment.

Projected Annual Water Demand

Year	Projected Population Served	Projected Per Capita Water Demand (GPCD)	Projected Average Demand (MGD)	Total Projected Maximum Demand (MGD)	East System Projected Maximum Demand (MGD)	West System Projected Maximum Demand (MGD)
2017	3,880	109	0.423	1.100	0.591	0.465
2018	3,890	109	0.424	1.102	0.592	0.468
2019	3,900	109	0.425	1.105	0.592	0.471
2020	3,910	109	0.426	1.108	0.592	0.473
2021	3,920	109	0.427	1.111	0.592	0.476
2022	3,930	109	0.428	1.114	0.592	0.479
2023	3,940	109	0.429	1.117	0.592	0.481
2024	3,950	109	0.431	1.119	0.593	0.484
2025	3,960	109	0.432	1.122	0.593	0.487
2030	4,010	109	0.437	1.136	0.594	0.500
2040	4,110	109	0.448	1.165	0.596	0.

GPCD = gallons per capita per day **MGD** = million gallons per day

PROPOSED IMPROVEMENTS

The City of Shorewood's water system will require maintenance and trunk watermain expansions through the year 2040. The next table lists the improvements proposed, along with estimated dates of implementation and costs, in order to maintain the City's system. The City will consider expanding its water distribution system where feasible and where additional looping will improve distribution.

Proposed Capital Improvements

Year	Improvement	Estimated Cost*
2018	Boulder Bridge Building	$60,000
	Boulder Bridge Well Motor Control Center	$200,000
	Well House Water Meters	$6,000
	SE Area Well Residing	$45,000
	Water Mains	$750,000
2019	Amesbury Well Anti-Corrosion and Pipe Coatings	$30,000
	Well House Water Meters	$12,000
	Boulder Bridge Dehumidifier	$5,000
2020	Boulder Bridge Well Motor	$45,000
	Boulder Bridge Anti Corrosion and Pipe Coatings	$30,000
	Well House Water Meters	$6,000

**Values listed include both direct and indirect costs.*

Proposed Distribution

To provide service to future and existing developments, the City will need to expand trunk watermain in several areas. Areas in need of expansion through the year 2031 were identified in the 2012 Water Distribution Plan Update, included with this report by reference. The main goal of the 2012 Water Distribution Plan was to provide recommendations for the City's water system expansion including a Capital Improvement Plan cost forecast for watermain segments, alternative construction methods to reduce overall project costs, policy alternatives to encourage residents to connect to the City's distribution system, and alternatives for funding the expansion of the system. The plan projected a $26 million investment to expand the water distribution network over a twenty-year time span. The majority of the plan focused on the expansion of the system by proposing the addition of lateral watermain (8-inch diameter and smaller) to provide general distribution of water to properties, with a few trunk mains (10-inch diameter and greater) to provide water distribution to networks of lateral watermain.

The City of Shorewood anticipates expansion of the water distribution system by neighborhood request and where needed to provide looping for the existing system.

INTRODUCTION

The Sanitary Sewer Plan projects future wastewater flows, and outlines the timing and sequence of future improvements to accommodate those flows. It also allows the City and the Metropolitan Council to build and improve their sanitary sewer collection and treatment systems so that development can occur in the most efficient and cost-effective manner. The City of Shorewood's Sanitary Sewer Plan was developed to align with the Metropolitan Council's Thrive MSP 2040 Water Resources Policy Plan. The Thrive MSP 2040 Plan was approved in May 2015 and outlines regional goals for the wastewater system, including environmental sustainability, water reuse, and water conservation. Additionally, the Thrive MSP 2040 Plan includes population, household, and employment projections, and projected wastewater flows.

Despite projected population increases, the Metropolitan Council forecasts that sanitary sewer flows from the City of Shorewood will decrease by approximately 5% by the year 2040 due to decreasing water use trends. This Sanitary Sewer Plan outlines the locations in which the Metropolitan Council can expect to see changes in wastewater flows, allowing the Council to determine if capacity upgrades will be required at regional wastewater treatment plants and interceptors. This plan also serves as a guiding document for City infrastructure improvements and expansion.

FORECASTS

Population

The Metropolitan Council publishes population and sewer usage forecasts for each city in the Metropolitan Area. These forecasts help cities prepare infrastructure for growth and promote continued maintenance of municipal infrastructure. The forecast data in the Population Projections table is from the Metropolitan Council's Local Planning Handbook Community Page for Shorewood. Nearly the entire population of Shorewood is served by the public sanitary sewer system, save the few Individual Sewage Treatment Systems (ISTS) described in Chapter 3. For the purposes of this analysis, the City assumed that the entire population is sewered.

Population, households, and employment are all projected to increase gradually over the next few decades. The population of the City is projected to increase by approximately three percent between now and the year 2040. The following table shows estimates of which MCES Meters and Interceptors can expect to see growth and an increase in sanitary flow, based on existing land use and potential for development/redevelopment.

Population Projections

	Total (Entirely Sewered)		
Year	Population	Households	Employment
2010	7,307	2,658	1,113
2020	7,600	2,800	1,600
2030	7,800	2,910	1,600
2040	8,000	3,000	1,600

Projected Wastewater Flows

Household and Employment Projections by MCES Meter & Interceptor

		2020		2030		2040	
Meter	Interceptor	Households	Employment	Households	Employment	Households	Employment
M412	7016	157	405	157	405	157	405
M415	7017	1,144	368	1,162	368	1,178	368
	7017-1	271	667	339	667	388	667
	7017-2	117	54	122	54	127	54
	7017-3	223	33	228	33	233	33
	7017-4	52	0	53	0	54	0
M416	6-GW-649	94	0	95	0	97	0
M417	7017	41	49	43	49	45	49
M420	7017	15	0	15	0	15	0
M424	6-DH-645	138	0	140	0	143	0
	6-DH-645A	168	0	170	0	172	0
M439	7017	290	23	294	23	297	23
M455	6-MT-647	90	0	92	0	94	0
Total		2,800	1,600	2,910	1,600	3,000	1,600

The wastewater flow is treated at the Blue Lake WWTP. The Total Wastewater Projections table lists projected total average wastewater flow from Shorewood to the Blue Lake WWTP, as estimated by this Sanitary Sewer Plan and by the MCES Water Resources Policy Plan (WRPP). Note that the projections used in this report, based on MCES meter data and unmetered flow estimates, are different from the flows projected in the WRPP. This is because the MCES WRPP projections were based on flow data from 2010, a year in which the City of Shorewood had uncharacteristically high wastewater flows. The projections used in this report are based on flow data from 2012-2016, which is more recent and captures a wider period of time.

Total Wastewater Projections

	2020 Average Flow (MGD)	2030 Average Flow (MGD)	2040 Average Flow (MGD)
Sanitary Sewer Plan	0.77	0.79	0.81
MCES WRPP	0.93	0.91	0.89

SANITARY SEWER DESIGN CRITERIA

Land Use

Detailed information and figures regarding Shorewood's land use are included in the Land Use Plan. Using existing land use, metering data, and future land use information, current and future flows were calculated and divided by meter service area as described below. This analysis considered the land use designations listed in the Assumed Wastewater Flow by Land Use Type Table. The largest development within Shorewood is the redevelopment of the Minnetonka Country Club site into 142 single-family residential lots, which was approved in 2016.

Estimated Average Flows – Existing

The existing wastewater flows within the City were estimated based on a combination of MCES meter data and land use designations. The MCES meter data provides flow rates for broad metersheds. The City estimated flow rates for the smaller sanitary sewer sub-districts and lift station service areas by calibrating flow estimates based on land use designations and acreages with the MCES meter data.

Estimated Average Flows – 2040 Build Out

Once existing flows were estimated, future flows were projected based on Land Use Plan. Parcels that are planned to be developed were assigned wastewater flow rates in accordance to their land use type. The following table lists the assigned flows, which include design considerations for inflow and infiltration (I/I). More information on I/I and how it relates to the sanitary sewer system is provided later in this section.

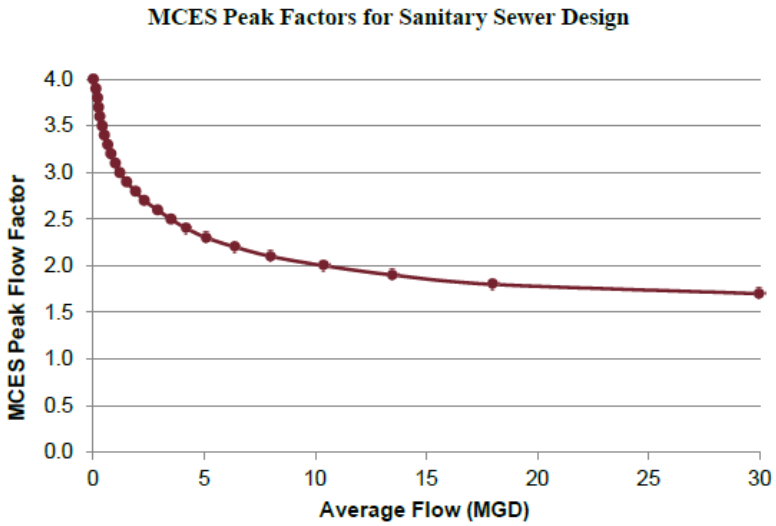
Future flows were added to existing flows to determine if existing pipe capacities will be sufficient. Recommendations are provided later in this section to address locations where development will lead to pipes that are under capacity.

Assumed Wastewater Flow by Land Use Type

Land Use	Daily Flow (gallons/acre)
Minimum Density Residential	99
Low Density Residential	270
Low to Medium Density Residential	450
Medium Density Residential	810
High Density Residential	1,440
Public/Institutional	600
Commercial	800
Office	800
Industrial and Utility	800
Park	0

Peak Flow Factors

To ensure that the sanitary sewer system is capable of handling flow fluctuations throughout the day, peak flows are calculated using peak factors based on average flows. The peak factors are provided by the Metropolitan Council and scale based on average flows. Pipes that serve small generator customers are more likely to experience large fluctuations in flows. Therefore, the peak factor decreases as average flow increases. The Metropolitan Council peak flow factors for sanitary sewer design used in this report are shown in the graphic below. Note that historical peak factors calculated from MCES meter data, as available, are used in lieu of the standard peak factors to calculate existing peak flows.



Intercommunity Flows

Some of Shorewood's sewers discharge into other communities. For some of the cities, Shorewood has no agreement on charging or collecting fees, including Excelsior, Greenwood, and Deephaven. Shorewood has some agreements with Minnetonka, Tonka Bay and Chanhassen for either reimbursements or direct utility charges to residents. The Sanitary Intercity Flows & Agreements map shows the interconnections, although properties served directly by the MCES interceptors passing through the City are not included.

Intercommunity Flows

Inflow to Shorewood		Outflow from Shorewood	
From	Metershed	To	Metershed
Chanhassen	M415	Minnetrista	M455
Greenwood	M424	Victoria	M439
		Tonka Bay	M420
		Excelsior	M417
		Greenwood	M416
		Deephaven	M424
		Minnetonka	M412

There is inflow into Shorewood from Chanhassen in metershed M415. There is no agreement for this area and no billing. If any additional agreements are written in the future, this will be provided to the Metropolitan Council. This includes the following areas:

- Chaska Road (Chanhassen Sub-sewer shed NO-12): 43 residential lots plus Minnetonka Middle School.
- Murray Hill Road (Chanhassen Sub-sewer shed NO-11): 30 residential lots.
- Apple Road (Chanhassen Sub-sewer shed NO-9): 106 residential lots.

- Summit/Hummingbird (Chanhassen Sub-sewer shed NO-10): 9 residential lots
- Galpin Blvd/Galpin Lake Rd (Chanhassen Sub-sewer shed NO-10, other than 9 lots indicated above): flows directly to Metropolitan Council gravity line.
- Mill Street (Chanhassen Sub-sewer shed NO-8): flows directly to Met Council gravity line.
- Ridge Road (Chanhassen Sub-sewer shed NO-1 thru NO-7): flows directly to Met Council gravity line.
- Washta Bay Road (Chanhassen Sub-sewer shed MW-7): flows directly to Met Council gravity line.
- Strawberry Lane/Church Road (Chanhassen Sub-sewer shed MW-1): flows directly to Met Council gravity line.

The flow that enters Chanhassen from Shorewood is also in metershed M415. Some of this is covered in the agreements dated January 25, 1993 and July 19, 1993 for 1030 Holly Lane. Chanhassen bills this homeowner directly. Another agreement dated July 26, 1993 covers five homes including 6150, 6155, 6170, and 6195 Deer Ridge. Chanhassen also directly bills these homeowners. There are also properties at 21220, 21200, 21115, 21125, and 21135 Christmas Lane as well as 1010 and 1050 Holly Lane which are not covered by an agreement.

There is flow coming from Greenwood into Shorewood, as well, in metershed M424. This flow is not covered by an agreement and is not billed. There is also flow from Shorewood to Minnetrista in metershed M455, to Victoria in metershed M439, and Minnetonka in metershed M412. There is flow from Shorewood to Greenwood in metershed M416 and Deephaven in M424 that have no agreements.

The flow from Shorewood to Tonka Bay in metershed M420 is covered by an agreement that states: "Users connected to the Tonka Bay sewer system shall comply with Tonka Bay ordinances governing the use of the Tonka Bay sewer. In the event Shorewood desires to bill and collect said user fees, it shall be Shorewood's obligation to remit to Tonka Bay that amount which would be due (to) Tonka Bay if Tonka Bay billed directly."

Tonka Bay bills Shorewood for this flow. This area includes 25360, 25370, 25380, 25480, 25485, 25510, 25530, 25535, 25545, 25560, and 25585 Birch Bluff Road as well as 5290, 5295, 5320, and 5325 Lee Circle. There is a separate agreement dated May 13, 1992 that covers 24200 Smithtown Road. Shorewood and Excelsior formerly had an agreement to interchange sewer and water service which has been suspended. There is currently no billing agreement between the two cities. When a new agreement is made, it will be shared with the Metropolitan Council. The following properties are served by sewer that flows into Excelsior. The 1971 agreement covered 58 residential parcels and one church. The 1973 agreement covered 26 residential parcels and five commercial properties. Directly west of Excelsior are the following properties being served:

South side of Smithtown Road/CR 19/Oak St pursuant to the 1973 agreement:

- There are 14 residential lots on Wood Duck Circle (5600, 5620, 5640, 5660, 5665, 5680, 5685, 5700, 5705, 5720, 5725, 5740, 5742, and 5745) plus 3 commercial properties located at 23575 Smithtown Rd, and 23425 and 23445 County Road 19. The Shorewood gravity sewer line appears to discharge directly into Metropolitan Council gravity line within the Excelsior municipal boundary.
- North side of Smithtown Road/CR 19/Oak St: There are three commercially used properties in this area including 23400 and 23500 Smithtown Road. There is also a vacant parcel that does not

have a sewer connection. Again, the Shorewood gravity sewer line appears to discharge directly into Metropolitan Council gravity line within Excelsior municipal boundary.

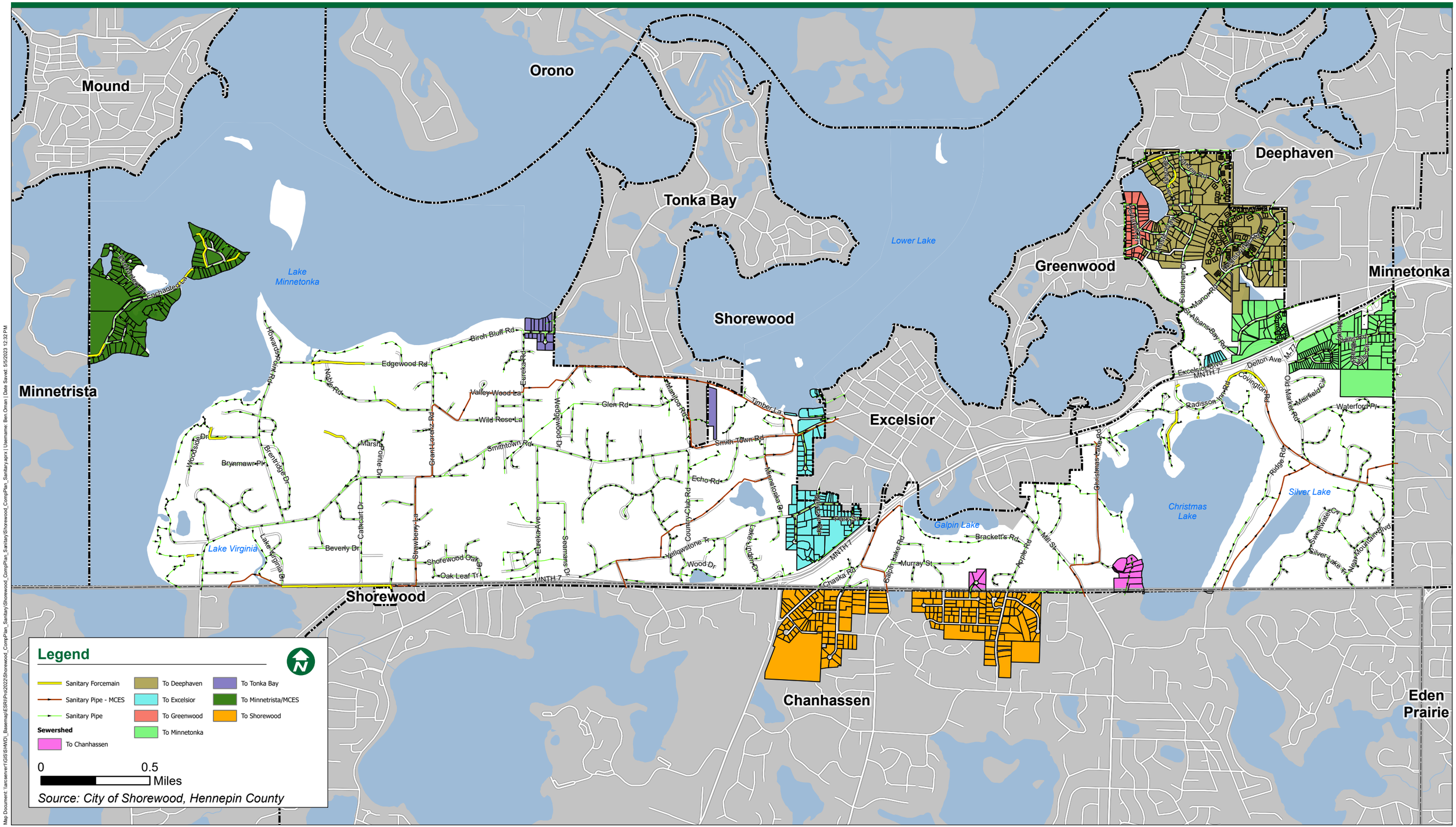
- Also within this area, there are four 4 residential lots (454, 452, 450, and 448 Lafayette Avenue).

Further south, there are several residential lots being served by sewer that flows into Excelsior pursuant to the 1971 agreement:

- 23120, 23125, 23145, 23240, 23255, 23260, 23290, 23320, 23340, 23350, and 23400 Park Street
- 5905, 5915, 5925, 5950, 5960, and 5965 Grant Street (5965 is currently vacant)
- 23155, 23285, 23310, 23335, 23350, 23355, 23360, 23370, 23405, and 23425 Academy Avenue
- 5840, 5855, 5860, 5865, 5885, 5920, 5935 5950, 5955, 5960, 5975, 5980, 5985, 5995, and 6065 Glencoe Road
- 23530, 23535, 23580, 23585, 23640, and 23645 Yellowstone Trail
- 23290 (church not a residence) and 23450 Highway 7
- 6045, 6065, and 6085 High Pointe Road
- 5950, 5955, 5960, 5970, 5975, 5980, and 5990 Charleston Circle

Then on the east side of Excelsior, there are eight residential lots served also pursuant to the 1973 agreement:

- 20520, 20522, 20540, 20542, 20550, 20552, 20560, and 20562 Excelsior Boulevard



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SANITARY SEWER TRUNK RECOMMENDATIONS

The firm capacity, existing flow, projected flow, and projected residual capacity for each of the City's lift stations are listed in the table below. The existing wastewater flows were estimated based on metering and billing data from MCES for 2012-2016 and the land use designations within each lift station's service area. The increase in projected flows was estimated based on the land use designations of areas that are expected to develop or redevelop by 2040. Standard MCES peak factors for sanitary sewer design were used to calculate peak flows, except for those lift stations located within metershed M415, where a historical peak factor calculated from MCES meter data was used to calculate existing peak flows. The standard peak factors were applied to calculate all 2040 peak flows.

Lift Station Capacity Analysis

LS No.	Lift Station Location	Firm Capacity (gpm)	Existing Average Flow (gpm)	Existing Peak Flow (gpm)	2040 Average Flow (gpm)	2040 Peak Flow (gpm)	2040 Residual Capacity (gpm)
5	Edgewood Rd	250	28.6	192	28.6	137	113
6	Smithtown Rd	90	7.8	32	7.8	32	58
7	Woodside Ln	90	5.5	31	5.5	22	68
8	Birch Bluff Rd	250	5.7	33	5.8	24	226
9	Minnetonka Blvd	92	1.3	5.4	1.3	5.4	87
10	Lakeway Terrace	150	7.8	32	8.3	34	116
11	Radisson Rd	200	8.4	60	8.4	44	156
12	Christmas Lake Point	95	2.2	13	2.2	9.0	86
13	Radisson Entrance	30	0.1	0.7	0.2	0.8	29
15	Enchanted Ln	135	7.2	43	7.2	43	92
16	Shady Island Rd	110	0.8	14	0.8	14	96
17	Shady Island Cr	100	1.2	4.9	1.2	4.9	95
18	Shady Island Point	110	1.3	5.2	1.3	5.2	105
20	Noble Rd	80	1.9	11	1.9	7.7	72

The Trunk Sewer Capacity Analysis table lists the capacity, existing wastewater flow, 2040 projected flow, and residual capacity of the City's trunk sewers. The City identified trunk sewers based on the sewer mains that convey the majority of the wastewater flow generated in each metershed. Peak factors used to calculate peak flows are based on the recommended MCES factors displayed in the graphic on the previous page. This report does not analyze the capacity of the MCES interceptor sewers that pass through the City of Shorewood.

As seen in the two tables above, there are no required upgrades to the existing list stations and trunk sewers to provide service through the specified planning period. Additionally, no new trunk sewers and lift stations will be needed. Lateral sewers may be extended as development or redevelopment occur.
MCES Interceptor Facility Forecasts

Trunk Sewer Capacity Analysis

Location	Diameter	Trunk Capacity (gpm)	Existing Average Flow (gpm)	Existing Peak Flow (gpm)	2040 Average Flow (gpm)	2040 Peak Flow (gpm)	2040 Residual Capacity (gpm)
Enchanted Ln	9"	532	11	42	11	42	488
Grant Lorenz Rd	15"	1,130	43	174	43	174	953
W 62nd St	10"	679	56	224	56	225	488
Vine Hill Rd	9"	562	35	140	35	140	419
Minnetonka Blvd	9"	562	21	84	22	86	474

The MCES interceptors used by each meter service area, as well as the 2040 forecasted flow to those interceptors, are listed in the following table. Note that the total flow listed may not correspond to the flow at every point along the interceptor, as the flow may accumulate along the interceptor path through the metershed. Also, note that the flow listed is only the flow generated in Shorewood and does not include any flows from neighboring communities that may also discharge into the metershed.

Projected 2040 MCES Interceptor Use

Meter	Interceptor	2040 Average Flow (MGD)	2040 Peak Flow (MGD)
M412	7016	0.050	0.202
M415	7017	0.319	1.149
	7017-1	0.119	0.463
	7017-2	0.031	0.124
	7017-3	0.061	0.245
	7017-4	0.014	0.054
M416	6-GW-649	0.023	0.092
M417	7017	0.020	0.079
M420	7017	0.002	0.009
M424	6-DH-645	0.036	0.143
	6-DH-645A	0.042	0.167
M439	7017	0.081	0.324
M455	6-MT-647	0.015	0.061

I/I Analysis

Shorewood's sanitary sewer system currently consists of approximately 60 miles of sanitary main, fourteen lift stations, and 2.6 miles of forcemain, which were installed from the early 1970's onward. Those lift stations that have not been rehabilitated since the early 1970's, and the surrounding sanitary sewers, are more susceptible to I/I. An estimated 29% of the residential housing within the City was built before 1970. Of the pre-1970 era private services, none have been evaluated for I/I aside from the sump pump inspections mentioned previously.

The amount of clearwater flow generated within the City was estimated by calculating the average annual and peak quarter I/I rates, equal to the average wastewater flow minus the base wastewater flow, using data from 2012-2016. The average flow, both annual and quarterly, was calculated from MCES meter data. Because much of the wastewater flow in the City of Shorewood is unmetered, the finest time scale for which flow estimates are available is quarterly. The peak quarter flow was determined for each year from 2012-2016 and those five values were averaged to give the peak quarter flow listed in the following table. The base flow was approximated as the winter water usage, which was calculated as the average water pumped in December through February from 2012-2016 times a historical ratio of water used to water pumped (presented as Total Water Delivered divided by Total Water Pumped in the City's Water Supply Plan). Because the City has two separate water systems, West and East, a separate I/I estimate was made for each system based on the corresponding sanitary sewer districts.

I/I Estimate

	West System	East System
Average Annual Flow (MGD)	0.207	0.161
Peak Quarter Flow (MGD)	0.245	0.195
Base Sanitary Flow (MGD)	0.101	0.129
Average Annual I/I Rate (MGD (%))	0.106 (51%)	0.032 (20%)
Peak Quarter I/I Rate (MGD (%))	0.144 (59%)	0.066 (34%)

I/I Reduction

The City's strategy for preventing excess I/I includes requiring all development to conform to City standards. City code prohibiting the discharge of storm water to the sanitary sewer system and requiring the disconnection of existing I/I sources is excerpted below.

904.09 PROHIBITED DISCHARGES INTO THE SANITARY SEWER SYSTEM.
Subd. 1. Prohibited connections. No person shall discharge or cause to be discharged, directly or indirectly, any storm water, surface water, ground water, roof runoff, subsurface drainage or cooling water to any sanitary sewer. Any person having a roof drain, sump pump, unauthorized swimming pool discharge, cistern overflow pipe or surface drain connected and/or discharging into the sanitary sewer shall disconnect and remove any piping or system conveying the water to the sanitary sewer system.
In addition, the City has routine activities directed at recognizing and correcting I/I. The City's annual Street Improvement Projects include sewer televising, chimney seal installation, pipe lining, and manhole grouting. Some of the specific projects completed by the City of Shorewood to reduce I/I are shown in the next table. The costs listed only include sanitary sewer improvements.

Given the public sanitary sewer and lift station improvements that have been completed to date, it is estimated that the majority of the remaining I/I in the system is from private sources. The City uses the sewer televising completed as part of its annual Street Improvement Projects to identify properties contributing I/I to the public system and works with property owners to remedy or eliminate these sources.

I/I Activities Completed

Project	Cost
2007 Wedgewood Dr, Teal Cir, Mallard Ln Improvements	$7,369
2009 Reconstruction of Lift Station 16	$85,594
2010 Smithtown Ln, Harding Ln, Harding Ave Rehabilitation	$5,014
2014 Utility & Street Improvements – Sunnyvale Ln	$66,413
2014 Mill and Overlay Improvement Project (chimney seals)	$4,375
2015 Mill and Overlay Improvement Project (chimney seals)	$4,288
2015 Star Ln, Star Cir Improvements	$14,026
2016 Mill and Overlay Improvement Project (chimney seals)	$4,950

Although the rehabilitation that has been completed to date resulted in a reduction, the remaining I/I continues to be a concern and will be addressed. The City will continue to proactively identify I/I sources and take corrective actions. The City has budgeted $70,000 annually for I/I reduction projects in addition to its other sanitary sewer improvement projects.

COST ESTIMATES AND FINANCING

The Capital Improvements table, below, lists the proposed capital improvements and their estimated costs. Because the City of Shorewood sanitary sewer system is largely built out, the capital improvements consist of maintaining and rehabilitating the existing system.

Capital Improvements

Year	Description	Location	Estimated Cost
Annual	I/I Reduction	-	$70,000
2019	Lift Station 20 Rehabilitation	Noble Road	$135,000
2020	Lift Station 7 Rehabilitation	Woodside Road	$120,000
2021	Lift Station 10 Rehabilitation	Lakeway Terrace	$140,000

SUMMARY AND OUTCOMES

The analysis is intended to provide assistance in planning for wastewater collection and treatment. The City anticipates that the design flows and criteria outlined will be used for utility planning as development continues. Tables and figures can be used to create budget-level estimates and schematic representations of infrastructure improvements, with specific sizing and routing to be determined during the design phase.

INTRODUCTION

Community facilities and services include lands, buildings, services and systems. The condition and availability of community facilities and services enhance the quality of life in the City. Community facilities should be well-planned and developed in a manner which serves as a good example for private development.

The purpose of this chapter is to present plans for the type and location of various community facilities. The Community Facilities Plan is not concerned with detailed schemes of development, operation, or programs of the various uses, rather, this Plan is offered as a general framework within which detailed plans and specific decisions regarding community facilities can be made and identify any future land needs. Many community facilities and services are most efficiently and economically provided on a joint basis with other nearby jurisdictions.

To be noted is that plans related to transportation, water supply, sanitary sewer and surface water management are technically considered "community facilities." Due to the amount of detail provide in such plans, they are provided as independent chapters of this Plan, or in the case of the Local Surface Water Management Plan, as an appendix. In this regard, plans for the following community facilities are provided in this chapter:

- Parks and Recreation
- Public Safety
- Solid Waste
- Natural Gas, Electrical Service, Cable Television and Street Lighting
- Municipal Buildings
- Schools

PARKS AND RECREATION PLAN

Introduction

At present, Shorewood's park system contains five major park facilities and a number of smaller areas which provide additional recreational opportunities. The City's park system contains approximately 100 acres of usable recreational land. Additional land exists which is part of the park system but is not considered suitable for active development. These areas, which contain wetlands or steep terrain, compliment the overall active park system by providing substantial areas of open space.

Classification System

Shorewood has a variety of park types which are components of the City's overall park system. As a basis for examining existing parks and projecting future park needs, a regional system of park classification is utilized. The following table, provided for reference in the Metropolitan Council's Thrive 2040 Regional Parks Policy Plan, provides a description of various types of regional and local park facilities.

Component	Use	Service Area	Size	Site Attributes	Site Location
Local Facilities					
Mini-park	Specialized facilities that serve a concentrated or limited population or specific group such as tots or senior citizens.	Less than 1/4-mile radius	< 1 acre		May be publicly or privately owned and/or incorporated into a development site, such as apartment,
Neighborhood park/playground	Area for intense recreational activities such as field games, court games, crafts, apparatus area, skating, and neighborhood centers.	¼ to ½ mile radius to serve a population of 4,000 – 5,000 (one neighborhood)	< 25 acres	Physical geography suited for intense development.	Proximity to elementary schools or residential neighborhoods.
Community playfield	Area for intense recreational facilities such as athletic fields and swimming pools; could include a neighborhood use.	3 - 5 neighborhoods or one community	25 - 50 acres	Physical geography suited for intense development.	Proximity to secondary schools and other public facilities.
Community park	Area of natural or ornamental quality for outdoor recreation such as walking, viewing, sitting, picnicking; could have some field and court games.	3 - 5 neighborhoods or one community	25 - 100 acres	Affords natural features with varied physical geographic interest.	Proximity to community facilities and resources.
County park	Area of natural or ornamental quality for outdoor recreation such as walking, viewing, sitting, picnicking; could have some field and court games.	County	25 - 100 acres	Affords natural features with varied physical geographic interest.	Proximity to community facilities and resources and/or where resource occurs
Conservancy lands	Area of natural quality such as watercourses and wetlands that are preserved for environmental or aesthetic benefits to the community and/or because of the negative environmental or economic effects of development in them.	Municipality, township, county	Variable, based on extent of resources.	Natural resources that merit preservation and that would be negatively affected by development	Where resource occurs.

Component	Use	Service Area	Size	Site Attributes	Site Location
Local Facilities					
Local linear parks, trail, corridors and parkways	Area developed for one or more varying modes of recreational travel such as hiking, biking, snowmobiling, horseback riding, cross-country skiing, canoeing and driving.	A neighborhood or several neighborhoods in a city or township	Contained within one city or township. Width and length minimums vary by locality.	On- or off-road trails that may or may not traverse scenic areas while assuring the trail treadway has no adverse effect on the natural resource base	Where needed to link neighborhoods to components of the local or regional recreation system and/or community facilities such as schools, libraries, commercial areas and to link to adjacent municipalities.
County linear parks, trail, corridors and parkways	Area developed for one or more varying modes of recreational travel such as hiking, biking, snowmobiling, horseback riding, cross-country skiing, canoeing and driving.	Several cities and/or townships in a county	Traverses one or more municipalities. Width and length minimums vary by county.	On- or off-road trails that may or may not traverse scenic areas while assuring the trail treadway has no adverse effect on the natural resource base	Often found adjacent to major roadways within the county. Other locations where needed to link cities to components of the local or regional recreation system and/or community facilities such as schools, libraries, commercial areas and to link to adjacent counties.
Regional Facilities					
Regional park	Area of natural or ornamental quality for nature-oriented outdoor recreation such as picnicking, boating, fishing, swimming, camping and trail uses.	3 - 5 communities	200 - 500 acres (100 minimum)	Complete natural setting contiguous to water bodies or watercourses where possible.	Where natural resource occurs particularly water
Regional park reserve	Area of natural quality for nature-oriented outdoor recreation such as viewing and studying nature, wildlife habitat, conservation, swimming, picnicking, hiking, boating, camping and trail uses.	County, multicounty area	1000+ acres; sufficient area to encompass the resource envisioned for preservation	Diversity of unique resources, such as topography, lakes, streams, marshes, flora, fauna.	Where natural resource occurs.

Component	Use	Service Area	Size	Site Attributes	Site Location
Regional Facilities					
Regional destination trail	Area developed for one or more varying modes of nonmotorized recreational travel such as hiking, biking, horseback riding, cross country skiing, and canoeing.	The entire metropolitan region	Sufficient corridor width to protect natural resources and can safely accommodate trail use. Sufficient length to be a destination itself, or to serve as a link between regional parks system units.	When feasible, off-road trails that utilize human made and/or natural linear resources such as utility corridors, railroad and highway rights of way, stream / river valleys, or at the edges of forest or prairie. On-road trails are acceptable when off-road trails are not feasible.	Preferably adjacent to high-quality natural areas. The trail treadway should be placed where it has no adverse impact on the natural resource base.
Regional linking trail	Area developed for one or more varying modes of nonmotorized recreational travel such as hiking, biking, horseback riding, cross country skiing, and canoeing.	The entire metropolitan region	Sufficient corridor width to protect natural resources and can safely accommodate trail use. Sufficient length to link regional parks system units.	When feasible, off-road trails that utilize human made and/or natural linear resources such as utility corridors, railroad and highway rights of way, stream / river valleys, or at the edges of forest or prairie. On-road trails are acceptable when off-road trails are not feasible.	Linkages between components of the regional parks system. When feasible, linking trails should attempt to connect to population, economic and social centers along its route. The trail treadway should be placed where it has no adverse impact on the natural resource base.

Component	Use	Service Area	Size	Site Attributes	Site Location
Regional Facilities					
Special recreation feature	Area that preserves, maintains, and provides specialized or single purpose recreational activities, such as nature center, marina, zoo, conservatory, arboretum, display gardens, hunter training education facilities, downhill ski area, sites of historic or archeological significance, and bridging facilities. Bridging facilities are specialized or single-purpose facilities that are intended to attract and introduce new outdoor recreation users to the Regional Parks System.	Regional metropolitan area	Specific standard applicable to desired feature.	Appropriate to particular special recreation feature.	Where most advantageous for the special recreation feature and the overall park system.

Existing System Analysis

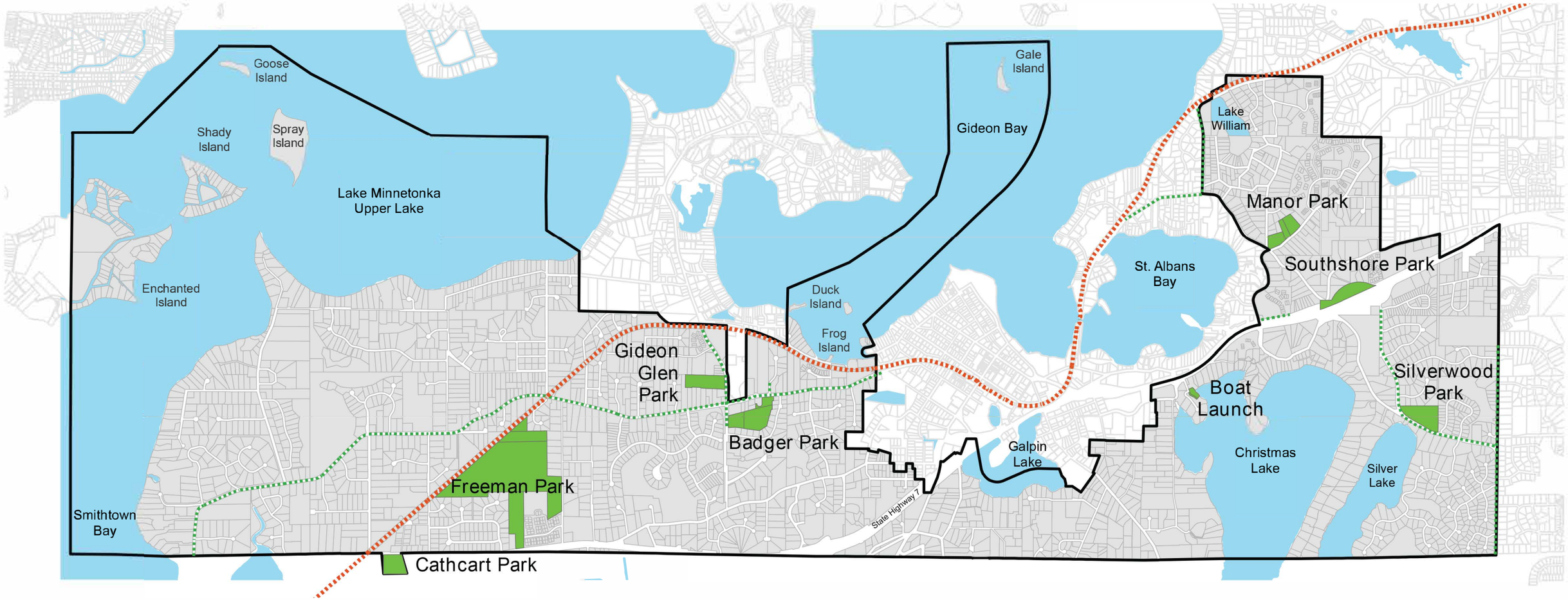
Shorewood is approaching full development. In their preliminary 2017 population estimates, the Metropolitan Council references a City of Shorewood population of 7,708 persons. Of interest is that such estimate exceeds the Metropolitan Council's 2040 population forecast for the City (7,600 persons) as provided in the City's system statement. Given the fact that the City is not expected to see significant additional residential growth and that few vacant land parcels remain in the community, Shorewood is not expected to add new park sites. The City's existing parks are considered adequate in size and location to meet the future needs of the community.

Shorewood residents are generally well-served by the existing park system. With the exception of the islands and a small pocket south of Galpin Lake, most areas of the community are within a one-half to one-mile radius of neighborhood park facilities. As a result, the focus of future park planning will be on developing existing parks, as opposed to acquiring more land, with one possible exception.

The City remains open to considering organization-supported expansion of Freeman Park as well as other existing sites. Also, as land becomes available through tax forfeiture, vacation of public right-of-way, donations and/or other means, it will be examined for possible inclusion in the park system.

Local Parks and Trail System

City of Shorewood
2040 Comprehensive Plan



Local Park and Trail System

- Local Trail
- Lake Minnetonka LRT Regional Trail
- Parks
- City Boundary

Map created: December 2022
Data: NAC, MNDNR, Metropolitan Council

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Miles

NORTHWEST ASSOCIATED CONSULTANTS, INC.
4150 Olson Memorial Highway, Ste. 320, Golden Valley, MN 55422
Telephone: 763.231.2555 Website: www.nacplanning.com

Existing Park Classifications

A considerable amount of planning has gone into Shorewood's park system as master plans for each of the City's parks have been developed. These master plans considered the classification system for local and regional parks which were previously identified. The following is an overview of Shorewood's existing park classifications:

Neighborhood Parks. Four of Shorewood's existing parks; Cathcart, Badger, Manor and Silverwood fall into this category. In addition, facilities at Freeman Park also serve the nearby neighborhoods, as do facilities at Minnewashta School.

Community Playfields. The Minnetonka School District has historically been heavily involved in providing playfields for local recreation. Within the City of Shorewood, Minnewashta Elementary School functions in part as a community playfield. Freeman Park is viewed as satisfying the majority of the community's need for playfields, but Badger, Cathcart and Manor Parks also satisfy this need.

Community Park. Besides its neighborhood functions, Freeman Park is the only community park in Shorewood's park system. Given the proximity of various regional parks, the need for an additional community park in Shorewood is not anticipated.

Conservancy Lands. Shorewood's wetland system, while not suitable for active recreation, is preserved for its aesthetic value, as well as its environmental benefit.

Special Uses. Crescent Beach along Lake Minnetonka and the Christmas Lake access on Merry Lane are essentially single-purpose recreational facilities (or special use parks). Crescent Beach is used exclusively for swimming, while the Christmas Lake access is used for fishing and the launching of boats. Both sites provide winter access to the lakes.

South Shore Community Park was previously used as a skate park, but the community found that purpose was no longer needed. A new master plan should be prepared to determine the appropriate role for such park.

Gideon Glen Park also fulfills a function of a special use park as it serves as a natural / environmental interpretive center.

Linear Park. While not a City-owned park, the Lake Minnetonka LRT Regional Trail fulfills a linear park function by providing walking / bicycle trail linkages within and outside of the City's municipal boundary.

Existing Parks and Plan Recommendations

Ten sites constitute the core of the Shorewood's park system. They include the following:

Cathcart Park	4.8 acres
Freeman Park	67.8 acres
Badger Park (including City Hall)	10.2 acres
Crescent Beach (joint use with Tonka Bay)	.4 acres
Manor Park	4.5 acres
Silverwood Park	8.1 acres
South Shore Community Park	3.4 acres
Merry Lane Access	.5 acres
Gideon Glen	5.8 acres
Total	**105.5 acres***

* Land area devoted to LRT Trail not included in acreage calculation

Lake Minnetonka LRT Regional Trail	2.7 lineal miles

In addition to the preceding parks, Minnewashta Elementary School also has a playground. Ten fire lanes, which have been held by the City, provide lake access and limited recreational opportunities to various neighborhoods. The City has also adopted a Trail Plan (as provided in the Transportation Chapter of the Comprehensive Plan). Recently, a trail segment was constructed along Smithtown Road which extends from the City's southern boundary (in the southeast corner of the City) to Country Club Road.

The following is an overview of each of the primary parks and recommendations for future improvements:

Badger Park (10.2 Acres). Badger Park is a neighborhood park which functions as part of the "City Campus" and is integral to the community services provided at City Hall and the Shorewood Community and Event Center. The park focuses on organized sports, with limited individual/pick-up opportunities and is currently undergoing renovations.

The park serves both the surrounding neighborhood and the Shorewood Community Center. The park is currently undergoing renovations (as shown below) which are scheduled to be completed in 2019.

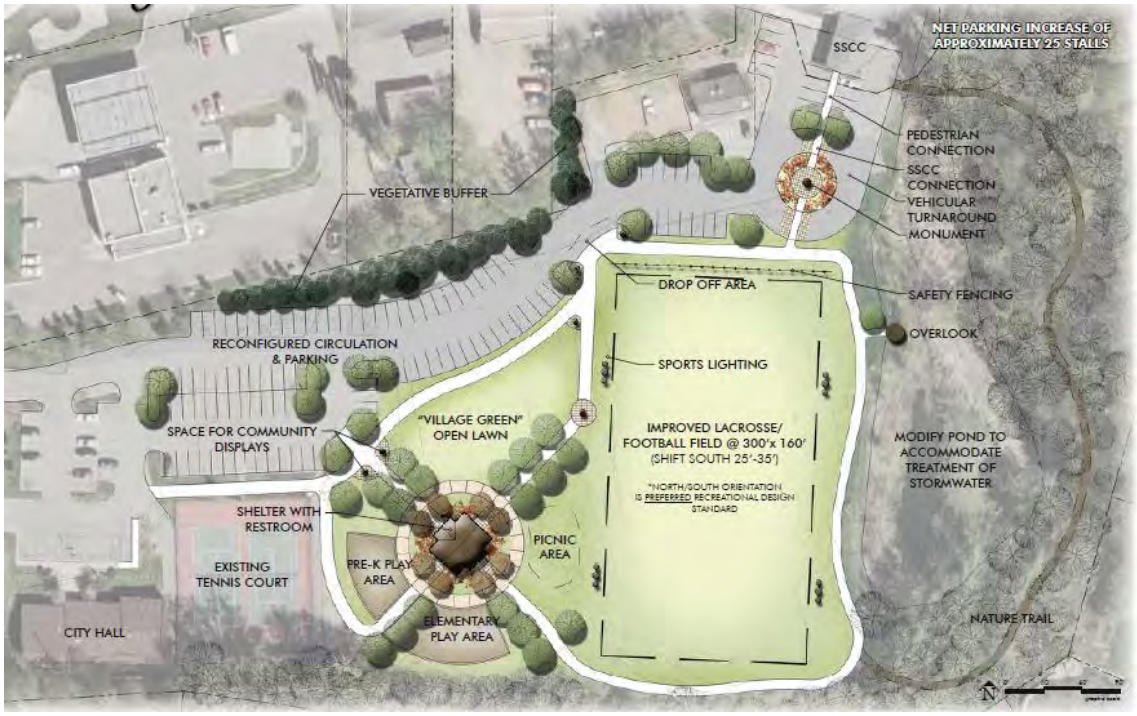
Facilities include:

- Multi-purpose field for lacrosse, soccer and football
- Playground equipment
- Tennis/pickle ball courts
- Picnic tables
- Open space, mowed and natural wooded area with a short nature trail by a stream
- Permanent restrooms and water-fountain (to be completed by 2019)
- Paved parking shared with Shorewood Community and Event Center and City Hall, short nature trail looping through wooded area on the east edge of the park
- Short paved looped trail (to be completed in 2019)
- Shelter (to be completed in 2019)

Population served: Badger Park serves persons of all ages.

Recommendation for further action:

- Increase programming within the Shorewood Community and Event Center which takes advantage of the facilities in Badger Park.



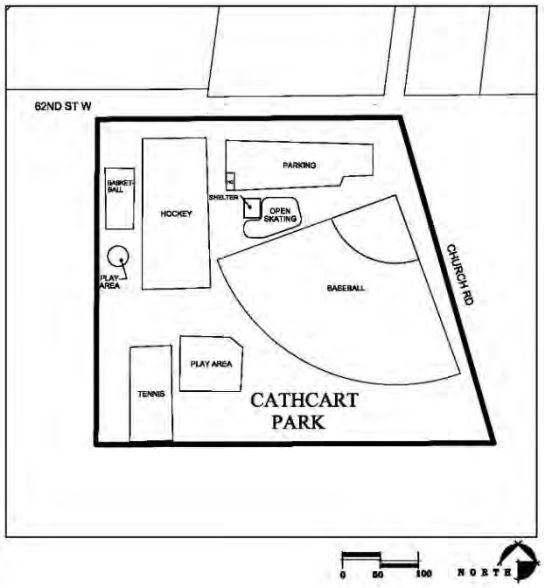
The Shorewood Community and Event Center

Badger Park Playground (pre-renovation)

Cathcart Park (4.8 acres). Cathcart Park is a neighborhood park with a mixture of uses, including organized sports and individual/pick-up opportunities.

Facilities include:

- Little League baseball field
- Hockey rink and seasonal warming house
- Family skating rink
- Basketball court
- Playground equipment
- Tennis court
- Picnic tables
- Open space
- Community adopt-a-garden
- Portable restrooms (no running water)
- Paved parking for 38 vehicles



Population served:

- Cathcart Park focuses primarily on the activities of youth and young adults, i.e., hockey, Little League and soccer.
- It serves the neighborhood and, through organized sports, a wider range of youth in the community.
- While the park's tennis court offers a recreational opportunity to adults, it is uncertain to what extent the court is used.

Recommendations for further action:

- Add pickle ball striping to the tennis court (as a recreational opportunity for seniors).
- Add additional parking.
- Pave the hockey rink for street hockey.

Manor Park (4.5 acres). Manor is a neighborhood park focusing on informal activities, with limited organized sports opportunities.

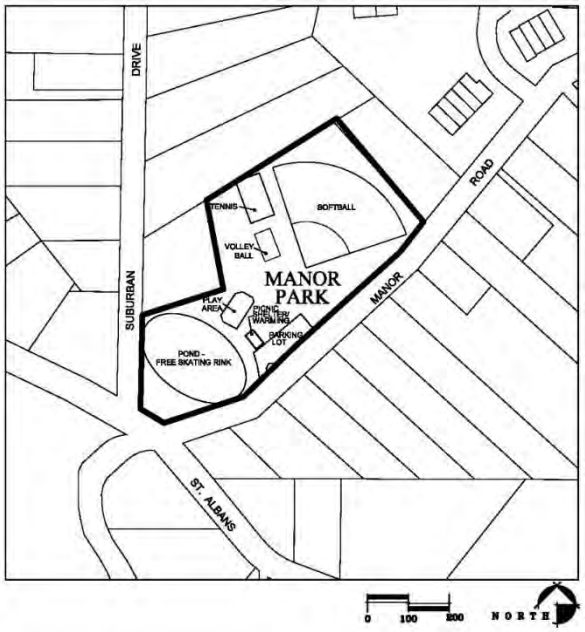
Facilities include:

- Pond skating rink/warming house
- Playground equipment
- Tennis/pickle ball court
- Picnic tables and shelter
- Open space
- One community adopt-a-garden
- Restrooms/water fountain
- Parking for 23 vehicles
- Softball field/multi-purpose field
- Shirley Rice Memorial Garden
- Sand volleyball court

Population served: Manor Park serves persons of all ages.

Recommendations for further action:

- Explore installation of horseshoe pits and bocce ball.
- Explore installation of perimeter walking trail.
- Provide needed dredging of the pond.
- Consider amphitheater or another central park feature.



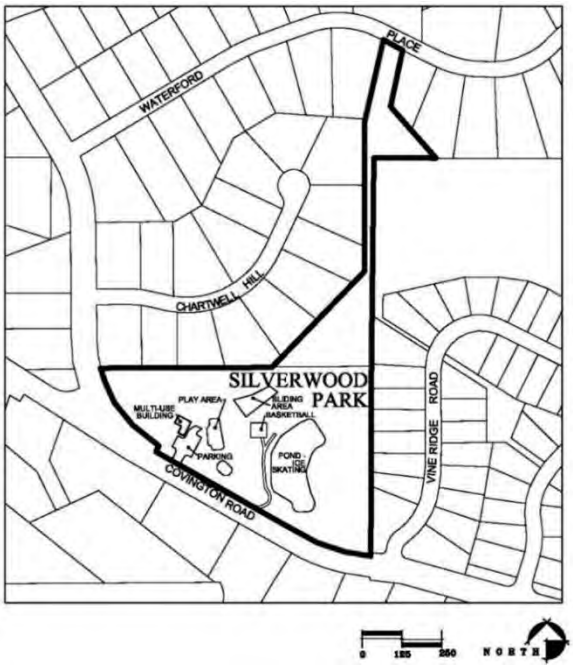
Shirley Rice Memorial Garden

Silverwood Park (8.1 acres). Silverwood is a small neighborhood park utilized by young children and their families.

Facilities include:

- Playground equipment
- Slide
- Sledding hill
- Free skate on the pond
- Community adopt-a-garden
- Portable restrooms (no running water)
- Picnic shelter, tables and grills
- Practice tennis court
- Half basketball court with practice wall for tennis
- Trail
- Paved parking for 11 vehicles

Population served: Silverwood Park can serve all ages but primarily serves families with young children.



Silverwood Park playground and slide

Freeman Park (67.8 acres). Freeman Park is Shorewood's principal community park. It measures 68 acres in size and accommodates a wide variety of both active and passive recreational activities. The park's north fields in particular provide an opportunity for a variety of organized sports.

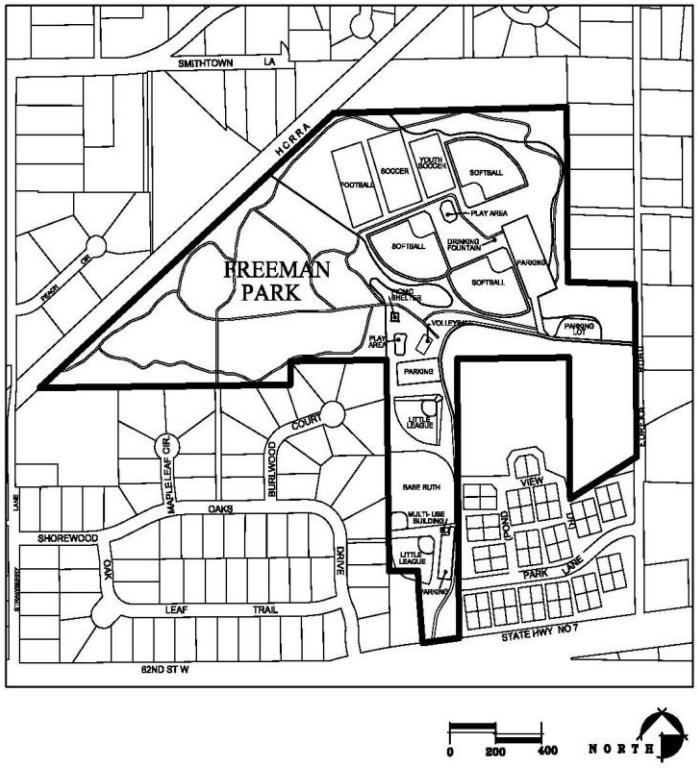
Facilities include:

- Softball fields (3)
- Baseball fields (2)
- Babe Ruth baseball field
- Soccer fields (6+ - depending on field layout)
- Volleyball courts (2)
- Multi-use building (Eddy Station) with warming house, restrooms and concessions
- South concessions building
- Portable restrooms
- Free skating rink
- Picnic shelter
- Playground (2)
- Picnic tables
- Trails
- Off-street parking for approximately 390 vehicles
- Community gardens

Population served: Reflective of its diverse range of active and passive recreational opportunities, Freeman Park caters to persons of all ages. The park hosts baseball, softball and soccer games which are part of organized leagues, functions as a neighborhood park for the immediate area and provides open space and wooded walking trails for passive park uses. Freeman Park serves approximately 140,000 users on an annual basis. The park is adjacent to the Lake Minnetonka LRT Regional Trail.

Recommendations for further action:

- Expand parking facilities near the south end of the park or work with sports organizations to provide off-site parking.
- Provide signage for the connection to the adjacent Lake Minnetonka LRT Regional Trail and directional signage on the trails.
- Replace the south playground and consider equipment options for different age groups.



North Fields

Freeman Park multi-use building

Freeman Park playground

South Shore Community Park (3.4 acres). South Shore Community Park is as unique a recreational facility as the process that led to its creation. The park was previously used as a skate park, but due to aging infrastructure and lack of use, the City removed the skate park facilities. Future use of the park will require study by the City Council, Parks Commission and residents.

Facilities include:

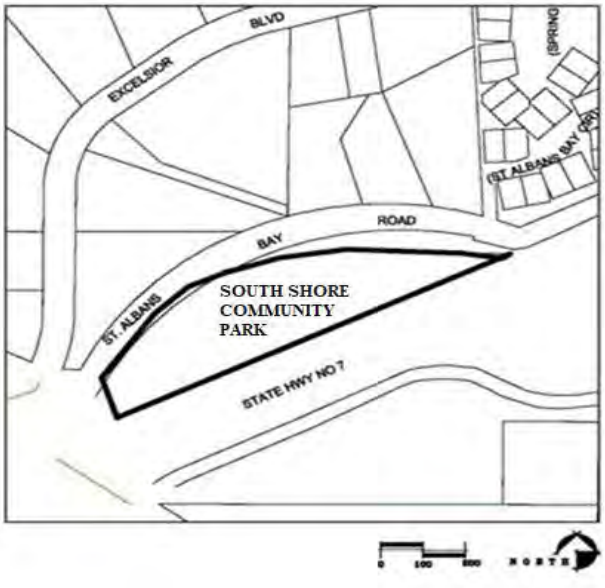
- Open space
- Community Gardens
- Water fountain

Population Served:

The South Shore Community Park primarily serves adults.

Recommendations for further action:

- Investigate potential future uses and facilities within the park which are compatible with its size and location next to State Highway 7.
- Develop a new park master plan to determine the appropriate role of the park.
- Consider a name change with the new master plan.
- Increase the size of the community gardens.



Gideon Glen Park (5.8 Acres). Gideon Glen Park overlays 5.8 acres of land and features native trees, shrubs, grasses and wildflowers and a maple basswood forest, all of which are remnants of the "big woods" that once covered the Lake Minnetonka region of the State. Owned by the City of Shorewood, the park site was restored in 2005 in partnership with the Minnehaha Creek Watershed District (MCWD), Hennepin County, Metropolitan Council and Lake Fellowship of Unitarian-Universalists.

Facilities include:

- An approximate 600-foot crushed rock walking trail
- Overlook locations with benches
- Educational opportunities
- Restored wetlands
- A stormwater pond (which captures pollutants)

Population served: Gideon Park serves persons of all ages.

Recommendations for further action:

- Increase public education and learning opportunities.
- Seek out additional research projects.
- Add more interpretive signage.

Gideon Glen Park Photograph Source: Lake Minnetonka Magazine - April 2015

Lake Minnetonka LRT Regional Trail (2.7 lineal miles). In total, the Lake Minnetonka LRT Regional Trail stretches 15 miles between the City of Hopkins and the Carver Park Reserve with 2.7 lineal miles located within the City of Shorewood. More specifically, the trail passes through the communities of Shorewood, Minnetonka, Deephaven, Greenwood, Excelsior, and Victoria. The aggregate trail offers scenic views and a convenient transportation route for pedestrians and bicyclists.

The trail is managed by the Three Rivers Park District.

Recommendations for further action:

- Investigate means with the Three Rivers Park District to improve the upkeep of lands which flank the Lake Minnetonka LRT Regional Trail (within the trail trial right-of-way) and recommend removal of invasive species.
- Encourage adjacent communities to provide winter trail maintenance.
- Encourage the Three Rivers Park District to consider paving the trail with public input from the citizenry of the affected cities.

General Recommendation

The City should continue to work with adjacent communities and the School District to maintain a clear understanding of the total recreational needs of the area. The South Shore area has a highly cooperative recreational and transportation system that will continue to require constant coordination (playfields, parks, and trails). The Park Commission and City Council should continue to monitor the needs of area residents in implementing the City's park and recreation plan. The City will also need to continue responding to the strong local interest for the expansion of the Shorewood trail system.

The City should also study whether additional parks are needed or desired on Shady or Enchanted Islands.

SOLID WASTE

As mentioned in the Transportation Chapter, garbage trucks have been identified as inflicting more damage to City streets than any other type of vehicle. In response to this issue, the City is examining the current solid waste collection system and considering options to improve collection.

The City presently licenses refuse haulers and limits pickup activities to one specified day of the week, thus eliminating the presence of curbside refuse on the remaining days. The City has a contract with a single hauler to pick up recycling City-wide. In the future, the City should explore organized hauling to further reduce the number of trash collection vehicles on City streets and in neighborhoods.

NATURAL GAS, ELECTRICAL SERVICE, CABLE TELEVSION AND STREET LIGHTING PLANS

All areas of the community are currently serviced by natural gas, electricity and cable television service, or have such services available. As such, provision of these services will not influence development in Shorewood. The thrust of these efforts should be concentrated toward the elimination of overhead wiring. The City requires the underground placement of all utilities where practical. In previously developed areas, plans for placement of underground utilities should be incorporated with future roadway improvements. The City may also want to initiate a more aggressive program for systematically eliminating overhead wiring within the next 10 to 15 years.

Residents appear to be split on the issue of street lighting. Consequently, no comprehensive program of installing street lights is suggested. The City has adopted the following policies in response to neighborhood demands for street lighting:

1. Location. The City recognizes that street lighting in certain locations is necessary to promote safe travel for vehicular and pedestrian traffic. However, it is not the intent of the City to install street lights for the purpose of deterring criminal activity. Based on this the City will consider the authorization of placing street lights on City streets only at: 1) intersections; 2) the ends of cul-de-sacs; 3) sharp turns; and 4) steep grades.

2. Requests for Street Lighting. While requests will be considered from any resident, it is recommended that a petition of neighboring residents be submitted with the request.

3. Cost of Street Lighting. The City agrees to pay the cost of monthly electric service for an authorized street light. It will not pay for the installation of the light or for extending power to the proposed location of the light, or for any light other than a standard street light.

CHAPTER SUMMARY

Community facilities and services include lands, buildings, services and systems which are provided on a public or semipublic basis. The City's goals in this regard are as follows:

- The City shall provide those basic facilities and services which ensure the health, safety and general welfare of the public, the cost of which facilities and services are most efficiently shared by the general public.

- The efforts of varying government agencies shall be coordinated to avoid duplication of efforts, unnecessary expense and improper location of public facilities.

- Maintain a sound financial planning program for capital improvements, relating such improvements to actual need, proper location and timing.

The following is a summary of recommendations intended to achieve the preceding goals.

Parks and Recreational Open Space

1. Shorewood's park and recreational open space system shall be classified in accordance with standards established by the Metropolitan Council.

2. Funding for park maintenance and necessary improvements (as determined by the City) shall be considered a community priority.

3. The allocation of funds for park improvements for specific facilities will be made on the basis of balancing overall community park needs of Shorewood residents with the specific needs of each facility.

4. The community shall provide for an appropriate balance among active, passive, and cultural recreational areas and activities, tailored to the needs of the total population.

5. Recreational facilities and a year-round program of activities suited to the varied recreational needs of all age groups within the community shall be provided.

6. Parks and recreational facilities shall be distributed throughout the community, based upon neighborhood needs and characteristics of each planning and development district.

7. Sufficient park land to fulfill the needs of the present and projected future population of the community shall be acquired and reserved. Park development shall be undertaken as residential development demands and as funds are available.

8. Recreational open space improvements shall be programmed in accordance with a capital improvement program, updated on an annual basis.

9. Parks shall be designed and maintained with proper lighting, landscaping, shelter design, etc., to ensure a high degree of public safety and protection of public property.

10. Where necessary, parks shall be screened, fenced and/or buffered for the safety and protection of the user as well as adjacent property owners.

11. Parks shall be improved and developed to take maximum advantage of natural features of Shorewood.

12. Safe and convenient pedestrian, bicycle and vehicular access and adequate parking to serve recreational facilities shall be provided.

13. The use of motorized recreational vehicles shall be limited to designated areas.

14. Park and open space facilities and programming shall be planned and developed in cooperation and coordinated with similar services of surrounding communities, the school district, private organizations and the metropolitan area as a whole.

15. Studies on a periodic basis shall be undertaken to analyze the effectiveness and comprehensiveness of the community recreation program. These studies should serve as the basis for recreation open space planning and programming.

16. Continual citizen participation in the planning, development and operation of recreational open space shall be maintained.

17. The City shall employ a pro-active approach to park development.

18. When opportunities arise, Shorewood shall consider the acquisition of parcels adjacent to the City's existing public beach (Crescent Beach) and conversion of such parcels to park land.

19. The City shall investigate means with the Three Rivers Park District to improve the upkeep of lands which flank the Lake Minnetonka LRT Regional Trail (within the trail trial right-of-way).

Lakeshore Use

1. Lake Minnetonka shall be considered a community recreational facility and appropriate actions shall be taken to permit utilization of the lake by all City residents.

2. Regulations shall be enforced to ensure accessibility to area lakes while at the same time minimizing any potential impact on surrounding uses and adjacent property owners.

3. In order to protect and preserve the amenity provided by area lakes, the City shall encourage uniform land use regulation and enforcement of lakeshore use.

Governmental Buildings and Facilities

1. Cooperation and coordination shall be promoted and actively pursued between governmental units in the provision of public facilities and services.

2. The full utilization of investments in public facilities and services shall be achieved prior to making new public investments.

3. Public facilities and services shall be located to the greatest extent possible so as to offer ease of access and minimal response time.

4. All public facilities shall be developed, improved and maintained according to the highest adopted standards of design and performance to serve as examples for private development.

5. All public buildings shall be designed and maintained to be safe, secure and resistant to vandalism while maximizing public and city usability.

6. Those areas, places, buildings, structures and other objects such as Indian mounds having significant architectural, historical, community or aesthetic interests and values shall be restored and preserved, as defined under the Minnesota Historic Sites Act of 1965, as may be amended.

7. Adequate screening, landscaping, and buffering of facilities shall be accomplished in order to minimize their impact on surrounding uses and enhance the community and areas in which they are located.

8. As part of future community facility improvement efforts, consideration shall be given to the creation or establishment of a visible and identifiable physical feature which distinguishes the City of Shorewood from the Cities of Excelsior and Tonka Bay.

9. The City shall examine alternatives and develop a plan for the future use of the Shorewood Community and Event Center which compliments the adjacent park use.

10. The City of Shorewood shall seek and implement creative ideas for its public spaces which pay homage to the community's history and identity.

11. The City shall strive to make efficient use of its various municipal buildings by evaluating, on a periodic basis, the space needs of various City functions (to ensure adequacy).

Public and Semi-Public Utilities

1. City public utilities will be reviewed with the Capital Improvement Program each year.

2. Demand for urban services shall be anticipated, with emphasis to conserving existing facilities, in order to facilitate orderly, fiscally responsible extension of service systems.

3. Easements for utility systems shall be located according to uniform standards, providing for ease of access for maintenance and repair and minimal disruption of other activities or areas.

4. All utility systems and possible utility and service needs shall be periodically monitored and all existing systems shall be maintained to assure a safe and high-quality standard of service on an ongoing basis.

5. The impact of required utility facilities and services shall be minimized upon surrounding uses.

6. Underground installation of all new utility services shall be required and when economically feasible, existing overhead systems shall be converted to underground.

7. Coordination among all utility improvement programs shall be constantly pursued.

8. Telecommunication facilities shall utilize existing tower structures where feasible.

9. Benefiting property owners shall assume the burden of improvements made by the City in their behalf.

10. When opportunities present themselves, the City will consider the burying of existing and new power lines to reduce the frequency of power loss during storm events.

Energy

1. Encourage use of alternative energy forms in new construction.

2. Continue to disseminate information on governmental energy conservation programs and helpful ideas on personal energy conservation methods.

3. Where practical, promote overall energy conservation in the community development process.

4. The City of Shorewood will, by example, attempt to become a more energy efficient community via future investment in such systems.

5. Create a program to encourage installation of alternative energy systems (solar and geothermal) and clarify procedures.

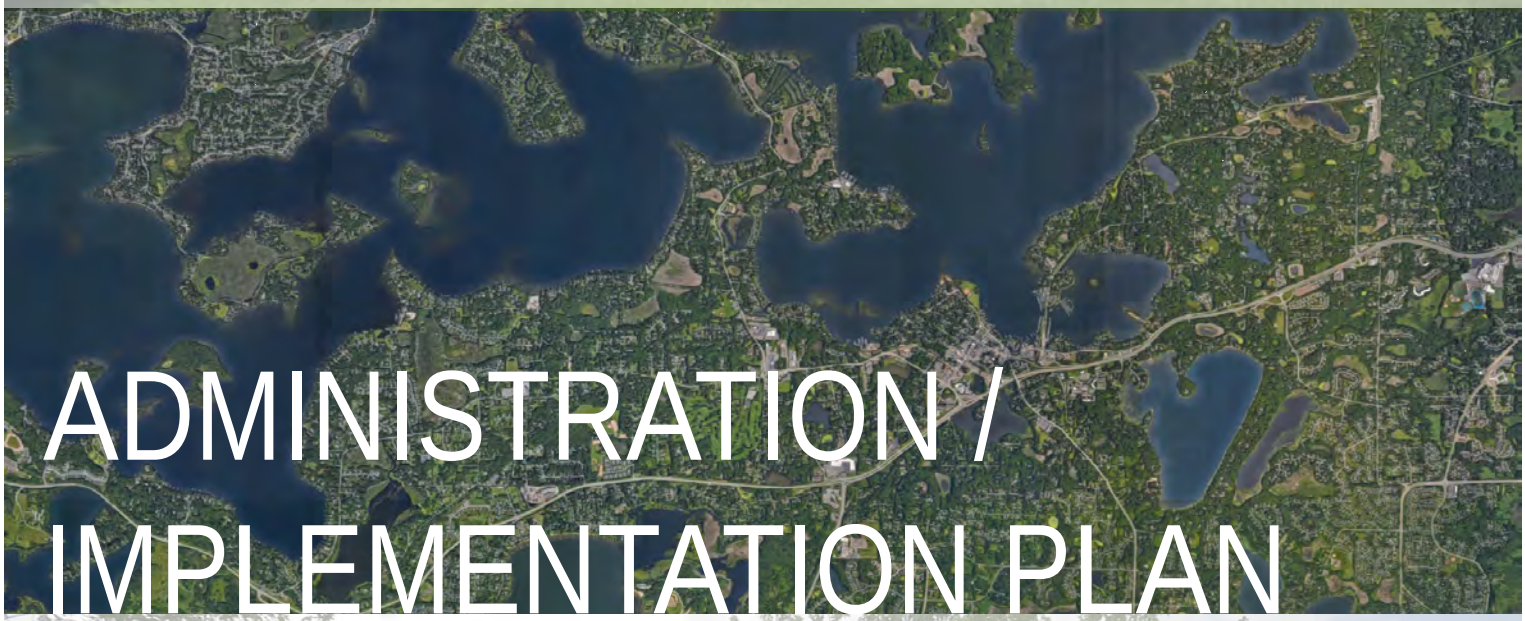
Solid Waste

1. The City of Shorewood shall continue to evaluate its solid waste collection system and consider options to improve collection services.

2. The City shall explore organized solid waste hauling to further reduce the number of collection vehicles on City streets and neighborhoods.

Collaboration

1. To the extent possible, the City of Shorewood shall collaborate with nearby lake communities in regard to the handling of shared services.



ADMINISTRATION / IMPLEMENTATION PLAN

2040 Comprehensive Plan

INTRODUCTION

Administration and implementation of the Comprehensive Plan and related supportive ordinances are equally as important as the development of the Plan itself. Only through the proper coordination of the Comprehensive Plan with the City's related development tools can the City fulfill its development and redevelopment vision and goals.

BUDGETING AND FINANCE

The Comprehensive Plan recognizes Shorewood as a fully developed, mature community. The recommendations of the Plan emphasize the need for the preservation of the City's environmental features and natural amenities, encouragement of land uses which are compatible with the residential and natural character of the City and provision of quality public services in a cost-effective manner.

In regard to future public expenditures, the City will implement the following strategies:

1. Continue monitor and maintain public facilities to avoid significant disrepair or breakdown.

2. Continue to maintain an annual Capital Improvement Plan which identifies needed public capital improvements, assigns costs and schedules implementation based on project priority and funding availability.

3. Continue to pursue intergovernmental cooperation for sharing public services and facilities to avoid duplication and economize on City investments.

4. Promote the maintenance, modernization and expansion of local land uses to preserve and expand the City's tax base and revenues.

5. Pursue available Federal, State and County grants and aids, as appropriate, to facilitate community improvements and programs.

6. Utilize cost-effective financing programs when authorized to encourage development and re-development projects.

7. Manage City budgets and spending in order to maintain a healthy reserve fund as a means to respond to unexpected expenses or emergency improvement projects.

COMMUNITY SERVICES

Through good communication with the public and responsiveness to residents' needs, the City administration has been cited as a community strength. High quality service to Shorewood residents will continue to be the standard for City operations in the future.

The City will continue to take a proactive approach to ensure a high level of community services in a fiscally responsible manner. These efforts include:

1. Conduct regular inspections of streets, utilities, parks and facilities to identify areas of disrepair, or facility replacement to ensure that City maintenance or capital improvement funds are properly planned and utilized.

2. Utilize available new technologies to assist in the delivery of services in an efficient and cost-effective manner.

3. Maintain active communication with City residents and businesses through direct contact, open meetings, television, newsletters, media releases, the City's website and project bulletins.

4. Periodically utilize community surveys to solicit resident perceptions, issues, or comments on community concerns and/or operations.

ORDINANCES / CODES / GUIDELINES

As a means of implementing the stated land use goals for Shorewood, the City will investigate the following potential changes to City ordinances, codes and guidelines:

1. Following the adoption of the 2040 Comprehensive Plan, the City's Zoning Ordinance, including the zoning map, will be reviewed, and if necessary updated, to ensure consistency with the City's Land Use Plan.

2. Continue (and create as determined necessary) programs and incentives for privately initiated maintenance efforts, improvements for energy conservation and redevelopment of existing land uses.

3. Ensure that sufficient setback requirements exist for new development to prevent problems associated with street upgrades, including, but not limited to, the widening of narrow streets.

4. Examine City regulations related to "teardowns" and "rebuilds" of single family homes and modify, if determined necessary, to ensure that adequate provisions are in place to ensure neighborhood compatibility.

5. Consider zoning ordinance and zoning map modifications which could accommodate the achievement of higher residential densities (as promoted by the Metropolitan Council).

6. Require staging plans for all infill development projects to minimize impacts upon existing surrounding neighborhoods. Minimally, such plans shall address contractor parking locations, construction material storage and construction hours.

7. Ensure that commercial development standards take into account the character of the community and promote the highest possible standards of quality (design and finish materials).

8. Review development regulations, and amend if necessary, to promote a balanced housing supply in the City.

9. Establish appropriate regulations for lawful nonconforming lots.

10. Within the context of residential neighborhoods, establish a design template for local streets which considers right-of-way and travel lane widths, pedestrian/bicycle components, stormwater management and on-street parking.

HOUSING

As a means of maintaining the City's housing stock, the City will investigate the following implementation strategies:

1. Consider the adoption of a "point of sale" ordinance which identifies certain housing deficiencies at the time of sale, putting buyers on notice of problems.

2. Continue to work with surrounding communities and various agencies to ensure that services are provided which allow seniors to stay in their homes as long as possible.

3. Continue to enforce the City's rental housing code.

4. Publicize available assistance programs geared toward the rehabilitation of substandard housing in the City.

5. Examine home improvement programs through Metro HRA, Hennepin County, the Greater Metropolitan Housing Corporation, or Minnesota Housing Finance Agency to identify finance programs which may assist Shorewood property owners in housing improvement loans.

6. Consider the use of tax increment financing (TIF) to assist in housing redevelopment projects which involved the elimination of blighted properties. The use of TIF funding will be evaluated on a project-by-project basis and weighed against the goals of the City's Comprehensive Plan.

INTERGOVERNMENTAL COOPERATION

The City of Shorewood receives police services from the South Lake Minnetonka Police Department (SLMPD). All of Shorewood, including the islands are serviced by SLMPD.

The mainland area of the City of Shorewood receives fire service from the Excelsior Fire District. Service to its islands is however, provided by the Mound Fire Department.

The City of Shorewood will continue to explore opportunities for shared services where it provides a high level of community service to its residents in a cost-effective manner.

SOLAR ACCESS PROTECTION

The City of Shorewood will continue to promote reasonable access to solar energy by controlling artificial blockage of solar radiation for optimum long-term economic and environmental benefits. Related to this issue, it should be recognized that tree preservation is also a considered a community priority. Thus, a desire for solar access must be balanced with the City's a desire to preserve a community amenity which contributes greatly to its community character.

Solar access protection is provided for by the uniform implementation of the City's land management tools. In this regard, solar energy systems are a permitted accessory use in all zoning districts subject to various conditions which are intended to mitigate adverse impacts (limitations related to height, location, size, aesthetics etc.).

Specifically, protections are provided via lot and building performance standards contained within Shorewood's Zoning Ordinance. Requirements such as maximum building height and yard setback standards are implemented for the purpose of creating separation between structures and allowing equal sunlight access such that a property is not in the shadow of an adjacent building.

RENEWABLE ENRGY SYSTEMS

The City of Shorewood has chosen to encourage and promote, rather than restrict, development of renewable energy sources which have a positive impact on energy production and conservation while not adversely impacting the community or where the economic and social impacts can be mitigated.

While the City's Zoning Ordinance specifically recognizes solar, wind and geothermal (ground source heat pump) energy systems, only solar energy and geothermal systems are currently permitted. The City will consider the establishment wind energy system requirements and the periodic updating of solar and geothermal energy system regulations (to adequately respond to changing technologies) as determined necessary.

APPENDICES
2040 Comprehensive Plan

APPENDIX A

Planning Tactics (Issues Identification)

INTRODUCTION

This section of the Comprehensive Plan is the Planning Tactics effort, which is devoted to the summary of comments and concerns raised in the Tactics interviews conducted with Planning Commission members, City Council members, and City staff.

To be noted is that identification of each and every issue raised in the interview process was not attempted. Rather, issues presented herein represent a broad categorization of topics raised.

CITY PERCEPTIONS

Generally, there was a strong consensus on many topics, however, where opinions differ, both sides of the issue are presented. The following perceptions and issues represent topics which require specific attention throughout the comprehensive planning process. The following interview responses are numbered for ease of reference and are in no particular order of priority.

Opportunities and/or Strengths

Most of the interview/survey participants have a very positive image of the City of Shorewood, describing it as a community that offers desirable residential neighborhoods within a natural setting. The following opportunities and/or strengths were identified as contributing to Shorewood's quality of life and public image:

1. The most common interview response related to Shorewood's natural amenities. Specifically, the lakes, trees, and open space were referenced as highly desirable environmental features of the community.

2. Interviewees were highly complementary of Shorewood's parks and highlighted such facilities as a positive aspect of the City.

3. Somewhat related to the City's environmental features, large residential lots (which commonly include significant vegetation) were often highlighted as a positive aspect of the City which contributes greatly to its desirable atmosphere.

Marina and Lakefront

City Park

4. Trails and sidewalks were identified as a desirable community feature, and particularly the recently constructed sidewalk along Smithtown Road.

5. Many interviewees consider the City's proximity to Lake Minnetonka to be a community strength and stressed a need to protect its water quality.

6. Specially highlighted as a community strength is the Lake Minnetonka LRT Regional Trail, which provides recreational opportunities for both pedestrians and bicyclists.

7. A number of interviewees identified the City's location within Minnetonka School District 276 as a desirable community feature.

Large Single Family Home

8. Several interviewees highlighted the quality of residential housing in the City as a distinct community strength.

9. Many interviewees view the City of Shorewood as a financially strong community with high level services and a quality City staff.

10. Many interviewees conveyed their belief that the City is occupied by "nice" people and that neighborhoods feel "closely knit."

Large Single Family Home

11. Interviewees also noted Shorewood's proximity to the City of Excelsior as a positive community feature. Specifically, convenient access to Excelsior's commercial services was referenced.

12. Also highlighted as a positive City feature is that Shorewood is fully developed and thus, negative aspects

Single Family Home

commonly associated with urban growth are not an issue.

13. On a broader scale, interviewees highlighted the City of Shorewood's proximity to the Minneapolis and St. Paul Metropolitan Areas as a positive community feature.

14. The size (population) of the City was identified as a positive feature of the City which contributes to its "small town" feel.

15. Interviewees were generally complimentary of City government operations and delivery of services. Most were particularly satisfied with the accessibility of City staff.

Issues and /or Concerns

While interview respondents characterize the City of Shorewood as a desirable place to live, respondents also identified some community weaknesses. The following were viewed as issues and/or concerns:

1. In terms of weaknesses, most interview respondents cited water infrastructure as a common community concern. Specific concern relates to water supply infrastructure, although stormwater management was also identified as a community issue which needs to be addressed.

Shorewood Water Tower

2. Traffic was also highlighted as a primary City concern. Specifically, highlighted was traffic congestion throughout the City but primarily at various Highway 7 access points. It was noted that such traffic congestion poses safety concerns for both motorists and pedestrians.

Commercial Strip Center

3. Incomplete trails were also cited as a community weakness. It was specifically noted by several interviewees that a lack of trail connections throughout the City forces pedestrians to use City streets as walkways which, in turn, creates safety concerns.

4. Several interviewees expressed concern over the City of Shorewood's working relationships with neighboring Lake Minnetonka communities. Specifically highlighted was a concern over the cost / benefit of shared Police services.

5. A lack of commercial services in Shorewood was frequently identified as a community drawback.

6. A number of interviewees expressed a desire for more housing choices within the City. Specific concern was cited over a lack of multiple family housing options and a lack of single family residential homes which are "affordable" to young families. Also conveyed is a belief that most persons who work in Shorewood cannot afford to live in the City (as a result of housing costs).

7. A few persons interviewed feel that the City presently lacks a community identity. Specifically noted was a lack of an identifiable physical feature which serves to distinguish the City of Shorewood from the City of Excelsior.

8. Many persons highlighted storm drainage as a significant community problem. Opinions were commonly expressed that curb and gutter along City streets may help address the issue.

9. Some interviewees expressed concern over the condition of Shorewood's streets. An opinion was expressed that

Multiple Family Residential Property

Single Family Home

On-Street Parking

City Baseball Field

the use of local streets by several different garbage haulers has contributed to the premature decay of City streets.

10. On-street parking was identified as a significant problem in the City. Interviewees feel the issue is primarily a result of the narrowness of local streets within the City and is compounded during the winter months when on-street parking opportunities are minimized due to snow storage needs.

11. While interviewees were generally complimentary of the City's efforts to preserve trees in the City, one respondent expressed a belief that greater preservation efforts are needed.

12. A few interviewees cited the City's haphazard municipal boundaries as a negative aspect of the City.

13. Many interviewees feel strongly that additional funding is needed for park improvements.

14. Several interviewees expressed concern over single family home teardowns and rebuilds and the potential loss of historic character which could result.

House Under Construction

Challenges

Interviewees were asked to identify what they perceive to be the biggest challenges facing the City of Shorewood in the next 20 years (the approximate term of the Comprehensive Plan Update). In this regard, the following views were expressed in order of popularity (the most popular response being listed first):

1. Upgrading of the City's aging infrastructure including water supply, stormwater management, and streets.

2. Funding desired for City improvements including projects related to infrastructure, parks, and trails.

3. Providing additional multiple family housing choices in the City in a manner which will preserve Shorewood's unique character.

4. Providing additional housing opportunities for seniors who wish to continue to reside in the City.

5. Examining alternatives and developing a creative plan for the future use of the Shorewood Community and Event Center.

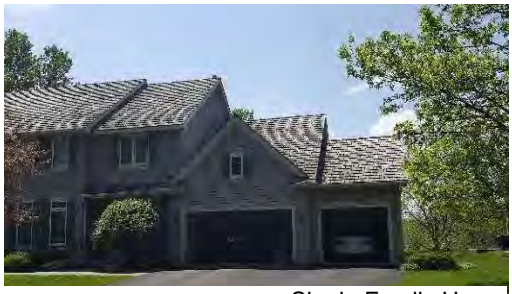
6. Promoting commercial redevelopment in the City which responds to the needs of Shorewood residents and is consistent with the desired community character.

7. Managing and/or improving vehicular traffic in a safe and functionally efficient manner, which considers the needs of pedestrian and bicyclists.

8. Striving to improve relationships with nearby lake communities in regard to the handling of shared services.

9. Improving connections (vehicular and pedestrian) between the Cities of Shorewood and Excelsior.

City Hall and Community Center Sign


Single Family Home

10. Redeveloping the Smithtown Crossing commercial area in a manner which promotes the City's identity.

11. Establishing appropriate zoning regulations for development upon legal non-conforming lots and single family residential teardowns.

2040 Vision

Persons interviewed/surveyed were asked to convey their 2040 vision of the City. In this regard, the following "visions" where conveyed:

1. Most persons interviewed do not expect to see any significant physical changes to the City by 2040. In this regard, a continuance of the City's residential/recreational character is considered their "vision" of the City for the year 2040.

2. Several interviewees did, however, convey their "vision" of the City moving forward. In this regard, the following changes are envisioned:

    a. Shorewood will become a more energy efficient City.

    b. The City will seek and implement creative ideas for the City's public spaces.

    c. Infrastructure systems within the City will be much improved and all properties will be connected to City water service.

    d. A greater mix of housing choices, including places which are affordable to young families and available to seniors will be provided.

    e. Better (improved) vehicular and pedestrian linkages between the Cities of Shorewood and Excelsior will be provided.

    f. City parks will be upgraded to respond to the recreational needs of Shorewood residents.

    g. Shorewood will be a more "pedestrian friendly" City.

    h. The City's population will be more diverse.

    i. Traffic patterns within the City will be functionally improved (for vehicle movements and pedestrian safety).

j. The City will promote the establishment a facility which pays homage to Shorewood's history (i.e., a history center or a museum).

Immediate Needs

Persons interviewed were asked to identify projects they feel are an immediate need in the City and should be addressed in the near term (next five years). In this regard, the following projects were identified:

1. Improvement of the Highway 7 /Vine Hill Road intersection.
2. City investments in alternative energy systems.
3. Trail system expansion (improved connections).
4. Shorewood Community and Event Center improvement.
5. Build-out of the Minnetonka Country Club single family residential subdivision.
6. General street improvements/ upgrades (including, but not limited to, features for improved stormwater management).
7. City-wide water service.
8. Redevelopment of the Smithtown Crossing commercial area.
9. Expansion of the City's Public Works building and/or relocation of impounded vehicle parking (to provide additional space for public works-related storage).
10. Park improvements (consistent with long term plans).
11. Improved maintenance of properties along the Lake Minnetonka LRT Regional Trail.

Country Club Subdivision

Public Works Building

Residential Land Uses

Persons interviewed were asked for their opinions related to existing and future residential uses in the City. In this regard, the following issues were identified:

1. Regarding the physical condition of the City's existing housing stock, most interviewees feel that such housing stock is either "good" or "very good."

2. Many interviewees expressed concern over a lack of residential housing choices in the City. In regard to planning for future residential uses, most interviewees feel it is important to consider a variety of housing options which cater to different age and income groups, but which would be consistent with the character of the City.

3. Several interviewees cited the two recently approved senior housing projects as being a benefit to the City (as such facilities provide an opportunity for long-time, elderly residents to stay in the community). A belief was also conveyed that a market for additional senior housing will likely exist in the future.

4. A number of interviewees expressed concern over the teardown of small, older housing and replacement with larger homes. It was suggested that appropriate zoning regulations should be in place to manage such activities and minimize potential adverse impacts.

5. Most interviewees do not feel there are significant property maintenance issues in the City. It was suggested, however, that the City undertake a pro-active approach related to code enforcement.

Single-Family Neighborhood

Single-Family Neighborhood

Commercial Land Uses

Interviewees expressed the following opinions regarding commercial land uses within the City:

1. Nearly all interviewees acknowledge there is a present lack of basic commercial services in the City, and that it is necessary to travel outside the City to obtain such services. Most interviewees do not, however, view this condition as a problem and cite the adjacent City of Excelsior as a convenient location for basic commercial goods.

2. Several interviewees expressed a belief that the redevelopment of the Smithtown Crossing area would be positive and would provide an opportunity for the City to establish a needed community identity.

3. One interviewee expressed an opinion that additional small office space is needed in the City.

4. A number of interviewees expressed an opinion that an assurance should be made that the physical appearance of new commercial development in the City should be of high quality (in terms of both design and finish materials).

5. A few interviewees suggested that the City should take steps necessary to ensure that new commercial buildings exhibit high quality finish materials and exhibit an architectural character which is consistent with an established vision for the community.

Existing Commercial Center

Transportation

Through the Tactics interviews, respondents offered several transportation-related comments. The following is a summary of comments and/or identified issues which were received:

1. The majority of interviewees indicated that roadway maintenance in the City is an issue. In this regard, it was suggested that funding for such efforts should be a community priority.

2. General concern was raised by interviewees regarding the ability of the City's collector streets to accommodate existing and future traffic volumes. Of primary concern are volumes on County Road 19. Most respondents acknowledge that such excessive traffic volumes are difficult to address.

Motorcycle Traffic

3. Specific concern was cited over excessive traffic volumes which presently exist on Country Club Road, a designated minor collector street. In this regard, it was suggested that improvements are needed at the adjacent Smithtown Road/ County Road 19 intersection.

3. Most interviewees raised concern over congestion and unsafe intersections along Highway 7. To be noted is that unsafe conditions were referenced not only for vehicles but pedestrians and bicyclists as well.

Narrow Residential Street

4. Bicycle safety was highlighted by interviewees as a major problem. It was noted that roadways and crossings are not equipped to manage the present volume of bicycle traffic encountered in the City. It was specifically noted that bicycle connections between commercial areas are needed.

5. A difference of opinion was expressed by interviewees regarding the long-term need for mass transit in the City. Many interviewees believe that existing and future residential densities cannot justify such service and thus, mass transit is not considered feasible.

Others expect mass transit to be a community need in the future. One interviewee specifically suggested that mass transit opportunities would be better located in the adjacent City of Excelsior.

6. The City of Shorewood is characterized by narrow streets, many of which lack curb and gutter. Most interviewees consider the City's narrow streets to be a desirable community feature which contributes to the character of the City. Several Interviewees, however, expressed concern that many local streets create circulation problems and are in need of repair/improvement.

7. A number of interviewees feel that the use of local streets by multiple garbage haulers has contributed to the degradation of the City's local streets.

8. In was noted by one interviewee that a number of dirt (gravel) roads presently exist within the City. It was suggested that all City roads should be hard surfaced.

9. Without exception, all interviewees oppose a proposed closure of Pleasant Avenue in Tonka Bay. Interviewees believe that the City is presently lacking in street connections/ linkages and that the closure of such street (to eliminate a City access to County Road 19) would be contrary to the City's transportation objectives.

10. One interviewee indicated that guardrails in certain areas of the City need to be replaced.

11. Also noted was a concern over vegetative "overgrowth" at certain street intersection limits vehicular visibility to oncoming traffic.

12. Several comments were received related to sidewalks and trails. These comments are summarized below:

    a. Nearly all persons interviewed feel that sidewalks and trails in the City are a great community amenity.

    b. Most interviewees feel the City's sidewalk and trail system is improving. The recently constructed sidewalk alongside Smithtown Road was highlighted as a significant system improvement.

    c. While the system is perceived as improved, most interviewees believe that more sidewalk/trail connections are needed in the City. Of specific note was an expressed desire to provide sidewalk/trail connections to the City of Excelsior.

Existing Sidewalk

d. Many interviewees feel that sidewalks and trails should be made a higher priority in the City. It was specifically indicated that walking paths (sidewalks and/or trails) are needed alongside City streets such that street surfaces are not utilized for pedestrian travel.

e. Several interviewees feel additional funding should be provided to maintain existing sidewalks/trails in the City and to implement Shorewood's Trail Plan.

f. Many interviewees consider pedestrian street crossings in the City to be unsafe. Interviewees suggested that additional attention be given to such crossings to ensure pedestrian safety. Specific safety concerns were cited along Strawberry Lane near the Minnewashta Elementary School, the Pleasant Avenue/County Road 19 intersection, and the Cathcart Drive/62nd Street intersection.

g. Considering the volume of bicycle use in the City, an interviewee suggested that specific trails intended for use by bicyclists should be considered.

h. One interviewee suggested that consideration be given to the construction of a pedestrian crossing of Highway 7.

i. Also related to Highway 7, some concern was expressed related to traffic noise and impacts upon abutting neighborhoods. In this regard, it was suggested that the noise issue and the need for buffering be addressed at some future point.

Highway 7 Conditions

Community Facilities

Parks. As part of the interview process, the following comments and/or opinions were received which relate to parks:

1. Most persons interviewed consider Shorewood's existing park system to be "good" or "excellent."

2. Several interviewees feel that efforts should continue to be made to improve the City's park system including a response to the changing recreational needs of residents and providing necessary financial investments.

3. It was suggested that the park system lacks a "vision" and that the City should be more "proactive" in the development of its parks.

4. Many interviewees made note of the fact that Shorewood's parks are routinely used by residents of neighboring communities.

5. Several interviewees cited a City need to take a more pro-active approach (rather than reactive) to park development.

6. Through the interview process, the following park-related projects were highlighted as areas of need:

    a. A storage building for park equipment.

    b. A passive park.

    c. General "facelifts" to several existing parks (park equipment upgrades).

d. Recreational facilities which respond to community desires (i.e., a pickle ball court).

Badger Park

UtilitySystems. As part of the interview/survey process, the following comments and/or opinions were received which relate to the City's utility systems:

1. Regarding the City's existing utility systems, municipal water service and stormwater drainage were highlighted by nearly all interviewees as areas of concern. Most expressed their opinion that City water service should be provided to all residents in the City and that efforts need to be made to improve stormwater management.

2. Other utility-related comments included the following:

   a. A desire to bury power lines to reduce the frequency of power loss in the City (as a result of storm events). Related to this comment was a concern over a common need for backup generators in the City.

   b. A need for a new water treatment plant.

   c. The City's well houses are in need of upgrades.

   d. Water pressure in the City is adequate but not great. It was suggested that the City consider water system improvements which will increase water pressure.

   e. In regard to stormwater management, concern was cited over "rural" (ditch) systems which are currently in place. It was suggested that the City consider the hiring of a "stormwater specialist" to assist in addressing stormwater issues.

MunicipalBuildings. As part of the interview process, the following comments and/or opinions were received which relate to the City's municipal buildings:

1. In general, most interviewees believe the City's municipal buildings are satisfactory. The City Hall, in particular, was highlighted as a source of community pride.

2. Most interviewees expressed interest in the future use of the Shorewood Community and Event Center. It was particularly noted that the facility needs rehabilitation. A few interviewees suggested that a study be conducted to determine the most feasible long-term use of the building.

3. A number of interviewees noted that the Public Works building needs to be expanded to accommodate equipment storage needs.

City Hall

City Park Building

Shorewood Community and Event Center

Environmental Issues

Interviewees offered several comments related to environmental issues. The following is a summary of comments and/or identified issues which were received:

1. While interviewees recognize that the waters of Lake Minnetonka are not under City jurisdiction, concerns over lake water quality were commonly identified. Specifically, concern was raised over invasive species and related lake impacts. Also, in regard to Lake Minnetonka, concerns were raised related to boat traffic (power boats) and lake refuse/garbage.

2. It was suggested by one interviewee that the City of Shorewood should strive to be a leader in environmental stewardship. Related to this comment was a desire by several interviewees to ensure that the City's ordinances strive to protect Shorewood's natural resources and promote alternative energy systems.

3. Several interviewees voiced concern over the private wells which exist in the City and the quality of the water extracted from such wells.

4. Drainage problems along the Lake Minnetonka LRT Regional Trail were highlighted as an environmental concern by several interviewees.

5. The quality of City water was raised as an environmental concern. Of specific issue is the "hardness" of the water and related sediment. In this regard, it was suggested that treatment (or additional treatment) of City water be considered.

6. Several interviewees suggested that greater funding for stormwater management efforts in the City needs to be provided.

7. It was also suggested that the City needs to continue to educate the general public on environmental issues.

8. It was indicated by one interviewee that a number of homes in the City were constructed upon hydrologic soil (prior to existing wetland regulations). Concern was raised regarding City responsibilities in the event of the structural failure of such homes.

Lake Access

Interviewees offered several comments related to lake access. A summary of received comments and/or identified issues is provided below:

1. Most interviewees believe existing lake access in the City (to Lake Minnetonka and Christmas Lake) is satisfactory.

2. A number of interviewees indicated that a future public access at the Howard's Point Marina property would be desirable.

3. A minority opinion expressed a desire to eliminate the existing public access on Christmas Lake.

4. Concern was expressed over "public" versus "private" boat launches on Lake Minnetonka in that "private" launches are typically less strict in regard to zebra mussel inspections (than "public" launches).

5. Also noted is a desire for a larger public beach on Lake Minnetonka. In this regard, it was suggested that the City consider the acquisition of parcels adjacent to the existing public beach when opportunities arise.

6. Related to Lake Minnetonka access, a desire was expressed to provide a bike path connection to Crescent Beach.

Boat Dock

Christmas Lake Access Area

CONCLUSION

The preceding comments are intended to help establish the basic direction of the 2040 Comprehensive Plan Update. In no order of priority, these comments identify a variety of community issues related to the following:

- Opportunities and/or Strengths
- Issues and/or Concerns
- Challenges
- 2040 Vision
- Immediate Needs
- Residential Land Uses
- Commercial Land Uses
- Transportation
- Community Facilities
- Environmental Issues
- Lake Access

The extent and scope of received comments speaks to the desirable features of Shorewood, while recognizing that many concerns/issues exist which should be addressed in the future. In this regard, there is an evident appreciation of the various issues which confront the City. Simultaneously, there appears to be an equal commitment to resolving those issues and preparing for an improved future.

To be stressed is that the provided views and opinions have not been prioritized nor do they include any positions or responses by appropriate professional staff. At this stage in the Plan Update process, only the directions desired by community representatives are a matter of concern. As may

be appropriate in future policy and plan discussions, professional staff recommendations and alternatives will be offered for consideration.

Ultimately, it will be the jurisdiction of City Officials to resolve the content and the direction of the Plan Update. In this regard, attempts will be made to build consensus on priority issues facing the City of Shorewood (as identified in the Tactics interviews) and the general direction of the Plan.

APPENDIX B

Emergency Preparedness Procedures

EMERGENCY PREPAREDNESS PROCEDURES

Water emergencies can occur as a result of vandalism, sabotage, accidental contamination, mechanical problems, power failures, drought, flooding, and other natural disasters. The purpose of emergency planning is to develop emergency response procedures and to identify actions needed to improve emergency preparedness. In the case of a municipality, these procedures should be in support of, and part of, an all-hazard emergency operations plan.

Federal Emergency Response Plan

Section 1433(b) of the Safe Drinking Water Act, as amended by the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Public Law 107-188, Title IV – Drinking Water Security and Safety), requires community water suppliers serving over 3,300 people to prepare an Emergency Response Plan. The City of Shorewood's Federal Emergency Response Plan was revised and adopted in 2011.

Operational Contingency Plan

The State recommends that all utilities develop an operational contingency plan that describes measures to be taken for water supply mainline breaks and other common system failures, as well as for routine maintenance. The City maintains a contact list for contractors and suppliers and a water emergency telephone list that act as an Operational Contingency Plan.

Emergency Response Procedures

Quick access to concise and detailed information on water sources, water treatment, and the distribution system may be needed in an emergency. System operation and maintenance records should be maintained in secured central and back-up locations so that the records are accessible for emergency purposes. A detailed map of the system showing the water sources, treatment plant, storage facilities, supply lines, interconnections, and other information that would be useful in an emergency should also be readily available. It is critical that public water supplier representatives and emergency response personnel communicate about the response procedures and be able to easily obtain this kind of information both in electronic and hard copy formats (in case of a power outage).

The City of Shorewood maintains records and maps of the water system. City staff can access these resources from a central secured location in the event of an emergency, and appropriate staff know where these resources are located.

Procedures for Augmenting Water Supplies

The City of Shorewood has six interconnections with four neighboring communities, to be used only in the event of an emergency. Each interconnection has a capacity of 1,000 gpm. The interconnections are with Minnetonka at Vine Hill Road and Shady Hills Road and at Vine Hill

Road and Waterford Place; with Chanhassen at Silver Lake Trail; with Victoria at Smithtown Road; and with Tonka Bay at CSAH 19 and Glen Road and at CSAH 19 and Smithtown Road. The City is exploring a possible interconnection with the City of Excelsior and has identified potential locations for that interconnection.

In the case of a short-term emergency, the City would need to obtain and distribute bottled water. For a long-term emergency, the City will evaluate the cause of service disruption and will determine if a new water source or improved water treatment is necessary. The scale of the response will depend on the cause of the disruption. In this case, a feasibility study will be conducted to determine the most cost-effective solution to the issue.

Allocation and Demand Reduction Procedures and Triggers

The City must prepare procedures to address gradual decreases in water supply, as well as emergencies and the sudden loss of water due to line breaks, power failures, sabotage, etc. These allocation and demand reduction procedures must be consistent with Minnesota State Statute 103G.261 that identifies and defines the priorities in which water usage will be allocated in the event of an emergency. They are defined as follows:

1. Domestic water supply only, excluding industrial and commercial uses of municipal water supply. The first priority also includes uses for power production that meet contingency requirements. Domestic use is defined by MN Rules 6115.0630, Subp. 9, as use for general household purposes for human needs such as cooking, cleaning, drinking, washing, and waste disposal, and uses for on-farm livestock watering excluding commercial livestock operations which use more than 10,000 gallons per day or one million gallons per year.
2. Consumption of less than 10,000 gallons per day.
3. Agricultural irrigation and processing of agricultural products of more than 10,000 gallons per day.
4. Power production in excess of the use provided for in the contingency plan.
5. All other water use of more than 10,000 gallons per day.
6. Non-essential uses. These uses are defined by Minnesota Statutes 103G.291 as lawn sprinkling, vehicle washing, golf course and park irrigation, and other non-essential uses.

The table below lists the priority ranking, average day demand, and demand reduction potential for each customer category in the City.

Customer Category	Allocation Priority	Average Day Demand (GPD)	Short-Term Emergency Demand Reduction Potential (GPD)
Residential	1	357,500	*
Commercial	2	22,100	*
Irrigation	3	6,800	*
Non-Essential	4	-	263,500
Total	**-**	**386,400**	**263,500**

GPD = gallons per day

*Non-essential use calculated as increased summer demand across all customer categories.

The City of Shorewood will use the following conditions to trigger an emergency response:

- Contamination
- Loss of Production
- Infrastructure Failure
- Governor's Executive Order

The City of Shorewood has identified the following short-term and long-term actions to be implemented as part of an emergency response:

Short-term Actions

- Supply augmentation through interconnection(s)
- Enforce its critical water deficiency ordinance
- Allocate water through emergency action of the City Council

Long-term Actions

- Supply augmentation through interconnections
- Enforce its critical water deficiency ordinance
- Allocate water through emergency action of the City Council
- Meet with large water users to discuss their contingency plan

Notification Procedures

The City of Shorewood has developed the following plan to inform customers regarding conservation requests, water use restrictions, and suspensions; with the support of City staff, neighboring communities, and local news outlets:

Short-term demand reduction declared (within one year)	Long-term demand reduction declared (over one year)	Governor's Critical water deficiency declared
Frequency: Monthly	Frequency: Annually	Frequency: As Needed
▪ Website ▪ Social media (e.g. Twitter, Facebook) ▪ Direct customer mailing ▪ Press release (TV, radio, newspaper) ▪ Public alert community notification system	▪ Website ▪ Social media (e.g. Twitter, Facebook) ▪ Direct customer mailing ▪ Press release (TV, radio, newspaper)	▪ Website ▪ Social media (e.g. Twitter, Facebook) ▪ Direct customer mailing ▪ Press release (TV, radio, newspaper)

Enforcement

Minnesota Statutes require public water supply authorities to adopt and enforce water conservation restrictions during periods of critical water shortages. As stated in Minnesota Statutes 103G.291, Subdivision 1, regarding public water supply appropriation during deficiency, if the governor determines and declares by executive order that there is a critical water deficiency, public water supply authorities appropriating water must adopt and enforce water conservation restrictions within their jurisdiction that are consistent with rules adopted by the commissioner. The restrictions must limit lawn sprinkling, vehicle washing, golf course and park irrigation, and other nonessential uses, and have appropriate penalties for failure to comply with the restrictions.

The City has a critical water deficiency ordinance defined in Shorewood City Code, Chapter 9: Section 903.12 Subd.1. This section authorizes the City Council to have the authority to implement water restrictions, which improves response times for dealing with water emergencies.

APPENDIX C

Capitol Improvement Program

City of Shorewood, Minnesota

Capital Improvement Program

2021 thru **2030**

PROJECTS BY FUNDING SOURCE

Source	#	Priority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
201 - Community & Event Center													
SCEC - Mechanical Systems	*SCEC-19-01*	n/a	10,000	10,000	10,000								*30,000*
SCEC - Doors, Exterior	*SCEC-21-01*	n/a	14,500										*14,500*
SCEC - Windows	*SCEC-22-01*	n/a		10,000									*10,000*
SCEC - Fire Suppression Attic System	*SCEC-22-02*	n/a		23,000									*23,000*
SCEC - Kitchen Exhaust System	*SCEC-23-01*	n/a			30,000								*30,000*
201 - Community & Event Center Total			24,500	43,000	40,000								*107,500*
402 - Park Improvements													
Freeman Park Overlay Trails	*P0105*	n/a			200,000								*200,000*
Freeman Park Fence Repair	*P0109*	n/a			50,000								*50,000*
Freeman Park North Playground - Hand Rails	*P0110*	n/a			25,000								*25,000*
Cathcart Park Resurface Tennis Court	*P0200*	n/a				15,000				18,000			*33,000*
Cathcart Park Hockey Boards	*P0201*	n/a							150,000				*150,000*
Cathcart Park Playground Equipment	*P0202*	n/a				150,000							*150,000*
Badger Park Tennis Courts	*P0301*	n/a						30,000					*30,000*
Manor Park Outdoor Ampitheatre & Perimeter Trail	*P0403*	n/a								150,000			*150,000*
Silverwood Park Playground Equipment	*P0501*	n/a	240,000										*240,000*
Silverwood Park Retaining Walls Replacement	*P0502*	n/a							27,900				*27,900*
South Shore Park Master Plan	*P0700*	n/a								10,000			*10,000*
South Shore Park Reconstruction Project	*P0701*	n/a								90,000			*90,000*
402 - Park Improvements Total			240,000		275,000	165,000		30,000	177,900	268,000			*1,155,900*

Source	#	Priority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
403 - Equipment Replacement Fund													
Dump Truck - Freightliner	004	n/a										233,500	*233,500*
Truck - Ford 550 w/crane, tool box	007	n/a									152,700		*152,700*
Pickup - 4 x 4 Ford F250	010	n/a										46,700	*46,700*
Pickup - 4 x 4 Ford F150	011	n/a									41,400		*41,400*
Mower - Toro Groundsmaster 7210	012b	n/a				30,000							*30,000*
Trailer 24' - Felling Galvanized	022	n/a		18,800									*18,800*
Sand Pro 3000	064	n/a	15,200										*15,200*
Pickup - 4 x 4 Ford F250	078	n/a	35,400										*35,400*
Pickup - 4 x 4 Ford F150	080	n/a	32,300										*32,300*
Pickup - 4 x 4 Ford F350	081	n/a										49,400	*49,400*
Mower - Toro Groundsmaster 7210	084	n/a			29,000							36,000	*65,000*
Pickup - 4 x 4 Ford F350	090	n/a										49,400	*49,400*
Truck - Ford 550 One Ton Dump Truck	091	n/a				94,300							*94,300*
Mower - Toro Groundsmaster 7210	091b	n/a			29,000			31,900					*60,900*
Dump Truck - Freightliner	092	n/a					200,200						*200,200*
Skid Steer - Case SV185	097	n/a	42,000								53,700		*95,700*
Dump Truck - Freightliner	098	n/a							212,900				*212,900*
Sweeper	099	n/a								235,900			*235,900*
Attach Skid Steer - Blower	A03	n/a						10,000					*10,000*
Attach Skid Steer - V Plow	A04	n/a			6,700								*6,700*
Attach Skid Steer - snow bucket	A08	n/a							6,800				*6,800*
Attach MultiOne - Dirt Bucket	A10	n/a							11,000				*11,000*
Engine Analysis station & software	A13	n/a	4,900										*4,900*
Asphalt hot box insert for truck	A14	n/a	9,000										*9,000*
Attach skid steer broom	A15	n/a		7,300									*7,300*
Attach skid steer leveling bar	A16	n/a	3,100										*3,100*
Color Copier Replacement	T-13-03	n/a		10,000									*10,000*
800 Mhz Radio Replacement	T-19-01	n/a							36,000				*36,000*
Computer Upgrades	T-99-99	n/a	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	*100,000*
403 - Equipment Replacement Fund Total			151,900	46,100	74,700	134,300	210,200	51,900	276,700	245,900	257,800	425,000	*1,874,500*
404 - Street Reconstruction Fund													
Maintenance-Bituminous Roadway	LR-99-100	n/a	2,060,000	472,101	0	512,107	0	555,234	0	601,716	0	649,853	*4,851,011*
Strawberry Ln ROW acquisition	ST-19-02	n/a	150,000										*150,000*

Source	#	Priority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Glen Rd, Amlee Rd, Manitou Ln reconstruction	ST-20-01	n/a	1,978,947										*1,978,947*
Edgewood Rd reconstruction	ST-21-01	n/a				2,774,610							*2,774,610*
Excelsior Blvd reclamation	ST-21-02	n/a								919,420			*919,420*
Minnetonka Blvd & St. Albans Rd w/ Greenwood	ST-21-05	n/a	210,000										*210,000*
Strawberry Ct	ST-22-01	n/a		209,000									*209,000*
Peach Circle	ST-22-02	n/a		332,000									*332,000*
Strawberry Ln reconstruction	ST-23-01	n/a		1,896,238									*1,896,238*
Grant Lorenz Rd reconstruction	ST-23-02	n/a						2,136,427					*2,136,427*
Eureka Rd N reconstruction	ST-23-03	n/a									2,129,076		*2,129,076*
Birch Bluff Rd reconstruction	ST-23-99	n/a			2,071,008								*2,071,008*
Noble Rd recon	ST-24-01	n/a				1,168,500							*1,168,500*
Noble Rd Reclaim	ST-24-02	n/a				478,744							*478,744*
Sweetwater Curve reclamation	ST-25-01	n/a							1,347,682				*1,347,682*
2030 Street Reconstruction	ST-30-01	n/a										2,000,000	*2,000,000*
Mill Street Trail Construction	T004	n/a				110,000							*110,000*
Mill Street Trail ROW	T017	n/a			105,000								*105,000*
Smithtown Pond Trail Connection	T018	n/a	154,500										*154,500*
404 - Street Reconstruction Fund Total			4,553,447	2,909,339	2,176,008	5,043,961	0	2,691,661	1,347,682	1,521,136	2,129,076	2,649,853	*25,022,163*
405 - MSA Road Reconstruction Fun													
Hwy 7/Old Market Rd Signal	ST-21-03	n/a	100,000										*100,000*
05 - MSA Road Reconstruction Fund Total			100,000										*100,000*
406 - Trails													
Galpin Lake Rd Sidewalk	T003	n/a		500,000									*500,000*
406 - Trails Total				500,000									*500,000*
601 - Water Fund													
Air Compressor - Ingersall Rand 185	038	n/a	20,700										*20,700*
Freightliner Water Truck 50%	085	n/a		57,350									*57,350*
Glen Rd, Amlee Rd, Manitou Ln reconstruction	ST-20-01	n/a	693,311										*693,311*
Edgewood Rd reconstruction	ST-21-01	n/a				540,244							*540,244*
Excelsior Blvd reclamation	ST-21-02	n/a								1,008,349			*1,008,349*
Sweetwater Curve Watermain	ST-21-04	n/a	270,000										*270,000*

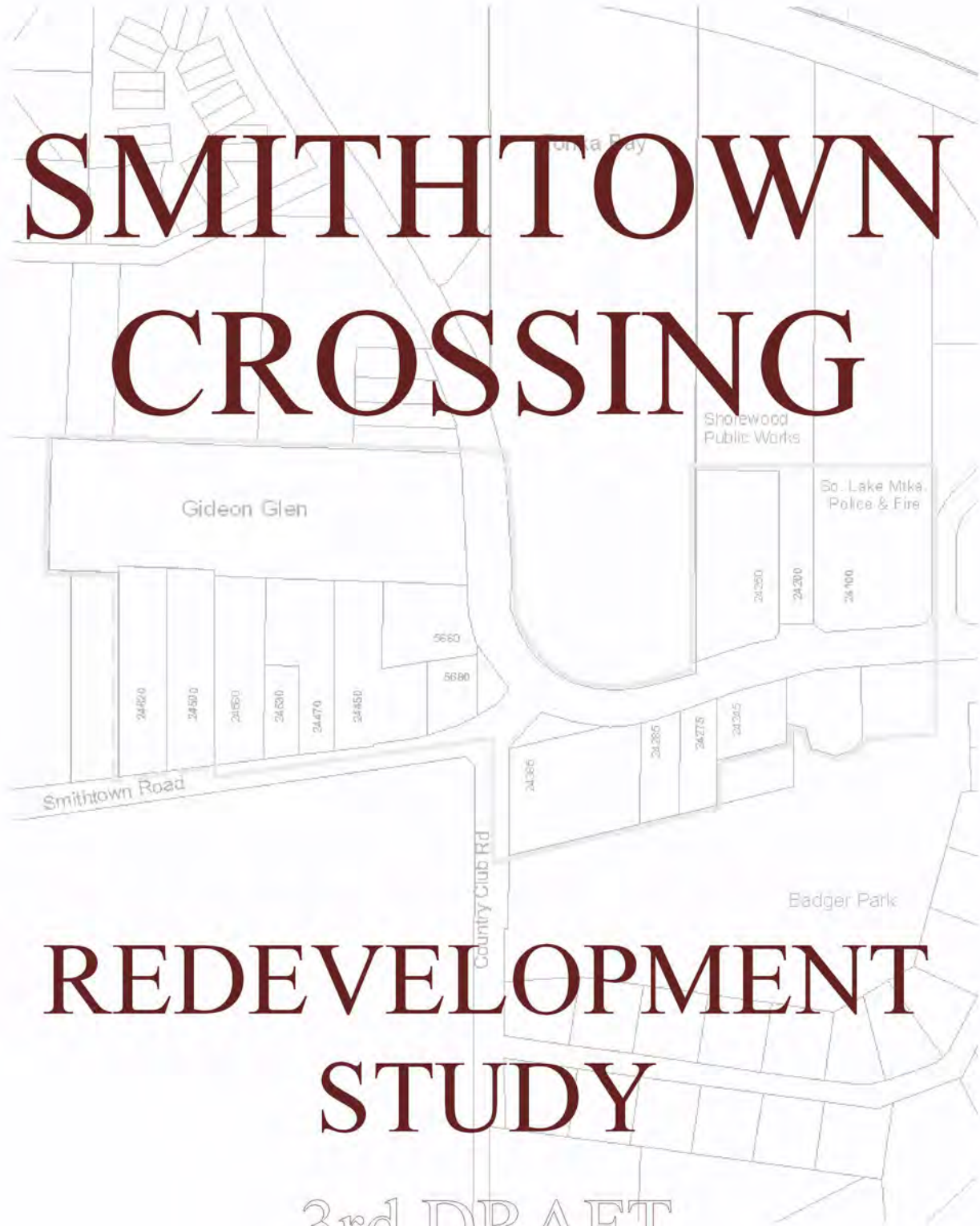
Source	#	Priority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Minnetonka Blvd & St. Albans Rd w/ Greenwood	ST-21-05	n/a	0										*0*
Strawberry Ct	ST-22-01	n/a		265,000									*265,000*
Peach Circle	ST-22-02	n/a		103,000									*103,000*
Strawberry Ln reconstruction	ST-23-01	n/a		489,075									*489,075*
Grant Lorenz Rd reconstruction	ST-23-02	n/a						797,627					*797,627*
Eureka Rd N reconstruction	ST-23-03	n/a									6,524		*6,524*
Birch Bluff Rd reconstruction	ST-23-99	n/a			866,533								*866,533*
Noble Rd recon	ST-24-01	n/a				372,543							*372,543*
2030 Street Reconstruction	ST-30-01	n/a										600,000	*600,000*
Boulder Bridge VT Well Motor Replace	W-18-01	n/a		35,000									*35,000*
Amesbury Well Pipe Coatings and Corrosion Prev	W-19-02	n/a	25,000										*25,000*
Rebuild Well Pump SE VT Well	W-19-05	n/a					25,000						*25,000*
SE Area Well Motor Replace	W-20-03	n/a		45,000									*45,000*
Rebuild Well Pump Amesbury VT Well	W-20-05	n/a						25,000					*25,000*
Rebuild Well Pump Badger VT Well	W-21-02	n/a	30,000						35,000				*65,000*
SE Area Well & Iron Plant LED Light Conversion	W-21-03	n/a	12,000										*12,000*
Badger Field Well LED Light Conversion	W-21-04	n/a	6,000										*6,000*
Rebuild Well Control Valve SE Well	W-21-05	n/a	15,000										*15,000*
SE Area Well Pipe Coatings and Corrosion Prev	W-22-01	n/a		25,000									*25,000*
Rebuild Well Pump Boulder Bridge VT Well	W-22-02	n/a		30,000						35,000			*65,000*
FilterMediaChangeout/RehabIronRemovalFilterSEPlant	W-22-03	n/a		40,000									*40,000*
Rebuild Well Pump Amesbury Submersible Well	W-23-01	n/a			30,000						36,000		*66,000*
Rebuild Well Pump Boulder Bridge Submersible Well	W-24-01	n/a				30,000							*30,000*
East Water Tower Paint & Reconditioning	W-24-02	n/a				380,000							*380,000*
Replace VFD SE Area Well	W-24-03	n/a				10,000							*10,000*
Replace VFD Badger Well	W-26-01	n/a						12,000					*12,000*
Watermain Reconstruction Activity	W-99-01	n/a				150,000	150,000	150,000	150,000	150,000	150,000	150,000	*1,050,000*
601 - Water Fund Total			1,072,011	1,089,425	896,533	1,482,787	175,000	984,627	185,000	1,193,349	192,524	750,000	*8,021,256*

Source	#	Priority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
611 - Sanitary Sewer Fund													
Freightliner Water Truck 50%	*085*	n/a		57,350									*57,350*
Lift Station 11 Rehab - 20465 Radisson Rd.	*SS-13-01*	n/a			240,000								*240,000*
Lift Station 9 Rehab - 20995 Minnetonka Blvd	*SS-14-01*	n/a		240,000									*240,000*
Lift Station 7 Rehab - 5600 Woodside Road	*SS-16-02*	n/a	240,000										*240,000*
CIP Sewer Repairs Assoc with Roadway Reconstr	*SS-99-01*	n/a	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	*500,000*
Televising & Cleaning	*SS-99-02*	n/a	0	0	0	0	0	0	0	0	0	0	*0*
Sewer Additional	*SS-99-04*	n/a				25,000	25,000	25,000	25,000	25,000	25,000	25,000	*175,000*
Infiltration and Inflow Reduction	*SS-99-05*	n/a	70,000	70,000	70,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	*770,000*
Glen Rd, Amlee Rd, Manitou Ln reconstruction	*ST-20-01*	n/a	110,326										*110,326*
Edgewood Rd reconstruction	*ST-21-01*	n/a				185,709							*185,709*
Excelsior Blvd reclamation	*ST-21-02*	n/a								139,345			*139,345*
Strawberry Ln reconstruction	*ST-23-01*	n/a		175,049									*175,049*
Grant Lorenz Rd reconstruction	*ST-23-02*	n/a						131,346					*131,346*
Eureka Rd N reconstruction	*ST-23-03*	n/a									143,525		*143,525*
Birch Bluff Rd reconstruction	*ST-23-99*	n/a			120,200								*120,200*
Noble Rd recon	*ST-24-01*	n/a				185,709							*185,709*
2030 Street Reconstruction	*ST-30-01*	n/a										200,000	*200,000*
611 - Sanitary Sewer Fund Total			470,326	592,399	480,200	526,418	155,000	286,346	155,000	294,345	298,525	355,000	*3,613,559*
631 - Stormwater Management Fund													
Pump - 4' Discharge Trailer Mtd	*050*	n/a			62,400								*62,400*
Culvert Replace - Galpin Lake Rd and Mayflower Rds	*CR-21-01*	n/a	9,000										*9,000*
Culvert Replace - 22630/22695 Murray St	*CR-21-02*	n/a	8,000										*8,000*
Culvert Replace - 22535 Murray St/6180 Cardinal Dr	*CR-22-01*	n/a		11,000									*11,000*
Glen Rd, Amlee Rd, Manitou Ln reconstruction	*ST-20-01*	n/a	819,867										*819,867*
Edgewood Rd reconstruction	*ST-21-01*	n/a				678,682							*678,682*
Excelsior Blvd reclamation	*ST-21-02*	n/a								157,828			*157,828*
Strawberry Ct	*ST-22-01*	n/a		40,000									*40,000*
Peach Circle	*ST-22-02*	n/a		25,000									*25,000*
Strawberry Ln reconstruction	*ST-23-01*	n/a		469,066									*469,066*

Source	#	Priority	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Grant Lorenz Rd reconstruction	*ST-23-02*	n/a						435,150					*435,150*
Eureka Rd N reconstruction	*ST-23-03*	n/a									457,557		*457,557*
Birch Bluff Rd reconstruction	*ST-23-99*	n/a			410,866								*410,866*
Noble Rd recon	*ST-24-01*	n/a				467,086							*467,086*
Sweetwater Curve reclamation	*ST-25-01*	n/a							61,494				*61,494*
2030 Street Reconstruction	*ST-30-01*	n/a										500,000	*500,000*
Shorewood Oaks Drainage	*STM-20-04*	n/a	190,000										*190,000*
Grant Street Drainage	*STM-20-05*	n/a	250,000										*250,000*
2021 Mill & Overlay - Drainage Improvements	*STM-21-01*	n/a	100,000										*100,000*
Noble Road Channel Widening	*STM-24-01*	n/a				247,612							*247,612*
Smithtown Pond	*STM-24-02*	n/a	3,065,280										*3,065,280*
Freeman Park Outlet	*STM-24-03*	n/a				96,794							*96,794*
Strawberry Lane Drainage (North)	*STM-25-01*	n/a		1,071,509									*1,071,509*
Strawberry Lane Drainage (South)	*STM-25-02*	n/a		381,924									*381,924*
Grant Lorenz Channel	*STM-26-01*	n/a						262,692					*262,692*
Shorewood Lane Ravine	*STM-26-02*	n/a		280,000									*280,000*
Catch Basin Reconstruction	*STM-99-01*	n/a	30,000	30,000	35,000	35,000	35,000	35,000	35,000	35,000	40,000	40,000	*350,000*
Disposal of Street Sweepings	*STM-99-02*	n/a	36,400	37,100	37,800	38,600	39,400	40,200	41,000	41,800	42,600	42,750	*397,650*
Storm Water Additional	*STM-99-03*	n/a				100,000	100,000	100,000	100,000	100,000	100,000	100,000	*700,000*
Storm Pond Sediment Cleaning & Disposal	*STM-99-04*	n/a	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	*1,500,000*
631 - Stormwater Management Fund Total			4,658,547	2,495,599	696,066	1,813,774	324,400	1,023,042	387,494	484,628	790,157	832,750	*13,506,457*
GRAND TOTAL			11,270,731	7,675,862	4,638,507	9,166,240	864,600	5,067,576	2,529,776	4,007,358	3,668,082	5,012,603	*53,901,335*

APPENDIX D

Smithtown Crossing Project



SMITHTOWN CROSSING

REDEVELOPMENT STUDY

3rd DRAFT

June 2012

Smithtown Crossing Redevelopment Study

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  - Architecture/Materials

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City Participation.....**23**

- Tax Increment Financing
- Land
- EDA

Appendix

- Planning Inventory
- List of Meeting Dates
- Traffic Volume Map

Smithtown Crossing

Executive Summary

While readers are encouraged to read the entire Study, following is a summary of the recommendations included therein:

- Encourage unified/coordinated redevelopment versus a piece-meal/individual approach.
- Consider various incentives to achieve coordinated and higher quality development.
- Utilize Planned Unit Development (P.U.D.) and establish parameters for mixed use (residential and commercial).
- Incentives and rewards will be tied to compliance with the City's redevelopment "guiding principles".
    - Consider use of Tax Increment Financing (TIF) to encourage land assembly, common open area and high quality architecture and landscaping.
    - Consider City acquisition of land as it becomes available to help facilitate land assembly.
- Require marketability and traffic studies for proposed activities.
- Provide for bicycle/pedestrian connections and circulation within the Study Area.
- Require substantial, natural, low maintenance landscaping in order to create buffers and achieve incentives.
- Include public/common open space internal to the project.
- Encourage well articulated architecture with pitched rooflines, tiered levels, interesting shadowing and natural materials.

Smithtown Crossing Redevelopment

Vicinity

Glen Road

TONKA BAY

Co Rd. 19

Shorewood Lane

Gideon Glen

Road

Christopher

County Road 19

Smithtown Road

Smithtown Crossing Study Area

Badger Park

Country Club Road

Minnetonka Country Club (Golf Course)

Echo Road

N

0 120 240 480 Feet

Shorewood Planning Department
04/12

Figure 1

Introduction

Geographically, the intersection of Smithtown Road and County Road 19 (Smithtown Crossing) is relatively centered in the City of Shorewood. The City considers the area surrounding the intersection to be somewhat of a northern gateway to the community. As such, considerable time, energy and money have been invested to enhance the area. The City has developed a "civic campus" including the Shorewood Public Works Facility, the South Lake Public Safety Building, the South Shore Community Center, and a newly remodeled City Hall. Badger Park and the Gideon Glen Conservation Open Space area provide active and passive recreational opportunities for the area, and proximity to the Lake Minnetonka Regional LRT Trail provides pedestrian and bicycle access for South Lake Minnetonka residents. Finally, the intersection itself was redesigned and reconstructed in 2005.

To date, private investment adjacent to Smithtown Crossing has not kept up with public investment. Commercial properties in the area are characterized as disjointed, with buildings that are low-valued and underutilized and, in many cases do not comply with current Shorewood zoning standards. In this regard, the Shorewood Comprehensive Plan has identified the area as being prime for redevelopment.

In order to facilitate redevelopment that makes better use of land, better serves the residents of the community, enhances tax base, reflects the quality and character of the community, and is commensurate with the highly desirable, highly visible Smithtown Crossing area, the City has begun exploring options and incentives to assist the area in realizing its true potential.

The Planning Commission began working on the Smithtown Crossing Redevelopment Study in early 2010. The study area boundary was established as shown on Figure 1, preceding, and Figures 2 and 3 in the following pages. The study area contains a total of 10.9 acres and consists of three locations: 1) the northwest quadrant of the intersection; 2) the southeast quadrant of the intersection; and 3) the area north of County Road 19, just west of Shorewood Lane. The study focused primarily on the northwest quadrant of the intersection, which contains anywhere from 4.52 to 6.56 acres, depending on how far west a project might extend. The southwest quadrant of the intersection contains another 2.74 acres. The area to the north of County Road 19 has 1.59 acres.

A brief planning inventory, examining the various uses in the district, property ownership, zoning and values was prepared and is contained in the Appendix of this report. With the exception of the American Legion, a retail/office building and a small, nonconforming apartment building, the area is predominantly occupied by auto-oriented uses (sales, auto repair, fuel station, car wash, etc.). Two single-family homes are also included in the study area.

Smithtown Crossing Redevelopment

Study Area

(See Appendix for detailed lot information)

Gideon Glen
(Conservation Open Space)

Tonka Bay

Shorewood Public Works

South Lake Public Safety

5660

(.73 ac.)

24620

24590

24560

24530

24470

24450

5680

(.36 ac.)

(1.18 ac.)

(.97 ac.)

(.33 ac.)

(.95 ac.)

(1.05 ac.)

(.99 ac.)

Smithtown Road

24250

(1.59 ac.)

Co. Rd. 19

SouthShore Community Center

24245

(.46 ac.)

24275

24285

24365

(.41 ac.)

(.42 ac.)

(1.45 ac.)

Country Club Rd

Badger Park

0 60 120 240 Feet

Shorewood Planning Department
06/12

Figure 2

Smithtown Crossing Redevelopment
Aerial View

Shorewood Public Works

South Lake Public Safety

Tonka Bay

Gideon Glen

5660

24250

Co. Rd. 19

24620

24590

24560

24530

24470

24450

5680

SouthShore Community Center

24245

24275

24285

24365

Country Club Rd

Smithtown Road

Badger Park

N

0 60 120 240 Feet

Shorewood Planning Department
06/12

Figure 3

Planning Issues

One of the first steps taken by the Planning Commission in its study was to identify planning issues associated with the study area. Following are a list of issues identified to date. These are also illustrated on Figure 2 on the following page.

- Study Area west boundary (it was decided that this edge of the study area could remain somewhat flexible, in the event a developer chooses to acquire one or more of the single-family residential lots that lie west of the commercial area)
- Land uses (considerable interest has been expressed in exploring mixed use for the Study Area
- Buffering and land use transitions
- Taking advantage of views into Gideon Glen while preserving natural views from across and within Gideon Glen
- Access (vehicular) – to and from County Road 19 and to and from Smithtown Road
- Internal circulation – vehicular and pedestrian
- Phasing
- Redevelopment of lots on an individual basis versus unified/coordinated development*
- Future development of golf course property
- Land use and zoning of single-familly residential property at 24250 Smithtown Road
- Pedestrian connection from Badger Park to north side of Smithtown Road
- Drainage**

*The table on the following page sets forth the advantages of unified/coordinated redevelopment versus a piece-meal approach.

**Note. This is a significant issue and supports the concept of a unified development effort. The City Engineer advises us that properties within the study area not only need to address rate control, but also the new volume of water that comes from redevelopment. This supports the concept of a coordinated redevelopment scenario versus piece-meal redevelopment of individual sites. Individually, the properties would have to come up with their own ponding for each site.

Unified/Coordinated versus Piece-meal Redevelopment
Smithtown Crossing

Unified/Coordinated	Piece-meal
Maximize exposure to County Rd 19	Only two properties front on County Rd 19
Maximize view of Gideon Glen	Two properties - no view
Efficient drainage	Each site provides its own seperate pond for rate control and volume storage; more land consumed by ponding
P.U.D. provides flexibility relative to internal setbacks - more efficient use of land	Strict adherence to setback requirements
Opportunity for joint-use parking	Each site provides its own parking, resulting in less efficient land use and circulation
Opportunity for 75% hardcover (site is large enough for on-site treatment)	Maximum 66% hardcover (individual sites too small for treatment solutions)
Consolidated access	Potential congestion from multiple access points
Project identity - "Smithtown Crossing"	Each business on its own
Possibility of City assistance (e.g. T.I.F.)	Each owner on its own
Pedestrian access/circulation	Less attractive to pedestrians (crossing driveways and parking lots
Efficiency of landscaping	Each site on its own

Smithtown Crossing Redevelopment

Planning Issues

- Study Area Boundary
- Buffer
- Transition
- Buffer/Views
- Phases?
- Access
- Internal Circulation
  - veh.
  - ped.
- Access
- Future Development
- Land Use/ Zoning
- Ped. Connection

Gideon Glen
Tonka Bay
Shorewood Public Works
South Lake Public Safety
SouthShore Community Center
Badger Park
Smithtown Road
Country Club Rd
Co. Rd. 19
5660
5680
24620
24590
24560
24530
24470
24450
24250
24245
24275
24285
24305

0 60 120 240 Feet

Shorewood Planning Department
04/12

Figure 4

Redevelopment Guiding Principles

Having identified issues associated with the study area, it was determined that a clear picture of what the City hopes to see for the subject area should be formulated – for lack of a better term, we will use "redevelopment guiding principles". This is the point where we step back and view the area as we would like to see it, say in the next 10-15 years. The redevelopment guiding principles should be a positive expression of what the City wants, rather than a list of what we don't want to see.

The proposed redevelopment guiding principles starts with the Shorewood Comprehensive Plan, which identified an interest in the following:

- Unified/coordinated development; assembly of land parcels
- Planned unit development
- Possible mixed use – commercial/residential
- Opportunity for additional senior housing
- Predominant retail and office uses versus service commercial*

*Since this was written, the Planning Commission held a meeting with real estate development professionals, the consensus of whom indicated that there may not be a strong market for retail. It was suggested that a stronger market may exist for personal service commercial (i.e. banking, health and beauty services, etc.).

In addition to the above, the Planning Commission discussed other factors such as pedestrian/bicycle circulation and connectivity, architectural treatment (e.g. residential character and natural materials), natural landscaping, and compatibility with surrounding land use activities as parameters for the redevelopment of the area. From this, the following was derived:

Redevelopment Guiding Principles – Smithtown Crossing

1. The project will result in a unified/coordinated pattern of development.

2. The use or mixture of uses of property in the study area shall be based on market needs and analysis of detailed traffic study.

3. Site design should take advantage of views afforded by existing natural areas and parks.

4. Uses within the study area shall be arranged to create a transition between higher intensity commercial development and surrounding lower density housing. Any use of land not currently zoned for commercial development shall be limited in building height to 35 feet or two and a half stories. The westerly edge of the project area shall be densely landscaped to enhance the transition.

5. Any housing component should add to and enhance the variety of housing choices in the community.
6. Commercial activities should serve not only the residents of the project area, but the community as a whole.

7. Access to and egress from, and circulation within Smithtown Crossing must be pedestrian/bicycle friendly.

8. Useable, inviting outdoor spaces shall be integrated into the development.

9. Landscaping will be natural and substantial, diminishing parking lot massing and softening and framing buildings on the site.

10. Attractive and articulated architecture with pitched rooflines and natural materials will reflect the residential character and quality of the community.

11. Reduction of building mass may be achieved by using a combination of the following techniques:

    a. Variations in roofline and form.
    b. Use of ground level arcades and covered areas.
    c. Use of protected and recessed entries.
    d. Inclusion of windows on elevations facing streets and pedestrian areas.
    e. Retaining a clear distinction between roof, body and base of building.

Smithtown Crossing – Plan

From the very beginning of this study, it has been realized that properties within the study area may develop or redevelop individually. It is not the City's intent to stand in the way of property owners wishing to improve their land. Individual site development will be expected to adhere to the development regulations currently in place.

What is the intent of this study is to encourage a higher level of quality than might occur with piecemeal development under the current rules. In this regard, there are a number of ways that the City can reduce regulatory obstacles and even incite or reward development built to the higher standards envisioned by this study. The greater a project complies with the City's vision for the area, the greater the incentive with respect to zoning flexibility and even City participation in the project.

Zoning Parameters

With the exception of the public facilities located north of County Road 19 and the three residential properties in the study area, all of the subject lots are zoned C-1, General Commercial (see Figure 4). Individual lots must adhere to the standard of that zoning district, including height limitations. Any coordinated development of several or all of the subject properties should be done by Planned Unit Development (P.U.D.), using the C-1 District and the R-3B, Multiple-Family Residential District as the underlying standards for the project. Any use of currently zoned residential lots shall be residential with building heights not exceeding 35 feet and two and a half stories.

The single-family residential property on the north side of County Road 19 is surrounded by commercial development in Tonka Bay and public facilities (public works, police and fire). The City should be open to a rezoning of this site to R-C, Residential/Commercial.

Update Regulations

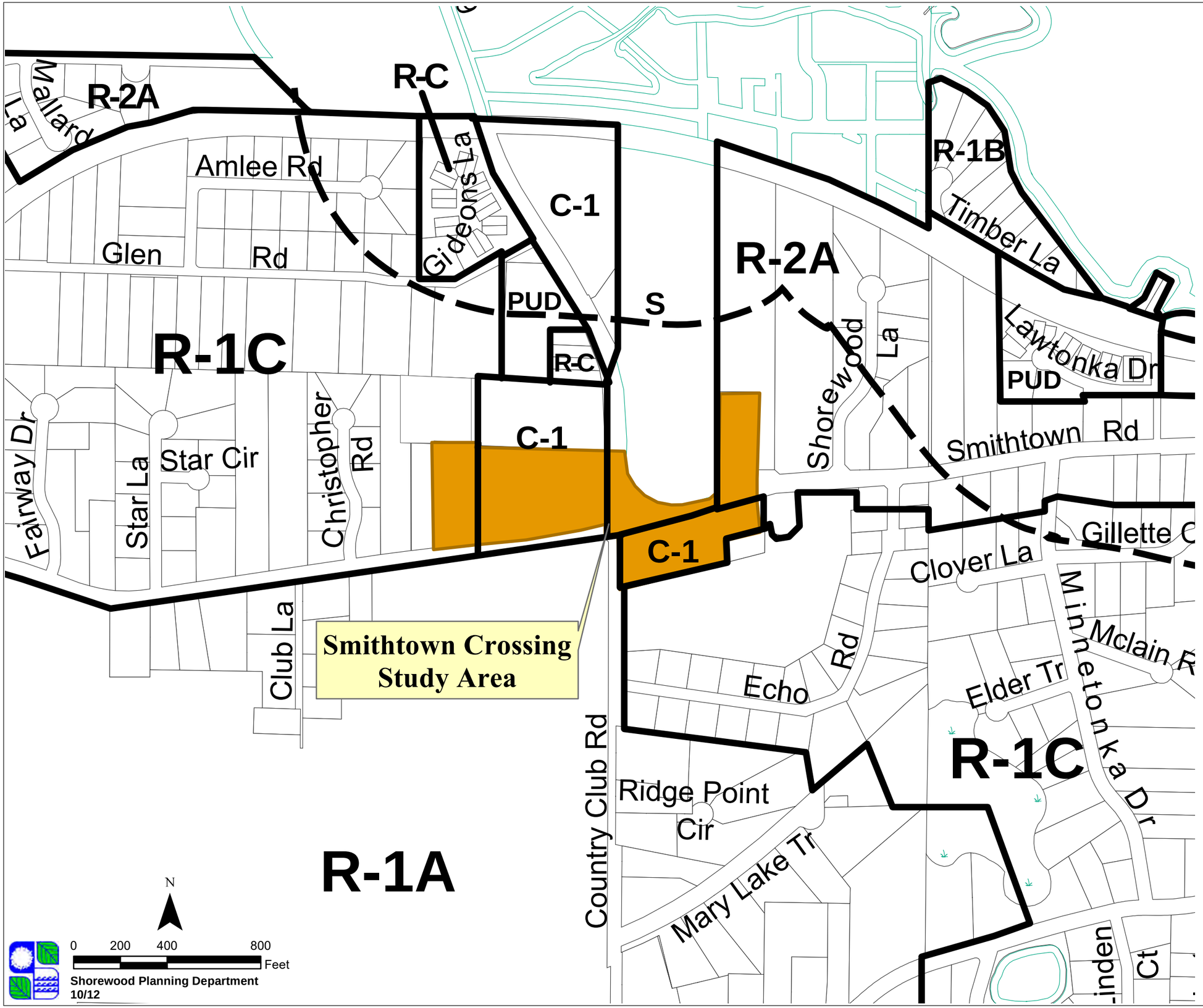
While the City's current P.U.D. provisions could be used to process a mixed use type of project, involving a mixture of commercial and residential development, it is recommended that the Shorewood Zoning Code be amended to specifically address mixed use. This update of the Code would include provisions tying flexibility and reward to the level of compliance with City's vision for the area. One such provision might include an allowance for additional building height based on architectural design and extent and type of landscaping. For certain types of housing in a mixed use project, higher densities than what current regulations allow might be considered where it could be demonstrated that the density would be compatible with surrounding uses and where resulting traffic volumes would not adversely affect existing streets. In this regard, a mixed use project would be required to submit a traffic study as part of its application submittals.

Design Criteria

Inherent to any mixed use development project is attention to pedestrian and bicycle circulation. Site planning should include both internal circulation as well as connections to existing and

Smithtown Crossing Redevelopment

Zoning Districts



RESIDENTIAL DISTRICTS

R-1A	*Single-Family (40,000 sq. ft.)*
R-1B	*Single-Family (30,000 sq. ft.)*
R-1C	*Single-Family (20,000 sq. ft.)*
R-1D	*Single-Family (10,000 sq. ft.)*
R-2A	*Single/Two-Family (20,000/30,000 sq. ft.)*
R-2B	*Single/Two-Family (15,000/20,000 sq. ft.)*
R-2C	*Single/Two-Family (10,000/15,000 sq.ft.)*
R-3A	*Two-Family/Multiple (20,000/30,000 sq. ft.)*
R-3B	*Two-Family/Multiple (15,000/20,000 sq. ft.)*

COMMERCIAL DISTRICTS

C-1	*General Commercial*
C-2	*Service Commercial*

SPECIAL DISTRICTS

L-R	*Lakeshore-Recreational*
PUD	*Planned Unit Development*
S	Shoreland
GD	*General Development*
RD	*Recreational Development*
NE	*Natural Environment*
* FL	*Fire Lane*

Figure 5

future trails and sidewalk systems. Sidewalks built with the reconstruction of the intersection in 2005 will ultimately provide connection with the LRT Trail to the north and to the City Hall/Badger Field complex south and east of the intersection. The County Road 19 Corridor Study illustrates an entire network of pedestrian/bicycle segments to the east of the study area. Smithtown Crossing should link to that system as well as extend west along Smithtown Road to the westerly extent of the project.

Landscaping has long been recognized as an effective means of creating buffers, diminishing the impact of building massing, enhancing architecture and screening and cooling of parking lots. The County Road 19 Corridor Study, adopted in 2003 sets forth concepts for streetscaping along the corridor as it passes through Shorewood. These concepts should be implemented on both the County Road 19 and Smithtown Road sides of the project, converging at the northwest corner of the intersection. This public right-of-way area should be redone and incorporated into the Smithtown Crossing design. Current landscape practice focuses on natural designs that require low to no maintenance, minimizing sprinkling and conserving water. Developers hoping to achieve additional density or building height will want to substantially exceed the minimum landscaping requirements currently found in the City's zoning regulations, both in terms of size and quantities of plant materials.

Example: Landscaping, screening/cooling parking lots

Example: Landscaping, public space

Site planning and landscaping for Smithtown Crossing should incorporate some sort of public space or common area that invites visitors to spend a little more time in the area, relaxing or connecting with others.

It is not the intent of this report to dictate a certain type of architecture. This does not, however, diminish the importance of this critical design element. Shorewood has in the past placed great value on buildings that are in keeping with the residential character of the community. While no formal definition of "residential character" exists, certain characteristics have been identified that begin to describe what the City is looking for. Well articulated buildings with pitched rooflines, tiered levels and interesting shadowing go far in mitigating the visual impact of larger, taller buildings. Similarly, features such as awnings, natural building materials, balconies and lighting help to diminish building masses and create a human scale for the project. And, as mentioned in the previous section, nothing does more to soften and enhance a building than landscaping.

Example: Architecture—pitched roofs, natural materials, shadow, articulation

At present, the C-1 zoning district allows buildings to be three stories or 40 feet in height, whichever is least. The visual impact of such a building can be mitigated by the means discussed above as well as by building placement on the property and use of the natural terrain. For example, the topography found in the northwest quadrant of the intersection may lend itself to partially below-grade levels or underground parking.

Example: Architecture—diminish visual impact of building height with construction materials, landscaping

Smithtown Crossing Redevelopment Concept

From the beginning of this study the City has deliberately avoided trying to dictate the design of the site or the buildings to be located within the project area. Rather, this plan is intended to convey the character of development the City wishes to see in the Study Area. During various public meetings at which the study was presented, it became clear that those interested in the project wanted more visual depictions of what was being described. Preceding pages include photographic examples of the types of buildings and landscaping the City desires. While no attempt has been made to produce an illustrative site plan for the Study Area, the Concept Sketch on the following page attempts to show the potential functional relationships of the various elements of future development.

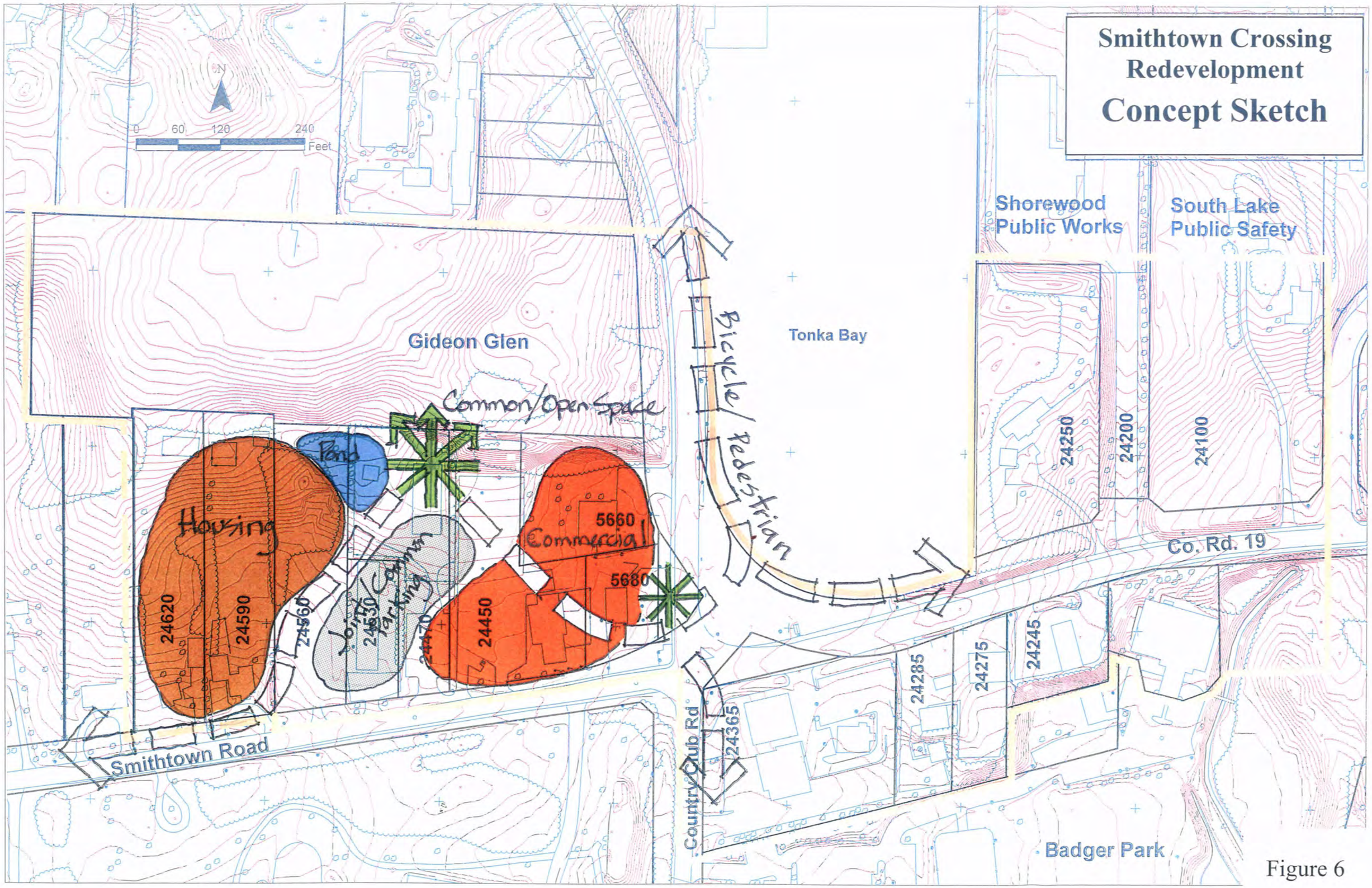

Smithtown Crossing
Redevelopment
Concept Sketch
N
0 60 120 240
Feet
Shorewood
Public Works
South Lake
Public Safety
Gideon Glen
Tonka Bay
Bicycle/Pedestrian
Common/Open Space
Pond
Housing
Commercial
Joint/Common Parking
5660
5680
24620
24590
24560
24530
24470
24450
24250
24200
24100
Co. Rd. 19
24285
24275
24245
24365
Country Club Rd
Smithtown Road
Badger Park

Figure 6

City Participation

While the plan for the redevelopment of Smithtown Crossing includes reducing regulatory obstacles, that alone may not be enough to entice the type of development envisioned in this study. Since the City's vision for the area requires development to substantially exceed current regulations (e.g. extra landscaping, architectural standards, acquisition and combination of land parcels), it will likely take some investment on the City's part. The greater the City's involvement, the greater say the City has in how the property develops. Following are possible ways in which the City can be involved.

Tax Increment Financing

Early on in the conversations about redeveloping the Smithtown Crossing area, tax increment financing (TIF) was mentioned as a possible tool for enticing developers to invest in a project. TIF is a financing tool that uses future gains in tax revenues to finance the cost of current improvements, including - in some cases- writing down the cost of land. Shorewood has used TIF successfully in the past when building the intersection at Old Market Road and Highway 7. In that case, the City opted for a "pay-as-you-go" method where any future risk is assumed by the developer. This is what is recommended for Smithtown Crossing. While there are projects done involving cities assuming some or all of the risk, this method is not recommended for the Smithtown Crossing redevelopment project.

Acquisition of Land

One of the most difficult obstacles to overcome in a redevelopment project is assembling land for a unified, cohesive development. It is strongly suggested that, as parcels within the redevelopment area become available on the market, the City consider acquiring them. These properties should be viewed as an investment in the redevelopment and could be sold to an ultimate developer "at cost" as a demonstration of the City's commitment to the project. This would also provide leverage toward the City having more input on the type, quality and design of the project.

Economic Development Authority

Shorewood already has an Economic Development Authority (EDA) which has been used successfully in the redevelopment of the property currently occupied by the South Lake Public Safety facility. The EDA can be useful with regard to tax increment financing as well as in the acquisition of property. Assisting in the correction of problem soils is yet another function of an EDA.

Appendix

Smithtown Crossing Planning Inventory.xls

Prop. Address	Owner	Use	Zoning	Area (Sq.Ft.)	Area (Ac.)	Land Val.	Struct. Val.	Tot. Val.	Notes
24620 Smithtown Rd	City of Shorewood	Vacant	R-1C	45731	1.05	$150,000		$150,000	
24590 Smithtown Rd	Hirsch	S.F. Res	R-1C	43303	0.99	$115,000	$186,000	$301,000	
24560 Smithtown Rd	American Legion	Vacant	C-1	42107	0.97	$200,000	n/a	$200,000	
24530 Smithtown Rd	Femrite	M.F. Res	C-1	14632	0.33	$90,000	$295,000	$385,000	Nonconforming use
24470 Smithtown Rd	Triple B Equities (Bury)	Auto Sales	C-1	41258	0.95	$410,000	$190,000	$600,000	Substandard building
24450 Smithtown Rd	American Legion	Bar/Rest.	C-1	51431	1.18	$264,000	$136,000	$400,000	
5680 County Rd 19	American Legion	Fuel Station	C-1	15804	0.36	$195,000	$105,000	$300,000	
5660 County Rd 19	HopHerr Props (Heartbr)	Ret./Office	C-1	31694	0.73	$355,000	$45,000	$400,000	
			Subtotals	285960	6.56	$1,744,000	$1,017,000	$2,761,000	
24365 Smithtown Rd	T C Stores (Oasis)	C Store/Fuel	C-1	62970	1.45	$770,000	$170,000	$940,000	
24285 Smithtown Rd	Moore	Auto Sales	C-1	18199	0.42	$171,000	$169,000	$340,000	
24275 Smithtown Rd	Howe	Auto Repair	C-1	17871	0.41	$166,000	$154,000	$320,000	
24245 Smithtown Rd	Wash N Roll	Car Wash	C-1	20218	0.46	$177,000	$138,000	$315,000	
			Subtotals	119258	2.74	$1,284,000	$631,000	$1,915,000	
24250 Smithtown Rd	Justinak	S.F.Res	R-2A	69154	1.59	$216,000	$243,000	$459,000	
24200 Smithtown Rd									

Smithtown Crossing Meetings

The Shorewood Planning Commission has spent many months preparing the Smithtown Crossing Redevelopment Study. Following is a list of Planning Commission meetings at which the Study was discussed. Some of the "milestone" meetings have been highlighted and summaries of selected meetings are provided below. It is worth noting that some of the early discussions referred to Planning District 3 from the Shorewood Comprehensive Plan.

February 17, 2009	
April 7, 2009	
January 19, 2010	
February 16, 2010	
March 2, 2010	
March 16, 2010	
April 6, 2010	Tax Increment Financing (T.I.F.)
April 20, 2010	Vision Statement
May 4, 2010	Joint Meeting with City Council
May 18, 2010	Meeting with Landowners *
June 29, 2010	Meeting with Developers (Forum) **
July 20, 2010	
August 17, 2010	Discussion of Mobile Tour ***
September 14, 2010	Mixed Use
February 15, 2011	
March 1, 2011	

*The Planning Commission met with a number of owners of land within the study area. The purpose of the meeting was to get feedback from them on issues related to redevelopment and to illustrate to them the advantages of a unified, cohesive redevelopment versus a piecemeal approach. The consensus of those attending the meeting appeared to agree with the direction the Commission was proposing.

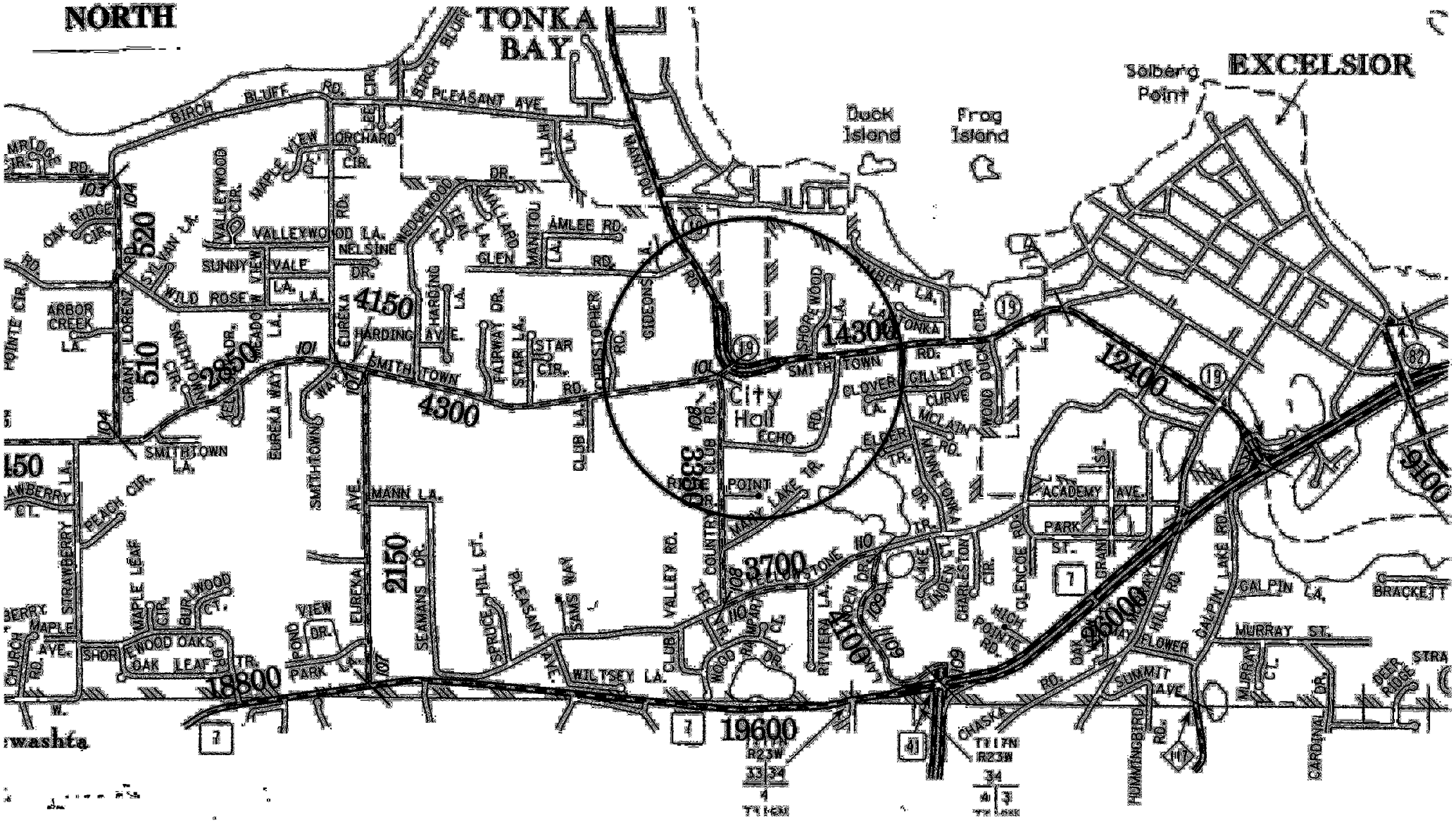
**Early on it was determined that input from people who actually do projects was important to the ultimate success of the project. A panel of development professionals was asked to comment on the Vision Statement and the concept drawings that had been reviewed by the Commission. The panel members all commented on the materials and then answered questions from the

Meetings (continued)

Commission. The general consensus of the panel was that Shorewood's development regulations are in need of revision in order to make a redevelopment project viable. Four key points were made:

1) The site is not well suited for retail commercial. Rather, some sort of service commercial development (e.g. banking, personal services, possibly office, etc.) should be expected.
2) The City should consider allowing something higher than the three stories allowed under the current regulations.
3) Whether the housing element was market or senior, Shorewood's current density limits are too low.
4) In this economy, redevelopment may not occur for some time.

***The Commission spent an evening visiting mixed use and senior housing projects. There was consensus that two projects in Golden Valley, Town Square and the Commons, contained elements that would be desirable for Smithtown Crossing. A mixed use redevelopment project in Glen Lake (Minnetonka) illustrated how the impact of building height could be mitigated with construction materials, siting, and landscaping. Some of the photographs used in this report came from the mobile tour.



2009 Traffic Volumes

Source: Minnesota Department of Transportation

APPENDIX E

Local Water Supply Plan

Local Water Supply Plan Template
Third Generation for 2016-2018

Revised April 10, 2017

Formerly called Water Emergency & Water Conservation Plan

DEPARTMENT OF NATURAL RESOURCES

Cover photo by Molly Shodeen

For more information on this Water Supply Plan Template, please contact the DNR Division of Ecological and Water Resources at (651) 259-5034 or (651) 259-5100.

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This information is available in an alternative format upon request.

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INTRODUCTION TO WATER SUPPLY PLANS (WSP)

Who needs to complete a Water Supply Plan

Public water suppliers serving more than 1,000 people, large private water suppliers in designated Groundwater Management Areas, and all water suppliers in the Twin Cities metropolitan area are required to prepare and submit a water supply plan.

The goal of the WSP is to help water suppliers: 1) implement long term water sustainability and conservation measures; and 2) develop critical emergency preparedness measures. Your community needs to know what measures will be implemented in case of a water crisis. A lot of emergencies can be avoided or mitigated if long term sustainability measures are implemented.

Groundwater Management Areas (GWMA)

The DNR has designated three areas of the state as Groundwater Management Areas (GWMAs) to focus groundwater management efforts in specific geographies where there is an added risk of overuse or water quality degradation. A plan directing the DNRs actions within each GWMA has been prepared. Although there are no specific additional requirements with respect to the water supply planning for communities within designated GWMAs, communities should be aware of the issues and actions planned if they are within the boundary of one of the GWMAs. The three GWMAs are the North and East Metro GWMA (Twin Cities Metro), the Bonanza Valley GWMA and the Straight River GWMA (near Park Rapids). Additional information and maps are included in the DNR Groundwater Management Areas webpage.

Benefits of completing a WSP

Completing a WSP using this template, fulfills a water supplier's statutory obligations under M.S. M.S.103G.291 to complete a water supply plan. For water suppliers in the metropolitan area, the WSP will help local governmental units to fulfill their requirements under M.S. 473.859 to complete a local comprehensive plan. Additional benefits of completing WSP template:

- The standardized format allows for quicker and easier review and approval
- Help water suppliers prepare for droughts and water emergencies.
- Create eligibility for funding requests to the Minnesota Department of Health (MDH) for the Drinking Water Revolving Fund.
- Allow water suppliers to submit requests for new wells or expanded capacity of existing wells.
- Simplify the development of county comprehensive water plans and watershed plans.
- Fulfill the contingency plan provisions required in the MDH wellhead protection and surface water protection plans.
- Fulfill the demand reduction requirements of Minnesota Statutes, section 103G.291 subd 3 and 4.

- Upon implementation, contribute to maintaining aquifer levels, reducing potential well interference and water use conflicts, and reducing the need to drill new wells or expand system capacity.
- Enable DNR to compile and analyze water use and conservation data to help guide decisions.
- Conserve Minnesota's water resources

If your community needs assistance completing the Water Supply Plan, assistance is available from your area hydrologist or groundwater specialist, the MN Rural Waters Association circuit rider program, or in the metropolitan area from Metropolitan Council staff. Many private consultants are also available.

WSP Approval Process

10 Basic Steps for completing a 10-Year Water Supply Plan

1. Download the DNR/Metropolitan Council Water Supply Plan Template from the DNR Water Supply Plan webpage.
2. Save the document with a file name with this naming convention: WSP_cityname_permitnumber_date.doc.
3. The template is a form that should be completed electronically.
4. Compile the required water use data (Part 1) and emergency procedures information (Part 2)
5. The Water Conservation section (Part 3) may need discussion with the water department, council, or planning commission, if your community does not already have an active water conservation program.
6. Communities in the seven-county Twin Cities metropolitan area should complete all the information discussed in Part 4. The Metropolitan Council has additional guidance information on their Water Supply webpage. All out-state water suppliers ***do not*** need to complete the content addressed in Part 4.
7. Use the Plan instructions and Checklist document from the DNR Water Supply Plan webpage to insure all data is complete and attachments are included. This will allow for a quicker approval process.
8. Plans should be submitted electronically using the MPARS website – no paper documents are required.
9. DNR hydrologist will review plans (in cooperation with Metropolitan Council in Metro area) and approve the plan or make recommendations.
10. Once approved, communities should complete a Certification of Adoption form, and send a copy to the DNR.

Complete Table 1 with information about the public water supply system covered by this WSP.

Table 1. General information regarding this WSP

Requested Information	Description
DNR Water Appropriation Permit Number(s)	**1974-5226**
Ownership	☒ Public or ☐ Private
Metropolitan Council Area	☒ Yes or ☐ No (and county name) – Hennepin County
Street Address	**5755 Country Club Road**
City, State, Zip	**Shorewood, MN, 55331**
Contact Person Name	Larry Brown, PE
Title	Public Works Director
Phone Number	952-474-3236
MDH Supplier Classification	Municipal

PART 1. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

The first step in any water supply analysis is to assess the current status of demand and availability. Information summarized in Part 1 can be used to develop Emergency Preparedness Procedures (Part 2) and the Water Conservation Plan (Part 3). This data is also needed to track progress for water efficiency measures.

A. Analysis of Water Demand

Complete Table 2 showing the past 10 years of water demand data.

- Some of this information may be in your Wellhead Protection Plan.
- If you do not have this information, do your best, call your engineer for assistance or if necessary leave blank.

If your customer categories are different than the ones listed in Table 2, please describe the differences below:

Table 2. Historic water demand (see definitions in the glossary after Part 4 of this template)

Year	Pop. Served	Total Connections	Residential Water Delivered (MG)	C/I/I Water Delivered (MG)	Agriculture Water Delivered (MG)	Total Water Delivered (MG)	Total Water Pumped (MG)	Water Supplier Services (WSS) (MG)	Percent Unmetered/ Unaccounted	Average Daily Demand (MGD)	Max. Daily Demand (MGD)	Date of Max. Demand	Residential Per Capita Demand (GPCD)	Total per capita Demand (GPCD)
2005	3,463	1,195	138.750	9.893	-	154.422	152.250	5.778	-	0.417	n/a	n/a	110	120
2006	3,423	1,195	163.364	27.866	-	191.230	180.059	-	-	0.493	n/a	n/a	131	144
2007	3,383	n/a	n/a	n/a	-	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a
2008	3,343	1,221	169.361	7.379	-	176.740	176.244	-	-	0.483	n/a	n/a	139	144
2009	3,751	1,320	161.274	9.415	-	170.690	177.666	-	3.93%	0.487	4.296	5/26/2009	118	130
2010	3,721	1,329	120.762	15.281	-	136.043	141.085	-	3.57%	0.387	0.617	7/16/2010	89	104
2011	3,721	1,332	141.162	10.695	-	162.709	164.404	10.852	1.03%	0.450	1.039	7/5/2011	104	121
2012	3,634	1,300	167.421	12.888	-	182.339	186.329	2.030	2.14%	0.510	1.396	7/11/2012	126	140
2013	3,562	1,374	142.013	12.025	-	156.013	156.013	1.975	0.00%	0.427	1.194	8/14/2013	109	120
2014	3,853	1,372	138.588	6.730	-	145.318	145.318	-	0.00%	0.398	1.404	8/7/2014	99	103
2015	3,865	1,388	110.807	5.481	2.465	130.238	133.228	11.484	2.24%	0.365	0.593	7/23/2015	79	94
2016	3,870	1,400	103.226	6.990	1.423	111.639	123.763	12.124	0.00%	0.339	0.853	8/3/2016	73	88
Avg. 2012-2016	3,757	1,367	132.411	8.823	1.944	145.109	148.930	6.903	0.88%	0.408	1.088	-	97	109

MG – Million Gallons **MGD –** Million Gallons per Day **GPCD** – Gallons per Capita per Day

See Glossary for definitions. A list of Acronyms and Initialisms can be found after the Glossary.

Complete Table 3 by listing the top 10 water users by volume, from largest to smallest. For each user, include information about the category of use (residential, commercial, industrial, institutional, or wholesale), the amount of water used in gallons per year, the percent of total water delivered, and the status of water conservation measures.

Table 3. Large volume users

Customer	Use Category (Residential, Industrial, Commercial, Institutional, Wholesale)	Amount Used (Gallons per Year)	Percent of Total Annual Water Delivered	Implementing Water Conservation Measures? (Yes/No/Unknown)
1. KRAUS-ANDERSON, INC.	COMMERCIAL	1,600,000	1.29%	UNKNOWN
2. CUB FOODS	COMMERCIAL	1,096,000	0.89%	UNKNOWN
3. MINNETONKA SCHOOL DISTRICT NO. 276	SCHOOL	1,052,900	0.85%	UNKNOWN
4. SHOREWOOD PONDS HOMEOWNERS ASSOCIATION	RESIDENTIAL	715,262	0.58%	UNKNOWN
5. SHOREWOOD OAKS PARTNERSHIP	RESIDENTIAL	677,000	0.55%	UNKNOWN
6. 28005 BOULDER BRIDGE DRIVE	RESIDENTIAL	540,512	0.44%	UNKNOWN
7. WATERFORD CENTER LLP	COMMERCIAL	504,000	0.41%	UNKNOWN
8. 5905 BOULDER BRIDGE LANE	RESIDENTIAL	485,291	0.39%	UNKNOWN
9. NEW HORIZON ACADEMY	COMMERCIAL	484,102	0.39%	UNKNOWN
10. 5960 BOULDER BRIDGE LANE	RESIDENTIAL	457,444	0.37%	UNKNOWN

B. Treatment and Storage Capacity

Complete Table 4 with a description of where water is treated, the year treatment facilities were constructed, water treatment capacity, the treatment methods (i.e. chemical addition, reverse osmosis, coagulation, sedimentation, etc.) and treatment types used (i.e. fluoridation, softening, chlorination, Fe/MN removal, coagulation, etc.). Also describe the annual amount and method of disposal of treatment residuals. Add rows to the table as needed.

Table 4. Water treatment capacity and treatment processes

Treatment Site ID (Plant Name or Well ID)	Year Constructed	Treatment Capacity (GPD)	Treatment Method	Treatment Type	Annual Volume of Residuals	Disposal Process for Residuals	Do You Reclaim Filter Backwash Water?
Well 1	1973	750	Chemical Addition	Chlorination, fluoridation	N/A	N/A	N/A
Well 3	1981	750	Chemical addition	Chlorination, fluoridation	N/A	N/A	N/A
Well 4	1981	500	Chemical addition	Chlorination, fluoridation	N/A	N/A	N/A
Well 5	1981	500	Chemical addition	Chlorination, fluoridation	N/A	N/A	N/A
Well 6	1982	100	Chemical addition	Chlorination, fluoridation	N/A	N/A	N/A
Well 7	1986	1,000	Chemical addition, Iron Filters	Chlorination, fluoridation, iron removal	N/A	N/A	N/A
Total	N/A	3,600	N/A	N/A	N/A	N/A	N/A

Complete Table 5 with information about storage structures. Describe the type (i.e. elevated, ground, etc.), the storage capacity of each type of structure, the year each structure was constructed, and the primary material for each structure. Add rows to the table as needed.

Table 5. Storage capacity, as of the end of the last calendar year

Structure Name	Type of Storage Structure	Year Constructed	Primary Material	Storage Capacity (Gallons)
West Water Tower	Elevated storage	1995	Steel	500,000
East Water Tower	Elevated storage	1986	Steel	400,000
Total	N/A	N/A	N/A	900,000

Treatment and storage capacity versus demand

It is recommended that total storage equal or exceed the average daily demand.

Discuss the difference between current storage and treatment capacity versus the water supplier's projected average water demand over the next 10 years (see Table 7 for projected water demand):

The City's distribution network has three separate systems: two major systems known as the West and East systems, and a smaller system in the center of the City that is serviced by the City of Chanhassen. Each major system has 3 production wells and 1 elevated storage tanks. The West system's elevated storage tank has an existing capacity of 500,000 gallons while the East system's elevated storage tank has an existing capacity of 400,000 gallons. It is recommended that a system's total storage capacity equal or exceed its average day demand. The West system's storage capacity of 500,000 gallons exceeds its projected 2040 average day demand of 203,000 gallons. The East system's storage capacity of 400,000 gallons also exceeds its projected 2040 average day demand of 229,000 gallons. Thus, both systems satisfy the storage recommendations individually.

It is generally recommended that a City's treatment or production capacity be equal to the maximum daily demand with the largest production well out of service (firm capacity). The West System's firm capacity is 1,000 gallons per minute (gpm) and the daily demand for this system is projected to reach a maximum of 341 gpm within the next ten years. The East System's firm capacity is 850 gpm and the daily demand for this system is projected to reach a maximum of 412 gpm within the next ten years. Thus, both systems satisfy the production capacity recommendations individually.

C. Water Sources

Complete Table 6 by listing all types of water sources that supply water to the system, including groundwater, surface water, interconnections with other water suppliers, or others. Provide the name of each source (aquifer name, river or lake name, name of interconnecting water supplier) and the Minnesota unique well number or intake ID, as appropriate. Report the year the source was installed or established and the current capacity. Provide information about the depth of all wells. Describe the status of the source (active, inactive, emergency only, retail/wholesale interconnection) and if the source facilities have a dedicated emergency power source. Add rows to the table as needed for each installation.

Include copies of well records and maintenance summary for each well that has occurred since your last approved plan in **Appendix 1.**

Table 6. Water sources and status

Resource Type (Groundwater, Surface water, Interconnection)	Resource Name	MN Unique Well # or Intake ID	Year Installed	Capacity (Gallons per Minute)	Well Depth (Feet)	Status of Normal and Emergency Operations (active, inactive, emergency only, retail/wholesale interconnection))	Does this Source have a Dedicated Emergency Power Source? (Yes or No)
Groundwater	Well 1	232331	1973	750	528	Active	No
Groundwater	Well 3	161414	1982	750	359	Active	No
Groundwater	Well 4	171020	1981	500	640	Active	No
Groundwater	Well 5	171023	1981	500	640	Active	No
Groundwater	Well 6	122298	1982	100	280	Active	No
Groundwater	Well 7	416160	1986	1,000	415	Active	No

Limits on Emergency Interconnections

Discuss any limitations on the use of the water sources (e.g. not to be operated simultaneously, limitations due to blending, aquifer recovery issues etc.) and the use of interconnections, including capacity limits or timing constraints (i.e. only 200 gallons per minute are available from the City of Prior Lake, and it is estimated to take 6 hours to establish the emergency connection). If there are no limitations, list none.

The City of Shorewood has explored a possible interconnection with the City of Excelsior and has identified potential locations for that interconnection.

D. Future Demand Projections – *Key Metropolitan Council Benchmark*

Water Use Trends

Use the data in Table 2 to describe trends in 1) population served; 2) total per capita water demand; 3) average daily demand; 4) maximum daily demand. Then explain the causes for upward or downward trends. For example, over the ten years has the average daily demand trended up or down? Why is this occurring?

Since 2005, the City has seen an 11% increase in the population served. Although the population served increased, the total per capita water demand decreased by over 21%, resulting in a 12.5% decrease in average daily demand. From 2010 to 2015, the maximum daily demand decreased by 3.5%. It is likely that improved appliances, reduced irrigation, general attitudes toward conservation, rainfall, and climate all play a role in these trends.

A total per capita water demand of 109 gallons per capita per day, calculated from the average 2012-2016 demand shown in Table 2, was used to project daily demands. A peaking factor of 2.6, which is the City's average 2012-2016 peaking factor, was applied to project maximum day demands through the year 2040. In ten years, the maximum day demand is expected to reach 1.12 MG. Daily demand (both average and maximum) is projected to increase linearly over the next ten years, due to an expected linear increase in population for the City of Shorewood through the planning period.

Use the water use trend information discussed above to complete Table 7 with projected annual demand for the next ten years. Communities in the seven-county Twin Cities metropolitan area must also include projections for 2030 and 2040 as part of their local comprehensive planning.

Projected demand should be consistent with trends evident in the historical data in Table 2, as discussed above. Projected demand should also reflect state demographer population projections and/or other planning projections.

Table 7. Projected annual water demand

Year	Projected Total Population	Projected Population Served	Projected Total Per Capita Water Demand (GPCD)	Projected Average Daily Demand (MGD)	Projected Maximum Daily Demand (MGD)	East System: Projected Maximum Demand (MGD)	West System: Projected Maximum Demand (MGD)
2018	7,621	3,890	109	0.424	1.102	0.593	0.466
2019	7,631	3,900	109	0.425	1.115	0.594	0.469
2020	7,641	3,910	109	0.426	1.108	0.594	0.472
2021	7,651	3,920	109	0.427	1.111	0.594	0.474
2022	7,661	3,930	109	0.428	1.114	0.594	0.477
2023	7,671	3,940	109	0.429	1.117	0.594	0.479
2024	7,681	3,950	109	0.431	1.119	0.595	0.482
2025	7,691	3,960	109	0.432	1.122	0.595	0.485
2030	7,741	4,010	109	0.437	1.136	0.596	0.498
2040	7,841	4,110	109	0.448	1.165	0.598	0.524

GPCD – Gallons per Capita per Day **MGD** – Million Gallons per Day

Projection Method

Describe the method used to project water demand, including assumptions for population and business growth and how water conservation and efficiency programs affect projected water demand:

Population projections in Table 7 were calculated using the Metropolitan Council estimated rate of growth through the year 2040 for the City of Shorewood and the known population and population served values from 2016. It is assumed that, as of 2016, any new population growth will be serviced by the municipal water system. A maximum day peaking factor of 2.6 and a total per capita water demand of 109 gallons per capita per day were determined from the City's historic water use data from 2012-2016.

It is important to note that there are several connections located in the south-central part of Shorewood that receive water from Chanhassen. The population served by these connections is estimated to be approximately 151. Given the peaking factor and the total per capita water demand used in this study, the connections supplied by Chanhassen require an estimated maximum day demand of 0.043 million gallons per day. This maximum demand flow was removed from the city-wide maximum demand displayed in Table 7 prior to distributing total maximum demand between the east and west systems.

Historical water pumping data was used to divide the existing maximum day demand between systems. Expected increase in maximum day demand through the year 2040 was assigned to each system based on the location of expected development or redevelopment in the City's Land Use Plan. The sum of the East and West System

demands is not equal to the total demand because of the small central system that is supplied by the City of Chanhassen.

E. Resource Sustainability

Monitoring – *Key DNR Benchmark*

Complete Table 8 by inserting information about source water quality and quantity monitoring efforts. The list should include all production wells, observation wells, and source water intakes or reservoirs. Groundwater level data for DNR's statewide network of observation wells are available online through the DNR's Cooperative Groundwater Monitoring (CGM) webpage.

Table 8. Information about source water quality and quantity monitoring

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
Well 1 - 232331	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☐ monthly ☐ quarterly ☒ annually	☐ SCADA ☒ grab sampling ☐ steel tape ☐ stream gauge
Well 3 - 161414	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☐ monthly ☐ quarterly ☒ annually	☐ SCADA ☒ grab sampling ☐ steel tape ☐ stream gauge
Well 4 - 171020	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☐ monthly ☐ quarterly ☒ annually	☐ SCADA ☒ grab sampling ☐ steel tape ☐ stream gauge
Well 5 - 171023	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☐ monthly ☐ quarterly ☒ annually	☐ SCADA ☒ grab sampling ☐ steel tape ☐ stream gauge
Well 6 - 122298	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☐ monthly ☐ quarterly ☒ annually	☐ SCADA ☒ grab sampling ☐ steel tape ☐ stream gauge

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
Well 7 - 416160	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☐ monthly ☐ quarterly ☒ annually	☐ SCADA ☒ grab sampling ☐ steel tape ☐ stream gauge

Water Level Data

A water level monitoring plan that includes monitoring locations and a schedule for water level readings must be submitted as **Appendix 2**. If one does not already exist, it needs to be prepared and submitted with the WSP. Ideally, all production and observation wells are monitored at least monthly.

Complete Table 9 to summarize water level data for each well being monitored. Provide the name of the aquifer and a brief description of how much water levels vary over the season (the difference between the highest and lowest water levels measured during the year) and the long-term trends for each well. If water levels are not measured and recorded on a routine basis, then provide the static water level when each well was constructed and the most recent water level measured during the same season the well was constructed. Also include all water level data taken during any well and pump maintenance. Add rows to the table as needed.

Groundwater hydrographs illustrate the historical record of aquifer water levels measured within a well and can indicate water level trends over time. For each well in your system, provide a hydrograph for the life of the well, or for as many years as water levels have been measured. Include the hydrographs in **Appendix 3**. An example of a hydrograph can be found on the DNR's Groundwater Hydrograph webpage. Hydrographs for DNR Observation wells can be found in the CGM discussed above.

Table 9. Water level data

Unique Well Number or Well ID	Aquifer Name	Seasonal Variation (Feet)	Long-term Trend in water level data	Water level measured during well/pumping maintenance
Well 1 - 232331	Prairie du Chien – Jordan	Monitoring pending	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
Well 3 - 161414	St. Peter – Jordan	Monitoring pending	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
Well 4 - 171020	Tunnel City - Wonewoc	Monitoring pending	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
Well 5 - 171023	Tunnel City – Wonewoc	Monitoring pending	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____

Unique Well Number or Well ID	Aquifer Name	Seasonal Variation (Feet)	Long-term Trend in water level data	Water level measured during well/pumping maintenance
Well 6 - 122298	Prairie Du Chien Group	Monitoring pending	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
Well 7 - 416160	Prairie Du Chien – Jordan	Monitoring pending	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY:____ MM/DD/YY:____ MM/DD/YY:____
DNR Observation Well: 27045 – unique no. 42150	Prairie du Chien - Jordan	Approx. 13-feet	☐ Falling ☒ Stable ☐ Rising	N/A

Potential Water Supply Issues & Natural Resource Impacts – *Key DNR & Metropolitan Council Benchmark*

Complete Table 10 by listing the types of natural resources that are or could potentially be impacted by permitted water withdrawals in the future. You do not need to identify every single water resource in your entire community. The goal is to help you triage the most important water resources and/or the water resources that may be impacted by your water supply system – perhaps during a drought or when the population has grown significantly in ten years. This is emerging science, so do the best you can with available data. For identified resources, provide the name of specific resources that may be impacted. Identify what the greatest risks to the resource are and how the risks are being assessed. Identify any resource protection thresholds – formal or informal – that have been established to identify when actions should be taken to mitigate impacts. Provide information about the potential mitigation actions that may be taken, if a resource protection threshold is crossed. Add additional rows to the table as needed. See the glossary at the end of the template for definitions.

Some of this baseline data should have been in your earlier water supply plans or county comprehensive water plans. When filling out this table, think of what are the water supply risks, identify the resources, determine the threshold and then determine what your community will do to mitigate the impacts.

Your DNR area hydrologist is available to assist with this table.

For communities in the seven-county Twin Cities metropolitan area, the Master Water Supply Plan *Appendix 1 (Water Supply Profiles)*, provides information about potential water supply issues and natural resource impacts for your community.

Steps for completing Table 10

1. ***Identify the potential for natural resource impacts/issues within the community***
   First, review available information to identify resources that may be impacted by the operation of your water supply system (such as pumping).
   Potential Sources of Information:
   - County Geologic Atlas
   - Local studies

- Metropolitan Council System Statement (for metro communities)
- Metropolitan Council Master Water Supply Plan (for metro communities)

ACTION: Check the resource type(s) that may be impacted in the column "Resource Type"

2. ***Identify where your water supply system is most likely to impact those resources (and vice versa).***

Potential Sources of Information:

- Drinking Water Supply Management Areas
- Geologic Atlas - Sensitivity
- If no WHPA or other information exists, consider rivers, lakes, wetlands and significant within 1.5 miles of wells; and calcareous fens and trout streams within 5 miles of wells

ACTION: Focus the rest of your work in these areas.

3. ***Within focus areas, identify specific features of value to the community***

You know your community best. What resources are important to pay attention to? It may be useful to check in with your community's planning and zoning staff and others.

Potential Sources of Information:

- Park plans
- Local studies
- Natural resource inventories
- Tourist attractions/recreational areas/valued community resource

ACTION: Identify specific features that the community prioritizes in the "Resource Name" column (for example: North Lake, Long River, Brook Trout Stream, or Green Fen). If, based on a review of available information, no features are likely to be at risk, note "None".

4. ***Identify what impact(s) the resource is at risk for***

Potential Sources of Information:

- Wellhead Protection Plan
- Water Appropriation Permit
- County Geologic Atlas
- MDH or PCA reports of the area
- Metropolitan Council System Statement (for metro communities)
- Metropolitan Council Master Water Supply Plan (for metro communities)

ACTION: Check the risk type in the column "Risk". If, based on a review of available information, no risk is identified, note "None anticipated".

5. ***Describe how the risk was assessed***

Potential Sources of Information:

- Local studies
- Monitoring data (community, WMO, DNR, etc.)
- Aquifer testing
- County Geologic Atlas or other hydrogeologic studies

- Regional or state studies, such as DNR's report 'Definitions and Thresholds for Negative Impacts to Surface Waters'
- Well boring logs

ACTION: Identify the method(s) used to identify the risk to the resource in the "Risk Assessed Through" column

6. ***Describe protection threshold/goals***

What is the goal, if any, for protecting these resources? For example, is there a lower limit on acceptable flow in a river or stream? Water quality outside of an accepted range? A lower limit on acceptable aquifer level decline at one or more monitoring wells? Withdrawals that exceed some percent of the total amount available from a source? Or a lower limit on acceptable changes to a protected habitat?

Potential Sources of Information:

- County Comprehensive Water Plans
- Watershed Plans or One Watershed/One Plan
- Groundwater or Aquifer Plans
- Metropolitan Master Plans
- DNR Thresholds study
- Community parks, open space, and natural resource plans

ACTION: Describe resource protection goals in the "Describe Resource Protection Threshold" column or reference an existing plan/document/webpage

7. ***If a goal/threshold should trigger action, describe the plan that will be implemented.***

Identify specific action, mitigation measures or management plan that the water supplier will implement, or refer to a partner's plan that includes actions to be taken.

Potential Sources of Information:

- County Comprehensive Water Plans
- Watershed Plans or One Watershed/One Plan
- Groundwater or Aquifer Plans
- Metropolitan Master Plans
- Studies such as DNR Thresholds study

ACTION: Describe the mitigation measure or management plan in the "Mitigation Measure or Management Plan" column.

8. ***Describe work to evaluate these risks going forward.***

For example, what is the plan to regularly check in to stay current on plans or new data?

Identify specific action that the water supplier will take to identify the creation of or change to goals/thresholds, or refer to a partner's plan that includes actions to be taken.

Potential Sources of Information:

- County Comprehensive Water Plans

- Watershed Plans or One Watershed/One Plan
- Groundwater or Aquifer Plans
- Metropolitan Master Plans
- Studies such as DNR Thresholds study

ACTION: Describe what will be done to evaluate risks going forward, including any changes to goals or protection thresholds in the "Describe how Changes to Goals are monitored" column.

Table 10. Natural resource impacts (*List specific resources in Appendix 12)

Resource Type	Resource Name	Risk	Risk Assessed Through *	Describe Resource Protection Threshold or Goal *	Mitigation Measures or Management Plan	Describe How Thresholds or Goals are Monitored
☐ River or stream	N/A	☐ None anticipated ☐ Flow/water level decline ☐ Degrading water quality trends ☐ Impacts on endangered, threatened, or special concern species habitat ☐ Other: _____	☐ Geologic atlas or other mapping ☐ Modeling ☐ Modeling ☐ Monitoring ☐ Aquifer testing ☐WRAPS or other watershed report ☐Proximity (<1.5 miles) ☐ Other: _____	☐ Not applicable ☐ Additional data is needed to establish ☐ See report: _____ ☐ No data available ☐ Other: _____	☐Not applicable ☐ Change groundwater pumping ☐ Increase conservation ☐ Other: _____	☐Not applicable ☐ Newly collected data will be analyzed ☐ Regular check-in with these partners: _____ ☐ Other: _____
☐ Calcareous fen	N/A	☐ None anticipated ☐ Flow/water level decline ☐ Degrading water quality trends ☐ Impacts on endangered, threatened, or special concern species habitat ☐ Other: _____	☐ Geologic atlas or other mapping ☐ Modeling ☐ Modeling ☐ Monitoring ☐ Aquifer testing ☐WRAPS or other watershed Report ☐Proximity (<5 miles) ☐ Other: _____ ☐ Other: ___	☐ Not applicable ☐ Additional data is needed to establish ☐ See report: _____ ☐ Other: _____	☐Not applicable ☐ Change groundwater pumping ☐ Increase conservation ☐ Other: _____	☐Not applicable ☐ Newly collected data will be analyzed ☐ Regular check-in with these partners: _____ ☐ Other: _____

Resource Type	Resource Name	Risk	Risk Assessed Through *	Describe Resource Protection Threshold or Goal *	Mitigation Measures or Management Plan	Describe How Thresholds or Goals are Monitored
☒ Lake	Lake Minnetonka and Lake Christmas	☐ None anticipated ☐ Flow/water level decline ☒ Degrading water quality trends ☐ Impacts on endangered, threatened, or special concern species habitat ☐ Other: _____	☐ Geologic atlas or other mapping ☐ Modeling ☐ Modeling ☒ Monitoring ☐ Aquifer testing ☐WRAPS or other watershed report ☐Proximity (<1.5 miles) ☐ Other: _____ ☐ Other: ___	☐ Not applicable ☐ Additional data is needed to establish ☒ See report: Surface Water Management Plan ☐ Other: _____	☐Not applicable ☐ Change groundwater pumping ☒ Increase conservation ☐ Other: _____	☐Not applicable ☒ Newly collected data will be analyzed ☐ Regular check-in with these partners: _____ ☐ Other: _____
☐ Wetland	N/A	☐ None anticipated ☐ Flow/water level decline ☐ Degrading water quality trends ☐ Impacts on endangered, threatened, or special concern species habitat ☐ Other: _____	☐ Geologic atlas or other mapping ☐ Modeling ☐ Modeling ☐ Monitoring ☐ Aquifer testing ☐WRAPS or other watershed report ☐Proximity (<1.5 miles) ☐ Other: _____	☐ Not applicable ☐ Additional data is needed to establish ☐ See report: _____ ☐ Other: _____	☐Not applicable ☐ Change groundwater pumping ☐ Increase conservation ☐ Other: _____	☐Not applicable ☐ Newly collected data will be analyzed ☐ Regular check-in with these partners: _____ ☐ Other: _____

Resource Type	Resource Name	Risk	Risk Assessed Through *	Describe Resource Protection Threshold or Goal *	Mitigation Measures or Management Plan	Describe How Thresholds or Goals are Monitored
☐ Trout stream	N/A	☐ None anticipated ☐ Flow/water level decline ☐ Degrading water quality trends ☐ Impacts on endangered, threatened, or special concern species habitat ☐ Other: _____	☐ Geologic atlas or other mapping ☐ Modeling ☐ Monitoring ☐ Aquifer testing ☐WRAPS or other watershed report ☐Proximity (< 5 miles) ☐ Other: _____	☐ Not applicable ☐ Additional data is needed to establish ☐ See report: _____ ☐ Other: _____	☐Not applicable ☐ Change groundwater pumping ☐ Increase conservation ☐ Other: _____	☐Not applicable ☐ Newly collected data will be analyzed ☐ Regular check-in with these partners: _____ ☐ Other: _____
☒ Aquifer	Prairie Du Chien – Jordan	☐ None anticipated ☒ Flow/water level decline ☐ Degrading water quality trends ☐ Impacts on endangered, threatened, or special concern species habitat ☐ Other: _____	☐ Geologic atlas or other mapping ☐ Modeling ☒ Monitoring ☐ Aquifer testing ☐Proximity (obwell < 5 miles) ☐ Other: _____	☐ Not applicable ☒ Additional data is needed to establish ☐ See report: _____ ☐ Other: _____	☐Not applicable ☐ Change groundwater pumping ☒ Increase conservation ☐ Other: _____	☐Not applicable ☒ Newly collected data will be analyzed ☐ Regular check-in with these partners: _____ ☐ Other: _____

Wellhead Protection (WHP) and Source Water Protection (SWP) Plans

Complete Table 11 to provide status information about WHP and SWP plans.

The emergency procedures in this plan are intended to comply with the contingency plan provisions required in the Minnesota Department of Health's (MDH) Wellhead Protection (WHP) Plan and Surface Water Protection (SWP) Plan.

Table 11. Status of Wellhead Protection and Source Water Protection Plans

Plan Type	Status	Date Adopted	Date for Update
WHP	☐ In Process ☒ Completed ☐ Not Applicable	December 2015	December 2025
SWP	☐ In Process ☐ Completed ☒ Not Applicable	N/A	N/A

WHP – Wellhead Protection Plan **SWP** – Source Water Protection Plan

F. Capital Improvement Plan (CIP)

Please note that any wells that received approval under a ten-year permit, but that were not built, are now expired and must submit a water appropriations permit.

Adequacy of Water Supply System

Complete Table 12 with information about the adequacy of wells and/or intakes, storage facilities, treatment facilities, and distribution systems to sustain current and projected demands. List planned capital improvements for any system components, in chronological order. Communities in the seven-county Twin Cities metropolitan area should also include information about plans through 2040.

The assessment can be the general status by category; it is not necessary to identify every single well, storage facility, treatment facility, lift station, and mile of pipe.

Please attach your latest Capital Improvement Plan as **Appendix 4**.

Table 12. Adequacy of Water Supply System

System Component	Planned action	Anticipated Construction Year	Notes
Wells/Intakes	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	2018, 2019, 2020	Well Controls, Water Meters, Well Motors and controls, Well Dehumidifier.
Water Storage Facilities	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Water Treatment Facilities	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Distribution Systems (Pipes, valves, etc.)	☐ No action planned - adequate ☒ Repair/replacement ☒ Expansion/addition	2018	Water main maintenance and expansion

System Component	Planned action	Anticipated Construction Year	Notes
Pressure Zones	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Other:	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		

Proposed Future Water Sources

Complete Table 13 to identify new water source installation planned over the next ten years. Add rows to the table as needed.

Table 13. Proposed future installations/sources

Source	Installation Location (approximate)	Resource Name	Proposed Pumping Capacity (gpm)	Planned Installation Year	Planned Partnerships
Groundwater	N/A				
Surface Water	N/A				
Interconnection to another supplier	Beehrle Ave & Oak St, Excelsior Blvd & Christmas Lake Rd	Excelsior Interconnection	TBD	TBD	City of Excelsior

Water Source Alternatives - *Key Metropolitan Council Benchmark*

Do you anticipate the need for alternative water sources in the next 10 years? Yes ☐ No ☒

For metro communities, will you need alternative water sources by the year 2040? Yes ☐ No ☒

If you answered yes for either question, then complete table 14. If no, insert NA.

Complete Table 14 by checking the box next to alternative approaches that your community is considering, including approximate locations (if known), the estimated amount of future demand that could be met through the approach, the estimated timeframe to implement the approach, potential partnerships, and the major benefits and challenges of the approach. Add rows to the table as needed.

For communities in the seven-county Twin Cities metropolitan area, these alternatives should include approaches the community is considering to meet projected 2040 water demand.

Table 14. Alternative water sources

Alternative Source Considered	Source and/or Installation Location (approximate)	Estimated Amount of Future Demand (%)	Timeframe to Implement (YYYY)	Potential Partners	Benefits	Challenges
☐ Groundwater	N/A					

Alternative Source Considered	Source and/or Installation Location (approximate)	Estimated Amount of Future Demand (%)	Timeframe to Implement (YYYY)	Potential Partners	Benefits	Challenges
☐ Surface Water	N/A					
☐ Reclaimed stormwater	N/A					
☐ Reclaimed wastewater	N/A					
☐ Interconnection to another supplier	N/A					

PART 2. EMERGENCY PREPAREDNESS PROCEDURES

The emergency preparedness procedures outlined in this plan are intended to comply with the contingency plan provisions required by MDH in the WHP and SWP. Water emergencies can occur as a result of vandalism, sabotage, accidental contamination, mechanical problems, power failings, drought, flooding, and other natural disasters. The purpose of emergency planning is to develop emergency response procedures and to identify actions needed to improve emergency preparedness. In the case of a municipality, these procedures should be in support of, and part of, an all-hazard emergency operations plan. Municipalities that already have written procedures dealing with water emergencies should review the following information and update existing procedures to address these water supply protection measures.

A. Emergency Response Plan

Section 1433(b) of the Safe Drinking Water Act, (Public Law 107-188, Title IV- Drinking Water Security and Safety) requires community water suppliers serving over 3,300 people to prepare an Emergency Response Plan. MDH recommends that Emergency Response Plans are updated annually.

Do you have an Emergency Response Plan? Yes ☒ No ☐

Have you updated the Emergency Response Plan in the last year? Yes ☐ No ☒

When did you last update your Emergency Response Plan? 2011

Complete Table 15 by inserting the noted information regarding your completed Emergency Response Plan.

Table 15. Emergency Response Plan contact information

Emergency Response Plan Role	Contact Person	Contact Phone Number	Contact Email
Emergency Response Lead	Larry Brown	lbrown@shorewoodpw.com	952.960.7913

B. Operational Contingency Plan

All utilities should have a written operational contingency plan that describes measures to be taken for water supply mainline breaks and other common system failures as well as routine maintenance.

Do you have a written operational contingency plan? Yes ☒ No ☐

At a minimum, a water supplier should prepare and maintain an emergency contact list of contractors and suppliers.

C. Emergency Response Procedures

Water suppliers must meet the requirements of MN Rules 4720.5280. Accordingly, the Minnesota Department of Natural Resources (DNR) requires public water suppliers serving more than 1,000 people to submit Emergency and Conservation Plans. Water emergency and conservation plans that have been approved by the DNR, under provisions of Minnesota Statute 186 and Minnesota Rules, part 6115.0770, will be considered equivalent to an approved WHP contingency plan.

Emergency Telephone List

Prepare and attach a list of emergency contacts, including the MN Duty Officer (1-800-422-0798), as **Appendix 5**. An Emergency Contact List template is available at the MnDNR Water Supply Plans webpage.

The list should include key utility and community personnel, contacts in adjacent water suppliers, and appropriate local, state and federal emergency contacts. Please be sure to verify and update the contacts on the emergency telephone list and date it. Thereafter, update on a regular basis (once a year is recommended). In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the Emergency Manager for that community. Responsibilities and services for each contact should be defined.

Current Water Sources and Service Area

Quick access to concise and detailed information on water sources, water treatment, and the distribution system may be needed in an emergency. System operation and maintenance records should be maintained in secured central and back-up locations so that the records are accessible for emergency purposes. A detailed map of the system showing the treatment plants, water sources, storage facilities, supply lines, interconnections, and other information that would be useful in an emergency should also be readily available. It is critical that public water supplier representatives and emergency response personnel communicate about the response procedures and be able to easily obtain this kind of information both in electronic and hard copy formats (in case of a power outage).

Do records and maps exist? Yes ☒ No ☐

Can staff access records and maps from a central secured location in the event of an emergency?

Yes ☒ No ☐

Does the appropriate staff know where the materials are located?

Yes ☒ No ☐

Procedure for Augmenting Water Supplies

Complete Tables 16 – 17 by listing all available sources of water that can be used to augment or replace existing sources in an emergency. Add rows to the tables as needed.

In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the warning point for that community. Municipalities are encouraged to execute cooperative agreements for potential emergency water services and copies should be included in **Appendix 6**. Outstate Communities may consider using nearby high capacity wells (industry, golf course) as emergency water sources.

WSP should include information on any physical or chemical problems that may limit interconnections to other sources of water. Approvals from the MDH are required for interconnections or the reuse of water.

Table 16. Interconnections with other water supply systems to supply water in an emergency

Other Water Supply System Owner	Capacity (GPM & MGD)	Note Any Limitations On Use	List of services, equipment, supplies available to respond
City of Minnetonka (at Vinehill and Shady hills rd.	1,000 gpm	Emergency Use Only	Interconnect
City of Minnetonka (at Vinehill @ waterford place)	1,000 gpm	Emergency Use Only	Interconnect
City of Chanhassen (at Silver Lake Trail)	1,000 gpm	Emergency Use Only	Interconnect
City of Victoria (at Smithtown Road)	1,000 gpm	Emergency Use Only	Interconnect
City of Tonka Bay (at CSAH 19 and Glen Rd.)	1,000 gpm	Emergency Use Only	Interconnect
City of Tonka Bay (200' east of CSAH 19 and Smithtown Road)	1,000 gpm	Emergency Use Only	Interconnect

GPM – Gallons per minute **MGD** – million gallons per day

Table 17. Utilizing surface water as an alternative source

Surface Water Source Name	Capacity (GPM)	Capacity (MGD)	Treatment Needs	Note Any Limitations On Use
Insert name of surface water source here	N/A			
Add rows as needed	N/A			

If not covered above, describe additional emergency measures for providing water (obtaining bottled water, or steps to obtain National Guard services, etc.)

In the event that interconnections with surrounding cities cannot be used during the emergency, the City would obtain and distribute bottled water in the case of a short-term emergency. For a long-term emergency, bulk water distribution would be set up at public facilities.

Allocation and Demand Reduction Procedures

Complete Table 18 by adding information about how decisions will be made to allocate water and reduce demand during an emergency. Provide information for each customer category, including its priority ranking, average day demand, and demand reduction potential for each customer category. Modify the customer categories as needed, and add additional lines if necessary.

Water use categories should be prioritized in a way that is consistent with Minnesota Statutes 103G.261 (#1 is highest priority) as follows:

1. Water use for human needs such as cooking, cleaning, drinking, washing and waste disposal; use for on-farm livestock watering; and use for power production that meets contingency requirements.
2. Water use involving consumption of less than 10,000 gallons per day (usually from private wells or surface water intakes)
3. Water use for agricultural irrigation and processing of agricultural products involving consumption of more than 10,000 gallons per day (usually from private high-capacity wells or surface water intakes)
4. Water use for power production above the use provided for in the contingency plan.
5. All other water use involving consumption of more than 10,000 gallons per day.
6. Nonessential uses – car washes, golf courses, etc.

Water used for human needs at hospitals, nursing homes and similar types of facilities should be designated as a high priority to be maintained in an emergency. Lower priority uses will need to address water used for human needs at other types of facilities such as hotels, office buildings, and manufacturing plants. The volume of water and other types of water uses at these facilities must be carefully considered. After reviewing the data, common sense should dictate local allocation priorities to protect domestic requirements over certain types of economic needs. Water use for lawn sprinkling, vehicle washing, golf courses, and recreation are legislatively considered non-essential.

Table 18. Water use priorities

Customer Category	Allocation Priority	Average Daily Demand (GDP)	Short-Term Emergency Demand Reduction Potential (GPD)
Residential	1	357,500	*
Commercial	2	22,100	*
Irrigation	3	6,800	*
Non-Essential	4		263,500
TOTAL	NA	386,400	263,500

GPD – Gallons per Day; 2013-2015 Water Use Data; *Non-essential calculated as increased summer demand between all customer categories

Tip: Calculating Emergency Demand Reduction Potential

The emergency demand reduction potential for all uses will typically equal the difference between maximum use (summer demand) and base use (winter demand). In extreme emergency situations, lower priority water uses must be restricted or eliminated to protect priority domestic water requirements. Emergency demand reduction potential should be based on average day demands for customer categories within each priority class. Use the tables in Part 3 on water conservation to help you determine strategies.

Complete Table 19 by selecting the triggers and actions during water supply disruption conditions.

Table 19. Emergency demand reduction conditions, triggers and actions (Select all that may apply and describe)

Emergency Triggers	Short-term Actions	Long-term Actions

Emergency Triggers	Short-term Actions	Long-term Actions
☒ Contamination ☒ Loss of production ☒ Infrastructure failure ☒ Executive order by Governor ☐ Other: _____	☒ Supply augmentation through interconnection ☒ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☒ Water allocation through emergency action of City Council ☐ Meet with large water users to discuss their contingency plan.	☒ Supply augmentation through interconnection ☒ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☒ Water allocation through emergency action of City Council ☒ Meet with large water users to discuss their contingency plan.

Notification Procedures

Complete Table 20 by selecting trigger for informing customers regarding conservation requests, water use restrictions, and suspensions; notification frequencies; and partners that may assist in the notification process. Add rows to the table as needed.

Table 20. Plan to inform customers regarding conservation requests, water use restrictions, and suspensions

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
☒ Short-term demand reduction declared (< 1 year)	☒ Website ☐ Email list serve ☒ Social media (e.g. Twitter, Facebook) ☒ Direct customer mailing, ☒ Press release (TV, radio, newspaper), ☐ Meeting with large water users (> 10% of total city use) ☐ Other: _____	☐ Daily ☐ Weekly ☒ Monthly ☐ Annually	City staff; Neighboring communities; Local news outlets
☒ Long-term Ongoing demand reduction declared	☒ Website ☐ Email list serve ☒ Social media (e.g. Twitter, Facebook) ☒ Direct customer mailing, ☒ Press release (TV, radio, newspaper), ☐ Meeting with large water users (> 10% of total city use) ☐ Other: _____	☐ Daily ☐ Weekly ☐ Monthly ☒ Annually	City staff; Neighboring communities; Local news outlets
☒ Governor's critical water deficiency declared	☒ Website ☐ Email list serve ☒ Social media (e.g. Twitter, Facebook) ☒ Direct customer mailing,	☐ Daily ☐ Weekly ☐ Monthly ☐ Annually ☒ As needed	City staff; Neighboring communities; Local news outlets

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
	☒ Press release (TV, radio, newspaper), ☐ Meeting with large water users (> 10% of total city use) ☐ Other: _____		

Enforcement

Prior to a water emergency, municipal water suppliers must adopt regulations that restrict water use and outline the enforcement response plan. The enforcement response plan must outline how conditions will be monitored to know when enforcement actions are triggered, what enforcement tools will be used, who will be responsible for enforcement, and what timelines for corrective actions will be expected.

Affected operations, communications, and enforcement staff must then be trained to rapidly implement those provisions during emergency conditions.

Important Note:

Disregard of critical water deficiency orders, even though total appropriation remains less than permitted, is adequate grounds for immediate modification of a public water supply authority's water use permit (2013 MN Statutes 103G.291)

Does the city have a critical water deficiency restriction/official control in place that includes provisions to restrict water use and enforce the restrictions? (This restriction may be an ordinance, rule, regulation, policy under a council directive, or other official control) Yes ☒ No ☐

If yes, attach the official control document to this WSP as **Appendix 7**.

If no, the municipality must adopt such an official control within 6 months of submitting this WSP and submit it to the DNR as an amendment to this WSP.

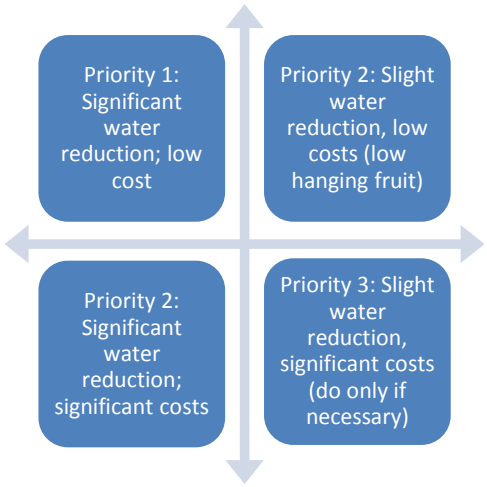
Irrespective of whether a critical water deficiency control is in place, does the public water supply utility, city manager, mayor, or emergency manager have standing authority to implement water restrictions? Yes ☒ No ☐

If yes, cite the regulatory authority reference: City Code, Chapter 602 – Emergency Management.

If no, who has authority to implement water use restrictions in an emergency?

PART 3. WATER CONSERVATION PLAN

Minnesotans have historically benefited from the state's abundant water supplies, reducing the need for conservation. There are however, limits to the available supplies of water and increasing threats to the quality of our drinking water. Causes of water supply limitation may include: population increases, economic trends, uneven statewide availability of groundwater, climatic changes, and degraded water quality. Examples of threats to drinking water quality include: the presence of contaminant plumes from past land use activities, exceedances of water quality standards from natural and human sources, contaminants of emerging concern, and increasing pollutant trends from nonpoint sources.



There are many incentives for conserving water; conservation:

- reduces the potential for pumping-induced transfer of contaminants into the deeper aquifers, which can add treatment costs
- reduces the need for capital projects to expand system capacity
- reduces the likelihood of water use conflicts, like well interference, aquatic habitat loss, and declining lake levels
- conserves energy, because less energy is needed to extract, treat and distribute water (and less energy production also conserves water since water is used to produce energy)
- maintains water supplies that can then be available during times of drought

It is therefore imperative that water suppliers implement water conservation plans. The first step in water conservation is identifying opportunities for behavioral or engineering changes that could be made to reduce water use by conducting a thorough analysis of:

- Water use by customer
- Extraction, treatment, distribution and irrigation system efficiencies
- Industrial processing system efficiencies
- Regulatory and barriers to conservation
- Cultural barriers to conservation
- Water reuse opportunities

Once accurate data is compiled, water suppliers can set achievable goals for reducing water use. A successful water conservation plan follows a logical sequence of events. The plan should address both conservation on the supply side (leak detection and repairs, metering), as well as on the demand side (reductions in usage). Implementation should be conducted in phases, starting with the most obvious and lowest-cost options. In some cases, one of the early steps will be reviewing regulatory constraints to water conservation, such as lawn irrigation requirements. Outside funding and grants may be available for implementation of projects. Engage water system operators and maintenance staff and customers in brainstorming opportunities to reduce water use. Ask the question: "How can I help save water?"

Progress since 2006

Is this your community's first Water Supply Plan? Yes ☐ No ☒

If yes, describe conservation practices that you are already implementing, such as: pricing, system improvements, education, regulation, appliance retrofitting, enforcement, etc.

If no, complete Table 21 to summarize conservation actions taken since the adoption of the 2006 water supply plan.

Table 21. Implementation of previous ten-year Conservation Plan

2006 Plan Commitments	Action Taken?
Change water rates structure to provide conservation pricing	☒ Yes ☐ No
Water supply system improvements (e.g. leak repairs, valve replacements, etc.)	☒ Yes ☐ No
Educational efforts	☒ Yes ☐ No
New water conservation ordinances	☐ Yes ☒ No
Rebate or retrofitting Program (e.g. for toilet, faucets, appliances, showerheads, dish washers, washing machines, irrigation systems, rain barrels, water softeners, etc.	☐ Yes ☒ No
Enforcement	☒ Yes ☐ No
Describe other	☐ Yes ☐ No

What are the results you have seen from the actions in Table 21 and how were results measured?

Although the City has not conduced a water audit in recent years, the City has seen a trend in per capita water use over the past decade likely occurring due to conservation actions taken by the City and its habitants.

A. Triggers for Allocation and Demand Reduction Actions

Complete table 22 by checking each trigger below, as appropriate, and the actions to be taken at various levels or stages of severity. Add in additional rows to the table as needed.

Table 22. Short and long-term demand reduction conditions, triggers and actions

Objective	Triggers	Actions
Protect surface water flows	☐ Low stream flow conditions ☒ Reports of declining wetland and lake levels ☐ Other: _____	☒ Increase promotion of conservation measures ☒ Other: consider water reuse/stormwater irrigation projects
Short-term demand reduction (less than 1 year	☒ Extremely high seasonal water demand (more than double winter demand) ☒ Loss of treatment capacity ☒ Lack of water in storage ☒ State drought plan ☒ Well interference ☐ Other: _____	☒ Adopt (if not already) and enforce the critical water deficiency ordinance to restrict or prohibit lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☒ Supply augmentation through emergency interconnection ☒ Water allocation through emergency interconnection ☐ Meet with large water users to discuss user's contingency plan.
Long-term demand reduction (>1 year)	☒ Per capita demand increasing ☐ Total demand increase (higher population or more industry). Water level in well(s) below elevation of _____ ☒ Other: Declared emergency	☒ Develop a critical water deficiency ordinance that is or can be quickly adopted to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☒ Enact a water waste ordinance that targets overwatering (causing water to flow off the landscape into streets, parking lots, or similar), watering impervious surfaces (streets, driveways or other hardscape areas), and negligence of known leaks, breaks, or malfunctions. ☐ Meet with large water users to discuss user's contingency plan. ☒ Enhanced monitoring and reporting: audits, meters, billing, etc.
Governor's "Critical Water Deficiency Order" declared	☒ Describe: Governor Declaration as needed	☒ Describe: take action as directed by the governor

B. Conservation Objectives and Strategies – *Key benchmark for DNR*

This section establishes water conservation objectives and strategies for eight major areas of water use.

Objective 1: Reduce Unaccounted (Non-Revenue) Water loss to Less than 10%

The Minnesota Rural Water Association, the Metropolitan Council and the Department of Natural Resources recommend that all water uses be metered. Metering can help identify high use locations and times, along with leaks within buildings that have multiple meters.

It is difficult to quantify specific unmetered water use such as that associated with firefighting and system flushing or system leaks. Typically, water suppliers subtract metered water use from total water pumped to calculate unaccounted or non-revenue water loss.

Is your five-year average (2005-2014) unaccounted Water Use in Table 2 higher than 10%?

Yes ☐ No ☒

What is your leak detection monitoring schedule? (e.g. Monitor 1/3rd of the city lines per year)

A full-system leak survey is completed every year.

Water Audits - are designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. The American Water Works Association (AWWA) has a recommended water audit methodology which is presented in AWWA's M36 Manual of Water Supply Practices: Water Audits and Loss Control Programs. AWWA also provides a free spreadsheet-based water audit tool that water suppliers can use to conduct their own water audits. This free water audit tool can be found on AWWA's Water Loss Control webpage. Another resource for water audit and water loss control information is Minnesota Rural Water Association.

What is the date of your most recent water audit? Unknown

Frequency of water audits: ☐ **yearly** ☒ **other (specify frequency)** As needed

Leak detection and survey: ☒ **every year** ☐ **every other year** ☐ **periodic as needed**
Year last leak detection survey completed: 2017

If Table 2 shows annual water losses over 10% or an increasing trend over time, describe what actions will be taken to reach the <10% loss objective and within what timeframe

Metering -AWWA recommends that every water supplier install meters to account for all water taken into its system, along with all water distributed from its system at each customer's point of service. An effective metering program relies upon periodic performance testing, repair, maintenance or replacement of all meters. Drinking Water Revolving Loan Funds are available for purchase of new meters when new plants are built. AWWA also recommends that water suppliers conduct regular water audits to account for unmetered unbilled consumption, metered unbilled consumption and source water and customer metering inaccuracies. Some cities install separate meters for interior and exterior water use, but some research suggests that this may not result in water conservation.

Complete Table 23 by adding the requested information regarding the number, types, testing and maintenance of customer meters.

Table 23. Information about customer meters

Customer Category	Number of Customers	Number of Metered Connections	Number of Automated Meter Readers	Meter testing intervals (years)	Average age/meter replacement schedule (years
Residential	1,392	1,392	1,392	As requested by owner	As issues arise
Irrigation meters	1	1	1	As requested by owner	As issues arise
Institutional	N/A				___ / ___
Commercial	6	6	0	As requested by owner	As issues arise
Industrial	N/A				___ / ___
Public facilities	N/A				___ / ___
Other					___ / ___
TOTALS	1,399	1,399	1,393	NA	NA

For unmetered systems, describe any plans to install meters or replace current meters with advanced technology meters. Provide an estimate of the cost to implement the plan and the projected water savings from implementing the plan.

The City does not have any unmetered connections.

Table 24. Water source meters

	Number of Meters	Meter testing schedule (years)	Number of Automated Meter Readers	Average age/meter replacement schedule (years
Water source (wells/intakes)	6	As needed	6	As issues arise
Treatment plant	N/A			___ / ___

Objective 2: Achieve Less than 75 Residential Gallons per Capita Demand (GPCD)

The 2002 average residential per capita demand in the Twin Cities Metropolitan area was 75 gallons per capita per day.

Is your average 2012-2016 residential per capita water demand in Table 2 more than 75? Yes ☒ No ☐

What was your 2012-2016 five-year average residential per capita water demand? 97 g/person/day

Describe the water use trend over that timeframe:

The City of Shorewood's five-year average residential per capita water demand was 97 gallons per capita per day. The 2012-2016 average residential per capita water demand shows a decreasing trend with its lowest value being approximately 73 gallons per capita per day during 2016.

Complete Table 25 by checking which strategies you will use to continue reducing residential per capita demand and project a likely timeframe for completing each checked strategy (Select all that apply and add rows for additional strategies):

Table 25. Strategies and timeframe to reduce residential per capita demand

Strategy to reduce residential per capita demand	Timeframe for completing work
☒ Revise city ordinances/codes to encourage or require water efficient landscaping.	Ongoing
☒ Revise city ordinance/codes to permit water reuse options, especially for non-potable purposes like irrigation, groundwater recharge, and industrial use. Check with plumbing authority to see if internal buildings reuse is permitted	Annually
☒ Revise ordinances to limit irrigation. Describe the restricted irrigation plan:	3-6 years following adoption of this plan
☐ Revise outdoor irrigation installations codes to require high efficiency systems (e.g. those with soil moisture sensors or programmable watering areas) in new installations or system replacements.	
☒ Make water system infrastructure improvements	Ongoing
☐ Offer free or reduced cost water use audits) for residential customers.	
☐ Implement a notification system to inform customers when water availability conditions change.	
☒ Provide rebates or incentives for installing water efficient appliances and/or fixtures indoors (e.g., low flow toilets, high efficiency dish washers and washing machines, showerhead and faucet aerators, water softeners, etc.)	1-3 years following the adoption of this plan
☒ Provide rebates or incentives to reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.)	1-3 years following the adoption of this plan
☐ Identify supplemental Water Resources	
☒ Conduct audience-appropriate water conservation education and outreach.	Ongoing
☐ Describe other plans	

Objective 3: Achieve at least 1.5% annual reduction in non-residential per capita water use

(For each of the next ten years, or a 15% total reduction over ten years.) This includes commercial, institutional, industrial and agricultural water users.

Complete Table 26 by checking which strategies you will used to continue reducing non-residential customer use demand and project a likely timeframe for completing each checked strategy (add rows for additional strategies).

Where possible, substitute recycled water used in one process for reuse in another. (For example, spent rinse water can often be reused in a cooling tower.) Keep in mind the true cost of water is the amount on the water bill PLUS the expenses to heat, cool, treat, pump, and dispose of/discharge the water. Don't just calculate the initial investment. Many conservation retrofits that appear to be prohibitively expensive are actually very cost-effective when amortized over the life of the equipment. Often reducing water use also saves electrical and other utility costs. Note: as of 2015, water reuse, and is not allowed by the state plumbing code, M.R. 4715 (a variance is needed). However, several state agencies are addressing this issue.

Table 26. Strategies and timeframe to reduce institutional, commercial industrial, and agricultural and non-revenue use demand

Strategy to reduce total business, industry, agricultural demand	Timeframe for completing work
☒ Conduct a facility water use audit for both indoor and outdoor use, including system components	Annually
☒ Install enhanced meters capable of automated readings to detect spikes in consumption	Ongoing
☐ Compare facility water use to related industry benchmarks, if available (e.g., meat processing, dairy, fruit and vegetable, beverage, textiles, paper/pulp, metals, technology, petroleum refining etc.)	
☒ Install water conservation fixtures and appliances or change processes to conserve water	Ongoing
☒ Repair leaking system components (e.g., pipes, valves)	Ongoing
☒ Investigate the reuse of reclaimed water (e.g., stormwater, wastewater effluent, process wastewater, etc.)	Annually
☒ Reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.)	Ongoing
☒ Train employees how to conserve water	Ongoing
☐ Implement a notification system to inform non-residential customers when water availability conditions change.	
☐ Nonpotable rainwater catchment systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, industrial processes, water features, vehicle washing facilities, cooling tower makeup, and similar uses shall be approved by the commissioner. Plumbing code 4714.1702, Published October 31, 2016	
☐ Describe other plans:	

Objective 4: Achieve a Decreasing Trend in Total Per Capita Demand

Include as **Appendix 8** one graph showing total per capita water demand for each customer category (i.e., residential, institutional, commercial, industrial) from 2005-2014 and add the calculated/estimated linear trend for the next 10 years.

Describe the trend for each customer category; explain the reason(s) for the trends, and where trends are increasing.

There is a decreasing trend in per capita water demand over the last ten years for the City of Shorewood for both the residential and commercial/industrial/intuitional categories.

Objective 5: Reduce Ratio of Maximum day (peak day) to the Average Day Demand to Less Than 2.6

Is the ratio of average 2005-2014 maximum day demand to average 2005-2014 average day demand reported in Table 2 more than 2.6? Yes ☒ No ☐

Calculate a ten-year average (2005 – 2014) of the ratio of maximum day demand to average day demand: _3.3__

The position of the DNR has been that a peak day/average day ratio that is above 2.6 for in summer indicates that the water being used for irrigation by the residents in a community is too large and that efforts should be made to reduce the peak day use by the community.

It should be noted that by reducing the peak day use, communities can also reduce the amount of infrastructure that is required to meet the peak day use. This infrastructure includes new wells, new water towers which can be costly items.

Objective 6: Implement Demand Reduction Measures

Water Conservation Program

Municipal water suppliers serving over 1,000 people are required to adopt demand reduction measures that include a conservation rate structure, or a uniform rate structure with a conservation program that achieves demand reduction. These measures must achieve demand reduction in ways that reduce water demand, water losses, peak water demands, and nonessential water uses. These measures must be approved before a community may request well construction approval from the Department of Health or before requesting an increase in water appropriations permit volume (Minnesota Statutes, section 103G.291, subd. 3 and 4). Rates should be adjusted on a regular basis to ensure that revenue of the system is adequate under reduced demand scenarios. If a municipal water supplier intends to use a Uniform Rate Structure, a community-wide Water Conservation Program that will achieve demand reduction must be provided.

Current Water Rates

Include a copy of the actual rate structure in **Appendix 9** or list current water rates including base/service fees and volume charges below.

Volume included in base rate or service charge: ___5,000__ gallons or ____ cubic feet ___ other

Frequency of billing: ☐ Monthly ☐ Bimonthly ☒ Quarterly ☐ Other: _____

Water Rate Evaluation Frequency: ☐ every year ☐ every ___ years ☒ no schedule

Date of last rate change: 2017

Table 27. Rate structures for each customer category (Select all that apply and add additional rows as needed)

Customer Category	Conservation Billing Strategies in Use *	Conservation Neutral Billing Strategies in Use **	Non-Conserving Billing Strategies in Use ***
Residential	☐ Monthly billing ☒ Increasing block rates (volume tiered rates) ☐ Seasonal rates ☐ Time of use rates ☐ Water bills reported in	☐ Uniform ☐ Odd/even day watering	☐ Service charge based on water volume ☐ Declining block ☐ Flat ☐ Other (describe)

Customer Category	Conservation Billing Strategies in Use *	Conservation Neutral Billing Strategies in Use **	Non-Conserving Billing Strategies in Use ***
	gallons ☐ Individualized goal rates ☐ Excess use rates ☐ Drought surcharge ☐ Use water bill to provide comparisons ☐ Service charge not based on water volume ☐ Other (describe)		
Commercial/ Industrial/ Institutional	☐ Monthly billing ☒ Increasing block rates (volume tiered rates) ☐ Seasonal rates ☐ Time of use rates ☐ Water bills reported in gallons ☐ Individualized goal rates ☐ Excess use rates ☐ Drought surcharge ☐ Use water bill to provide comparisons ☐ Service charge not based on water volume ☐ Other (describe)	☐ Uniform	☐ Service charge based on water volume ☐ Declining block ☐ Flat ☐ Other (describe)
☐ Other			

*** Rate Structures components that may promote water conservation:**

- **Monthly billing:** is encouraged to help people see their water usage so they can consider changing behavior.
- **Increasing block rates (also known as a tiered residential rate structure):** Typically, these have at least three tiers: should have at least three tiers.
    - The first tier is for the winter average water use.
    - The second tier is the year-round average use, which is lower than typical summer use. This rate should be set to cover the full cost of service.
    - The third tier should be above the average annual use and should be priced high enough to encourage conservation, as should any higher tiers. For this to be effective, the difference in block rates should be significant.
- **Seasonal rate:** higher rates in summer to reduce peak demands
- **Time of Use rates:** lower rates for off peak water use
- **Bill water use in gallons:** this allows customers to compare their use to average rates
- **Individualized goal rates:** typically used for industry, business or other large water users to promote water conservation if they keep within agreed upon goals. **Excess Use rates**: if water use goes above an agreed upon amount this higher rate is charged
- **Drought surcharge:** an extra fee is charged for guaranteed water use during drought
- **Use water bill to provide comparisons**: simple graphics comparing individual use over time or compare individual use to others.
- **Service charge or base fee that does not include a water volume** – a base charge or fee to cover universal city expenses that are not customer dependent and/or to provide minimal water at a lower rate (e.g., an amount less than the average residential per capita demand for the water supplier for the last 5 years)

- **Emergency rates** -A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

****Conservation Neutral****

- **Uniform rate**: rate per unit used is the same regardless of the volume used
- **Odd/even day watering** –This approach reduces peak demand on a daily basis for system operation, but it does not reduce overall water use.

***** Non-Conserving *****

- **Service charge or base fee with water volume:** an amount of water larger than the average residential per capita demand for the water supplier for the last 5 years
- **Declining block rate:** the rate per unit used decreases as water use increases.
- **Flat rate:** one fee regardless of how much water is used (usually unmetered).

Provide justification for any conservation neutral or non-conserving rate structures. If intending to adopt a conservation rate structure, include the timeframe to do so:

N/A

Objective 7: Additional strategies to Reduce Water Use and Support Wellhead Protection Planning

Development and redevelopment projects can provide additional water conservation opportunities, such as the actions listed below. If a Uniform Rate Structure is in place, the water supplier must provide a Water Conservation Program that includes at <u>least two</u> of the actions listed below. Check those actions that you intent to implement within the next 10 years.

Table 28. Additional strategies to Reduce Water Use & Support Wellhead Protection

☐	Participate in the GreenStep Cities Program, including implementation of at least one of the 20 "Best Practices" for water
☐	Prepare a master plan for smart growth (compact urban growth that avoids sprawl)
☐	Prepare a comprehensive open space plan (areas for parks, green spaces, natural areas)
☒	Enforce the water use restriction ordinance (lawn irrigation, car washing, pools, etc.)
☒	Enforce the outdoor lawn irrigation ordinance
☐	Adopt a private well ordinance (private wells in a city must comply with water restrictions)
☐	Implement a stormwater management program
☐	Adopt non-zoning wetlands ordinance (can further protect wetlands beyond state/federal laws-for vernal pools, buffer areas, restrictions on filling or alterations)
☐	Adopt a water offset program (primarily for new development or expansion)
☒	Consider implementing a water conservation outreach program
☐	Hire a water conservation coordinator (part-time)
☒	Consider implementing a rebate program for water efficient appliances, fixtures, or outdoor water management
☐	Other

Objective 8: Tracking Success: How will you track or measure success through the next ten years?

The City will continue to monitor water usage by customer category to determine the efficacy of conservation efforts. The City will monitor and document the water levels in their active production wells.

Tip: The process to monitor demand reduction and/or a rate structure includes:

a) The DNR Hydrologist will call or visit the community the first 1-3 years after the water supply plan is completed.
b) They will discuss what activities the community is doing to conserve water and if they feel their actions are successful. The Water Supply Plan, Part 3 tables and responses will guide the discussion. For example, they will discuss efforts to reduce unaccounted for water loss if that is a problem, or go through Tables 33, 34 and 35 to discuss new initiatives.
c) The city representative and the hydrologist will discuss total per capita water use, residential per capita water use, and business/industry use. They will note trends.
d) They will also discuss options for improvement and/or collect case studies of success stories to share with other communities. One option may be to change the rate structure, but there are many other paths to successful water conservation.
e) If appropriate, they will cooperatively develop a simple work plan for the next few years, targeting a couple areas where the city might focus efforts.

C. Regulation

Complete Table 29 by selecting which regulations are used to reduce demand and improve water efficiencies. Add additional rows as needed.

Copies of adopted regulations or proposed restrictions or should be included in **Appendix 10** (a list with hyperlinks is acceptable).

Table 29. Regulations for short-term reductions in demand and long-term improvements in water efficiencies

Regulations Utilized	When is it applied (in effect)?
☒ Rainfall sensors required on landscape irrigation systems	☒ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Water efficient plumbing fixtures required	☐ New development ☐ Replacement ☐ Rebate Programs
☒ Critical/Emergency Water Deficiency ordinance	☒ Only during declared Emergencies
☒ Watering restriction requirements (time of day, allowable days, etc.)	☐ Odd/even ☐ 2 days/week ☐ Only during declared Emergencies ☒ Irrigation restricted 11:00 am to 4:30 pm from May 1st to September 30th
☐ Water waste prohibited (for example, having a fine for irrigators spraying on the street)	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Limitations on turf areas (requiring lots to have 10% - 25% of the space in natural areas)	☐ New development

Regulations Utilized	When is it applied (in effect)?
	☐ Shoreland/zoning ☐ Other
☐ Soil preparation requirement s (after construction, requiring topsoil to be applied to promote good root growth)	☐ New Development ☐ Construction Projects ☐ Other
☐ Tree ratios (requiring a certain number of trees per square foot of lawn)	☐ New development ☐ Shoreland/zoning ☐ Other
☐ Permit to fill swimming pool and/or requiring pools to be covered (to prevent evaporation)	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Ordinances that permit stormwater irrigation, reuse of water, or other alternative water use (Note: be sure to check current plumbing codes for updates)	☐ Describe

D. Retrofitting Programs

Education and incentive programs aimed at replacing inefficient plumbing fixtures and appliances can help reduce per capita water use, as well as energy costs. It is recommended that municipal water suppliers develop a long-term plan to retrofit public buildings with water efficient plumbing fixtures and appliances. Some water suppliers have developed partnerships with organizations having similar conservation goals, such as electric or gas suppliers, to develop cooperative rebate and retrofit programs.

A study by the AWWA Research Foundation (Residential End Uses of Water, 1999) found that the average indoor water use for a non-conserving home is 69.3 gallons per capita per day (gpcd). The average indoor water use in a conserving home is 45.2 gpcd and most of the decrease in water use is related to water efficient plumbing fixtures and appliances that can reduce water, sewer and energy costs. In Minnesota, certain electric and gas providers are required (Minnesota Statute 216B.241) to fund programs that will conserve energy resources and some utilities have distributed water efficient showerheads to customers to help reduce energy demands required to supply hot water.

Retrofitting Programs

Complete Table 30 by checking which water uses are targeted, the outreach methods used, the measures used to identify success, and any participating partners.

Table 30. Retrofitting programs (Select all that apply)

Water Use Targets	Outreach Methods	Partners
☐ Low flush toilets, ☐ Toilet leak tablets, ☐ Low flow showerheads, ☐ Faucet aerators;	☐ Education about ☐ Free distribution of ☐ Rebate for ☐ Other	☐ Gas company ☐ Electric company ☐ Watershed organization
☒ Water conserving washing machines, ☐ Dish washers, ☐ Water softeners;	☐ Education about ☐ Free distribution of ☒ Rebate for ☐ Other	☒ Gas company ☒ Electric company ☐ Watershed organization

Water Use Targets	Outreach Methods	Partners
☒ Rain gardens, ☒ Rain barrels, ☐ Native/drought tolerant landscaping, etc.	☒ Education about ☐ Free distribution of ☐ Rebate for ☐ Other	☐ Gas company ☐ Electric company ☒ Watershed organization

Briefly discuss measures of success from the above table (e.g. number of items distributed, dollar value of rebates, gallons of water conserved, etc.):

E. Education and Information Programs

Customer education should take place in three different circumstances. First, customers should be provided information on how to conserve water and improve water use efficiencies. Second, information should be provided at appropriate times to address peak demands. Third, emergency notices and educational materials about how to reduce water use should be available for quick distribution during an emergency.

Proposed Education Programs

Complete Table 31 by selecting which methods are used to provide water conservation and information, including the frequency of program components. Select all that apply and add additional lines as needed.

Table 31. Current and Proposed Education Programs

Education Methods	General summary of topics	#/Year	Frequency
Billing inserts or tips printed on the actual bill	Yearly inserts included with billing materials	1	☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Consumer Confidence Reports	Yearly Consumer Confidence Reports prepared	1	☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Press releases to traditional local news outlets (e.g., newspapers, radio and TV)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Social media distribution (e.g., emails, Facebook, Twitter)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Paid advertisements (e.g., billboards, print media, TV, radio, web sites, etc.)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies

Education Methods	General summary of topics	#/Year	Frequency
Presentations to community groups			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Staff training			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Facility tours			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Displays and exhibits			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Marketing rebate programs (e.g., indoor fixtures & appliances and outdoor practices)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Community news letters			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Direct mailings (water audit/retrofit kits, showerheads, brochures)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Information kiosk at utility and public buildings	Information available at public works	N/A	☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Public service announcements			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Cable TV Programs			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Demonstration projects (landscaping or plumbing)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
K-12 education programs (Project Wet, Drinking Water Institute, presentations)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies

Education Methods	General summary of topics	#/Year	Frequency
Community events (children's water festivals, environmental fairs)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Community education classes			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Water week promotions			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Website (include address: http://www.ci.shorewood.mn.us/)	Water billing rates, wellhead protection information available, water conservation strategies and restrictions.		☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Targeted efforts (large volume users, users with large increases)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Notices of ordinances			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Emergency conservation notices			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Other:			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies

Briefly discuss what future education and information activities your community is considering in the future:

The City will consider incorporating water conservation and wellhead protection education at City events and in staff training.

PART 4. ITEMS FOR METROPOLITAN AREA COMMUNITIES

Minnesota Statute 473.859 requires WSPs to be completed for all local units of government in the seven-county Metropolitan Area as part of the local comprehensive planning process.

Much of the information in Parts 1-3 addresses water demand for the next 10 years. However, additional information is needed to address water demand through 2040, which will make the WSP consistent with the Metropolitan Land Use Planning Act, upon which the local comprehensive plans are based.

This Part 4 provides guidance to complete the WSP in a way that addresses plans for water supply through 2040.

A. Water Demand Projections through 2040

Complete Table 7 in Part 1D by filling in information about long-term water demand projections through 2040. Total Community Population projections should be consistent with the community's system statement, which can be found on the Metropolitan Council's website and which was sent to the community in September 2015.

Projected Average Day, Maximum Day, and Annual Water Demands may either be calculated using the method outlined in *Appendix 2* of the *2015 Master Water Supply Plan* or by a method developed by the individual water supplier.

B. Potential Water Supply Issues

Complete Table 10 in Part 1E by providing information about the potential water supply issues in your community, including those that might occur due to 2040 projected water use.

The Master Water Supply Plan provides information about potential issues for your community in *Appendix 1 (Water Supply Profiles).* This resource may be useful in completing Table 10.

You may document results of local work done to evaluate impact of planned uses by attaching a feasibility assessment or providing a citation and link to where the plan is available electronically.

C. Proposed Alternative Approaches to Meet Extended Water Demand Projections

Complete Table 12 in Part 1F with information about potential water supply infrastructure impacts (such as replacements, expansions or additions to wells/intakes, water storage and treatment capacity, distribution systems, and emergency interconnections) of extended plans for development and redevelopment, in 10-year increments through 2040. It may be useful to refer to information in the community's local Land Use Plan, if available.

Complete Table 14 in Part 1F by checking each approach your community is considering to meet future demand. For each approach your community is considering, provide information about the amount of

future water demand to be met using that approach, the timeframe to implement the approach, potential partners, and current understanding of the key benefits and challenges of the approach.

As challenges are being discussed, consider the need for: evaluation of geologic conditions (mapping, aquifer tests, modeling), identification of areas where domestic wells could be impacted, measurement and analysis of water levels & pumping rates, triggers & associated actions to protect water levels, etc.

D. Value-Added Water Supply Planning Efforts (Optional)

The following information is not required to be completed as part of the local water supply plan, but completing this can help strengthen source water protection throughout the region and help Metropolitan Council and partners in the region to better support local efforts.

Source Water Protection Strategies

Does a Drinking Water Supply Management Area for a neighboring public water supplier overlap your community? Yes ☒ No ☐

If you answered no, skip this section. If you answered yes, please complete Table 32 with information about new water demand or land use planning-related local controls that are being considered to provide additional protection in this area.

Table 32. Local controls and schedule to protect Drinking Water Supply Management Areas

Local Control	Schedule to Implement	Potential Partners
☐ None at this time		
☒ Comprehensive planning that guides development in vulnerable drinking water supply management areas	Wellhead Protection Plan; Comprehensive Plan update	City of Chanhassen, Eden Prairie, Excelsior, Minnetonka, and Tonka Bay
☐ Zoning overlay		
☐ Other:		

Technical assistance

From your community's perspective, what are the most important topics for the Metropolitan Council to address, guided by the region's Metropolitan Area Water Supply Advisory Committee and Technical Advisory Committee, as part of its ongoing water supply planning role?

☒ Coordination of state, regional and local water supply planning roles
☐ Regional water use goals
☒ Water use reporting standards
☒ Regional and sub-regional partnership opportunities
☐ Identifying and prioritizing data gaps and input for regional and sub-regional analyses
☐ Others: _____

GLOSSARY

Agricultural/Irrigation Water Use - Water used for crop and non-crop irrigation, livestock watering, chemigation, golf course irrigation, landscape and athletic field irrigation.

Average Daily Demand - The total water pumped during the year divided by 365 days.

Calcareous Fen - Calcareous fens are rare and distinctive wetlands dependent on a constant supply of cold groundwater. Because they are dependent on groundwater and are one of the rarest natural communities in the United States, they are a protected resource in MN. Approximately 200 have been located in Minnesota. They may not be filled, drained or otherwise degraded.

Commercial/Institutional Water Use - Water used by motels, hotels, restaurants, office buildings, commercial facilities and institutions (both civilian and military). Consider maintaining separate institutional water use records for emergency planning and allocation purposes. Water used by multi-family dwellings, apartment buildings, senior housing complexes, and mobile home parks should be reported as Residential Water Use.

Commercial/Institutional/Industrial (C/I/I) Water Sold - The sum of water delivered for commercial/institutional or industrial purposes.

Conservation Rate Structure - A rate structure that encourages conservation and may include increasing block rates, seasonal rates, time of use rates, individualized goal rates, or excess use rates. If a conservation rate is applied to multifamily dwellings, the rate structure must consider each residential unit as an individual user. A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

Date of Maximum Daily Demand - The date of the maximum (highest) water demand. Typically this is a day in July or August.

Declining Rate Structure - Under a declining block rate structure, a consumer pays less per additional unit of water as usage increases. This rate structure does not promote water conservation.

Distribution System - Water distribution systems consist of an interconnected series of pipes, valves, storage facilities (water tanks, water towers, reservoirs), water purification facilities, pumping stations, flushing hydrants, and components that convey drinking water and meeting fire protection needs for cities, homes, schools, hospitals, businesses, industries and other facilities.

Flat Rate Structure - Flat fee rates do not vary by customer characteristics or water usage. This rate structure does not promote water conservation.

Industrial Water Use - Water used for thermonuclear power (electric utility generation) and other industrial use such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining.

Low Flow Fixtures/Appliances - Plumbing fixtures and appliances that significantly reduce the amount of water released per use are labeled “low flow”. These fixtures and appliances use just enough water to be effective, saving excess, clean drinking water that usually goes down the drain.

Maximum Daily Demand - The maximum (highest) amount of water used in one day.

Metered Residential Connections - The number of residential connections to the water system that have meters. For multifamily dwellings, report each residential unit as an individual user.

Percent Unmetered/Unaccounted For - Unaccounted for water use is the volume of water withdrawn from all sources minus the volume of water delivered. This value represents water “lost” by miscalculated water use due to inaccurate meters, water lost through leaks, or water that is used but unmetered or otherwise undocumented. Water used for public services such as hydrant flushing, ice skating rinks, and public swimming pools should be reported under the category “Water Supplier Services”.

Population Served - The number of people who are served by the community's public water supply system. This includes the number of people in the community who are connected to the public water supply system, as well as people in neighboring communities who use water supplied by the community's public water supply system. It should not include residents in the community who have private wells or get their water from neighboring water supply.

Residential Connections - The total number of residential connections to the water system. For multifamily dwellings, report each residential unit as an individual user.

Residential Per Capita Demand - The total residential water delivered during the year divided by the population served divided by 365 days.

Residential Water Use - Water used for normal household purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Should include all water delivered to single family private residences, multi-family dwellings, apartment buildings, senior housing complexes, mobile home parks, etc.

Smart Meter - Smart meters can be used by municipalities or by individual homeowners. Smart metering generally indicates the presence of one or more of the following:

- Smart irrigation water meters are controllers that look at factors such as weather, soil, slope, etc. and adjust watering time up or down based on data. Smart controllers in a typical summer will reduce water use by 30%-50%. Just changing the spray nozzle to new efficient models can reduce water use by 40%.
- Smart Meters on customer premises that measure consumption during specific time periods and communicate it to the utility, often on a daily basis.
- A communication channel that permits the utility, at a minimum, to obtain meter reads on demand, to ascertain whether water has recently been flowing through the meter and onto the premises, and to issue commands to the meter to perform specific tasks such as disconnecting or restricting water flow.

Total Connections - The number of connections to the public water supply system.

Total Per Capita Demand - The total amount of water withdrawn from all water supply sources during the year divided by the population served divided by 365 days.

Total Water Pumped - The cumulative amount of water withdrawn from all water supply sources during the year.

Total Water Delivered - The sum of residential, commercial, industrial, institutional, water supplier services, wholesale and other water delivered.

Ultimate (Full Build-Out) - Time period representing the community's estimated total amount and location of potential development, or when the community is fully built out at the final planned density.

Unaccounted (Non-revenue) Loss - See definitions for "percent unmetered/unaccounted for loss".

Uniform Rate Structure - A uniform rate structure charges the same price-per-unit for water usage beyond the fixed customer charge, which covers some fixed costs. The rate sends a price signal to the customer because the water bill will vary by usage. Uniform rates by class charge the same price-per-unit for all customers within a customer class (e.g. residential or non-residential). This price structure is generally considered less effective in encouraging water conservation.

Water Supplier Services - Water used for public services such as hydrant flushing, ice skating rinks, public swimming pools, city park irrigation, back-flushing at water treatment facilities, and/or other uses.

Water Used for Nonessential Purposes - Water used for lawn irrigation, golf course and park irrigation, car washes, ornamental fountains, and other non-essential uses.

Wholesale Deliveries - The amount of water delivered in bulk to other public water suppliers.

Acronyms and Initialisms

AWWA – American Water Works Association
C/I/I – Commercial/Institutional/Industrial
CIP – Capital Improvement Plan
GIS – Geographic Information System
GPCD – Gallons per capita per day
GWMA – Groundwater Management Area – North and East Metro, Straight River, Bonanza,
MDH – Minnesota Department of Health
MGD – Million gallons per day
MG – Million gallons
MGL – Maximum Contaminant Level
MnTAP – Minnesota Technical Assistance Program (University of Minnesota)
MPARS – MN/DNR Permitting and Reporting System (new electronic permitting system)
MRWA – Minnesota Rural Waters Association
SWP – Source Water Protection
WHP – Wellhead Protection

APPENDICES TO BE SUBMITTED BY THE WATER SUPPLIER

Appendix 1: Well records and maintenance summaries
Go to Part 1C for information on what to include in appendix

Appendix 2: Water level monitoring plan
Go to Part 1E for information on what to include in appendix

Appendix 3: Water level graphs for each water supply well
Go to Part 1E for information on what to include in appendix

Appendix 4: Capital Improvement Plan
Go to Part 1E for information on what to include in appendix

Appendix 5: Emergency Telephone List
Go to Part 2C for information on what to include in appendix

Appendix 6: Cooperative Agreements for Emergency Services
Go to Part 2C for information on what to include in appendix

Appendix 7: Municipal Critical Water Deficiency Ordinance
Go to Part 2C for information on what to include in appendix

Appendix 8: Graph of Ten Years of Annual Per Capita Water Demand for Each Customer Category
Go to Objective 4 in Part 3B for information on what to include in appendix

Appendix 9: Water Rate Structure
Go to Objective 6 in Part 3B for information on what to include in appendix

Appendix 10: Ordinances or Regulations Related to Water Use
Go to Objective 7 in Part 3B for information on what to include in appendix

Appendix 11: Implementation Checklist
Provide a table that summarizes all the actions that the public water supplier is doing, or proposes to do, with estimated implementation dates.

Appendix 12: Sources of Information for Table 10
Provide links or references to the information used to complete Table 10. If the file size is reasonable, provide source information as attachments to the plan.

Appendix 1

Well Records and Maintenance Summaries

Minnesota Unique Well Number

232331

County Hennepin
Quad Excelsior
Quad ID 105A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 06/11/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SHOREWOOD 1	117	23	W	25	BCDDAB

Elevation 985 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 5755 COUNTRY CLUB RD SHOREWOOD MN 55331
Well KNIGHTS BRIDGE RD SHOREWOOD MN 55331

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	16		
CLAY	16	38		
SAND & GRAVEL	38	193		
CLAY-SILTY	193	234		
SHALE & SANDROCK-	234	280		
LIMEROCK SHAKOPEE-	280	435		
JORDAN SANDROCK	435	524		
ST. LAWRENCE SHALE	524	528		

Remarks

WELL SERVED AMESBURY ADD. FORMER PERMITS 74-5226 & 82-6074.

Well Depth 528 ft. **Depth Completed** 528 ft. **Date Well Completed** 09/21/1973

Drill Method Cable Tool **Drill Fluid**

Use community supply(municipal) **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter		Weight
16 in. To	244 ft.	lbs./ft.
20 in. To	204 ft.	lbs./ft.

Open Hole From 244 ft. To 528 ft.

Screen? ☐ **Type** **Make**

Static Water Level

114 ft. land surface Measure 09/21/1973

Pumping Level (below land surface)

117 ft. hrs. Pumping at 700 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock St.Peter Sandstone Aquifer Prairie Du Chien-
Last Strat St.Lawrence Formation Depth to Bedrock 234 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged)
System UTM - NAD83, Zone 15, Meters X 457484 Y 4973547
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Bergerson-Caswell 27058
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

161414

County Hennepin
Quad Excelsior
Quad ID 105A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/08/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SHOREWOOD 3	117	23	W	33	ADCAAA

Elevation 970 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 5755 COUNTRY CLUB RD SHOREWOOD MN 55331
Well SHOREWOOD MN 55331

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & ROCKS	0	80		
HARD SAND	80	90		
CLAY	90	139		
GRAY SAND & ROCKS	139	220		
YELLOW SAND	220	275		
SAND & ROCKS	275	285		
SAND & ROCKS	285	290		
YELLOW SAND	290	310	YELLOW	
SAND & ROCKS	310	325		
SAND & ROCKS	325	332		
LIMEROCK	332	335		
LIMEROCK	335	352		
JORDAN SANDROCK	352	372		

Remarks

M.G.S. NO. 1736.
WELL AT BADGER FIELD. FORMER PERMIT 82-6074.
SCREEN LENTGH 31' + 53' LEADER

Well Depth 372 ft. **Depth Completed** 372 ft. **Date Well Completed** 05/28/1981

Drill Method Cable Tool **Drill Fluid**

Use community supply(municipal) **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 2 ft.

Casing Diameter		Weight
16 in. To 332 ft.		lbs./ft.
24 in. To 151 ft.		lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
10 in.		ft.	275 ft.	359 ft.

Static Water Level

90 ft. land surface Measure 05/28/1981

Pumping Level (below land surface)

114 ft. 45 hrs. Pumping at 1000 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
neat cement	9	Cubic yards	0 ft.	153 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed

Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock St.Peter Sandstone Aquifer St.Peter-Jordan
Last Strat Jordan Sandstone Depth to Bedrock 325 ft
Located by Minnesota Department of Health
Locate Method GPS SA On (averaged)
System UTM - NAD83, Zone 15, Meters X 453661 Y 4972050
Unique Number Verification Information from Input Date 10/01/1999

Angled Drill Hole

Well Contractor

Bergerson-Caswell 27058
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

171020

County Hennepin
Quad Mound
Quad ID 105B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/10/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SHOREWOOD 4	117	23	W	31	DBCBDC

Elevation 945 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 5755 COUNRTY CLUB RD SHOREWOOD MN 55331
Well SHOREWOOD MN 55331

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	6	YELLOW	
CLAY & GRAVEL	6	41	YELLOW	
GRAVEL & SOME BIND	41	59	DK. GRY	
CLAY & GRAVEL	59	65	GRAY	
BOULDER	65	70	BLACK	
CLAY & GRAVEL 50	70	130	GRAY	
CLAY & GRAVEL 70	130	137	GRAY	
BOULDERS & ROCKS	137	139	DARK	
SAND	139	142	VARIED	
ROCKS	142	144	DARK	
SAND & GRAVEL	144	190	VARIED	
GRAVEL	190	208	DARK	
GRAVEL & CLAY	208	240	GRAY	
GRAVEL	240	260	VARIED	
GRAVEL	260	300	GRAY	
BROKEN SANDSTONE	300	309	GRAY	
MUSHY CLAY &	309	311	GRAY	
BROKEN SANDSTONE	311	335	WHITE	
SANDSTONE	335	341	TAN	
SANDSTONE WHITE &	341	360	WHT/TAN	
SANDSTONE	360	365	WHITE	
PINK SANDSTONE &	365	371	PNK/BLU	
SANDSTONE & SHALE	371	381	WHITE	
SANDSTONE	381	399	PINK	
SANDSTONE & SHALE	399	400	GRN/WHT	
SANDSTONE & SHALE	400	415	GRN/WHT	
FRANCONIA	415	435		
FRANCONIA	435	581		
IRONTON GALESVILLE	581	629	WHITE	
IRONTON GALESVILLE	629	640	WHITE	
SANDSTONE & SHALE	640	640		

Remarks

BOULDER BRIDGE WELL A.
M.G.S. NO. 1735. GAMMA LOGGED 3-20-1981.

Well Depth 640 ft. **Depth Completed** 640 ft. **Date Well Completed** 03/18/1981

Drill Method Non-specified Rotary **Drill Fluid**

Use community supply(municipal) **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☐ No ☐ **Above/Below** 2 ft.

Casing Diameter	Weight	Hole Diameter
12 in. To 398 ft.	49.5 lbs./ft.	12 in. To 640 ft.

Open Hole From 398 ft. To 640 ft.

Screen? ☐ **Type** **Make**

Static Water Level
64 ft. land surface Measure 06/01/1988

Pumping Level (below land surface)
100 ft. 20 hrs. Pumping at 750 g.p.m.

Wellhead Completion
Pitless adapter manufacturer BAKER Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
neat cement	11	Cubic yards	0 ft.	398 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ Turbine

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Lawrence Formation Aquifer Tunnel City-
Last Strat Eau Claire Formation Depth to Bedrock 400 ft
Located by Minnesota Department of Health
Locate Method GPS SA On (averaged)
System UTM - NAD83, Zone 15, Meters X 449923 Y 4971598
Unique Number Verification Information from Input Date 10/01/1999

Angled Drill Hole

Well Contractor
Renner E.H. & Sons 02015
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

171023

County Hennepin
Quad Mound
Quad ID 105B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 06/16/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SHOREWOOD 5	117	23	W	31	DBDBCB

Elevation 944 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 5755 COUNTRY CLUB RD SHOREWOOD MN 55331
Well SHOREWOOD MN 55331

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	7	GRAY	
GRAVEL	7	10	VARIED	
CLAY	10	102	GRAY	
CLAY & STONES	102	116	GRAY	
GRAVEL	116	131	VARIED	
GRAVEL & CLAY	131	155	BROWN	
GRAVEL & CLAY	155	246	GRAY	
GRAVEL & BOULDERS	246	290	RED	
GRAVEL & BOULDERS	290	310	TAN	
BROKEN SANDSTONE	310	330	TAN	
GRAVEL	330	334	VARIED	
SHALE & GRAVEL	334	380		
FRANCONIA	380	399	RED/GRN	
FRANCONIA	399	434	RED/GRN	
FRANCONIA	434	578	RED/GRN	
IRONTON GALESVILLE	578	630	WHITE	
IRONTON GALESVILLE	630	637	WHITE	
EAU CLAIRE	637	640	WHT/GRN	

Remarks

BOULDER BRIDGE WELL B.
M.G.S. NO. 1748. GAMMA LOGGED 5-21-1981.

Well Depth 640 ft. **Depth Completed** 640 ft. **Date Well Completed** 05/00/1981

Drill Method Non-specified Rotary **Drill Fluid**

Use community supply(municipal) **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
12 in. To 399 ft.	49.5 lbs./ft.	12 in. To 640 ft.

Open Hole From 399 ft. To 640 ft.

Screen? ☐ **Type** **Make**

Static Water Level
62 ft. land surface Measure 04/00/1981

Pumping Level (below land surface)
81 ft. 12 hrs. Pumping at 760 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Lawrence Formation Aquifer Tunnel City-
Last Strat Eau Claire Formation Depth to Bedrock 399 ft
Located by Minnesota Department of Health
Locate Method GPS SA On (averaged)
System UTM - NAD83, Zone 15, Meters X 450065 Y 4971626
Unique Number Verification Information from Input Date 10/01/1999

Angled Drill Hole

Well Contractor
Renner E.H. & Sons 02015 RENNER, R.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

122298

County Hennepin
Quad Excelsior
Quad ID 105A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 06/11/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SHOREWOOD 6	117	23	W	25	CBAADB

Elevation 978 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 5755 COUNTRY CLUB RD SHOREWOOD MN 55331
Well SHOREWOOD MN 55331

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	21	BROWN	
SAND	21	47	VARIED	
SAND WITH CLAY	47	57	GRAY	
SAND & GRAVEL	57	111	VARIED	
FINE SAND	111	167	BROWN	
COARSE SAND	167	169	VARIED	
FINE SAND	169	190	BROWN	
CLAY & FINE SAND	190	195	GRAY	
CLAY	195	232	GRAY	
SHALE	232	243	GREEN	
ST. PETER	243	274	RED/GRN	
SHAKOPEE	274	281	RED	
SHAKOPEE &	281	299	GRAY	
SHAKOPEE	299	326	RED/GRY	

Remarks

M.G.S. NO. 1956.
KNIGHTS BRIDGE & SUSSEX RD., 30' W. OF PUMP HOUSE; 40' N. OF POOL

Well Depth 326 ft. **Depth Completed** 326 ft. **Date Well Completed** 11/00/1982

Drill Method Non-specified Rotary **Drill Fluid**

Use community supply(municipal) **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
8 in. To 276 ft.	28.5 lbs./ft.	8 in. To 326 ft.

Open Hole From 276 ft. To 326 ft.

Screen? ☐ **Type** **Make**

Static Water Level
117 ft. land surface Measure 11/00/1982

Pumping Level (below land surface)
136 ft. 8 hrs. Pumping at 330 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		0 ft.	276 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 12/00/1982
Manufacturer's name NATIONAL
Model Number S6LC6A HP 10 Volt 230
Length of drop pipe 147 ft Capacity 100 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 243 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - NAD83, Zone 15, Meters X 457471 Y 4973392
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Renner E.H. & Sons 02015 RENNER, R.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

416160

County Hennepin
Quad Excelsior
Quad ID 105A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 06/24/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SHOREWOOD 7	117	23	W	36	ACDBCB

Elevation 915 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 5755 COUNTRY CLUB RD SHOREWOOD MN 55331
Well SHOREWOOD MN 55331

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY FILL	0	10	BROWN	
SAND GRAVEL	10	70	BROWN	
SAND GRAVEL	70	135	GRAY	
SAND CLAY	135	165	GRAY	
CEMENTED SAND	165	175	GRAY	
LIMEROCK	175	178	GRAY	
LIMEROCK	178	180	GRAY	
ST. PETER	180	202	GRAY	
SHALE	202	210	GRAY	
SHAKOPEE	210	346	PINK	
SHAKOPEE	346	360	PINK	
JORDAN SHALE	360	390	WHITE	
JORDAN	390	395	PINK	
JORDAN	395	411	WHITE	
ST. LAWRENCE	411	415	GRN/BLU	

Remarks

GAMMA LOGGED 10-20-1986. SOUTH EAST AREA DEEP WELL.

Well Depth	Depth Completed	Date Well Completed
415 ft.	415 ft.	11/21/1986

Drill Method Cable Tool **Drill Fluid**

Use community supply(municipal) **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 2 ft.

Casing Diameter			Weight	
24	in. To	223 ft.	94.6	lbs./ft.
30	in. To	212 ft.	118.	lbs./ft.

Open Hole From 223 ft. To 415 ft.

Screen? ☐ **Type** **Make**

Static Water Level

52 ft. land surface Measure 11/21/1983

Pumping Level (below land surface)

65 ft. 20 hrs. Pumping at 1000 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	15.2 Cubic yards	0 ft.	223 ft.

Nearest Known Source of Contamination

100 feet South Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 00/00/1987

Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ Turbine

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock St.Peter Sandstone Aquifer Prairie Du Chien-
Last Strat Jordan Sandstone Depth to Bedrock 178 ft
Located by Minnesota Department of Health
Locate Method GPS SA On (averaged)
System UTM - NAD83, Zone 15, Meters X 458103 Y 4971974
Unique Number Verification Information from Input Date 10/01/1999

Angled Drill Hole

Well Contractor

Renner E.H. Well 71015 SIGAFOOS, G.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

242150

County Hennepin
Quad Excelsior
Quad ID 105A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 03/25/1992
Update Date 11/20/2017
Received Date

Well Name	Township	Range	Dir	Section	Subsection
GALPINS LAKE	117	23	W	34	DAABDA

Elevation 945 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
LOAM	0	1		
SANDY CLAY	1	20	YELLOW	
SANDY CLAY	20	30	BLUE	
BLUE CLAY MIXED	30	35		
SANDY CLAY	35	55	BLUE	
SAND AND COARSE	55	115		
FINE SAND AND	115	120		
FINE SAND SOME	120	130		
VERY FINE SAND	130	180		
FINE SAND	180	190		
SAND AND GRAVEL	190	195		
LIMESTONE	195	204		
SANDSTONE AND	204	261		
LIMESTONE	261	264		
LIMESTONE AND SAND	264	270		
LIMESTONE	270	350		
JORDAN SANDSTONE	350	460		
SANDY SHALE	460	468		

Remarks

CASING DEPTH/OPEN HOLE LENGTH FROM DNR COOPERATIVE GROUNDWATER MONITORING SITE

Well Depth 468 ft. **Depth Completed** 362 ft. **Date Well Completed** 12/03/1938

Drill Method Cable Tool **Drill Fluid**

Use observation well **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**

6 in. To 199 ft. lbs./ft.

Open Hole From 199 ft. To 362 ft.

Screen? ☐ **Type** **Make**

Static Water Level

65 ft. land surface Measure 01/09/1939

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer St.Peter-Jordan

Last Strat St.Lawrence Formation Depth to Bedrock 195 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 455369 Y 4971760

Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Layne Well Co. 27010

Licensee Business Lic. or Reg. No. Name of Driller

Appendix 2

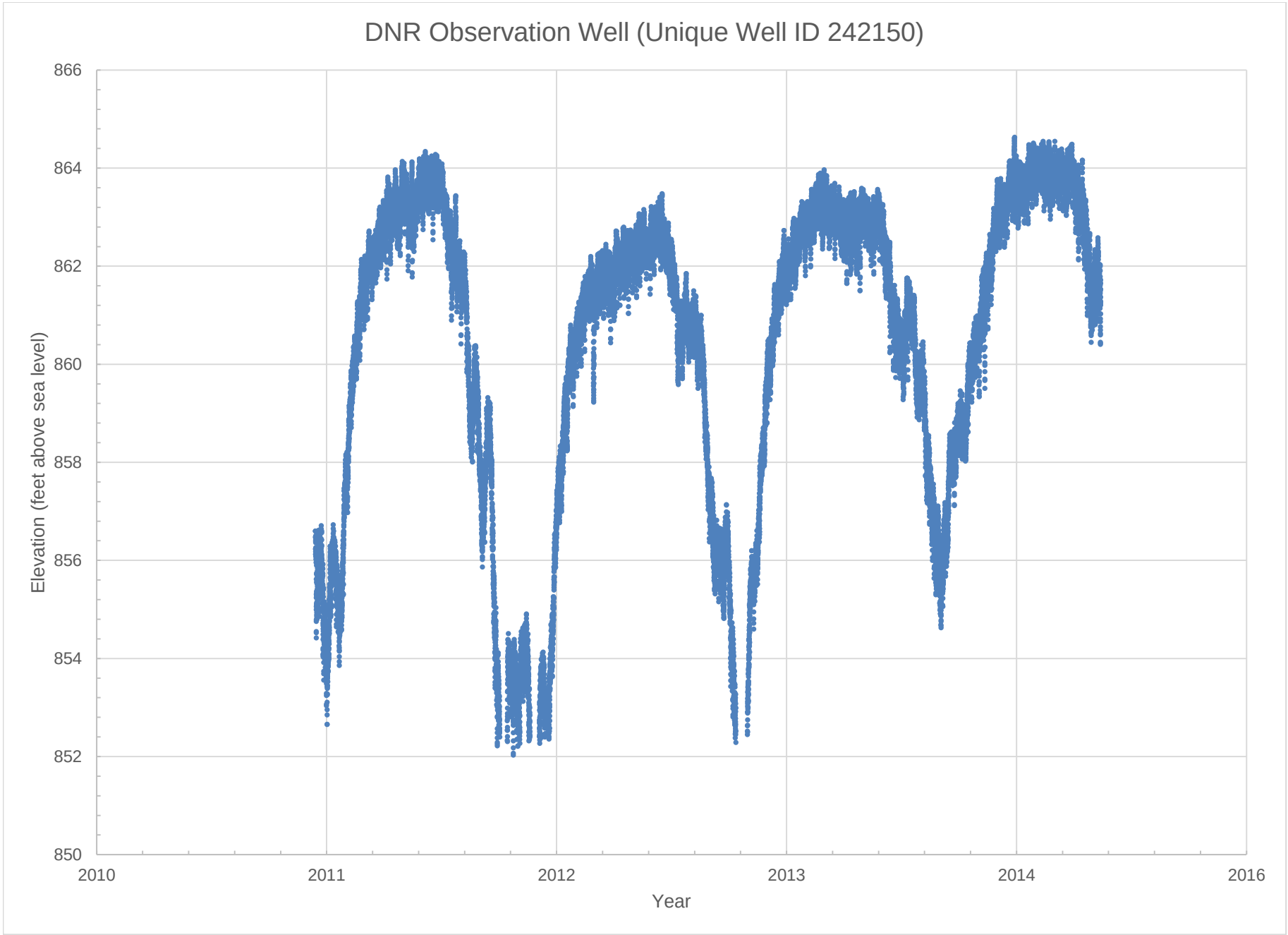
Water Level Monitoring Plan

City of Shorewood Future Water Level Monitoring Plan

Source	Monitoring Type	Frequency
Well 1	SCADA	Continuous
Well 3	SCADA	Continuous
Well 4	SCADA	Continuous
Well 5	SCADA	Continuous
Well 6	SCADA	Continuous
Well 7	SCADA	Continuous

Appendix 3

Water Level Graphs for Production and Observation Wells


DNR Observation Well (Unique Well ID 242150)
Elevation (feet above sea level)
866
864
862
860
858
856
854
852
850
2010
2011
2012
2013
2014
2016
Year

Appendix 4

Capital Improvements Plan

City of Shorewood, Minnesota

Capital Improvement Program

2016 thru 2025

PROJECTS BY FUNDING SOURCE

Source	#	Priority	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
402 - Park Improvements													
Freeman Plaza	P0100	5				5,000							*5,000*
Freeman North Playground Equipment	P0102	4					100,000						*100,000*
Freeman South Parking Lot	P0103	5		60,000									*60,000*
Freeman Skating Lights, Warming House & Grading	P0104	5		40,000									*40,000*
Freeman Park - Eddy Station	P0108	4							3,000				*3,000*
Cathcart Park - Resurface Tennis/Basketball Courts	P0200	1			9,000			9,000			10,000		*28,000*
Cathcart Park Hockey Boards	P0201	3					150,000						*150,000*
Cathcart Park Tot Lot	P0202	5			100,000								*100,000*
Badger Park - Phase I	P0300	3	640,000	400,000									*1,040,000*
Badger Park Tennis Courts	P0301	2			200,000			9,500			10,000		*219,500*
Badger Park - Phase 2	P0302	n/a				747,000							*747,000*
Manor Park - Shelter Outside Floor & Stoops	P0402	1					5,400						*5,400*
Silverwood Park-Resurface 1/2 court	P0500	2			2,500			2,500			3,000		*8,000*
Silverwood Park Equipment	P0501	3								100,000			*100,000*
Skate Park Rehab for Pickleball	P0600	3		50,000									*50,000*
402 - Park Improvements Total			**640,000**	**550,000**	**311,500**	**752,000**	**255,400**	**21,000**	**3,000**	**100,000**	**23,000**		***2,655,900***
403 - Equipment Replacement Fund													
UTV - replace unit 34	034	5					14,100						*14,100*
Tractor - Ford 3910	035	5		55,300									*55,300*
Flatbed - 4 x 2 Replace unit 49	049	5			39,200								*39,200*
Loader - Cat 930H	056	5								210,400			*210,400*
Trailer 18' replace unit 59	059	5					15,700						*15,700*
Sand Pro 3000 - replace Unit 64	064	2				9,000							*9,000*
Trailer 12' replace unit 69	069	5					5,000						*5,000*

Source	#	Priority	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Generator - Generac 163 KW	071	5										75,600	75,600
Groundsmaster Mower- Toro 328D - replace unit 75	075	2		27,100							32,300		59,400
Pickup 4x4 - Replace Unit 78	078	3			27,800								27,800
Pickup - 350 4x4 replace unit 81	081	5	30,400										30,400
Mower - Replace Unit 86	086	4						32,000					32,000
2010 4x4 Ford F350	090	5					33,600						33,600
Pickup 350 4x4 - replace unit 91	091	5							39,500				39,500
Dump Truck - Freightliner	092	5										221,200	221,200
Groundsmaster Mower replace unit 93	093	5		28,000							35,000		63,000
Loader - Cat 930H	094	5								250,000			250,000
Skid Steer - replace unit 97	097	5						37,600					37,600
Boom Truck	100	5	84,000										84,000
Chipper	101	5	45,000										45,000
MultiOne Trail Machine	103	1	54,900										54,900
Wash Bay	104	1	18,000										18,000
Cab for mower - replace A02	A02	3			7,600								7,600
Ag Tractor & Flail Mower	A06	4		41,200									41,200
Attach - Plow for Groundmaster	A08	4			6,200								6,200
Engine/Transmission Analysis Station	A09	n/a			4,500				5,000				9,500
Replace Sander	A10	3				9,500							9,500
Plow Blade & Snow Kit for Skid Steer	A11	3								4,700			4,700
Broom Attachment - Skid Steer replace A13	A13	5	5,600										5,600
Broom Attachment for MultiOne	A14	5	3,700										3,700
South Shore Community Center	PF-11-01	n/a	2,500	43,000	41,000			2,000					88,500
Public Works Roof	PF-12-01	n/a				81,000							81,000
City Hall LED Lighting	PF-16-01	n/a	38,000										38,000
Color Copier Replacement	T-13-03	2						10,000					10,000
Building Permit Software	T-16-01	2	20,000										20,000
800 Mhz Radio Replacement	T-19-01	2				9,500	9,800	10,100					29,400
Computer Upgrades	T-99-99	1	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000			80,000
403 - Equipment Replacement Fund Total			**312,100**	**204,600**	**136,300**	**119,000**	**88,200**	**101,700**	**54,500**	**475,100**	**67,300**	**296,800**	***1,855,600***
404 - Street Reconstruction Fund													
Summit Avenue	LR-15-06	5		32,000									32,000
Amlee Road	LR-16-01	5						332,000					332,000

Source	#	Priority	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Garden Road	LR-16-02	5	42,000										42,000
Gillette Curve	LR-16-03	5	35,000										35,000
Manitou Lane	LR-16-04	5						317,000					317,000
McKinley Place N & S	LR-16-05	5	65,000										65,000
Shady Hills Circle	LR-16-06	5	51,000										51,000
Glen Road East	LR-16-07	5						1,024,000					1,024,000
Lake Linden Dr - Guardrail	LR-16-08	5	30,000										30,000
Excelsior Blvd - Guardrail	LR-16-09	5	15,000										15,000
Echo Road	LR-17-01	5		71,000									71,000
Howards Point Road	LR-17-02	5		180,000									180,000
Kathleen Court	LR-17-03	5		22,000									22,000
Oak Ridge Circle	LR-17-04	5		29,000									29,000
Riviera Lane	LR-17-05	5		371,000									371,000
Shorewood Lane	LR-17-06	5		455,000									455,000
Mann Lane	LR-18-01	5			444,000								444,000
Maple Street	LR-18-02	5			100,000								100,000
Bayswater Road	LR-19-01	5				100,000							100,000
Boulder Circle	LR-19-02	5				49,000							49,000
Christmas Lane W	LR-19-03	5				32,000							32,000
Lilac Lane	LR-19-05	5				46,000							46,000
Strawberry Lane & W 62nd	LR-19-06	5			1,140,000								1,140,000
Vine Street	LR-19-07	5				33,000							33,000
Eureka Road N	LR-19-08	5				260,000							260,000
Birch Bluff Road	LR-20-01	5					107,000						107,000
Excelsior Blvd	LR-20-02	5					19,000						19,000
Seamans Drive	LR-20-03	5					629,000						629,000
West Lane	LR-20-04	5					32,000						32,000
Christmas Lane E	LR-21-01	5						21,000					21,000
Christmas Lake Road	LR-21-02	5						107,000					107,000
Country Club Road	LR-21-03	5						95,000					95,000
Chestnut Court & Chestnut Terrace	LR-22-01	5							58,000				58,000
Murray St	LR-22-02	5							82,000				82,000
Rampart Ct	LR-22-03	5							24,000				24,000
Silver Lake Trail	LR-22-04	5							47,000				47,000
Smithtown Circle	LR-22-05	5							25,000				25,000
Shady Island Circle, Point & Road	LR-23-01	5		116,000									116,000
Shady Island Trail	LR-23-02	5		128,000									128,000
Sylvan Lane	LR-23-03	5								28,000			28,000

Source	#	Priority	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Wild Rose Lane E & W	LR-23-04	5								842,000			842,000
Dellwood Lane	LR-24-01	5		42,000									42,000
Enchanted Cove	LR-24-02	5		24,000									24,000
Enchanged Drive	LR-24-03	5		72,000									72,000
Enchanted Lane	LR-24-04	5		127,000									127,000
Street Sign Replacement	LR-99-001	2	7,200	7,500	7,800	8,100	8,400	8,700	9,000	9,300	9,600		75,600
Maintenance-Bituminous Sealcoating	LR-99-100	1	245,000	184,000	238,000	305,000	274,000	255,000	248,000	275,000	323,000		2,347,000
404 - Street Reconstruction Fund Total			**490,200**	**1,860,500**	**1,929,800**	**833,100**	**1,069,400**	**2,159,700**	**493,000**	**1,154,300**	**332,600**		***10,322,600***
405 - MSA Road Reconstruction Fun													
Vine Hill Road Intersection Improvements	MSA-1701	n/a		200,000									200,000
05 - MSA Road Reconstruction Fund Total				**200,000**									***200,000***
406 - Trails													
Galpin Lake Rd Sidewalk	T003	1			1,330,000								1,330,000
Mill Street Trail	T004	1									735,000		735,000
From 7/41 to Chanhassen Trail	T005	1									123,750		123,750
Smithtown from Co Rd 19 to Regional Trail	T006	1	1,340,000										1,340,000
Strawberry Lane & W 62nd	T007	1			852,000								852,000
County Road 19 from Pub Works to Excelsior	T008	1									472,500		472,500
St. Albans Bay Rd	T009	1									405,000		405,000
Edgewood Road	T010	1									855,000		855,000
Grant Lorenz - Edgewood to Smithtown	T011	1									596,250		596,250
Howards Point Road - Smithtown to Edgewood	T012	1									900,000		900,000
Vine Hill Road - Waterford to Hwy 7	T013	1									596,250		596,250
Country Club Rd - Smithtown to Yellowstone	T014	1										517,500	517,500
406 - Trails Total			**1,340,000**		**2,182,000**						**4,683,750**	**517,500**	***8,723,250***
601 - Water Fund													
Air Compressor-Replace unit 38	038	3						20,000					20,000
Dump Truck - replace unit 72	072	5		90,450									90,450
Utility Truck w/crane & toolbox replace unit 76	076	5	40,000										40,000

Source	#	Priority	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Utility Vehicle - replace unit 77	077	4	18,700										18,700
Pick-up - 4 x 4 150 Replace Unit 80	080	5				27,500							27,500
Radio/ISP Communications System	W-10-01	1	80,000										80,000
Boulder Bridge Well Controls	W-12-03	5	175,000										175,000
SE Well - Exterior & Compressor	W-16-01	3	45,000										45,000
Boulder Bridge Building	W-17-01	3		85,000									85,000
Well House Water Meters	W-17-02	3		12,000	6,000	12,000	6,000						36,000
SE Well Dehumidifier	W-17-03	3		5,000									5,000
Boulder Bridge Well Motor	W-18-01	3			45,000								45,000
Boulder Bridge Deumidifier	W-19-01	3				5,000							5,000
601 - Water Fund Total			**358,700**	**192,450**	**51,000**	**44,500**	**6,000**	**20,000**					**672,650**
611 - Sanitary Sewer Fund													
Sewer Jetter - replace unit 60	060	5	140,000										140,000
Dump Truck - replace unit 72	072	5		90,450									90,450
Utility Truck w/crane & toolbox replace unit 76	076	5	60,000										60,000
Radio/ISP Communications - Lift Station Retrofit	SS-10-10	1	32,000										32,000
Lift Station 11 Rehab - 20465 Radisson Rd.	SS-13-01	3	190,000	→ 2018									190,000
Lift Station 10 Rehab - 4773 Lakeway Terrace	SS-15-01	3		90,000	→ 2019								90,000
Lift Station 20 Rehab - 26550 Noble Road	SS-16-01	3				135,000							135,000
Lift Station 7 Rehab - 5600 Woodside Road	SS-16-02	3			120,000	→ 2020							120,000
Lift Station 18 Rehab - 4996 Shady Island Point	SS-17-01	3		10,000									10,000
Infiltration and Inflow Reduction	SS-99-05	1	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000		630,000
611 - Sanitary Sewer Fund Total			**492,000**	**260,450**	**190,000**	**205,000**	**70,000**	**70,000**	**70,000**	**70,000**	**70,000**		**1,497,450**
631 - Stormwater Management Fund													
4" pump replace unit 50	050	5					45,500						45,500
Galpin Lake Rd Trail Stormwater	SS003	1			230,000								230,000
Amlee Road	STM-16-01	4						78,000					78,000
Manitou Lane	STM-16-02	4						75,000					75,000
Glen Road East	STM-16-03	4						241,000					241,000
Riveria Lane	STM-17-01	4		87,000									87,000
Shorewood Lane	STM-17-02	4		99,000									99,000

Source	#	Priority	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Mann Lane	STM-18-01	4			105,000								*105,000*
Maple St	STM-18-02	4			24,000								*24,000*
Eureka Road N	STM-19-01	4				452,000							*452,000*
Strawberry & W 62nd	STM-19-02	4			283,000								*283,000*
Seamans Drive	STM-20-01	4					148,000						*148,000*
Rampart Ct. Drainage	STM-22-01	1							11,880				*11,880*
631 - Stormwater Management Fund Total				**186,000**	**642,000**	**452,000**	**193,500**	**394,000**	**11,880**				***1,879,380***
GRAND TOTAL			**3,633,000**	**3,454,000**	**5,442,600**	**2,405,600**	**1,682,500**	**2,766,400**	**632,380**	**1,799,400**	**5,176,650**	**814,300**	***27,806,830***

Appendix 5

Emergency Telephone List

Emergency Telephone List
City of Shorewood

Emergency Response Team	Name	Work Telephone	Alternate Telephone
Emergency Response Lead	Larry Brown	952-960-7913	
Alternate Emergency Response Lead			
Water Operator			
Alternate Water Operator			
Public Communications	Julie Moore	952-960-7906	

State and Local Emergency Response Contacts	Name	Work Telephone	Alternate Telephone
State Incident Duty Officer	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
County Emergency Director	Hennepin County	612-596-0250	
National Guard	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
Mayor/Board Chair	Scott Zerby		
Fire Chief	Scott Gerber	952-960-1650	
Sheriff			
Police Chief	Mike Meehan	952-474-3261	
Ambulance	Ridgeview Medical Center	911	
Hospital	Ridgeview Medical Center	911	
Doctor or Medical Facility	Ridgeview Medical Center	952-442-2191	

State and Local Agencies	Name	Work Telephone	Alternate Telephone
MDH District Engineer	James Loveland	651-201-3710	
MDH	Drinking Water Protection	651-201-4700	
State Testing Laboratory	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
MPCA	Chuck Regan	651-757-2866	
DNR Area Hydrologist	Kate Drewry	651-259-5753	
County Water Planner	Joel Settles	612-348-6157	

Utilities	Name	Work Telephone	Alternate Telephone
Electric Company	Xcel Energy	1-800-895-4999	
Gas Company	CenterPoint Energy	612-372-4727	
Telephone Company			
Gopher State One Call	Utility Locations	800-252-1166	651-454-0002
Highway Department			

Mutual Aid Agreements	Name	Work Telephone	Alternate Telephone
Neighboring Water System	Chanhassen – Paul Oehme	952-227-1169	
Neighboring Water System	Minnetonka – Jim Malone	952-988-8410	
Emergency Water Connection	Chanhassen – Paul Oehme	952-227-1169	
Emergency Water Connection	Minnetonka – Jim Malone	952-988-8410	
Materials			

Technical/Contracted Services/Supplies	Name	Work Telephone	Alternate Telephone
MRWA Technical Services	MN Rural Water Association	800-367-6792	
Well Driller/Repair	E.H. Renner	763-427-6100	
Pump Repair			
Electrician			
Plumber			
Backhoe			
Chemical Feed			

Meter Repair			
Generator			
Valves			
Pipe & Fittings			
Water Storage			
Laboratory			
Engineering firm	WSB & Associates, Inc. Paul Hornby	952-960-7910	

Communications	Name	Work Telephone	Alternate Telephone
News Paper	Lakeshore Weekly News	952-843-0890	
Radio Station	MPR	651-290-1500	
School Superintendent	Dennis Peterson	952-401-5004	
Property & Casualty Insurance			

Critical Water Users	Name	Work Telephone	Alternate Telephone
Hospital Critical Use:	Ridgeview Medical Center	952-442-2191	
Nursing Home Critical Use:	BeeHive Homes of Excelsior	952-300-3275	
Public Shelter Critical Use:	Crisis Nursery	763-591-0400	

Appendix 6

Cooperative Agreements for Emergency Services

(No formal intercommunity agreements exist at this time.)

Appendix 7

Municipal Critical Water Deficiency Ordinance

City of Shorewood Critical Water Deficiency Ordinances

903.11 AUTHORIZED WATER SHUT OFFS.

In case of fire or alarm of fire, water may be shut off to insure a supply for the fire fighting; or in making repairs or construction of new works, water may be shut off at any time and kept shut off as long as necessary.

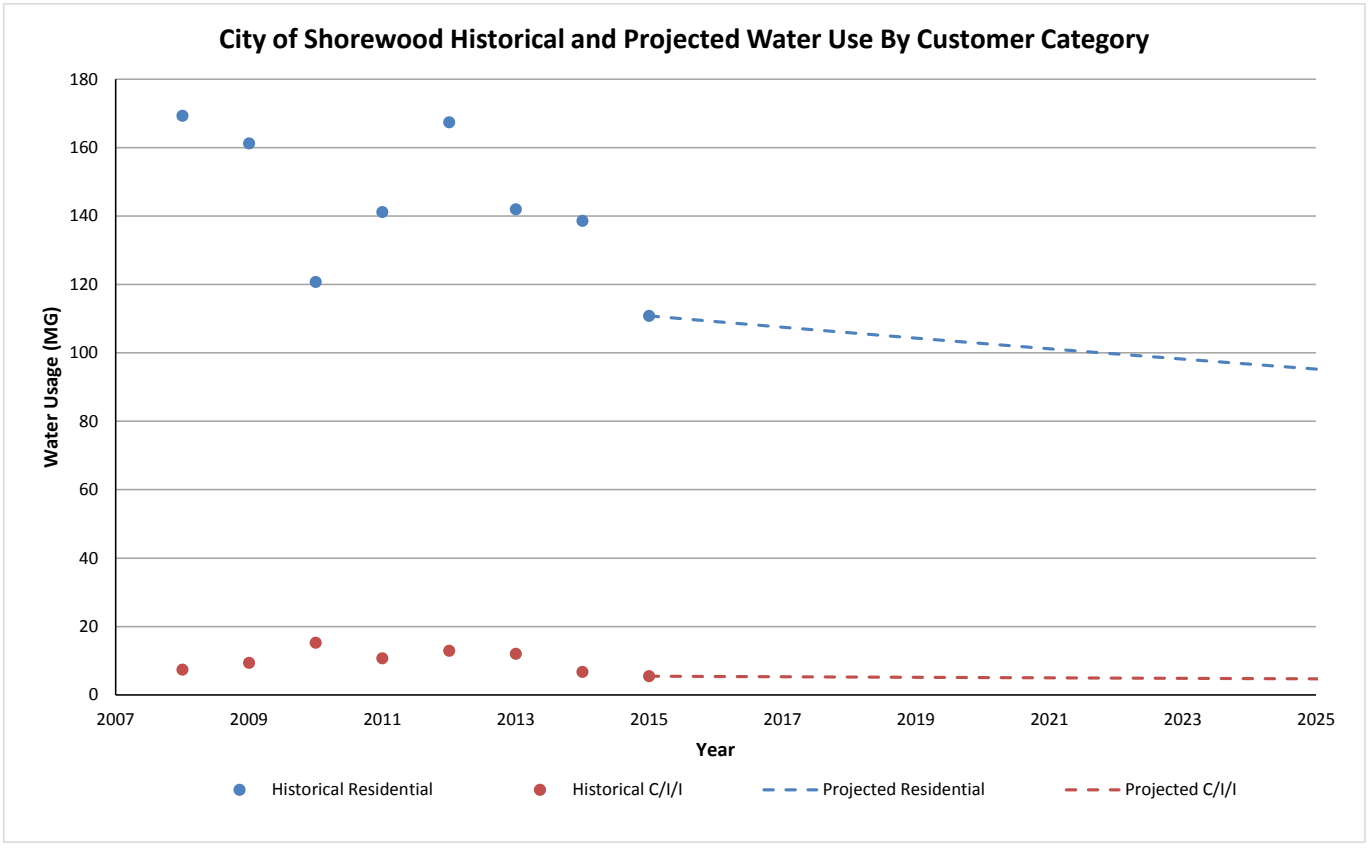
903.12 CONSERVATION MEASURES.

Subd. 1. Whenever the City Council shall determine that a shortage of water supply threatens the city, it may, by resolution, limit the time and hours during which water may be used from the water system for lawn and garden sprinkling, irrigation, car washing and other uses specified therein. Appropriate notice of the limitation shall be given prior to the enforcement thereof.

Subd. 2. To conserve water resources, prevent the wasteful and harmful effects of sprinkling during midday hours, and allow the city's water system adequate opportunity to replenish the water supply in the city's water storage tanks, certain limitations must be placed on the use of the city's water supply. During the period of May 1 through September 30 of any year, a person may only sprinkle or irrigate lawns, sod, seeded areas, gardens, shrubs, or other vegetation with city water in the city before 11:00 a.m. and after 4:30 p.m. Watering activities such as play toys, car washing and hand watering of flower beds are exempt, as long as the activity is continuously human attended.

Appendix 8

Graph Showing Historical and Projected Annual Water Demand for Each Customer Category


City of Shorewood Historical and Projected Water Use By Customer Category
Water Usage (MG)
180
160
140
120
100
80
60
40
20
0
2007
2009
2011
2013
2015
2017
2019
2021
2023
2025
Year
Historical Residential
Historical C/I/I
Projected Residential
Projected C/I/I

Appendix 9

Water Rate Structure

Water Rate Structure

City of Shorewood, MN

Water meters are read each quarter and the amount used is rounded to the nearest 1,000 gallons of usage and billed accordingly.

Quarterly Volume	Rate
Up to 5,000 gallons	$17.50 base rate
5,000 – 50,000 gallons	$2.95 per 1,000 gallons in excess of 5,000 gallons
Over 50,000 gallons	$4.25 per 1,000 gallons in excess of 50,000 gallons

Appendix 10

Adopted or Proposed Regulations to Reduce Demand or Improve Water Efficiency

City of Shorewood Ordinances or Regulations Related to Water Use

903.06 INSTALLATION AND CONSTRUCTION REQUIREMENTS AND SPECIFICATIONS.

…

Subd. 4. *Separate connections and meters.* No more than one housing unit or building shall be supplied from one service connection except by special permission of the City Council. Whenever two or more parties are supplied from one pipe, connecting with the distribution main, each building or part of the building must have a separate stop box and a separate meter.

…

903.08 METERS.

Subd. 1. *Meter use required.* Except for extinguishing of fire, no person except authorized city employees shall use water from the water supply system or permit water to be drawn therefrom unless the same be metered by passing through a meter supplied by the city.

…

903.09 WATER RATES AND CHARGES.

Subd. 1. *Rates and charges established.*

a. *Water service rates - quarterly rates.* The water rate due and payable to the city by each water user for water taken from the municipal water system shall be at a quarterly rate established by a ordinance of the City Council. Where service is for less than a quarterly period, the quarterly charge will be prorated on a monthly basis.

b. *Meter charges.* A charge for a water meter shall be made by the city. Property owners or users shall pay in advance before delivery of the water meter for installation. The charge shall be as established by the City Council by ordinance.

c. *Water turn on.* The established turn-on fee will be charged for turning on water where service has been shut off for nonpayment of water billings, failure to repair a leak, discontinuance of service, or other reason specified in this chapter.

d. *Estimated and adjusted rates.*

(1) In the event the water meter servicing any property is found to be operating in a faulty manner or to have become inoperative, the amount of water will be estimated in accordance with the amount previously used in comparable periods of the year.

(2) The City Council shall be authorized to make adjustments in water charges when the amount billed is erroneous due to a meter deficiency or other mistake.

e. *Rates outside city limits.* Rates due and payable by each water user located beyond the territorial boundaries of the city shall be determined by special contract.

Subd. 2. *Listing of accounts.* All accounts shall be kept on the books of the city in the name of the owner of the property served. All bills and notices sent out by the city shall be sent to the address of the property served. If nonresident owners or agents desire personal notice sent to a different address, they shall file an application therefore with the city. Any error in address shall be promptly reported to the city.

Subd. 3. *Bills for services, delinquencies, discontinuance, tax assessments.*

a. *Billing.* Statements for charges for water service for a quarterly period shall be mailed to each property owner or user on or before the tenth day of the first month following the end of the quarter and shall be due and payable on or before the last day of the months of January, April, July and October

following the quarterly period covered by the statement.

b. *Delinquencies.* After the last day of the month in which payment is due, a penalty of 10% of the unpaid account balance will be assessed and added to the amount due on the account. If the balance due on the account is not paid in full within 45 days of the day on which the account became due, a notice shall be sent to the property owner or user informing the property owner or user that the account is delinquent and that unless the account balance is paid in full within 15 days, the water may be shut off and the prescribed shut-off fee will be assessed.

c. *Discontinuance of service.* If the property owner or user does not respond to the notice given above, prior to the date indicated in the notice, and the statement remains unpaid, the water may be shut off at the curb stop. Prior to the water being turned back on again, the property owner or user shall be required to pay all delinquent charges, plus penalties and shut-off fees, and the prescribed turn-on fee.

d. *Appeals to discontinuance of service.* The property owner or user may appeal the notice to the City Council during the 15 day period set forth in Subd. 3(b). Water service shall continue to the appealing property owner or user pending the decision of the Council on the appeal. Upon the determination of the Council, the water may be shut off pursuant to Subd. 3(c) as set forth above.

e. *Tax assessments.* All delinquent accounts may be certified by the Clerk who shall prepare an assessment roll each year providing for assessment of the delinquent accounts against the respective property served. This assessment roll shall be delivered to the City Council for adoption prior to November 30 of each year and upon approval thereof, the Clerk shall certify to the County Auditor the amount due, plus a certification fee as established by ordinance of the City Council, and the County Auditor shall thereupon enter the amount as part of the tax levy on the premises to be collected during the ensuing year. The action may be optional or subsequent to taking legal action to collect delinquent accounts.

903.10 WATER CONNECTIONS SERVED BY ADJACENT MUNICIPALITIES.

The City Council has heretofore and will in the future enter into contracts with adjacent municipalities to provide water service to properties located within the city. All permits to be issued under this chapter shall comply with the terms of the agreements. In instances where the cost of the water hook-up from the supplying city is included in full or in part as a quarterly charge, then shall be added to the billing for the minimum quarterly water charge to be paid by the recipient.

903.11 AUTHORIZED WATER SHUT OFFS.

In case of fire or alarm of fire, water may be shut off to insure a supply for the fire fighting; or in making repairs or construction of new works, water may be shut off at any time and kept shut off as long as necessary.

903.12 CONSERVATION MEASURES.

Subd. 1. Whenever the City Council shall determine that a shortage of water supply threatens the city, it may, by resolution, limit the time and hours during which water may be used from the water system for lawn and garden sprinkling, irrigation, car washing and other uses specified therein. Appropriate notice of the limitation shall be given prior to the enforcement thereof.

Subd. 2. To conserve water resources, prevent the wasteful and harmful effects of sprinkling during midday hours, and allow the city's water system adequate opportunity to replenish the water supply in the city's water storage tanks, certain limitations must be placed on the use of the city's water supply. During

the period of May 1 through September 30 of any year, a person may only sprinkle or irrigate lawns, sod, seeded areas, gardens, shrubs, or other vegetation with city water in the city before 11:00 a.m. and after 4:30 p.m. Watering activities such as play toys, car washing and hand watering of flower beds are exempt, as long as the activity is continuously human attended.

903.13 RESTRICTED AND PROHIBITED ACTS.

Subd. 1. *Unauthorized turn on or shut off.* No person, except an authorized city employee or agent, shall turn on or off any water supply at the curb stop. A turn-on or shut-off fee in an amount equivalent to twice the prescribed fee shall be charged for the unauthorized turn on or shut off of any connection to the municipal water system.

Subd. 2. *Unauthorized use of hydrants, interference with system.* No person, other than employees or agents of the city, shall operate fire hydrants or interfere in any way with the water system.

Subd. 3. *Supplying water to others.* No person shall permit water from the water system to be used for any purpose except upon his own premises unless written consent is first obtained from the city.

903.14 DISCONTINUANCE OF SERVICE.

Water service may be shut off at any curb stop connection whenever:

Subd. 1. The owner or occupant of the premises served, or any person working on any pipes or equipment thereon which are connected with the water system, has violated, threatens to violate or causes to be violated, any of the provisions of this chapter.

Subd. 2. Any charge for water, service, meter or other financial obligation imposed on the present or former owner or occupant of the premises served is unpaid.

Subd. 3. Fraud or misrepresentation by the owner or occupant of the premises served in connection with an application for service.

903.15 MANDATORY HOOK UP, COMMERCIAL AND MULTIPLE-FAMILY RESIDENTIAL USERS AND CERTAIN RESIDENTIAL DEVELOPMENTS.

The owner of a property used for commercial purposes or for multiple-family residential purposes, involving four or more dwelling units, situated within the city and abutting on any street, alley or rightof-way in which there is located a municipal water trunk or lateral facility, is hereby required at its expense to connect to the facility in accordance with the provisions of this chapter within 90 days after the date of official written notice by the City Council to so connect. Single-family residential developments of more than three lots shall be required to connect to the municipal water system, at the developer's expense, based upon a determination by the City Engineer that the connection is feasible. The connection is considered feasible if the cost of providing water to the property line of the lots within the development does not exceed the connection charges, set forth in § 903.04, subd. 3. of this code, times the number of lots in the development.

903.16 RIGHT OF ENTRY POWERS.

Authorized city employees shall have free access at reasonable hours of the day to all parts of every building and premises connected to the water system necessary for reading of meters and inspection. City employees shall be properly identified and shall display the identification upon seeking admittance to the building.

1201.25 P.U.D., PLANNED UNIT DEVELOPMENT DISTRICT.

…

Subd. 4. *General requirements and standards*.

…

i. *Utility connections*.

(1) *Water connections*. Where more than one property is served from the same service line, a shutoff valve must be located in a way that each unit's service may be shut off by the city, in addition to the normally supplied shut-off at the street.

…

1201.26 S, SHORELAND DISTRICT.

…

Subd. 6. *Development regulations*.

…

c. *Water supply*. Any private supply of water for domestic purposes shall conform to Minnesota Department of Health Standards for water quality. Private wells shall be placed in areas not subject to flooding and up slope from any source of contamination. Wells already existing in areas subject to flooding shall be floodproofed in accordance with city standards.

…

Subd. 10. *Variance*. Variances may be granted by the City Council upon application as required in § 1201.05 of this chapter in extraordinary cases, but only when the proposed use is determined to be in the public interest and no variance shall be granted which the Council determines will or has a tendency to:

…

b. Result in compatible land uses or which would be detrimental to the protection of surface and ground water supplies;

Appendix 11

Implementation Checklist

City of Shorewood
Implementation Spreadsheet

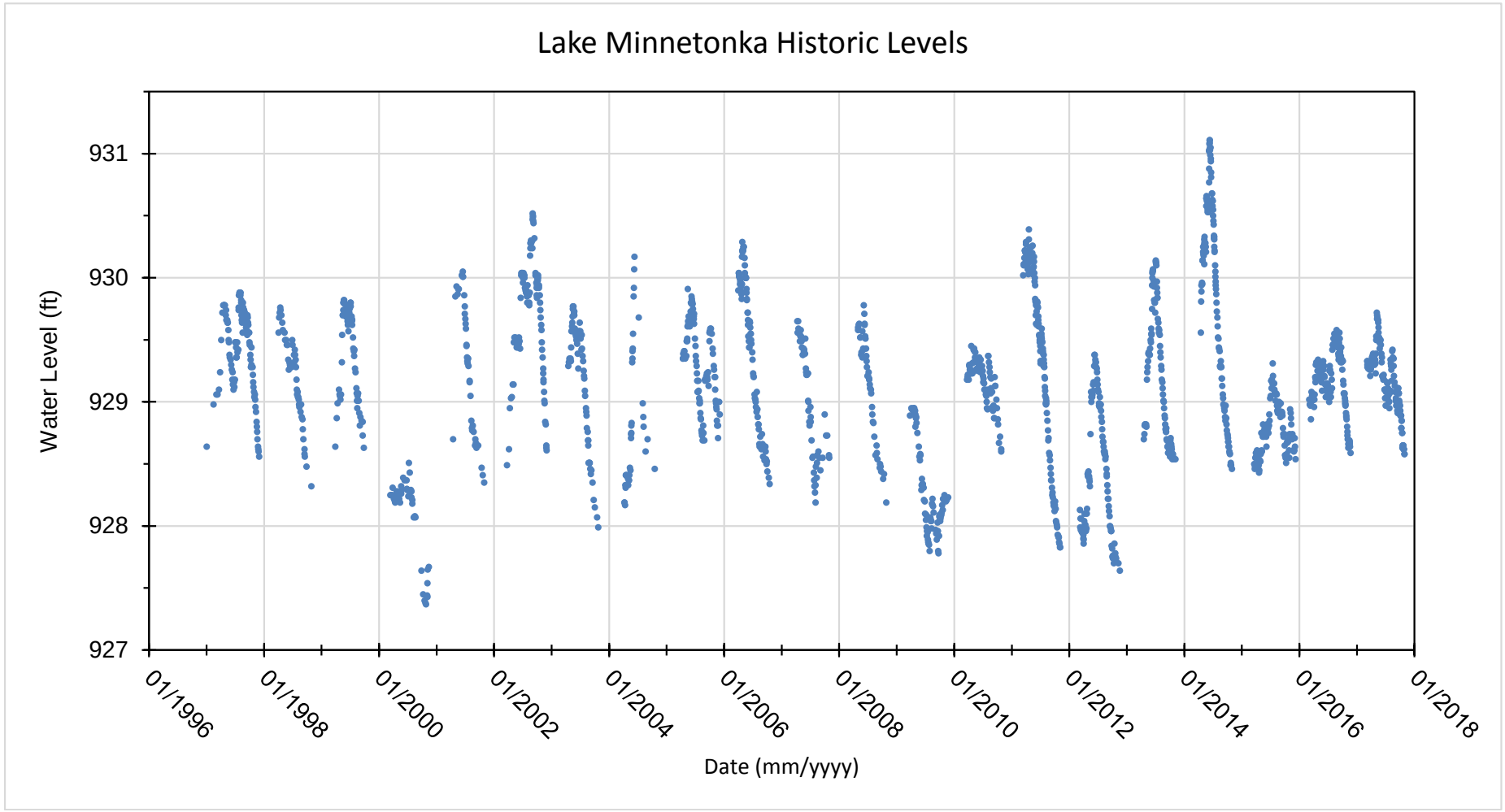
CITY OF SHOREWOOD

Action	Description	Timeframe				
		ongoing	annually	1-3 yrs	1-5 yrs	3-6 yrs
Review city ordinances/codes	To encourage or require water efficient landscaping.	✓				
Review city ordinance/codes	To permit water reuse options, especially for non-potable purposes like irrigation, groundwater recharge, and industrial use.		✓			
Revise ordinances to limit irrigation	Review outdoor irrigation installations codes to require high efficiency systems (e.g. those with soil moisture sensors or programmable watering areas) in new installations or system replacements					✓
Make water system infrastructure improvements		✓				
Provide rebates or incentives for installing water efficient appliances and/or fixtures	e.g. low flow toilets, high efficiency dish washers and washing machines, showerhead and faucet			✓		
Provide reabtes or incentives to reduce outdoor water use	e.g. turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use			✓		
Conduct audience-appropriate water conservation education and outreach		✓				
Conduct a facility water use audit	For both indoor and outdoor use, including system components		✓			
Install enhanced meters	Capable of automated readings to detect spikes in consumption	✓				
Install water conservation fixtures and appliances or change processes to conserve water	Toilets, faucets, etc.	✓				
Repair leaking system components	(e.g., pipes, valves)	✓				
Investigate the reuse of reclaimed water	(e.g., stormwater, wastewater effluent, process wastewater, etc.)		✓			
Reduce outdoor water use	(e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.)	✓				
Train employees how to conserve water	Include for new employee training	✓				
Increasing block rates billing strategy	Rate structure for Residential, Commercial, Industrial, and Institutional customers	✓				
Consider participating in the GreenStep Cities Program	Voluntary program to aid cities in achieving their sustainability and quality-of-life goals			✓		

Rainfall sensors required on landscape irrigation systems	Conserve water and reduce utility bill when there is a sufficient moisture for landscape area.	✓				
Watering restriction requirements	Odd/Even day watering	✓				
Billing inserts or tips printed on the actual bill	Educational information supplied as billing insert	✓				
Consumer Confidence Reports	Report of City's water quality		✓			
Direct mailings (water audit/retrofit kits, showerheads, brochures)	City is looking into using direct mailings to further educate residents on the benefits of water conservation.	✓				
K-12 Education programs (Project Wet, Drinking Water Institute, presentations)	Making programs to educate school age children on water resources.		✓			

Appendix 12

Sources of Information for Table 10


Lake Minnetonka Historic Levels
Water Level (ft)
931
930
929
928
927
01/1996
01/1998
01/2000
01/2002
01/2004
01/2006
01/2008
01/2010
01/2012
01/2014
01/2016
01/2018
Date (mm/yyyy)

APPENDIX F

Local Surface Water Management Plan

CITY OF
SHOREWOOD

Surface Water Management Plan

September 2018

Prepared For
City of Shorewood
5755 Country Club Road
Shorewood, MN 55331

WSB

WSB Project No. 02925-360

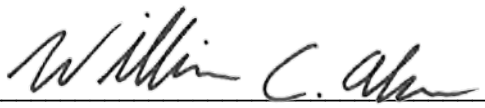
SURFACE WATER MANAGEMENT PLAN

CITY OF SHOREWOOD, MINNESOTA

September 2018

WSB Project No. 02925-360

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



Bill Alms, PE Lic. No. 54301

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Certification
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SECTION 4: ASSESSMENT OF PROBLEMS AND ISSUES
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BMP – Best Management Practice
CIP – Capital Improvement Projects
City – City of Shorewood
DNR – Department of Natural Resources
FEMA – Federal Emergency Management Agency
FHA – Federal Housing Administration
FIRM – Flood Insurance Rate Maps
GIS – Geographic Information System
HHPLS – Hydrologic, Hydraulic, and Pollutant Loading Study
HWL – High Water Level
LGU – Local Government Unit
LID – Low Impact Development
LMCD – Lake Minnetonka Conservation District
MCBS – Minnesota County Biological Survey
MCM – Minimum Control Measure
McRAM – Minnehaha Creek Routine Assessment Method
MCBS – Minnesota County Biological Survey
MCWD – Minnehaha Creek Watershed District
MLCCS – Minnesota Land Cover Classification System
MnDOT – Minnesota Department of Transportation
MOU – Memorandum of Understanding
MPCA – Minnesota Pollution Control Agency
MS4 – Municipal Separate Storm Sewer Systems
NOAA – National Oceanic Atmospheric Administration
NPDES – National Pollutant Discharge Elimination System
NURP – Nationwide Urban Runoff Program
NWI – National Wetland Inventory
OHWL – Ordinary High Water Level
PAHs – Polycyclic Aromatic Hydrocarbons
RPBCWD – Riley Purgatory Bluff Creek Watershed District
SMP – Storm Water Management Programs
SMS – Storm Water Management Studies
SWAMP – Stormwater Asset Management Program
SWMP – Surface Water Management Plan (also called the Plan)
SWPPP – Storm Water Pollution Prevention Plan
TMDL – Total Maximum Daily Load
WCA – Wetland Conservation Act

1. EXECUTIVE SUMMARY

1.1. Surface Water Management Plan Purposes

This Local Surface Water Management Plan (LSWMP, SWMP, the Plan) for the City of Shorewood (City) has been developed to meet local watershed management planning requirements of the Metropolitan Surface Water Management Act and Board of Water and Soil Resources Rules 8410. It has also been developed to be in conformance with the requirements of the local watershed districts, Metropolitan Council requirements, and applicable State and Federal laws. This document and its referenced literature is intended to provide a comprehensive inventory of pertinent water resource related information that affects the City and management of those resources.

1.2. Executive Summary

The Shorewood Surface Water Management Plan is divided into six sections:

- **Section 1 Executive Summary** provides background information and summarizes the contents of the plan.
- **Section 2 Land and Water Resource Inventory** includes a general description and summary of data related to precipitation, geology, topography, flood problem areas, water quality, land use, public utilities services, unique features, scenic areas, and pollutant source locations within the City among others.
- **Section 3 Agency Cooperation** describes the City's ordinances and other governmental controls and programs that affect water resources.
- **Section 4 Assessment of Problems and Issues** presents the existing and potential water resource related concerns within the City as well as corrective actions.
- **Section 5 Goals and Policies** outlines the City's goals and policies pertaining to water management.
- **Section 6 Implementation Program** outlines a prioritized listing of the studies, programs, and capital improvements that have been identified as necessary to respond to the water resource needs within the City.

The following appendices are included in the back of the plan:

- **Appendix A: Figures**
  A number of figures were developed to assist in summarizing the information provided in the plan. A list of the figures included in the appendix can be found in the Table of Contents.
- **Appendix B: Water Resource Related Agreements**
  This section contains copies of agreements that the City has entered into with other agencies regarding water resource management. More information on current City water resource related agreements can be found in **Section 1.3**.
- **Appendix C: Stormwater System Modeling Information**
  A summary of the stormwater model that was developed for the City is included in this appendix. This includes drainage areas, high water levels, and peak discharge rates.
- **Appendix D: Federal Emergency Management Agency (FEMA) Flood Insurance Study**
  This appendix contains the list of FEMA Flood Insurance Rate Maps (FIRM) applicable to the City, as well as additional information on how to obtain the most up-to-date data.
- **Appendix E: Municipal Separate Storm Sewer Systems (MS4) Permit Application and Storm Water Pollution Prevention Plan (SWPPP) Documents**
  A copy of the City's MS4 permit information is included in this appendix.

- **Appendix F: Minnehaha Creek Routine Assessment Method (McRAM) Data**
  In 2000, the Minnehaha Creek Watershed District (MCWD) completed a McRAM assessment of most of the City's wetlands. The results of this effort are summarized in this appendix.
- **Appendix G: P8 Water Quality Modeling Results**
  A water quality model has been prepared for the City. This report provides the modeled water quality results for inflow and outflow to stormwater basins within the City.
- **Appendix H: Problem Area Summary**
  A summary of the water resource problem areas within the City is provided here. These include past problem areas that have been addressed and areas that were noted as a private nuisance drainage concern by the City. A figure of the private nuisance drainage concerns is included in the Appendix as well.
- **Appendix I: Ordinances**
  The City's water resource related ordinances are included in this appendix. The most up-to-date ordinances are available on the City's website.
- **Appendix J: Phosphorus Removal Study**
  A cursory look at potential methods for phosphorus removal is presented in this appendix.
- **Appendix K: Water Quality Data**
  Selected water quality data from outside agencies is provided in this appendix.
- **Appendix L: Publicly Owned Stormwater BMP Inventory**
  Inventory of stormwater BMPs owned by the City with location information.

Additional material is referenced within this report and is available from the Engineering Department.

This document is expected to be a ten-year Water Resource Management Plan, after which time this plan should be updated in conjunction with the City's Comprehensive Plan. However, if significant changes to the plan are deemed necessary prior to that date the City may revise this plan in its entirety.

1.3. Water Resource Related Agreements

The City currently has multiple water resource related agreements with the MCWD and RPBCWD. Before 2018, all local government unit (LGU) responsibilities within the City for the Wetland Conservation Act (WCA) were handled by MCWD. In 2018, a resolution was passed by the City which defers the authority and administrative responsibilities to implement the WCA as the LGU to the RPBCWD within the legal boundaries of the RPBCWD. MCWD will continue to act as the LGU for WCA matters within their legal boundary. In 2009, a Memorandum of Understanding (MOU) was adopted by the City which memorializes the City and the MCWD's roles in implementing water resource protection and management with the City. In 2018, a MOU was adopted which stated the City and the MCWD would work together to solve several large-scale water related issues within the City. A copy of each of these water resource related agreements can be found in **Appendix B**.

2. LAND AND WATER RESOURCE INVENTORY

In conformance with the Metropolitan Surface Water Management Act and as required in Minnesota Rules Section 8410.0060, this section of the plan provides a general description and summary of the climate, geology, surficial topography, surface and ground water resource data, soils, land use, public utilities services, water-based recreation, fish and wildlife habitat, unique features, scenic areas, and pollutant sources. This section also identifies where detailed information can be obtained for many of these areas of concern.

2.1. Location

The City of Shorewood is 13.3 square miles and located in southwestern Hennepin County (**Figure 1, Appendix A**). More than half of the City is covered in water. Lake Minnetonka borders the City to the north and west. The City is also bordered by Tonka Bay, Excelsior, Greenwood, and Deephaven to the north. Minnetonka borders the City to the east and Victoria and Chanhassen create the southern border. The City lies within two major watershed districts, MCWD and RPBCWD (**Figure 2, Appendix A**).

2.2. Climate and Precipitation

2.2.1. Climate

The climate within the Minneapolis/St. Paul metropolitan area is described as a humid continental climate with moderate precipitation, wide daily temperature variations, warm humid summers, and cold winters. The total average annual precipitation is approximately 31 inches, of which approximately one-third occurs in the months of June, July, and August. The annual snowfall average is about 54 inches, which is equivalent to approximately 5.4 inches of water. Average monthly temperature and precipitation are shown in **Table 2-1**.

2.2.2. Precipitation

In 2013, the National Oceanic Atmospheric Administration (NOAA) published the Atlas 14 Precipitation-Frequency document which showed an increase in rainfall intensity from the previously referenced Technical Paper 40 precipitation values. The City uses the Atlas 14 precipitation data for design purposes. A rainfall event having a 99% chance of occurrence in a given year over a 24-hour period is approximately 2.9 inches. A rainfall event having a 1% chance of occurrence in a given year over a 24-hour period is approximately 7.83 inches. The 1%, 10-day snowmelt runoff is 7.2 inches. Additional climatological information for the area can be obtained from the National Weather Service website or from the State Climatologist website.

2.3. Geology and Topographic Information

2.3.1. Geology

The bedrock geology of the area mainly consists of St. Peter Sandstone, Prairie du Chien Group, St. Lawrence and Franconia Formations, and Jordan Sandstone. The City lies within the glacial till deposits left after the retreat of the Des Moines lobe and Grantsburg sub-lobe. The material making up this area is loamy, clayey till underlain with stratified sediment from the Superior lobe. Most of the lakes (including Lake Minnetonka) are in depressions created by the melting of buried glacial ice remnants.

Water tables in Shorewood are the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mt. Simon-Hinckley aquifers. The water table is located approximately 700-800 feet above sea

level.

Additional information on City geology may be found in the Water Resource Reference Library at City Hall.

Table 2-1 Average Monthly Temperature and Precipitation Data for City

Months	**Average Temp** (F°)	**Precipitation** (inches)	**Snowfall** (inches)
January	15.6	0.9	12.2
February	20.8	0.77	7.7
March	32.8	1.89	10.3
April	47.5	2.66	2.4
May	59.1	3.36	0
June	68.8	4.25	0
July	73.8	4.04	0
August	71.2	4.3	0
September	62	3.08	0
October	48.9	2.43	0.6
November	33.7	1.77	9.3
December	19.7	1.16	11.9
Totals	**46.2**	**30.61**	**54.4**

Source: Midwestern Regional Climate Center, Minneapolis/St. Paul Airport (2017)

2.3.2. Topography

The landscape within the City is generally described as irregular, rolling hills interspersed with level and/or wet depressions. The specific drainage patterns, which depict topography for areas within the City, are shown on the subwatershed delineation map (**Figure 3, Appendix A**). As can be observed from the subwatershed delineation map, the City is divided into many small watersheds. The subwatershed delineations used City topographic mapping, storm sewer as-builts, aerial photos, and field investigations. There are a number of landlocked depressions within the City which are recognized by the MCWD. However, as a result of recent investigations, existing outlets have been discovered for some of these basins previously identified as landlocked.

The lowest point within the City is approximately 890 feet above sea level. The high point in the City is approximately 1,060 feet above sea level. One-foot topographic information for all areas within the City has been completed and is the source by which these watersheds were delineated.

2.4. Surface Water Resource Data

Available surface water resource data within the City is summarized in this section. Detailed information has been included either in the appendices of this report or has been identified by reference and is available in the Water Resource Library at Shorewood City Hall and from the MCWD or RPBCWD.

The hydrologic system of the City consists of wetlands, streams, and major water bodies as outlined below.

2.4.1. Wetlands

The general locations of wetlands within the City are shown in **Figure 4, Appendix A**. This figure shows the location of wetlands identified by the National Wetland Inventory (NWI) and also shows the DNR Public Waters. These wetlands provide habitat to many species of plants and animals.

In 2003, the MCWD completed a functional assessment of the wetlands within the City. The results of this assessment are included in **Appendix F**. The location of the wetlands classified in the MCWD assessment are shown in **Figure 5, Appendix A**.

2.4.2. Major Bodies of Water

There are several major water bodies that convey and store water within and through the City including Lake Minnetonka, Christmas Lake, Silver Lake, Lake William, Mary Lake, Galpin Lake, Como, Lake Virginia, and Footprint Lake (**Figure 4, Appendix A**). More information about these water bodies in included in various portions of this section.

2.4.3. Hydrologic Modeling (Water Quantity)

Stormwater in the City is directed to the storm sewer system which discharges water to the various ponds and lakes within the City. The City is divided into approximately 16 distinct watersheds. These areas are shown on **Figure 3, Appendix A**. **Figure 18, Appendix A** shows the storm sewer system and the stormwater ponds within the City, both public and private. **Appendix L** includes an inventory of publicly owned stormwater Best Management Practices (BMPs).

The hydrologic/hydraulic modeling effort quantifies the 1-year and 100-year rainfall events, peak discharge rates, storage requirements, other pertinent hydrologic/hydraulic information for stormwater retention areas, and trunk stormwater conveyance systems within the City. The hydrologic/hydraulic modeling results are included as **Appendix C**. The City plans to update the existing hydrologic/hydraulic model to Atlas 14 precipitation data and updated land use within the next few years. RPBCWD has expressed interest in partnering with the City when the City-wide model is updated to gain additional detail on the hydrodynamics and hydraulics within the Silver Lake subwatershed.

Additional information regarding hydrologic modeling within the City can be found in the following documents:

- Comprehensive Storm Water Study; OSM, 1975.
- Hydrologic Analysis of Glen Road – County Road 19 subwatershed; Eugene Hickok & Associates, 1988.
- Draft Feasibility Report in Storm Water Improvements and Appurtenant Work for Glen Road and County Road 19; OSM, 1997.
- Gideons Bay / Glen Road Stormwater Management Plan; WSB, 2001.
- CSAH 19/lSmithtown Road/Country Club Road Hydraulic Report; WSB, 2002.

The MCWD also has a hydrology and hydraulics model which provides information on regional flood elevations and hydraulics for the City to use as reference. The 100-year high water level (HWL) for Lake Minnetonka is 931.5 as determined by the MCWD. This water body was not analyzed as part of the City's modeling efforts.

The RPBCWD has a hydrology and hydraulics model which provides information on regional flood elevations for the Silver Lake portion of the City, and is used as a resource by the City. The Ordinary High Water Level (OHWL) for Silver Lake is 898.1 as determined by the DNR.

2.5. Water Resource Problem Areas

As the City continues to be developed and redeveloped, drainage issues become more and more pressing. The western half of the City has minimal vacant land available for new stormwater control and treatment. Therefore, drainage issues will likely guide proposed capital improvement projects and the City will look for innovative ways to add stormwater storage. The problem areas to be addressed by the City are shown on **Figure 6, Appendix A**.

As a result of two heavy rainfall events in the fall of 2005, the City compiled a list of 51 reported problem areas. A supplemental report added another 12 areas the following year. The majority of the areas were determined to be areas of nuisance flooding. Most of the areas that represented potential safety problems have been addressed by the City. These reports are included in **Appendix H** along with a figure showing the location of unresolved private nuisance water resource problem areas identified by these reports.

2.6. Water Quality Data

2.6.1. Overview

Water quality data for the City has been obtained from the Minnesota Pollution Control Agency (MPCA) Environmental Data Access website.
This database is utilized by participating agencies to compile water quality testing data and is almost entirely used for the storage of water quality parameters.

Figure 7, Appendix A shows the location of monitoring sites listed on the MPCA website. Average water quality information for each is summarized in **Table 2-2**.

Table 2-2 Water Quality Summary for Shorewood Lakes

	Mean Total Phosphorus (ppb)	Mean Chlorophyll a (ppb)	Secchi Disk (meters)	Carlson Trophic Status
Lake Minnetonka (Upper Lake)	26	10	3	Eutrophic
Lake Minnetonka (St. Albans Bay)	32	3.5	4	Mesotrophic
Christmas Lake	13	2	64	Mesotrophic
Galpin Lake	NA	NA	1.4	Hypereutrophic
Silver Lake	112	49	1.7	Hypereutrophic

There are currently three water bodies within the City that are considered impaired by the MPCA: Lake Minnetonka, Silver Lake, and Christmas Lake. The City discharges water to Lake Minnewashta and Lake Virginia, which are impaired waters located outside the City. Detailed information for the impairments of these waterbodies can be found in **Section 4**.

2.6.2. Water Quality Modeling Data

The MCWD completed a water quality model in 2003 as part of their Hydrologic, Hydraulic, and Pollutant Loading Study (HHPLS). This study represents the most up to date water quality information available for the City. Prior to this, a water quality model had been developed for the City. This information includes annual and seasonal pollutant loading calculations for the subwatersheds within the City. The results of the previous modeling effort are not included in this report, but are available in the City's Water Resource Library.

2.6.3. Stormwater Asset Management Program (SWAMP)

The City uses WSB's SWAMP to monitor stormwater BMPs throughout the City for water quality concerns. The program gives each BMP a score based on its estimated total suspended solids and total phosphorus removal efficiencies using survey data. The City uses SWAMP to determine which BMPs require maintenance and will be the most effective use of resources to restore.

2.7. Flood Insurance Studies/Floodplain Management

FEMA FIRM maps have been compiled for the City and is included in **Appendix D** of this plan. These FIRM maps were updated in 2016 by FEMA. **Figure 8, Appendix A** shows the extent of the FEMA floodplain within the City boundary. The City of Shorewood Floodplain Management Ordinance is included in **Appendix I**. This ordinance states that structures cannot be built within the 100-year floodplain as defined on the FEMA FIRM maps.

The City has adopted Floodplain Management Regulations to reduce risk to public health, property, and general welfare. A copy of these regulations can be found on the City's website. These regulations prohibit uses or activities within the floodplain or floodway that include structures or fill or that obstruct flood flows or cause increased flood elevations.

2.8. Shoreland Management

A Shoreland Management Ordinance has been developed by the City and is included in **Appendix I**. This ordinance requires building setbacks to be 50-150 feet, depending on the water body classification, and can be found on the City's website.

2.9. Private Development Stormwater Maintenance

Stormwater management ponds constructed on private development are required to be covered by drainage and utility easements that are dedicated to the City. Developers are required to submit an operations and maintenance plan for proposed stormwater BMPs. Current and future landowners are required to maintain the stormwater BMPs including but not limited to removing trash and debris, inspecting inlets and outlets, removing sediment buildup and stabilizing and restoring eroded areas. In the event the landowner fails to maintain the stormwater BMP in good working condition acceptable to the City, the City may enter the property and correct any deficiencies. The City will start an inventory of private stormwater management facilities following the approval of this Plan.

2.10. Groundwater Appropriations

Within the City, municipal wells serve the City's water needs. Each of these wells has a groundwater appropriation permit from the DNR. **Figure 9, Appendix A** shows the locations of all sites within the City covered by a DNR Water Appropriations Permit. If private residents install a well within the RPBCWD boundary, the resident would be required to obtain a groundwater appropriation permit from the RPBCWD in addition to the groundwater appropriation permit from the DNR.

2.11. Groundwater Resource Data

The City is underlain by the Mt. Simon-Hinckley aquifer, the western edge of the Prairie du Chien-Jordan aquifer, and the Franconia-Ironton-Galesville aquifer. The depth of these aquifers is approximately 750, 875, and 850 feet above sea level, respectively.

Based on the Geologic Atlas of Hennepin County, the groundwater system has a low sensitivity to pollution with very highly sensitive areas near Lake Minnetonka.

The City's Wellhead Protection Plan discusses possible connections between surface water and groundwater in the City. Tritium is an element associated with nuclear bomb testing in the 1950s and 60s and is used as a tracer of surface water and groundwater interactions. Tritium is not a health concern but trace amounts of tritium in the drinking water for the City indicates a likely surface water connection to groundwater. Further discussion on the interaction between the surface water and groundwater can be found in Part II of the Wellhead Protection Plan which can be found at City Hall.

Additional groundwater resource information for the City may be found in the Water Resources Library at City Hall in the Hennepin County Geologic Atlas (1989). The Minnesota Geological Survey is in the process of updating Hennepin County's Geologic Atlas. The City will update its groundwater resource data with the new Hennepin County Geologic Atlas information as necessary.

2.12. Wellhead Protection Plan

The Minnesota Department of Health completed Part I of Shorewood's Wellhead Protection Plan in October in 2011. In 2015, Part II of the Wellhead Protection Plan was submitted and approved by the Metropolitan Council. A copy of the Wellhead Protection Plan can be found at City Hall. The City is currently drafting a Wellhead Protection Implementation Plan which will be put in place once completed. **Figure 10, Appendix A** shows the location of wellhead protection areas as well as drinking water supply vulnerability.

2.13. Soils Information

The City consists mostly of Hayden-Cordova-Peaty muck association and Lester-Peaty muck association. These soils developed from glacial till and range from well-drained (Hayden and Lester) to poorly-drained (Cordova and Peaty Muck).

Using the Hennepin County Geologic Atlas, the hydrologic soil classification map for the City was developed and is shown on **Figure 11, Appendix A**. The soils for the City have been classified into four hydrologic soil groups defined as follows:

Group A – These soils have high infiltration rates even when thoroughly wetted. The infiltration rates range from 0.3 to 0.5 inches per hour. These soils consist chiefly of deep, well drained to excessively drained sands and gravel. These soils have a high rate of water transmission, therefore resulting in a low runoff potential.

Group B – These soils have moderate infiltration rates ranging from 0.15 to 0.30 inches per hour when thoroughly wetted. These soils consist of deep moderately well to well drained soils with moderately fine to moderately coarse textures.

Group C – These soils have slow infiltration rates ranging from 0.05 to 0.15 inches per hour when thoroughly wetted.

Group D – These soils have very slow infiltration rates ranging from 0 to 0.05 inches per hour when thoroughly wetted. These soils are typically clay soils with high swelling potential, soils with a high permanent water table, soils with a clay layer at or near the surface, or shallow soils over nearly impervious material.

Additional information on the geology and soil for this area can be obtained in the Hennepin

County Geologic Atlas.

2.14. Land Use and Public Utilities Services

The City's land use practices generally include residential, commercial, public, semi-public, and water. Land use information is available from the City. **Figure 12, Appendix A** shows the Minnesota Land Cover Classification System (MLCCS) land cover for the City. **Figures 13** and **14, Appendix A** show the existing and future land use map for the City, respectively. **Figure 17, Appendix A** shows Shorewood's City-owned parcels. The following municipal facilities are considered City owned facilities that contribute pollutants to stormwater discharges and are inspected quarterly:

- City Dump Site
- Organic Material Storage
- Public Works and Park Maintenance Storage

There is very little developable vacant land within the City, so no-large scale changes are expected in land use or drainage patterns. For this reason, **Figure 3, Appendix A** is considered both the current and future drainage patterns map for the City. When the City's hydrologic/hydraulic model is updated for Atlas 14 precipitation, if changes to the drainage patterns are found an updated drainage routing map will be made. Additionally, when the hydrologic/hydraulic model is updated to Atlas 14 precipitation, updates to the list of potential drainage problem areas will be made if necessary.

The following definitions of redevelopment and single-family home development apply to the entire Plan. Redevelopment is defined as any development on one or more lots where the land use is being altered or a structure is being torn down and rebuilt. Single-family home redevelopment is defined as a subsection of redevelopment where a residential home is being torn down and rebuilt.

There are opportunities for redevelopment within the City. The over 100-acre Minnetonka Country Club property is in the process of being redeveloped into a residential development, which will include 142 units of low density residential. Additional information on the redevelopment of the Minnetonka County Club can be found on the City's website. The five-acre Xcel Energy site located south of the Lake Minnetonka LRT and east of County Road 19, if redeveloped, may be suitable for higher density housing or some sort of mixed use development. Additional information on this redevelopment opportunity can be found in the City's 2040 Comprehensive Plan. Similarly, and likely sooner, the northwest quadrant of the intersection of Smithtown Road and County Road 19 (Smithtown Crossing) is viewed as being an excellent redevelopment site. Again, a mixed-use approach to that area should be used. Additional information on the Smithtown Crossing redevelopment potential can be found in the Smithtown Crossing Redevelopment Study from 2012.

2.15. Public Areas for Water Based Recreation and Access

Lake Minnetonka is the major water body that borders the City to the north. This lake offers water-based recreation for fishing, boating, and swimming. Other lakes within the City include Christmas Lake, Silver Lake, and Galpin Lake. Galpin Lake extends into the City of Excelsior. Christmas Lake has boat access and has been stocked with rainbow trout by the DNR consistently for the last several years.

Smaller lakes and wetlands include Spray Island Marsh and other unnamed wetlands and lakes. The variety of water bodies within the City offer a great abundance of water-based recreation opportunities.

2.16. Fish and Wildlife Habitat and Unique Features

The abundance of lakes and wetlands in the City provide much fish and wildlife habitat. Lakes within the City contain walleye, northern pike, sunfish, trout, perch, bass, and bluegill. Christmas Lake is one of the few lakes in the Metropolitan Area that can support a two-story fishery, which means it can support both cold and warm-water species of fish.

Rare plant and animal species are present within the City. Red-shouldered hawks, blanding's turtles, fox snakes, least darter, and the pugnose shiner have all been observed in or around the City of Shorewood. No formal biological studies or State Management Plans have been completed within the City of Shorewood. **Figure 15, Appendix A** shows the MCWD key conservations areas, Minnesota County Biological Survey (MCBS) moderate biodiversity areas, and areas within City limits that are in the Metropolitan Conservation Corridor.

A portion of Silver Lake supports wild rice along the southern half of the eastern shore. Silver Lake is one of the only urban lakes in Minnesota that can support wild rice

Unique features and scenic areas include State-designated Scientific and Natural Areas, designated scenic areas, areas containing rare and endangered species, biologically diverse areas, and historic areas.

The City has a number of natural areas, water bodies, and city/regional parks. Areas of interest include Lake Minnetonka, Christmas Lake, and Crescent Beach. The City has no Scientific and Natural Areas or wild and scenic rivers as defined by the State, although the City has designated the Gideon Glen wetland as a conservation area. Restoration of this site has provided educational opportunities for the public.

2.17. Pollutant Source Locations

Pollutant sources have been identified by the MPCA and the location of these sites are shown in **Figure 16, Appendix A**. These pollutants include tanks and spills, leak sites, spill emergency response, and information from the MPCA Master Entity System.

Additional information on the pollution sources within the City is available in the City's Water Resource Library.

2.18. NPDES Phase II

The MPCA implemented the National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Program in March 2003. Phase II requires MS4s in Census Bureau defined urbanized areas to obtain an NPDES Phase II permit. Permits for construction sites greater than one acre will also be required as part of the Phase II. The City has submitted its SWPPP and Notice of Intent in conformance with the MPCA guidelines. The application that was sent to the MPCA is included in **Appendix E**. An inventory of city owned facilities is also included in **Appendix E**.

2.19. Key Conservation Areas

The MCWD has identified several Key Conservation Areas and the locations of these areas are shown on **Figure 15, Appendix A**.

A small portion of the area north of Lake Virginia (the upland portion) has been developed; however, a Conservation Easement has been obtained for the remainder of the area.

Further detail on the City's efforts to protect and conserve the hydrologic and ecologic values of these areas is presented in **Section 5**.

3. AGENCY COOPERATION

There are a number of other local, state, and federal agencies that have rules and regulations related to stormwater management. Through this strategy, the City recognizes these other agencies' role in this endeavor and will cooperate and coordinate with these agencies as necessary.

This Plan is in conformance with but does not restate all other agency rules that are applicable to water quality and natural resource protection. The other agency rules and policies include rules, policies, and guidelines associated with the following organizations:

- Minnesota Department of Health
- Minnesota Pollution Control Agency
- Board of Water and Soil Resources and the Wetland Conservation Act
- Minnesota Department of Natural Resources
- US Army Corps of Engineers
- Minnesota Department of Agriculture
- US Fish and Wildlife Service
- Minnehaha Creek Watershed District
- Riley Purgatory Bluff Creek Watershed District
- Lake Minnetonka Conservation District

While these other agency rules, policies, and guidelines are not all restated in this Plan, they are applicable to projects, programs, and planning within the City. Projects within each watershed district must meet requirements from the necessary watershed district in addition to any City requirements. The Minnesota Stormwater Manual, which is a document intended to be frequently updated, is incorporated by reference into this Plan and can be found on their website.

3.1. Personal Contacts

To implement this Plan, a coordinated water resource management approach must be used. This approach utilizes the services of staff personnel within the City and surrounding communities, as well as staff associated with the various Watershed Districts having jurisdiction over areas within the City.

The primary implementation responsibility will lie with the appropriate staff members at the City. Assistance from the surrounding municipalities and Watershed Districts will also be anticipated. Outlined below are the names, addresses, telephone numbers, and website address for personnel having responsibilities for overseeing or implementing various aspects of the Plan.

City of Shorewood
Alyson Fauske, PE
City Engineer
5755 Country Club Road
Shorewood, MN 55331-892
(952) 960-7910

www.ci.shorewood.mn.us

Minnehaha Creek Watershed District
Becky Christopher
Lead Planner
15320 Minnetonka Blvd
Minnetonka, MN 55345
(952) 641-4512
www.minnehahacreek.org

Riley Purgatory Bluff Creek Watershed District
Dr. Claire Bleser
Administrator
18681 Lake Drive East
Chanhassen, MN 55317
(952) 687-1348
http://www.rpbcwd.org/

3.2. Minnehaha Creek Watershed Coordination Plan

MCWD requests that local government units establish a coordination plan that the LGU and MCWD can implement at a staff level to achieve common goals. Some of these goals include:

- Maintaining awareness of needs and opportunities between the City and MCWD
- Implementing programs and projects that meet the needs of all partners, align financially, and are a part of the overall watershed planning effort.

Improving coordination between land use planning at the City and watershed planning at MCWD will result in better projects that meet agency goals and are a more efficient use of public funds. Coordination and collaboration between entities is key to constructing cost effect BMPs to manage water quality concerns and preserve the City's natural resources in the future.

The following is a summary of the coordination plan, which will be adjusted and expanded as deemed appropriate by the City and MCWD during project implementation. It is anticipated that the City Administrator, Public Works Director, and Planning Director will be the primary contacts for the coordination plan.

- Annual meeting – City staff members will meet during the summer to review NPDES MS4 reports and activity from the previous year. Staff will also discuss draft Capital Improvement Plans for each entity for the upcoming year. It is anticipated that the City Administrator, Public Works Director, and Planning Director will be the primary contacts for the annual meeting.

- Land Use Planning – City Planning staff will continue to route requests for land use approvals including, but not limited to, subdivisions and site plan reviews which fall under MCWD jurisdiction will be forwarded to MCWD staff for comment. Coordination will occur in the beginning stages of the project during the concept plan review.

  The City's ten-year Capital Improvement Plan (CIP) is a flexible schedule of projects and public improvements that the City wishes to do over the next ten years. The 2018-2027 CIP is the most recent version of the CIP and can be found on the City's website. The CIP is updated annually to ensure consistency of changing demands and funds available. Projects are prioritized by the current level of need for the project, and available funds but to address the growing number of drainage concerns within the City, the CIP in the near future will be guided by addressing drainage concerns primarily.

The City will send the MCWD the CIP when it is updated annually and ask the MCWD for planning assistance and aid in finding funding sources to help finance the projects on the CIP. The CIP would include future feasibility studies and capital improvement projects that the City is hoping to implement in the future. The City will send the MCWD any small area plans, major land use changes or policy changes such as zoning and ordinance updates to receive feedback from the MCWD on how water quality treatment could be incorporated into these items. The city will include the MCWD early on in project initiation, even if projects are unfunded at the time, to utilize the technical planning assistance offered by the MCWD and to look for opportunities to incorporate water quality improvements into otherwise non-water related projects.

- Regulatory Activities –The MCWD has rules covering stormwater management, erosion control, shoreline and streambank stabilization, floodplain alteration and wetland protection among others. MCWD will be responsible for implementation and enforcement of their own rules. In cases where there are analogous City requirements, then the more restrictive rules are understood to govern. Enforcement of the rules will be the responsibility of the governing entity.

  The City will include the MCWD early on in City projects including holding pre-application meetings to discuss proposed project plans. The City will also continue to refer developers to the MCWD early on in project planning to ensure the MCWD has adequate time to be value added for development plans. Planning staff will require documentation of appropriate MCWD construction and land alteration permits for those projects located within District boundaries as a condition to City approval. Approved MCWD permits will be stored with other project documentation for future reference. Staff will consider additional coordination for erosion control inspection and enforcement and discuss opportunities at future annual meetings.

- Wetland Conservation Act Enforcement – MCWD acts as the LGU for WCA applications within the MCWD boundary. The City will continue to forward any concerns regarding wetlands in the MCWD boundary to MCWD as they arise.

- Funding – The City seeks support from MCWD in terms of grant funding for water quality projects. The City requests that MCWD staff continue to provide information about upcoming grants and other funding opportunities.

- Data Sharing – City staff members and MCWD staff will coordinate to share any new or relevant data with one another on an annual basis to ensure consistency between entities. This data could be related to any newly completed studies water quality monitoring, BMP performance monitoring, and other activities.

- Public Improvement Projects – City staff members will provide yearly updates on plans for public improvement projects. This will be coordinated as part of the annual meeting while discussing the draft Capital Improvement Plan. Maintenance activities for stormwater infrastructure will be provided to MCWD as part of the MS4 recording process and City inspection reports.

- Public Outreach and Education – The City will continue to provide surface water management updates to the public through the annual newsletter, City mailings and the City website. The City will encourage programs aimed at fostering responsible water quality management practices by its residents, including educating residents on the proper use of fertilizer and the importance of cleaning up after their pets. The City will help promote the MCWD's educational workshops and events to private homeowners and developers. The MCWD's educational workshops cover topics such as winter maintenance training, installing turf alternatives, and informational sessions on the

Master Water Steward program. The City will coordinate with the MCWD on other educational efforts when possible to avoid duplicating efforts.

- Future Project Coordination – The City wishes to continue to coordinate with the MCWD on future projects. In 2018, a MOU was adopted which states the City and the MCWD will work together to solve large-scale drainage issues within the western half of the City. These drainage issues include Shorewood Oaks Development, Strawberry Lane, Grant Lorenz Channel, Alexander Lane Pond and Church Road Ponding. The City plans to partner with the MCWD on Freeman Park drainage area projects to reduce the risk of flooding including reconstructing the Freeman Park outlet, stabilizing the Grant Lorenz Channel and other smaller projects. The City of Excelsior and the City of Shorewood plan to partner on a Grant Street/Park Street drainage improvement project in the future with collaboration from the MCWD. The City will continue to look for opportunities to collaborate with the MCWD on future drainage improvement projects.

  Street reconstruction projects are planned for most upcoming years in the City. Some street reconstruction projects include storm sewer replacement. The City will send the MCWD where future street reconstruction projects are planned when they are added to the CIP so the MCWD can provide recommendations and technical planning assistance for how water quality improvements could be incorporated into larger City projects.

- Overall Goals – Both entities wish to maintain healthy water quality and water quantity throughout the City. Prioritization of these characteristics may differ between the two entities but City staff and MCWD staff will continue to have an open dialogue about how to best meet both water quality and water quantity goals.

3.3. Riley Purgatory Bluff Creek Watershed Coordination Plan

The RPBCWD has developed a suite of rules that include floodplain management and drainage alterations, erosion and sediment control, wetland and creek buffers, shoreline and streambank stabilization, waterbody crossings and structures, appropriation of public surface waters, appropriation of groundwater, and stormwater management for the communities within its jurisdiction. RPBCWD will be responsible for implementation and enforcement of the different rules and how it plans or not as the case may be to take on these rules.

In cases where there are analogous City requirements, then the more restrictive rules are understood to govern. Enforcement of the rules will be the responsibility of the governing entity.

The RPBCWD assumes that it will continue to implement its regulatory program in Shorewood until at least such a time as the City amends its LSWMP, updates its official controls, and submits the amendment to the RPBCWD for a determination that it will provide water resources protection equal to or better than the RPBCWD's rules. At that point, the RPBCWD and Shorewood could enter an agreement recognizing that the City will exercise sole regulatory authority for the relevant RPBCWD rule areas. The RPBCWD will continue to implement those rules it is required to implement by statute or that are within the watershed district's sole jurisdiction.

The City will continue to work and collaborate with RPBCWD on projects and initiatives that improve the water quality and quantity conditions in the Silver Lake subwatershed. The City would like to partner with the RPBCWD on water quality monitoring within the Silver Lake subwatershed as well as monitoring erosion concerns along Silver Lake. Planning staff will require documentation of appropriate RPBCWD construction and land alteration permits for those projects located within District boundaries as a condition to City approval. City staff and the RPBCWD will continue to share any new or relevant data with one another to ensure consistency between the two entities. The City and the RPBCWD will collaborate on any new issues that

emerge in the Silver Lake subwatershed as necessary.

RPBCWD acts as the LGU for WCA applications within the RPBCWD boundary. The City will continue to forward any concerns regarding wetlands in the RPBCWD boundary to RPBCWD as they arise.

4. PROBLEMS AND CORRECTIVE ACTIONS

Outlined below is an assessment of the known existing and potential water resource-related problems. These problems have been identified based on an analysis of the land and water resource data collected as part of this plan preparation and through information provided by the City. Any existing or potential problems within the topic area has been described and future corrective actions have been incorporated into an implementation plan. The problems/corrective actions noted with an asterisk(*) are completely or partially on City-owned property, including drainage and utility easements.

4.1. Lake and stream water quality problems

Problem 4.1.1
Impaired waters to which the City discharges and the impairments for each are listed in **Table 4-1**.

Table 4-1 Impaired Waterbodies to which Shorewood Discharges

Waterbody/Watercourse (AUID)	Year Added to List	Affected Use	Pollutant/Stressor	TMDL Status
Lake Minnetonka (ID – 27-0133-02 and 27-0133-05)	1998	Aquatic Consumption	Mercury in Fish Tissue	Complete
Christmas Lake (ID – 27-0137-00)	1998	Aquatic Consumption	Mercury in Fish Tissue	Complete
Lake Virginia (ID – 10-0015-00)	2004	Aquatic Recreation	Nutrient/Eutrophication	Complete
Lake Virginia (ID – 10-0015-00)	2006	Aquatic Consumption	Mercury in Fish Tissue	Complete
Silver Lake (ID – 27-0136-00)	2016	Aquatic Recreation	Nutrient/Eutrophication	Underway
Lake Minnewashta* (ID – 10-0009-00)	2004	Aquatic Consumption	Mercury in Fish Tissue	Complete

*Lake Minnewashta is located outside of Shorewood but receives runoff from the City

Corrective Action 4.1.1
The City shall work with the MCWD and the RPBCWD to develop and implement any necessary Total Maximum Daily Loads (TMDLs) for the impaired waters within its boundaries.

Additional information about the TMDL process can be found at the MPCA website.

Problem 4.1.2*
Stormwater pond maintenance for improved water quality treatment, flood control, and aesthetics is needed at Manor Park Pond.

Corrective Action 4.1.2*
The City, in cooperation with MCWD, will complete a feasibility study to identify methods to improve Manor Park Pond as funds are available.

Problem 4.1.3
The MCWD identified a small stream in the upper Christmas Lake subwatershed that is not listed as impaired for nutrients but has a total phosphorus concentration significantly higher than state river eutrophication standards.

Corrective Action 4.1.3
The City will work with MCWD to look into potential projects to reduce the total phosphorus concentration of the stream by improving the water quality of the runoff entering the stream.

Problem 4.1.4
The MCWD has identified an established zebra mussel population in the following waterbodies within City limits:

- Christmas Lake
- Lake Virginia

Corrective Action 4.1.4
The City will work with MCWD to continue to educate its residents on the importance of proper boat maintenance and boat draining to reduce the spread of invasive species.

Problem 4.1.5
Silver Lake has been identified as an impaired water for nutrients/eutrophication due to a high phosphorus load.

Corrective Action 4.1.5
The City will work with RPBCWD to implement projects to reduce the phosphorus load concentration entering the lake.

4.2. Flooding and stormwater rate control concerns

Problem 4.2.1*
The portion of the City west of Mary Lake is mostly developed with minimal vacant land available for additional stormwater storage and treatment. There are drainage problems throughout the western half of the City due to the minimal amount of storage availability.

Corrective Action 4.2.1*
The City will work with the MCWD to manage flooding and rate control issues experienced within the City. Regional maintenance of stormwater will be preferred over individual, private BMPs. Drainage issues will likely guide proposed capital improvement projects in the City.

Problem 4.2.2*
Drainage problems have been reported in the areas listed below and are shown on **Figure 6, Appendix A**. Areas marked with ** are included below based on modeling done by the RPBCWD in 2016; these locations were not reported to the City by residents.

- 4770 Lakeway Terrace
- 5615 and 5635 Harding Lane
- 24645 and 24735 Glen Road
- 6060 Strawberry Lane
- 26370 Peach Circle
- 6120 Riviera Lane
- 23350 Academy Road
- 5830 Echo Road
- 27125 Beverly Drive
- 19305, 19310, 19315, 19320, 19325, 19345, 19365, 19375, 19385, 19395, 19405, 19415, and 19425 Vine Ridge Road**
- 5670, 5705, and 5791 Vine Hill Road**
- 19210 Covington Court**
- 5900 and 18924 Covington Road**

- 5700, 5720, 5729 and 5730 Covington Circle**

Corrective Action 4.2.2*
The City will work with the MCWD and the RPBCWD to manage flooding and rate control concerns experienced within the City. Several of the drainage issue areas listed above will be addressed during the City's planned street reconstruction projects. The City will complete hydraulic and hydrologic analyses and feasibility reports for each of the flooding and drainage problem areas noted above that do not currently have identified solutions.

Problem 4.2.3
A number of landlocked subwatersheds are located within the City. These areas are shown on **Figure 6, Appendix A**.

Corrective Action 4.2.3
Mary Lake currently threatens homes located on the east end of the lake, near Clover Lane and Elder Turn. The City will determine the best option for constructing an outlet from this area.

For other landlocked areas, the City will require redevelopment plans within these subwatersheds to utilize strategies that minimize downstream flooding and additional runoff volumes.

Problem 4.2.4*
A large portion of the City drains near Freeman Park through several residential backyards causing flooding issues for these properties during large storm events. The current outlet for Freeman Park was constructed too low and is submerged during large storm events.

Corrective Action 4.2.4*
The City will determine the best option for an outlet improvement project for Freeman Park to decrease the risk to the residential properties near the park. The City plans to partner with the MCWD on Freeman Park drainage area projects to reduce the risk of flooding and provide water quality improvements.

Problem 4.2.5
Basement flooding in the Shorewood Oaks development due to private draintile connections to the public storm sewer. During large storm events, the stormwater surcharge can take place causing backflow through the private draintile.

Corrective Action 4.2.5
The City will disconnect private draintile and/or install backflow preventers to eliminate the risk of backing up draintile connections.

Problem 4.2.6*
The Strawberry Lane area is prone to standing water adjacent to the roadway due to the flat terrain.

Corrective Action 4.2.6*
The City will look into different alternatives to provide a piped outlet from the Strawberry Lane area to address the existing drainage issue. All alternatives required additional stormwater storage, either by expanding an existing pond or creating a new pond.

Problem 4.2.7
Stormwater pond located in a development at Alexander Lane is not draining as intended and holds standing water longer than designed.

Corrective Action 4.2.7
The City will connect the pond outlet pipe to the proposed storm sewer under Strawberry Lane to

reduce the drawdown time of the stormwater pond.

Problem 4.2.8*
Reported standing water occurring along Church Road during large storm events due to the area being landlocked.

Corrective Action 4.2.8*
The City will construct a ditch running southwest parallel to the Lake Minnetonka LRT Regional Trail towards existing dual culverts.

Problem 4.2.9
There are several private nuisance water resource related problem areas throughout the City.

Corrective Action 4.2.9
The City has determined that these private nuisance water resource related problem areas are not caused by City-owned property and would be best solved by the residents involved. In 2006 and 2007, studies were completed looking into the cause and solution for these residential problems. The associated report for this study and a figure showing the location of these drainage issues can be found in **Appendix H.**

4.3. Impacts on water quantity or quality management practices on recreational opportunities.

Problem 4.3.1
The City has not experienced any impacts to recreational opportunities as the result of water quantity or quality impacts.

Corrective Action 4.3.1
No corrective action needed.

4.4. Impacts of stormwater quality on fish and wildlife resources.

Problem 4.4.1
The City recognizes that there is currently not enough water quality monitoring data available to determine the effects of stormwater quality on area lakes.

Corrective Action 4.4.1
Consider implementing a water quality monitoring program in cooperation with MCWD. The City will collaborate with the RPBCWD on water quality monitoring within the Silver Lake subwatershed.

4.5. Impacts of erosion and sedimentation on water resources.

Problem 4.5.1*
Erosion problems have been reported at Footprint Lake and the Waterford Place drainage way.

Corrective Action 4.5.1*
The City will monitor conditions of these areas and consider maintenance and improvement options if needed.

Problem 4.5.2*
High velocities in the Grant Lorenz channel have caused erosion and frequent sediment transport to downstream waters. Additionally, high water levels in the channels during large storm events cause damage to adjacent properties.

Corrective Action 4.5.2*
The City will work with MCWD to stabilize and provide drainage improvements to the Grant Lorenz channel. The project is expected to entail realignment, ensuring adequate capacity and stabilizing the channel.

Problem 4.5.3
The MCWD has requested that shoreline conditions on Christmas Lake, specifically the eastern shore, be monitored and maintained. Shoreline restoration practices need to be implemented to prevent erosion.

Corrective Action 4.5.3
The City will undertake efforts to educate and provide technical assistance to private property owners to identify maintenance and improvement options, if desired.

Problem 4.5.4
The RPBCWD has identified erosion concerns along the edge of Silver Lake in Shorewood and Chanhassen.

Corrective Action 4.5.4
The City will work with RPBCWD and the City of Chanhassen on a slope stabilization project on Silver Lake.

4.6. Adequacy of existing regulations to address adverse impacts on water resources.

Problem 4.6.1
The City has regulatory controls in place to manage and mitigate adverse impacts on public waters and wetlands in addition to the regulatory controls in place by the MCWD and the RPBCWD. However, additional ordinances or ordinance updates may be necessary to keep regulatory controls relevant to emerging impacts on public waters or wetlands.

Corrective Action 4.6.1
Continue to implement the SWPPP. The City will continue to implement BMPs as well as review and revise existing ordinances, as necessary.

4.7. Identification of potential problems which are anticipated to occur in the next 20 years based on growth projections and planned urbanization.

Problem 4.7.1
The City is almost entirely developed; however, the City recognizes that increased development in the future may increase the volume of runoff directed to the current stormwater storage and conveyance systems within the City. The City anticipates the stormwater runoff generated from newly developing areas will be treated prior to being discharged from the City to areas of concern.

Corrective Action 4.7.1
Implement the City's SWMP, including rate control, stormwater treatment and infiltration requirements. If and when areas redevelop, these controls will be required based on the Goals and Policies of **Section 5**. New developments and redevopments will also be required to be in compliance with MCWD and RPBCWD rules and requirements.

Problem 4.7.2*
Determining the performance of existing stormwater facilities throughout the City.

Corrective Action 4.7.2*
Included in the City's SWPPP are established BMPs aimed at storm sewer inspection and maintenance training programs. The City is to annually inspect twenty percent of all MS4 outlets each year and all structural pollution control devices. The City will also conduct annual inspections of all stockpile, storage, and material handling areas. The City will evaluate records to determine if inspection frequency should be increased or decreased. More information on the City's stormwater maintenance and inspection program can be found in the SWPPP located in **Appendix E.**

Problem 4.7.3*
Determining the need for pond sediment removal projects.

Corrective Action 4.7.3*
The City will implement WSB's SWAMP to monitor stormwater BMPs for water quality concerns. The program estimates total suspended solids and total phosphorus removal efficiencies based on survey information. The City will use SWAMP to determine which BMPs require maintenance and will be the most effective use of City resources.

Problem 4.7.4*
Increasing prevalence of polycyclic aromatic hydrocarbons (PAHs) in stormwater ponds from runoff of roads and other surfaces.

Corrective Action 4.7.4*
The City will identify stormwater ponds that are contaminated and follow protocol for disposal of dredged material. The City also bans the use of materials that contain PAHs for paved surfaces for future development and redevelopment.

Problem 4.7.5*
Increasing prevalence of chloride in surface and groundwater in the Twin Cities from road salt runoff from roadways and other impervious surfaces.

Corrective Action 4.7.5*
Although the City does not use salt as a deicer, the City will work to implement preventative measures to reduce the chloride runoff before it reaches surface and/or groundwater. Measures will include education and outreach for salt applicators (commercial or private), promote winter best practices, partnering with the watershed districts for training, and other initiates noted in the Twin Cities Metropolitan Area Chloride Management Plan.

4.8. Impact of land use practices and development on water resource issues.

Problem 4.8.1
The MCWD has identified several Key Conservation Areas. The areas are shown in **Figure 15, Appendix A**.

Corrective Action 4.8.1
The City will work with MCWD to appropriately protect these areas where possible. A small portion of upland area has been developed north of Lake Virginia.

4.9. Availability and adequacy of existing technical information to manage water resources.

Problem 4.9.1
The existing HydroCAD model for the City is not using the most current precipitation data available.

Corrective Action 4.9.1
The City will update the existing HydroCAD model to Atlas 14 conditions along with updating any out of date subwatershed delineations and updating pond live storage information based on LiDAR data or record plans. Any new problem areas identified by the updated model will be added to the existing list of problem areas included in this Plan.

Problem 4.9.2
The development of this SWMP has provided additional technical information to the City related to stormwater management.

Corrective Action 4.9.2
The City will continue to update the hydrologic/hydraulic model and Geographic Information System (GIS) database as new development and redevelopment occur. This activity is included in the City's Storm Water Pollution Prevention Plan as Minimum Control Measure (MCM) 3-Illicit Discharge. Costs for implementing MCMs are included in **Table 6-1**.

5. ESTABLISHMENT OF GOALS AND POLICIES

The City has developed a number of goals, strategies, and policies for the management of stormwater within the City. These goals and policies have been developed to complement any county, regional, or state goals and policies. The goals of the City are as follows:

1. Minimize public capital expenditures needed to correct flooding and water quality problems.
2. Identify and plan for means to effectively protect and improve surface and groundwater quality.
3. Prevent erosion of soil into surface water systems.
4. Promote groundwater recharge.
5. Protect and enhance fish and wildlife habitat and water recreational facilities.
6. Secure the other benefits associated with the proper management of surface and ground water.

In order to achieve the City's goals for managing stormwater, four strategies were developed. These strategies will assist the City in targeting its main audiences for the purposes of stormwater management as follows:

Strategies

Cooperation with other agencies: This strategy recognizes that the City is not alone in managing stormwater within its boundaries. There are a number of other local, state, and federal agencies that also have rules and regulations related to stormwater management. Through this strategy, the City has recognized these other agencies' role in this endeavor and will cooperate and coordinate with these agencies as deemed necessary by the City.

Education: This strategy includes educating various groups within the City about proper stormwater management. Education of residents, City staff, City Council, business owners, and developers is included in this strategy to assist in meeting the City's goals.

Regulation: Much of stormwater management comes in the form of regulations put on new or redevelopment within the City. These regulations will also assist the City in achieving their water management goals. Policies related to the management of stormwater are included in the regulation strategy.

Internal operations: The final strategy relates to the internal operations of the City. By outlining policies related to how the City's operations will treat and manage stormwater, the City can work to achieve its stormwater management goals.

The City has identified target audiences for the policies outlined in each strategy. The target audiences and strategies are as follows:

AUDIENCE	STRATEGY
Public (Residents and Business Owners)	Education, Regulation
City Staff and City Council	Cooperation, Education, Operation
Developers	Education, Regulation
Review Agencies	Cooperation

Based on the target audience and the strategy, the City has developed a number of policies. These policies are outlined below.

5.1. Cooperation with Other Agencies

There are a number of other local, state, and federal agencies that have rules and regulations related to stormwater management. Through this strategy, the City recognizes these other agencies' role in this endeavor and will cooperate and coordinate with these agencies as necessary. A list of the other agencies the City will work with can be found in **Section 3** of this plan.

5.2. Education

The purpose of the education strategy in meeting the City's goals is to foster responsible water quality management practices by educating residents, business owners, City staff, City Council, and developers about proper stormwater management. If these targeted audiences recognize their role in responsible stormwater management in their homes, businesses, and practices, it is another way for the City to meet its goals. This education strategy has also been designed to be in conformance with the NPDES requirements.

STRATEGY: EDUCATION		
No.	***Policy***	***Target Audience***
1.	The City will continue to implement its public education program as part of the NPDES Phase II program.	Residents, Business Owners, Developers, City Staff and Council
2.	The City will develop and update its website for water resource management information.	Residents, Business Owners, Developers
3.	The City will develop and distribute an annual newsletter and include information in other City mailings aimed at fostering responsible water quality management practices. Topics may include, but not be limited to: ● Wetland buffers ● Groundwater quality and protection ● Controlling invasive species ● Water conservation and the water cycle ● Proper hazardous waste disposal ● Yard waste management ● Pet waste disposal ● Illicit discharge	Residents, Business Owners, Developers
4.	The City will collaborate with MCWD, RPBCWD, and Lake Minnetonka Conservation District (LMCD) in stormwater management education efforts.	Residents, Business Owners, Developers
5.	The City will provide annual training opportunities to City staff regarding housekeeping and construction BMPs and the NPDES permit requirement.	City Staff

STRATEGY: EDUCATION		
No.	***Policy***	***Target Audience***
6.	The City will conduct pre-construction meetings with contractors to review erosion control methods and inspections for projects that disturb one acre or more for City projects.	City Staff, Contractors, Residents
7.	The City will encourage programs aimed at fostering responsible water quality management practices by its residents, including educating residents on the proper use of fertilizer. Information on the City's Public Education Program is included in the City's NPDES Storm Water Pollution Prevention Plan at City Hall.	Business Owners, Residents
8.	The City will submit a public notice 30 days in advance and hold an annual public meeting to review the SWPPP, SWMP, and BMPs.	Residents, Developers, Business Owners
9.	The City will maintain a phone line and website to report construction site erosion control concerns and waste disposal infractions. The phone number is (952) 474-3236.	Residents, Developers, Business Owners
10.	The City will work with landowners through public education efforts to reduce the amount of animal or pet waste entering local water bodies.	Residents, Developers, Business Owners
11.	Prepare and distribute information on pertinent water management issues to residents a minimum of one time per year and as required as part of the NPDES Phase II program. This information will be incorporated into the City's newsletters and will provide an opportunity for residents to participate in watershed management activities. A copy of the description of the program to be implemented by the City is in the NPDES SWPPP at City Hall.	Residents, Developers, Business Owners

5.3. Regulation

The policies developed in this strategy outline specific stormwater management elements that are required to be implemented through the development and/or permitting process. The regulation strategy is targeted at the public, developers, City staff, and City Council. The policies below are City regulations. Developers will need to determine if they trigger either MCWD or RPBCWD regulations as well based on site location and proposed site changes.

STRATEGY: REGULATION		
No.	***Policy***	***Target Audience***
Overall Regulation Policy		
1.	The MCWD is responsible for implementing all of their rules within the City, when applicable. The RPBCWD is responsible for implementing all of their rules within the City, when applicable. In addition, the City will verify adherence to policies outlined in this section.	Developers, MCWD, RPBCWD, City Staff

STRATEGY: REGULATION		
No.	***Policy***	***Target Audience***
2.	For all regulations listed in **Section 5.3** the following terms are defined as follows: – Redevelopment: Any development on one or more lots where the land use is being altered or a structure is being torn down and rebuilt. – Single-family home redevelopment: A subsection of redevelopment where a residential home is being torn down and rebuilt.	Developers, MCWD, RPBCWD, City Staff
3.	Regulations listed in **Section 5.3** are enforced for all new development or redevelopment projects where a building or grading permit is required.	Developers, City Staff
Rate Control		
1.	Future discharge rates from new development and redevelopment will not exceed existing discharge rates.	Developers
2.	Design calculations for the 1%, 10%, and 99% chance storm events must be submitted for review and approval. Discharge rates must be based on pre-development conditions allowing for no increase compared to existing rates.	Developers
3.	The design of major stormwater storage facilities shall accommodate a critical duration event with a 1% chance of occurrence.	Developers
4.	The design of new storm sewer systems shall be based on a critical duration rainfall event having a 10% chance of occurring in any given year for local storm sewer.	Developers
5.	For collection systems not designed to meet rate control standards (i.e., catch basins) a clogging factor of 50% will be utilized in sizing intake structures.	Developers
6.	No orifice having a diameter less than eight inches (8”) is allowed in the design of rate control structures within the City.	Developers
7.	An emergency spillway (emergency outlet) from ponding areas shall be installed a minimum of one foot (1’) below the lowest building opening and shall be designed to have a capacity to overflow water at an elevation below the lowest building opening at a rate not less than three times the 100-year peak discharge rate from the basin or the anticipated 100-year peak inflow rate to the basin, whichever is higher.	Developers
8.	As part of any new development or redevelopment within the City, on-site retention and treatment for stormwater runoff will be required to conform to the policies outlined in this plan unless an approved off-site regional facility is available to accommodate this runoff.	Developers

Flood Control		
1.	The 100-year high surface water elevation will be derived from the City's hydrologic/hydraulic model in **Appendix C** and information from the FEMA Flood Insurance Study. For Silver Lake and the Silver Lake branch of Purgatory Creek, the 100-year high water elevation developed by the Riley Purgatory Bluff Creek Watershed District will be used as shown also in **Appendix C.**	Developers
2.	Any new or redevelopment building construction within the City will maintain a minimum building opening elevation three feet (3') above the projected 100-year high water elevation for the area. If this three-foot building opening freeboard requirement is considered a hardship, the standard could be lowered to two feet (2') if the following can be demonstrated: ● That, within the two-foot freeboard area, stormwater storage is available which is equal to or exceeds 50% of the stormwater storage currently available in the basin below the 100-year elevation. ● That a 25% obstruction of the basin outlet over a 24-hour period would not result in more than one-foot (1') of additional bounce in the basin. ● An adequate overflow route from the basin is available that will provide assurance that one foot of freeboard will be maintained for the proposed low building opening.	Developers
3.	Any new development or redevelopment in the City must set minimum basement floor elevations to an elevation that meets the following criteria: ● The basement floor will be four feet (4') above the currently-observed groundwater elevations in the area (Federal Housing Administration (FHA) policy). ● The basement floor elevation will be two feet (2') above the elevation of any known historic high ground water elevations for the area. Information on historic high groundwater elevations can be derived from any reasonable sources, including piezometer data, soil boring data, etc. ● For areas outside of the RPBCWD boundaries, the basement floor elevation will be one foot (1') above the 100-year high-water elevation for the area unless it can be demonstrated that this standard creates a hardship, and that the basement floor will be one foot (1') above the highest anticipated groundwater elevation that could result from high surface water elevations elevating groundwater elevations in the area during the 100-year critical duration rainfall event. The impact of high surface water elevation on groundwater elevations in the vicinity of the structure can take into consideration the site's distance from the floodplain areas, the soils, the normal water elevation of surface depressions in the areas, the static groundwater table, and historic water elevations in the area. ● For areas within the RPBCWD boundaries, the low floor elevation must be a minimum of two feet (2') above the calculated 100-year	Developers

	flood frequency elevation.	
4.	No structure (temporary or permanent), fill (including fill for roads and levees), deposit, obstruction, storage of materials or equipment, or other uses may be allowed as a conditional use that will cause any increase in the stage of the 100-year flood or cause an increase in flood damages in the reach or reaches affected.	Developers
5.	The City may allow an outlet to land locked basins, provided that the discharge rate from these basins not exceed the 10-day, 100-year average daily run-off rate and that it can be demonstrated that this discharge will not significantly impact the downstream flood profile.	Developers
6.	The City will require compensatory storage equal to storage losses resulting from floodplain fill as part of any new development. This compensatory storage must be provided in a suitable location so as not to increase the 100-year floodplain elevation for the area.	Developers
7.	The City will revise its subdivision ordinance to direct the developer to provide the MCWD or RPBCWD with a copy of the preliminary plat, if applicable.	Developers, MCWD, RPBCWD
Water Quality Treatment		
1.	Treatment of stormwater to Nationwide Urban Runoff Program (NURP) guidelines is required prior to stormwater discharge to a lake, stream, or wetland and prior to discharge from the site as part of development. A single-family home development or redevelopment is exempt from meeting the NURP standards below. The NURP guidelines for the design of stormwater treatment basins are as follows: a. A permanent pool ("dead storage") volume below the principal spillway (normal outlet) which shall be greater than or equal to the runoff from a 2.5-inch storm over the entire contributing drainage area assuming full development. b. A permanent pool average depth (basin volume/basin area) which shall be greater than or equal to four feet (4'), with a maximum depth of less than or equal to ten feet (10'). c. Basin side slopes above the normal water level should be no steeper than 3:1, and preferably flatter. A basin shelf with a minimum width of ten feet (10') and depth of one foot (1') below the normal water level is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long-term maintenance. d. To prevent short-circuiting, the distance between major inlets and outlets shall be maximized.	Developers
2.	New stormwater management ponds that are constructed as part of private development shall be covered by drainage and utility easements that are dedicated to the City.	Developers

3.	An operations and maintenance plan must be submitted for all new stormwater BMPs.	Developers
4.	The City will cooperate with the MPCA and other outside organizations to develop TMDL plans for the listed impaired waters that receive stormwater from the City.	City Staff, MPCA
5.	The City will require the inclusion of skimmers in the construction of new pond outlets, and add skimmers to the existing system whenever feasible and practical to prevent floatables from being discharged downstream. Skimmer structures will have a minimum four-inch (4") overlap and the maximum one-year storm event discharge velocity should not exceed half a foot (0.5') per second. The use of skimmer structures other than wood baffles will be encouraged unless the baffle structure is properly designed.	Developers
6.	The City will include provisions for coarse sedimentation and skimming floatable materials prior to stormwater discharge to lakes and DNR-protected wetlands. Skimmers will be designed to skim the one-year storm event. This requirement will apply in all cases except where it is deemed not feasible or not practical to do so. Considerations for variance to this policy will only be made in cases where the direct drainage area is limited in size and the probability that a significant pollutant discharge from the area to areas outside the City would be extremely unlikely. The use of skimmer structures other than wood baffles will be encouraged unless the baffle structure is properly designed.	Developers
7.	The City has adopted the RPBCWD water quality goals for Silver Lake. These goals are as follows: Water Quality: TSI_{SD}=83 Recreation Goal: Canoeing and aesthetic viewing Aquatic Communities: Preserve lake's wildlife habitat Water Quantity: Manage for regional flood Wildlife: Protect existing wildlife These goals and information about the lake is included in the *Silver Lake Use Attainability Analysis* (May 2003) which is available in the City's Water Resource Library.	City Staff
Infiltration/Volume Control		
1.	Abstraction via infiltration, evapotranspiration, capture, and/or reuse of one inch of rainfall over the net new impervious of the site or on a regional basis upon development or redevelopment is required for projects that increase stormwater runoff volume, provided that past and existing land use practices do not have a significant potential to contaminate the stormwater runoff and that the soil characteristics are suitable for infiltration. If the soil characteristics are not suitable for infiltration, the same volume will be required to be treated through filtration practices.	Developers

2.	New development and redevelopment shall consider and incorporate to the extent practical and feasible low impact development (LID) techniques. The LID techniques must be reviewed and approved by the City as part of the plan review process. A maintenance plan for these features will be submitted to the City for review and approval.	Developers
3.	The amount of allowable impervious surfaces within new development will be regulated according to the City's ordinances.	Developers
4.	The City intends to use both designated and non-designated areas to store stormwater runoff in the 100-year event. These areas include general depressions, low points, and streets where structures and/or property are not damaged and any inundation will only be temporary in nature.	City Staff, MPCA
Wetlands		
1.	Wetlands will be protected within the City boundaries to assure that the value of wetlands in relation to their surface water quantity benefits are not significantly impacted by development.	Developers, Residents
2.	The City will encourage land owners to maintain wetlands and open space areas for the benefit of wildlife. The City will utilize the Planning Commission and Land Conservation and Environment Committee members to promote this objective.	Developers, Residents
3.	MCWD and RPBCWD act as LGU for the City within their respective boundaries. The Districts will manage wetlands in conformance with Minnesota Rules Chapter 8420 as developed by the Board of Water and Soil Resources. Any redevelopment in the City of Shorewood involving wetland alterations will be subject to the MCWD or RPBCWD procedures for such activities, as applicable, including regulation, monitoring, and control.	Developers, Residents

5.4. Internal Operations

The City's internal operations can have a significant impact on stormwater management. This strategy is targeted primarily at the City with some areas targeted at the public and/or another agency. These policies are aimed at operation and maintenance activities associated with water resource management within the City.

Many of these policies are policies that are already in place through the previous SWMP. Other policies have been developed as part of the City's MS4 permit and the subsequent SWPPP.

STRATEGY: INTERNAL OPERATIONS		
	Policy	***Source/Rationale***
1.	The City will sweep the streets at least once annually and record the results. Areas that need more frequent sweeping will be swept as needed.	City Staff

STRATEGY: INTERNAL OPERATIONS		
	Policy	***Source/Rationale***
2.	The City will inspect 20% of its stormwater treatment basins, structural pollution control devices, outfalls, and ponds every year on a rotating basis. Maintenance will be conducted as necessary. The costs for this activity are included in **No. 33 of Table 6-1**.	City Staff
3.	The City prefers to use regional detention and treatment areas rather than site specific detention areas where feasible. The City recognizes that development of these areas will likely be incorporated into development activity and not initiated independently by the City.	City Staff
4.	The City requires as-builts of all ponding areas and designated emergency overflows.	City Staff, Developers
5.	The City will develop a stormwater management ordinance.	City Staff
6.	The City will maintain and update its storm sewer map, including storm sewer pipes, outfalls, ponds, conveyances, and water bodies on an annual basis. The costs for this activity are included in **No. 45 of Table 6-1**.	City Staff
7.	The City will conduct visual inspections of stormwater discharges on City-owned land annually and record results of inspections in conformance with the City's MS4 SWPPP.	City Staff
8.	The City will contact the MPCA State Duty Officer at 1-800-422-0798 to report any hazardous material spills or discharges in conformance with the City's MS4 SWPPP.	City Staff
9.	The City will have an annual coordination meeting with MCWD to discuss activity from the previous year and upcoming proposed projects within MCWD jurisdiction.	City Staff, MCWD
10.	The City will annually inspect and maintain any exposed stockpiles and storage areas on City property to prevent erosion and discharge into the storm sewer system or water body in conformance with the City's MS4 SWPPP.	City Staff
11.	The City will maintain and submit annual inspection reports, maintenance reports, and other needed documentation in conformance with the NPDES permit and the MCWD requirements. This will include annually reporting of the progress towards meeting the MCWD goals for reduction in annual phosphorus loading: Lake Minnetonka Watershed – 50 pounds Lake Virginia Watershed – 4 pounds Christmas Lake Watershed – 3 pounds	City Staff, MCWD

STRATEGY: INTERNAL OPERATIONS		
	Policy	***Source/Rationale***
12.	The City staff will review and adjust as necessary mowing, fertilizing, and herbicide application practices to reduce organic and pollutant discharges to the storm sewer and water bodies. The cost for this activity is included in **No. 56 on Table 6-1**.	City Staff
13.	The City will review road salt application practices and consider alternative products as they become available. The cost for this activity is included in **No. 57 on Table 6-1**.	City Staff
14.	The City will participate, to the extent deemed necessary by the City, in TMDL studies that affect land use within its borders as these studies are completed. The costs for this activity are included in **No. 52 of Table 6-1.**	City Staff
15.	The City will encourage homeowners with properties adjacent to water resources to establish a vegetative buffer strip at the shoreline. This strip should consist of native vegetation to limit erosion and nutrient transport across the buffer strip.	Residents
16.	The City will implement its NPDES SWPPP. The SWPPP is incorporated by reference and is available in the Water Resource Library at City Hall.	City Staff
17.	The City will work with the MCWD and RPBCWD to assure adequate inspection, maintenance and repair of all ditches under their jurisdiction within the City.	City Staff, MCWD, RPBCWD
18.	The City prefers the development of municipal drainage systems whenever possible to private drainage systems. Design of drainage systems shall attempt to accommodate existing drainage systems including tile lines. Existing drainage systems will be protected and drainage perpetuated.	City Staff, Developers
19.	The City will adopt the MCWD goal to reduce phosphorus loading by 50 pounds annually within the City by a combination of existing stormwater treatment ponds that have been constructed, exploring other options for additional ponds that will exceed treatment standards, and implementing a fall street sweeping program. The City will report annually to the MCWD about the effectiveness of these BMPs and the progress made by each to reduce phosphorus loading.	City Staff, MCWD
20.	The City will work with the MCWD to monitor shoreline conditions on Christmas Lake. The costs for this activity are included in **No. 41 of Table 6-1.**	Residents, MCWD

21.	The City will work with the RPBCWD to monitor shoreline conditions on Silver Lake. The costs for this activity are included in **No. 42 of Table 6-1.**	Residents, RPBCWD
22.	Although the City is fully developed, the City will continue to look for opportunities to acquire additional open space and enhance existing open space. The City will incorporate into future park and open space improvement plans, water quality protections consistent with MCWD rules. These activities will be guided by the City's overall Comprehensive Plan which will adopt the Surface Water Management Plan by reference.	City Staff
23.	In addition to zoning requirements, buffer requirements may place additional restrictions on properties. The MCWD is responsible for reviewing and enforcing wetland buffer requirements.	City Staff, MCWD

6. IMPLEMENTATION PROGRAM

6.1. Implementation Priorities

Based on the information developed in **Sections 4 a**nd **5,** the City has developed a SWMP that reflects the needs and concerns of the City Council, City staff, citizens, and the funding capabilities of the City. A prioritized listing of the studies, programs, and capital improvements that have been identified as necessary to respond to the water resource needs within the City is outlined on the following tables. The City anticipates implementing at least to some extent the regulatory programs, studies, or improvements identified within this plan within the next ten years.

The City has developed a method to prioritize capital improvement projects. A three-tiered approach has been adopted that prioritizes projects as "High", "Medium", or "Low". Prioritized projects are shown on **Figure 6, Appendix A.** This method is based on the following criteria:

High Priority: Projects meet one or more of the following criteria:

- Projects with the highest benefit relative to project cost.
- Projects that should be completed soon to meet regulatory or permit requirements.
- Projects that are needed to address significant public safety concerns.
- Projects that are needed to finish or upgrade the construction of the City's stormwater infrastructure system to meet long-term improvement plans.
- Projects that should be constructed now so as to be in conjunction with other projects that will result in a reduction in cost or impact to the public.
- Projects for which funding is now available or will be available in the next few years.

Medium Priority: Projects meet one or more of the following criteria:

- Projects with a high benefit relative to project cost.
- Projects that must be completed soon, but not immediately to meet regulatory or permit requirements.
- Projects that are needed to address public safety concerns.
- Projects that are needed to finish or upgrade the construction of the City's stormwater infrastructure system to meet long term improvement plans, but timing for construction should be delayed to accommodate other planning or project work.
- Projects that should be constructed soon and/or scheduled so as to be in conjunction with other projects that will result in a reduction in cost or impact to the public.

Low Priority: These projects meet the criteria listed above, but are not urgent, have lower Benefit to Cost Ratios, can be delayed until other work can be done at the same time, or must be delayed until funds become available.

Table 6 contains Storm Water Capital Improvement Projects (CIP), Storm Water Management Programs (SMP), and Storm Water Management Studies (SMS). The costs associated with these items reflect year 2017 costs and do not take into account inflation. These tables are for

planning and budgeting purposes and are considered rough estimates. It is anticipated that these cost estimates will be reviewed annually and updated as needed.

The City's ten-year Capital Improvement Plan (CIP) is a flexible schedule of projects and public improvements the City wishes to implement over the next 10 years The 2018-2027 CIP is the most recent version of the CIP and can be found on the City's website. The CIP includes park improvement projects, infrastructure improvement projects, water and sanitary sewer improvements and trail improvement projects. Storm sewer improvements are typically coordinated with the street reconstruction project in the same area. The CIP is reviewed and updated annually to remain representative of the City's demands and funds. Projects are prioritized by current level of need for the project, the overlap of different department projects and the funds available for each of the different departments.

6.2. Financial Considerations

Implementation of the proposed regulatory controls, programs and improvements that are identified in this plan will have a financial impact on the City. To establish how significant this impact will be, a review of the means and ability of the City to fund these controls, programs and improvements is necessary. Toward this end, please find outlined below a listing of various sources of revenue that the City will endeavor to implement the water resource management efforts outlined in this plan.

For the next ten years, the capital improvement projects are estimated to cost over $7,000,000. The stormwater management program costs are estimated at about $2,500,000. The official controls are estimated to cost approximately $113,000. The stormwater studies are estimated to cost about $120,000. Over this ten-year period, these projects, programs, and studies are estimated to cost about $11,000,000 altogether. Any projects, studies, and programs and the associated funding are subject to City Council approval.

The City intends to maintain its existing storm sewer system by using funds collected under the existing Storm Water Utility Fee. For this reason, there are no anticipated impacts on the City's General Fund. Levy limits are not anticipated to impact this fund either. Monetary impacts on households will be limited to the same level it is currently impacting households.

The greatest barrier the City faces toward implementing these programs, studies and projects is a lack of funding. Since the proposed expenditures exceed the projected revenue, the City has identified projects for which it will pursue grants to fund the work. In lieu of additional funding, the City Council will prioritize the activities that are undertaken based on which projects provide the most benefit to the City.

DESCRIPTION OF FUNDING SOURCE	REVENUE GENERATED
1. Revenue generated by City's Storm Water Utility estimated for 2018	$352,000/year
2. Project paybacks	Variable
3. Special assessments for local improvements made under the authority granted by Minnesota Statutes Chapter 429 (Ad Valorem Financing)	Variable depending on activities undertaken
4. Revenue generated by Watershed Management Special Tax Districts provided for under Minnesota Statutes Chapter 473.882	Variable depending on activities undertaken

DESCRIPTION OF FUNDING SOURCE	REVENUE GENERATED
5. For projects being completed by or in cooperation with a Watershed District or Watershed Management Organization, project funds could be obtained from watershed district levies associated with their administrative funds, construction funds, preliminary funds, repair and maintenance funds or survey and data acquisition funds, as provided for in Minnesota Statutes Chapter 103D.905	Variable depending on activities undertaken
6. Grant monies that may be secured from various local, regional, County, State, or Federal agencies. This would include the County, Minnesota Department of Transportation (MnDOT), MPCA, the DNR and others.	Variable depending on activities undertaken
7. Other Sources: These may be other sources of funding for stormwater activities such as tax increment financing, state aid, etc. The City will continue to explore additional revenue sources as they become available.	Variable depending on activities undertaken
8. Tax abatement	Variable

6.3. Amendment Procedures

It is the intention of the City to have this Plan reviewed and approved by the MCWD and the RPBCWD. Once approved, no significant changes to this plan can be facilitated without the approval of the proposed revisions by the watershed districts within the City that are affected by the change.

Significant changes to the local plan shall be made known to the following parties:

1. City Council
2. City Administrator, Director of Public Works, and City Engineer
3. Affected watershed districts within the City
4. Metropolitan Council
5. Public within the City through a public hearing process

Following notification of the above parties, they shall have 60 days to comment on the proposed revisions. The Metropolitan Council shall have 45 days to comment on the revisions. Failure to respond within 60 days constitutes approval. Upon receipt of approvals from the affected Watershed Districts within the City, any proposed amendments will be considered approved.

Minor changes to the Plan shall be defined as changes that do not modify the goals, policies, or commitments expressly defined in this plan by the City. Adjustment to subwatershed boundaries will be considered minor changes provided that the change will have no significant impact on the rate or quality in which stormwater runoff is discharged from the City boundaries. Minor changes to this plan can be made by the staff at the City without outside review. It is the intention of the City that this Plan be updated ten years after the adoption of this Plan unless significant changes to the plan are deemed necessary prior to that date.

The City is required to complete these amendments within two years of the adoption of a watershed plan, in accordance with Chapter 8410.0160.

TABLE 6.1

SURFACE WATER MANAGEMENT IMPLEMENTATION PLAN

No.	Project Description	10 Year Total Cost Estimate [1,3]	Priority	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Capital Improvement Projects (CIP)															
1	Storm sewer improvements paired with Street CIP items.	$4,500,000	High	Storm Water Utility Fund		$1,050,000	$100,000	$700,000	$700,000	$750,000	$300,000	$300,000	$300,000	$300,000	To be implemented when street reconstruction projects are constructed.
2	Harding Lane Drainage: Involves installation of tile lines, catch basin structure and culvert.	$97,000	High	MCWD Grants/ Storm Water Utility Fund							$97,000				
3	Lake Mary Outlet: Currently Lake Mary is landlocked. This project provides an emergency overflow to reduce flooding potential.	$505,000	High	MCWD Grants/ Storm Water Utility Fund								$505,000			
4	Nelsine Dr Drainage: Involves installation of tile lines, catch basin structure and culvert.	$16,000	High	Storm Water Utility Fund						$16,000					
5	5925 Grant Drainage: Involves installation of tile lines, catch basin structure and culvert.	$49,000	High	Storm Water Utility Fund								$49,000			
6	Amlee Road Drainage: Part of street reconstruction project	$115,498	High	Storm Water Utility Fund					$115,498						
7	Manitou Lane Drainage: Part of street reconstruction project	$61,749	High	Storm Water Utility Fund					$61,749						
8	Glen Road East Drainage: Part of street reconstruction project	$178,126	High	Storm Water Utility Fund					$178,126						
9	Rivera Lane Drainage: Part of street reconstruction project	$139,396	High	Storm Water Utility Fund	$139,396										
10	Shorewood Lane Drainage: Part of street reconstruction project	$150,257	High	Storm Water Utility Fund	$150,257										
11	Mann Lane Drainage: Part of street reconstruction project	$83,006	High	Storm Water Utility Fund	$83,006										
12	Maple Street Road Drainage: Part of the street reconstruction	$32,451	High	Storm Water Utility Fund	$32,451										
13	Update the City's existing HydroCAD model to Atlas-14 conditions.	$9,500	High	RPBCWD Grants/ Storm Water Utility Fund	$9,500										
14	Grant Lorenz Channel: Work with MCWD on a project to stabilize the channel. Project may include realignment, ensuring adequate capacity and stabilization of the channel	$725,000	High	MCWD Grants/ Storm Water Utility Fund			$725,000								
15	Freeman Park Outlet Improvement: Work with MCWD to replace the outlet structure from Freeman Park.	$10,000	High	MCWD Grants/ Storm Water Utility Fund				$10,000							
16	Freeman Park Drainage Area: Work with MCWD to reduce drainage issues in the Freeman Park area. This project may include a stormwater management feature immediately downstream of the Freeman Park outlet.	$194,500	High	MCWD Grants/ Storm Water Utility Fund				$194,500							Cost does not include land acquisition expense
17	Shorewood Oaks Drainage Issues: Disconnect private draintile and/or install backflow preventers	$45,000	Medium	MCWD Grants/ Storm Water Utility Fund										$45,000	
18	Strawberry Lane Drainage: Route storm sewer to a proposed retention pond via a drainage easement.	$242,000	Medium	MCWD Grants/ Storm Water Utility Fund									$242,000		
19	Church Road Ponding: Construct Ditch parallel to the Lake Minnetonka LRT Regional Trail to provide outlet for landlocked area.	$29,000	Medium	MCWD Grants/ Storm Water Utility Fund							$29,000				

No.	Project Description	10 Year Total Cost Estimate [1,3]	Priority	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
20	Alexander Lane Pond: Connect pond outlet pipe to proposed storm sewer under Strawberry Lane to reduce drawdown time of pond.	$43,000	Medium	MCWD Grants/ Storm Water Utility Fund								$43,000			
21	23350 Academy Ave. Storm: Involves installation of tile lines, catch basin structure and culvert.	$55,000	Medium	Storm Water Utility Fund					$55,000						
22	Undertake projects to restore potential wetlands outlined in the MCWD Functional Assessment Report	$50,000	Medium	MCWD Grants/ Developers						$50,000					
23	Galpin Lake Road Trail Drainage: Involved creating drainage along newly constructed trails.	$230,000	Low	Storm Water Utility Fund	$230,000										
24	Rampart Ct. Drainage: Involves installation of tile lines, catch basin structure and culvert.	$11,880	Low	Storm Water Utility Fund					$11,880						
25	Work with RPBCWD on a project to reduce the phosphorus loading rate into Silver Lake.	$811,000	Low	RPBCWD Grant/ Storm Water Utility Fund											This project is not currently in RPBCWD's 10-year implementation table but this description is used as a place holder in case RPBCWD decides to move forward with this project sooner than planned.
26	Work with RPBCWD on a slope stabilization project on Silver Lake.	$52,000	Low	RPBCWD Grant/ Storm Water Utility Fund											This project is not currently in RPBCWD's 10-year implementation table but this description is used as a place holder in case RPBCWD decides to move forward with this project sooner than planned.

No.	Project Description	10 Year Total Cost Estimate [1,3]	Priority	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Operation and Maintenance															
27	Sponsor City Spring Clean Up Day	$80,000		Stormwater Utility Revenue	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	
28	Conduct inspections and clean up of illicit discharges and illegal dumping within the City	$77,000		Stormwater Utility Revenue	$7,700	$7,700	$7,700	$7,700	$7,700	$7,700	$7,700	$7,700	$7,700	$7,700	
29	Conduct erosion control inspections of construction sites	$55,000		Stormwater Utility Revenue	$5,500	$5,500	$5,500	$5,500	$5,500	$5,500	$5,500	$5,500	$5,500	$5,500	
30	Review construction plans for conformance to City stormwater management policies. MCWD and RPBCWD are responsible for implementing all of their rules within the City, when applicable.	$75,000		Stormwater Utility Revenue	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	
31	Conduct pre-construction meetings with contractors to review erosion control methods and inspections.	$20,000		Stormwater Utility Revenue	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	
32	Plan review and inspection of long term operation and maintenance of BMPs.	$70,000		Stormwater Utility Revenue	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	
33	Inspect 20% of storm sewer system including outfalls, ponds, and structural pollution control devices	$80,000		Stormwater Utility Revenue	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	
34	Inspect all identified structural pollution control devices and BMPs once per year.	$10,000		Stormwater Utility Revenue	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	
35	Sweep streets each spring	$250,000		Stormwater Utility Revenue	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	
36	Sweep streets in strategic areas each fall	$250,000		Stormwater Utility Revenue	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	
37	Conduct annual pond surveys to schedule and prioritize the necessary maintenance projects. This effort will be assisted by the SWAMP Application.	$150,000		Stormwater Utility Revenue	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	
38	The City will perform yearly cleanout of ponds identified for maintenance with the SWAMP program.	$1,500,000		Stormwater Utility Revenue	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	
39	Annual maintenance on the Stormwater Asset Management Program (SWAMP).	$20,000		Stormwater Utility Revenue	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	
40	Monitor erosion control problems at Footprint Lake and Waterford Place drainage way	$10,000		Stormwater Utility Revenue	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	
41	Work with MCWD to monitor shoreline conditions on Christmas Lake and educate private property owners on maintenance and improvement options.	$10,000		Stormwater Utility Revenue	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	
42	Work with RPBCWD to monitor shoreline conditions on Silver Lake and educate private property owners on maintenance and improvement options.	$10,000		Stormwater Utility Revenue	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	

No.	Project Description	10 Year Total Cost Estimate [1,3]	Priority	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Official Controls															
43	Prepare and distribute annual newsletter and distribute information in City mailing regarding surface water management	$4,000		Stormwater Utility Revenue	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400	
44	Maintain and update website for surface water management education per NPDES permit	$3,000		Stormwater Utility Revenue	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300	
45	Maintain and update GIS database, storm sewer map, and hydrologic model	$65,000		Stormwater Utility Revenue	$6,500	$6,500	$6,500	$6,500	$6,500	$6,500	$6,500	$6,500	$6,500	$6,500	
46	Hold annual public meetings to educate residents and business owners on surface water management	$4,000		Stormwater Utility Revenue	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400	
47	Provide annual training workshops to educate City staff about surface water management	$8,000		Stormwater Utility Revenue	$800	$800	$800	$800	$800	$800	$800	$800	$800	$800	
48	Submit a public notice 30 days in advance of holding annual public meeting to review SWPPP, Surface Water Management Plan and BMPs.	$4,000		Stormwater Utility Revenue	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400	
49	Prepare and submit annual SWPPP report and MCWD report	$5,000		Stormwater Utility Revenue	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	
50	Hold annual public meetings to review SWPPP, Surface Water Management Plan and BMPs. Collect and consider public input.	$15,000		Stormwater Utility Revenue	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	
51	Maintain and submit annual inspection reports, maintenance records, and other documentation in conformance with the NPDES permit	$5,000		Stormwater Utility Revenue	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	

No.	Project Description	10 Year Total Cost Estimate [1,3]	Priority	Possible Funding Sources [2]	Proposed Cost By Year[1]										Comments
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Monitor and Study															
52	Coordinate with MCWD and/or RPBCWD in the development and implementation of TMDLs	$30,000	High	MCWD Grants / Storm Water Utility Fund / Clean Water Legacy Fund	$10,000	$10,000	$10,000								
53	Complete a wetland functions and values assessment for wetlands within the RPBCWD	$50,000	High	RPBCWD Grant					$50,000						
54	Complete phosphorus loading study of street sweepings to calibrate the phosphorus load reductions for the MCWD	$10,000	High	MCWD Grants/ Storm Water Utility Fund				$10,000							
55	Review planning and zoning policies and ordinances and update as needed to comply with Surface Water Management Plan, MCWD rules and RPBCWD rules.	$10,000	Medium	MCWD Grants/ Storm Water Utility Fund	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	
56	Review mowing, fertilizing, and herbicide application practices and review alternative products (as available)	$10,000	Medium	Storm Water Utility Fund		$2,000		$2,000		$2,000		$2,000		$2,000	
57	Review road salt application practices and review alternative products (as available). Implement projects or other management actions based on the Minnesota Pollution Control Agency's Twin Cities Metro Chloride TMDL when applicable.	$25,000	Medium	RPBCWD Grants/ Storm Water Utility Fund	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	The City currently does not salt roads.
	TOTAL	$11,350,363			$291,500	$1,343,500	$1,116,500	$1,198,000	$1,453,753	$1,099,500	$707,500	$1,180,500	$823,500	$628,500	

[1] Cost estimates are preliminary and subject to review and revision as engineer's reports are completed and more information becomes available. Table reflects 2018 costs and does not account for inflation. Costs generally include labor, equipment, materials, and all other costs necessary to complete each activity. Some of the costs outlined above may be included in other operational costs budgeted by the City.

[2] Funding for stormwater program activities projected to come from following sources - Surface Water Management Fund, Developers Agreements, Grant Funds, General Operating Fund, or Special Assessments.

[3] Staff time is not included in the cost shown.

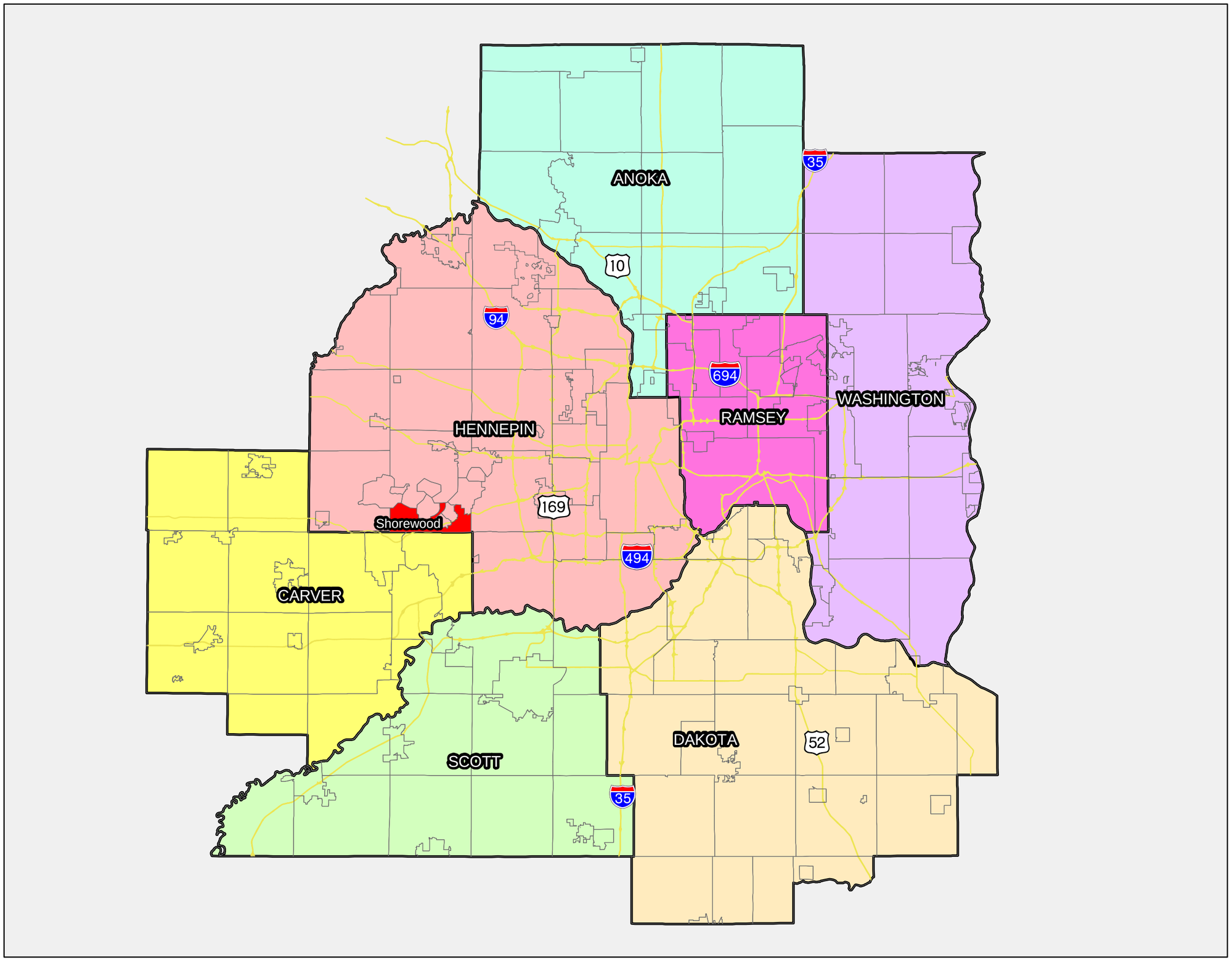
APPENDIX A

Figures

CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan

Figure 1: City Location



City Boundaries
City of Shorewood

N

0 7 Miles
1 inch = 7 miles

WSB

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CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 2: Watershed Districts

- City Boundary
- Minnehaha Creek Watershed District
- Riley Purgatory Bluff Creek Watershed District

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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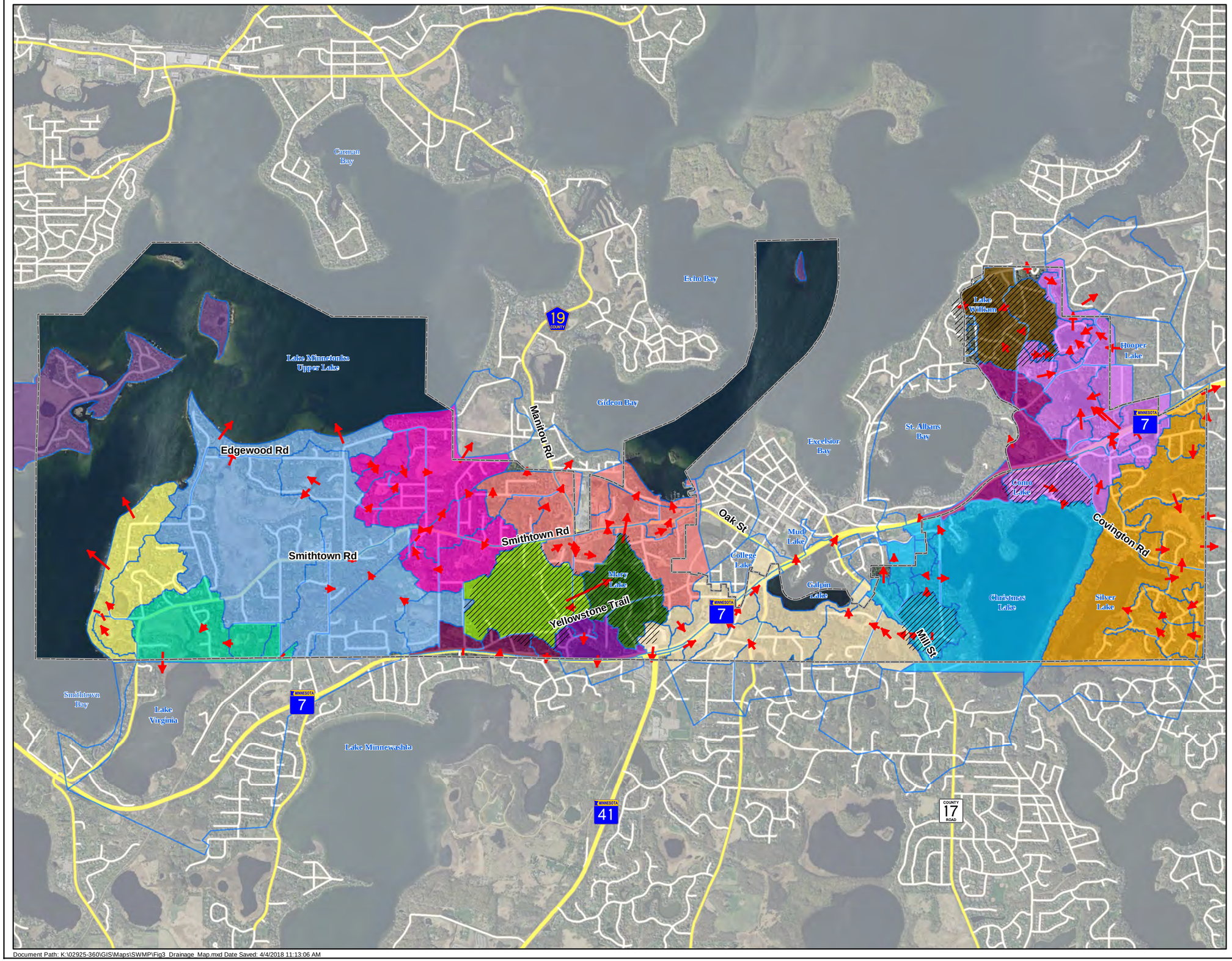
CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 3: Drainage Map



City Boundary

Direction of Flow

Subwatersheds

- Outside City Limits
- Carson Bay
- Central Area
- Christmas Lake
- Gideon Bay
- Galpin Lake
- Lake Minnetonka
- Lake Mary
- Lake Minnewashta
- Lake Virginia
- Lake William
- North-Central Area
- Purgatory Creek
- St. Albans Bay
- South-Central Area
- West Area
- West-Central Area
- Landlocked Basins as Identified by MCWD

N

0 2,500 Feet

1 inch = 2,500 feet

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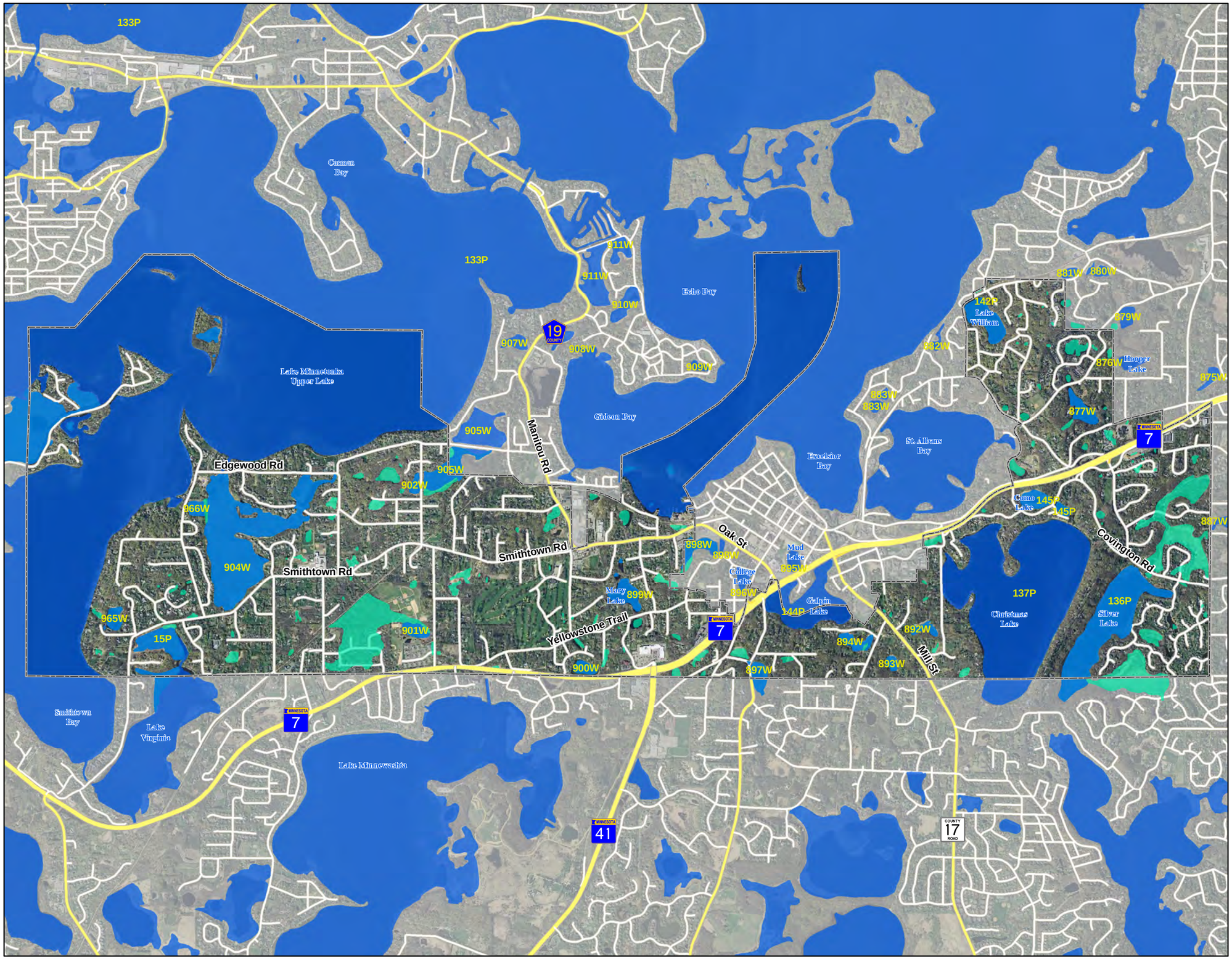
CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 4: Wetlands and DNR Public Waters



- City Boundary
- DNR Public Waters/Wetlands
- NWI Wetland

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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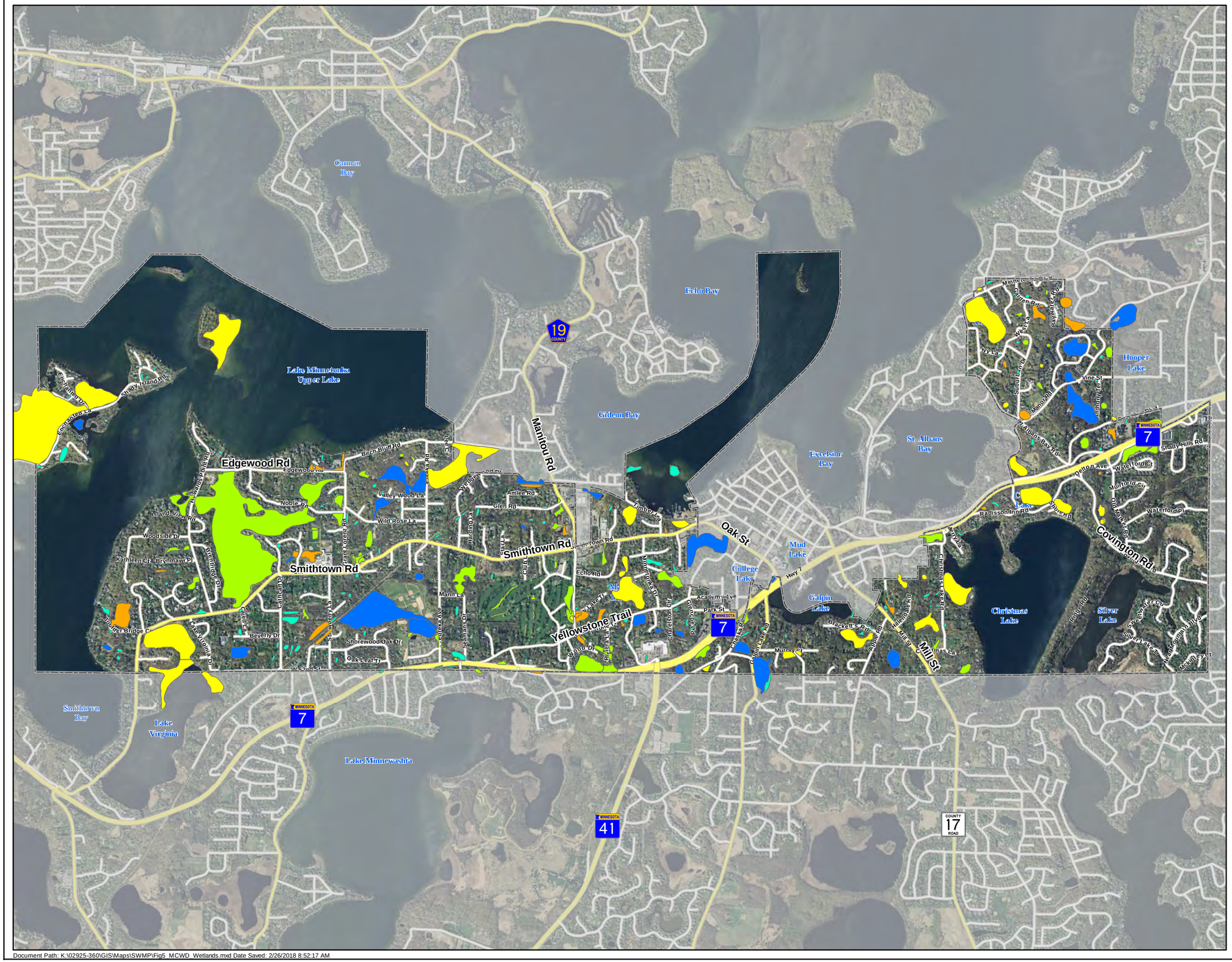
CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 5: MCWD Wetland Assessment Map



City Boundary

MCWD Wetland Management Class

- Manage 1
- Manage 2
- Manage 3
- Not Classified
- Preserve

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan

Figure 6: Water Resource Problem Areas

1. Lake Mary is currently landlocked and has the risk of flooding adjacent homes.
2. Large part of Shorewood drains through Freeman park and nearby homes causing flooding issues.
3. Low point along Glen Road causing drainage problems.
4. Low point along Harding Lane causing drianage problems.
5. Drainage issues along Strawberry Lane.
6. Deteriorating drain tile through wetland causing drainage problems.
7. Low point of Lakeway Terrace cul-de-sac casuing flooding problems between homes.
8. Ditch on the south side of Academy Avenue requires maintenance.
9. Grading creates ponding at low point of Echo Road.
10. Drainage issues along Amlee Road.
11. Private draintile issues in the Shorewood Oaks development
12. High velocities resulting in erosion and sediment transport from Grant Lorenz Road Channel
13. Undesired standing water in Alexander Lane Pond
14. Drainage issues along Church Road due to landlocked area
15. Flooding concerns at properties around Silver Lake as modeled by the RPBCWD

City Boundary

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 7: MPCA Water Quality Monitoring Locations

City Boundary

Owner of Monitoring Station

- MPCA
- USEPA

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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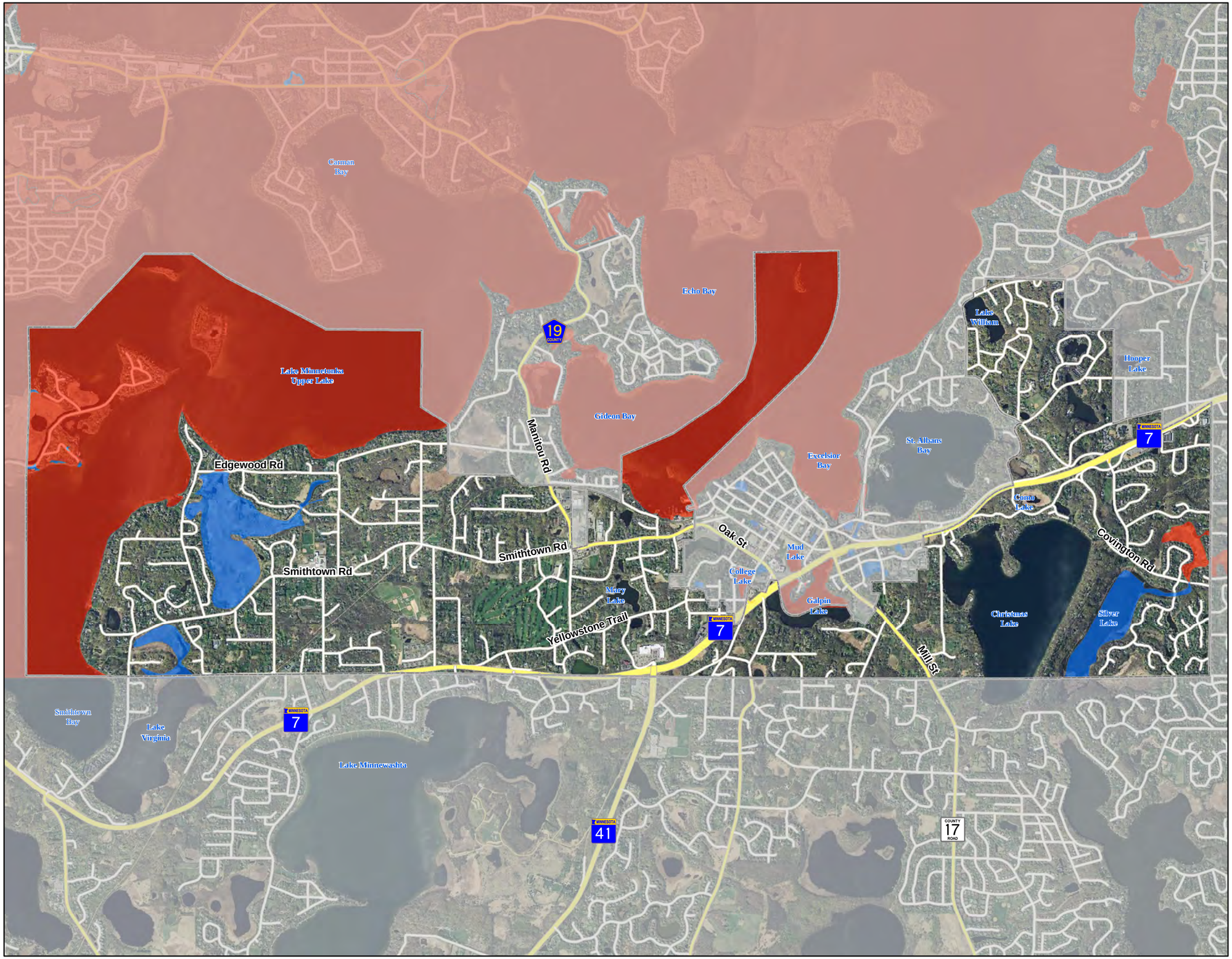
CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 8: FEMA Floodplain Map



City Boundary

Floodplain Boundaries

- 100-Year Floodplain
- 500-Year Floodplain

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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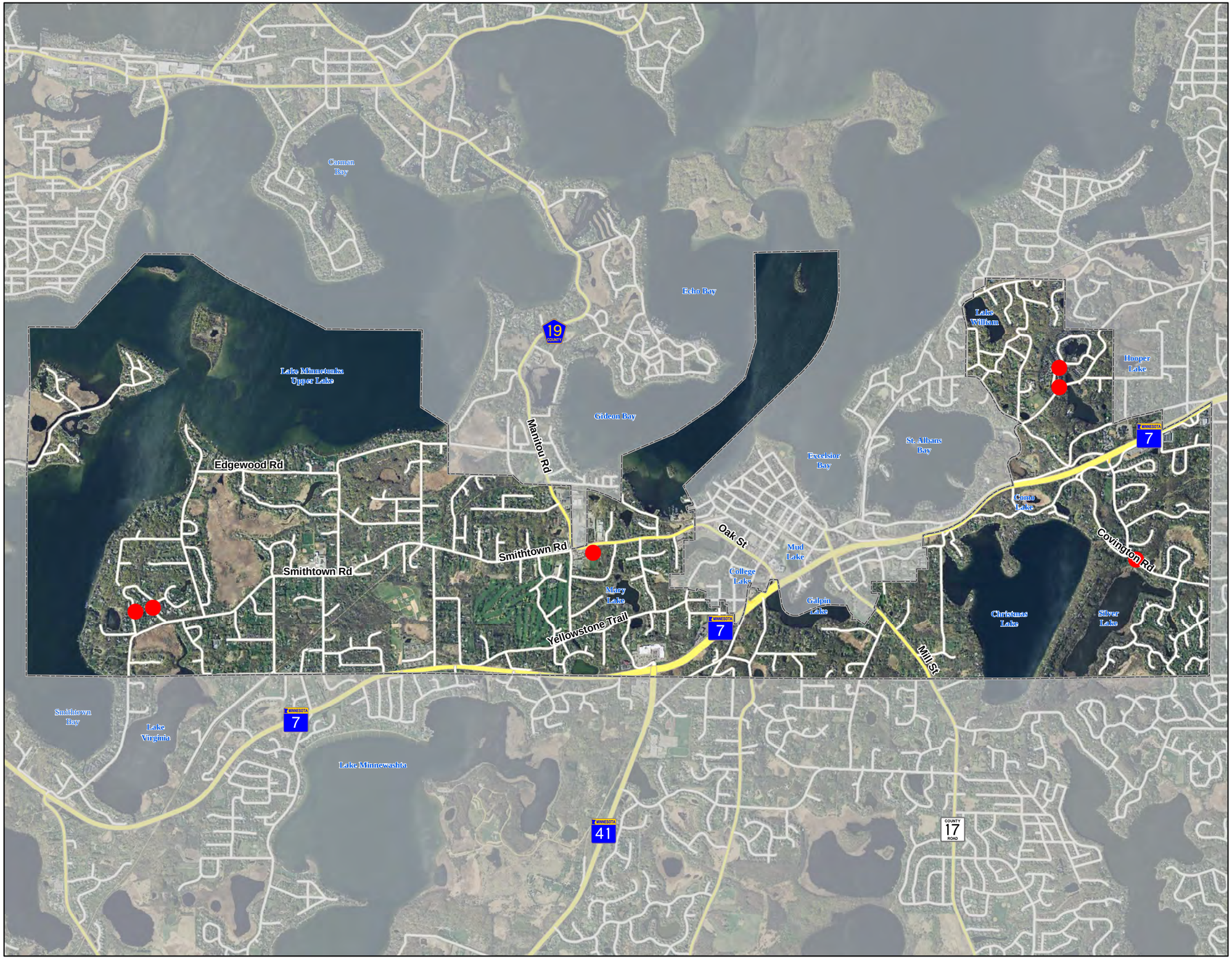
CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan
Figure 9: Groundwater Appropriations



City Boundary

MN DNR Permitted Water Appropriation Locations

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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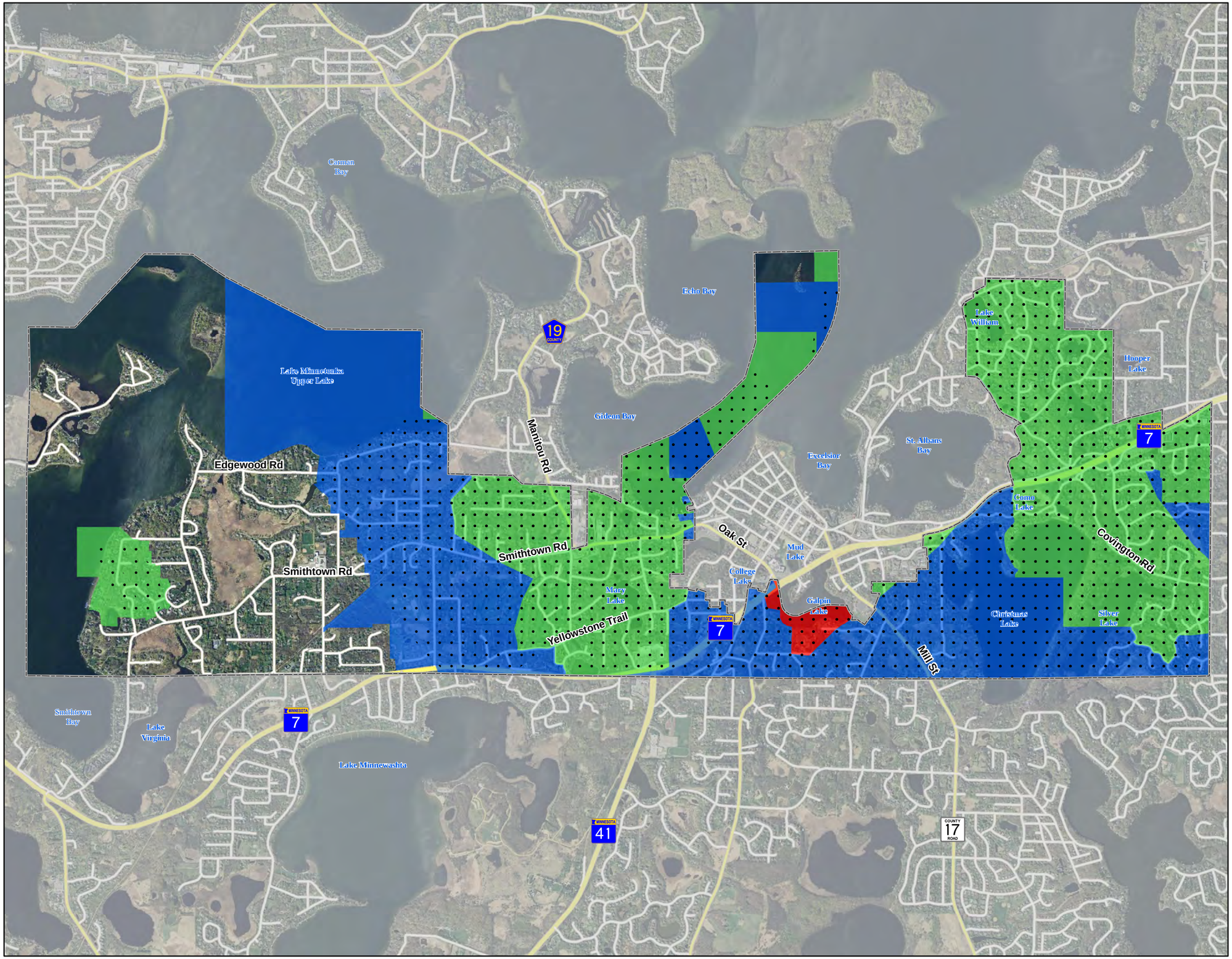
CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan

Figure 10: Drinking Water Supply Management Areas



- City Boundary
- Wellhead Protection Area

Drinking Water Supply Vulnerability

- High
- Moderate
- Low

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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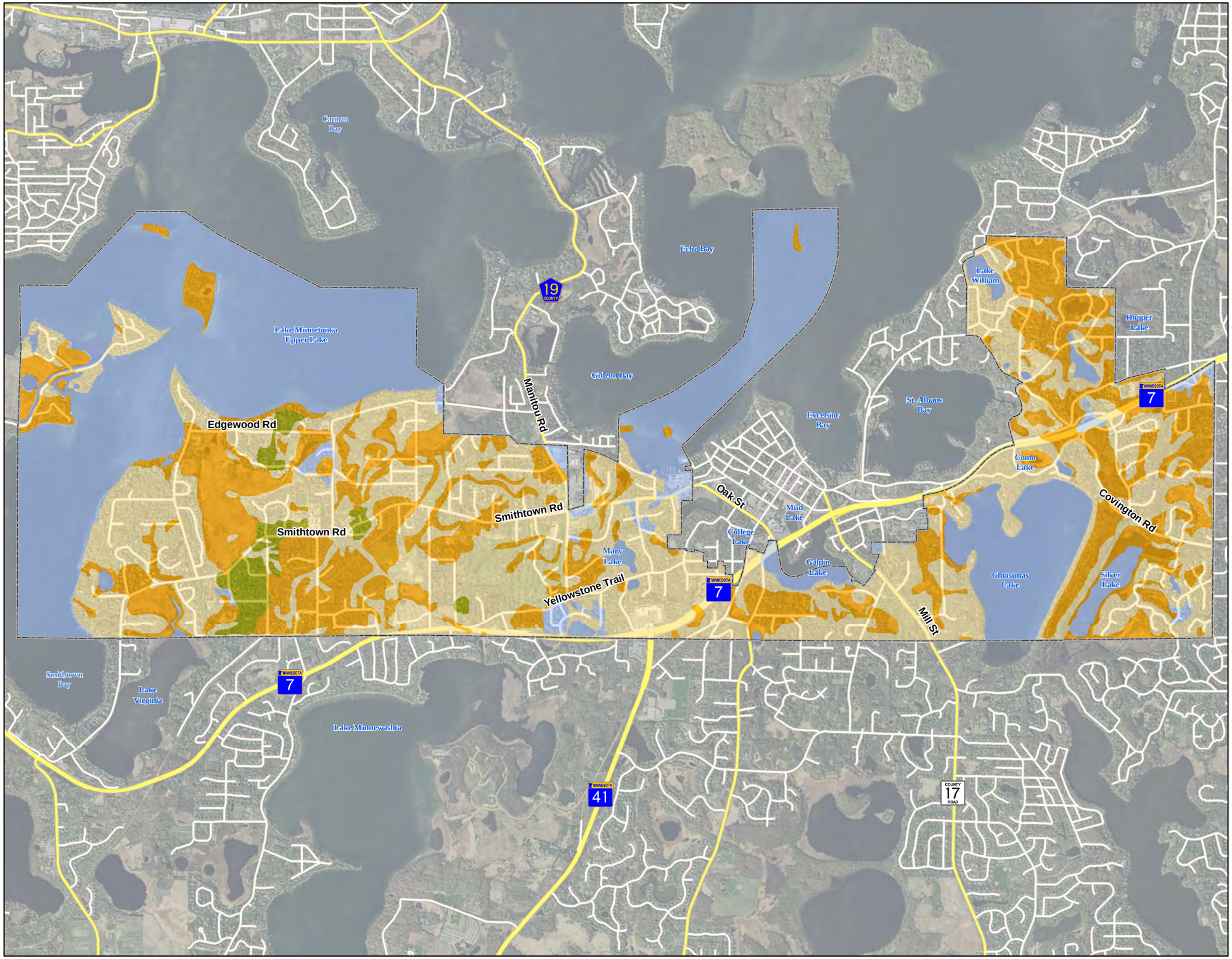
CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan

Figure 11: Hydrologic Soils Classificiation Map



City Boundary

Hydrologic Group

HSG B: These soils have moderate infiltration rates ranging from 0.15 to 0.30 inches per hour when thoroughly wetted. These soils consist of deep moderately well to well drained soils with moderately fine to moderately coarse textures.

HSG C: These soils have slow infiltration rates ranging from 0.05 to 0.15 inches per hour when thoroughly wetted

HSG D: These soils have very slow infiltration rates ranging from 0 to 0.05 inches per hour when thoroughly wetted. These soils are typically clay soils with high swelling potential, soils with high permanent water table, soils with clay layer at or near the surface, or shallow soils over nearly impervious material.

Water

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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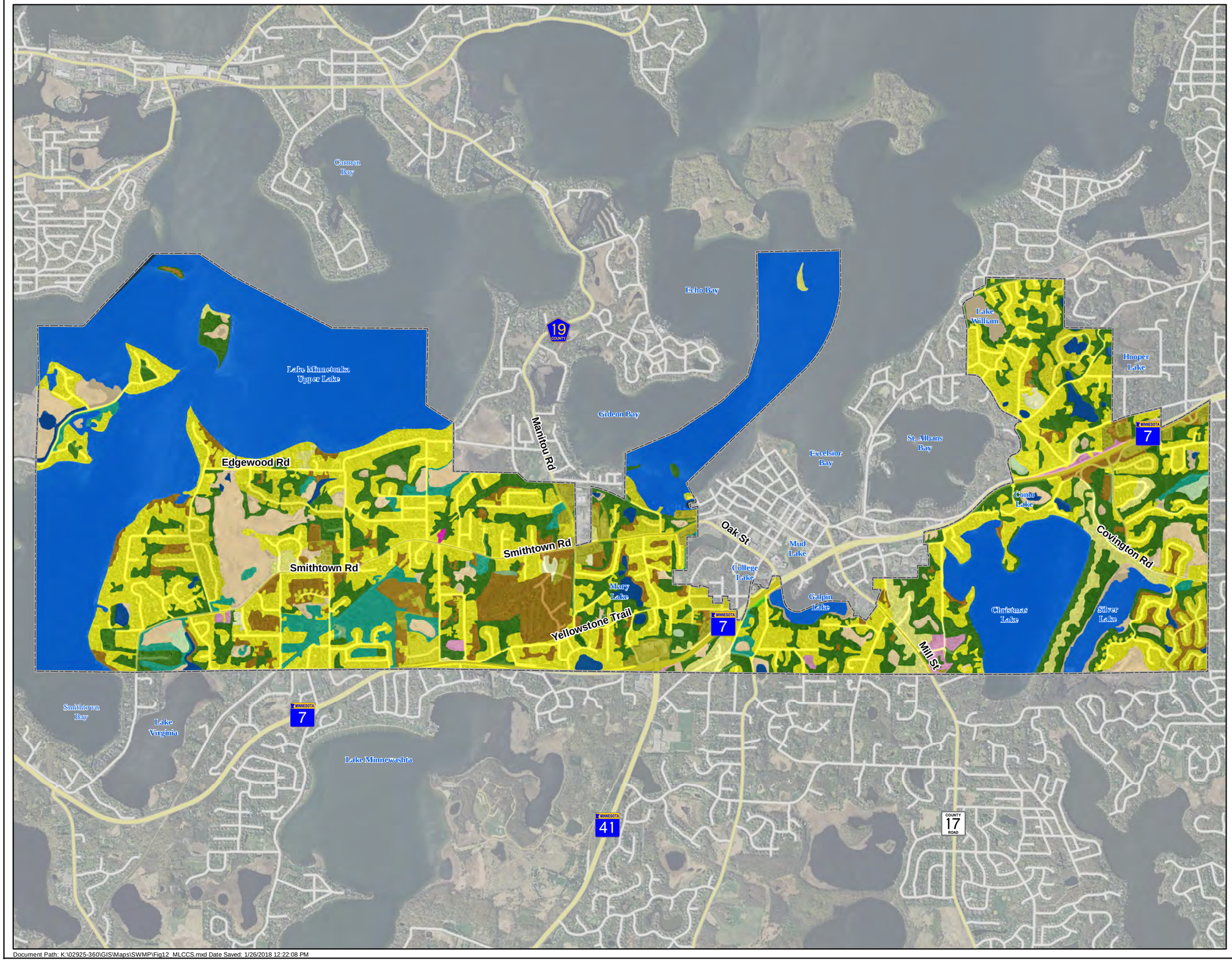
CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan

Figure 12: Minnesota Land Cover Classification System



City Boundary

Landcover Classification

- 5-10% Impervious
- 11-25% Impervious
- 26-50% Impervious
- 51-75% Impervious
- 76-100% Impervious
- Short Grasses
- Agricultural Land
- Tree Plantation
- Forest
- Wetland Forest
- Wetland Shrubs
- Tall Grasses
- Wetland Emergent Vegetation
- Dry Tall Grasses
- Open Water
- Wetland Open Water

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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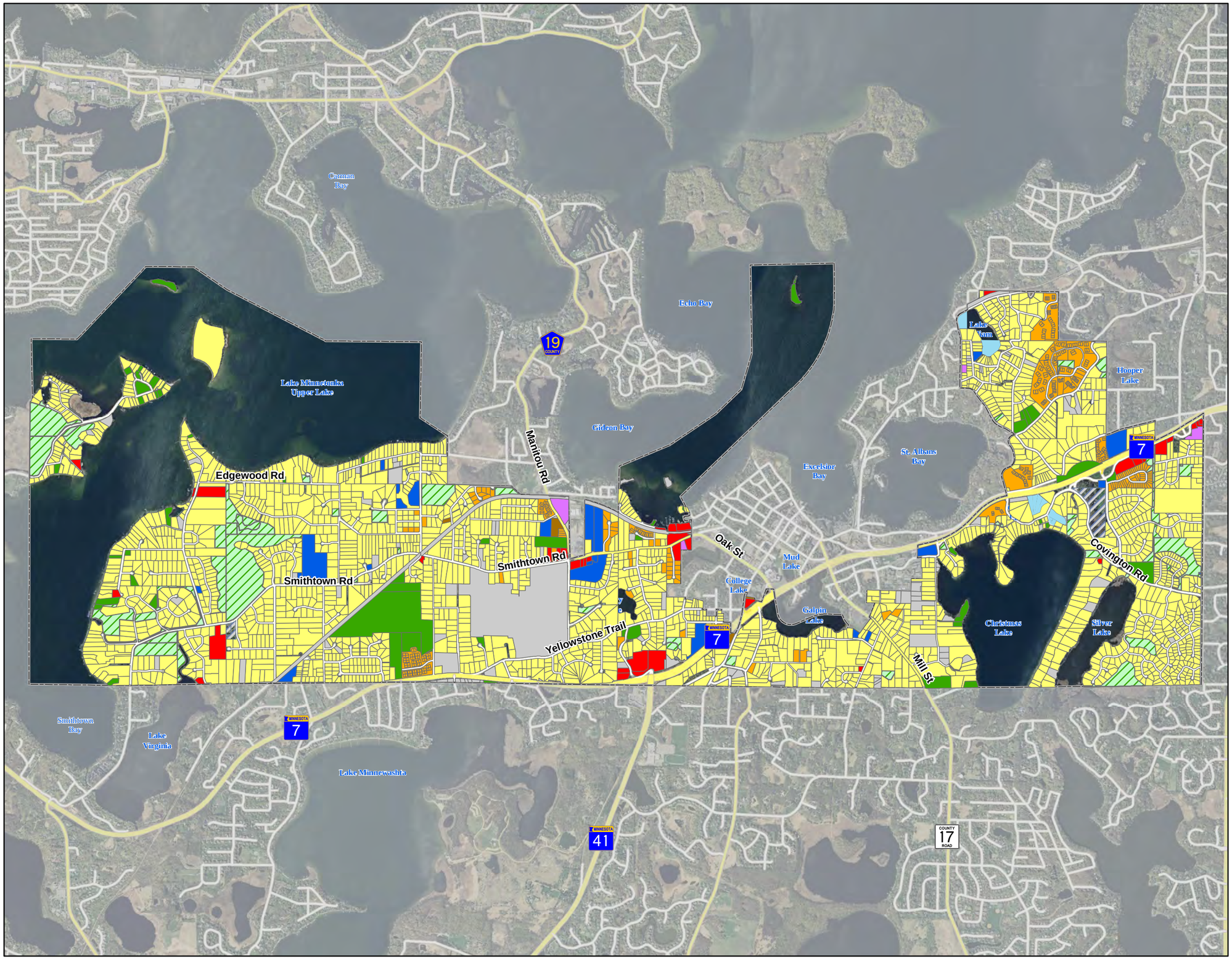
CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 13: Existing Land Use



- City Boundary

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Public/Institutional
- Open Space
- Parks
- Cemetary
- Vacant Land/Undeveloped
- Lakes and Wetlands

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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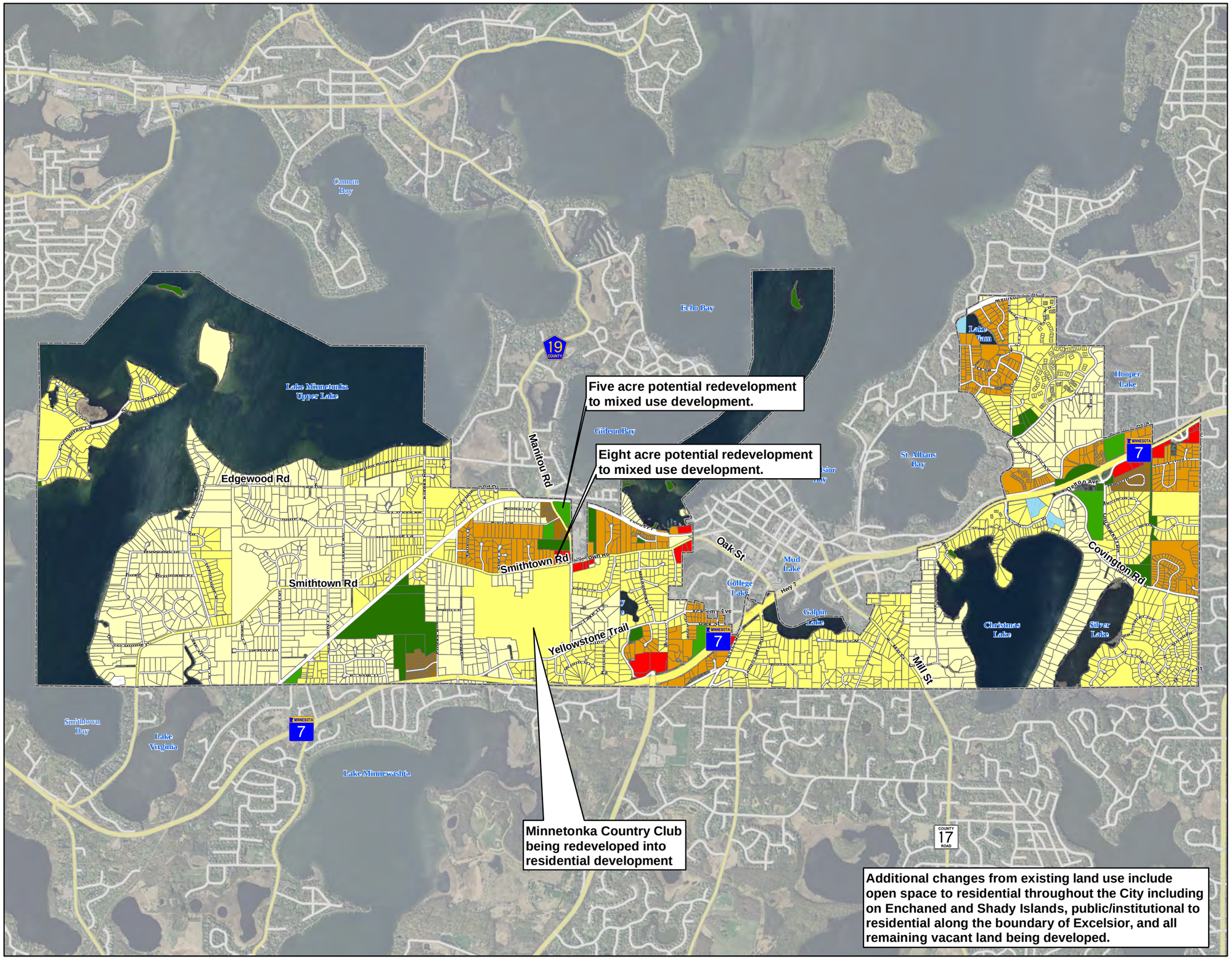
CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 14: Future Land Use



- City Boundary

Land Use

- Lowest Density Residential
- Low Density Residential
- Low to Medium Density Residential
- Medium Density Residential
- Commercial
- Semi-Public
- Public
- Open Water
- ROW

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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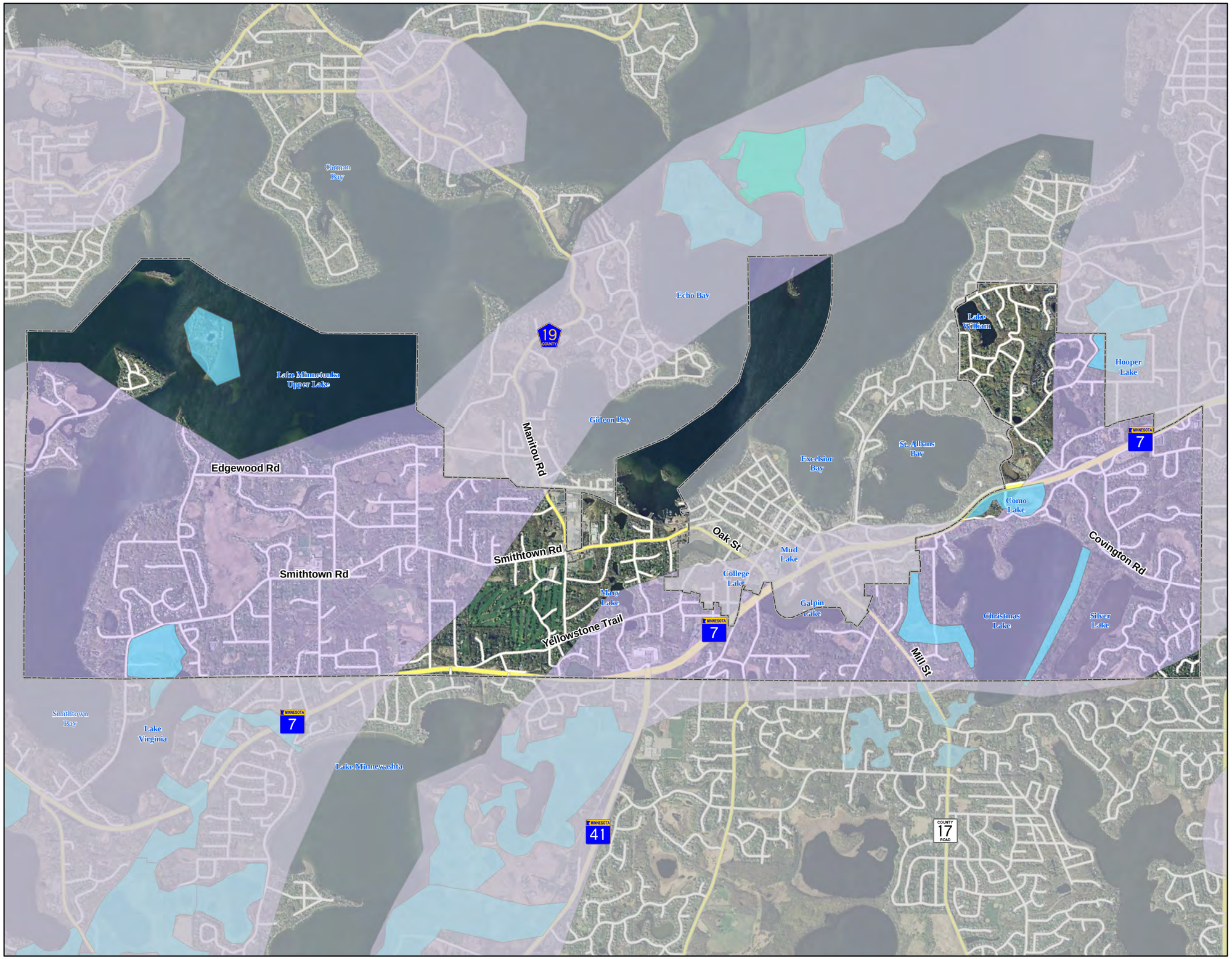
CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 15: Biological Significance and Conservation Corridor Map



- City Boundary
- MCWD Key Conservation Areas
- MCBS Moderate Biodiversity Area
- Metropolitan Conservation Corridor

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Figure 16: Pollutant Source Location Map

- City Boundary

MPCA Pollutant Source

- Aboveground Tanks
- Brownfields
- Construction Stormwater
- Hazardous Waste
- Industrial Stormwater
- Multiple Programs
- Petroleum Remediation
- Solid Waste
- Underground Tanks
- Wastewater

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan

Figure 17: Shorewood's City-Owned Parcels

City Boundary
City-Owned Parcels

N

0 2,500 Feet
1 inch = 2,500 feet

WSB

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Privately Owned BMPs
A. Raingardens; owned and maintained by landowner
B. Filtration basins and ponds; owned and maintained by landowner
C. Stormwater pond; owned and maintained by landowner
D. Stormwater pond; owned and maintained by landowner

CITY OF SHOREWOOD

Shorewood
Surface Water
Management Plan

Figure 18: Storm Sewer and Stormwater BMPs

City Boundary
Outfalls
Storm Sewer
Pond Inventory*

*Numbers Coincide with City-Owned Stormwater Basin Identifiers

N
0 2,500 Feet
1 inch = 2,500 feet

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APPENDIX B

Water Resource Related Agreements

CITY OF SHOREWOOD

RESOLUTION NO. 18-082

A RESOLUTION REGARDING THE ADMINISTRATION OF THE MINNESOTA WETLAND CONSERVATION ACT AND OTHER DUTIES

WHEREAS, the Minnesota Wetland Conservation Act of 1991 (WCA) requires local government units (LGUs) to implement the rules and regulations promulgated by the Board of Water and Soil Resources (BWSR) pertaining to wetland draining, filling and excavation; and

WHEREAS, Minnesota Rules, chapter 8420 have been adopted by BWSR in accordance with the rulemaking provisions of Minnesota Statutes, chapter 14, for the purpose of implementing WCA; and

WHEREAS, Minnesota Rules 8420.0200, Subpart 1, Item E allows a county, city, or town to delegate implementation of chapter 8420 and the Act to another governmental entity by the passage of resolutions by both parties; and

WHEREAS, both parties must provide notice to BWSR, the Department of Natural Resources, and the Soil and Water Conservation District of the delegation, including a copy of the resolution and a description of the applicable geographic area, within 15 business days of adoption of the resolution.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Shorewood defers the authority and administrative responsibility to implement the WCA as the LGU to the Riley Purgatory Bluff Creek Watershed District for those areas within the legal boundaries the Riley Purgatory Bluff Creek Watershed District as of this date in accordance with Minnesota Rules, Chapter 8420;

AND FURTHER, that the Riley Purgatory Bluff Creek Watershed District may review certain Public Waters work projects within the Riley Purgatory Bluff Creek Watershed District as allowed by their General Permit through the Minnesota Department of Natural Resources.

ADOPTED BY THE CITY COUNCIL OF THE CITY OF SHOREWOOD this 27th day of August, 2018.

Scott Zerby, Mayor

ATTEST:

Sandie Thone, City Clerk

MEMORANDUM of UNDERSTANDING

Between the Minnehaha Creek Watershed District and the City of Shorewood for Local Water Planning and Regulation

This Memorandum of Understanding (MOU) is made by and between the Minnehaha Creek Watershed District, a watershed district with purposes and powers as set forth at Minnesota Statutes Chapters 103B and 103D ("MCWD"), and the City of Shorewood, a body corporate and politic and a statutory city in the State of Minnesota ("City").

Recitals and Statement of Purpose

WHEREAS in 2007, the MCWD revised its comprehensive watershed management plan under Minnesota Statutes § 103B.231, which details the existing physical environment, land use and development in the watershed and establishes a plan to regulate water resource use and management to protect water resources, improve water quality, prevent flooding and otherwise achieve the goals of Minnesota Statutes Chapters 103B and 103D;

WHEREAS the MCWD's comprehensive watershed management plan incorporates the Rules adopted by the MCWD to protect water resources, improve water quality, prevent flooding and otherwise achieve the goals of Minnesota Statutes Chapters 103B and 103D;

WHEREAS the City has developed a local water management plan under Minnesota Statutes §103B.235 that describes the existing and proposed physical environment and land use within the City and sets forth an implementation plan for bringing local water management into conformance with the MCWD's comprehensive watershed management plan;

WHEREAS on January 8, 2009, the MCWD Board of Managers conditionally approved the City's local water management plan by adoption of Resolution 09-005, which resolution is attached and incorporated herein;

WHEREAS the City wishes to continue to authorize MCWD permitting authority with respect to all areas regulated by the MCWD including the Minnesota Wetland Conservation Act;

WHEREAS MCWD approval of a local plan requires a finding that the official controls of the local government are at least as protective of water resources as the MCWD Rules;

WHEREAS the finding by the MCWD Board of Managers in this regard rests on the City's authorization of the MCWD's continued exercise of regulatory authority within the City in accordance with Minnesota Statutes §103B.211, subdivision 1(a)(3);

WHEREAS the MCWD and City desire to memorialize their respective roles in implementing water resource protection and management within the City;

NOW THEREFORE it is mutually agreed by and between the parties that they enter into this MOU in order to document the understanding of the parties as to the roles and responsibilities of each party.

1.0 Responsibilities of the City

1.1 The City may exercise all present and future authority it otherwise may possess to issue permits for and regulate activities affecting water resources within the City.

1.2 The City will meet at least annually with the MCWD to review the implementation of the City's local water management plan.

1.3 Annually, by the date specified for the City's submittal of its annual report under its NPDES municipal stormwater permit, the City will submit to the MCWD a concise but specific report describing:

a. Progress on the local water management plan implementation program.
b. Progress on meeting phosphorus load reduction requirements of the WMP.
c. Any adjustments to the implementation and/or capital improvement program in the local water management plan.
d. A listing, with further specific information as the MCWD may request, of grading and structural alterations approved or occurring within city boundaries since the last annual report (both private and public alterations) that could measurably affect hydraulic and hydrologic model outcomes.

The City may incorporate its annual report into its NPDES MS4 annual report, provided it addresses the above items with specificity.

2.0 Responsibilities of the MCWD

2.1 The MCWD will continue to apply and enforce its Rules, as they may be amended from time to time, within the City.

2.2 The MCWD will meet with the City at least annually to review the implementation of the City's local water management plan, addressing at a minimum the following topics:

1. Maintenance of up-to-date water quality measures, such as concentrations of Phosphorus, in the City's local water management plan;
2. The City's progress toward Implementation Program/CIP items;
3. Utilizing street sweeping to meet MCWD Phosphorus Loading Reduction goals, and specifically the progress of the City toward testing phosphorus concentrations in sweepings and utilizing that knowledge for effective sweeping.

2.3 The MCWD retains all authority that it may possess under Minnesota Statutes Chapters 103B and 103D or any other provision of law, except as explicitly reposed in the City under this

MOU, including but not limited to authority set forth at Minnesota Statutes §§103B.211, subdivision 1(a); 103D.335 and 103D.341.

3.0 General

3.1 The MOU is effective on the date that it has been executed by both parties, will remain in effect for five years, and will be extended automatically for five-year terms unless terminated by agreement of the parties. Notwithstanding, the City will continue to be subject to applicable statutes and rules requiring that it revise its local water management plan in response to MCWD revisions of the WMP.

3.2 This MOU may be amended only by a writing signed by both parties.

3.3 This MOU does not affect the rights and duties of the parties under the March 24, 2008 Joint Powers Agreement signed by the MCWD and the City of Shorewood, which remains in force and effect according to its terms.

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of Understanding.

CITY OF SHOREWOOD

By Laura Burgeson
acting Mayor

By
City Manager

Date:

MINNEHAHA CREEK WATERSHED DISTRICT

By James B. Calkins
President, Board of Managers

Date: 2-12-09

APPROVED AS TO FORM AND EXECUTION

By
Its Attorney

APPROVED AS TO FORM AND EXECUTION

By
Its Attorney

MEMORANDUM of UNDERSTANDING

This Memorandum of Understanding (MOU) is made between the City of Shorewood, a Minnesota municipal corporation ("City"), and the Minnehaha Creek Watershed District ("District"), a watershed district and political subdivision with powers at Minnesota Statutes Chapters 103B and 103D.

Recitals and Statement of Purpose

WHEREAS the City has identified drainage, groundwater and flooding concerns within certain defined catchments identified as:

- Shorewood Oaks Development
- Strawberry Lane
- Grant Lorenz Channel
- Alexander Lane Pond
- Church Road Ponding

and evaluated solutions to those concerns at a conceptual level as summarized in the "Freeman Park Feasibility Study" (April 5, 2017) ("Study");

WHEREAS the City would like to address these concerns through a systematic approach that integrates multiple goals for road improvements; parks, trails and open space; and management of water as a community asset;

WHEREAS in its Watershed Management Plan (2018), the District outlines its commitment to serving as a resource to its communities through early coordination and planning of land use and water resource matters, including technical assistance, regulatory process facilitation and shared efforts to secure funding;

WHEREAS in addition to addressing drainage, groundwater and flooding concerns, collaboration between the City and District may create the opportunity for water quality, habitat and other water resource benefits;

WHEREAS the City and District wish to formalize a mutual commitment to integrating efforts and aligning resources in order to plan wisely, make sound public investments in infrastructure, and protect and improve natural systems so as to foster a vibrant and healthy community;

THEREFORE this MOU establishes a cooperative framework to examine and pursue work within the area defined by the Study that integrates and cost-effectively achieves the above City and District goals.

Terms of Understanding

1. The City will lead further development of the engineering basis for a plan to address the identified areas of drainage, groundwater and flooding concern, including the evaluation of alternatives and costs.

2. The District, through its staff and engineer, will provide independent technical evaluation of the concerns; proposed solutions; and opportunities to integrate elements for water quality, habitat or other water resource benefits.

3. To facilitate technical review and collaboration, the City and District each will make relevant data available to each other on request. City data including but are not limited to technical data supporting the Study; City stormwater conveyance maps and system component specifications; City capital improvement programs for roads, trails and parks; and information on City land interests including ownership and rights under easements and covenants. District data include, but are not limited to, District hydraulic & hydrologic models and data sets and other District water quality and water resource data for relevant surface waters. Data sharing is subject to the ordinary licensing protocols of each party.

4. After initial mutual review of relevant data, the City and District will identify data gaps. The City will address gaps related to drainage, groundwater and related water quantity matters, as well as those related to City road, trails and parks improvements. The District will address gaps related to water quality and water resource matters other than quantity.

5. The City and District, through the working group formed under paragraph 8 below, will collaborate to identify and prioritize potential strategies and projects to address identified drainage, groundwater and flooding concerns while also advancing public natural resource, water quality, parks and trails, and infrastructure goals.

6. The strategies identified in paragraph 5 will be incorporated into an Area Plan developed by the City for the study area identified in Exhibit A. Through the collaborative analysis, the Plan will include a prioritized, phased City investment strategy that integrates City infrastructure priorities for road improvements, trails, park improvements and water resource improvements for volume, rate, and load reduction and ecological enhancements.

7. The Area Plan developed by the City will include a funding plan for the City investments identified. There are no funding commitments by MCWD at this time beyond the technical services provided herein. MCWD funding may be available for strategies with a water resources or ecological benefit through a MCWD grant program to be developed in 2018 or considered by the Board of Managers as part of its annual Capital Improvement Program. Formal request for funding are prioritized annually. MCWD will identify applicable outside funding opportunities as they relate to the integration of water resource improvement strategies and assist the City in seeking those funds.

8. As each potential project or other capital work is developed, the City and District will:

   a. Facilitate conceptual review by their respective regulatory staff to provide for early identification of potential regulatory criteria or obstacles. The District also will assist the City in understanding the potential regulatory requirements of other water resource agencies. Notwithstanding the foregoing, any project that is pursued as a result of coordination under this MOU will remain subject to the ordinary permit requirements and procedures of each party, as applicable.

   b. Explore internal and external sources of funding for such work.

9. With the District's assistance, the City will coordinate outreach and engagement of the neighborhood and the broader interested public with respect to the work under this MOU, and will be responsible for

process facilitation including public notice, meeting space and similar administrative matters. The parties will co-lead public sessions.

10. The City and District each will designate a staff member and an engineering representative to serve as working group members to advance this MOU. These representatives will maintain contact and coordination in order to achieve progress under this MOU. Each staff member will draw on others within his or her organization as is appropriate to contribute to progress, and will coordinate briefing and action by his or her decision making body when appropriate.

11. This MOU is a statement of mutual interest and cooperation. Nothing herein is legally binding. At such time as the District and City proceed to implement a specific capital project or program, or to formalize other coordination in a binding manner, they will enter into a written agreement that establishes legally binding roles, responsibilities and financial obligations.

12. Each party will bear the costs of its participation in the activities described herein.

13. This MOU is effective when fully executed by the parties and expires two years thereafter. Either party may terminate this MOU on 30 days' advance written notice to the other party.

CITY of SHOREWOOD

By: Scott Zerby Date: 3/1/18

MINNHAHA CREEK WATERSHED DISTRICT

By: K. Boguess Date: 3/8/18

RESOLUTION

COPY

RESOLUTION NUMBER: 18-020

TITLE: **Authorization to execute memorandum of understanding with the City of Shorewood to coordinate planning of water resources and City capital improvement planning**

WHEREAS, in 2014, the Board of Managers established the Balanced Urban Ecology Policy which emphasizes the importance of integrated land use and water planning in order to maximize water resource and community benefits;

WHEREAS the 2017 Strategic Alignment Plan identifies the following organizational strategies to achieve the District's mission of protecting and improving land and water resources:

- Develop high impact capital projects integrated with non-water initiatives through multijurisdictional partnerships
- Change the land-use and water policy environment to increase early, value added partnership with private development, public infrastructure, and public policy/planning;

WHEREAS in its Watershed Management Plan (2018), the District outlines its commitment to serving as a resource to its communities through early coordination and planning of land use and water resource matters, including technical assistance, regulatory process facilitation and shared efforts to secure funding;

WHEREAS the City of Shorewood has initiated early coordination with the District to take a systematic approach to addressing identified drainage, groundwater and flooding concerns in the western portion of the City that integrates multiple goals for road improvements, parks, trails and open space management; and management of water as a community asset;

WHEREAS in addition to addressing drainage, groundwater and flooding concerns, collaboration between the City and District may create the opportunity for water quality, habitat and other water resource benefits;

WHEREAS the City and District wish to formalize a mutual commitment to integrating efforts and aligning resources in order to plan wisely, make sound public investments in infrastructure, and protect and improve natural systems so as to foster a vibrant and healthy community;

WHEREAS this MOU does not establish legally binding terns on the District and City, but establishes a cooperative framework to examine and pursue work within the area defined by the study that integrates and cost-effectively achieves the above City and District goals;

WHEREAS the City of Shorewood authorized the Memorandum of Understanding at its meeting on February 26.

NOW THEREFORE BE IT RESOLVED that the Minnehaha Creek Board of Managers authorizes the District Administrator to enter into a memorandum of understanding with the City of Shorewood to coordinate the planning and programming of water resource, road, infrastructure and park investments.

Resolution Number 18-020 moved by Manager Olson, seconded by Manager Becker.
Motion to adopt the resolution 7 ayes, 0 nays, 0 abstentions. Date: March 8, 2018.

K. Rogness
Secretary

Date: 3/8/18.

DRAFT for discussion purposes only and subject to Board approval and the availability of funds.
Resolutions are not final until approved by the Board and signed by the Board Secretary.

APPENDIX C

Stormwater System Modeling Information

Storm Water System Modeling Information

NOTE: The City's storm water model does not match the MCWD model. The MCWD model is on more of a global scale, whereas the City's model is split into several subwatersheds. The City will defer to the MCWD, when appropriate; however, the City will retain its existing model for areas where the MCWD model does not reflect localized subwatershed characteristics.

HYDROLOGIC INFORMATION FOR THE CITY OF SHOREWOOD

SUBWATERSHED NAME

Indicates area shown on the Subwatershed Delineation Map. The letter generally indicates a group of subwatersheds that connect to a common outlet or lake. The abbreviations used in the following tables and the watershed to which they correspond are:

GB	Subwatershed tributary to Gideon Bay
LMAR	Subwatershed tributary to Lake Mary
C	Subwatershed tributary to Central area
SC	Subwatershed tributary to South-Central area
LMIN	Subwatershed tributary to Lake Minnewashta
NC	Subwatershed tributary to North-Central area
WC	Subwatershed tributary to West-Central area
LV	Subwatershed tributary to Lake Virginia
W	Subwatershed tributary to West area
PC	Subwatershed tributary to Purgatory Creek
CB	Subwatershed tributary to Carson Bay
LW	Subwatershed tributary to Lake William
SAB	Subwatershed tributary to St. Albans Bay
CL	Subwatershed tributary to Christmas Lake
GL	Subwatershed tributary to Galpin Lake
I	Subwatershed tributary to Lake Minnetonka

SUBWATERSHED DRAINAGE AREA

The area that drains directly to a particular pond or major drainageway. The subwatershed boundaries are typically determined using available contour mapping. The boundaries should be considered approximate due to the limited availability or accuracy of the contour mapping and the possibility of alteration by new construction or storm sewer projects.

TIME OF CONCENTRATION (Tc)

The longest travel time for a particle of water to reach a discharge point in a watershed.

CURVE NUMBER (CN)

The runoff curve number accounts for many major factors in hydrologic modeling. The major factors that determine the curve number are the hydrologic soil group, the type of cover present in the watershed, land use in the watershed, and antecedent moisture conditions. Other factors affecting the curve number are whether impervious surface areas outlet directly to the drainage system or whether the flow spreads over pervious areas before entering the drainage system. Highly developed urban areas with a greater percentage of impervious surface area are characterized with higher curve numbers. Rural area with land uses of rural residential and agricultural typically will have lower curve numbers. Curve numbers have a typical range of 40 to 98.

PEAK RUN-OFF RATE

This is the rate water is shed from a particular drainage area. It is equivalent to the inflow rate of a storm water treatment basin.

RUNOFF VOLUME

This is the volume of water that is shed from a particular drainage area. The volume of water for a particular watershed is dependent on the subwatershed CN and storm event precipitation.

POND NWL

The normal water level of the pond is the lowest controlling elevation. It is usually taken as the invert of the outlet structure or the pump control elevation and is the elevation that the pond will drain down to after a rainfall event. The NWL does not reflect the lowest elevation that may be attained naturally by infiltration, evaporation or transpiration.

POND HWL

The highest water level achieved in a pond as predicted by the hydrologic/hydraulic model for a 100-year event. The model assumes that the pond elevation is equal to the NWL at the beginning of the storm event. The HWL is affected by the accuracy of the data such as drainage area, storage capacity, outlet description and condition, and runoff factors. All of these factors should be reviewed when HWL is considered critical.

RECOMMENDED 100 YEAR HWL

The highest water level predicted for a pond based on the 100-year event hydrologic/ hydraulic model data results. This elevation is recommended for ponding areas and is not representative of actual conditions without full implementation of the model parameters.

PEAK OUTFLOW FROM POND

The maximum discharge rate from a pond through the outlet. This normally occurs when the pond is at the HWL and it assumes the full efficiency of the outlet structure. The peak outflow rate for subwatersheds without ponding areas is based on the flowing full capacity of the discharge pipe from that subwatershed.

POND OUTLET

The diameter of pipe or type of structure which provides an outlet from a subwatershed or storm water storage basin.

REQUIRED STORAGE

The volume of water required to be retained in order to reduce the peak runoff rate to the peak outflow from the pond. This volume of water is stored in a storm water retention basin between the NWL and the HWL.

AVAILABLE STORAGE

The storm water storage which is currently available within a subwatershed in the form of natural wetlands and depressions. These storage values are estimates taken from topography mapping provided by the City, U.S. Geological Survey Quad Maps, or available plans for proposed ponds.

APPROXIMATE OVERFLOW ELEVATION

The elevation at which the pond would overland overflow if the storage capacity is exceeded. This approximate elevation was determined from contour mapping.

EXISTING LOW BUILDING ELEVATION

This elevation was determined from the "House-Print" on the contour mapping and does not indicate low-floor or basement elevations. These elevations should be considered approximate due to possible inaccuracies in the mapping and buildings that have been constructed after the mapping was completed.

1-YEAR EVENT

A rainfall event that has a 100% chance of occurrence in a given year. The information in this table was obtained from a hydrologic/hydraulic model that utilized the Soil Conservation Service TR-20 Hydrograph Routing procedure. The 1-year event assumed a 2.4 inch, Type II distribution, 24-hour duration rainfall event.

100-YEAR EVENT

A rainfall event that has a 1% chance of occurrence in a given year. The information in this table was obtained from a hydrologic/hydraulic model that utilized the Soil Conservation Service TR20 Hydrograph Routing Procedure. The 100-year event assumed a 6.0 inch, Type II distribution, 24-hour duration rainfall event.

CITY OF SHOREWOOD
COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN
STORMWATER MODEL RESULTS
1-YEAR EVENT

SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (c)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (b)	APPROXIMATE OVERFLOW ELEVATION (a)	EXISTING LOW BUILDING ELEVATION (a)	COMMENTS
PC 1	4.9	16	75	3.0	0.2	943.2	943.5	0.3	12" RCP - (E)	0.1	1.9	947	949	
PC 2	10.3	20	74	4.9	0.5	922.1	922.8	1.2	12" RCP - (E)	0.2	11.8	930.8	932	
PC 3	18.1	23	75	9.1	0.9	910.1	910.9	0.1	12" RCP - (E)	1.2	3.8	912.1	914	
PC 4	19.3	21	76	10.9	1.0	904	904.4	3.4	5' Weir - (P)	0.3	0.8	905	912	
PC 5	20.2	23	78	13.1	1.2	898.6	899.3	1.1	12" RCP - (E)	1.6	13.7	902.7	906	
PC 6	183	25	78	115.0	11.0	894.8	895.5	2.0	15" RCP - (E)	16.8	250	904	904	
PC 7	16.3	15	73	8.7	0.7	889	890.7	7.1	24" CMP - (P)	0.1	4.7	897.2	899	
PC 8	11.8	15	76	8.3	0.6	893.7	894	0.2	12" RCP - (E)	0.5	12.8	898.3	901	
PC 9	26.9	18	75	15.4	1.3	933.5	934.2	1.6	15" RCP - (P)	0.6	8.4	938.5	939	
PC 10	65.9	21	74	31.1	3.0	910.8	911.6	13.7	36" RCP - (E)	0.7	55	920.8	922	
PC 11	64.3	29	76	31.3	3.4	888	890.2	39.3	72" x 54" RCP-A - (E)	4.6	21	892.4	897	
PC 12	3	15	87	4.5	0.3	963.9	964.8	2.5	15' weir - (P)	0.1	0.7	968.3	971	
PC 13	10	15	87	14.9	1.0							983	986	
CB 1	7.5	15	73	4.0	0.3	1000.5	1000.7	0.1	15' Weir - (E)	0.3	16	1007	N/A	
CB 2	24.9	30	75	10.8	1.2	984.7	985.2	2.0	18" RCP - (E)	0.5	9	989.8	1009	
CB 3	15.2	15	80	14.6	1.0	978	978.6	0.8	18" RCP - (E)	0.6	6.7	984.8	987	
CB 4	38	20	82	35.2	2.9	976	977.7	8.1	18" RCP - (E)	1.2	36.2 (985)	987.8	991	
CB 5	13.3	25	75	6.5	0.7	975.9	976.3	0.9	21" RCP - (E)	0.3	9	987.8	984	
CB 6	10.5	15	76	7.4	0.6	978.6	978.8	0.2	12" RCP - (P)	0.4	9.7	995.7	984	
CB 7	26.3	28	71	7.8	1.0	967.8	968.4	1.2	15" RCP - (P)	0.4	23	984.5	982	
CB 8	48.8	20	71	17.0	1.8	955.2	955.8	1.5	18" RCP - (P)	6.8	67	961.4	969	
CB 9	14.3	19	71	5.0	0.5	970	970.6	1.0	21" CMP - (E)	0.2	1.1	974	973.5	
CB 10	6.1	15	75	3.9	0.3	953.7	954.5	1.6	18" RCP - (E)	0.9	11.3 (961.4)	974	973.5	
CB 11	1.5	10	68	0.5	0.0	979.8	980.1	0.4	12" RCP - (E)	0.1	0.5	991	982	
CB 12	17.2	20	73	7.4	0.7	955.1	955.8	1.9	15" CMP - (P)	1.1	17	963.5	973	
CB 13	3.4	15	81	3.5	0.3	953.1	954	1.9	18" RCP - (P)	0.5	2.1	963.5	956	
CB 14	23	34	76	9.9	1.2	952.5	953.4	2.3	21" CMP - (E)	3.9	20.2	963.5	957	
CB 15	4.9	16	70	1.8	0.2	943.9	944.1	0.2	12" RCP - (E)	0.1	5.8	952.9	953	
CB 16	16.5	20	78	11.1	1.0								947	
CB 17	4.57	20	71	1.6	0.2	984.8	985.1	0.5	12" RCP - (P)	0.0	0.8	987	990	
LW 1	39.3	21	72	15.2	1.6	933	934	4.9	27" RCP - (E)	0.4	2.2	938	943	
LW 2	71.7	34	76	30.9	3.8	931.5	931.8	0.2	15" CMP - (P)	5.2	88	936	939	
SAB 1	15.1	30	70	3.7	0.5	970.4	970.7	0.4	15" CMP - (P)	0.2	6.5	977.3	981	
SAB 2	16.9	28	73	6.3	0.7	986.5	986.7	0.2	9" RCP - (E)	0.6	4	992	988	
SAB 3	38.7	24	73	15.8	1.7	935.4	935.8	0.3	12" CMP - (E)	1.4	7.4	937.4	946	
SAB 4	21.3	19	79	16.4	1.4	944	945.9	13.2	36" CMP - (P)	0.2	-	942	956	
CL 1	10.6	20	74	5.1	0.5	932.8	934.1	2.6	15" CMP - (E)	0.1	1.2	936.7	941	
CL 1A	47	30	74	18.5	2.2	947	947.3	0.5	12" RCP - (P)	1.8	12.4	949	952	
CL 1B	11.1	20	74	5.3	0.5	938.5	938.9	0.6	18" RCP - (P)	0.2	1.3	940	940	
CL 2	50	16	74	28.2	2.3	933	933.2	0.1	18" RCP - (P)	2.2	44	937.2	938	
CL 3	356.6	60	90	272.9	42.9	932.8	933	2.3	36" CMP - (E)	51.3	1045	936.7	938	
CL 4	8.2	15	69	2.7	0.3	930.4	931.3	2.2	42" CMP - (E)	1.0	18	937.9	N/A	
CL 5	15.9	21	72	6.1	0.6	951	952.3	3.3	15" CMP - (E)	0.1	0.7	953.5	957	
CL 6	23.7	20	77	14.7	1.3	946	946.6	1.8	24" RCP - (E)	1.0	3.7	948	948	

CITY OF SHOREWOOD
COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN
STORMWATER MODEL RESULTS
1-YEAR EVENT

SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (c)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (b)	APPROXIMATE OVERFLOW ELEVATION (a)	EXISTING LOW BUILDING ELEVATION (a)	COMMENTS
GL 1	32.6	30	73	11.6	1.4	951.3	955.1	7.5	15" CMP - (E)	0.2	0.2	955.1	959	
GL 2	49.1	18	76	30.7	2.6	943.5	944.7	1.7	15" CMP - (E)	4.4	18.6	947.8	947	
GL 3	36	21	75	18.6	1.8	964.6	965.3	0.8	12" CMP - (E)	2.9	10.7	967.1	977	
GL 4	25.9	18	77	17.7	1.5	957.5	958.7	5.6	24" VCP - (E)	1.8	14.8	962.7	966	
GL 5	5.8	20	75	3.0	0.3	989.9	990	0.0	18" CMP - (E)	0.3	1.7	988	990	
GL 6	28.2	42	79	13.7	1.8	945	946.7	8.3	30" CMP - (E)	0.8	6.1	950.5	953	
GL 7	43.8	17	75	26.1	2.2	943.3	943.7	1.5	2-24" RCP - (E)	21.5	300	950	949	
GL 9	8.5	15	70	3.2	0.3	982.9	983.5	0.9	15' Weir - (P)	0.8	12.2	991.2	992	
GL 10	46.8	80	77	11.9	2.7							950	951	
GB 1	20.4	25	74	9.3	0.9	953	953.6	0.8	15" CMP-(P)	0.5	1.6	955.3	955	
GB 2	27.5	28	78	16.5	1.7	945	946.2	2.4	10" ORIFICE-(E)	0.8	2.6	948	951	
GB 3	34.9	37	72	9.7	1.4	933	933.8	2.1	21" RCP-(P)	0.5	4.9	939.6	937	
GB 4	11.9	15	74	7.5	0.6								950	
GB 5	13.3	21	65	2.0	0.3	967.4	968.1	1.9	18" RCP-(E)	0.0	0.5	971.7	985	
GB 6	24.3	18	77	17.7	1.4	957.8	959.6	10.8	24" RCP-(E)	0.3	19.5	972.8	967	
GB 7	29.4	30	75	13.0	1.5	932.3	933.2	2.4	15"-CMP-(E)	1.6	17.1	938	942	
GB 8	74.7	18	76	50.1	4.0								974	
GB 9	14.3	25	76	7.8	0.8	930.1	930.3	0.3	36"-STEEL-(E)	0.6	16.9	939.1	936.4	
GB 10	36.5	20	77	25.1	2.1								933	
LMAR 1	32.7	28	76	16.5	1.7	955	955.4	0.7	12" CMP-(P)	1.2	5.3	963.9	957	
LMAR 2	61.8	20	77	42.5	3.5	953.1	953.4	0.4	15" RCP-(P)	4.3	54.8	958	957	
C 1	137.1	37	69	26.5	4.3	958	958.3	0.4	21" RCP-(P)	4.2	30.4	966.4	960	
C 2	10.1	17	72	4.8	0.4	960	960.2	0.1	12" RCP-(P)	0.3	2.3	961.7	968	
SC 1	6.2	15	78	5.5	0.4	974.8	975	0.2	12" RCP-(E)	0.2	2.2	979.6	977	
SC 2	37.7	25	78	24.4	2.3	960.6	961.1	1.1	15" RCP-(P)	3.3	25.7	964.5	966	
LMIN 1	16.7	30	75	7.4	0.8	977.2	978.3	5.5	24" RCP-(E)	0.1	17.6	984.7	991	
LMIN 2	18	20	74	9.5	0.8	948.6	950	9.4	27" RCP-(E)	0.0	12.5	963.6	964.5	
LMIN 3	6.7	20	73	3.2	0.3	960.6	961.2	0.8	18" CMP-(E)	0.1	0.9	963.6	966	
LMIN 4	16.4	20	89	23.3	1.9	985	986.6	8.8	36" RCP-(E)	0.7	2.2	990	994	
NC 1	16.5	21	79	12.9	1.1	981.7	983.5	4.1	15" CMP-(E)	0.3	1.3	984.7	985.2	
NC 2	39.4	47	75	12.5	2.0	979	979.3	5.5	12" RCP-(E)	0.9	2.9	980.3	980	
NC 3	18.5	21	72	7.7	0.7	966.3	969.3	6.0	27" RCP-(E)	0.4	0.5	970	973	
NC 4	27.9	30	73	10.1	1.2	950.2	951.8	11.3	36" STEEL-(E)	0.2	0.9	956.2	961	
NC 5	20	30	75	8.8	1.0	948	949.2	5.2	24"-STEEL-(E)	0.2	1.7	952.3	955	
NC 6	6.4	15	70	2.6	0.2	953.5	953.7	0.1	10" ORIFICE-(E)	0.1	0.9	954.8	966	
NC 7	12.6	15	75	8.7	0.6	941.3	941.4	1.1	24" CMP-(E)	0.2	1.4	941.3	944	
NC 8	6.6	15	73	3.8	0.3	937.9	938	0.1	12" CMP-(P)	0.2	10.9	944.7	945	
NC 9	24.8	21	74	12.7	1.1	932	932.2	0.1	15" CMP-(P)	1.2	13.5	934.5	940	
NC 10	47.6	43	75	16.2	2.4	930.5	931.1	0.7	15" CMP-(E)	2.6	7	931.9	939	
NC 11	86.1	40	75	30.9	4.3	-	-	-	-	-	-	-	932	
WC 1	49.6	29	72	16.5	2.0	975.5	975.6	4.2	15" & 12" CMP-(E)	0.6	2.9	976	983	
WC 2	106.6	60	76	31.1	5.6	959.5	963.8	16.0	"ORIF. TO 48" RCP-(E	1.5	68	971.4	974	
WC 3	44.5	62	77	13.9	2.5	950	951.9	26.7	2-36" CMP-(E)	0.7	3	955.9	956.2	
WC 4	106.5	95	75	20.2	5.3	930	931.3	42.8	4-54"x31" RCPA-(E)	1.6	5.2	932	934	
WC 5	50.8	175	78	7.8	3.1	965	967.2	2.9	9" ORIFICE-(E)	1.1	5.6	970.1	972.5	
WC 6	316.4	52	77	112.0	17.9	929.4	929.8	1.7	-18" CMP & 24"CMP-(E	34.3	191.4	931.1	932	
WC 7	69.3	20	66	12.9	1.7								932	

CITY OF SHOREWOOD
COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN
STORMWATER MODEL RESULTS
1-YEAR EVENT

SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (c)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (b)	APPROXIMATE OVERFLOW ELEVATION (a)	EXISTING LOW BUILDING ELEVATION (a)	COMMENTS
LV 1	22.1	15	75	15.2	1.1	949.5	949.8	5.0	27" RCP-(P)	0.3	11.7	953.7	954	
LV 2	116.6	69	75	28.0	5.8	-	-	-	-	-	-	-	936	
W 1	62.1	43	70	12.2	2.1	932.2	932.6	0.3	12" CMP-(P)	2.0	13.2	934.5	938	
W 2	21.6	20	65	3.4	0.5	930.2	930.3	0.0	12" CMP-(P)	0.5	3.6	931.1	938	
W 3	64.9	20	68	16.8	1.9	-	-	-	-	-	-	-	933	
I1	69.3	20	72	28.8	2.8	-	-	-	-	-	-	-	-	
I2	20.0	20	76	12.2	1.1	-	-	-	-	-	-	-	-	
I3	2.0	20	72	0.8	0.1	-	-	-	-	-	-	-	-	

a) Elevations obtained from the Cities digital topographic 1' contour mapping.
b) Available storage values calculated to the lowest elevation of either the overflow elevation or the low building elevation.
c) It is recommended the existing outlet elevations be surveyed.

Note: The Outlet designation (E) is an existing outlet, (P) is a proposed outlet.

SUBWATERSHED LABELS

PC = subwatershed tributary to Purgatory Creek
CB = subwatershed tributary to Carson Bay
LW = subwatershed tributary to Lake William
SAB = subwatershed tributary to St. Albans Bay
CL = subwatershed tributary to Christmas Lake

GL = subwatershed tributary to Galpin Lake
GB = subwatershed tributary to Gideon Bay
LMAR = subwatersed tributary to Lake Mary
C = subwatershed tributary to Central area
SC = subwatershed tributary to South-Central area

LMIN = subwatershed tributary to Lake Minnewashta
NC = subwatershed tributary to North-Central area
WC = subwatershed tributary to West-Central area
LV = subwatershed tributary to Lake Virginia
W = subwatershed tributary to West area
I= subwatershed tributary to Lake Minnetonka

CITY OF SHOREWOOD
COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN
STORMWATER MODEL RESULTS
100-YEAR EVENT

SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	RECOMMENDED 100 YR HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (d)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (c)	APPROXIMATE OVERFLOW ELEVATION (b)	EXISTING LOW BUILDING ELEVATION (b)	COMMENTS
PC 1	4.9	16	75	18.5	1.3	943.2	944.5	945	3.4	12" RCP - (E)	0.6	1.9	947	949	The subwatershed modeling utilized City as-built #15 for the basin outlet. Recommend routine maintenance of basin\outlet.
PC 2	10.3	20	74	33.0	2.7	922.1	924.7	926	3.7	12" RCP - (E)	1.3	11.8	930.8	932	The subwatershed modeling utilized City as-built #14 for the basin outlet. Recommend routine maintenance of basin\outlet and periodic inspection of overflow elevation\route.
PC 3	18.1	23	75	55.4	4.8	910.1	911.7	912.5	7.1	12" RCP - (E)	2.8	3.8	912.1	914	The subwatershed modeling utilized City as-built #16 for the basin outlet. Recommend routine maintenance of basin\outlet and periodic inspection of overflow elevation\route.
PC 4	19.3	21	76	63.9	5.3	904	905.9	906	35.5	5' Weir - (P)	1.6	0.8	905	912	The basin oulet was modeled w\ 5' weir set @ the overland flow elevation. Research did not identify a control structure or pipe outlet for this basin.
PC 5	20.2	23	78	67.4	5.9	898.6	902.3 a	903	5.9 a	12" RCP - (E)	11.7 a	13.7	902.7	906	The subwatershed modeling utilized City as-built #33 for the basin outlet. Recommend routine maintenance of basin\outlet.
PC 6	183	25	78	595.0	53.2	894.8	899.2 a	900	10.6 a	15" RCP - (E)	111.3 a	250	904	904	The subwatershed modeling utilized City as-built #16 for the Silver Lake outlet. Recommend routine maintenance of outlet and periodic inspection of overflow route.
PC 7	16.3	15	73	59.5	4.1	889	894.7	895	14.2	21" CMP - (E)	1.4	4.7	897.2	899	The Covington Road culvert could not be field verified for size and invert elevation due to being submerged. Utilized culvert size identified in Riley-Purgatory-Bluff Creek stormwater plan. Recommend survey of culvert crossing Covington Road for invert\size verification.
PC 8	11.8	15	76	47.2	3.2	893.7	894.7	895	1.7	12" RCP - (E)	2.1	12.8	898.3	901	The subwatershed modeling utilized City as-built #17 for the basin outlet. Recommend routine maintenance of basin,outlet, and overland overflow route.
PC 9	26.9	18	75	95.3	7.2	933.5	936.7	937	10.4	15" RCP - (P)	3.6	8.4	938.5	939	The basin outlet requires field verification for elevation ,type, length, and size. The current model reflects approximate elevations for this basin.
PC 10	65.9	21	74	204.8	17.0	910.8	915.5	916	32.9	36" RCP - (E)	7.8	55	920.8	922	The basin outlet requires field verification for elevation ,type, length, and size. The current model reflects approximate elevations for this basin. DRAFT
PC 11	64.3	29	76	184.1	17.7	888	894	894	171.2	72" x 54" RCP-A - (E)	41.1	21	892.4	897	This subwatershed discharges east to Minnetonka. Recommend a survey of the outlet as a response to conflicting data contained in as-builts previous City plan, and R-P-B Creek plan.
PC 12	3	15	87	15.6	1.1	963.9	966.4	967	5.3	12" RCP - (P)	0.3	0.7	968.3	971	The field inspection of the depression indicated no existing outlet. The depression will discharge east into Minnetonka.
PC 13	10	15	87	52.0	3.7	-	-	-	-	-	-	-	983	986	The basin outlet requires additional research, field inspection, and survey to define the in place outlet. This discharge from this subwatershed is directed to the TH 7 system flowing into Minnetonka.
CB 1	7.5	15	73	27.4	1.9	1000.5	1001.3 a	1002	1.2 a	15' Weir - (E)	1.4 a	16	1007	N/A	Recommend field inspection and survey of culvert. The basin currently is located in an undeveloped\underdevolped area with no structures identified on the city topography.
CB 2	24.9	30	75	67.7	6.6	984.7	986.7	987	6.8	18" RCP - (E)	3.5	9	989.8	1009	The basins for this subwatershed area located @ Broms Blvd and Old Market Road. The discharge is conveyed north into the TH 7 stormsewer. The basin oulet data was taken from City as-built #46.
CB 3	15.2	15	80	67.7	4.7	978	980.9	982	4.1	18" RCP - (E)	2.7	6.7	984.8	987	The basin outlet data was obtained from City as-built #57,58. The flow is directed north into the TH 7 storm sewer discharging into CB 4 north of TH 7.
CB 4	38	20	82	153.1	12.3	976	980.7	981.5	10.0	18" RCP - (E)	12.2	36.2 (985)	987.8	991	The outlet from this depression requires further analysis. Recommend a survey, field inspection, and research to define the basin outlet. The model utilized a system defined in the previous city plan.
CB 5	13.3	25	75	39.6	3.5	975.9	978.1	980	12.4	21" RCP - (E)	1.4	9	987.8	984	Field inspection identified existing culvert. Recommended a survey of the culvert to define the model data. The rearch of this area did not provide system data.
CB 6	10.5	15	76	42.0	2.9	978.6	979.6	980	2.2	12" RCP - (P)	1.7	9.7	995.7	984	The research and field inspection of this basin indicated that no outlet presently exists.(8-11-1999) The basin can bounce approximately 5' before approaching structures based on the City topography. The proposed outlet for this basin would be approximately 15 to 20 deep crossing Excelsior Blvd. based on the contour mapping.
CB 7	26.3	28	71	65.1	6.2	967.8	971.6	972	8.4	15" RCP - (P)	3.0	23	984.5	982	The research and field inspection of this basin indicated that no outlet presently exists.(8-11-1999) The basin can bounce approximately 16' before approaching structures, and 12' prior to any driveways based on the City topography. The proposed outlet pipe for this basin would have approximately 17' of cover. This basin receives runoff from the City of Deephaven.

CITY OF SHOREWOOD
COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN
STORMWATER MODEL RESULTS
100-YEAR EVENT

SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	RECOMMENDED 100 YR HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (d)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (c)	APPROXIMATE OVERFLOW ELEVATION (b)	EXISTING LOW BUILDING ELEVATION (b)	COMMENTS
CB 8	48.8	20	71	141.3	11.5	955.2	959.7 a	960.5	6.5 a	18" RCP - (P)	47.5 a	67	961.4	969	The field inspection of the basin was unable to locate an existing outlet. Recommend survey, inspection to define outlet. The research of previous City plan utilized an 18" outlet. The basin is proposed to discharge north across Manor Road to CB 10.
CB 9	14.3	19	71	42.9	3.4	970	973.9	974	12.4	21" CMP - (E)	1.2	1.1	974	973.5	The basin outlet field inspection indicated a 21" CMP discharges to CB 10. Recommend a survey of the outlet to obtain culvert data.
CB 10	6.1	15	75	23.7	1.6	953.7	957.3 a	959	9.3 a	18" RCP - (E)	4.8 a	11.3 (961.4)	974	973.5	The outlet data for basin utilized City as-built #1. Recommend inspection and routine maintenance of outlet.
CB 11	1.5	10	68	4.8	0.3	979.8	981.2	981.5	3.6	12" RCP - (E)	0.3	0.5	991	982	The outlet data for basin utilized City as-built #1. Recommend inspection and routine maintenance of outlet. The low building elevation and overflow route require a survey to determine available stormwater storage.
CB 12	17.2	20	73	53.4	4.3	955.1	961.8	962	8.2	15" CMP - (P)	13.0	17	963.5	973	The basin recieves flow from Hooper Lake within the City of Deephaven. Additional study is required to quantify flow rates and runoff volumes tributary to City. The overflow elevation from this basin is ultimately controled by the CB 14 overflow elevation. the field inspection did not identify an inplace culvert under Manor Road to the northeast into CB 13. Recommend additional inspection of basin for existing outlet.
CB 13	3.4	15	81	15.5	1.1	953.1	958.4 a	958.5	4.9 a	18" RCP - (P)	4.7 a	2.1	963.5	956	The field inspection did not identify an existing outlet across Regent Walk from basin to CB 14. Recommend additional inspection of basin for existing outlet. Research of City as-builts did not produce outlet data. The ultimate overflow from basin is controlled downstream at CB 14.
CB 14	23	34	76	69.2	6.3	952.5	956.6 a	957	12.8 a	21" CMP - (E)	18.4 a	20.2	963.5	957	The field inspection identified a 21"CMP serving as the outlet from basin. Recommend a survey of the outlet. The discharge is directed north across the City border into Deephaven.
CB 15	4.9	16	70	15.7	1.1	943.9	945.1	946	2.8	12" RCP - (E)	0.5	5.8	952.9	953	The field inspection identified a 12" RCP outlet. Recommend a survey of the culvert. Discharge is east into Deephaven. Basin serve a small watershed with approximately 6' of bounce available.
CB 16	16.5	20	78	59.8	4.8	-	-	-	-	-	-	-	-	947	This subwatershed discharges east into Deephaven. The stormwater storage is provided within the wetlands\basins on the NE city limits. Additional analysis of the basin is required of data outside the city to establish basin criteria.
CB 17	4.57	20	71	13.2	1.1	984.8	986.3	987	3.7	12" RCP - (P)	0.4	0.8	987	990	The rearyard depression is proposed to discharge east to CB 11. Additional analysis\study is recommended to assess routing feasibility.
LW 1	39.3	21	72	114.2	9.5	933	938.9	939	36.6	27" RCP - (E)	3.2	2.2	938	943	This subwatershed contains several small basins proposed to ultimately discharge to Lake William. The stormwater storage for this subwatershed utilized the largest basin immediately east of Lake William. The field inspection indicated no existing outlet is inplace.(8.11-199) Future development could reroute conveyance to the Carson Bay watershed.
LW 2	71.7	34	76	184.5	19.7	931.5	933.6 a	935	3.0 a	15" CMP - (P)	39.7 a	88	936	939	The field inspection did not identify an existing outlet. Recommend a survey to obtain outlet data. Discharge from Lake William is conveyed west across City border.
SAB 1	15.1	30	70	34.6	3.4	970.4	972.4	974	6.9	15" CMP - (P)	1.5	6.5	977.3	981	The field inspection did not identify an existing outlet. The proposed outlet alignment to the west across the city border could create difficulties in obtaining easements. Additional analysis\study is recommended as parat of feasibility study.
SAB 2	16.9	28	73	44.8	4.2	986.5	987.8 a	988	1.4 a	9" RCP - (E)	3.4 a	4	992	988	The basin is located within a park. The field inspection idicated a 9" RCP discharges scuthwest across the city limits. Recommend a survey of the outlet,existing low buildings, and overflow route for additional analysis.
SAB 3	38.7	24	73	109.8	9.7	935.4	937.6 a	938	5.8 a	12" CMP - (E)	7.8 a	7.4	937.4	946	The field inspection identified an existing 12" CMP culvert serving this subwatershed. The current model indicates overtopping of Manor Road during the 100 yr event. The stormwater runoff is directed across the City limits.
SAB 4	21.3	19	79	82.0	6.4	-	-	-	-	36" CMP - (P)	-	-	942	956	This subwatershed consists of area south of TH 7 and MnDOT RW tributary to St. Albans bay. Additional research\field inspection is required to identify the existing storm sewer to St. Albans Bay.
CL 1	10.6	20	74	34.0	2.7	932.8	937.1	937.5	14.1	15" CMP - (E)	1.5	1.2	936.7	941	The field inspection indicated an existing 15" CMP outlet. Recommend a survey of culvert,low building, and overflow elevations. The discharge from this depression east across Christmas Lake Road.
CL 1A	47	30	74	123.7	12.1	947	948.6 a	949	4.0 a	12" RCP - (P)	9.5 a	12.4	949	952	The existing basin currently discharges overland to CL 1. Recommend installation of culvert under driveway to define NWL for this depression.

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STORMWATER MODEL RESULTS
100-YEAR EVENT

SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	RECOMMENDED 100 YR HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (d)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (c)	APPROXIMATE OVERFLOW ELEVATION (b)	EXISTING LOW BUILDING ELEVATION (b)	COMMENTS
CL 1B	11.1	20	74	35.6	2.9	938.5	940.1	940	6.5	18" RCP - (P)	1.3	1.3	940	940	The existing basin currently discharges over to CL 1. Installation of a culvert will maximize the available storage within the basin, create additional stormwater storage, and improve treatment.
CL 2	50	16	74	183.1	12.9	933	934.3 a	935	3.9 a	18" RCP - (P)	14.0 a	44	937.2	938	The field inspection of Como Lake basin and east basin identified a culvert between the two basins. No culvert was identified to Christmas Lake. The proposed culvert allignment would convey runoff from the East basin to Christmas Lake. Additional study is recommended as part of feasibility study.
CL 3	356.6	60	90	878.4	141.1	932.8	933.9 a	934	15.8 a	36" CMP - (E)	275.9 a	1045	936.7	938	The Christmas Lake outlet was inspected and appeared in fair condition. Recommend routine outlet maintenance\debris removal. The Basin receives runoff from Chanhassen.
CL 4	8.2	15	69	26.1	1.8	930.4	932.9	934	14.0	42" CMP - (E)	4.4	18	937.9	N/A	The outlet from the basin is directed north across TH 7 ultimately to St. albans Bay. The outlet is recommended for survey. MnDOT as-builts or survey data is required for model input. MnDOT is in the process of TH 7 design immediately west of this outlet in the city of Excelsior.(8-11-1999)
CL 5	15.9	21	72	46.2	3.9	951	954	954.5	22.4	15" CMP - (E)	1.1	0.7	953.5	957	The discharge is directed north to the City of Excelsior and ultimately flows into St. Albans Bay. The downstream system is being evaluated by MnDOT as part of the TH 7 improvements.(8-11-1999) Analysis outside the City limits would be required to obtain downstream system capacity. Recommend survey or as-builts from Excelsior for storm system.
CL 6	23.7	20	77	83.4	6.7	946	948.4	948.5	17.1	24" RCP - (E)	4.6	3.7	948	948	The basin discharges north to the City of Excelsior. The outlet requires additional analysis\data from the City of Excelsior. The storm sewer system is tributary to the TH 7 storm sewer flowing north to St. Albans Bay.Recommend survey or as-builts from Excelsior of system.
GL 1	32.6	30	73	83.0	8.2	951.3	957.9	958	76.8	15" CMP - (E)	0.6	0.2	955.1	959	The subwatershed is modeled with available stormwater storage adjacent to the road due to no control structure inplace at the wetland\basin perched 9' above the culvert crossing Apple Road. Recommend installation of control structure at wetland to maximize wetland storage. Approximately 5' of bounce available in upstream wetland to serve approximately 75% of subwatershed area. Recommend survey of existing culvert crossing Apple Road.
GL 2	49.1	18	76	179.3	13.5	943.5	947.9 a	948	7.5 a	15" CMP - (E)	26.4 a	18.6	947.8	947	Field inspection of existing culvert indicated system was in good condition. Recommend installation of skimmer at culvert inlet. Downstream channel requires inspection for erosion\maitenance. Basin receives flow from Chanhassen.
GL 3	36	21	75	115.5	9.6	964.6	967.4	968	10.6	12" CMP - (E)	12.5	10.7	967.1	977	Field inspection indicated culvert was in good condition. Recommend installation of skimmer at culvert inlet and riprap on downstream end. Basin receives runoff from Chanhassen.
GL 4	25.9	18	77	97.4	7.3	957.5	962.3	963	24.8	24" VCP - (E)	11.6	14.8	962.7	966	Field inspection indicated culvert inlet was in poor condition. The inlet was failing and contained debris.(8-11-1999) Recommend repair of apron inlet and installation of skimmer. Recommend riprap on downstream end of storm sewer system within GL 6.Additional stormwater storage is available north of Murray Street and south of Chaska Road. The additional storage was not utilized in the stormwater model.(8-11-1999). Basin receives runoff from Chanhassen.
GL 5	5.8	20	75	19.2	1.6	987	987.6	988	0.5	18" CMP - (E)	1.1	1.7	988	990	The existing culvert outlet was inspected and appeared in good condition. The wetland overland flows on the south side of TH 7 northeast to GL 6. The City topography indicates overland flow will occur across private property prior to conveyance down the TH 7 ditch. Recommend the ditch be graded to allow flow from the wetland. This activity could be conducted as part of the TH 7 & TH 41 improvement project.(8-11-1999)
GL 6	28.2	42	79	69.3	8.4	945	951.7	952	23.8	30" CMP - (E)	8.8	6.1	950.5	953	This subwatershed consists of three wetlands\depressions located between TH 7 and Chaska Road. The stormwater storage for this area utilized the two northwest wetlands\depressions. The storm sewer outlet routing requires verification due to conflicting data. Recommend installation of a control structure\outlet for the southwest

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SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	RECOMMENDED 100 YR HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (d)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (c)	APPROXIMATE OVERFLOW ELEVATION (b)	EXISTING LOW BUILDING ELEVATION (b)	COMMENTS
GL 7	43.8	17	75	160.3	11.7	943.3	945.8 a	946	20.7 a	2-24" RCP - (E)	120.4 a	300	950	949	The Galpin Lake outlets require additional research\survey\field inspection due to conflicting data. MnDOT is undertaking a project on TH 7 involving the outlet systems (8-11-1999). The City of Excelsior and MnDOT system modifications should be incorporated in the model. The table drainage area reflects the City of Shorewood stormwater runoff to Galpin Lake. The stormwater model incorporates drainage areas from outside the city borders.
GL 9	8.5	15	70	28.0	1.9	982.9	986.4	987	4.9	15' Weir - (P)	5.0	12.2	991.2	992	The GL 9 basin is currently landlocked based on available research. The proposed outlet will covey runoff northeast to GL 10 and ultimately into Excelsior.
GL 10	46.8	80	77	68.1	13.2	-	-	-	-	-	-	-	950	951	The stormwater runoff is directed north to the City of Excelsior. The downstream system is being evaluated by MnDOT and Excelsior as part of the TH 7 improvements (8-11-1999) Analysis outside the City limits would be required to obtain direction of flow either to St. Albans bay or Galpin Lake. Discrepancies in the downstream storm sewer system data outside city limits requires additional analysis. The model currently routes GL 10 to Galpin Lake (8-11-1999).
GB 1	16.4	20	74	61.1	5.3	953	955.5	955.5	6.0	15" CMP-(P)	2.9	1.6	955.3	955	No existing Outlet. Additional storage available in perched wetlands. Recommend survey of low building and overland overflow elevations.
GB 2	27.5	28	78	86.8	8.0	945	949	949	28.5	10" ORIFICE-(E)	3.7	2.6	948	951	Existing Outlet utilized in model. Overland overflow elevation is approx. 3' below Existing buildings based on 1' contours.
GB 3	34.9	37	72	75.7	8.5	933	936.9	937	17.7	21" RCP-(P)	3.7	4.9	939.6	937	Discharges north to Tonka Bay. Recommend survey of low building and overflow elevations.
GB 4	11.9	15	74	47.2	3.1	-	-	-	-	-	-	-	-	950	Subwatershed discharges to Tonka bay w\ no storage identified within city limits.
GB 5	13.3	21	65	31.7	2.5	967.4	971.6	972	15.7	18" RCP-(E)	0.4	0.5	971.7	985	Exist. Outlet maximizes existing stormwater storage. HWL approaches Country Club Road overflow elev. based on 1' contour mapping.
GB 6	24.3	18	77	96.4	6.9	957.8	962.2	963	27.8	24" RCP-(E)	3.0	19.5	972.8	967	Field verified 24" CMP outlet. Recommend inlet maintenance\skimmer and survey of pipe invert.
GB 7	29.4	30	75	81.0	7.8	932.3	937.3 a	937	10.7 a	15"-CMP-(E)	14.6 a	17.1	938	942	Recommend survey of existing outlet invert and overflow elevations. Recommend verification of easment over drainage route.
GB 8	74.7	18	76	287.9	20.5	-	-	-	-	-	-	-	-	974	Discharges east into Excelsior. No basin outlet or overflow elevation identified within the city limits.
GB 9	14.3	25	76	45.6	3.9	930.1	931	932	4.1	36"-STEEL-(E)	2.2	16.9	939.1	936.4	Field inspection of outlet indicated the exist. Pipe was in good condition. Recommend limited dredging at pipe inlet as part of maintenance plan.
GB 10	36.5	20	77	136.4	10.3	-	-	-	-	-	-	-	-	933	Direct discharge\runoff from subwatershed within City.
LMAR 1	32.7	28	76	97.3	9.0	955	957.4	957.5	3.6	12" CMP-(P)	6.1	5.3	963.9	957	No outlet identified for Lake Linden from research or field inspection. Recommend outlet construction to Lake Mary.
LMAR 2	61.8	20	77	230.9	17.5	953.1	954.9	955	6.0	15" RCP-(P)	24.8	54.8	958	957	No outlet was identified from as-builts or field inspection for Lake Mary. Current model routes discharge to GB 7, routing option to GB8.
C 1	137.1	37	69	266.2	30.1	958	960.3 a	959.8	9.9 a	21" RCP-(P)	35.9 a	30.4	966.4	960	Central district is proposed to discharge to Lake Mary. No outlet was identified from research or field inspection. Recommend pipe alignment on south side of existing trail to the east in order to provide an outlet from subwatershed C2 and large depression in LMAR 2.
C 2	10.1	17	72	35.4	2.5	960	961.1	961.5	2.0	12" RCP-(P)	1.4	2.3	961.7	968	Currently modeled to subwatershed C1 Stormwater storage is provided by two wetlands east of Country Club Road. No outlet was identified from research or field inspection.
SC 1	6.2	15	78	27.6	1.8	974.8	975.8	976	2.6	12" RCP-(E)	1.0	2.2	979.6	977	Field inspection identified a 12" RCP outlet from basin, and was unable to verify the pipe discharge location\conditon. Recommend survey of outlet, and installation of skimmer.
SC 2	37.7	25	78	127.3	11.0	960.6	962.8	963	7.4	15" RCP-(P)	14.5	25.7	964.5	966	No existing outlet was identified from research or field inspection. This basin is assumed to be currently land locked. Recommend further study\analysis of outlet from this basin.
LMIN 1	28	20	75	46.0	4.5	977.2	980.7	981	21.4	24" RCP-(E)	1.0	17.6	984.7	991	The outlet culvert was receiving maintenance by MnDot during the field inspection. Recommend survey of culvert.
LMIN 2	16.7	30	74	61.5	4.7	948.6	955.2	955.5	43.5	27" RCP-(E)	0.5	12.5	963.6	964.5	The field inspection indicated the apron of this culvert required maintance/re-attachment. Recommend removal of sediment at the culvert inlet and repair. This subwatershed could serve as the primary discharge location for the LMIN watershed in the future.

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LMIN 3	6.7	20	73	22.2	1.7	960.6	963.9	964	11.0	18" CMP-(E)	0.5	0.9	963.6	966	The field inspection indicated the culvert inlet was in good condition. Recommend MnDOT excavate accumulated sediment\vegetation at the culvert inlet.
LMIN 4	16.4	20	89	76.8	6.3	985	990.2	990	24.0	36" RCP-(E)	2.3	2.2	990	994	This subwatershed has been incorporated as part of the TH7 & TH 41 project (1999) into the LMIN watershed.
NC 1	16.5	21	79	63.5	4.9	981.7	985.2	985.2	37.1	15" CMP-(E)	1.5	1.3	984.7	985.2	The existing culvert requires maintenance\cleaning based on the field inspection. It is recommended that the feasibility of rerouting the discharge from NC 1 & NC 2 be analized to determine if rerouting to either NC 4 or NC 5 is feasible. Survey of existing culvert\ overflow elevation is recommended.
NC 2	39.4	47	75	79.9	10.5	979	980.9	981	7.0	12" RCP-(E)	9.3	2.9	980.3	980	The existing culvert and overflow elevation requires a survey. The existing basin routing is recommended for additional analysis to determine the feasibility of alternate conveyance routes.
NC 3	18.5	21	72	57.7	4.5	966.3	970.6	971	61.6	27" RCP-(E)	0.6	0.5	970	973	The subwatershed could provide additional storage in upstream depression based on 1' contour mapping. It is recommended that the conveyance route be verified for alignment within existing easements. The basin outlet is a two-stage structure, and was in good condition based on the field inspection.
NC 4	27.9	30	73	72.1	7.0	950.2	956.9	957	103.4	36"-STEEL-(E)	1.5	0.9	956.2	961	The field inspection of the inplace culvert indicated maintenance\cleaning of the culvert and downstream channel is required. The inplace culvert was partialy submerged and appeared in fair condition. This culvert crossing currently provides conveyance of NC 1,2 & 3 and is recommended for a survey and feasibility study based on upstream conveyance alternatives for the NC watershed.
NC 5	20	30	75	55.1	5.3	948	951.9	952	24.9	24"-STEEL-(E)	1.4	1.7	952.3	955	The field inspection of the inplace culvert indicated no obstructions at the inlet or outlet. The culvert appeared in good condition. Recommend routine maintenance\clearing of upstream conveyance route to inlet.
NC 6	6.4	15	70	22.2	1.5	953.5	954.6	955	2.1	10" ORIFICE-(E)	0.7	0.9	954.8	965	The inplace culvert inlet was in good condition based on the field inspection. The culvert outlet was not located for inspection. The inlet locaton is outside the road right of way. The City should consider if current inlet location requires an easement or relocation to within the right of way.
NC 7	12.6	15	75	51.5	3.4	941.3	941.8	942	12.3	24" CMP-(E)	1.4	1.4	941.3	944	The basin currently overland flows to the 24" CMP culvert under Valleywood Lane. This conveyance route appears to cross private property. It is recommended that the City construct the conveyance to this culvert within the right of way or verify easements over the existing overflow alignment.
NC 8	6.6	15	73	25.4	1.7	937.9	938.5	939	1.4	12" CMP-(P)	1.0	10.9	944.7	945	The basin has an available bounce of approximately 6' prior to overland flow to NC 9. Installation of the proposed outlet would require easements based on the topographic mapping. Recommend a survey of the low building and overflow elevation, and outlet alignment for this basin.
NC 9	24.8	21	74	82.5	6.4	932	933.4 a	932	2.5 a	15" CMP-(P)	7.5 a	13.5	934.5	940	It is recommeded that the outlet alignment be surveyed for placement within easments. Additional stormwater storage is available in perched basins within this subwatershed.
NC 10	47.6	43	75	102.9	12.7	930.5	932.9 a	933	16.7 a	15" CMP-(E)	11.0 a	7	931.9	939	The field inspection of the existing culvert indicated that maintenance\cleaning of sediment and vegetation at the inlet and outlet is required. The inplace culvert contains minimal cover within the road. It is recommended that a skimmer be installed in conjuction with culvert replacement. This basin could be utilized for rate control in the event that Eureka Road overtopping elevation is increased.
NC 11	86.1	40	75	195.7	22.9	-	-	-	-	-	-	-	-	932	This subwatershed discharges east across city limits into Tonka Bay.
WC 1	49.6	29	72	127.0	12.0	975.5	976.5	977	16.9	15"& 12" CMP-(E)	5.9	2.9	976	983	The outlet culverts from this subwatershed are in good condition based on the field inspection (1999). It is recommended that a skimmer be installed at the basin outlet.
WC 2	106.6	60	76	187.1	29.3	959.5	966.8	967	21.8	8"ORIF. TO 48" RCP-(E	19.8	68	971.4	974	The outlet from this basin is a special structure shown on City as-built #20. The 48" outlet pipe was filled to a depth of approximately 2' based on the field inspection. The 18" submerged outlet was not inspected during the field visit. It is recommended that the 48' outlet and 18" inlet be cleared of accumulated sediment. The inplace manhole control structure is recommended for inspection of accumulated sediment.In addition, upstream conveyance channels require sediment removal based on the field inspection and should be included in the City's CIP.

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SUB-WATERSHED NUMBER	AREA (ac)	Tc (min)	CN	PEAK RUNOFF RATE (cfs)	RUNOFF VOLUME (ac-ft)	POND NWL (elev.)	POND HWL (elev.)	RECOMMENDED 100 YR HWL (elev.)	PEAK OUTFLOW FROM POND (cfs)	POND OUTLET (d)	REQUIRED STORAGE (ac-ft)	AVAILABLE STORAGE (ac-ft) (c)	APPROXIMATE OVERFLOW ELEVATION (b)	EXISTING LOW BUILDING ELEVATION (b)	COMMENTS
WC 3	44.5	62	77	78.7	12.6	950	954.9	955.5	92.7	2-36"CMP-(E)	1.7	3	955.9	956.2	The inplace 2-36" CMP culvert inlets were in good condition based on the field inspection. The conveyance channel upstream contained several fallen trees and sediment bars. It is recommended that the conveyance channel within this subwatershed be cleaned as part of the City CIP.
WC 4	106.5	95	75	128.2	28.4	930	932.6	933	145.4	4-54"x31" RCPA-(E)	10.0	5.2	932	934	The field inspection of the basin outlet indicated that the culverts were in good condition. (1999) It is recommeded that sediment accumulation on the downstream e of the culverts be removed.
WC 5	50.8	175	78	42.2	14.8	965	970.7	971	20.2	9" ORIFICE-(E)	6.8	5.6	970.1	972.5	The field inspection of the outlet did not locate the system inlet. It is recommended th a skimmer be installed at the inlet. The city as-built #54 did not indicate the inlet bein submerged. The field inspection indicated that a 9" pvc outlet was installed contrary t the as-built. Additional stormwater storage is available within this subwatershed in the form of wetlands.
Equivalent to WC 6	316.4	52	77	635.1	89.4	929.4	931.5 a	931.5	36.29 32.3 a	2-24" RCP -18" CMP & 24"CMP-(E	204.2 a	191.4	930.5 931.1	Culverts Replaced in 2007 932	The outlets from this basin appeared in fair condition based on the field inspection. It recommended that a skimmer be installed upstream of culvert inlets. The accumulatio of vegetation\debris was present at the inlets at inspection.(1999)
WC 7	69.3	20	66	177.2	13.7									932	This subwatershed represents the City's direct discharge to Lake Minnetonka.
LV 1	22.1	15	75	90.3	5.9	949.5	951	952	19.3	27" RCP-(P)	2.1	11.7	953.7	954	The wetland currently overland overflows west to LV 2. It is recommended that a surv of the low building and overflow elevation be conducted. The proposed outlet alignme location requires easment verification. Based on the topographic mapping, one structure could be at risk of impact if the current overflow elevation is not decreased.
LV 2	116.6	69	75	178.7	31.1									936	This subwatershed consists of the direct tributary area to Lake Virginia. The proposed conveyance route from LV 1 should be contained within an easement.
W 1	62.1	43	70	112.9	14.1	932.2	934.8 a	934.5	6.7 a	12" CMP-(P)	14.5 a	13.2	934.5	938	The field inspection indicated overland flow across a driveway entrance is the existing outlet for this basin. It is proposed that an outlet be installed to define and establish ar NWL for this basin.
W 2	21.6	20	65	52.9	4.1	930.2	931.4 a	931.5	4.9 a	12" CMP-(P)	4.2 a	3.6	931.1	938	This subwatershed is tributary to two depressions which currently overland flow to Lak Minnetonka once the stormwater storage is exceeded. The proposed outlet could allov backflow from the Lake. It is recommended that the outlet configuration be designed to prevent backflow.
W 3	64.9	20	68	179.7	13.8	-	-	-	-	-	-	-	-	933	This subwatershed is directly tributary to Lake Minnetonka.
I1	69.3	20	72	212.1	16.8	-	-	-	-	-	-	-	-	-	Enchanted Island tributary to Lake Minnetonka.
I2	20.0	20	76	69.4	5.5	-	-	-	-	-	-	-	-	-	Spray Island tributary to Lake Minnetonka.
I3	2.0	20	72	6.1	0.5	-	-	-	-	-	-	-	-	-	Gale Island tributary to Lake Minnetonka.

a) The critical event is the 100 year-10 day snowmelt.
b) Elevations obtained from the Cities digital topographic 1' contour mapping.
c) Available storage values calculated to the lowest elevation of either the overflow elevation or the low building elevation.
d) It is recommended the existing outlet elevations be surveyed.

Note: The Outlet designation (E) is an existing outlet, (P) is a proposed outlet.

PC = subwatershed tributary to Purgatory Creek
CB = subwatershed tributary to Carson Bay
LW = subwatershed tributary to Lake William
SAB = subwatershed tributary to St. Albans Bay
subwatershed tributary to Christmas Lake

SUBWATERSHED LABELS

GL = subwatershed tributary to Galpin Lake
GB = subwatershed tributary to Gideon Bay
LMAR = subwatersed tributary to Lake Mary
C = subwatershed tributary to Central area
SC = subwatershed tributary to South-Central area

LMIN = subwatershed tributary to Lake Minnewashta
NC = subwatershed tributary to North-Central area
WC = subwatershed tributary to West-Central area
LV = subwatershed tributary to Lake Virginia
W = subwatershed tributary to West area
I= subwatershed tributary to Lake Minnetonka

APPENDIX D

FEMA Flood Insurance Maps

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 27, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in mapfeatures across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey **at (301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the Minnesota Department of Natural Resources. This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated 2010 or later.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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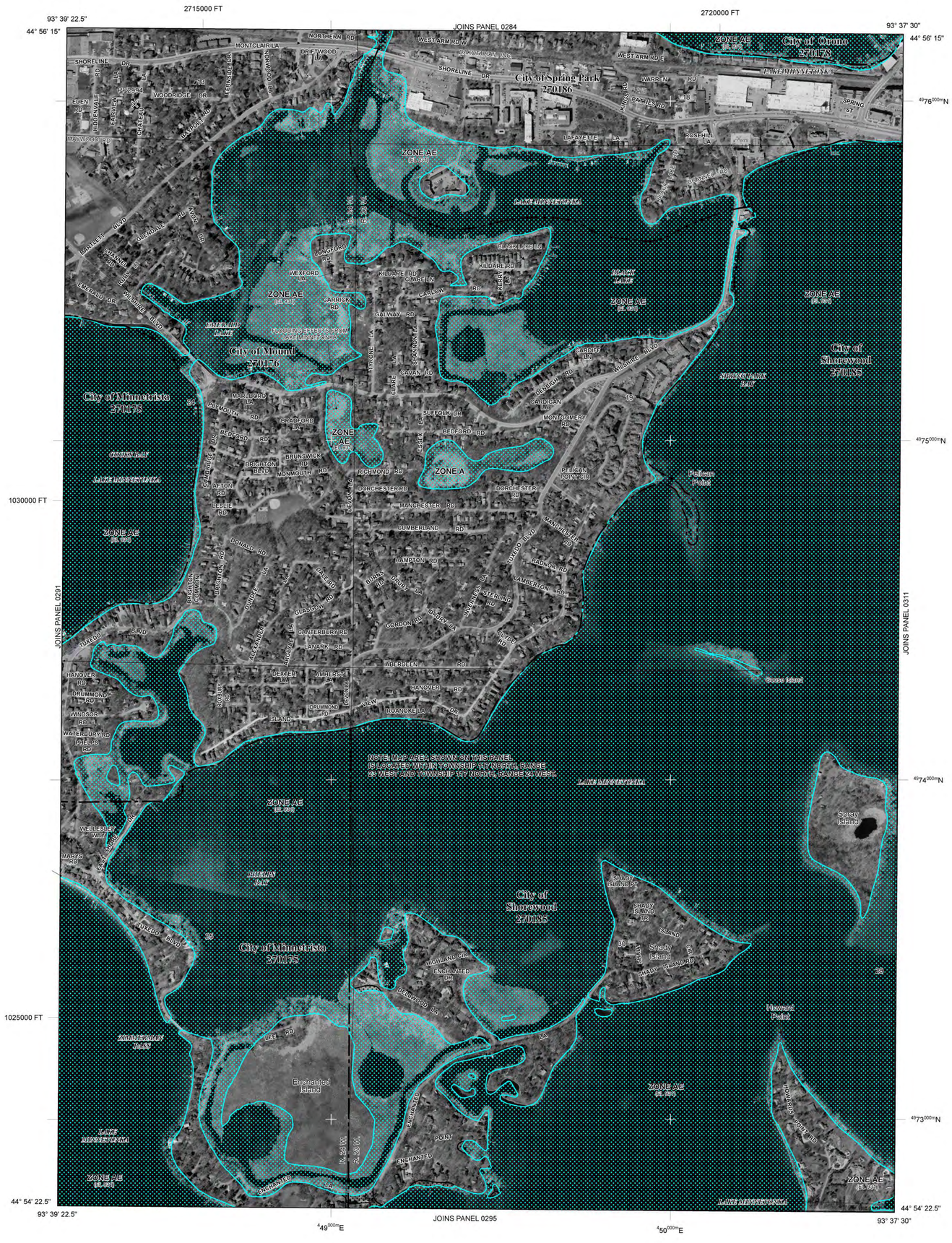
ADMINISTRATIVE FLOODWAY

* Administrative floodway designated in accordance with local regulations for management of these areas

A — MODELED NODE LABEL



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetical Vertical Datum of 1929

A — A	Cross section line
23 — 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Minnesota State Plane coordinate system, South Zone (FIPSZONE 2203), Lambert Conformal Conic projection
4980000mN	1000-meter Universal Transverse Mercator grid values, zone 15
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0292F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 292 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MINNETRISTA, CITY OF	270175	0292	F
MOUND, CITY OF	270176	0292	F
ORONO, CITY OF	270178	0292	F
SHOREWOOD, CITY OF	270185	0292	F
SPRING PARK, CITY OF	270186	0292	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
27053C0292F
MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 27, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in mapfeatures across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
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National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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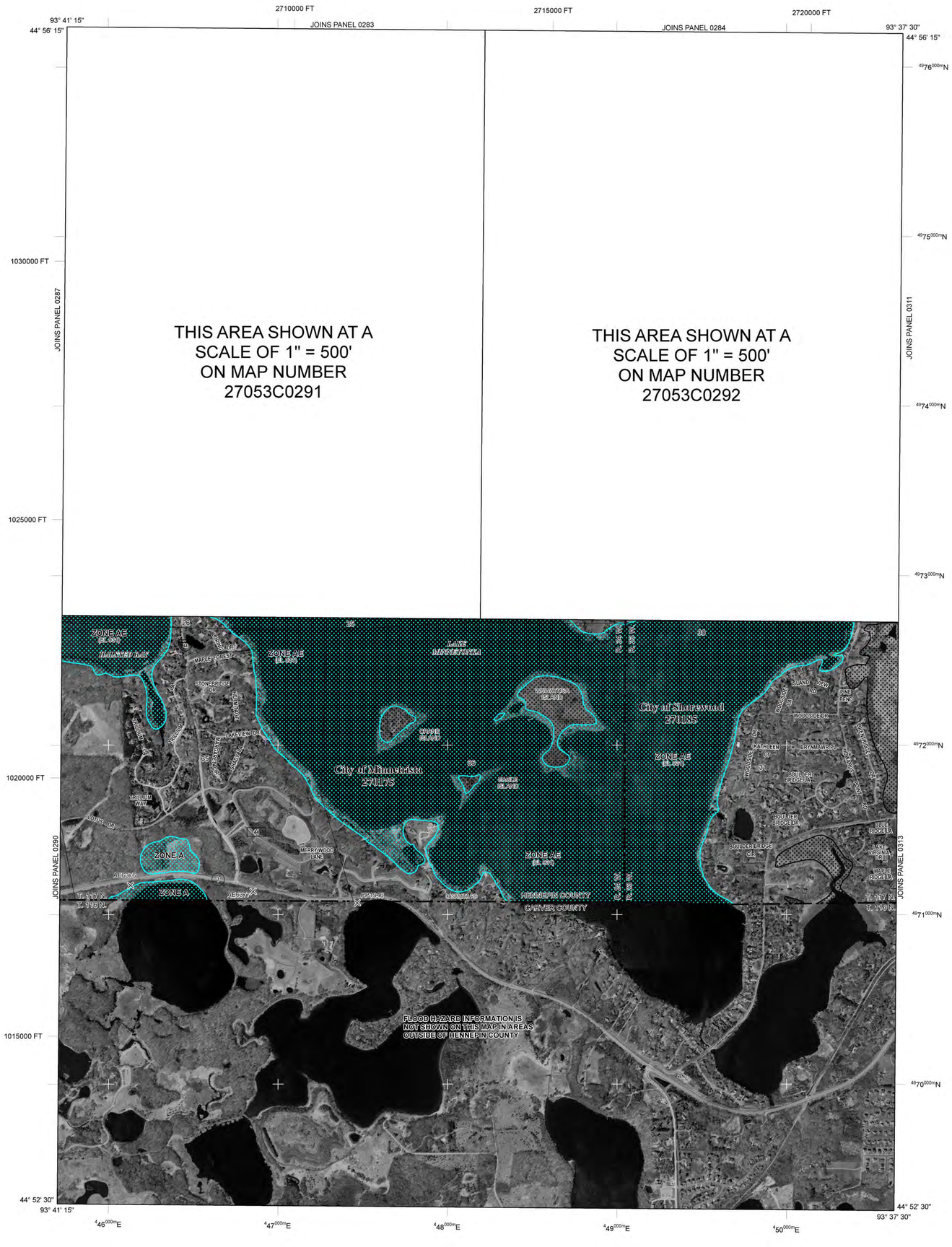

LEGEND

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FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
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(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetical Vertical Datum of 1929

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M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

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MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 0295F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA
(ALL JURISDICTIONS)

PANEL 295 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MINNETRISTA, CITY OF	270175	0295	F
SHOREWOOD, CITY OF	270185	0295	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
27053C0295F
MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

MAP REPOSITORY
Refer to Map Repositories list on Map Index

NOTES TO USERS

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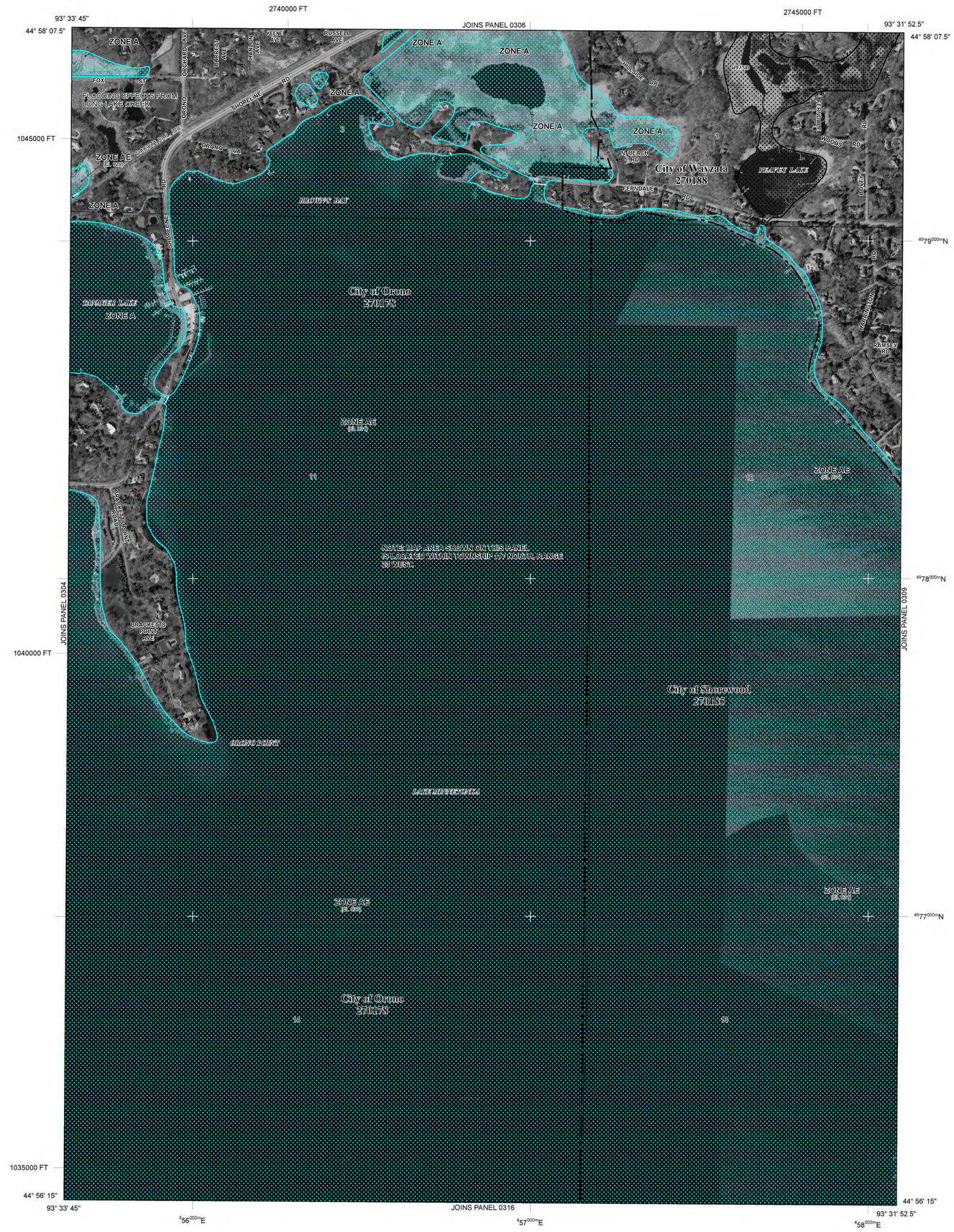
93° 33' 45"
2740000 FT
JOINS PANEL 0306
2745000 FT
93° 31' 52.5"
44° 58' 07.5"
1045000 FT
ZONE A
ZONE AE
(EL 929)
FLOODING EFFECTS FROM LONG LAKE CREEK
ORCHARD AVE
BARRETT AVE
HAMLIN AVE
XERXES AVE
RUSSELL AVE
SHORELINE RD
ORONO BLVD
ORONO - LA
SHORELINE
HILLSIDE DR
WOODS RD
N BEACH RD
FERNDALE RD
City of Wayzata
270188
HEATHER LAKE
BOWERS
MEADOW LAKE
ZONE A
City of Orono
270178
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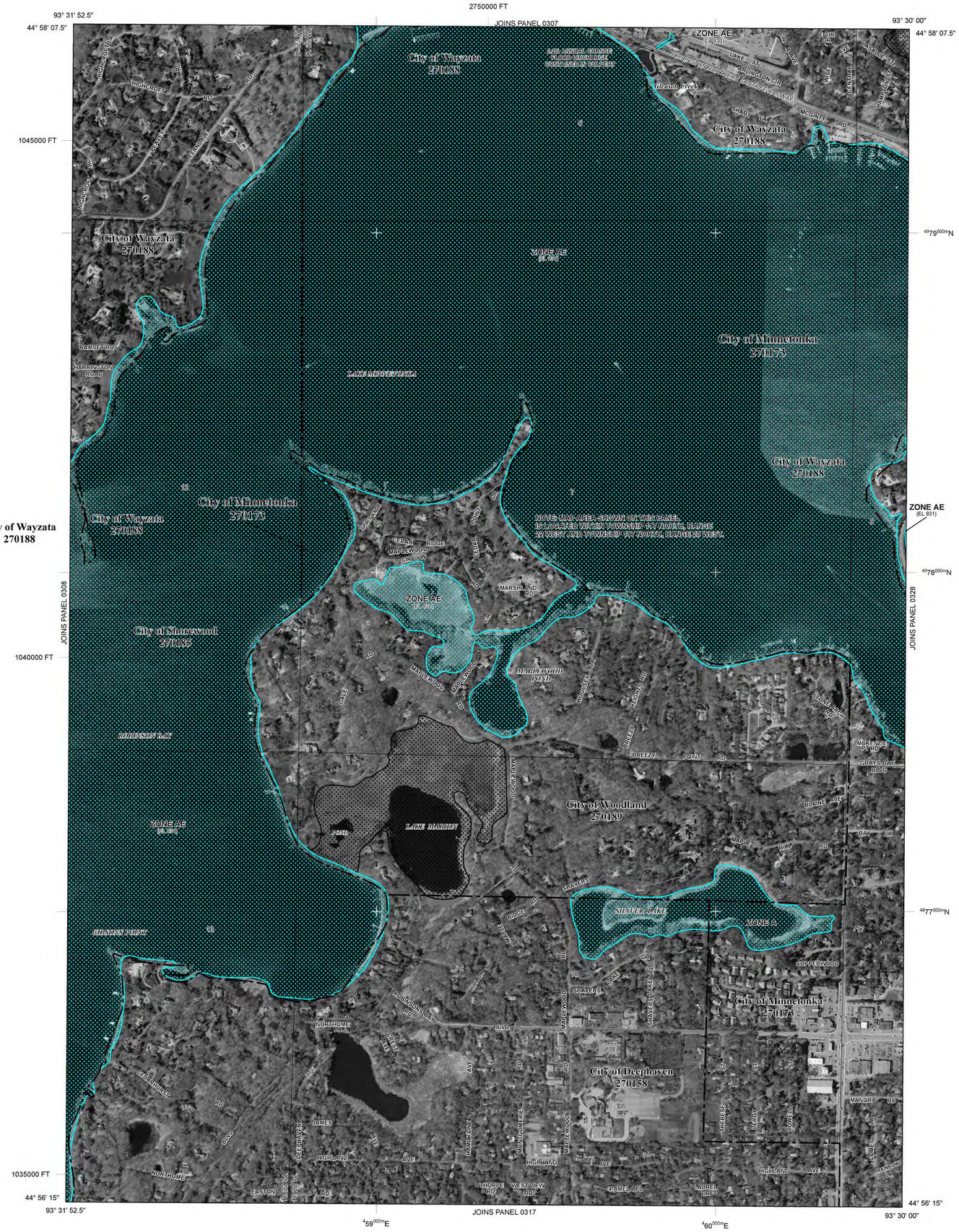

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

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OTHER AREAS

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- 513 — Base Flood Elevation line and value; elevation in feet*
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*Referenced to the National Geodetical Vertical Datum of 1929

- A — A — Cross section line
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- 4980000mN — 1000-meter Universal Transverse Mercator grid values, zone 15
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0309F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 309 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DEEPHAVEN, CITY OF	270158	0309	F
MINNETONKA, CITY OF	270173	0309	F
SHOREWOOD, CITY OF	270185	0309	F
WAYZATA, CITY OF	270188	0309	F
WOODLAND, CITY OF	270189	0309	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
27053C0309F
MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

NOTES TO USERS

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 27, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in mapfeatures across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
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National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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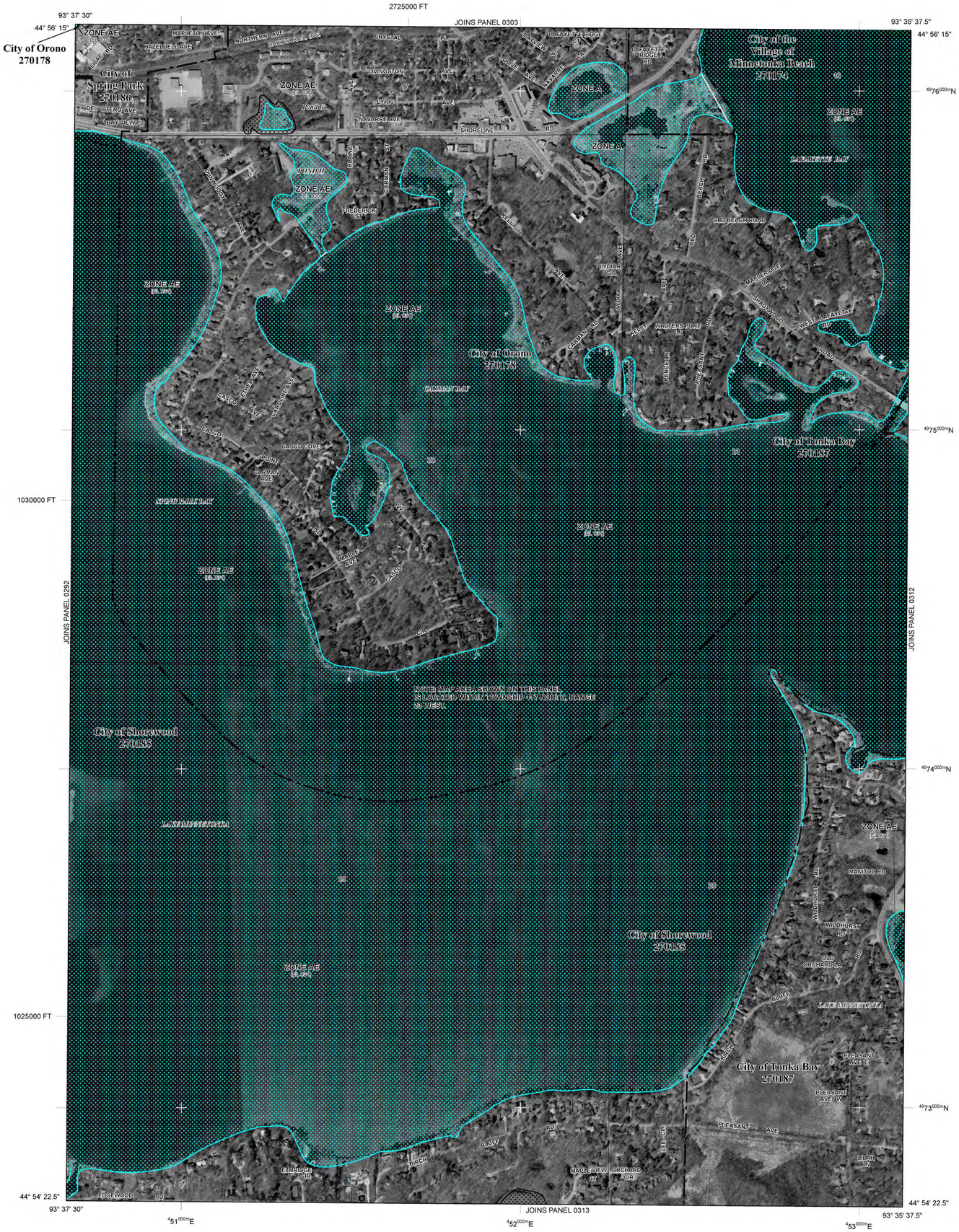
ADMINISTRATIVE FLOODWAY

* Administrative floodway designated in accordance with local regulations for management of these areas

MODELED NODE LABEL



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetical Vertical Datum of 1929

A — A	Cross section line
23 — 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Minnesota State Plane coordinate system, South Zone (FIPSZONE 2203), Lambert Conformal Conic projection
4980000mN	1000-meter Universal Transverse Mercator grid values, zone 15
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

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MAP SCALE 1" = 500'

250 0 500 1000 FEET
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NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0311F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 311 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
THE VILLAGE OF MINNETONKA BEACH, CITY OF	270174	0311	F
ORONO, CITY OF	270178	0311	F
SHOREWOOD, CITY OF	270185	0311	F
SPRING PARK, CITY OF	270186	0311	F
TONKA BAY, CITY OF	270187	0311	F

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MAP NUMBER
27053C0311F
MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

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ADMINISTRATIVE FLOODWAY

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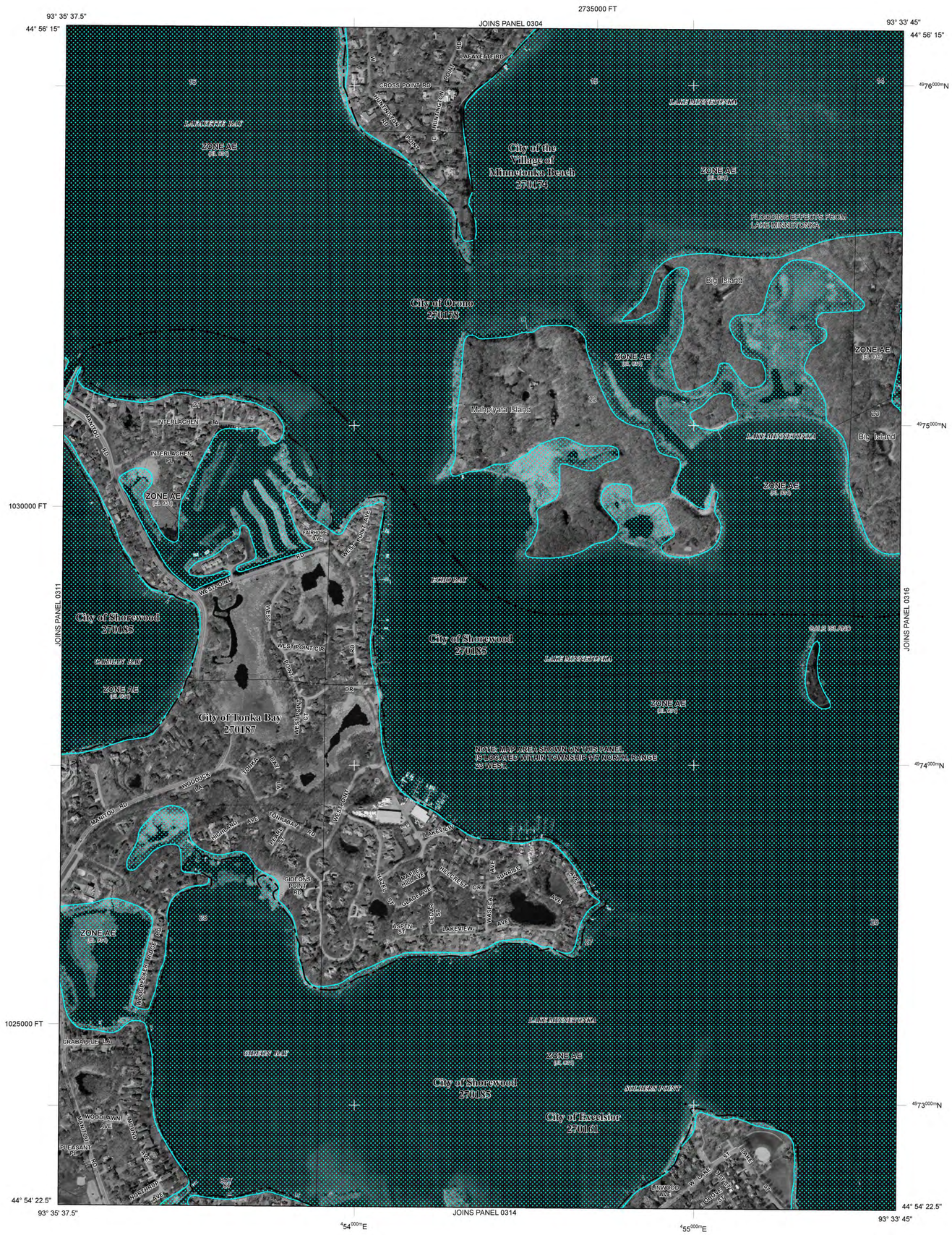
A — MODELED NODE LABEL



LEGEND

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ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

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- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetical Vertical Datum of 1929

- A — A — Cross section line
- 23 — - - - — 23 — Transect line
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- 4980000mN — 1000-meter Universal Transverse Mercator grid values, zone 15
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
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EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

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250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0312F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 312 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
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EXCELSIOR, CITY OF	270161	0312	F
ORONO, CITY OF	270178	0312	F
SHOREWOOD, CITY OF	270185	0312	F
TONKA BAY, CITY OF	270187	0312	F

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MAP NUMBER 27053C0312F

MAP REVISED NOVEMBER 4, 2016

Federal Emergency Management Agency

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A — MODELED NODE LABEL

LEGEND

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FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

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FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0313F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 313 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
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TONKA BAY, CITY OF	270187	0313	F

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MAP NUMBER
27053C0313F
MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

NOTES TO USERS

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

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Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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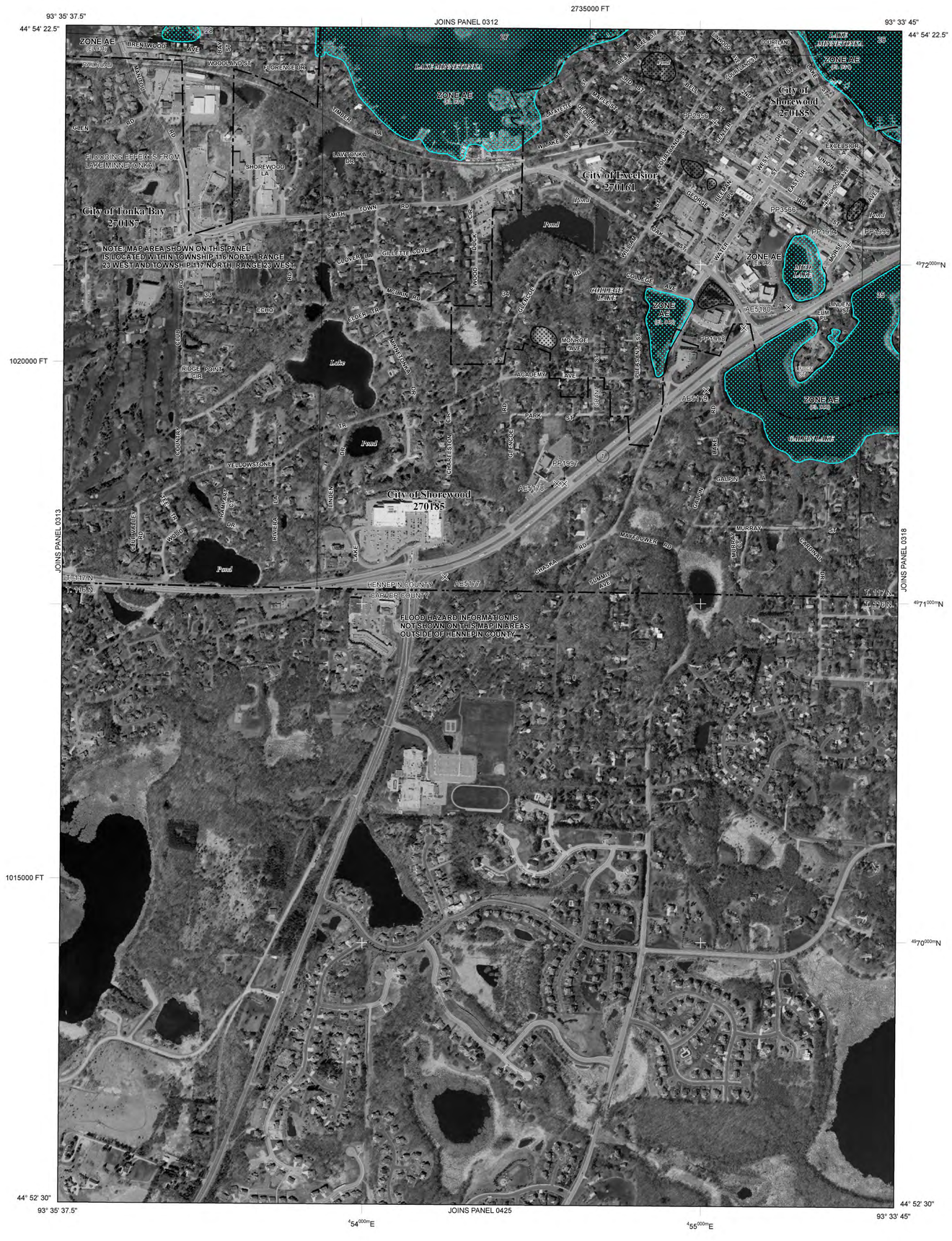
ADMINISTRATIVE FLOODWAY

* Administrative floodway designated in accordance with local regulations for management of these areas

A — MODELED NODE LABEL



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetical Vertical Datum of 1929

- A — A — Cross section line
- 23 — 23 — Transect line
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT — 5000-foot ticks: Minnesota State Plane coordinate system, South Zone (FIPSZONE 2203), Lambert Conformal Conic projection
- $^{4}80^{000m}$N — 1000-meter Universal Transverse Mercator grid values, zone 15
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 • — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0314F

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 314 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXCELSIOR, CITY OF	270161	0314	F
SHOREWOOD, CITY OF	270185	0314	F
TONKA BAY, CITY OF	270187	0314	F

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MAP NUMBER
27053C0314F
MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

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ADMINISTRATIVE FLOODWAY

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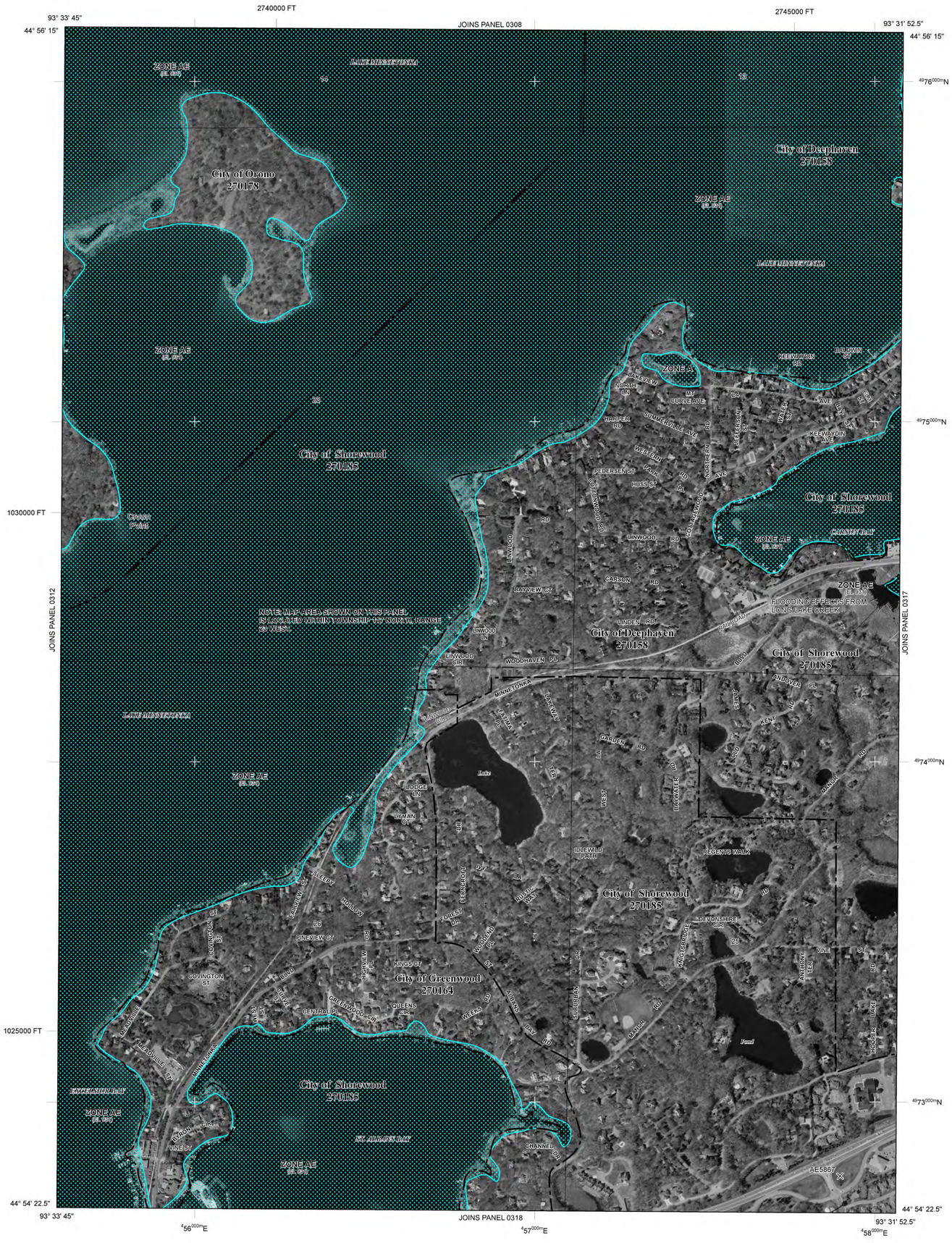
A MODELED NODE LABEL



LEGEND

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FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

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1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513 Base Flood Elevation line and value; elevation in feet*

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*Referenced to the National Geodetical Vertical Datum of 1929

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4980000mN 1000-meter Universal Transverse Mercator grid values, zone 15

DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

MAP REPOSITORIES
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EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

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250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0316F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA
(ALL JURISDICTIONS)

PANEL 316 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DEEPHAVEN, CITY OF	270158	0316	F
GREENWOOD, CITY OF	270164	0316	F
ORONO, CITY OF	270178	0316	F
SHOREWOOD, CITY OF	270185	0316	F

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MAP NUMBER
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MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

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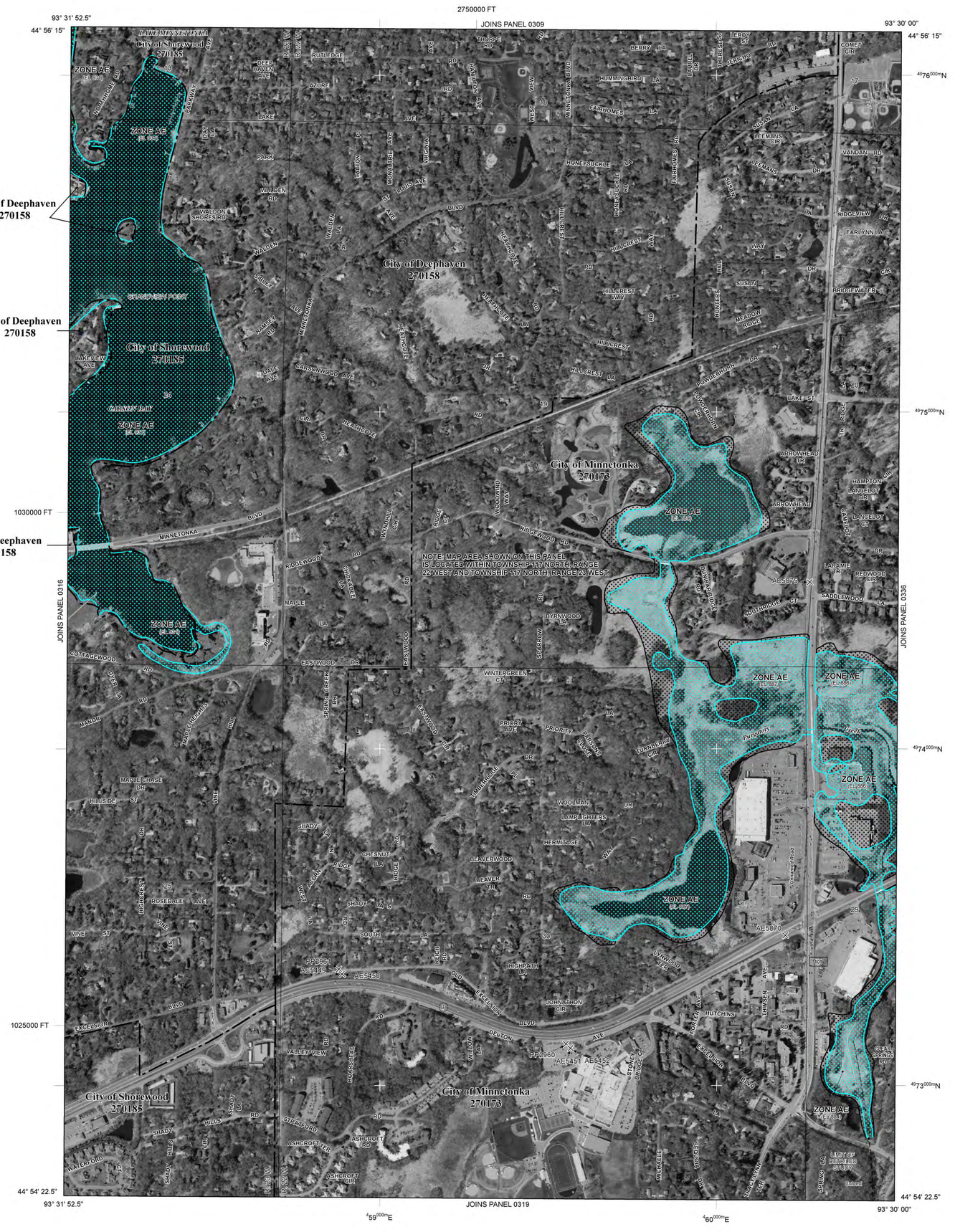

LEGEND

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FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

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EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0317F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 317 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DEEPHAVEN, CITY OF	270158	0317	F
MINNETONKA, CITY OF	270173	0317	F
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MAP NUMBER 27053C0317F

MAP REVISED NOVEMBER 4, 2016

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 27, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in mapfeatures across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey **at (301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the Minnesota Department of Natural Resources. This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated 2010 or later.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

ADMINISTRATIVE FLOODWAY

* Administrative floodway designated in accordance with local regulations for management of these areas

A MODELED NODE LABEL

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513 Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetical Vertical Datum of 1929

A–A Cross section line

23–23 Transect line

45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

3100000 FT 5000-foot ticks: Minnesota State Plane coordinate system, South Zone (FIPSZONE 2203), Lambert Conformal Conic projection

4980000mN 1000-meter Universal Transverse Mercator grid values, zone 15

DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

November 4, 2016 - to add Special Flood Hazard Areas, to change Base Flood Elevations, to change floodway, to change Special Flood Hazard Areas, to decrease Base Flood Elevations, to incorporate previously issued Letters of Map Revisions, to increase Base Flood Elevations, to reflect updated topographic information, to update corporate limits, to update map format

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

MAP REVISED NOVEMBER 4, 2016

PANEL 0318F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 318 OF 500

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXCELSIOR, CITY OF	270161	0318	F
GREENWOOD, CITY OF	270164	0318	F
SHOREWOOD, CITY OF	270185	0318	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 27053C0318F

MAP REVISED NOVEMBER 4, 2016

Federal Emergency Management Agency

NOTES TO USERS

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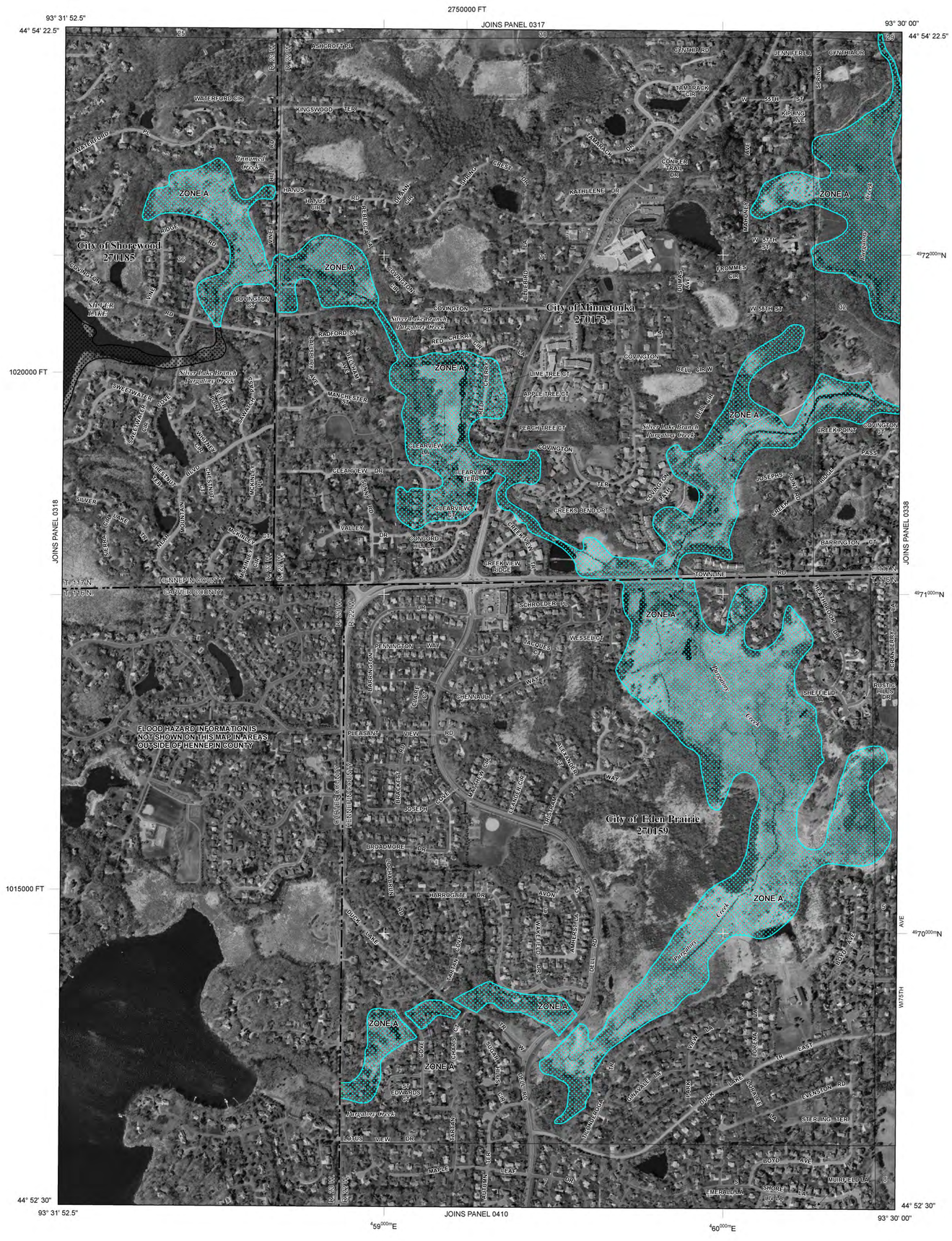
ADMINISTRATIVE FLOODWAY

* Administrative floodway designated in accordance with local regulations for management of these areas

A — MODELED NODE LABEL



LEGEND

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FLOODWAY AREAS IN ZONE AE

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ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

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- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetical Vertical Datum of 1929

- A — A — Cross section line
- 23 — - - - — 23 — Transect line
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
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- 4980000mN — 1000-meter Universal Transverse Mercator grid values, zone 15
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
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FLOOD INSURANCE RATE MAP
September 2, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
MAJOR PROGRAM PARTICIPATION

PANEL 0319F

FIRM

FLOOD INSURANCE RATE MAP

HENNEPIN COUNTY, MINNESOTA (ALL JURISDICTIONS)

PANEL 319 OF 500
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EDEN PRAIRIE, CITY OF	270159	0319	F
MINNETONKA, CITY OF	270173	0319	F
SHOREWOOD, CITY OF	270185	0319	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
27053C0319F
MAP REVISED
NOVEMBER 4, 2016

Federal Emergency Management Agency

APPENDIX E

NPDES Phase II Information and City Facility Inventory

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

MS4 SWPPP Application for Reauthorization

for the NPDES/SDS General Small Municipal Separate Storm Sewer System (MS4) Permit MNR040000 reissued with an effective date of August 1, 2013

Stormwater Pollution Prevention Program (SWPPP) Document

Doc Type: Permit Application

Instructions: This application is for authorization to discharge stormwater associated with Municipal Separate Storm Sewer Systems (MS4s) under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit Program. **No fee** is required with the submittal of this application. Please refer to "Example" for detailed instructions found on the Minnesota Pollution Control Agency (MPCA) MS4 website at http://www.pca.state.mn.us/ms4.

Submittal: This *MS4 SWPPP Application for Reauthorization* form must be submitted electronically via e-mail to the MPCA at ms4permitprogram.pca@state.mn.us from the person that is duly authorized to certify this form. All questions with an asterisk (*) are required fields. All applications will be returned if required fields are not completed.

Questions: Contact Claudia Hochstein at 651-757-2881 or claudia.hochstein@state.mn.us, Dan Miller at 651-757-2246 or daniel.miller@state.mn.us, or call toll-free at 800-657-3864.

General Contact Information (*Required fields)

MS4 Owner (with ownership or operational responsibility, or control of the MS4)

*MS4 permittee name: City of Shorewood *County: Hennepin
(city, county, municipality, government agency or other entity)

*Mailing address: 5755 Country Club Road

*City: Shorewood *State: MN *Zip code: 55331

*Phone (including area code): (952) 960-7900 *E-mail: lbrown@shorewoodpw.com

MS4 General contact (with Stormwater Pollution Prevention Program [SWPPP] implementation responsibility)

*Last name: Brown *First name: Larry
(department head, MS4 coordinator, consultant, etc.)

*Title: Public Works Director

*Mailing address: 5755 Country Club Road

*City: Shorewood *State: MN *Zip code: 55331

*Phone (including area code): (952) 960-7900 *E-mail: lbrown@shorewoodpw.com

Preparer information (complete if SWPPP application is prepared by a party other than MS4 General contact)

Last name: Carlson First name: Jesse
(department head, MS4 coordinator, consultant, etc.)

Title: Water Resources Project Manager (WSB & Associates, Inc.)

Mailing address: 477 Temperance Street

City: St. Paul State: MN Zip code: 554101

Phone (including area code): (651) 286-8464 E-mail: JCarlson@wsbeng.com

Verification

1. I seek to continue discharging stormwater associated with a small MS4 after the effective date of this Permit, and shall submit this *MS4 SWPPP Application for Reauthorization* form, in accordance with the schedule in Appendix A, Table 1, with the SWPPP document completed in accordance with the Permit (Part II.D.). ☒ Yes
2. I have read and understand the NPDES/SDS MS4 General Permit and certify that we intend to comply with all requirements of the Permit. ☒ Yes

Certification (All fields are required)

☒ Yes - *I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted.*

I certify that based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of civil and criminal penalties.

This certification is required by Minn. Stat. §§ 7001.0070 and 7001.0540. The authorized person with overall, MS4 legal responsibility must certify the application (principal executive officer or a ranking elected official).

By typing my name in the following box, I certify the above statements to be true and correct, to the best of my knowledge, and that this information can be used for the purpose of processing my application.

Name: Larry Brown
(This document has been electronically signed)

Title: Public Works Director Date (mm/dd/yyyy): 12/30/13

Mailing address: 5755 Country Club Road

City: Shorewood State: MN Zip code: 55331

Phone (including area code): (952) 960-7900 E-mail: lbrown@shorewoodpw.com

***Note:** The application will not be processed without certification.*

Stormwater Pollution Prevention Program Document

I. Partnerships: (Part II.D.1)

A. List the **regulated small MS4(s)** with which you have established a partnership in order to satisfy one or more requirements of this Permit. Indicate which Minimum Control Measure (MCM) requirements or other program components that each partnership helps to accomplish (List all that apply). Check the box below if you currently have no established partnerships with other regulated MS4s. If you have more than five partnerships, hit the tab key after the last line to generate a new row.

☒ No partnerships with regulated small MS4s

Name and description of partnership	MCM/Other permit requirements involved

B. If you have additional information that you would like to communicate about your partnerships with other regulated small MS4(s), provide it in the space below, or include an attachment to the SWPPP Document, with the following file naming convention: *MS4NameHere_Partnerships.*

Minnehaha Creek Watershed District (MCWD): Coordinates educational efforts to provide focused outreach to stakeholders including residents, local businesses and developers. Aquatic invasive species control is also a high priority and the City encourages residents to work with the Freshwater Center to promote a Watershed Association Initiative (WAI). The City and MCWD have established a Memorandum of Understanding and Joint Power Agreement. Refer to V.B.2 for further details. MCM 1, 2, 4,and 5

Riley-Purgatory Creek Watershed District (RPCWD): Coordinates educational efforts to provide opportunities for public participation and involvement by offering residents cost-share funding assistance for stormwater management best management practices to protect and conserve water resources. MCM 1, 2, 4, and 5

II. Description of Regulatory Mechanisms: (Part II.D.2)

Illicit discharges

A. Do you have a regulatory mechanism(s) that effectively prohibits non-stormwater discharges into your small MS4, except those non-stormwater discharges authorized under the Permit (Part III.D.3.b.)? ☒ Yes ☐ No

1. If **yes:**

   a. Check which *type* of regulatory mechanism(s) your organization has (check all that apply):

   ☒ Ordinance ☐ Contract language
   ☐ Policy/Standards ☐ Permits
   ☐ Rules
   ☐ Other, explain: _____

   b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

   Citation:

   City Ordinance Chapter 907 – Illicit Discharges into Stormwater System

   Direct link:

   http://www.amlegal.com/nxt/gateway.dll/Minnesota/shorewood_mn/title900publicright-of-wayandproperty/chapter907illicitdischargeintostormwater?f=templates$fn=default.htm$3.0$vid=amlegal:shorewood_mn$anc=JD_Chapter907

   ☐ Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere_IDDEreg.*

2. If **no:**

   Describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

Construction site stormwater runoff control

A. Do you have a regulatory mechanism(s) that establishes requirements for erosion and sediment controls and waste controls? ☒ Yes ☐ No

1. If **yes:**

   a. Check which *type* of regulatory mechanism(s) your organization has (check all that apply):

   ☒ Ordinance ☐ Contract language
   ☒ Policy/Standards ☒ Permits
   ☒ Rules
   ☐ Other, explain: _____

   b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

   Citation:

   1. *City of Shorewood Municipal Code: Chapter 1202 – Subdivision Regulations, Section 1202.04, Subdivision 2(d)(9) and Comprehensive Water Resources Management Plan (CWRMP) Erosion Control Policy 1 and 4.*
   2. *Minnehaha Creek Watershed District: Erosion Control Rule*
   3. *Riley-Purgatory Creek Watershed District: Watershed is currently in the process of updating district rules.*

   Direct link:

   1. *City of Shorewood: http://www.amlegal.com/nxt/gateway.dll/Minnesota/shorewood_mn/title1200zoningandsubdivisionregulations/chapter1202subdivisionregulations?f=templates$fn=default.htm$3.0$vid=amlegal:shorewood_mn$anc=JD_1202.04*
   2. *Minnehaha Creek Watershed District: http://www.minnehahacreek.org/permits/full-mcwd-rules/erosion-control-rule*
   3. *Riley-Purgatory Creek Watershed District: http://www.rpbcwd.org/permits/*

   ☐ Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere_CSWreg.*

B. Is your regulatory mechanism at least as stringent as the MPCA general permit to Discharge Stormwater Associated with Construction Activity (as of the effective date of the MS4 Permit)? ☒Yes ☐ No

If you answered **yes** to the above question, proceed to C.

If you answered **no** to either of the above permit requirements listed in A. or B., describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

C. Answer **yes** or **no** to indicate whether your regulatory mechanism(s) requires owners and operators of construction activity to develop site plans that incorporate the following erosion and sediment controls and waste controls as described in the Permit (Part III.D.4.a.(1)-(8)), and as listed below:

1.	Best Management Practices (BMPs) to minimize erosion.	☒ Yes ☐ No
2.	BMPs to minimize the discharge of sediment and other pollutants.	☒ Yes ☐ No
3.	BMPs for dewatering activities.	☒ Yes ☐ No
4.	Site inspections and records of rainfall events	☒ Yes ☐ No
5.	BMP maintenance	☒ Yes ☐ No
6.	Management of solid and hazardous wastes on each project site.	☒ Yes ☐ No
7.	Final stabilization upon the completion of construction activity, including the use of perennial vegetative cover on all exposed soils or other equivalent means.	☒ Yes ☐ No
8.	Criteria for the use of temporary sediment basins.	☒ Yes ☐ No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

Post-construction stormwater management

A. Do you have a regulatory mechanism(s) to address post-construction stormwater management activities? ☒ Yes ☐ No

1. If **yes:**

a. Check which *type* of regulatory mechanism(s) your organization has (check all that apply):

☒ Ordinance ☐ Contract language
☒ Policy/Standards ☒ Permits
☒ Rules
☐ Other, explain: _____

b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

Citation:

1. *City of Shorewood Municipal Code: Chapter – Subdivision Regulations, Section 1202.04, Subdivision 3.n and Subdivision 8 – require compliance with watershed rules and CWRMP.*
2. *Minnehaha Creek Watershed District: Stormwater Management Rule*
3. *Riley-Purgatory Creek Watershed District: Watershed is currently in the process of updating their rules.*

Direct link:

1. *City of Shorewood: http://www.amlegal.com/nxt/gateway.dll/Minnesota/shorewood_mn/title1200zoningandsubdivisionregulations/chapter1202subdivisionregulations?f=templates$fn=default.htm$3.0*
2. *Minnehaha Creek Watershed District: http://www.minnehahacreek.org/sites/minnehahacreek.org/files/pdfs/regulatory/Stormwater%20Management%20Rule.pdf*
3. *Riley-Purgatory Creek Watershed District: http://www.rpbcwd.org/permits/*

☐ Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere_PostCSWreg.*

B. Answer **yes** or **no** below to indicate whether you have a regulatory mechanism(s) in place that meets the following requirements as described in the Permit (Part III.D.5.a.):

1. **Site plan review:** Requirements that owners and/or operators of construction activity submit site plans with post-construction stormwater management BMPs to the permittee for review and approval, prior to start of construction activity. ☒ Yes ☐ No

2. **Conditions for post construction stormwater management:** Requires the use of any combination of BMPs, with highest preference given to Green Infrastructure techniques and practices (e.g., infiltration, evapotranspiration, reuse/harvesting, conservation design, urban forestry, green roofs, etc.), necessary to meet the following conditions on the site of a construction activity to the Maximum Extent Practicable (MEP):
   a. For new development projects – no net increase from pre-project conditions (on an annual average basis) of: ☒ Yes ☐ No
      1) Stormwater discharge volume, unless precluded by the stormwater management limitations in the Permit (Part III.D.5.a(3)(a)).
      2) Stormwater discharges of Total Suspended Solids (TSS).
      3) Stormwater discharges of Total Phosphorus (TP).
   b. For redevelopment projects – a net reduction from pre-project conditions (on an annual average basis) of: ☒ Yes ☐ No
      1) Stormwater discharge volume, unless precluded by the stormwater management limitations in the Permit (Part III.D.5.a(3)(a)).
      2) Stormwater discharges of TSS.
      3) Stormwater discharges of TP.

3. **Stormwater management limitations and exceptions:**
   a. Limitations
      1) Prohibit the use of infiltration techniques to achieve the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)) when the infiltration structural stormwater BMP will receive discharges from, or be constructed in areas: ☒ Yes ☐ No
         a) Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the MPCA.
         b) Where vehicle fueling and maintenance occur.
         c) With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock.
         d) Where high levels of contaminants in soil or groundwater will be mobilized by the infiltrating stormwater.
      2) Restrict the use of infiltration techniques to achieve the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)), without higher engineering review, ☐ Yes ☒ No

sufficient to provide a functioning treatment system and prevent adverse impacts to groundwater, when the infiltration device will be constructed in areas:

a) With predominately Hydrologic Soil Group D (clay) soils.
b) Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features.
c) Within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13.
d) Where soil infiltration rates are more than 8.3 inches per hour.

3) For linear projects where the lack of right-of-way precludes the installation of volume control practices that meet the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)), the permittee's regulatory mechanism(s) may allow exceptions as described in the Permit (Part III.D.5.a(3)(b)). The permittee's regulatory mechanism(s) shall ensure that a reasonable attempt be made to obtain right-of-way during the project planning process. ☒ Yes ☐ No

4. **Mitigation provisions:** The permittee's regulatory mechanism(s) shall ensure that any stormwater discharges of TSS and/or TP not addressed on the site of the original construction activity are addressed through mitigation and, at a minimum, shall ensure the following requirements are met:

   a. Mitigation project areas are selected in the following order of preference: ☐ Yes ☒ No
      1) Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
      2) Locations within the same Minnesota Department of Natural Resource (DNR) catchment area as the original construction activity.
      3) Locations in the next adjacent DNR catchment area up-stream
      4) Locations anywhere within the permittee's jurisdiction.

   b. Mitigation projects must involve the creation of new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP. ☒ Yes ☐ No

   c. Routine maintenance of structural stormwater BMPs already required by this permit cannot be used to meet mitigation requirements of this part. ☒ Yes ☐ No

   d. Mitigation projects shall be completed within 24 months after the start of the original construction activity. ☐ Yes ☒ No

   e. The permittee shall determine, and document, who will be responsible for long-term maintenance on all mitigation projects of this part. ☒ Yes ☐ No

   f. If the permittee receives payment from the owner and/or operator of a construction activity for mitigation purposes in lieu of the owner or operator of that construction activity meeting the conditions for post-construction stormwater management in Part III.D.5.a(2), the permittee shall apply any such payment received to a public stormwater project, and all projects must be in compliance with Part III.D.5.a(4)(a)-(e). ☐ Yes ☒ No

5. **Long-term maintenance of structural stormwater BMPs:** The permittee's regulatory mechanism(s) shall provide for the establishment of legal mechanisms between the permittee and owners or operators responsible for the long-term maintenance of structural stormwater BMPs not owned or operated by the permittee, that have been implemented to meet the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)). This only includes structural stormwater BMPs constructed after the effective date of this permit and that are directly connected to the permittee's MS4, and that are in the permittee's jurisdiction. The legal mechanism shall include provisions that, at a minimum:

   a. Allow the permittee to conduct inspections of structural stormwater BMPs not owned or operated by the permittee, perform necessary maintenance, and assess costs for those structural stormwater BMPs when the permittee determines that the owner and/or operator of that structural stormwater BMP has not conducted maintenance. ☒ Yes ☐ No

   b. Include conditions that are designed to preserve the permittee's right to ensure maintenance responsibility, for structural stormwater BMPs not owned or operated by the permittee, when those responsibilities are legally transferred to another party. ☒ Yes ☐ No

   c. Include conditions that are designed to protect/preserve structural stormwater BMPs and site features that are implemented to comply with the Permit (Part III.D.5.a(2)). If site configurations or structural stormwater BMPs change, causing decreased structural stormwater BMP effectiveness, new or improved structural stormwater BMPs must be implemented to ensure the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)) continue to be met. ☐ Yes ☒ No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within twelve (12) months of the date permit coverage is extended, these permit requirements are met:

B.3.a.2: The City will amend the ordinance to include restricting the use of infiltration techniques for post-construction stormwater management as described in the Permit (PartIII.D.5.a(3)(a).2). These amendments will be placed on the City Councils meeting agenda for approval within 12 months following the date permit coverage is extended.

B.4.a.: The City will amend the ordinance to include order of preference for selecting mitigation project areas as described in the Permit (PartIII.D.5.a(4)(a)). This will occur on the same schedule as B.3.a.2.

B.4.d.: The City will amend the ordinance to include the requirement to complete mitigation projects within 24 months after the start of the original construction activity as described in the Permit (PartIII.D.5.a(4)(d)). This will occur on the same schedule as B.3.a.2.

B.4.f.: The City does not accept money in lieu of meeting the post-construction stormwater requirements.No revisions to the City Code will be made.

B.5.c.: The City will amend the ordinance to include conditions to address BMP modification in the future as described in the Permit (PartIII.D.5.a(5)(c)). This will occur on the same schedule as B.3.a.2.

III. Enforcement Response Procedures (ERPs): (Part II.D.3)

A. Do you have existing ERPs that satisfy the requirements of the Permit (Part III.B.)? ☐ Yes ☒ No

1. If **yes**, attach them to this form as an electronic document, with the following file naming convention: *MS4NameHere_ERPs.*
2. If **no**, describe the tasks and corresponding schedules that will be taken to assure that, with twelve (12) months of the date permit coverage is extended, these permit requirements are met:

   The City will develop draft ERPs within 12 months of receiving permit coverage. The draft ERPs will include requirements for site inspections, criteria for elevating enforcement, and enforcement tools. The will be developed for MCM 3, 4, and 5. Enforcement mechanisms considered may include:

   - Notice of Violations

   - Stop Work Orders

   - Securities in the form of a performance bond, letter of credit, or cash deposit

   - Misdemeanor

   - Partnerships with the watersheds for enforcement of their maintenance agreement for post-construction stormwater BMPs.

   The draft ERPs will be incorporated in the City Code, policy document, or a formal partnership with the watersheds within 12 months of receiving permit coverage.

B. Describe your ERPs:

The current ERPs are include in the following City Code: Chapter 907; Illicit Discharge Detection and Elimination.

The City Code includes the following enforcement mechanisms:

- Notice of Violation

- Responsible for costs associated with resolving illicit discharge

IV. Storm Sewer System Map and Inventory: (Part II.D.4.)

A. Describe how you manage your storm sewer system map and inventory:

The City's storm sewer inventory was completed in 2007, and is reviewed annually and revised to include new construction and reconstruction projects. The inventory will be revised in 2014 to include new MS4 permit definitions for outfalls and ponds.

B. Answer **yes** or **no** to indicate whether your storm sewer system map addresses the following requirements from the Permit (Part III.C.1.a-d), as listed below:

1. The permittee's entire small MS4 as a goal, but at a minimum, all pipes 12 inches or greater in diameter, including stormwater flow direction in those pipes. ☒ Yes ☐ No
2. Outfalls, including a unique identification (ID) number assigned by the permittee, and an associated geographic coordinate. ☒ Yes ☐ No

3. Structural stormwater BMPs that are part of the permittee's small MS4. ☒ Yes ☐ No
4. All receiving waters. ☒ Yes ☐ No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

C. Answer **yes** or **no** to indicate whether you have completed the requirements of 2009 Minnesota Session Law, Ch. 172. Sec. 28: with the following inventories, according to the specifications of the Permit (Part III.C.2.a.-b.), including:

1. All ponds within the permittee's jurisdiction that are constructed and operated for purposes of water quality treatment, stormwater detention, and flood control, and that are used for the collection of stormwater via constructed conveyances. ☒ Yes ☐ No
2. All wetlands and lakes, within the permittee's jurisdiction, that collect stormwater via constructed conveyances. ☒ Yes ☐ No

D. Answer **yes** or **no** to indicate whether you have completed the following information for each feature inventoried.

1. A unique identification (ID) number assigned by the permittee. ☒ Yes ☐ No
2. A geographic coordinate. ☐ Yes ☒ No
3. Type of feature (e.g., pond, wetland, or lake). This may be determined by using best professional judgment. ☐ Yes ☒ No

If you have answered **yes** to all above requirements, and you have already submitted the Pond Inventory Form to the MPCA, then you do not need to resubmit the inventory form below.

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

D.1. The City GIS specialist will update the storm sewer map to include a geographic coordinate for each stormwater feature inventoried and identify the type of feature.

E. Answer **yes** or **no** to indicate if you are attaching your pond, wetland and lake inventory to the MPCA on the form provided on the MPCA website at: http://www.pca.state.mn.us/ms4 , according to the specifications of Permit (Part III.C.2.b.(1)-(3)). Attach with the following file naming convention: *MS4NameHere_inventory*. ☐ Yes ☒ No

If you answered **no,** the inventory form must be submitted to the MPCA MS4 Permit Program within 12 months of the date permit coverage is extended.

V. Minimum Control Measures (MCMs) (Part II.D.5)

A. MCM1: Public education and outreach

1. The Permit requires that, within 12 months of the date permit coverage is extended, existing permittees revise their education and outreach program that focuses on illicit discharge recognition and reporting, as well as other specifically selected stormwater-related issue(s) of high priority to the permittee during this permit term. Describe your **current** educational program, including **any high-priority topics included**:

   The City's stormwater educational program focuses on target audiences including local residents, businesses and developers to encourage adoption of best management practices that improve water quality and protection of natural resources. Grant applications are accepted through the Minnehaha Creek Watershed District and the Riley-Purgatory Watershed District. The main vehicle for publicizing stormwater public education and outreach is through the use of the city's webpage and newsletters. Additionally, the City uses printed brochures for additional public education and outreach.

2. List the categories of BMPs that address your public education and outreach program, including the distribution of educational materials and a program implementation plan. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the U.S. Environmental Protection Agency's (EPA) *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf).

   If you have more than five categories, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Printed Brochures at City Hall	*Three different stormwater related brochures will be available at the City Hall. City staff will annually record the number of*

	brochures distributed, review the appropriateness of the existing brochures, and provide new brochures for existing topics or high priority topics of interest (at the discretion of City staff). This BMP will be completed a minimum of once a year throughout the MS4 permit cycle (July 31, 2018).
City Newsletter	*The City distributes 10 articles to approximately 7,500 residents per month during each year of the MS4 permit cycle (July 31, 2018).*
Resident Guide	*The City produces a Resident Guide that discusses stormwater related topics for annual distribution to an audience of approximately 7,500 residents. This BMP will continue to be implemented throughout the MS4 permit cycle (July 31, 2018).*
Public Works Webpage	*Stormwater educational materials are provided on the City's webpage (http://www.ci.shorewood.mn.us/pages/pworks/water.html) under the Sewer and Water section of the Public Works Department. City staff track hits on the website and update the content and appropriateness of all materials on the webpage once per calendar year during the MS4 permit cycle (July 31, 2018).*
MCWD NEMO and University of Minnesota Extension	*The City will continue to coordinate with the University of Minnesota Extension and the MCWD to provide stormwater education in the City that is also focused on elected officials through the NEMO program. Typically once per permit cycle.*
Minnehaha Creek Watershed District Workshops	*The City partners with MCWD to host an erosion and sediment control workshop to educate contractors or developers. Other workshops include aquatic invasive species control and encouragement of residents to work with the Fresh water Center on a Watershed Association Initiative (WAI).*
BMP categories to be implemented	**Measurable goals and timeframes**
Annual SWPPP Assessment & Annual Reporting	*City staff will conduct an annual SWPPP assessment in preparation of each annual report. Proposed SWPPP modifications are subject to Part II.G of the MS4 permit. The final annual report will be posted on the Sewer and Water webpage. City staff will submit the annual report to the MPCA prior to June 30th for the previous calendar year.*
Water Resources Webpage updates (high priority topics)	*The City's water resources webpage (http://www.ci.shorewood.mn.us/pages/pworks/water.html) will be updated with high priority topics, such as Illicit discharge recognition/reporting and information related to the Minnehaha Creek Watershed District Lakes TMDL, specifically for Phosphorus impairments in Lake Virginia. Periodic webpage updates will be completed throughout each year of the MS4 permit cycle (July 31, 2018).*

3. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Director of Public Works

B. MCM2: Public participation and involvement

1. The Permit (Part III.D.2.a.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement a public participation/involvement program to solicit public input on the SWPPP. Describe your current program:

   City staff solicits public input during the annual SWPPP annual meeting and collaborates with Minnehaha Creek Watershed District to provide workshops on relevant stormwater topics that include parking lot or turf grass maintenance.

2. List the categories of BMPs that address your public participation/involvement program, including solicitation and documentation of public input on the SWPPP. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Annual Public Meeting	*Present the draft MS4 annual report and solicit public input regarding the adequacy of the City's SWPPP. Public input received (oral and written) will be recorded in meeting minutes and evaluated by the City's MS4 General Contact. City responses (if relevant) will be made in writing to each commenter. Hold one meeting per calendar year (between January and June for the previous year) of the MS4 permit cycle.*
Grant Programs	*The City has partnered with Minnehaha Creek Watershed District, Riley-Purgatory Creek Watershed District and Blue Thumb to provide matching funds that encourage Shorewood residents, local business and organizations to improve water quality and natural resources within their respective watersheds. Programs currently available include:* *<u>Minnehaha Creek Watershed District</u>* · *The Non-Homeowner/Homeowner Stormwater Best Management Practices Program pays for practices that reduce runoff going to lakes, streams and wetlands. Financial assistance/cost-share is offered for installing rain gardens, permeable pavement, green roofs, tree trenches and infiltration basins and trenches.* · *The Shoreline/Streambank Stabilization Cost-Share Program offers cost-share for projects that help protect valuable water resources within the watershed.* *<u>Riley-Purgatory Creek Watershed District</u>* · *The Cost-Share Program provides funding assistance for the design and construction, restoration or implementation of stormwater management best management practices (BMPs) that protect and conserve water resources within the RPCWD. Eligible funding varies according to the type of project and focuses on three categories:* o *Local Government and Commercial Facility BMP Projects* o *Lake Association, Homeowners Association, Nonprofit Organization BMP Projects* o *Single-Family Residential BMP Projects* *The City will continue to partner with watershed organizations and districts to offer grant programs that improve water quality to residents, business owners and local governments throughout the MS4 permit cycle (July 31, 2018).*
Resident Participation	*The City of Shorewood encourages residents in their SWPPP to help maintain or improve water quality on their residential lots by marinating a health lawn with minimal fertilizers, redirect downspouts from paved areas, keep storm sewer drains free of debris, properly dispose of wastes.*

BMP categories to be implemented	Measurable goals and timeframes
Online Availability of the Stormwater Pollution Prevention Program (SWPPP) document	*The City will make the SWPPP and 2013 annual report available on the Public Works Department webpage within 12 months from the date the MS4 permit coverage is extended to the City.*
Coordination Meeting	*Propose regular meetings with the MCWD to ensure the internal procedures from communication between the City and MCWD regarding the stormwater program continues seamlessly as responsibilities are shared. On-going*
Develop Stormwater Organizational Chart	*The City will develop a stormwater organizational chart detailing the roles and responsibilities of City staff in implementing the SWPPP.*

3. Do you have a process for receiving and documenting citizen input? ☐ Yes ☒ No

If you answered **no** to the above permit requirement, describe the tasks and corresponding schedules that will be taken to

assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

Within 12 months of permit coverage the city willl evaulate how they currently recieve citizen input and develop this into a standard operating procedure (SOP).

4. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Director of Public Works

C. MCM 3: Illicit discharge detection and elimination

1. The Permit (Part III.D.3.) requires that, within 12 months of the date permit coverage is extended, existing permittees revise their current program as necessary, and continue to implement and enforce a program to detect and eliminate illicit discharges into the small MS4. Describe your current program:

   The City's IDDE ordinace #455 (Chapter 907 - Illicit Discharge into Stormwater System) was adopted in 2008 and the IDDE program was develped in 2009. Implementation and IDDE inspections began in January 1, 2009. The City currently uses an IDDE datbase to record inspection results and provides annual training to Public Works staff. City staff intends to maintain their "Water and Sanitary Sewer" section of the Public Works webpage to provide city contact information for the public to report potential non-stormwater discharges, spills, and connections throughout the MS4 Permit cycle (July 31, 2018).

2. Does your Illicit Discharge Detection and Elimination Program meet the following requirements, as found in the Permit (Part III.D.3.c.-g.)?

   a. Incorporation of illicit discharge detection into all inspection and maintenance activities conducted under the Permit (Part III.D.6.e.-f.)Where feasible, illicit discharge inspections shall be conducted during dry-weather conditions (e.g., periods of 72 or more hours of no precipitation). ☒ Yes ☐ No

   b. Detecting and tracking the source of illicit discharges using visual inspections. The permittee may also include use of mobile cameras, collecting and analyzing water samples, and/or other detailed procedures that may be effective investigative tools. ☒ Yes ☐ No

   c. Training of all field staff, in accordance with the requirements of the Permit (Part III.D.6.g.(2)), in illicit discharge recognition (including conditions which could cause illicit discharges), and reporting illicit discharges for further investigation. ☐ Yes ☒ No

   d. Identification of priority areas likely to have illicit discharges, including at a minimum, evaluating land use associated with business/industrial activities, areas where illicit discharges have been identified in the past, and areas with storage of large quantities of significant materials that could result in an illicit discharge. ☐ Yes ☒ No

   e. Procedures for the timely response to known, suspected, and reported illicit discharges. ☒ Yes ☐ No

   f. Procedures for investigating, locating, and eliminating the source of illicit discharges. ☒ Yes ☐ No

   g. Procedures for responding to spills, including emergency response procedures to prevent spills from entering the small MS4. The procedures shall also include the immediate notification of the Minnesota Department of Public Safety Duty Officer, if the source of the illicit discharge is a spill or leak as defined in Minn. Stat. § 115.061. ☐ Yes ☒ No

   h. When the source of the illicit discharge is found, the permittee shall use the ERPs required by the Permit (Part III.B.) to eliminate the illicit discharge and require any needed corrective action(s). ☐ Yes ☒ No

   If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

   The City's IDDE program will be revised to include a map of high priority areas (based on current landuse, history of discharges, and active NPDES Industrial Stormwater permits) and internal procedures for emergency and non-emergency response to reported spills, illicit discharges, and connections. Draft revisions will be completed in 2014 and implemented within 12 months from the date MS4 permit coverage is extended to the City.

3. List the categories of BMPs that address your illicit discharge, detection and elimination program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf).

   If you have more than five categories, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
IDDE Inspections	*The City will continue to annually conduct IDDE inspections*

	concurrently with stormsewer, outfall, and ponds inspections per the IDDE inspection program.
Televising Sewer Lines	*The City televises sewer lines when necessary to diagnose blockages using a robotic camera and digitally records and documents visual images of nearly 6 miles of sanitary sewer collection pipe interiors.*
Training	*Continue to host a minimum of one staff training event per year to discuss illicit discharge recognition and reporting. City staff will develop an annual training schedule, record the employee names, topics covered, and date of each event, annually through the end of the MS4 permit cycle (July 31, 2018).*

BMP categories to be implemented	**Measurable goals and timeframes**
IDDE Priority Inspection Map	*Develop IDDE inspection map in 2014. Utilize map for inspections within 12 months from the date MS4 permit coverage is extended.*
Written Procedures for Emergency Response	*Draft written procedures for emergency and non-emergency response to non-stormwater spills, discharges, and connections in 2014. Implement final written procedures within 12 months from the date MS4 permit coverage is extended.*
Public Works "Sewer and Water" Webpage updates	*The City will update the "Report a Problem" section of the Public Works webpage to include city contact information for construction site non-compliance. The Water Resources webpage will also be updated with constriction site erosion and sediment control related public education. This update will occur within 12 months from the date MS4 permit coverage is extended.*

4. Do you have procedures for record-keeping within your Illicit Discharge Detection and Elimination (IDDE) program as specified within the Permit (Part III.D.3.h.)? ☐ Yes ☒ No

   If you answered **no**, indicate how you will develop procedures for record-keeping of your Illicit Discharge, Detection and Elimination Program, within 12 months of the date permit coverage is extended:

   C.4., The City will develop written procedures for receiving, documenting and storing citizen input as descriped in the permit (Part III.D.3.h). The procedure may include incorporating a link on the website and will include a record of all complaints received and follow-up activity that was performed. Procedures will be in place within 12 months following the date permit coverage is extended.

5. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Public Works Director

D. MCM 4: Construction site stormwater runoff control

1. The Permit (Part III.D.4) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement and enforce a construction site stormwater runoff control program. Describe your current program:

   The City requires an erosion control permit. City ordinance Chapter 1202 - Subdivision Regulations defines requirements for construction stormwater permit approval.

   Additionally the City partners with the Minnehaha Creek Watershed District and to assist with permitting.The City has an MOU with the Minnehaha Creek Watershed District (MCWD) where MCWD has the primary role in reviewing and permitting projects requiring construction site runoff control for areas within the MCWD boundaries.

   Riley Purgatory Bluff Creek Watershed District (RPBCWD) is in the process of developing regulatory rules and can be found on their website. It is anticipated that the RPBCWD will adopt their rules within a year. Once the rules are adopted the City will either establish a partnership with RPBCWD for completing reviews and permitting projects requiring construction site runoff control or revise their ordinances to meet the requirements of the Construction Site General Permit.

   City Engineering and Building Department staff conduct erosion control site plan reviews and perform regular site inspections on all permitted residential and commercial sites, and serve as the City's point of contact for public complaints of potential non-compliance. The City Engineer provides plan review and inspections of development projects. The City also collaborates with the Minnehaha Creek Watershed District and the Riley-Purgatory Creek Watershed District to manage construction site stormwater runoff within the respective watershed boundaries.

   Stop Work Orders, Suspension or Revocation of Permit, and Misdemeanors are the enforcement tools used for non-compliance.

2. Does your program address the following BMPs for construction stormwater erosion and sediment control as required in the Permit (Part III.D.4.b.):

   a. Have you established written procedures for site plan reviews that you conduct prior to the start of construction activity? ☒ Yes ☐ No

   b. Does the site plan review procedure include notification to owners and operators proposing construction activity that they need to apply for and obtain coverage under the MPCA's general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001*? ☒ Yes ☐ No

   c. Does your program include written procedures for receipt and consideration of reports of noncompliance or other stormwater related information on construction activity submitted by the public to the permittee? ☐ Yes ☒ No

   d. Have you included written procedures for the following aspects of site inspections to determine compliance with your regulatory mechanism(s):

      1) Does your program include procedures for identifying priority sites for inspection? ☐ Yes ☒ No

      2) Does your program identify a frequency at which you will conduct construction site inspections? ☐ Yes ☒ No

      3) Does your program identify the names of individual(s) or position titles of those responsible for conducting construction site inspections? ☐ Yes ☒ No

      4) Does your program include a checklist or other written means to document construction site inspections when determining compliance? ☐ Yes ☒ No

   e. Does your program document and retain construction project name, location, total acreage to be disturbed, and owner/operator information? ☐ Yes ☒ No

   f. Does your program document stormwater-related comments and/or supporting information used to determine project approval or denial? ☐ Yes ☒ No

   g. Does your program retain construction site inspection checklists or other written materials used to document site inspections? ☐ Yes ☒ No

   If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met.

   The City intends to review the existing procedures for site inspections, and revise (as needed) to include definitions for identifying priority sites, frequency of City inspections, and protocols for the receipt and consideration of non-compliance. Draft revisions will be completed in early 2014 and formally adopted for implementation within 12 months of the date MS4 permit coverage is extended to the City. City staff will also add contact information on the City website (Departments/Public Works/"Report a Problem") for the public to provide complaints regarding non-compliance of construction sites.

3. List the categories of BMPs that address your construction site stormwater runoff control program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	**Measurable goals and timeframes**
City Erosion Control Permit	*Continue to implement as defined by City Code Chapter 1202 Subdivision Regulations*
Training	*Building or Engineering Department staff (a minimum of one staff member) will maintain valid certification in NPDES Construction Stormwater Permit related training per NPDES-CSW training requirements.*

BMP categories to be implemented	**Measurable goals and timeframes**
Public Works Webpage updates	*The City will update the "Report a Problem" section of the Public Works webpage to include city contact information for construction site non-compliance. The Water Resources webpage will also be updated with constriction site erosion and sediment control related public education. This update will occur within 12 months from the date MS4 permit coverage is extended.*

Review Building Dept. inspection checklist	*The City will update the existing Erosion and sediment control checklist to meet current NPDES Construction Stormwater Permit requirements and develop a standardize form that can be used in conjunction with MCWD. This update will occur in 2014 and be implemented within 12 months from the date MS4 permit coverage is extended.*
Revise Building Dept. plan review checklist	*Revise the Building and Engineering Department's plan review checklist for single family dwellings to include specific erosion and sediment control standards.*

4. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Director of Public Works

E. MCM 5: Post-construction stormwater management

1.

   The Permit (Part III.D.5.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement and enforce a post-construction stormwater management program. Describe your current program:

   Permit applications require a plan submittal consisting of the design standards used for permanent facilities. The Post-Construction Stormwater Management program is primarily described in Subdivision Regulations, Section 1202.04, Subdivision 3.n and Subdivision 8. The City code requires that applicant's comply with the goals and policies of the City of Shorewood's approved Comprehensive Water Resources Management Plan and the Watershed Rules.

2. Have you established written procedures for site plan reviews that you will conduct prior to the start of construction activity? ☒ Yes ☐ No

3. Answer **yes** or **no** to indicate whether you have the following listed procedures for documentation of post-construction stormwater management according to the specifications of Permit (Part III.D.5.c.):
   a. Any supporting documentation that you use to determine compliance with the Permit (Part III.D.5.a), including the project name, location, owner and operator of the construction activity, any checklists used for conducting site plan reviews, and any calculations used to determine compliance? ☒ Yes ☐ No
   b. All supporting documentation associated with mitigation projects that you authorize? ☐ Yes ☒ No
   c. Payments received and used in accordance with Permit (Part III.D.5.a.(4)(f))? ☐ Yes ☒ No
   d. All legal mechanisms drafted in accordance with the Permit (Part III.D.5.a.(5)), including date(s) of the agreement(s) and names of all responsible parties involved? ☒ Yes ☐ No

   If you answered **no** to any of the above permit requirements, describe the steps that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met.

   E.3.b-c., The City will develop written procedures for documention of post-construction stormwater management for documentation of mitigation projects, payments, and legal mechanisms as described in the Permit (Part III.D.5.c.). Procedures will be in place within 12 months following the date permit coverage is extended.

4. List the categories of BMPs that address your post-construction stormwater management program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	**Measurable goals and timeframes**
City Stormwater Management Permits	*The City will continue to review and issue stormwater permits (for land disturbance of 5,000 square feet and larger) in collaboration with the Minnehaha Creek Watershed District through the end of the MS4 permit cycle (July 31, 2018).*

BMP categories to be implemented	**Measurable goals and timeframes**
Ordinance Updates	*City Code 1202 will be evaluated and revised if needed to include MS4 regulatory standards. If changes are deemed necessary the final ordinance language will be formally*

	adopted and implemented within 12 months from the date MS4 permit coverage is extended to the City.

5. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

   Director of Public Works

F. MCM 6: Pollution prevention/good housekeeping for municipal operations

1. The Permit (Part III.D.6.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement an operations and maintenance program that prevents or reduces the discharge of pollutants from the permittee owned/operated facilities and operations to the small MS4. Describe your current program:

   The City's Public Works Department is primarily responsible for all MCM 6 activities. Current Public Works activities include inspections and maintenance of the storm sewer system, street sweeping, and employee training. In 2014, the City intends to expand the employee training opportunities, refine all record keeping procedures of inspections and maintenance, and written procedures for IDDE.

2. Do you have a facilities inventory as outlined in the Permit (Part III.D.6.a.)? ☐ Yes ☒ No

3. If you answered **no** to the above permit requirement in question 2, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

   City staff will prepare a facility inventory within 12 months of the date permit coverage is extended to the City.

4. List the categories of BMPs that address your pollution prevention/good housekeeping for municipal operations program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

   Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. For an explanation of measurable goals, refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (http://www.epa.gov/npdes/pubs/measurablegoals.pdf).

   If you have more than five categories, hit the tab key after the last line to generate a new row.

Established BMP categories	**Measurable goals and timeframes**
Street Sweeping	*The City will continue to conduct street sweeping operations of all public streets a minimum of twice annually (record the sweeping route and date per occurrence). Review and revise (as needed) street sweeping operations (including schedule, equipment, and disposal), stormwater quality priority areas, and routes annually through the end of the MS4 permit cycle (July 31, 2018).*
Structural Pollution Control Device (SPCD) Inspections	*Continue to inspect 100% of all SPCD's each year of the MS4 permit cycle (July 31, 2018)*
Inspect MS4 Outfalls and Ponds	*Continue to inspect 20% of all MS4 outfalls each year, until 100% of all MS4 Outfalls and Ponds have been inspected within the MS4 permit cycle (until July 31, 2018).*
Review Inspection Reports	*Annually, review all pond, outfall, and SPCD inspection records to determine if maintenance, repair, or replacement is needed. Include a description of the findings and any maintenance, repair, or replacement as a result of the inspection findings. Evaluate each SPCD's inspection frequency and adjust as needed per MS4 Permit Part III.D.6.e (1.). Evaluate and update inspection records annually through the end of the MS4 permit cycle (July 31, 2018).*
Training	*Continue to host a minimum of one staff training event per year to discuss stormwater related topics. City staff will develop an annual training schedule, record the employee names, topics covered, and date of each event, annually through the end of the MS4 permit cycle (July 31, 2018).*

BMP categories to be implemented	**Measurable goals and timeframes**
Pond Sediment Excavation and Removal Projects	*The City will develop a reporting component for pond sediment removal projects within 12 months from the date MS4 permit*

	coverage is extended to the City. Reporting will consist of documenting the date, pond ID, project limits/construction plans, volume of sediment removed, test results (if any), and disposal location. Will report annually as projects are completed.
Stockpiles, Storage and Material Handling Area Inspections	*Conduct written inspections of all stockpile, storage and material handling areas as per the facilities inventoried in 2014. Reporting done annually starting in 2015.*

5. Does discharge from your MS4 affect a Source Water Protection Area (Permit Part III.D.6.c.)? ☒ Yes ☐ No

   a. If **no**, continue to 6.

   b. If **yes**, the Minnesota Department of Health (MDH) is in the process of mapping the following items. Maps are available at http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm. Is a map including the following items available for your MS4:

      1) Wells and source waters for drinking water supply management areas identified as vulnerable under Minn. R. 4720.5205, 4720.5210, and 4720.5330? ☒ Yes ☐ No

      2) Source water protection areas for surface intakes identified in the source water assessments conducted by or for the Minnesota Department of Health under the federal Safe Drinking Water Act, U.S.C. §§ 300j – 13? ☐ Yes ☒ No

   c. Have you developed and implemented BMPs to protect any of the above drinking water sources? ☐ Yes ☒ No

6. Have you developed procedures and a schedule for the purpose of determining the TSS and TP treatment effectiveness of all permittee owned/operated ponds constructed and used for the collection and treatment of stormwater, according to the Permit (Part III.D.6.d.)? ☐ Yes ☒ No

7. Do you have inspection procedures that meet the requirements of the Permit (Part III.D.6.e.(1)-(3)) for structural stormwater BMPs, ponds and outfalls, and stockpile, storage and material handling areas? ☐ Yes ☒ No

8. Have you developed and implemented a stormwater management training program commensurate with each employee's job duties that:

   a. Addresses the importance of protecting water quality? ☒ Yes ☐ No

   b. Covers the requirements of the permit relevant to the duties of the employee? ☐ Yes ☒ No

   c. Includes a schedule that establishes initial training for new and/or seasonal employees and recurring training intervals for existing employees to address changes in procedures, practices, techniques, or requirements? ☐ Yes ☒ No

9. Do you keep documentation of inspections, maintenance, and training as required by the Permit (Part III.D.6.h.(1)-(5))? ☒ Yes ☐ No

   If you answered **no** to any of the above permit requirements listed in **Questions 5 – 9**, then describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

   The City will update written procedures for conducting inspections of illicit discharge detection, outfalls, ponds and structural pollution control devices, develop BMPs to protect drinking water sources, draft inspection and record keeping procedures for stockpile, storage, and material handling areas, a reporting method for employee training events, and record keeping procedures for pond excavation projects within 12 months of the date permit coverage is extended to the City.

10. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

    Director of Public Works

VI. Compliance Schedule for an Approved Total Maximum Daily Load (TMDL) with an Applicable Waste Load Allocation (WLA) (Part II.D.6.)

A. Do you have an approved TMDL with a Waste Load Allocation (WLA) prior to the effective date of the Permit? ☒ Yes ☐ No

   1. If **no**, continue to section VII.

   2. If **yes**, fill out and attach the MS4 Permit TMDL Attachment Spreadsheet with the following naming convention**:** *MS4NameHere_TMDL.*

This form is found on the MPCA MS4 website: http://www.pca.state.mn.us/ms4.

VII. Alum or Ferric Chloride Phosphorus Treatment Systems (Part II.D.7.)

A. Do you own and/or operate any Alum or Ferric Chloride Phosphorus Treatment Systems which are regulated by this Permit (Part III.F.)? ☐ Yes ☒ No

1. If **no**, this section requires no further information.
2. If **yes**, you own and/or operate an Alum or Ferric Chloride Phosphorus Treatment System within your small MS4, then you must submit the Alum or Ferric Chloride Phosphorus Treatment Systems Form supplement to this document, with the following naming convention: *MS4NameHere_TreatmentSystem*.
   This form is found on the MPCA MS4 website: http://www.pca.state.mn.us/ms4.

VIII. Add any Additional Comments to Describe Your Program

TMDL Wasteload Allocation Excel Spreadsheet PART II.D.6.a.-e.

Copy and paste from the Master List MS4 TMDL Spreadsheet for your MS4 to the space below.

Permittee name	Preferred ID	TMDL project name*	Waterbody ID	Type of WLA*	Numeric WLA*	Unit*	Percent reduction	Flow condition*	Waterbody name	Pollutant of concern*	Date approved
Shorewood City	MS400122	Minnehaha Creek Watershed District Lakes TMDL	10-0015	Individual	0.05	lbs/day	16%	N/A	Lake Virginia	Phosphorus	4/25/2011

• www.pca.state.mn.us • Available in alternative formats • 651-296-6300 • 800-657-3864 • TTY 651-282-5332 or 800-657-3864

Compliance Schedule PART II.D.6.f.-g.

Is your MS4 currently meeting its WLA for any approved TMDLs?

Go to: Table 1 | Go to: Strategies... | Go to: Table 2

☐ **NO** (Complete Table 1: Strategies for continued BMP implementation beyond the term of this permit. and Table 2 below)

☑ **YES** (Provide the following information below)

If YES, indicate the WLAs (may be grouped by TMDL Project) you believe are reasonably being met. For each WLA, list the implemented BMPs and provide a narrative strategy for the long-term continuation of meeting each WLA. PART II.D.6.g.(1)-(2)

Minnehaha Creek Watershed District Lakes TMDL (Lake Virginia) - 0.05 lbs/day Phosphorus

Phosphorus sources for Lake Virginia may inlcude all or any of the following:

- Regulated stormwater runoff
- Non-regulated stormwater runoff
- Point sources
- Internal loading
- Atmospheric deposition
- Groundwater discharge

The city is meeting its WLA by performing the following BMPs on a regular basis.

1. The city provides stormwater education to employees and the public.
2. The city provides water resource education materials to contractors, builders, developers, and the general public.
3. The city performs inspections for the cities illicit discharge detection and elimination program.
4. The city references and makes permitees comply with watershed requirements for post -construction BMP performance. This standard requires that the runoff volume from new impervious surfaces be treated by capturing the first 1 inch of runoff .
5. The city continues to monitor and maintain the existing stormwater ponds and other BMPs to sustain removal effectiveness.
6. The city has established maintenance agreements with private owners of permanent BMPs.
7. The city has an established street sweeping program and the streets are swept two times per year. The City did in analysis in in 2008 to estimate potential phosphorus reducation strategies. Street sweeping was evealuted and it was estimated that they City could remove the phosphorus load to Lake Virginia by 4 lbs/yr. Th is demonstrates that street sweepin alone is capable of meeting the 3 lb/yr phosphourus reduction requirement imposed on the City.
8. The city annually inspects and cleans all structural pollution control devices.

Table 1

Fill in the following table with your Interim Milestones, BMP IDs, and Implementation Dates. Replace "TMDL Project Name & Pollutant" Columns with each TMDL Project Name and the corresponding pollutant. Then put an "X" in the boxes for the TMDL that corresponds with each BMP. PART II.D.6.f.(1)-(2)

NOTE:

It is recommended to assign each Interim Milestone (BMP) a BMP ID. You will be required to report on the status of each Int erim Milestone and include a BMP ID for all structural BMPs as part of the MS4 Annual Report (see Part III.E.), so including tho se ID numbers at the time of application may be useful in tracking implementation efforts. If a pond that will be included in the p ond inventory (Part III.C.2.) is to be applied toward a WLA, use the same ID for both the pond inventory and TMDL tracking. Non-structural BMPs are not required to have an ID, but it may be useful to assign it an ID for internal MS4 recordkeeping.

MPCA recommends the Implementation Dates align with the submittal of MS4 Annual Reports. Dates selected may not reflect the a ctual date a BMP is implemented, but shall indicate a BMP will be implemented on that date or before for that reporting year.

Interim Milestone (Best Management Practice)	BMP ID	Implementation Date	TMDL Project Name & Pollutant1	TMDL Project Name & Pollutant2	TMDL Project Name & Pollutant3	TMDL Project Name & Pollutant4	TMDL Project Name & Pollutant5	TMDL Project Name & Pollutant6	TMDL Project Name & Pollutant7	TMDL Project Name & Pollutant8	TMDL Project Name & Pollutant9	TMDL Project Name & Pollutant10	TMDL Project Name & Pollutant11	TMDL Project Name & Pollutant12	TMDL Project Name & Pollutant13	TMDL Project Name & Pollutant14	TMDL Project Name & Pollutant15	TMDL Project Name & Pollutant16	TMDL Project Name & Pollutant17	TMDL Project Name & Pollutant18	TMDL Project Name & Pollutant19	TMDL Project Name & Pollutant20	TMDL Project Name & Pollutant21	TMDL Project Name & Pollutant22	TMDL Project Name & Pollutant23

JOINT POWERS AGREEMENT

Between the City of Shorewood and the Minnehaha Creek Watershed District

This Agreement is made this 24th day of March, 2008, by and between the City of Shorewood, a body corporate and politic and a statutory city in the State of Minnesota ("City") and the Minnehaha Creek Watershed District, a watershed district with purposes and powers as set forth in Minnesota Statutes Chapters 103B and 103D ("MCWD"). This Agreement is executed under authority of Minnesota Statutes §471.59, which permits two or more governmental units to jointly and cooperatively exercise any power common to each of them.

Recitals and Statement of Purpose

WHEREAS, a majority of the City of Shorewood lies in the Minnehaha Creek Watershed District, and the MCWD serves as the Local Governmental Unit responsible for administering the Wetland Conservation Act within that area;

WHEREAS, the remainder of the City of Shorewood lies in the Riley Purgatory Bluff Creek Watershed District (RPBCWD), and the RPBCWD has affirmatively and voluntarily committed in writing to transfer all local permitting authority, including its responsibility for administering the Wetland Conservation Act, to the City of Shorewood effective December 31, 2007;

WHEREAS, the City has requested that the MCWD provide services as the Local Government Unit responsible for administering the Wetland Conservation Act for the entire City, including the area that lies within the RPBCWD;

WHEREAS, the RPBCWD previously held General Permit #1997-6113 from the Minnesota Department of Natural Resources, which allowed the RPBCWD to permit certain Public Waters work projects without requiring an individual permit, and the RPBCWD affirmatively and voluntarily requested the withdrawal of this General Permit, and the Department of Natural Resources granted this request on February 25, 2008, effectively immediately;

WHEREAS, the MCWD holds General Permit #2001-6009 from the Minnesota Department of Natural Resources, which allows the MCWD to permit certain Public Waters work projects without requiring an individual permit, and the City has requested that the MCWD exercise this authority for the entire City, including the area that lies within the RPBCWD;

NOW, THEREFORE it is mutually agreed by and between the parties as follows:

1.0 Wetland Conservation Act Administration

1..1 The MCWD will serve as the Local Government Unit responsible for administering the Wetland Conservation Act for the entire City, including the area that lies within the RPBCWD.

1.2 The MCWD will not charge the City for providing these services, but may charge fees to permit applicants, and otherwise exercise enforcement powers as authorized by law, including Minnesota Statutes Sections 103D.345, 103G.2242, and 103G.237.

2.0 Department of Natural Resources General Permit Administration

2.1 Upon approval in writing from the Department of Natural Resources, the MCWD will exercise its authority under General Permit 2001-6009 from the Department of Natural Resources for the entire City, including that area that lies within the RPBCWD to regulate riprap shoreline protection, intakes and storm sewer outfalls, retaining walls, excavation for navigation, excavation for wildlife enhancement, excavation for bioengineering, ice ridge removal, and bridges and culvert crossings, pursuant to the MCWD Rules, as they may be amended from time to time.

2.2 The MCWD will not charge the City for providing these services, but may charge fees to permit applicants, and otherwise exercise enforcement powers as authorized by law, including Minnesota Statutes Section 103D.345.

3.0 Indemnification

Each party hereby holds the other party harmless, and agrees to defend and indemnify the other party from and against any and all suits, actions, causes of actions, proceedings, claims, costs and damages arising out of the indemnifying party's action or inaction, except to the extent resulting from an action or inaction of another party or third party for which the other party or third party independently would be subject to liability.

4.0 Termination

4.1 This Agreement may be terminated at any time for any reason by either party upon providing 90 days advance notice in writing.

4.2 The MCWD will terminate the exercise of authority under General Permit 2001-6009 for the area of the City that lies within the RPBCWD in the event that the RPBCWD obtains a new General Permit from the Department of Natural Resources, and communicates in writing to the City and the MCWD that it desires to resume the exercise of such authority within the City.

4.3 In the event of the termination of this Agreement, the parties pledge to cooperate in developing a transition plan to address pending permit applications and ongoing enforcement responsibilities.

5.0 Amendment

This Agreement may be amended only by a writing signed by both of the parties.

6.0 Notices

Any written communication required under this Agreement shall be addressed to the other party as follows, except that any party may change its address for notice by so notifying the other parties in writing:

To MCWD:

Administrator
Minnehaha Creek Watershed District
18202 Minnetonka Boulevard
Deephaven, MN 55391

To City:

Administrator
City of Shorewood
5755 Country Club Road
Shorewood, MN 55331

7.0 Reservation of Powers

Nothing in this Agreement shall limit either party's lawful exercise of its regulatory authority.

IN WITNESS WHEREOF, intending to be legally bound, the parties hereto execute and deliver this Agreement.

MINNEHAHA CREEK WATERSHED DISTRICT

By: James B. Calkins
Its: PRESIDENT

Approved as to Form and Execution:

District Counsel

CITY OF SHOREWOOD

By: Christine Lizee
Its: Mayor

Approved as to Form and Execution:

City Attorney

CITY OF SHOREWOOD

RESOLUTION NO. 08-022

A RESOLUTION ADOPTING THE PERMANENT RULES OF THE WETLAND CONSERVATION ACT

WHEREAS, The Minnesota Wetland Conservation Act of 1991 (WCA) requires local government units (LGUs) to implement this law by adopting the rules and regulations promulgated by the Board of Water and Soil Resources (BWSR) pertaining to wetland draining and filling; and,

WHEREAS, the BWSR is requesting LGUs adopting the permanent rules of the WCA to notify them of the LGU decision regarding adoption; and,

WHEREAS, the LGU is responsible for making WCA determinations for landowners; and,

WHEREAS, the Minnehaha Creek Watershed District accepts LGU authority within their watershed boundaries; and,

NOW, THEREFORE BE IT RESOLVED:

The City hereby delegates the responsibility as the LGU to Minnehaha Creek Watershed District for WCA within the legal boundaries of the Riley Purgatory Bluff Creek Watershed District within the City of Shorewood as of May 1, 2008, within the guidelines as set forth by the WCA and rules.

BE IT FURTHER RESOLVED:

This is subject to approval of the agreement between the City and the Minnehaha Creek Watershed District.

ADOPTED by the City Council of the City of Shorewood this 10th day of March, 2008.

Christine Lizée

Christine Lizée, Mayor

ATTEST:

Larry Brown, Acting City Administrator/Clerk

MEMORANDUM of UNDERSTANDING

Between the Minnehaha Creek Watershed District and the City of Shorewood for Local Water Planning and Regulation

This Memorandum of Understanding (MOU) is made by and between the Minnehaha Creek Watershed District, a watershed district with purposes and powers as set forth at Minnesota Statutes Chapters 103B and 103D ("MCWD"), and the City of Shorewood, a body corporate and politic and a statutory city in the State of Minnesota ("City").

Recitals and Statement of Purpose

WHEREAS in 2007, the MCWD revised its comprehensive watershed management plan under Minnesota Statutes § 103B.231, which details the existing physical environment, land use and development in the watershed and establishes a plan to regulate water resource use and management to protect water resources, improve water quality, prevent flooding and otherwise achieve the goals of Minnesota Statutes Chapters 103B and 103D;

WHEREAS the MCWD's comprehensive watershed management plan incorporates the Rules adopted by the MCWD to protect water resources, improve water quality, prevent flooding and otherwise achieve the goals of Minnesota Statutes Chapters 103B and 103D;

WHEREAS the City has developed a local water management plan under Minnesota Statutes §103B.235 that describes the existing and proposed physical environment and land use within the City and sets forth an implementation plan for bringing local water management into conformance with the MCWD's comprehensive watershed management plan;

WHEREAS on January 8, 2009, the MCWD Board of Managers conditionally approved the City's local water management plan by adoption of Resolution 09-005, which resolution is attached and incorporated herein;

WHEREAS the City wishes to continue to authorize MCWD permitting authority with respect to all areas regulated by the MCWD including the Minnesota Wetland Conservation Act;

WHEREAS MCWD approval of a local plan requires a finding that the official controls of the local government are at least as protective of water resources as the MCWD Rules;

WHEREAS the finding by the MCWD Board of Managers in this regard rests on the City's authorization of the MCWD's continued exercise of regulatory authority within the City in accordance with Minnesota Statutes §103B.211, subdivision 1(a)(3);

WHEREAS the MCWD and City desire to memorialize their respective roles in implementing water resource protection and management within the City;

NOW THEREFORE it is mutually agreed by and between the parties that they enter into this MOU in order to document the understanding of the parties as to the roles and responsibilities of each party.

1.0 Responsibilities of the City

1.1 The City may exercise all present and future authority it otherwise may possess to issue permits for and regulate activities affecting water resources within the City.

1.2 The City will meet at least annually with the MCWD to review the implementation of the City's local water management plan.

1.3 Annually, by the date specified for the City's submittal of its annual report under its NPDES municipal stormwater permit, the City will submit to the MCWD a concise but specific report describing:

a. Progress on the local water management plan implementation program.
b. Progress on meeting phosphorus load reduction requirements of the WMP.
c. Any adjustments to the implementation and/or capital improvement program in the local water management plan.
d. A listing, with further specific information as the MCWD may request, of grading and structural alterations approved or occurring within city boundaries since the last annual report (both private and public alterations) that could measurably affect hydraulic and hydrologic model outcomes.

The City may incorporate its annual report into its NPDES MS4 annual report, provided it addresses the above items with specificity.

2.0 Responsibilities of the MCWD

2.1 The MCWD will continue to apply and enforce its Rules, as they may be amended from time to time, within the City.

2.2 The MCWD will meet with the City at least annually to review the implementation of the City's local water management plan, addressing at a minimum the following topics:

1. Maintenance of up-to-date water quality measures, such as concentrations of Phosphorus, in the City's local water management plan;
2. The City's progress toward Implementation Program/CIP items;
3. Utilizing street sweeping to meet MCWD Phosphorus Loading Reduction goals, and specifically the progress of the City toward testing phosphorus concentrations in sweepings and utilizing that knowledge for effective sweeping.

2.3 The MCWD retains all authority that it may possess under Minnesota Statutes Chapters 103B and 103D or any other provision of law, except as explicitly reposed in the City under this

MOU, including but not limited to authority set forth at Minnesota Statutes §§103B.211, subdivision 1(a); 103D.335 and 103D.341.

3.0 General

3.1 The MOU is effective on the date that it has been executed by both parties, will remain in effect for five years, and will be extended automatically for five-year terms unless terminated by agreement of the parties. Notwithstanding, the City will continue to be subject to applicable statutes and rules requiring that it revise its local water management plan in response to MCWD revisions of the WMP.

3.2 This MOU may be amended only by a writing signed by both parties.

3.3 This MOU does not affect the rights and duties of the parties under the March 24, 2008 Joint Powers Agreement signed by the MCWD and the City of Shorewood, which remains in force and effect according to its terms.

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum of Understanding.

CITY OF SHOREWOOD

By Laura Burgeson
acting Mayor

By
City Manager

Date:

MINNEHAHA CREEK WATERSHED DISTRICT

By James B. Calkins
President, Board of Managers

Date: 2-12-09

APPROVED AS TO FORM AND EXECUTION

By
Its Attorney

APPROVED AS TO FORM AND EXECUTION

By
Its Attorney

APPENDIX F

MCWD Wetland Functional Assessment Summary

Minnehaha Creek Watershed District - Functional Assessment of Wetlands
Wetland Management Classification

Wetland ID Number	Circular 39 Classification	Vegetative Diversity	Wildlife Habitat Quality	Fishery Habitat Quality	Aesthetic Quality
D-117-23-26-001	Type 2	Moderate	Moderate	Low	Low
D-117-23-25-005	Type 2	Low	Moderate	Moderate	Moderate
D-117-23-25-003	Type 2	Not Applicable	Not Applicable	Not Assessed	Not Applicable
D-117-23-25-004	Type 5	Low	Not Applicable	Low	Low
E-117-23-30-001	Type 3, Type 2,	High	High	Moderate	Moderate
D-117-23-25-001	Type 2	Low	Moderate	Low	Low
E-117-23-25-022	Type 5, Type 4	Moderate	Moderate	Low	Exceptional
D-117-23-25-038	Type 3, Type 5	Moderate	Moderate	Moderate	Low
D-117-23-25-043	Type 3	Moderate	Moderate	Low	Low
D-117-23-25-037	Type 2	Low	Low	Moderate	Low
E-117-23-25-011	Type 5	Moderate	Moderate	Low	Low
D-117-23-26-008	Type 2	Not Applicable	Not Applicable	Not Assessed	Not Applicable
E-117-23-25-021	Type 3	High	Moderate	Low	Moderate
E-117-23-25-020	Type 5	Moderate	Moderate	Low	Exceptional
E-117-23-30-002	Type 4	Low	Moderate	Exceptional	Moderate
E-117-23-25-019	Type 5	Low	Moderate	Moderate	Moderate
E-117-23-25-016	Type 5	Moderate	Moderate	Low	Exceptional
E-117-23-26-004	Type 5	Moderate	Moderate	Exceptional	High
E-117-23-25-017	Type 3, Type 2	Low	Moderate	Moderate	Moderate
E-117-23-25-018	Type 5	Low	Low	Low	Moderate
E-117-23-30-004	Type 1	Moderate	High	Low	Moderate
D-117-23-25-024	Type 2, Type 3	Low	Moderate	Low	Moderate
D-117-23-25-027	Type 2	Low	Moderate	Low	Moderate
D-117-23-30-007	Type 3	Low	Moderate	Low	Low
D-117-23-25-023	Type 5	Low	Low	Low	Low
E-117-23-25-015	Type 3	Low	Moderate	Moderate	Moderate
D-117-23-25-023	Type 5	Low	Low	Low	Low
D-117-23-30-014	Type 3	Low	Moderate	Low	Low
D-117-23-25-023	Type 5	Low	Low	Low	Low
D-117-23-29-002	Type 3	Not Applicable	Not Applicable	Not Assessed	Not Applicable

Data taken from 2003 Functional Assessment of Wetlands completed by Minnehaha Creek Watershed District

Minnehaha Creek Watershed District - Functional Assessment of Wetlands
Wetland Management Classification

Wetland ID Number	Circular 39 Classification	Vegetative Diversity	Wildlife Habitat Quality	Fishery Habitat Quality	Aesthetic Quality
E-117-23-25-023	Type 6, Type 3	Exceptional	Exceptional	Low	Moderate
D-117-23-29-002	Type 3	Not Applicable	Not Applicable	Not Assessed	Not Applicable
D-117-23-32-042	Type 3	Low	Moderate	Low	High
E-117-23-32-001	Type 3	Low	Moderate	Low	Moderate
D-117-23-32-039	Type 3	Low	Moderate	Low	Moderate
D-117-23-25-028	Type 5	Low	Low	Low	Low
D-117-23-33-036	Type 3, Type 4	Moderate	Moderate	Low	High
D-117-23-32-043	Type 4	Low	Moderate	Moderate	Moderate
D-117-23-33-005	Type 3	Low	Moderate	Low	Moderate
D-117-23-32-039	Type 3	Low	Moderate	Low	Moderate
E-117-23-33-002	Type 4	Moderate	Moderate	Low	Moderate
E-117-23-36-001	Type 5, Type 4	Moderate	Moderate	Exceptional	Exceptional
D-117-23-32-002	Type 3	Low	Moderate	Low	High
D-117-23-32-037	Type 1, Type 2	Low	Moderate	Low	Moderate
D-117-23-32-043	Type 4	Low	Moderate	Moderate	Moderate
D-117-23-32-002	Type 3	Low	Moderate	Low	High
E-117-23-33-001	Type 4	Low	Moderate	Low	Moderate
E-117-23-36-002	Type 5	Moderate	Moderate	Exceptional	Exceptional
D-117-23-33-011	Type 4	Low	Moderate	Low	Moderate
D-117-23-34-032	Type 5, Type 4	Moderate	Moderate	Exceptional	Exceptional
E-117-23-36-003	Type 8	Exceptional	High	Low	High
D-117-23-35-009	Type 3, Type 5	Low	Low	Low	Low
D-117-23-32-037	Type 1, Type 2	Low	Moderate	Low	Moderate
D-117-23-36-004	Type 2	Moderate	Moderate	Low	High
E-117-23-34-001	Type 4	Moderate	Moderate	Exceptional	Exceptional
D-117-23-36-004	Type 2	Moderate	Moderate	Low	High
D-117-23-33-006	Type 3	Low	High	Low	Low
D-117-23-33-017	Type 2	Low	Moderate	Low	Moderate
D-117-23-32-035	Type 4	Low	Moderate	Low	Moderate
D-117-23-32-035	Type 4	Low	Moderate	Low	Moderate

Data taken from 2003 Functional Assessment of Wetlands completed by Minnehaha Creek Watershed District

Minnehaha Creek Watershed District - Functional Assessment of Wetlands
Wetland Management Classification

Wetland ID Number	Circular 39 Classification	Vegetative Diversity	Wildlife Habitat Quality	Fishery Habitat Quality	Aesthetic Quality
D-117-23-34-002	Type 7, Type 2	Not Applicable	Not Applicable	Not Assessed	Not Applicable
D-117-23-32-041	Type 4	Low	Moderate	Low	Moderate
D-117-23-34-001	Type 7, Type 2	Not Applicable	Not Applicable	Not Assessed	Not Applicable
D-117-23-35-005	Type 3, Type 1	Low	Moderate	Low	Moderate
D-117-23-33-016	Type 4	Low	Moderate	Low	Moderate
E-117-23-31-007	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-033	Type 1	Moderate	Moderate	Low	Moderate
D-117-23-32-032	Type 2, Type 4	Low	Moderate	Low	Moderate
D-117-23-32-033	Type 2	Low	Moderate	Low	Moderate
D-117-23-32-009	Type 1, Type 2	Low	Low	Low	Moderate
D-117-23-32-009	Type 1, Type 2	Low	Low	Low	Moderate
D-117-23-32-002	Type 3	Low	Moderate	Low	High
D-117-23-32-009	Type 1, Type 2	Low	Low	Low	Moderate
D-117-23-32-009	Type 1, Type 2	Low	Low	Low	Moderate
D-117-23-33-001	Type 4	Moderate	Moderate	Exceptional	Moderate
E-117-23-33-003	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-031	Type 3	Low	Moderate	Low	Moderate
E-117-23-31-001	Type 3	Low	Moderate	Low	Moderate
D-117-23-34-009	Type 2	Low	Moderate	Low	Moderate
D-117-23-32-012	Type 2	Low	High	Low	Moderate
E-117-23-35-001	Type 5	Moderate	Moderate	Exceptional	Exceptional
E-117-23-31-002	Type 5	Low	Moderate	Low	Moderate
D-117-23-35-011	Type 3, Type 4	Moderate	Moderate	Exceptional	Exceptional
D-117-23-35-012	Type 3	Moderate	Moderate	Exceptional	Exceptional
E-117-23-34-007	Type 5	Exceptional	Moderate	Exceptional	Exceptional
E-117-23-34-006	Type 4	Moderate	Moderate	Moderate	Exceptional
D-117-23-33-052	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-044	Type 4	Low	Moderate	Low	Moderate
D-117-23-32-040	Type 3	Low	Moderate	Low	High
E-117-23-35-002	Type 4, Type 5,	Low	Low	Low	Low

Data taken from 2003 Functional Assessment of Wetlands completed by Minnehaha Creek Watershed District

Minnehaha Creek Watershed District - Functional Assessment of Wetlands
Wetland Management Classification

Wetland ID Number	Circular 39 Classification	Vegetative Diversity	Wildlife Habitat Quality	Fishery Habitat Quality	Aesthetic Quality
D-117-23-33-049	Type 4	Low	Moderate	Low	Moderate
E-117-23-31-003	Type 5	Low	Moderate	Low	Moderate
D-117-23-33-050	Type 4	Low	Moderate	Low	Moderate
D-117-23-32-030	Type 4	Low	Moderate	Low	Low
D-117-23-33-048	Type 3	Low	Moderate	Low	Moderate
D-117-23-33-021	Type 2	Low	Moderate	Low	Moderate
D-117-23-34-011	Type 2	Moderate	Moderate	Low	Moderate
D-117-23-33-044	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-020	Type 2	Low	Moderate	Low	Moderate
D-117-23-33-051	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-047	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-020	Type 2	Low	Moderate	Low	Moderate
E-117-23-35-003	Type 3, Type 6	Moderate	Moderate	Exceptional	Exceptional
D-117-23-34-025	Type 4	Moderate	Moderate	Low	Moderate
D-117-23-34-012	Type 3	Low	Low	Low	Low
D-117-23-33-043	Type 4	Exceptional	Moderate	Low	Moderate
D-117-23-32-040	Type 3	Low	Moderate	Low	High
D-117-23-32-020	Type 2	Not Applicable	Not Applicable	Not Assessed	Not Applicable
D-117-23-33-022	Type 2	Low	Moderate	Low	Moderate
D-117-23-33-027	Type 2	Exceptional	Moderate	Low	Moderate
D-117-23-34-026	Type 1	Low	High	Low	Moderate
D-117-23-35-020	Type 3, Type 1	Moderate	Moderate	Moderate	Exceptional
D-117-23-34-027	Type 3, Type 6	Moderate	Moderate	Low	Exceptional
D-117-23-32-041	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-046	Type 2	Low	Moderate	Low	Moderate
D-117-23-33-041	Type 5	Low	Moderate	Low	Moderate
D-117-23-33-023	Type 4	Low	Moderate	Low	Moderate
D-117-23-34-015	Type 1	Moderate	Moderate	Low	Moderate
D-117-23-33-040	Type 2	Low	Moderate	Low	Moderate
D-117-23-35-017	Type 2, Type 3	Moderate	Moderate	Low	Moderate

Data taken from 2003 Functional Assessment of Wetlands completed by Minnehaha Creek Watershed District

Minnehaha Creek Watershed District - Functional Assessment of Wetlands
Wetland Management Classification

Wetland ID Number	Circular 39 Classification	Vegetative Diversity	Wildlife Habitat Quality	Fishery Habitat Quality	Aesthetic Quality
E-117-23-31-005	Type 3	Low	High	Low	Moderate
D-117-23-34-018	Type 3	Moderate	Moderate	Moderate	Exceptional
D-117-23-32-026	Type 2	Low	High	Low	Low
D-117-23-33-029	Type 6	Low	Moderate	Low	Moderate
D-117-23-33-023	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-023	Type 4	Low	Moderate	Low	Moderate
D-117-23-34-020	Type 3	Moderate	Moderate	Low	Moderate
D-117-23-33-029	Type 6	Low	Moderate	Low	Moderate
D-117-23-34-034	Type 2	Low	Moderate	Low	Moderate
E-117-23-35-004	Type 3	Low	Moderate	Low	Exceptional
D-117-23-34-017	Type 7, Type 4	Moderate	Moderate	Moderate	Exceptional
D-117-23-34-017	Type 7, Type 4	Moderate	Moderate	Moderate	Exceptional
D-117-23-35-015	Type 3	Not Applicable	Not Applicable	Not Assessed	Not Applicable
D-117-23-33-023	Type 4	Low	Moderate	Low	Moderate
D-117-23-33-042	Type 5	Low	Low	Low	Moderate
D-117-23-33-045	Type 2	Low	Moderate	Low	Moderate
D-117-23-33-026	Type 2	Low	Moderate	Low	Moderate
D-117-23-34-021	Type 2, Type 6	High	Moderate	Low	Moderate
D-117-23-34-019	Type 2, Type 1	Moderate	Moderate	Low	Moderate
D-117-23-35-018	Type 3	Moderate	Moderate	Moderate	Moderate
E-117-23-31-008	Type 3	Moderate	High	Exceptional	High
D-117-23-32-018	Type 2	Not Applicable	Not Applicable	Not Assessed	Not Applicable
D-117-23-34-033	Type 4, Type 3	Moderate	Moderate	Moderate	Exceptional
E-117-23-26-006	Type 5	Moderate	Moderate	Exceptional	Exceptional

Data taken from 2003 Functional Assessment of Wetlands completed by Minnehaha Creek Watershed District

APPENDIX G

P8 Water Quality Modeling Results

P8 WATER QUALITY MODELING RESULTS

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I. DESCRIPTION OF P8 WATER QUALITY MODEL

In an effort to provide the City with additional information on existing and future water quality, an urban water quality model was developed. The computer program used to model water quality within the City of Shorewood is the "Program for Predicting Polluting Particle Passage through Pits, Puddles, and Ponds" referred to as the P8 Urban Catchment Model developed by Dr. William W. Walker, Jr.

The P8 urban water quality model predicts the generation and transportation of stormwater run-off pollutants within the City. This model can estimate pollutant loadings, concentrations and removal efficiencies for basins subject to single or continuous rainfall events. The model will simulate the performance of a variety of treatment devices including swales, buffer strips, detention ponds, flow splitters, infiltration basins and general devices.

The initial calibration of this model corresponds to values measured under the Nationwide Urban Run-off Program or NURP. Specific calibration of this model for the City of Shorewood will require water quality monitoring data for selected areas in the City. Without calibration of the model to site specific data, predictions for specific parameter concentrations, flows, and loadings will be less reliable. However, the relative predictions concerning the removal efficiency of a basin by particle size will be unaffected by calibration.

The methodology used to model the City of Shorewood is described as follows. The Stormwater Treatment basins were assumed to provide a minimum of 4 feet of depth below the invert of the basin outlet and existing line pool storage between the basin outlet and the high water level. The storage volume of the treatment basin between the NWL and HWL was obtained from the TR-20 modeling effort for the 100-year storm event. The dimensions of the treatment basins as well as the peak discharge rates from these basins are shown in the P8 Input Tables.

Some preliminary calibration to regional standards has been completed for this P8 Water Quality Model. The data used to calibrate this model was run-off data collected from the City of Minneapolis. The original parameters that the P8 Model estimates are total suspended solids (TSS), total kjeldahl nitrogen (TKN), total phosphorous (TP), copper (CU), lead (PB), and zinc (ZN). In addition to these parameters, when calibrated to run-off data from the City of Minneapolis, the following water quality parameters were added to the calibrated model, hydrocarbons (HC), chemical oxygen demand (COD) and biological oxygen demand (BOD).

Again, it must be noted that the concentrations of individual water quality parameters estimated by P8 Water Quality Computer Model may vary significantly with concentrations obtained in the field. This inconsistency is due to the extreme variation in water quality parameter concentrations observed from individual subwatersheds. However, the estimated removal efficiency of treatment

basins should be comparable to the removal efficiencies determined from field investigations. This is a result of removal efficiencies being estimated by the total removal of suspended solids. The removal efficiency of a stormwater treatment basin is determined by the particle size distribution and settling velocity of the total suspended solids found in the stormwater run-off received by the basin. The following particle classes are based primarily upon calibration of run-off concentrations and settling velocity measured under the Nation-Wide Urban Run-off Program:

PARTICLE CLASS	DESCRIPTION	PERCENT OF TSS	SETTLING VELOCITY (FT/HR)
P O%	Dissolved	0	0
P 10%	10th Percentile	20	0.03
P 30%	30th Percentile	20	0.3
P 50%	50th Percentile	20	1.5
P 80%	80th Percentile	40	15

The first class permits consideration of the dissolved fractions of stormwater run-off quality components.

The storm event used to model water quality is a 1-inch, 24-hour, Type II storm.

II. INTERPRETATION OF P8 WATER QUALITY MODEL RESULTS

The P8 water quality modeling results are summarized on the following table. This table contains the estimated minimum, mean, and maximum concentrations of water quality parameters found in both the inflow to a stormwater treatment basin and the outflow. This table is a summary of all stormwater treatment basins modeled in the City of Shorewood. Minimum is defined as the treatment basin within the City of Shorewood which contains the lowest concentration of these water quality parameters and its inflow, and outflow, as well as, the treatment basin with the lowest removal efficiency of these parameters. Mean is the average concentration of water quality parameters found in the inflow, the outflow and the average treatment efficiency of basins within the City of Shorewood. Maximum is defined as the highest concentration of water quality parameters found in the inflow and outflow. The maximum removal efficiency is that pond in Shorewood which removes the greatest percentage of the water quality parameters from stormwater run-off.

The treatment efficiency of a pond will be somewhat dependent upon the quality of water entering the stormwater treatment basin. A stormwater treatment basin which receives a large volume of stormwater from watersheds which have treated runoff prior to discharge into the downstream pond

will show a reduced treatment or pollutant removal efficiency when compared to treatment basins that only receive untreated runoff..

Included in this Appendix is a breakdown of the treatment efficiencies, as well as, the concentrations of water quality parameters for each stormwater treatment basin proposed for the City of Shorewood. These tables, as well as the P8 input, are contained in **Sections III, IV, V, VI and VII of this Appendix**.

City of Shorewood
Comprehensive Water Resources Management Plan
P8 Water Quality Monitoring Results

		WATER QUALITY PARAMETERS													
		P 0%	P 10%	P 30%	P 50%	P 80%	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
Concentration in the inflow (PPM)	Minimum	0.121	0.783	0.193	0.129	0.229	1.136	0.035	0.195	0.002	0.002	0.011	0.069	2.873	0.402
	Mean	0.948	14.957	14.219	13.830	27.197	47.620	0.324	1.544	0.016	0.038	0.089	1.283	60.771	8.890
	Maximum	1.000	17.185	17.185	17.185	34.370	85.924	0.479	2.197	0.023	0.064	0.126	2.183	99.983	14.742
Concentration in the outflow (PPM)	Minimum	0.111	0.552	0.081	0.012	0.002	0.242	0.007	0.040	0.000	0.000	0.002	0.014	0.669	0.092
	Mean	0.796	10.083	7.583	6.250	10.684	37.389	0.283	1.366	0.014	0.030	0.079	1.039	50.655	7.380
	Maximum	1.003	16.860	16.860	16.860	33.721	84.301	0.473	2.174	0.023	0.063	0.125	2.147	98.125	14.468
Removal Efficiency on Pond (%)	Minimum	0.175	0.500	0.168	0.031	0.004	14.200	2.800	2.200	2.200	10.700	2.200	10.700	5.700	6.000
	Mean	0.691	38.382	54.922	65.097	73.011	78.589	43.297	36.033	36.033	67.141	36.033	67.141	65.317	66.375
	Maximum	1.000	94.900	99.200	99.900	100.000	98.800	64.800	54.500	54.500	87.200	54.500	87.200	95.800	95.900

City of Shorewood
Comprehensive Water Resources Management Plan
Christmas Lake and Galpin Lake
Watersheds-P8 Results-Model Input

Subwatershed Identification	Index Number	Area (acres)	Impervious Fraction	Pervious CN	Treatment Device Number	Infiltration Rate (in/hour)	Flows to Number	Area of Pond (acres)			Storage at HWL (acre feet)	Peak Discharge Rate (cfs)
								Bottom	NWL	HWL		
CL1	1	10.6	0.243	68	1		3	0.3	1.0	3.3	30.0	14.1
CL1A	22	47	0.240	68	22		3	3.5	4.1	6.9	19.9	4.0
CL1B	23	11.1	0.240	68	23		3	0.2	0.4	1.3	1.3	6.5
CL2	2	50	0.353	61	2		3	8.6	9.8	11.1	44.9	3.9
CL3	3	356.6	0.670	61	3		4	239.0	254.0	269.0	1016.0	15.8
CL4	4	8.2	0.225	61	4		out	---	0.8	4.0	18.3	14.0
CL5	5	15.9	0.300	61	5		6	---	0.4	1.3	1.8	22.4
CL6	6	23.7	0.434	61	6		out	---	---	---	---	---
CL7*	7	267.9	0.250	61	7		out	---	---	---	---	---
GL1	8	32.6	0.327	61	8		9	0.5	0.8	0.9	0.5	76.8
GL2	9	49.1	0.230	61	9		out	1.0	2.2	9.3	27.2	7.5
GL3	10	36	0.283	61	10		11	2.3	3.8	4.8	11.3	10.6
GL4	11	25.9	0.434	61	11		13	0.5	1.0	3.8	10.9	24.8
GL5	12	5.8	0.380	68	12		13	0.9	2.6	3.8	9.9	0.5
GL6	13	28.2	0.488	61	13		out	---	0.2	1.4	4.9	22.5
GL7	14	43.8	0.380	61	14		out	---	---	---	---	---
GL9	16	8.5	0.250	61	16		17	0.7	1.1	1.9	12.2	4.9
GL10	17	46.8	0.434	61	17		out	---	---	---	---	---
GL11*	18	49.7	0.407	61	18		11	---	---	---	---	---
GL12*	19	34.1	0.380	61	19		10	---	---	---	---	---
GL13*	20	34	0.407	61	20		9	---	---	---	---	---
GL14*	21	19.6	0.327	61	21		8	---	---	---	---	---

* CL 7 represents the area in Chanhassen tributary to Christmas Lake. Subwatershed parameters were assumed.

Note: Storage is the flood pool available to 100 year HWL. Peak Discharge is the 100 year basin outflow.

* Subwatershed areas outside City boundaries tributary to City of Shorewood.

City of Shorewood
Comprehensive Water Resources Management Plan
Christmas Lake and Galpin Lake
Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	CB1	0.175	0.818	0.247	0.061	0.009
2	CB2	0.529	3.792	1.401	0.541	0.104
3	CB3	0.669	5.45	2.17	1.077	0.248
4	CB4	0.839	10.392	4.599	1.313	0.273
5	CB5	1	15.508	9.76	3.769	0.893
6	CB6	0.468	2.606	0.889	0.249	0.04
7	CB7	0.917	8.393	4.118	1.914	0.426
8	CB8	0.419	2.455	0.307	0.037	0.004
9	CB9	1	13.114	5.053	1.241	0.245
10	CB10	0.434	2.618	0.326	0.04	0.005
11	CB11	0.998	11.091	2.239	0.249	0.025
12	CB12	1	4.131	0.442	0.078	0.015
13	CB13	1	4.018	0.416	0.074	0.014
14	CB14	0.43	2.069	0.224	0.033	0.005
15	CB15	0.646	4.404	1.89	0.875	0.19
16	CB16	1	16.849	16.849	16.849	33.698
17	CB17	0.999	15.503	9.329	3.378	0.802
18	LW1	0.999	14.668	10.971	6.91	2.562
19	LW2	0.208	1.235	0.168	0.031	0.004
20	SAB1	0.54	3.639	1.445	0.619	0.123
21	SAB2	0.433	2.563	0.691	0.169	0.026
22	SAB3	0.429	2.805	0.673	0.165	0.025
23	SAB4	1	16.849	16.849	16.849	33.698
25	OVERALL	0.441	3.503	1.98	1.761	3.4

City of Shorewood
Comprehensive Water Resources Management Plan
Christmas Lake and Galpin Lake
Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	CL1	83.7	27.3	20.1	20.1	54.8	20.1	54.8	67.8	69
2	CL2	97.2	63.2	53.2	53.2	85.8	53.2	85.8	92.1	92.6
3	CL3	97.5	62.7	52.6	52.6	85.7	52.6	85.7	92.5	93
4	CL4	38.9	7	4.9	4.9	19.4	4.9	19.4	19.4	20.7
5	CL5	78.3	42.6	35.9	35.9	69.2	35.9	69.2	56.7	58.9
6	CL6	0	0	0	0	0	0	0	0	0
7	CL7	0	0	0	0	0	0	0	0	0
8	GL1	74.1	38.3	32.2	32.2	65.5	32.2	65.5	52.1	54
9	GL2	85	46.3	37.9	37.9	71.6	37.9	71.6	71	72.4
10	GL3	94.4	60.1	50.6	50.6	83.4	50.6	83.4	86.7	87.5
11	GL4	72.8	34.2	28	28	62	28	62	52	53.7
12	GL5	98.5	64.6	54.4	54.4	87	54.4	87	95.2	95.4
13	GL6	42.9	12.6	9.9	9.9	32.4	9.9	32.4	21.6	22.9
14	GL7	98.1	64.2	54.1	54.1	86.7	54.1	86.7	94.1	94.4
16	GL9	96.9	62.9	53	53	85.6	53	85.6	92.1	92.5
17	GL10	0	0	0	0	0	0	0	0	0
18	GL11	0	0	0	0	0	0	0	0	0
19	GL12	0	0	0	0	0	0	0	0	0
20	GL13	0	0	0	0	0	0	0	0	0
21	GL14	0	0	0	0	0	0	0	0	0
22	CL1A	96.8	62.7	52.8	52.8	85.5	52.8	85.5	91.6	92.1
23	CL1B	88.5	53.7	45.2	45.2	78.1	45.2	78.1	77.5	78.3
25	OVERALL	88.6	56.4	47.5	47.5	78.3	47.5	78.3	81.8	82.5

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Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	CL1	0.784	5.117	3.332	2.788	5.272
2	CL2	1	16.849	16.849	16.849	33.699
3	CL3	0.938	15.328	15.2	15.175	30.337
4	CL4	0.121	0.783	0.193	0.129	0.229
5	CL5	1	16.849	16.849	16.849	33.699
6	CL6	1	15.505	12.913	11.84	23.088
7	CL7	1	16.849	16.849	16.849	33.699
8	GL1	1	16.849	16.849	16.849	33.698
9	GL2	0.998	15.261	12.47	10.844	20.582
10	GL3	1	16.848	16.848	16.848	33.696
11	GL4	0.794	11.125	10.033	9.783	19.427
12	GL5	1	16.829	16.829	16.829	33.659
13	GL6	0.789	9.597	6.242	4.398	6.807
14	GL7	1	16.849	16.849	16.849	33.699
16	GL9	1	16.849	16.849	16.849	33.699
17	GL10	0.925	15.379	15.293	15.267	30.509
18	GL11	1	16.849	16.849	16.849	33.699
19	GL12	1	16.849	16.849	16.849	33.699
20	GL13	1	16.849	16.849	16.849	33.698
21	GL14	1	16.849	16.849	16.849	33.699
22	CL1A	1	16.811	16.811	16.811	33.621
23	CL1B	1	16.811	16.811	16.811	33.621
25	OVERALL	1	16.848	16.848	16.848	33.696

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Christmas Lake and Galpin Lake
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CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	CB1	1.136	0.035	0.195	0.002	0.002	0.011	0.069	2.873	0.402
2	CB2	5.839	0.12	0.645	0.007	0.008	0.037	0.264	13.365	1.878
3	CB3	8.945	0.161	0.851	0.009	0.011	0.049	0.369	19.488	2.746
4	CB4	16.577	0.235	1.197	0.013	0.017	0.069	0.583	36.48	5.15
5	CB5	29.93	0.339	1.657	0.017	0.027	0.095	0.923	58.888	8.448
6	CB6	3.785	0.098	0.539	0.006	0.006	0.031	0.202	9.17	1.286
7	CB7	14.851	0.236	1.226	0.013	0.017	0.07	0.563	30.947	4.395
8	CB8	2.803	0.084	0.469	0.005	0.005	0.027	0.168	7.827	1.072
9	CB9	19.653	0.28	1.426	0.015	0.02	0.082	0.692	44.734	6.28
10	CB10	2.989	0.088	0.488	0.005	0.005	0.028	0.176	8.326	1.14
11	CB11	13.604	0.243	1.284	0.013	0.016	0.074	0.556	35.039	4.825
12	CB12	4.665	0.188	1.072	0.011	0.01	0.061	0.355	13.554	1.859
13	CB13	4.523	0.187	1.068	0.011	0.01	0.061	0.352	13.21	1.812
14	CB14	2.332	0.083	0.468	0.005	0.005	0.027	0.16	6.677	0.915
15	CB15	7.359	0.147	0.792	0.008	0.01	0.045	0.327	16.073	2.272
16	CB16	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
17	CB17	29.012	0.334	1.636	0.017	0.026	0.094	0.903	58.07	8.311
18	LW1	35.111	0.361	1.74	0.018	0.031	0.1	1.04	60.851	8.817
19	LW2	1.438	0.042	0.234	0.002	0.002	0.013	0.084	3.957	0.543
20	SAB1	5.826	0.121	0.655	0.007	0.008	0.038	0.266	13.069	1.842
21	SAB2	3.449	0.09	0.498	0.005	0.005	0.029	0.186	8.701	1.211
22	SAB3	3.667	0.091	0.499	0.005	0.006	0.029	0.19	9.336	1.295
23	SAB4	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458

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CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	CB1	1	16.612	16.612	16.612	33.225
2	CB2	0.83	13.174	13.056	13.018	26.013
3	CB3	1	16.849	16.849	16.849	33.699
4	CB4	0.839	11.908	10.746	10.347	20.098
5	CB5	1	16.849	16.849	16.849	33.699
6	CB6	1	16.849	16.849	16.849	33.699
7	CB7	1	16.849	16.849	16.849	33.699
8	CB8	0.872	11.442	7.421	5.031	7.99
9	CB9	1	16.849	16.849	16.849	33.699
10	CB10	0.472	3.546	1.101	0.623	1.046
11	CB11	0.999	15.729	10.592	5.642	6.329
12	CB12	1	16.849	16.849	16.849	33.699
13	CB13	1	6.333	3.297	2.998	5.879
14	CB14	0.539	4.299	2.024	1.73	3.38
15	CB15	1	16.849	16.849	16.849	33.699
16	CB16	1	16.849	16.849	16.849	33.699
17	CB17	1	16.849	16.849	16.849	33.699
18	LW1	1	16.849	16.849	16.849	33.699
19	LW2	1	16.221	15.157	13.987	24.733
20	SAB1	1	16.849	16.849	16.849	33.699
21	SAB2	1	16.847	16.847	16.847	33.695
22	SAB3	1	16.849	16.849	16.849	33.699
23	SAB4	1	16.849	16.849	16.849	33.699
25	OVERALL	1	16.831	16.831	16.831	33.662

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CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	CL1	2.67	0.111	0.636	0.007	0.006	0.036	0.209	7.418	1.029
2	CL2	1.344	0.036	0.2	0.002	0.002	0.11	0.074	3.556	0.49
3	CL3	0.773	0.023	0.129	0.001	0.001	0.007	0.046	2.149	0.294
4	CL4	0.814	0.024	0.135	0.001	0.001	0.008	0.048	2.248	0.308
5	CL5	18.277	0.271	1.393	0.015	0.019	0.08	0.661	42.43	5.937
6	CL6	63.346	0.409	1.926	0.02	0.049	0.11	1.675	80.436	11.759
7	CL7	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
8	GL1	21.755	0.291	1.469	0.015	0.022	0.084	0.739	46.795	6.624
9	GL2	8.8	0.196	1.061	0.011	0.012	0.061	0.42	22.058	3.064
10	GL3	4.312	0.108	0.596	0.006	0.007	0.034	0.225	11.076	1.534
11	GL4	13.68	0.205	1.054	0.011	0.015	0.06	0.499	29.259	4.144
12	GL5	0.896	0.024	0.136	0.001	0.001	0.008	0.05	2.25	0.311
13	GL6	15.433	0.22	1.121	0.012	0.016	0.064	0.545	32.797	4.656
14	GL7	0.242	0.007	0.04	0	0	0.002	0.014	0.669	0.092
16	GL9	1.9	0.045	0.246	0.003	0.003	0.014	0.095	4.573	0.639
17	GL10	76.447	0.432	1.991	0.021	0.057	0.114	1.951	89.207	13.15
18	GL11	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
19	GL12	84.244	0.473	2.173	0.023	0.063	0.125	2.145	98.059	14.458
20	GL13	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
21	GL14	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
22	CL1A	2.692	0.127	0.731	0.008	0.007	0.042	0.234	7.76	1.075
23	CL1B	9.703	0.212	1.148	0.012	0.013	0.066	0.457	21.99	3.117
25	OVERALL	9.976	0.106	0.536	0.006	0.009	0.031	0.317	16.217	2.326

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Watersheds-P8 Results

Subwatershed Identification	Index Number	Area (acres)	Impervious Fraction	Pervious CN	Treatment Device Number	Infiltration Rate (in/hour)	Flows to Number	Area of Pond (acres)			Storage at HWL (acre-feet)	Peak Discharge Rate (cfs)
								Bottom	NWL	HWL		
CB 1	1	7.5	0.188	71	1		2	0.1	1.4	3.5	16	1.2
CB 2	2	24.9	0.215	71	2		4	0.5	0.8	3.2	7.9	6.8
CB 3	3	15.2	0.515	61	3		4	0.5	0.7	1.4	7	4.1
CB 4	4	38.0	0.569	61	4		8	---	0.3	4.3	2.7	10
CB 5	5	13.3	0.300	66	5		8	---	0.1	3.0	9	12.4
CB 6	6	10.5	0.407	61	6		8	0.2	1.1	2.5	9.7	2.2
CB 7*	7	26.3	0.325	61	7		8	0.2	0.4	2.4	17.2	8.4
CB 8	8	48.8	0.325	61	8		10	8.1	9.6	11.9	67.6	6.5
CB 9	9	14.3	0.325	61	9		10	---	0.3	1.9	7.1	12.4
CB 10	10	6.1	0.380	61	10		14	0.6	1.0	1.9	11.3	9.3
CB 11	11	1.5	0.200	61	11		14	---	0.2	0.2	0.1	3.6
CB 12*	12	17.2	0.300	61	12		13	---	1.4	2.4	12.7	8.2
CB 13	13	3.4	0.321	71	13		14	---	0.3	1.5	4.8	5.9
CB 14	14	23.0	0.407	61	14		out	2.4	3.8	5.5	23.1	25.2
CB 15	15	4.9	0.407	61	15		out	0.1	0.3	1.1	5.8	2.8
CB 16	16	16.5	0.461	61	16		out	---	---	---	---	---
CB 17	17	4.6	0.325	61	17		11	---	0.0	0.8	0.8	4.9
LW 1	18	39.3	0.300	61	18		19	0.1	0.1	1.1	3.3	36.6
LW 2	19	71.7	0.407	61	19		out	15.8	17.9	20.3	87.9	3
SAB 1	20	15.1	0.250	61	20		out	.	0.6	1.3	6.5	6.9
SAB 2	21	16.9	0.300	67	21		out	0.5	1.2	4.0	6.6	1.4
SAB 3	22	38.7	0.407	61	22		out	2.2	3.3	3.8	7.4	5.8
SAB 4	23	21.3	0.488	61	23		out	---	---	---	---	---

* CB 7 and CB 12 account for the areas in Deephaven that drain into Shorewood.

Note: Storage is the flood pool available to 100 year HWL. Peak Discharge is the 100 year basin outflow.

City of Shorewood
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PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	CB1	0	94.2	98.5	99.6	100
2	CB2	0	69.2	89.3	95.8	99.6
3	CB3	0	65	87.1	93.6	99.3
4	CB4	0	12.7	57.2	87.3	98.6
5	CB5	0	8	42.1	77.6	97.3
6	CB6	0	83.7	94.7	98.5	99.9
7	CB7	0	49.8	75.6	88.6	98.7
8	CB8	0	73.8	95.9	99.3	100
9	CB9	0	22.2	70	92.6	99.3
10	CB10	0	24.9	70.4	93.6	99.6
11	CB11	0	29.5	78.8	95.6	99.6
12	CB12	0	75.5	97.4	99.5	100
13	CB13	0	36.5	87.4	97.5	99.8
14	CB14	0	49.3	88.9	98.1	99.9
15	CB15	0	72.7	88.8	94.8	99.4
16	CB16	0	0	0	0	0
17	CB17	0	8	44.6	79.9	97.6
18	LW1	0	12.9	34.8	59	92.4
19	LW2	0	85.9	98.9	99.8	100
20	SAB1	0	76.6	91.4	96.3	99.6
21	SAB2	0	83.1	95.9	99	99.9
22	SAB3	0	80	96	99	99.9
23	SAB4	0	0	0	0	0
25	OVERALL	0	75.4	88.2	89.5	89.9

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PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	CB1	98.5	64.3	54.1	54.1	86.8	54.1	86.8	95.3	95.4
2	CB2	90.7	54.9	45.9	45.9	79.4	45.9	79.4	80.9	81.8
3	CB3	88.8	54.3	45.7	45.7	78.5	45.7	78.5	78.3	79.3
4	CB4	68.8	30.6	25.1	25.1	58.5	25.1	58.5	43.9	46
5	CB5	64.5	28.2	23.8	23.8	57	23.8	57	39.9	41.6
6	CB6	95.3	61.2	51.5	51.5	84.2	51.5	84.2	89.4	89.9
7	CB7	82.3	47.3	39.8	39.8	72.7	39.8	72.7	68.1	69.3
8	CB8	89.5	44.4	35	35	68.7	35	68.7	79.8	80.7
9	CB9	76.7	40.8	34.4	34.4	67.7	34.4	67.7	54.4	56.6
10	CB10	52	12.9	9.3	9.3	28.4	9.3	28.4	33.7	35.2
11	CB11	64.5	31.9	25.6	25.6	50	25.6	50	45.9	48.3
12	CB12	94.5	60.2	50.7	50.7	83.5	50.7	83.5	86.2	87.1
13	CB13	75.6	21.2	15.4	15.4	47.2	15.4	47.2	53.2	55.2
14	CB14	78.6	25.6	19	19	51.6	19	51.6	60.6	62.1
15	CB15	91	56.6	47.7	47.7	80.4	47.7	80.4	82.5	83.2
16	CB16	0	0	0	0	0	0	0	0	0
17	CB17	65.6	29.3	24.7	24.7	57.9	24.7	57.9	40.8	42.5
18	LW1	58.3	23.6	19.8	19.8	51.5	19.8	51.5	37.9	39
19	LW2	96.4	60.3	50.2	50.2	83.2	50.2	83.2	90.7	91.3
20	SAB1	92.7	58.4	49.2	49.2	81.9	49.2	81.9	85.1	85.7
21	SAB2	95.6	61.4	51.7	51.7	84.4	51.7	84.4	89.4	90
22	SAB3	95	60.8	51.2	51.2	83.9	51.2	83.9	88	88.7
23	SAB4	0	0	0	0	0	0	0	0	0
25	OVERALL	86.6	55.9	47.1	47.1	76.5	47.1	76.5	81.2	81.8

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CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	CB1	1	16.612	16.612	16.612	33.225
2	CB2	0.83	13.174	13.056	13.018	26.013
3	CB3	1	16.849	16.849	16.849	33.699
4	CB4	0.839	11.908	10.746	10.347	20.098
5	CB5	1	16.849	16.849	16.849	33.699
6	CB6	1	16.849	16.849	16.849	33.699
7	CB7	1	16.849	16.849	16.849	33.699
8	CB8	0.872	11.442	7.421	5.031	7.99
9	CB9	1	16.849	16.849	16.849	33.699
10	CB10	0.472	3.546	1.101	0.623	1.046
11	CB11	0.999	15.729	10.592	5.642	6.329
12	CB12	1	16.849	16.849	16.849	33.699
13	CB13	1	6.333	3.297	2.998	5.879
14	CB14	0.539	4.299	2.024	1.73	3.38
15	CB15	1	16.849	16.849	16.849	33.699
16	CB16	1	16.849	16.849	16.849	33.699
17	CB17	1	16.849	16.849	16.849	33.699
18	LW1	1	16.849	16.849	16.849	33.699
19	LW2	1	16.221	15.157	13.987	24.733
20	SAB1	1	16.849	16.849	16.849	33.699
21	SAB2	1	16.847	16.847	16.847	33.695
22	SAB3	1	16.849	16.849	16.849	33.699
23	SAB4	1	16.849	16.849	16.849	33.699
25	OVERALL	1	16.831	16.831	16.831	33.662

City of Shorewood
Comprehensive Water Resources Management Plan
Carson Bay, Lake William, and St. Albans Bay
Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	CB1	1.136	0.035	0.195	0.002	0.002	0.011	0.069	2.873	0.402
2	CB2	5.839	0.12	0.645	0.007	0.008	0.037	0.264	13.365	1.878
3	CB3	8.945	0.161	0.851	0.009	0.011	0.049	0.369	19.488	2.746
4	CB4	16.577	0.235	1.197	0.013	0.017	0.069	0.583	36.48	5.15
5	CB5	29.93	0.339	1.657	0.017	0.027	0.095	0.923	58.888	8.448
6	CB6	3.785	0.098	0.539	0.006	0.006	0.031	0.202	9.17	1.286
7	CB7	14.851	0.236	1.226	0.013	0.017	0.07	0.563	30.947	4.395
8	CB8	2.803	0.084	0.469	0.005	0.005	0.027	0.168	7.827	1.072
9	CB9	19.653	0.28	1.426	0.015	0.02	0.082	0.692	44.734	6.28
10	CB10	2.989	0.088	0.488	0.005	0.005	0.028	0.176	8.326	1.14
11	CB11	13.604	0.243	1.284	0.013	0.016	0.074	0.556	35.039	4.825
12	CB12	4.665	0.188	1.072	0.011	0.01	0.061	0.355	13.554	1.859
13	CB13	4.523	0.187	1.068	0.011	0.01	0.061	0.352	13.21	1.812
14	CB14	2.332	0.083	0.468	0.005	0.005	0.027	0.16	6.677	0.915
15	CB15	7.359	0.147	0.792	0.008	0.01	0.045	0.327	16.073	2.272
16	CB16	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
17	CB17	29.012	0.334	1.636	0.017	0.026	0.094	0.903	58.07	8.311
18	LW1	35.111	0.361	1.74	0.018	0.031	0.1	1.04	60.851	8.817
19	LW2	1.438	0.042	0.234	0.002	0.002	0.013	0.084	3.957	0.543
20	SAB1	5.826	0.121	0.655	0.007	0.008	0.038	0.266	13.069	1.842
21	SAB2	3.449	0.09	0.498	0.005	0.005	0.029	0.186	8.701	1.211
22	SAB3	3.667	0.091	0.499	0.005	0.006	0.029	0.19	9.336	1.295
23	SAB4	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
25	OVERALL	10.644	0.115	0.597	0.006	0.01	0.034	0.35	15.777	2.268

City of Shorewood
Comprehensive Water Resources Management Plan
Carson Bay, Lake William, and St. Albans Bay
Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	CB1	0.175	0.818	0.247	0.061	0.009
2	CB2	0.529	3.792	1.401	0.541	0.104
3	CB3	0.669	5.45	2.17	1.077	0.248
4	CB4	0.839	10.392	4.599	1.313	0.273
5	CB5	1	15.508	9.76	3.769	0.893
6	CB6	0.468	2.606	0.889	0.249	0.04
7	CB7	0.917	8.393	4.118	1.914	0.426
8	CB8	0.419	2.455	0.307	0.037	0.004
9	CB9	1	13.114	5.053	1.241	0.245
10	CB10	0.434	2.618	0.326	0.04	0.005
11	CB11	0.998	11.091	2.239	0.249	0.025
12	CB12	1	4.131	0.442	0.078	0.015
13	CB13	1	4.018	0.416	0.074	0.014
14	CB14	0.43	2.069	0.224	0.033	0.005
15	CB15	0.646	4.404	1.89	0.875	0.19
16	CB16	1	16.849	16.849	16.849	33.698
17	CB17	0.999	15.503	9.329	3.378	0.802
18	LW1	0.999	14.668	10.971	6.91	2.562
19	LW2	0.208	1.235	0.168	0.031	0.004
20	SAB1	0.54	3.639	1.445	0.619	0.123
21	SAB2	0.433	2.563	0.691	0.169	0.026
22	SAB3	0.429	2.805	0.673	0.165	0.025
23	SAB4	1	16.849	16.849	16.849	33.698
25	OVERALL	0.441	3.503	1.98	1.761	3.4

City of Shorewood
Comprehensive Water Resources Management Plan
Carson Bay, Lake William, and St. Albans Bay
Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	CB1	83.062	0.468	2.156	0.023	0.062	0.124	2.119	96.706	14.259
2	CB2	65.262	0.376	1.739	0.018	0.049	0.1	1.676	76.318	11.248
3	CB3	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
4	CB4	53.099	0.338	1.598	0.017	0.041	0.092	1.404	65.011	9.54
5	CB5	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
6	CB6	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
7	CB7	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
8	CB8	31.885	0.287	1.411	0.015	0.027	0.081	0.935	49.543	7.146
9	CB9	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
10	CB10	6.316	0.108	0.58	0.006	0.008	0.033	0.26	12.834	1.799
11	CB11	38.292	0.357	1.726	0.018	0.033	0.099	1.111	64.789	9.344
12	CB12	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
13	CB13	18.506	0.238	1.263	0.013	0.02	0.072	0.666	28.232	4.048
14	CB14	11.432	0.136	0.711	0.007	0.012	0.041	0.392	18.15	2.59
15	CB15	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
16	CB16	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
17	CB17	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
18	LW1	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
19	LW2	70.098	0.441	2.049	0.021	0.054	0.117	1.827	87.348	12.834
20	SAB1	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
21	SAB2	84.237	0.473	2.173	0.023	0.063	0.125	2.145	98.052	14.457
22	SAB3	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
23	SAB4	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
25	OVERALL	84.156	0.472	2.172	0.023	0.063	0.125	2.144	97.959	14.443

City of Shorewood
Comprehensive Water Resources Management Plan
Purgatory Creek Watersheds-P8 Results

Subwatershed Identification	Index Number	Area (acres)	Impervious Fraction	Pervious CN	Treatment Device Number	Infiltration Rate (in/hour)	Flows to Number	Area of Pond (acres)			Storage at HWL (acre-feet)	Peak Discharge Rate (cfs)
								Bottom	NWL	HWL		
PC1	1	4.9	0.380	61	1		4	0.2	0.4	0.6	1.9	6.9
PC2	2	10.3	0.353	61	2		3	0.1	0.2	3.9	11.8	8.7
PC3	3	18.1	0.380	61	3		5	---	1.0	2.2	3.9	6.1
PC4	4	19.3	0.318	66	4		5	0.5	0.8	0.9	0.9	2.9
PC5	5	20.2	0.311	67	5		6	0.5	1.0	5.9	15.3	7.5
PC6	6	183	0.380	61	6		7	21.6	24.0	27.0	127.5	12.4
PC7	7	16.3	0.327	61	7		11	---	0.0	2.9	11.7	54.3
PC8	8	11.8	0.100	68	8		11	0.4	1.6	5.9	50.7	13.6
PC9	9	26.9	0.380	61	9		10	0.1	0.7	2.1	4.9	6.5
PC10	10	65.9	0.353	61	10		11	0.2	0.5	13.7	65.0	94.1
PC11	11	64.3	0.407	61	11		out	0.5	1.0	13.5	28.7	101.0
PC12	12	3.0	0.380	61	12		out	---	---	---	---	---
PC13	13	10.0	0.380	68	13		out	---	---	---	---	---
PC14*	14	245.7	0.407	61	14		11	---	---	---	---	---
PC15*	15	104.2	0.461	61	15		6	---	---	---	---	---

* Subwatershed PC 14 represents the area in Minnetonka that contributes stormwater to Shorewood. Likewise, subwatershed PC 15 represents the area in Chanhassen that is tributary to Silver Lake.

Note: Storage is the flood pool available to 100 year HWL. Peak Discharge is the 100 year basin outflow.

City of Shorewood
Comprehensive Water Resources Management Plan
Purgatory Creek Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	PC1	0	80.7	93.3	97	99.7
2	PC2	0	54.7	80.3	92.5	99.3
3	PC3	0	32.2	81.1	95.9	99.6
4	PC4	0	64.3	82.8	92.9	99.3
5	PC5	0	49.7	82.5	95.9	99.7
6	PC6	0	76.9	97.5	99.5	100
7	PC7	0	3.4	25.6	63.4	94.7
8	PC8	0	94.9	99.1	99.8	100
9	PC9	0	58	82	94.4	99.5
10	PC10	0	24.1	57.1	84	98.2
11	PC11	0	8.1	40.2	76.1	97.1
12	PC12	0	0	0	0	0
13	PC13	0	0	0	0	0
14	PC14	0	0	0	0	0
15	PC15	0	0	0	0	0
25	OVERALL	0	45.3	71.1	88.3	97.2

City of Shorewood
Comprehensive Water Resources Management Plan
Purgatory Creek Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	PC1	94.1	60.3	50.9	50.9	83.3	50.9	83.3	87.5	88.1
2	PC2	85.2	50.3	42.3	42.3	75.3	42.3	75.3	71.9	73.1
3	PC3	79.6	40.8	33.4	33.4	67.5	33.4	67.5	59.1	61.3
4	PC4	87.5	51.1	42.6	42.6	76.3	42.6	76.3	76.6	77.5
5	PC5	78.8	33.1	25.6	25.6	58.9	25.6	58.9	62.4	63.9
6	PC6	94.6	57.7	48	48	82.1	48	82.1	86.4	87.3
7	PC7	32.9	5	3.6	3.6	18.4	3.6	18.4	13.4	14.4
8	PC8	98.8	64.8	54.5	54.5	87.2	54.5	87.2	95.8	95.9
9	PC9	86.7	51.8	43.6	43.6	76.6	43.6	76.6	74.1	75.2
10	PC10	70.5	32.5	26.7	26.7	60.1	26.7	60.1	49.3	50.9
11	PC11	59.6	22	17.8	17.8	49.4	17.8	49.4	34.8	36.4
12	PC12	0	0	0	0	0	0	0	0	0
13	PC13	0	0	0	0	0	0	0	0	0
14	PC14	0	0	0	0	0	0	0	0	0
15	PC15	0	0	0	0	0	0	0	0	0
25	OVERALL	79.9	45.2	38.1	38.1	70.5	38.1	70.5	64.8	65.9

City of Shorewood
Comprehensive Water Resources Management Plan
Purgatory Creek Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	PC1	1	17.185	17.185	17.185	34.37
2	PC2	1	16.849	16.849	16.849	33.699
3	PC3	0.961	13.637	12.171	11.458	22.132
4	PC4	0.872	13.659	13.252	13.105	26
5	PC5	0.89	9.771	5.998	4.785	8.663
6	PC6	0.962	14.768	14.105	13.957	27.851
7	PC7	0.422	3.064	0.958	0.682	1.24
8	PC8	1	16.74	16.74	16.74	33.48
9	PC9	1	16.849	16.849	16.849	33.699
10	PC10	0.97	13.861	12.633	11.995	23.465
11	PC11	0.716	9.482	7.856	7.253	13.927
12	PC12	1	16.849	16.849	16.849	33.699
13	PC13	1	16.829	16.829	16.829	33.659
14	PC14	1	16.849	16.849	16.849	33.699
15	PC15	1	16.849	16.849	16.849	33.699
25	OVERALL	1	16.851	16.851	16.851	33.701

City of Shorewood
Comprehensive Water Resources Management Plan
Purgatory Creek Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	PC1	85.924	0.479	2.197	0.023	0.064	0.126	2.183	99.983	14.742
2	PC2	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
3	PC3	59.398	0.384	1.817	0.019	0.046	0.104	1.577	73.54	10.786
4	PC4	66.016	0.387	1.797	0.019	0.05	0.103	1.703	78.001	11.485
5	PC5	29.217	0.269	1.348	0.014	0.026	0.077	0.88	43.492	6.267
6	PC6	70.682	0.419	1.952	0.02	0.054	0.112	1.831	83.82	12.333
7	PC7	5.944	0.096	0.518	0.005	0.007	0.03	0.239	11.403	1.601
8	PC8	83.7	0.471	2.165	0.023	0.063	0.124	2.133	97.436	14.366
9	PC9	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
10	PC10	61.954	0.393	1.855	0.019	0.048	0.106	1.636	75.827	11.132
11	PC11	38.518	0.267	1.277	0.013	0.031	0.073	1.046	49.199	7.191
12	PC12	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
13	PC13	84.147	0.472	2.172	0.023	0.063	0.125	2.143	97.948	14.442
14	PC14	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
15	PC15	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
25	OVERALL	84.253	0.473	2.173	0.023	0.063	0.125	2.146	98.069	14.46

City of Shorewood
Comprehensive Water Resources Management Plan
Purgatory Creek Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	PC1	0.44	2.929	1.153	0.514	0.105
2	PC2	0.886	7.56	3.323	1.261	0.251
3	PC3	0.961	9.239	2.303	0.469	0.089
4	PC4	0.709	4.86	2.292	0.942	0.181
5	PC5	0.784	4.866	1.05	0.197	0.028
6	PC6	0.4	2.543	0.357	0.07	0.012
7	PC7	0.42	2.958	0.714	0.249	0.066
8	PC8	0.111	0.552	0.152	0.037	0.006
9	PC9	0.902	7.058	3.035	0.945	0.169
10	PC10	0.956	10.51	5.42	1.916	0.413
11	PC11	0.708	8.698	4.696	1.734	0.411
12	PC12	0.999	16.848	16.848	16.848	33.697
13	PC13	1	16.829	16.829	16.829	33.658
14	PC14	1	16.849	16.849	16.849	33.698
15	PC15	1	16.849	16.849	16.849	33.698
25	OVERALL	0.713	8.827	4.888	1.973	0.938

City of Shorewood
Comprehensive Water Resources Management Plan
Purgatory Creek Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	PC1	4.701	0.099	0.533	0.006	0.006	0.031	0.216	10.529	1.484
2	PC2	12.394	0.217	1.142	0.012	0.015	0.065	0.5	27.152	3.838
3	PC3	12.101	0.228	1.21	0.013	0.015	0.069	0.512	30.114	4.172
4	PC4	8.275	0.163	0.875	0.009	0.011	0.05	0.364	17.95	2.546
5	PC5	6.14	0.163	0.9	0.009	0.01	0.052	0.334	16.058	2.222
6	PC6	2.982	0.082	0.455	0.005	0.005	0.026	0.167	8.124	1.114
7	PC7	3.987	0.091	0.498	0.005	0.006	0.029	0.195	9.87	1.369
8	PC8	0.747	0.022	0.124	0.001	0.001	0.007	0.044	1.906	0.266
9	PC9	11.208	0.212	1.131	0.012	0.014	0.065	0.478	25.212	3.56
10	PC10	18.259	0.263	1.346	0.014	0.019	0.077	0.65	38.414	5.462
11	PC11	15.539	0.207	1.043	0.011	0.015	0.06	0.527	32.044	4.565
12	PC12	84.242	0.473	2.172	0.023	0.063	0.125	2.145	98.055	14.458
13	PC13	84.145	0.472	2.171	0.023	0.063	0.124	2.143	97.946	14.441
14	PC14	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
15	PC15	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
25	OVERALL	16.626	0.211	1.061	0.011	0.016	0.061	0.552	33.088	4.721

City of Shorewood
Comprehensive Water Resources Management Plan
West, Lake Virginia, West-Central, Lake Minnewashta, South-Central, Central, and Lake Mary Watersheds-P8 Results

Subwatershed Identification	Index Number	Area (acres)	Impervious Fraction	Pervious CN	Treatment Device Number	Infiltration Rate (in/hour)	Flows to Number	Area of Pond (acres)			Storage at HWL (acre-feet)	Peak Discharge Rate (cfs)
								Bottom	NWL	HWL		
W1	1	62.1	0.250	61	1		3	1.0	4.5	6.5	13.2	16.9
W2	2	21.6	0.120	61	2		3	1.0	3.0	4.2	3.6	21.8
(1) W3	3	64.9	0.200	61	3		out	---	---	---	---	---
LV1	4	22.1	0.200	71	4		5	0.5	0.7	4.7	11.3	19.3
(1) LV2	5	116.6	0.235	70	5		out	---	---	---	---	---
WC1	6	49.6	0.200	71	6		7	3.0	5.0	6.4	3.5	16.9
WC2	7	106.6	0.250	74	7		8	---	0.0	1.5	4.1	18.5
WC3	8	44.5	0.120	74	8		9	---	0.0	1.0	1.5	92.7
WC4	9	106.5	0.220	69	9		11	0.5	1.0	10.2	5.2	145.4
WC5	10	50.8	0.160	74	10		8	0.0	0.0	9.5	5.6	5.4
WC6	11	316.4	0.226	70	11		out	59.7	77.7	113.7	164.6	20.2
(1) WC7	12	69.3	0.147	60	12		out	---	---	---	---	---
C1	13	137.1	0.225	61	13		16	2.0	10.1	20.3	30.4	9.9
C2	14	10.1	0.300	67	14		13	---	1.0	1.7	2.3	2.0
LMAR 1	15	32.7	0.250	61	15		16	2.0	2.3	3.2	24.8	3.6
LMAR 2	16	61.8	0.334	61	16		out	6.9	11.7	16.4	54.8	6.0
SC1	17	6.2	0.310	68	17		18	---	0.7	1.5	5.9	2.8
SC2	18	37.7	0.310	61	18		out	4.9	5.8	8.1	56.5	7.4
(2) SC3	19	28.0	0.327	61	19		18	---	---	---	---	---
LMIN1	20	26.0	0.253	68	20		out	---	0.0	7.4	26.9	42.5
LMIN2	21	16.7	0.353	61	21		out	---	0.0	0.7	2.5	59.5
LMIN3	22	6.7	0.327	61	22		out	---	0.1	0.2	0.5	11.0
LMIN4	23	18.4	0.320	61	23		out	---	0.0	3.5	2.3	24.0

Note: Storage is the flood pool available to 100 year HWL. Peak Discharge is the 100 year basin outflow.

City of Shorewood
Comprehensive Water Resources Management Plan
West, Lake Virginia, West-Central, Lake Minnewashta, South-Central, Central, and Lake Mary Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	W1	0	85.9	97.4	99.5	100
2	W2	0	94	99.2	99.8	100
3	W3	0	0	0	0	0
4	LV1	0	49.5	81	95.5	99.6
5	LV2	0	0	0	0	0
6	WC1	0	87	96.7	99.4	99.9
7	WC2	0	3.4	25.2	62.6	94.5
8	WC3	0	0.5	4.3	18.2	69.7
9	WC4	0	26	66.1	90	99
10	WC5	0	7.5	44.6	80.1	97.6
11	WC6	0	88.6	99.2	99.9	100
12	WC7	0	0	0	0	0
13	C1	0	86.7	97.7	99.5	100
14	C2	0	70.3	96.5	99.4	99.9
15	LMAR1	0	82.4	96.7	99.1	99.9
16	LMAR2	0	80	97.8	99.6	100
17	SC1	0	68.7	96.2	99.3	99.9
18	SC2	0	81.7	97.2	99.4	100
19	SC3	0	0	0	0	0
20	LMIN1	0	1.3	11.7	39	86.1
21	LMIN2	0	0.6	5.7	20.7	68.9
22	LMIN3	0	11.9	51.4	83.7	98.1
23	LMIN4	0	5.1	34.8	72.8	96.4
25	OVERALL	0	69.8	78.5	80.9	83.4

City of Shorewood
Comprehensive Water Resources Management Plan
West, Lake Virginia, West-Central, Lake Minnewashta, South-Central, Central, and Lake Mary Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	W1	96.5	62.5	52.6	52.6	85.3	52.6	85.3	91.1	91.6
2	W2	98.6	64.7	54.5	54.5	87.1	54.5	87.1	95.4	95.6
3	W3	0	0	0	0	0	0	0	0	0
4	LV1	85	49.4	41.5	41.5	74.9	41.5	74.9	69.9	71.4
5	LV2	0	0	0	0	0	0	0	0	0
6	WC1	96.6	61.9	52	52	85	52	85	91.4	91.8
7	WC2	55.5	18.2	14.9	14.9	47.4	14.9	47.4	31.4	32.5
8	WC3	14.2	2.8	2.2	2.2	10.7	2.2	10.7	5.7	6
9	WC4	66.3	31.9	25.8	25.8	53.5	25.8	53.5	46.1	48.1
10	WC5	65.5	28.1	23.4	23.4	57	23.4	57	40.5	42.2
11	WC6	96.6	53.1	42.7	42.7	78.8	42.7	78.8	91	91.4
12	WC7	0	0	0	0	0	0	0	0	0
13	C1	96.7	60.9	50.9	50.9	84.5	50.9	84.5	91.4	91.8
14	C2	93.2	58.8	49.5	49.5	82.4	49.5	82.4	83.5	84.7
15	LMAR1	95.6	61.5	51.8	51.8	84.5	51.8	84.5	89.3	89.9
16	LMAR2	94.8	49.9	39.8	39.8	77.4	39.8	77.4	86.7	87.4
17	SC1	92.8	58.4	49.1	49.1	82	49.1	82	82.7	83.9
18	SC2	95.6	59.8	50	50	83.6	50	83.6	88.9	89.5
19	SC3	0	0	0	0	0	0	0	0	0
20	LMIN1	44.9	11.5	9.7	9.7	39.6	9.7	39.6	24.4	25
21	LMIN2	33	6	5	5	29.1	5	29.1	17.5	17.8
22	LMIN3	68.6	32.5	27.3	27.3	60.6	27.3	60.6	44.5	46.3
23	LMIN4	61.1	24.9	21	21	54	21	54	36.4	37.8
25	OVERALL	79.2	50.3	42.3	42.3	69.8	42.3	69.8	74.3	74.7

City of Shorewood
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CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	W1	1	16.849	16.849	16.849	33.699
2	W2	1	16.849	16.849	16.849	33.698
3	W3	0.638	8.171	7.264	7.08	14.073
4	LV1	1	16.338	16.338	16.338	32.677
5	LV2	1	15.425	14.7	14.366	28.546
6	WC1	1	16.338	16.338	16.338	32.677
7	WC2	0.899	12.164	11.743	11.628	23.208
8	WC3	0.926	12.406	9.342	5.277	4.364
9	WC4	0.948	13.665	11.293	8.078	11.062
10	WC5	1	15.042	15.042	15.042	30.084
11	WC6	0.968	13.233	9.984	8.424	16.066
12	WC7	1	16.849	16.849	16.849	33.699
13	C1	1	15.789	15.395	15.352	30.686
14	C2	1	16.847	16.847	16.847	33.695
15	LMAR1	1	16.849	16.849	16.849	33.699
16	LMAR2	0.596	6.872	5.815	5.605	11.104
17	SC1	1	16.822	16.822	16.822	33.644
18	SC2	1	15.869	15.478	15.435	30.851
19	SC3	1	16.849	16.849	16.849	33.699
20	LMIN1	1	16.813	16.813	16.813	33.626
21	LMIN2	1	16.849	16.849	16.849	33.699
22	LMIN3	1	16.849	16.849	16.849	33.698
23	LMIN4	1	16.849	16.849	16.849	33.699
25	OVERALL	1	16.548	16.548	16.548	33.096

City of Shorewood
Comprehensive Water Resources Management Plan
West, Lake Virginia, West-Central, Lake Minnewashta, South-Central, Central, and Lake Mary Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	W1	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
2	W2	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
3	W3	36.588	0.241	1.153	0.012	0.029	0.066	0.983	44.729	6.56
4	LV1	81.692	0.463	2.136	0.022	0.061	0.122	2.088	95.136	14.027
5	LV2	73.036	0.435	2.027	0.021	0.056	0.116	1.893	87.056	12.808
6	WC1	81.692	0.463	2.136	0.022	0.061	0.122	2.088	95.136	14.027
7	WC2	58.743	0.364	1.716	0.018	0.045	0.098	1.546	69.593	10.245
8	WC3	31.389	0.315	1.538	0.016	0.028	0.088	0.938	52.626	7.631
9	WC4	44.098	0.356	1.703	0.018	0.036	0.098	1.229	64.063	9.346
10	WC5	75.209	0.439	2.043	0.021	0.057	0.117	1.942	87.711	12.933
11	WC6	47.708	0.35	1.689	0.018	0.039	0.097	1.316	64.46	9.377
12	WC7	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
13	C1	77.222	0.448	2.077	0.022	0.058	0.119	1.987	90.735	13.363
14	C2	84.237	0.473	2.173	0.023	0.063	0.125	2.145	98.052	14.457
15	LMAR1	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
16	LMAR2	29.396	0.208	1.012	0.011	0.024	0.058	0.81	36.722	5.374
17	SC1	84.11	0.472	2.171	0.023	0.063	0.124	2.142	97.906	14.436
18	SC2	77.633	0.449	2.083	0.022	0.059	0.119	1.997	91.201	13.432
19	SC3	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
20	LMIN1	84.066	0.472	2.171	0.023	0.063	0.124	2.141	97.856	14.428
21	LMIN2	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
22	LMIN3	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
23	LMIN4	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
25	OVERALL	82.739	0.467	2.151	0.023	0.062	0.123	2.112	96.335	14.204

City of Shorewood
Comprehensive Water Resources Management Plan
West, Lake Virginia, West-Central, Lake Minnewashta, South-Central, Central, and Lake Mary Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	W1	0.422	2.175	0.44	0.09	0.013
2	W2	0.124	0.625	0.142	0.032	0.005
3	W3	0.638	8.171	7.264	7.08	14.073
4	LV1	0.998	8.249	3.103	0.729	0.14
5	LV2	1	15.425	14.7	14.366	28.546
6	WC1	0.618	2.131	0.536	0.1	0.016
7	WC2	0.899	11.752	8.78	4.35	1.278
8	WC3	0.926	12.336	8.931	4.316	1.319
9	WC4	0.939	10.104	3.825	0.81	0.108
10	WC5	0.99	13.781	8.257	2.968	0.725
11	WC6	0.175	0.827	0.081	0.012	0.002
12	WC7	1	16.849	16.849	16.849	33.698
13	C1	0.419	1.939	0.361	0.07	0.011
14	C2	1	4.999	0.586	0.108	0.021
15	LMAR1	0.313	2.126	0.555	0.154	0.024
16	LMAR2	0.234	1.11	0.129	0.022	0.004
17	SC1	0.999	5.258	0.635	0.12	0.024
18	SC2	0.341	2.12	0.432	0.098	0.014
19	SC3	1	16.849	16.849	16.849	33.698
20	LMIN1	1	16.589	14.84	10.259	4.664
21	LMIN2	1.003	16.797	15.947	13.411	10.52
22	LMIN3	1	14.853	8.186	2.753	0.641
23	LMIN4	1	15.992	10.979	4.587	1.215
25	OVERALL	0.399	4.551	3.575	3.173	5.516

City of Shorewood
Comprehensive Water Resources Management Plan
West, Lake Virginia, West-Central, Lake Minnewashta, South-Central, Central, and Lake Mary Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	W1	2.717	0.084	0.47	0.005	0.005	0.027	0.167	7.254	1.003
2	W2	0.803	0.025	0.138	0.001	0.001	0.008	0.049	2.111	0.293
3	W3	36.588	0.241	1.153	0.012	0.029	0.066	0.983	44.729	6.56
4	LV1	12.221	0.234	1.248	0.013	0.015	0.072	0.524	28.586	4.015
5	LV2	73.036	0.435	2.027	0.021	0.056	0.116	1.893	87.055	12.808
6	WC1	2.783	0.116	0.66	0.007	0.006	0.038	0.217	7.564	1.055
7	WC2	26.16	0.298	1.46	0.015	0.024	0.084	0.813	47.747	6.914
8	WC3	26.902	0.306	1.503	0.016	0.025	0.086	0.837	49.587	7.169
9	WC4	14.847	0.241	1.255	0.013	0.017	0.072	0.569	34.515	4.844
10	WC5	25.731	0.313	1.551	0.016	0.024	0.089	0.827	51.724	7.403
11	WC6	0.922	0.034	0.19	0.002	0.002	0.011	0.064	2.661	0.364
12	WC7	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.061	14.458
13	C1	2.38	0.081	0.459	0.005	0.005	0.026	0.158	6.489	0.897
14	C2	5.715	0.195	1.097	0.011	0.011	0.063	0.379	16.148	2.214
15	LMAR1	2.859	0.068	0.369	0.004	0.004	0.021	0.143	7.132	0.991
16	LMAR2	1.265	0.045	0.255	0.003	0.003	0.015	0.087	3.602	0.494
17	SC1	6.037	0.197	1.104	0.012	0.011	0.063	0.386	16.928	2.321
18	SC2	2.666	0.071	0.391	0.004	0.004	0.022	0.145	6.975	0.964
19	SC3	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
20	LMIN1	46.351	0.418	1.96	0.021	0.038	0.112	1.293	74.022	10.829
21	LMIN2	56.675	0.446	2.071	0.022	0.045	0.119	1.526	81.222	11.928
22	LMIN3	26.434	0.319	1.579	0.017	0.025	0.091	0.845	54.437	7.759
23	LMIN4	32.772	0.355	1.717	0.018	0.029	0.098	0.987	62.364	8.987
25	OVERALL	16.815	0.134	0.654	0.007	0.014	0.038	0.478	22.599	3.294

City of Shorewood
Comprehensive Water Resources Management Plan
Gideon Bay, North-Central, and Lake Minnetonka
Watersheds-P8 Results

Subwatershed Identification	Index Number	Area (acres)	Impervious Fraction	Pervious CN	Treatment Device Number	Infiltration Rate (in/hour)	Flows to Number	Area of Pond (acres)			Storage at HWL (acre-feet)	Peak Discharge Rate (cfs)
								Bottom	NWL	HWL		
GB 1	1	16.4	0.353	61	1		2	---	0.5	1.8	2.9	6.0
GB 2	2	27.5	0.460	61	2		4	0.20	0.4	1.3	2.6	28.5
GB 3	3	34.9	0.300	61	3		out	---	0.4	1.2	1.7	17.7
GB 4	4	11.9	0.535	61	4		out	---	---	---	---	---
GB 5	5	13.3	0.120	61	5		6	---	0.0	1.0	0.59	15.7
GB 6	6	24.3	0.120	68	6		7	---	0.1	2.7	6.6	27.8
GB 7	7	29.4	0.380	61	7		out	---	0.7	4.3	15	10.7
GB 8	8	74.7	0.407	61	8		out	---	---	---	---	---
GB 9	9	14.3	0.407	61	9		out	0.50	1.6	3.3	9.7	4.1
GB 10	10	36.5	0.434	61	10		out	---	---	---	---	---
NC 1	11	16.5	0.300	71	11		12	---	0.0	0.8	1.01	37.1
NC 2	12	39.4	0.240	71	12		13	---	0.5	4.0	9.8	7.0
NC 3	13	18.5	0.300	61	13		14	0.05	0.1	0.2	0.52	61.6
NC 4	14	27.9	0.210	68	14		21	0.01	0.0	0.5	0.9	103.4
NC 5	15	20.0	0.310	65	15		21	0.08	0.1	1.3	3.13	24.8
NC 6	16	6.4	0.250	61	16		17	---	0.6	0.8	1	2.1
NC 7	17	12.6	0.310	66	17		20	0.80	2.7	3.2	2.4	12.3
NC 8	18	6.6	0.327	61	18		19	0.58	1.1	2.0	10.9	1.4
NC 9	19	24.8	0.353	61	19		20	3.70	5.0	5.3	16.4	2.5
NC 10	20	47.6	0.380	61	20		out	2.00	3.3	6.0	7	16.7
I1	21	69.3	0.300	72	21		out	---	---	---	---	---
I2	22	20.0	0.300	72	22		out	---	---	---	---	---
I3	23	2.0	0.300	72	23		out	---	---	---	---	---

Note: Storage is the flood pool available to 100 year HWL. Peak Discharge is the 100 year basin outflow.

City of Shorewood
Comprehensive Water Resources Management Plan
Gideon Bay, North-Central, and Lake Minnetonka Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	GB1	0	38.3	84.9	97	99.7
2	GB2	0	32.6	66.5	88.7	98.9
3	GB3	0	50.8	92.9	99.7	100
4	GB4	0	0	0	0	0
5	GB5	0	2	14.4	41.3	86.4
6	GB6	0	8.7	44.1	79.6	97.7
7	GB7	0	37.6	84.3	97	99.7
8	GB8	0	0	0	0	0
9	GB9	0	84.4	94.3	97.5	99.7
10	GB10	0	0	0	0	0
11	NC1	0	2.8	22.2	58.3	93.3
12	NC2	0	29.7	78.7	95.5	99.6
13	NC3	0	5.2	19.2	49.3	90.6
14	NC4	0	0.8	5.6	22.1	73.8
15	NC5	0	23	51	71.1	95.3
16	NC6	0	58.5	93.8	98.8	99.9
17	NC7	0	89.6	96.8	98.8	99.9
18	NC8	0	88.6	97.1	99	99.9
19	NC9	0	87	98.3	99.6	100
20	NC10	0	68.7	93	98.5	99.9
21	NC11	0	0	0	0	0
22	I1	0	0	0	0	0
23	I2	0	0	0	0	0
24	I3	0	0	0	0	0
25	OVERALL	0	25.8	40.9	46.6	50.4

City of Shorewood
Comprehensive Water Resources Management Plan
Gideon Bay, North-Central, and Lake Minnetonka Watersheds-P8 Results

PERCENT REMOVAL EFFICIENCY OF TREATMENT DEVICE
FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	GB1	83.9	48.7	41	41	74.1	41	74.1	65.7	67.8
2	GB2	74.7	36.3	29.7	29.7	63.3	29.7	63.3	55	56.6
3	GB3	88.7	53.8	45.3	45.3	78.3	45.3	78.3	73.6	75.4
4	GB4	0	0	0	0	0	0	0	0	0
5	GB5	46.1	12.8	10.7	10.7	40.7	10.7	40.7	25.5	26.2
6	GB6	60.7	27.4	22.9	22.9	52.4	22.9	52.4	36.6	38.4
7	GB7	80.9	44.5	36.9	36.9	69.6	36.9	69.6	61.9	64.1
8	GB8	0	0	0	0	0	0	0	0	0
9	GB9	95.1	61	51.4	51.4	84	51.4	84	89.5	89.9
10	GB10	0	0	0	0	0	0	0	0	0
11	NC1	54	18.3	15.4	15.4	47.6	15.4	47.6	30.6	31.6
12	NC2	77.1	41.8	34.7	34.7	66.1	34.7	66.1	56.3	58.6
13	NC3	37.7	8.9	6.9	6.9	28.5	6.9	28.5	18.3	19.2
14	NC4	22.3	3.5	2.7	2.7	17	2.7	17	9.2	9.6
15	NC5	67.1	32.1	27	27	59.3	27	59.3	47.9	49.2
16	NC6	90.2	55.5	46.7	46.7	79.7	46.7	79.7	77.3	78.8
17	NC7	96.8	56.7	46.3	46.3	82.1	46.3	82.1	91.9	92.2
18	NC8	96.9	62.9	53	53	85.6	53	85.6	92.3	92.6
19	NC9	96.9	61.9	51.9	51.9	85.1	51.9	85.1	91.7	92.2
20	NC10	91.7	54.4	45.1	45.1	79.5	45.1	79.5	81.4	82.5
21	NC11	0	0	0	0	0	0	0	0	0
22	I1	0	0	0	0	0	0	0	0	0
23	I2	0	0	0	0	0	0	0	0	0
24	I3	0	0	0	0	0	0	0	0	0
25	OVERALL	42.8	25	21	21	37.8	21	37.8	35.6	36.2

City of Shorewood
Comprehensive Water Resources Management Plan
Gideon Bay, North-Central, and Lake Minnetonka Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	GB 1	1	16.849	16.849	16.849	33.699
2	GB 2	1	14.822	12.358	11.719	23.149
3	GB 3	1	16.849	16.849	16.849	33.698
4	GB 4	0.994	11.065	6.19	3.966	6.062
5	GB 5	1	16.849	16.849	16.849	33.699
6	GB 6	1	16.685	15.946	14.349	23.335
7	GB 7	1	16.383	14.563	12.838	24.143
8	GB 8	1	16.849	16.849	16.849	33.699
9	GB 9	1	16.849	16.849	16.849	33.698
10	GB 10	1	16.849	16.849	16.849	33.698
11	NC 1	1	16.547	16.547	16.547	33.095
12	NC 2	1	16.318	15.221	13.175	22.391
13	NC 3	1	12.942	6.961	5.04	9.288
14	NC 4	1	13.283	8.136	5.757	8.227
15	NC 5	1	16.849	16.849	16.849	33.699
16	NC 6	1	16.849	16.849	16.849	33.698
17	NC 7	1	13.986	12.257	12.013	23.918
18	NC 8	1	16.849	16.849	16.849	33.698
19	NC 9	0.848	13.796	13.613	13.552	27.04
20	NC 10	0.624	9.379	8.969	8.871	17.671
21	NC 11	1	15.004	12.348	10.742	17.966
22	I1	1	16.849	16.849	16.849	33.699
23	I2	1	16.849	16.849	16.849	33.699
24	I3	1	16.849	16.849	16.849	33.699
25	OVERALL	1	16.823	16.823	16.823	33.646

City of Shorewood
Comprehensive Water Resources Management Plan
Gideon Bay, North-Central, and Lake Minnetonka Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE INFLOW OF EACH TREATMENT DEVICE FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	GB 1	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
2	GB 2	62.048	0.4	1.894	0.02	0.048	0.109	1.646	77.847	11.383
3	GB 3	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
4	GB 4	27.284	0.29	1.464	0.015	0.025	0.084	0.862	45.454	6.511
5	GB 5	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
6	GB 6	70.315	0.451	2.088	0.022	0.054	0.12	1.832	88.973	13.084
7	GB 7	67.927	0.431	2.011	0.021	0.052	0.115	1.778	86.058	12.615
8	GB 8	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
9	GB 9	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
10	GB 10	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
11	NC 1	82.737	0.467	2.151	0.023	0.062	0.123	2.112	96.333	14.204
12	NC 2	67.106	0.437	2.033	0.021	0.052	0.117	1.76	85.844	12.609
13	NC 3	34.231	0.314	1.559	0.016	0.03	0.089	1.02	54.096	7.744
14	NC 4	35.403	0.328	1.612	0.017	0.031	0.092	1.046	56.254	8.092
15	NC 5	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
16	NC 6	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
17	NC 7	62.173	0.396	1.878	0.02	0.048	0.108	1.649	76.041	11.146
18	NC 8	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
19	NC 9	68	0.389	1.797	0.019	0.051	0.103	1.742	79.649	11.737
20	NC 10	44.89	0.268	1.252	0.013	0.034	0.072	1.166	53.261	7.837
21	NC 11	56.06	0.395	1.874	0.02	0.044	0.107	1.511	74.725	10.911
22	I1	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
23	I2	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
24	I3	84.246	0.473	2.173	0.023	0.063	0.125	2.146	98.062	14.459
25	OVERALL	84.115	0.472	2.171	0.023	0.063	0.124	2.143	97.911	14.436

City of Shorewood
Comprehensive Water Resources Management Plan
Gideon Bay, North-Central, and Lake Minnetonka Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE FOR EACH PARTICLE CLASS

Device Number	Subwatershed Number	1	2	3	4	5
		P 0%	P 10%	P 30%	P 50%	P 80%
1	GB1	1	10.392	2.545	0.508	0.097
2	GB2	0.992	9.978	4.143	1.329	0.257
3	GB3	1	8.251	1.532	0.324	0.061
4	GB4	0.994	11.066	6.19	3.966	6.062
5	GB5	1.001	16.546	14.447	9.913	4.589
6	GB6	1	15.232	8.918	2.933	0.546
7	GB7	1	10.225	2.282	0.38	0.064
8	GB8	1	16.849	16.849	16.849	33.698
9	GB9	0.406	2.383	0.966	0.424	0.087
10	GB10	1	16.849	16.849	16.849	33.698
11	NC1	1	16.08	12.874	6.894	2.215
12	NC2	1	11.47	3.236	0.591	0.092
13	NC3	1	12.264	5.626	2.557	0.875
14	NC4	1	13.177	7.685	4.489	2.159
15	NC5	0.998	12.973	8.255	4.875	1.593
16	NC6	0.999	6.996	1.045	0.205	0.041
17	NC7	0.262	1.218	0.395	0.139	0.024
18	NC8	0.232	1.411	0.484	0.176	0.031
19	NC9	0.184	1.116	0.233	0.052	0.007
20	NC10	0.419	2.769	0.626	0.133	0.02
21	NC11	1	15.004	12.348	10.742	17.966
22	I1	1	16.849	16.849	16.849	33.698
23	I2	1	16.849	16.849	16.849	33.698
24	I3	1	16.86	16.86	16.86	33.721
25	OVERALL	0.892	12.583	10.31	9.359	17.357

City of Shorewood
Comprehensive Water Resources Management Plan
Gideon Bay, North-Central, and Lake Minnetonka Watersheds-P8 Results

CONCENTRATION (PPM) PRESENT IN THE OUTFLOW OF EACH TREATMENT DEVICE FOR EACH WATER QUALITY COMPONENT

Device Number	Subwatershed Number	TSS	TP	TKN	Cu	Pb	Zn	HC	COD	BOD
1	GB1	13.542	0.243	1.282	0.013	0.016	0.074	0.555	33.675	4.662
2	GB2	15.708	0.254	1.323	0.014	0.018	0.076	0.601	35.027	4.936
3	GB3	10.169	0.222	1.203	0.013	0.014	0.069	0.479	26.415	3.637
4	GB4	27.285	0.29	1.464	0.015	0.025	0.084	0.862	45.455	6.511
5	GB5	45.495	0.413	1.943	0.02	0.037	0.111	1.274	73.185	10.693
6	GB6	27.629	0.327	1.61	0.017	0.026	0.092	0.872	56.415	8.062
7	GB7	12.951	0.239	1.269	0.013	0.016	0.073	0.541	32.804	4.53
8	GB8	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.061	14.458
9	GB9	3.86	0.088	0.48	0.005	0.006	0.028	0.188	8.678	1.225
10	GB10	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.061	14.458
11	NC1	38.063	0.382	1.82	0.019	0.032	0.104	1.106	66.834	9.713
12	NC2	15.389	0.254	1.327	0.014	0.018	0.076	0.596	37.532	5.215
13	NC3	21.322	0.286	1.45	0.015	0.021	0.083	0.73	44.219	6.259
14	NC4	27.51	0.317	1.568	0.016	0.026	0.09	0.869	51.113	7.317
15	NC5	27.696	0.321	1.585	0.017	0.026	0.091	0.873	51.131	7.348
16	NC6	8.287	0.21	1.157	0.012	0.013	0.066	0.436	22.281	3.058
17	NC7	1.776	0.053	0.293	0.003	0.003	0.017	0.105	4.343	0.609
18	NC8	2.101	0.05	0.273	0.003	0.003	0.016	0.105	4.962	0.696
19	NC9	1.409	0.038	0.21	0.002	0.002	0.012	0.078	3.684	0.509
20	NC10	3.548	0.089	0.487	0.005	0.005	0.028	0.185	9.143	1.266
21	NC11	56.059	0.395	1.874	0.02	0.044	0.107	1.511	74.724	10.911
22	I1	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.061	14.458
23	I2	84.245	0.473	2.173	0.023	0.063	0.125	2.145	98.06	14.458
24	I3	84.301	0.473	2.174	0.023	0.063	0.125	2.147	98.125	14.468
25	OVERALL	49.608	0.342	1.63	0.017	0.039	0.093	1.339	64.243	9.383

APPENDIX H

Problem Area Summary

CITY OF SHOREWOOD

Shorewood Surface Water Management Plan

Problem Areas Identified in 2006 and 2007 Drainage Analysis

City Boundary

Problem Areas from 2006/2007 Study

- Project Completed
- To be Corrected by Residents/Owners
- To be Corrected by the City

N

0 2,500 Feet

1 inch = 2,500 feet

WSB

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ANALYSIS OF DRAINAGE PROBLEM AREAS WITHIN THE CITY OF SHOREWOOD

PREPARED FOR THE
CITY OF SHOREWOOD, MINNESOTA

January 23, 2006

Prepared By:

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TABLE 2 - Areas Categorized As "Substantial Financial Impact To The City" Problem Areas

TABLE 3 - Areas Categorized As "Public Nuisance" Problem Areas

TABLE 4 - Areas Categorized As "Private Nuisance with Limited City Responsibility" Problem Areas

TABLE 5 - Areas Categorized As "Private Nuisance With No City Responsibility" Problem Areas

TABLE 6 - Areas Categorized As "No Further Action Required" Problem Areas

LIST OF APPENDICIES

APPENDIX A - Opinion Of Probable Cost For Selected Problem Areas (Category 1-5)

APPENDIX B - Recommended Maintenance Activities (On-going or One-time projects)

CERTIFICATION

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Steven Gurney, P.E.

Date: January, 2006 Reg. No. 40497

I. INTRODUCTION

On September 4th, 2005 a strong thunderstorm developed over the City of Shorewood. In the course of approximately three hours, close to six inches of rain fell within the City. During this time, large hail also was observed, stripping leaves from trees and adding to the general debris that was present within the storm sewer system.

The City experienced a second storm on October 4th, 2005. This storm produced approximately 4.5 inches of rain within a four hour period.

The City requested WSB & Associates, Inc. look at the various drainage problem areas. The preliminary findings of this investigation are outlined within this report.

To aid the City in planning for projects that will reduce the number of flood problem areas, we have ranked the problem areas based on a modified classification system. In order to maintain some consistency with the City's system previously established, we used the same categories with limited modifications. The criteria outlined in the Capital Improvement Program (1997 – 2001) were modified as follows:

- Split "Private Nuisance" areas into two categories, one in which the City may share in the responsibility for the project and one that is entirely the responsibility of the private property owner and / or their neighbors.

- Added a new category consisting of areas where no additional work is recommended.

The various categories are outlined below:

1) PUBLIC SAFETY AND HEALTH

Primary attention will be paid to those projects that impact the public health or safety. These projects would include ice problems on the road, erosion that is causing a hazardous structural problem (i.e. undermining a road), or storm water that is causing a significant health problem (such as flooding the sanitary system).

2) SUBSTANTIAL FINANCIAL IMPACT TO THE CITY

This category will include those projects that, while not endangering the public health, will still have a negative impact on the residents as a whole. Projects in this category include minor infrastructure replacement that cannot be funded cost effectively by other means. Other potential projects include erosion causing property damage and minor structure replacement.

3) PUBLIC NUISANCE

This category includes those projects that cannot be considered a substantial hazard, are not likely to cause a financial loss to the City, but are a public nuisance. These projects include standing water in the roadway, unwanted flooding in public parks, and minor erosion projects.

4) PRIVATE NUISANCE WITH LIMITED CITY RESPONSIBILITY

This category includes projects that are a nuisance to a single residence or small group of residences that the City Council deems that the City has some responsibility to help correct. These projects include those instances where a large drainage area is causing a problem to a small area or where a substantial portion of the runoff is generated within the City's Right-of-Way.

In order for the City to participate, the homeowner(s) must be willing to provide a right-of-entry to City crews and provide Drainage and Utility Easement over improvements without cost.

5) PRIVATE NUISANCE WITH NO CITY RESPONSIBILTY

This category includes projects that are a nuisance to a single residence or small group of residences that the City Council deems that the City has no responsibility to help correct. These projects include those instances where a limited drainage area, consisting of private property, is causing a problem to a small area. The nuisance problem will involve little or no runoff that is generated from City Right-of-Way.

6) NO FURTHER ACTION REQUIRED

This category includes projects that are under way, or have been addressed through various means, such as individual homeowners correcting the problem himself or herself or City crews fixing the problem.

The problem areas are all evaluated and a category assigned so that the City Council can begin to prioritize the problem areas.

Tables 1-6 contain a list of the problem areas for each category along with a preliminary ranking of the areas within in each category. This ranking, along with the preliminary cost estimates, can be used by the City Council to determine the priority for fixing the problem areas.

II. DISCUSSION OF PROBLEM AREAS

Following the September 4th storm, the City received several drainage complaints. Since that time, we have investigated each of the various areas to visit with concerned residents, gather additional information, take pictures, and where possible, observe the problems.

The results of this preliminary investigation are presented in the following pages. Each problem area has a brief description of the complaint expressed by the property owner followed by a summary of the hydrologic characteristics of the subwatershed tributary to the site.

Next, possible alternatives that may be considered to address the problems at the subject site are outlined. A preliminary cost estimate for each alternative is also provided.

Following that is a recommendation by WSB as to how the City should proceed. Several of the areas are within private property and do not necessarily much additional investigation by City Staff or their consultants. However, there are several areas that, because of their proximity to or the amount of public property involved in the tributary area, will require further review.

Unless otherwise noted, the hydrologic information is based on a cursory review of the subwatershed tributary to the problem area. The Soil Conservation Service's TR-20 method was used to estimate flow rates from the subwatershed directly tributary to the problem area.

Problem Area Number 1 – 6180 Murray Hill Road

Description of Problem:

The owner of 6180 Murray Hill Road has experienced flooding as a result of the September 4th storm. The house is located at the base of a steep hill. At the top of the hill, two city streets, Murray Hill Road and Summit Drive, intersect at a "T" intersection. Runoff from Summit Drive is conveyed down the surface of the road, which is at an approximate 12.5% slope. It has been observed by City crews that the runoff from this road is flowing with such velocity that it does not stay on the road surface. Rather, it drops down the steep slope and flows towards the residence at 6180 Murray Hill Road. This is evident by the accumulation of sediment at the base of the hill. The resident has stated that they had flooding of their basement during the storm event.

Hydrologic Information:

- Tributary Area: 2.3 ac
- Impervious Surface: 20%
- Peak 10-year Flow Rate: 5.8 cfs
- Peak 100-year Flow Rate: 10.2 cfs

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. Installation of storm sewer and catch basins on Summit Drive. It is anticipated that the construction costs associated with this work will be approximately $31,000.

2. Regrading of Murray Hill Road and / or areas behind the west curb to provide conveyance for on the street surface, rather than down the steep bank. It is anticipated that the construction costs associated with this work will be approximately $2,300.

3. Grading of the yard to provide a swale that will intercept runoff coming down the steep slope and convey it to the wetland behind the residence. It is anticipated that the construction costs associated with this work will be approximately $2,900.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is also recommended that additional analysis be undertaken to determine the depth of flow at this intersection so that the height of the constructed berm can be verified.

Problem Area Number 2 – 6100 Apple Road

Description of Problem:

This residence is located at the bottom of a ravine, with the house cut back into the hill. The homeowner has attempted to redirect runoff around his house by constructing a drain tile system comprised of six inch HDPE and pea rock french drain system. During the heavy rains of September, the system was overwhelmed and several areas were eroded, depositing the pea rock on the downstream lawn.

Hydrologic Information:

- Tributary Area: 5.1 ac
- Impervious Surface: 5%
- Peak 10-year Flow Rate: 7.7 cfs
- Peak 100-year Flow Rate: 15 cfs

Possible Alternatives:

The homeowner could construct a new pipe with more capacity. Due to the proximity of the house, it is not recommended that additional ponding be provided uphill unless an emergency overflow route can be established. In order to accomplish this, the homeowner may have to coordinate the work with his neighbors. It is anticipated that the construction costs associated with this work will be approximately $16,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5).

A letter will be sent to the resident recommending that he contact his neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 3 – Minnetonka Country Club

Description of Problem:

Discussion during the heavy storm events of September, the Country Club experienced flooding that resulted in the course being shut down for a few days. While much of the course was flooded initially, the extended duration of the flooding in the southeast corner of the course has the groundskeeper concerned. A field review of the area shows that the outlet pipe that conveys runoff from this area is an 8-inch PVC line.

Hydrologic Information:

- Tributary Area: 147.2 ac*
- Impervious Surface: 12%*
- Peak 10-year Flow Rate: 141cfs**
- Peak 100-year Flow Rate: 267 cfs**

*Based on a model developed as part of CSMP

**Considerable storage volume available on golf course. Peak rates represent runoff to golf course.

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. Provide a larger pipe with more capacity to convey runoff from the southeast corner of the golf course.

2. Provide additional ponding within golf course, within areas that will not impact play.

3. Raise impacted greens above high-water level.

4. Combination of the above. The above alternatives could be constructed in phases or as one large project. Since the scope of this project could vary significantly, separate cost opinions have not been developed for the individual alternatives. Rather, a cost range has been provided to aid in planning and budgeting purposes. It is anticipated that the construction costs associated with this work will be approximately $120,000 to $533,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since there are areas off-site including City Right-of-Way that contributes runoff to the golf course.

Since this is a large area containing lots of open space, and there is potential for a comprehensive storm water management plan for this area, it is recommended that further analysis be undertaken to develop a comprehensive system that will provide treatment and rate control for the watershed as a whole.

Problem Area Number 4 – 5925 Galpin Lake Road

Description of Problem:

This residence is a new home constructed on a previously vacant lot. The homeowner is concerned with the amount of runoff that is conveyed through his property from the road.

Hydrologic Information:

- *No hydrologic analysis completed since this problem has already been addressed.*

Possible Alternatives:

The homeowner has redirected the runoff conveyed through his property by constructing a berm adjacent to the road surface. The berm will contain runoff within the road surface. It is then conveyed downstream to a low point, where it will discharge to Galpin Lake.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the problem has been addressed through the building permitting process.

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 5 – 25360 Birch Bluff Road

Description of Problem:

The culvert at the driveway entrance to this property is damaged and in need of replacement. The CMP is deteriorated along the bottom of the culvert and both ends of the culvert are partially collapsed. This has resulted in greater flow velocities and erosion at both ends of the culvert.

The culvert is located on the drainage ditch that conveys runoff from a large portion of the City directly to Lake Minnetonka at Crescent Beach.

Hydrologic Information:

- Tributary Area: 86.1 ac (direct), 306.4 ac (total tributary area)*
- Impervious Surface: 30%**
- Peak 10-year Flow Rate: 8 cfs***
- Peak 100-year Flow Rate: 14 cfs***

* Based on subwatershed delineated in CSMP.

** The amount of impervious surface is estimated from the Curve Numbers previously established during preparation of the City's CSMP.

*** Flow rates based on full flow capacity of existing culvert (10-year) and peak flow rate without overtopping of driveway (100-year). Additional rate control is provided by upstream culvert at Pleasant Place.

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. Do nothing.

2. Replace culvert. It is anticipated that the construction costs associated with this work will be approximately $15,000.

Recommendation:

It is recommended that this problem area be categorized as a "Public Safety and Health" area (Category 1) since the drainage ditch is an integral part of the City's storm water conveyance system.

The City will replace this culvert in the spring.

Problem Area Number 6 – 26220 Wild Rose Lane

Description of Problem:

During the heavy rainfalls of September, the resident experienced basement flooding. The water in the basement was approximately 2 – 2 ½ feet deep. The backyard of the residence contains an in-ground swimming pool that is located at the base of a steep hill. To gain access to the pool from the house, there is an egress door located below ground, as well as a lookout window. The runoff seems to have entered through these openings as evident by the debris line on the lookout window.

Hydrologic Information:

- Tributary Area: 1.5 ac
- Impervious Surface: 15%
- Peak 10-year Flow Rate: 3.9 cfs
- Peak 100-year Flow Rate: 6.9 cfs

Possible Alternatives:

The following alternatives are available to reduce the risk of flooding at the basement of this residence in the future:

1. Seal the low-building openings. It is anticipated the construction costs associated with this work will be approximately $12,500.

2. Provide a drainage swale around the back of the lot to convey runoff around the home. It is anticipated the construction costs associated with this work will be approximately $6,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5).

A letter will be sent to the resident recommending that they contact their neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Since this property has experienced flooding of the basement, it is further recommended that this be given a higher priority if the City does decide to get involved in private drainage problems.

Problem Area Number 7 – 5925 Grant Street

Description of Problem:

This residence is located at the lowest point of a subwatershed that includes a portion of the City of Excelsior. A series of culverts are located in the roadway ditch in the front of the yard. To alleviate standing water in the low backyard area, a 4-inch PVC drain tile was installed to convey runoff from this lowpoint to the storm sewer located in the street Right-of-Way. The inlet to this drain tile consists of a small hole dug into the yard supported by landscape bricks. A screened grate was placed over the bricks.

During the September rainfall event, this area flooded resulting in water in the basement of the residence. It was observed that the landscape bricks that supported the grate had collapsed, partially blocking the drain tile line.

The storm sewer system crosses below Park Street and discharges to a drainage ditch located within the City's Right-of-Way. At the end of the ditch, adjacent to the TH-7 Right-of-Way, a resident has constructed a horseshoe shaped berm in an attempt to block runoff from flowing across his property. The height of this berm is approximately 3–4 feet high. Based on review of the City's 1-foot contour information, it appears that there is approximately 7 feet of fall from the outlet of the storm sewer system to the top of this berm. Therefore, it is unlikely that the berm is creating any tailwater impacts on the Grant Street storm sewer system. The City has an existing sewer easement across the property containing the berm. It is recommended that the City instruct the homeowner at 5965 Grant Street to remove the berm.

Hydrologic Information:

- Tributary Area: 1.7 ac* (direct), 8.9 ac total (tributary to Park St. storm sewer)
- Impervious Surface: 9% (direct), 25% (total area)
- Peak 10-year Flow Rate: 19.7 cfs
- Peak 100-year Flow Rate: 34.3 cfs

*Area within City of Excelsior has been estimated based on field visit.

Possible Alternatives:

Constructing a larger storm sewer system with additional capacity would reduce the flooding potential in this area. It is anticipated the construction costs associated with this work will be approximately $42,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since the runoff involves City Right-of-Way and a portion of the storm sewer system is a City owned system.

It is recommended that additional analysis be undertaken to design a comprehensive system in this area.

Problem Area Number 8 – 20955 Ivy Lane

Description of Problem:

The resident is complaining of small "sink holes" in her yard. It appears that these eroded areas are a result of the gutter downspouts from the garage area, which are directed toward the areas that have eroded. The resident was requesting that fill be placed in these areas since it is adjacent to a City drainage ditch.

Hydrologic Information:

- *No hydrologic analysis completed since the erosion is located on private property.*

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6).

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 9 – 4980 Suburban Drive

Description of Problem:

The owner has experienced a wet basement. He believes this is due to the neighbor's gutter downspouts being directed toward his foundation. In addition, during the October rainfall event the homeowner observed that runoff from the neighbor's yards has conveyed down a small hill in his backyard and across his driveway, resulting in erosion to the gravel driveway. The eroded material is then deposited in a low area adjacent to this property.

Hydrologic Information:

- Tributary Area: 0.5 ac
- Impervious Surface: 37%
- Peak 10-year Flow Rate: 1.6 cfs
- Peak 100-year Flow Rate: 2.6 cfs

Possible Alternatives:

The following alternatives are available to reduce the potential for further erosion in this area:

1. Installation of a small private drainage system to convey runoff under the driveway. It is anticipated that the construction costs associated with this work will be approximately $6,500.

2. Construction of a berm to contain runoff within the yard or spread it out so that localized erosion is not experienced. It is anticipated that the construction costs associated with this work will be approximately $4,300.

3. Paving driveway. It is anticipated that the construction costs associated with this work will be approximately $7,800.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5).

A letter will be sent to the resident recommending that he contact his neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 10 – 25720 / 25722 Wild Rose Lane

Description of Problem:

The property owner has experienced erosion of his driveway. A review of the site showed that the driveway culvert at this location was almost completely plugged. Runoff from the roadway that would have been conveyed under the driveway by this culvert instead ran down the driveway thereby causing erosion.

The property owner has since regraded the front yard and driveway to block street runoff from entering his property. In addition, the City has built up a small bituminous curb over the driveway that will convey runoff past the driveway and into a low area west of the property.

Hydrologic Information:

- *No hydrologic analysis completed since the property owner was fixing this area.*

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the property owner has addressed the problem.

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 11 – 25575 Smithtown Road (Lake South Auto)

Description of Problem:

During the September rainfall event, the business owner reported flooding of his shop area. A catch basin is located in the Smithtown Road ditch, immediately east of the paved area in front of the shop. Runoff intercepted by this catch basin is conveyed under Smithtown Road by a storm sewer system that discharges to the Regional Trail ditch.

The primary structure for this property has experienced flooding on several occasions. During the last events approximately 8 inches of water covered the finished floor of the building. In addition, runoff inundated the low point of Smithtown Way Roadway, located approximately 75 feet west of Smithtown Road, and the intersection of Smithtown Road and Smithtown Way.

Further observations by the City during the October rainfall event indicated that runoff was being trapped by the curb that has been placed around the edge of the parking lot, by the owner, in front of the business. In addition, it has been observed that the capacity of the catch basin immediately east of the driveway is exceeded.

Hydrologic Information:

- Tributary Area: 7.4 ac
- Impervious Surface: 19%
- Peak 10-year Flow Rate: 14.9 cfs
- Peak 100-year Flow Rate: 26.7 cfs

Possible Alternatives:

1. The Public Works Department has swapped out the inlet grate for the catch basin located immediately east of the subject driveway to increase the capacity of the drainage inlet.

2. If the increased capacity of the inlet grate remains inadequate, modifications to the driveway will be required to redirect runoff to the mainline structures. It is anticipated that the construction costs associated with this work will be approximately $19,000.

Recommendation:

It is recommended that this problem area be categorized as a “Public Nuisance” (Category 3.)

Problem Area Number 12 – 21165 Minnetonka Boulevard

Description of Problem:

This home was recently constructed on a subdivided lot. As a requirement of the construction, the homeowner constructed a private drainage system within the City Right-of-Way. Runoff from a small depression located on his lot is conveyed to the storm sewer system through a flared end section (FES) located on the property. The system discharges to the roadside ditch located downstream along Minnetonka Boulevard. The storm sewer system appears to have replaced a series of culverts in two downstream driveways. To replace these culverts, catch basins were added at the driveways that connect to the private drainage system.

The homeowner originally contacted the City to express concern that the system was clogging with debris. He also expressed concern that an upstream culvert was clogged and redirecting runoff through his front yard rather than along the roadside ditch. He also expressed concern with the amount of standing water that was in the depression on his property. The homeowner indicated that he plans to place fill in the depression to eliminate standing water below the FES.

Subsequent conversations with the property owner indicate that, at times, stormwater runoff was actually flowing into the depression through the FES. Based on this, it appears that the storm sewer system may have surcharged and back-flowed into the depression area. Once the peak subsided, the water did drain out of the depression to the elevation of the FES.

Hydrologic Information:

- Tributary Area: 6.0 ac
- Impervious Surface: 25%
- Peak 10-year Flow Rate: 13.3 cfs
- Peak 100-year Flow Rate: 23.2 cfs

Possible Alternatives:

To reduce the risk of clogging, City crews have replaced the standard CB grates with beehive-type grates. In addition, the trash guard on the FES at the downstream discharge point to the Minnetonka Boulevard ditch was removed. This trash guard had trapped debris within the FES. City crews also removed a portion of the damaged culvert upstream of the property, which should reduce the potential for runoff being conveyed across the front yard of the 21165 Minnetonka Boulevard.

In order to reduce the potential for runoff backflowing into the depression area located on the property, the homeowner may wish to consider the following options:

1. Installation of a flap gate within the storm sewer line between the FES and the catch basin. It is anticipated that the construction costs associated with this work will be approximately $4,000.

2. Construction of a parallel storm sewer system to convey runoff from Minnetonka Boulevard. The system could be installed over the top of the previously installed system

to convey the runoff collected by the catch basins adjacent to Minnetonka Boulevard. It is anticipated that the construction costs associated with this work will be approximately $12,000.

3. Do nothing. The backflow is a temporary inconvenience that, with proper grading of the depression area, could be reduced to occurring only during large intensity storms. The emergency overflow elevation for this depression area is approximately two feet lower than the low building opening of the new home at 21165 Minnetonka Boulevard. Provided that overflow elevation is maintained, it is likely that adequate freeboard will be provided for this property.

4. Other, homeowner-initiated solution.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance With No City Responsibility" area (Category 5). This situation would normally be categorized as a "Private Nuisance With Limited City Responsibility" area (Category 4), but since this private storm sewer system was required to develop the lot, it should remain a private system.

A letter will be sent to the residents recommending that they contact their engineer to discuss the operation of the storm sewer system and potential solutions to the back flow condition.

No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 13 – 4770 Lakeway Terrace

Description of Problem:

This property is located near the low point of the Lakeway Terrace cul-de-sac. The property owner is complaining that during the recent storms, runoff was conveyed over his landscaped berm and through his side yard to Lake William. There is a storm sewer system in the street that conveys runoff from a drainage ditch as well as runoff from the road surface. Catch basins are located at the street low point. The catch basin on the west side of Lakeway Terrace has a beehive casting that appears to be slightly silted in. During the September storm event, it is possible that this casting became plugged with debris, as there were a lot of leaves dropped from trees as a result of hail.

A review of City records did not yield any specific information as to a drainage and utility easement, although, typically, there is a 10-foot easement provided along each side of the common lot line.

Hydrologic Information:

- Tributary Area: 3.4 ac
- Impervious Surface: 14%
- Peak 10-year Flow Rate: 7.8 cfs
- Peak 100-year Flow Rate: 14.0 cfs

Possible Alternatives:

The following alternatives are available to reduce the potential for runoff being conveyed through this property:

1. Install a different casting that will allow debris to enter the CB. A stool grate such as the Neena HR-4341-A casting is recommended. It is anticipated that the construction costs associated with this work will be approximately $900.

2. The road grade could be lowered on the east edge of the roadway. This would convey runoff back to the drainage ditch. There are drawbacks to this proposed system, as it would impact an existing force main and lift station located in the Right-of-Way in this location. It is anticipated that the construction costs associated with this work will be approximately $12,000.

3. Construction of a higher berm along the property would allow additional runoff to pond on the road surface in this area before being conveyed across the property. This construction would result in the disturbance to front yards that are currently in good condition. It is anticipated that the construction costs associated with this work will be approximately $1,700.

4. Do nothing. The remainder of the overflow route does appear to be well graded away from structures; therefore, flooding potential is minimized. It does not appear that the

runoff conveyed along the lot line of this property would result in a flooding risk to the adjacent homes.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance With Limited City Responsibility" area (Category 4).

It will be recommended that the City look at future improvements in this area that may reduce the potential for runoff being conveyed along the common lot line.

Problem Area Number 14 – 28070 Woodside Road

Description of Problem:

This property has experienced partial erosion of the timber retaining wall that has been constructed along the bluff overlooking Lake Minnetonka. In order to convey runoff from the backyard to the lake, a downspout consisting of two CMP flumes have been installed. The entrance to these flumes consists of grouted riprap to provide a smooth transition.

Based on a field visit, it appears that runoff from the adjacent property to the north is conveyed to this downspout. During the site visit, it was observed that the grass surface had been bent over, indicating that runoff had come from that property and been conveyed to the downspout. Based on a review of the grading plan for the adjoining property, the construction of the new house does not appear to have significantly altered the drainage patterns that existed prior to the construction of the new house.

Hydrologic Information:

- Tributary Area: 1.1 ac
- Impervious Surface: 16%
- Peak 10-year Flow Rate:
- Peak 100-year Flow Rate:

Possible Alternatives:

The property owner has already fixed the eroded areas. The following alternatives are available to reduce the potential for future erosion in this area:

1. Reconstruct the entrance to the downspout by building up the grouted riprap area adjacent to the entrance to the culverts. This would reduce the chance of water flowing over the bluff and eroding the material supporting the downspouts. It is anticipated that the construction costs associated with this work will be approximately $1,700.

2. Constructing a new drain on the north property that would reduce the amount of runoff being conveyed to the downspout. In order to convey this runoff to the lake, a separate pipe would have to be constructed through the bluff, which would require a variance from the Bluff Preservation Ordinance. Alternatively, the drain system could connect into the existing downspout at a lower elevation. It is anticipated that the construction costs associated with this work will be approximately $5,000.

3. Do nothing. The storm events that caused the erosion were large storm events that exceeded the 10-year storm event, which is the typical design storm event for this type of system.

Recommendation:

It is recommended that this problem area be categorized as a “Private Nuisance With No City Responsibility” area (Category 5.)

A letter will be sent to the resident recommending that she contact her neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 15 – 800 Water Street (Frontier Electric)

Description of Problem:

The Frontier Electric shop building was flooded during the September storm event. The property is actually located within the City of Excelsior. The property owner contends that increased runoff from the City of Shorewood has resulted in his shop being flooded. These improvements include the reconstruction of the parking lot at the Shorewood Mall, as well as the construction of the new townhomes located immediately east of the mall.

Subsequent inspection of the catch basins within the mall parking lot indicates that the runoff from the parking lot is conveyed to the storm sewer system that was constructed as part of the TH-7/41 improvements. This was verified during a subsequent rainfall event where no runoff was observed being conveyed to the TH-7 ditch east of the mall. There is an emergency overflow pipe that would convey runoff to the east should that ditch in front of the mall fill up. However, the area tributary to this ditch is relatively small, and it is not likely that runoff would be conveyed to the east.

Hydrologic Information:

The hydrologic analysis completed in conjunction with the Mn/DOT project to reconstruct the TH-7/41 intersection indicated that the tributary area to the Frontier Electric building was actually reduced.

Possible Alternatives:

In addition to the work that was previously done during the reconstruction of TH-7/41, work is has been completed by other government entities.

Mn/DOT has regraded the TH-7 ditch and improved the entrance to the culvert adjacent to the shop building. In addition, it is our understanding that the City of Excelsior will be removing the pipe adjacent to the shop, providing an open channel conveyance system that will be less likely to cause flooding of the shop building. It is anticipated that this work will be completed in 2006.

Recommendations:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since it is being addressed by other government entities.

A letter informing the property owner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 16 – 27780 Island View Road

Description of Problem:

The homeowner expressed concern about standing water in his yard adjacent to his neighbor's property. The problem has been noticed since the neighbor installed a new pool. The property owner believes that a drain tile may have been damaged as part of the construction of the pool.

Hydrologic Information:

- Tributary Area: 1.6 ac
- Impervious Surface: 4%
- Peak 10-year Flow Rate: 3.0 cfs
- Peak 100-year Flow Rate: 5.7 cfs

Possible Alternatives:

The following alternatives are available to correct the standing water problem at this site:

1. Construct a small drain system to the lake. The effectiveness of this system may be limited because the system would have to operate under hydraulic head since there is limited fill between the yard and the lake. It is anticipated that the construction costs associated with this work will be approximately $7,800.

2. Because the area of standing water is relatively small, a rain garden could be constructed at the site low point consisting of wet tolerant trees or shrubs. It is anticipated that the construction costs associated with this work will be approximately $4,500.

3. Do nothing. Since the problem does not pose an immediate potential for flooding, doing nothing would be an appropriate option at this site.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance With No City Responsibility" area (Category 5).

A letter will be sent to the resident recommending that he contact his neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 17 – 23350 AcademyAvenue

Description of Problem:

The elevation of this house and the garage are below the elevation of the street adjacent to the property. During the September storm event, runoff was observed flowing onto the property. The house was flooded. A catch basin is located on the south side of the road, but this catch basin appears to have been plugged. Runoff then overtopped the road. It appears that the majority of the ditch on the south side of the road has been silted in over time and is in need of maintenance.

Hydrologic Information:

- Tributary Area: 1.2 ac
- Impervious Surface: 18%
- Peak 10-year Flow Rate: 2.9 cfs
- Peak 100-year Flow Rate: 5.1 cfs

Possible Alternatives:

The following alternatives are available to correct the flooding problem at this site:

1. Installation of a beehive manhole will reduce potential for clogging. It is anticipated that the construction costs associated with this work will be approximately $900.

2. Excavation of a new ditch along the south side of the street would reduce the potential for runoff overtopping the road. It is anticipated that the construction costs associated with this work will be approximately $1,400.

3. Regrading the road to provide positive drainage away from the house may not be possible due to the steep grades of driveways across the street. However, installation of curb and gutter along this stretch of road, combined with some lowering of the road, may reduce the potential for runoff being conveyed toward the house. It is anticipated that the construction costs associated with this work will be approximately $53,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is also recommended that additional analysis be undertaken to determine the most cost effective alternative to reduce flooding potential.

Problem Area Number 18 – 6180 Chaska Road

Description of Problem:

Runoff from Chaska Road washed out a landscape berm on the west edge of this property. Runoff was conveyed through the side yard and into an egress window, flooding the basement. A small drain system with small catch basin inlets located in the side yard did not convey the runoff at the high rate generated by the September storm.

Hydrologic Information:

- Tributary Area: 1.3 ac*
- Impervious Surface: 7%
- Peak 10-year Flow Rate: 2.5 cfs
- Peak 100-year Flow Rate: 4.8 cfs

* Area is estimated from CSMP Subwatershed Boundaries since the City's 1-foot contour information does not extend into Chanhassen.

Possible Alternatives:

The homeowner is considering the following alternatives to correct the drainage problem at this site:

1. Construction of a more defined swale to provide an overflow route through the side yard of this residence. In addition, increase the height of the grading around the egress windows. It is anticipated that the construction costs associated with this work will be approximately $3,200.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance With Limited City Responsibility" area (Category 4.)

It will be recommended that the City look at future improvements to reduce the potential for flooding at this property.

Problem Area Number 19 – 26025 Birch Bluff Road

Description of Problem:

Runoff from the road has eroded the area around the driveway.

Hydrologic Information:

- *No hydrologic analysis was completed since the problem has been addressed.*

Possible Alternatives:

City crews have already corrected this erosion problem by building up a bituminous curb along the edge of the road and backfilling the eroded area. It is anticipated that this work has addressed the erosion problem.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the City maintenance crews have fixed this area.

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 20 – 22015 Stratford Place

Description of Problem:

During the large September rainfall event, runoff from the drainage channel adjacent to this property may have scoured away part of the bank on the north side of the channel. Continued high flows in this drainage channel may result in additional erosion of the channel, thereby threatening the foundation of the house. During the site visit, it was noted that the 36-inch culvert under Stratford Place was almost completely clogged at the inlet. The City removed the debris at this site.

Hydrologic Information:

- Tributary Area: 45 ac*
- Impervious Surface: 25%**
- Peak 10-year Flow Rate: 66.2 cfs
- Peak 100-year Flow Rate: 116.6 cfs

* The majority of the subwatershed is in the City of Chanhassen. Tributary area outside the City limits is estimated from subwatershed boundaries established during development of the City's CSMP.

** The amount of impervious surface is estimated since the majority of watershed is in the City of Chanhassen.

Possible Alternatives:

It is recommended that the City of Chanhassen be contacted to discuss repairs in this area since the majority of the area tributary to this problem is within their boundary. The following alternatives are available to correct the erosion problem at this site:

1. Extend the culvert under Stratford Place. A manhole could be added beyond the storm sewer extended up through the channel to collect runoff prior to the point where it begins to erode the bank of the existing home. The length of the storm sewer is approximately 100 feet. It is anticipated that the construction costs associated with this work will be approximately $27,000.

2. Armoring along the channel bank to protect the foundation of the house along with installation of riprap adjacent to Apple Road is recommended. It is possible that the riprap could be placed only in selected portions of the channel that are posing a threat to the stability of the roadbed. It is anticipated that the construction costs associated with this work will be approximately $18,000.

Recommendation:

It is recommended that this problem area be categorized as a "Public Safety and Health" area (Category 1) since further erosion may threaten both the City's roadway and the private residence.

Problem Area Number 21 – 5915 Grant Street

Description of Problem:

The property owner experienced flooding in her yard. This residence is adjacent to 5925 Grant Street. The description of the problem, hydrologic information, and possible alternatives are the same for this property as those outlined in ***Problem Area Number 7***.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since the runoff involves City Right-of-Way and a portion of the storm sewer system is a City owned system.

It is recommended that additional analysis be undertaken to design a comprehensive system in this area.

Problem Area Number 22 – 5635 Harding Lane

Description of Problem:

Runoff from adjacent homes is conveyed through the backyard of this property. The runoff is conveyed by overland flow on the property. The catch basin is located on the north property line of this property, but it does not appear that the catch basin fully intercepts all runoff conveyed through the backyards. There is a drainage and utility easement on the back 50 feet of the lot. This does not appear to coincide with the primary flow path. This problem area was previously studied in 2003 and a draft version of the report was presented to the City for review. The project was tabled since there was not a consensus with the impacted property owners at that time.

Hydrologic Information:

- Tributary Area: 2.8 ac*
- Impervious Surface: 30%*
- Peak 10-year Flow Rate: 6.0 cfs
- Peak 100-year Flow Rate: 12.2 cfs

* Based on model previously developed as part of the 2003 Harding Lane Comprehensive Stormwater Management Plan.

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. The backyard area could be regraded so that the drainage swale is moved further away from the walkout opening. It is anticipated that the construction costs associated with this work will be approximately $9,000.

2. Construction of a catch basin and storm sewer upstream of the project would intercept more water before it is conveyed onto this property. This system would be connected to the existing catch basin. It is anticipated that the construction costs associated with this work will be approximately $13,000.

3. The construction of the improvements suggested in the 2003 study could address problems within the whole Harding Lane area. Adjusted for inflation, these costs are anticipated to be approximately $87,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.)

A letter will be sent to the resident recommending that they contact their neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 23 – 5615 Harding Lane

Description of Problem:

This is a property immediately north of 5635 Harding Lane. The runoff that is not intercepted by the catch basin located in the side yard of this property and 5635 Harding Lane is conveyed through this backyard. A retaining wall has been partially eroded and the runoff ponds in the homeowners garage. The hydrologic information and possible alternatives are the same for this area as those outlined for ***Problem Area Number 22***.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.)

A letter will be sent to the resident recommending that they contact their neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Since this property has experienced flooding of the garage, it is further recommended that this be given a higher priority if the City does decide to get involved in private drainage problems.

Problem Area Number 24 – 23980 Yellowstone Trail

Description of Problem:

This property is concerned about the current high water level of Mary Lake. Trees are being flooded on this property. A review of the Minnesota Department of Natural Resources website indicates that no Ordinary High Water Level has been determined for this lake.

Hydrologic Information:

- Tributary Area: 61.8 ac
- Impervious Surface: 43%
- Peak 10-year Flow Rate: 133 cfs*
- Peak 100-year Flow Rate: 231 cfs*

*Basin is actually land-locked. Flow rates represent peak runoff rates to the basin.

Possible Alternatives:

The following alternatives are available to correct the nuisance flooding problem at this site:

1. Construction of an outlet for this basin. The proposed storm sewer improvements for Minnetonka Drive could easily be modified to include an outlet for this basin. This outlet pipe would be relatively small and would function as an emergency overflow. It is anticipated that this pipe could be set at an elevation two feet lower than the existing overflow elevation. It is anticipated that the construction costs associated with this work will be approximately $207,000.

2. Pump down the basin. The City did this for a period of time this fall. The costs associated with this option would vary depending on the amount of time the pump would run, and the number of occasions that the pump would have to be brought to this location.

3. Do nothing. The emergency overflow elevation of Mary Lake is approximately 957.1 and the lowest floor elevation of the adjacent elevations is 957.5. This provides 0.4 inches of freeboard, which is less than ideal, but would provide some buffer so that if the City were not able to pump, the water would overflow from the lake before flooding the residence at 23955 Clover Lane.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is also recommended that an outlet from Mary Lake be constructed as part of the Minnetonka Drive storm sewer improvement project.

Problem Area Number 25 – 23955 Clover Lane

Description of Problem:

This property is also located on Mary Lake. The description of the problem, hydrologic information and possible alternatives are the same as those outlined for ***Problem Area Number 24***.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is also recommended that an outlet from Mary Lake be constructed as part of the Minnetonka Drive storm sewer improvement project.

Since this residence has the lowest low floor elevation, the property owner should consider obtaining sand bags to protect his building in the event that the water level rises and the City is not able to pump.

Problem Area Number 26 – 5815 Eureka Road

Description of Problem:

A new house was constructed south of this property and it has blocked the drainage from the subject property. An old drain tile existed prior to construction of the new house, but it was damaged during construction of the new house. The drain tile conveyed runoff to an existing drainage ditch located south of the new house construction. New drain tile was installed, but this does not appear to be functioning properly. During the heavy rainfall events, water has ponded in the low area in the southwest corner of this property. During the October storm event, it was observed that runoff overtopped to Eureka Road and was conveyed to the west through the backyards. (See ***Problem Area Number 35 and Problem Area Number 48***.)

Hydrologic Information:

- Tributary Area: 2.9 ac
- Impervious Surface: 5%
- Peak 10-year Flow Rate: 5.7 cfs
- Peak 100-year Flow Rate: 10.7 cfs

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. We have been working with the home builder to fix the drainage problem at this site. This is being accomplished through the building permit process. The solution proposed by the builder is to excavate a small pond area to replace the depression area in the southwest corner of the lot. It is anticipated that the construction costs associated with this work will be approximately $1,000. The builder has placed $1,500 in an escrow account to cover this work once the area dries out in the spring.

Recommendation:

It is recommended that this problem area be categorized as a "Public Safety and Health" area (Category 1) since the overtopping of Eureka Road, if it occurs in the winter, could result in ice on the road.

The City is working with the builder to construct these improvements to minimize the potential for flooding across Eureka Road. This situation would typically be categorized as a private drainage matter, but, because of the hazard potential, is moved to Category 1.

Problem Area Number 27 – 5840 Eureka Road

Description of Problem:

This property has experienced a wet basement after the two large rainfall events this fall. The property owner contends that this is a result of a new culvert that was installed under Eureka Road, which conveys runoff to the drainage swale located along the south edge of this property. This swale discharges to the wetland located west of this property.

The homeowner believes that removal of debris at the outlet of this wetland would eliminate his problem. A cursory review indicates that the elevation of the outlet is approximately six feet below the existing ground elevation adjacent to his house. Since the basement is depressed approximately two feet, it appears that this is a groundwater related problem rather than a surface water runoff problem. It is unlikely that removing the debris, which is approximately six to twelve inches deep at the outlet, would greatly decrease the water level at the wetland.

Hydrologic Information:

- Tributary Area: 39.4 ac (direct), 55.9 ac (direct and indirect)
- Impervious Surface: 38%
- Peak 10-year Flow Rate: 6.4 cfs*
- Peak 100-year Flow Rate: 7.0 cfs*

* Flow rates based on existing CSMP model for culvert located upstream of this property.

Possible Alternatives:

In order to address flooding at this site, a new outlet for this basin would have to be constructed at a lower elevation. Storm sewer improvements for this area would involve constructing a trunk storm sewer system that would be deeper than the existing conveyance system of culverts, pipes, and ditches. This new trunk sewer would discharge to the large wetland complex downstream of Eureka Road. There will most likely be some amount of wetland mitigation required as a result of lowering the water level of this basin.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the problem appears to be related to a ground water level.

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 28 – 5600 Wedgewood Drive

Description of Problem:

There has been standing water at the Regional Trail and that it is higher than usual. It is creating an annoying odor. The homeowner is also concerned about the potential for his house flooding. An emergency overflow elevation for this area is approximately two feet lower than that ground adjacent to the house. This overflow elevation is located approximately 300 feet west of Wedgewood Lane.

Hydrologic Information:

- Tributary Area: 1.1 ac
- Impervious Surface: 14%
- Peak 10-year Flow Rate: 2.5 cfs
- Peak 100-year Flow Rate: 4.5 cfs

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. Do nothing. The house is not in danger of flooding from surface waters since there is an adequate overflow section.

2. Provide outlet through existing overflow route. A positive outlet could be established by dredging the ditch deeper through the existing overflow area to the west. This work could be done by the Hennepin County Regional Trail Authority since the area is within their Right-of-Way. It would result in significant tree loss. The area with the standing water has been identified as a wetland, so eliminating all standing water would require mitigation to replace the lost wetland. It is anticipated that the construction costs associated with this work will be approximately $18,000.

3. Construct an outlet to the Wedgewood Drive storm sewer that is being proposed for construction in 2006. It is anticipated that the construction costs associated with this work will be approximately $156,000. This cost could be reduced if the outlet is constructed as part of the up-coming Wedgewood Drive road reconstruction project.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5).

No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Since the area in question also involves the Hennepin County Regional Trail Authority, the City has contacted them in an effort to assist with the solutions to the standing water. However, this effort would result in the loss of many trees. The removal of these trees would not require replacement if the work is done as part of a City project.

Problem Area Number 29 – 26395 Peach Circle

Description of Problem:

The property owner at this location is concerned with the amount of standing water located adjacent to the Hennepin County Regional Trail. The water backed up during the recent storm events and flooded their backyard. They have also had flooding in the basement that was due to a failed sump pump. The emergency overflow elevation for this area is approximately one foot lower than that ground adjacent to the house. This overflow elevation is located approximately 600 feet east of Strawberry Lane.

Hydrologic Information:

- Tributary Area: 2.7 ac
- Impervious Surface: 10%
- Peak 10-year Flow Rate: 5.6 cfs
- Peak 100-year Flow Rate: 10.4 cfs

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. Do nothing. The house is not in danger of flooding from surface waters since the overflow section is lower than the low building opening of the residence. However, more freeboard would be preferred.

2. Provide a positive outlet through the existing overflow route. This outlet could be established through the existing overflow area by dredging the ditch deeper. This work could be done by the Hennepin County Regional Trail Authority since the area is within their Right-of-Way. It would result in significant tree loss. These trees would not have to be replaced, but replacement would result in a project that is more acceptable to surrounding residents. It is anticipated that the construction costs associated with this work will be approximately $28,000, excluding tree replacement.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.)

No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Since the area in question also involves the Hennepin County Regional Trail Authority, the City has contacted them in an effort to assist with the solutions to the standing water.

Problem Area Number 30 – 23930 Yellowstone Trail

Description of Problem:

This property is immediately east of 23980 Yellowstone Trail. The description of the problem, hydrologic information and possible alternatives are the same as those outlined in ***Problem Area Number 24***.

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is also recommended that an outlet from Mary Lake be constructed as part of the Minnetonka Drive storm sewer improvement project.

Problem Area Number 31 – 24735 Glen Road

Description of Problem:

During recent storm events, the backyard area has filled up with water. When I visited the area on the 13th of October, the water had receded. The property owner claims to have lost $25,000 worth of landscaping improvements in the past at this property. This area has been studied as part of the Glen Road Problem Area Report, which was originally completed by WSB & Associates, Inc. in October of 2001. This project was not completed due to resistance by several property owners. Since that time, there have been storm sewer improvements constructed as part of the CSAH-19 Project. Based on these improvements, the previously proposed plan no longer is valid. However, the hydrology of this problem area is essentially unchanged in the vicinity.

Hydrologic Information:

- Tributary Area: 16.4 ac*
- Impervious Surface: 26%*
- Peak 10-year Flow Rate: 34.9 cfs**
- Peak 100-year Flow Rate: 61.1 cfs**

*Based on model developed for CSMP

**Peak runoff rate represents runoff to low point at problem area.

Possible Alternatives:

There is an outlet for this area proposed as part of the Amlee Road Reconstruction. The outlet will be constructed in the northeast corner of the lot and at an elevation low enough to convey runoff from the lower area at the back of the property. This outlet could be extended to the south to convey runoff from the low point if desired by the property owner. However, an easement will be required over all pipes within this property. It is anticipated that the construction costs associated with this work will be approximately $82,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.) However, since this area has been an ongoing problem area, the City is in the process of designing plans for the construction of an outlet for this problem area, provided easements can be obtained.

Problem Area Number 32 – 5770 Smithtown Way

Description of Problem:

The property owner contacted the City concerned about a "river" running through her yard. The "river" was caused by runoff from a designed drainage swale that outlets a wetland area behind this development. The swale flowing through conveys runoff around the houses, down the common lot line, and into a rock-lined channel where it is then conveyed the Smithtown Road storm sewer. The property owner claims that the increased runoff is a result of the construction on the new house at 5835 Eureka Road.

Hydrologic Information:

- Tributary Area: 18.5 ac (direct), 74.4 ac (direct and indirect)
- Impervious Surface: 38%
- Peak 10-year Flow Rate: 36.5 cfs*
- Peak 100-year Flow Rate: 59.1 cfs*

* Flow rate on based existing CSMP model for downstream outlet at pond adjacent to Smithtown Way.

Possible Alternatives:

There is no alternative identified for this problem area as the system appears to be functioning as designed. All runoff is being contained in the drainage and utility easements. A review of these easements indicates that they are located along the back lot line for a width of approximately 51 feet at the west edge of the property.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the runoff conveyed through this property is contained within the existing drainage and utility easement.

No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 33 – 26275 Smithtown Road

Description of Problem:

The property owner called concerned that the culverts under Smithtown Road were partially plugged. During a visit to this area, it was observed that the entrance to one culvert was mostly plugged with debris. The other culvert had sufficient capacity to convey the runoff under Smithtown Road. A review of the City's one foot contour information indicates that Smithtown Road would overtop before the house at 26275 Smithtown Road would become inundated.

Hydrologic Information:

- Tributary Area: 44.5 ac (direct), 251.5 ac (total tributary area)
- Impervious Surface: 43%
- Peak 10-year Flow Rate: 63.4 cfs*
- Peak 100-year Flow Rate: 92.6 cfs*

*Flow rates based on CSMP model. Road will not overtop during 100-year event.

Possible Alternatives:

No further work is required at this area, except regular maintenance to clean debris from the culvert entrances.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6.)

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 34 – 5900 Afton Road

Description of Problem:

The property owner has expressed concern about the amount of runoff that is conveyed through his backyard from his neighbor's property. The grading adjacent to the structure is adequate, with positive drainage away from the foundation. The runoff is conveyed through a small swale located approximately at the location of the homeowner's fence. The runoff is generated from a small tributary area, comprised of a portion of two neighboring lots.

In addition to this concern, the property owner also expressed concern about several small maintenance items associated with the storm sewer for Smithtown Road. These include the following:

a) There is a sinkhole adjacent to a catch basin immediately west of Afton Road. This is located in the south ditch of Smithtown Road.
b) There is standing water on Afton Road after large rainfall events.
c) There are additional sinkholes in the south ditch, east of Afton Road. This suggests there may be damage to the bands connecting the culvert.

Hydrologic Information:

- Tributary Area: 0.5 ac
- Impervious Surface: 14%
- Peak 10-year Flow Rate: 1.3 cfs
- Peak 100-year Flow Rate: 2.3 cfs

Possible Alternatives:

The homeowner may wish to consider regarding his lot to provide a more defined conveyance route for runoff through his backyard, further from his foundation.

In order to address the maintenance concerns along Smithtown Road, it is recommended that the catch basin and culverts be repaired and the sinkholes backfilled. To reduce the potential for standing water on Afton Road, it is recommended that the grassed areas adjacent to the street be lowered so that the road is higher than that ditch.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance With No City Responsibility" area (Category 5).

A letter will be sent to the resident recommending that he contact his neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

The maintenance items associated with this problem area will be added to the maintenance list that has been developed while discussing drainage concerns with residents and by observing problems during site visits.

Problem Area Number 35 – 5790 Smithtown Way

Description of Problem:

The homeowner has a concern about the amount of runoff flowing through her backyard. She believes the problem is created by the construction of the new house 5835 Eureka Road.

A review of the City's records indicates that there is a drainage and utility easement located in the backyard of this property.

During the large October rainfall event, it was noted that the low spot at 5815 Eureka Road (See ***Problem Area Number 26***) had standing water that backed up and over-topped Eureka Road. This water was conveyed through the backyards to this property. However, it does appear that the runoff was contained within the drainage and utility easement.

Hydrologic Information:

- Tributary Area: 1.5 ac
- Impervious Surface: 24%
- Peak 10-year Flow Rate: 4.0 cfs
- Peak 100-year Flow Rate: 6.8 cfs

Possible Alternatives:

This problem area does not require any additional work as the runoff is conveyed within drainage and utility easements.

The standing water and subsequent over-topping of Eureka Road is being addressed through the building permit process as discussed in the report for ***Problem Area Number 26***.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6.)

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

The City will be working with the house builder to reduce the potential for runoff over-topping Eureka Road.

Problem Area Number 36 – 27475 Pine Bend

Description of Problem:

The property owner called complaining of a "river" running through her backyard. This appears to be an ongoing problem. The basement of the property is wet, but this appears to be caused by a high ground water table. The City did install a catch basin and grade a small swale along the property line to convey water away from the property. This was done in either 2001 or 2002.

Hydrologic Information:

- Tributary Area: 8.4 ac
- Impervious Surface: 13%
- Peak 10-year Flow Rate: 13.0 cfs
- Peak 100-year Flow Rate: 24.2 cfs

Possible Alternatives:

The following alternatives are available to correct the flooding problem at this site:

1. Do nothing. This problem does not appear to be related to surface water runoff as there is an existing swale to convey surface water flows through the property. The catch basin that was installed consisted of a perforated riser, which would lower the ground water table if the soils adjacent to the house were porous enough to convey water.

2. Construct a storm sewer system from west of Howards Point Road through the property. Although the swale is located on a private property, it does convey runoff from several lots upstream. It is possible to construct a system at a lower elevation, but this would result in the removal of several mature trees.

3. Since this is a ground water issue, the homeowner may wish to consider a more comprehensive foundation drain tile system and sump pump.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the problem appears to be related to a high ground water level.

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 37 – 23950 Elder Turn

Description of Problem:

The property owner is concerned with the high water level in Mary Lake. This residence is south of the property at 23955 Clover Lane. The description of the problem, hydrologic information, and possible alternatives are the same for this property as those outlined for ***Problem Area Number 25***.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is also recommended that an outlet from Mary Lake be constructed as part of the Minnetonka Drive storm sewer improvement project.

Problem Area Number 38 – 23075 State Highway 7 (Control House)

Description of Problem:

The owner of this commercial property initially contacted the City with a concern about a partially blocked culvert located in the roadside ditch downstream of this property. After review of property boundaries, it was determined that the constriction and the ditch block downstream were a result of an abandoned right-of-way. Mn/DOT maintenance crews have removed the old culvert and restored disturbed areas in the ditch downstream if the Control House. No record drawing information was available to verify the location of storm sewer in this area. However, there is a large pipe that discharges to the ditch north of the Control House driveway. The alignment of this culvert is not known at this time.

After the constriction was removed, the property owner again contacted the City to express concern over the amount of gravel that had eroded upstream and deposited on his driveway.

Hydrologic Information:

- Tributary Area: 0.4 ac
- Impervious Surface: 35%
- Peak 10-year Flow Rate: 1.2 cfs
- Peak 100-year Flow Rate: 2.1 cfs

Possible Alternatives:

The following alternatives are available to reduce the potential for eroded materials being deposited on the driveway of the Control House property:

1. Construct storm sewer along Chaska Road. This would allow runoff to be conveyed in the storm sewer pipe rather than on the roadway shoulder. This would reduce the potential of gravel from the shoulder being eroded downstream. It is anticipated that the construction costs associated with this work will be approximately $18,000.

2. Construct catch basin over existing storm sewer. This would convey runoff, and sediment, from the road under the driveway. Additional investigation would have to be done to determine exactly where the storm sewer is located in this area. It is anticipated that the construction costs associated with this work will be approximately $2,500.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is recommended that additional investigation be undertaken as to the exact location of the storm sewer outletting into the Chaska Road ditch adjacent to the Control House. This investigation will be necessary to determine the most effective storm sewer option available to minimize the amount of sediment deposited on the driveway entrance to the Control House.

Problem Area Number 39 – 23895 / 23905 Elder Turn

Description of Problem:

This property is located across the street from the property located at 23950 Elder Turn (***Problem Area Number 37***.) The description of the problem, the hydrologic information, and possible alternatives are the same for this property as those outlined for ***Problem Area Number 25***.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

It is also recommended that an outlet from Mary Lake be constructed as part of the Minnetonka Drive storm sewer improvement.

Problem Area Number 40 – 19660 Silver Lake Trail

Description of Problem:

The property owner contacted the City concerned about the high water level in the wetland behind her house. She had also reported that the road was washed out, but it was determined that what she meant was only that the water had overtopped the road.

Hydrologic Information:

- Tributary Area: 20.2 ac (direct), 72.8 ac (total tributary area)*
- Impervious Surface: 35%
- Peak 10-year Flow Rate: 5.0 cfs**
- Peak 100-year Flow Rate: 5.8 cfs**

*Based on model developed for CSMP

** Estimated flow rates based on capacity of culvert under Sweetwater Curve.

Possible Alternatives:

This area is located on private property. Therefore, no work will be done by the City on this property. However, if the homeowner wishes to regrade the lot, they could do so. Any fill in excess of 100 cubic yards would require a Conditional Use Permit from the City.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6.)

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 41 – 5775 Smithtown Way

Description of Problem:

This property is adjacent to 5790 Smithtown Way. The description of the problem, hydrologic information, and possible alternatives are the same for this property as those outlined for ***Problem Area Number 35***.

The homeowner has a concern about the amount of runoff flowing through her backyard. She believes the problem is created by the construction of the new house 5835 Eureka Road.

A review of the City's records indicates that there is a drainage and utility easement located in the backyard of this property.

During the large October rainfall event, it was noted that the low spot at 5815 Eureka Road (See ***Problem Area Number 26***) had standing water that backed up and over-topped Eureka Road. This water was conveyed through the backyards to this property. However, it does appear that the runoff was contained within the drainage and utility easement.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6.)

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

The City will be working with the house builder to address the potential for runoff over-topping Eureka Road**.**

Problem Area Number 42 – 5970 Strawberry Lane

Description of Problem:

This property owner is concerned about standing water in the neighbor's yard and along his common lotline. He would like his neighbor to the north to install a culvert under his driveway so that runoff will be conveyed to the existing wetland north of the neighbor's property.

Hydrologic Information:

- Tributary Area: 4.7 ac
- Impervious Surface: 19%
- Peak 10-year Flow Rate: 9.5 cfs
- Peak 100-year Flow Rate: 17.0 cfs

Possible Alternatives:

The following alternatives are available to reduce the potential for nuisance flooding at this site:

1. Do nothing. There is an emergency overflow located at the west end of the property that would allow runoff to overflow to a pond in back of the property prior to flooding the structure located at 5970 Strawberry Lane.

2. Installation of a culvert in the neighbor's property. This could be done, but it appears there would be a minimal amount of hydraulic head over the culvert to convey water to the north. It appears the area most likely would remain wet after large storm events unless the culvert could be installed at a lower elevation and the adjacent ground graded to drain toward the culvert. Since this is a relatively large area that is very flat, this does not appear to be a very practical solution. It is anticipated that the construction costs associated with this work will be approximately $4,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.)

A letter will be sent to the resident recommending that he contact his neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 43 – 20458/ 20456 / 20454 / 20452 / 20450 Knightsbridge Road (Amesbury Townhomes)

Description of Problem:

This problem area is immediately downstream of an existing wetland. During the storm events, the wetland filled up until it reached its over-topping elevation. Once this happened, the runoff that normally would have been contained within the basin was conveyed down the hill through the drainage swale adjacent to the townhomes and into a culvert located under Knightsbridge Road. The capacity of this storm sewer system does not appear to be adequate to convey the runoff rate from the area. Therefore, the townhomes were flooded. A subdivision of existing lots in the upstream reach of this subwatershed was under construction when the flooding occurred.

Hydrologic Information:

- Tributary Area: 6.5 ac (reduced to 5.6 ac with new construction upstream)
- Impervious Surface: 17% (based on proposed conditions)
- Peak 10-year Flow Rate: 12.6 cfs*
- Peak 100-year Flow Rate: 22.4 cfs*

*Peak rates based on proposed conditions

Possible Alternatives:

The following alternatives are available to reduce the potential for flooding at this site:

1. Provide a positive outlet from the wetland located on the common lot line. By providing a positive outlet, the storage in this basin can be used to reduce peak rates. A possible secondary benefit would be that the outlet pipe could be constructed so that the runoff is conveyed in the pipe rather than through the overland swale adjacent to the townhomes. Increasing the size of the wetland and/or constructing a berm across the natural overflow outlet could create additional storage. This work would have to be coordinated with the Minnehaha Creek Watershed District so that the requirements of the Wetland Conservation Act are met. It is anticipated that the construction costs associated with this work will be approximately $12,000.

2. A larger pipe could replace the 18-inch RCP with greater conveyance capacity. Consideration should be given to providing a larger pipe that is less susceptible to plugging by debris. It is anticipated that the construction costs associated with this work will be approximately $56,000.

3. Do nothing. The Homeowner's Association could monitor the wetland level and pump the water down to provide some storage for larger runoff events. It should be noted that this might not eliminate flooding potential, depending on the amount of pumping that can be achieved between storm events.

Recommendation:

It is recommended that this problem area be categorized as a “Private Nuisance with No City Responsibility” area (Category 5.)

A letter will be sent to the Homeowners Association recommending that they contact their residents to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

Problem Area Number 44 – 6045 Burlwood Court

Description of Problem:

This property owner called to complain about standing water located between her house and the neighbor to the west. They are also concerned about a bad odor, presumably from standing water. During the November 8, 2005 site visit, no standing water was observed.

Hydrologic Information:

- Tributary Area: 1.7 ac
- Impervious Surface: 13%
- Peak 10-year Flow Rate: 3.7 cfs
- Peak 100-year Flow Rate: 6.8 cfs

Possible Alternatives:

The following alternatives are available that may reduce the potential for standing water in this area:

1. Do nothing. There does not appear to be flood potential. Based on the City's one foot contour information, the emergency overflow to Burlwood Court is approximately 975. The homes adjacent to this low point have a low building opening of greater than 976 (6065 Burlwood Court) or 979.5 (6045 Burlwood Court), which provides approximately one foot of freeboard.

2. Construction of an outlet to the Burlwood Court storm sewer would minimize standing water at this location. It is anticipated that the construction costs associated with this work will be approximately $11,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.)

Problem Area Number 45 – 5480 Carrie Lane

Description of Problem:

This property owner contacted the City for assistance after experiencing minor erosion on her property after the heavy rainfall event in September. The property owner wanted to use salvaged landscape rock that had washed off the entrance area to Carrie Lane. Carrie Lane is a private road. Therefore, the City is not responsible for maintenance of this road.

Hydrologic Information:

- *No hydrologic information was gathered nor an analysis made as this is a private matter.*

Possible Alternatives:

The homeowner desired to use the salvaged material, although it was recommended that larger rip-rap or other channel stabilization measures may be necessary due to the high velocity of runoff coming through the culvert under their driveway. Since this was a private system entirely on private property, it was determined that the homeowner could proceed at their own risk.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6.)

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 46 – 5480 Teal Circle

Description of Problem:

This property owner contacted the City concerned that a neighbor had dammed up the channel with concrete blocks, and the blocks were causing erosion to the channel banks. The resident also expressed concern that increased runoff due to a pond south of the Hennepin County Regional Trail being filled in over time with sediment.

Hydrologic Information:

- Tributary Area: 20 ac
- Impervious Surface: 30%
- Peak 10-year Flow Rate: 19.2 cfs*
- Peak 100-year Flow Rate: 24.8 cfs*

* Peak flow rates based on model developed for CSMP.

Possible Alternatives:

City crews removed the concrete blocks on November 2, 2005. Dredging of the pond could be accomplished when the Harding Lane improvements are constructed (see ***Problem Area 22***.)

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6.)

A letter informing the homeowner of this will be mailed, but no further analysis of this site will be made without direction from the City.

Problem Area Number 47 – 6060 Strawberry Lane

Description of Problem:

This property owner has standing water in his yard and he would like to grade the road ditch towards the Regional Trail to provide a positive outlet for standing water in his front yard. It appears the previous homeowner had placed fill in a portion of the ditch. He does not want to lose trees in his back yard. Therefore, he is not receptive to having the Regional Trail Authority provide a ditch along their trail corridor.

An outlet culvert is located under Strawberry Lane that conveys runoff in the south ditch of the Regional Trail from the west side of Strawberry Lane to the east side. This water then is conveyed into Freeman Park.

Hydrologic Information:

- Tributary Area: 0.3 ac*
- Impervious Surface: 30%
- Peak 10-year Flow Rate: 1.0 cfs
- Peak 100-year Flow Rate: 1.6 cfs

*Hydrologic information listed is for area directly tributary to road side ditch. The total area tributary to the Regional Trail ditch is significantly larger.

Possible Alternatives:

1. In order to minimize the amount of standing water that is present within this property, the old drainage ditch could be dredged out along the Regional Trail. In lieu of this, the property owner mentioned that he would dig out a small channel to drain the water out. The property owner also asked permission to dig out the road ditch adjacent to his property. It is anticipated that the construction costs associated with this work will be approximately $1,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.)

A letter will be sent to the resident recommending that he contact his neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

The letter will also indicate to the property owner that the maintenance of the ditch adjacent to Strawberry Lane within his property limits would be acceptable, provided the ditch was cleaned out but not lined with rock.

Problem Area Number 48 – 5820 Eureka Road

Description of Problem:

This property is located across the street from 5815 Eureka Road. The description of the problem, hydrologic information, and possible alternatives are the same as those outlined for ***Problem Area Number 26***.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6.)

No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

The City is working with the builder to construct improvements at 5815 Eureka Road, which will minimize the potential for flooding across Eureka Road.

Problem Area Number 49 – 20480 Radisson Road

Description of Problem:

The resident contacted the City to express concern about the amount of runoff from Radisson Road. It appears that the runoff was conveyed over his driveway and across his lawn, where it may have displaced a portion of a keystone block retaining wall. The wall is approximately six to seven feet high and does not appear to have any tiebacks. This lack of tiebacks may have contributed to the displacement of the wall.

Hydrologic Information:

- Tributary Area: 0.4 ac
- Impervious Surface: 23%
- Peak 10-year Flow Rate: 1.2 cfs
- Peak 100-year Flow Rate: 2.0 cfs

Possible Alternatives:

The following alternatives are available to correct the drainage problem at this site:

1. Install curb and gutter along Radisson Road when the street is reconstructed. It is anticipated that the construction costs associated with this work will be approximately $17,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with Limited Public Responsibility" area (Category 4) since a portion of the runoff comes from City Right-of-Way.

The area below the retaining wall is a good location for a storm water treatment pond. If the City desires to upgrade Radisson Road with curb and gutter in the future, consideration should be given to obtaining an easement in this area for a storm water treatment pond.

Problem Area Number 50 – 6120 Riviera Lane

Description of Problem:

The property owner contacted the City to express concern over standing water at the end of his driveway. This area is in the low point of Riviera Road, adjacent to a wetland. The standing water is caused by the crown of the road trapping water in this area.

Hydrologic Information:

- Tributary Area: 4.4 ac
- Impervious Surface: 13%
- Peak 10-year Flow Rate: 6.8 cfs
- Peak 100-year Flow Rate: 12.7 cfs

Possible Alternatives:

The following alternatives are available to reduce the nuisance flooding in this area:

1. Regrade Riviera Lane road surface. It is anticipated that the construction costs associated with this work will be approximately $14,000. Substantial cost savings would be realized if this work was to be completed as a part of the reconstruction of the Riviera Lane road surface.

Recommendation:

It is recommended that this problem area be categorized as a "Public Nuisance" area (Category 3.) The project is not cost-effective unless it is done as part of an overall reconstruction of Riviera Lane. Therefore, it is recommended that the project not be undertaken until the City reconstructs the road surface at Riviera Lane.

A letter will be sent to the property owner informing them of this, but no further analysis will be made without direction from the City.

Problem Area Number 51 – 26505 Maple Avenue

Description of Problem:

The property owner contacted the City to express concern about standing water in their yard. Their property is an inside lot with no direct access to the street, with the exception of their driveway through Maple Avenue.

Hydrologic Information:

- Tributary Area: 2.0 ac*
- Impervious Surface: 15%
- Peak 10-year Flow Rate: 5.1 cfs
- Peak 100-year Flow Rate: 9.2 cfs

*Hydrologic information listed is for area directly tributary to low spot between houses. The entire area is low and has a larger total tributary area.

Possible Alternatives:

Since this a low land-locked area, the only alternative would be to construct a large trunk storm sewer to provide a positive outlet for this property. The trunk sewer could also serve as a conveyance system for ***Problem Area Number 47 and Problem Area Number 29***. It is anticipated that the construction costs associated with this system will be approximately $215,000.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5.)

A letter will be sent to the resident recommending that he contact his neighbors to discuss alternatives and that they work together to provide a solution to the problem. No further analysis will be undertaken by WSB on this problem area unless directed by the City to do so.

III. SUMMARY AND RECOMMENDATIONS

Generally, the City's drainage issues can be classified as nuisance flooding, with a few exceptions. ***Tables 1 – 6*** summarize the problem areas by each of the six categories outlined at the beginning of this report. Of the 51 problem areas, only three are recommended for immediate correction. These are the areas listed under Category 1, which may pose a threat to public safety if left unchecked.

Table 1 outlines the problem areas that may impact the public health or safety (Category 1). It is anticipated that flooding risks at the two areas can be reduced through construction projects with an estimated cost of $29,000 to $44,000.

Table 2 is provided as a place holder should any new areas be discovered in which the problem area will have a negative impact on the residents as a whole (Category 2.)

Table 3 shows the problem areas that are a public nuisance (Category 3.) It is anticipated that flooding risks at the two areas can be reduced through construction projects with an estimated cost of $22,000 to $33,000. The flooding problem at Lake South Auto has already been addressed and the other area is a nuisance problem that does not pose an immediate threat to any buildings. Therefore, it is recommended that these projects be deferred until a time the projects could be combined with other work in the vicinity.

Table 4 outlines the problem areas that either involve a site where the problem is caused, at least partially, by runoff generated within the City's Right-of-Way, or where a large drainage area is causing a problem to a small area, limiting a single resident to easily solve the problem by themselves (Category 4.) It is anticipated that that flooding risks at these areas can be reduced through construction projects with an estimated cost of $216,300 to $916,200. It should be noted that costs vary greatly dependent upon the scope and solutions of the projects noted. Design projects would have to be undertaken to determine a more specific detail of the costs.

Of the areas within this category, it is recommended that the areas identified as a flooding threat to any buildings should be considered first.

Table 5 outlines the problem areas that either involve a site where the problem is caused by runoff generated from private property or where a small area is involved (Category 5.) It is anticipated that that flooding risks at these areas can be reduced through construction projects with an estimated cost ranging from $345,400 to $703,100. Of these areas, it is recommended that the areas identified as a flooding threat to any buildings should be considered first. These areas are highlighted on the table, and represent a cost of $69,000.

Table 6 outlines the problem areas that, after our investigation, were deemed to not be problems Category 6.) These areas either were entirely private issues on a single property, maintenance issues addressed by City crews, or problems being addressed through the City's building permit process. There were five areas in which a resident perceived "flooding," but after further review, it was determined that the runoff was contained to portions of their property, our adjacent properties, that were covered by Drainage and Utility Easements. No further work is recommended for these areas, other than sending a letter to the resident explaining our findings.

In order to address the problem areas summarized in ***Tables 1 – 4***, the estimated costs range is between $267,300 and $993,200.

Funding:

Currently, the City has in place a stormwater fee. As design alternatives are considered, utilization of the stormwater fees, in conjunction with special assessments for benefiting areas, will need to be considered.

TABLES

Table 1

Summary of Problem Areas Categorized as "Public Safety and Health" Areas (Category 1)

PA #	Name	Address	Opinion of Probable Cost	Notes
5	Chris Farni	25360 Birch Bluff Rd	$10,000 to $15,000	Contractor has been hired to do work in spring
20	Susan Neslund	22015 Stratford Pl	$18,000 to $27,000	Recommend contacting City of Chanhassen to discuss possibility of cost split
26	Don Rogers	5815 Eureka Rd	$1,000 to $2,000	Work to be done by Clark Kent Homes as condition of building permit
		Totals	$29,000 to $44,000	

Table 2

Summary of Problem Areas Categorized as "Substantial Financial Impact to the City" Areas (Category 2)

PA #	Name	Address	Opinion of Probable Cost	Notes
				No problem areas are categorized as "Substantial Financial Impact to the City"
		Totals		

Table 3

Summary of Problem Areas Categorized as "Public Nuisance" Areas (Category 3)

PA #	Name	Address	Opinion of Probable Cost	Notes
11	Lake South Auto	Bill Kirchner	$15,000 to $19,000	Building flooded
50	Jim McFarland	6120 Riviera	$7,000 to $14,000	More cost effective if done as part of overall project when Riviera is reconstructed
		Totals	$22,000 to $33,000	

Table 4

Summary of Problem Areas Categorized as "Private Nuisance with Limited City Responsibility" Areas (Category 4)

PA #	Name	Address	Opinion of Probable Cost	Notes
24	Kay Marie	23980 Yellowstone Tr	$40,000 to $207,000	Cost will be less if constructed with Minnetonka Dr. storm sewer improvements
25	Don Chinander	23955 Clover Ln	see note	Combined with PA 24
30	Igor Zotov	23930 Yellowstone Tr	see note	Combined with PA 24
37	Anna Williams	23950 Elder Turn	see note	Combined with PA 24
39	Pat Niemi	23905/23895 Elder Turn	see note	Combined with PA 24
1	Elizabeth Birkland	6180 Murray Hill Rd	$2,000 to $31,000	
7	Marilyn Miscivits	5925 Grant St	$33,000 to $42,000	
21	Dorothea Hanes	5915 Grant St	see note	Combined with PA 7
17	Leslie Huberty	23350 Academy	$900 to $53,000	
18	John Dean	6180 Chaska Rd	$2,000 to $3,200	Home owner willing to do work
3	Minnetonka CC	Maxwell Olson	$120,000 to $533,000	Has potential for comprehensive "regional" system; phased construction possible
13	Russ Aldrich	4770 Lakeway Terrace	$900 to $12,000	
38	Dave Mueller	23075 State Hwy 7	$2,500 to $18,000	
49	Doug Maxwell	20480 Radisson Road	$15,000 to $17,000	
		Totals	$216,300 to $916,200	

NOTE: Projects are listed in recommended order of priority. Highlighted areas represent the areas that experienced flooding of buildings.

Table 5

Summary of Problem Areas Categorized as "Private Nuisance with No City Responsibility" Areas (Category 5)

PA #	Name	Address	Opinion of Probable Cost	Notes
6	Ketti & Mike Histon	26220 Wild Rose Ln	$6,000 to $13,000	House flooded
43	Amesbury Townhomes	Tom Maple	$12,000 to $56,000	Townhouses flooded
31	Diane Buranen	24735 Glen Rd	$65,000 to $82,000	Long-term problem
22	Pat Brown	5635 Harding Ln	$8,900 to $87,000	Long-term problem
23	Adam McArthur	5615 Harding Ln	see note	Combined with PA 22
2	Kim Culp	6100 Apple Rd	$12,000 to $16,000	
9	Greg Johnson	4980 Suburban Dr	$4,000 to $8,000	
12	Nathan Shanklin	21165 Mtka Blvd	$4,000 to $12,000	
14	Ann Levenworth	28070 Woodside Rd	$1,700 to $5,000	
16	Larry Reid	27780 Island View Rd	$4,500 to $7,800	
28	Greg Sochko	5600 Wedgewood Dr	$18,500 to $156,000	More cost effective if done with overall project when Wedgewood is reconstructed
29	Kizilos-Clift	26395 Peach Circle	$22,000 to $27,000	
34	Bob Castellano	5900 Afton Rd	$1,700 to $2,100	
42	Brian Lieffers	5970 Strawberry Lane	$3,300 to $4,200	
44	Ellen Jordano	6045 Burlwood Ct	$9,000 to $11,000	
47	Don Johnson	6060 Strawberry Lane	$800 to $1,000	
51	Eileen Koehnen	26505 Maple Ave	$172,000 to $215,000	
		Totals	$345,400 to $703,100	

NOTE: Projects are listed in recommended order of priority. Highlighted areas represent the areas that experienced flooding of buildings.

Table 6

Summary of Problem Areas Categorized as "No Further Action Required" Areas (Category 6)

PA #	Name	Address	Opinion of Probable Cost	Notes
4	Jim Cradit	5925 Galpin Lake Rd	N/A	Problem addressed through building permit process
8	Kathy Kucera	20955 Ivy Lane	N/A	Private matter on individual lot
10	Mike Messina	25720 & 25722 Wildrose Ln	N/A	Property owner has addressed problem
15	Frontier Electric	800 Water Street	N/A	Problem addressed through other governmental entities
19	Craig Johnson	26025 Birch Bluff Rd	N/A	Problem addressed by City crews
27	John Majestic	5840 Eureka Rd	N/A	This appears to be related to a high groundwater level
32	Barb Richman	5770 Smithtown Way	N/A	Not really a problem - runoff contained within Drainage & Utility Easement
33	Glen Gillund	26275 Smithtown Rd	N/A	Problem addressed by City crews
35	Shelly McGinnis	5790 Smithtown Way	N/A	Not really a problem - runoff contained within Drainage & Utility Easement
36	Ann Seymour	27475 Pine Bend	N/A	Previously addressed by City - appears to be related to a high groundwater level
40	Melena Gross	19660 Silver Lake Tr	N/A	Not really a problem - wetland contained within Drainage & Utility Easement
41	Darcy Bertagnoli	5775 Smithtown Way	N/A	Not really a problem - runoff contained within Drainage & Utility Easement
45	Carol McClure	5480 Carrie Ln	N/A	Private matter on individual lot
46	Pat Arnst	5480 Teal Circle	N/A	Problem addressed by City crews
48	Mark McClure	5820 Eureka Rd	N/A	Problem will be addressed through building permit process

APPENDIX A

Appendix A

Opinion of Probable Cost

Problem Area 1 - 6180 Murray Hill Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Remove Bituminous Pavement	200	SY	$5.00	$1,000.00
3	Salvage and Reinstall Base Course Aggregate	35	CY	$12.00	$420.00
4	Excavation	20	CY	$15.00	$300.00
5	Storm Sewer (15" RCP)	120	LF	$40.00	$4,800.00
6	Catch Basins and Manholes	5	EA	$1,250.00	$6,250.00
7	Bituminous Pavement	45	TN	$150.00	$6,750.00
				Subtotal	$24,520.00
				+25% Contingencies	$6,130.00
				Total	**$30,650.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct Berm on West Edge of Road)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$750.00	$750.00
2	Imported Borrow Material	45	CY	$15.00	$675.00
3	Turf Establishment	200	SY	$2.00	$400.00
				Subtotal	$1,825.00
				+25% Contingencies	$456.00
				Total	**$2,281.00**

Preliminary Opinion of Probable Cost - Option 3 (Excavate a Drainage Swale Below Hill)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$1,250.00	$1,250.00
2	Excavation	75	CY	$8.00	$600.00
3	Turf Establishment	250	SY	$2.00	$500.00
				Subtotal	$2,350.00
				+25% Contingencies	$588.00
				Total	**$2,938.00**

Appendix A

Opinion of Probable Cost

Problem Area 2 - 6100 Apple Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Storm Sewer (15" HDPE)	250	LF	$25.00	$6,250.00
3	Catch Basins and Manholes	4	EA	$750.00	$3,000.00
4	Restoration	1	LS	$750.00	$750.00
				Subtotal	$12,500.00
				+25% Contingencies	$3,125.00
				Total	**$15,625.00**

Appendix A

Opinion of Probable Cost

Problem Area 3 - Minnetonka Country Club

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$25,000.00	$25,000.00
2	Excavation	15000	CY	$12.00	$180,000.00
3	Storm Sewer (12" RCP)	600	LF	$35.00	$21,000.00
4	Storm Sewer (15" RCP)	300	LF	$40.00	$12,000.00
5	Storm Sewer (27" RCP)	2000	LF	$85.00	$170,000.00
6	Catch Basins and Manholes	9	EA	$1,250.00	$11,250.00
7	Turf Establishment	5	Ac	$1,500.00	$7,500.00
				Subtotal	$426,750.00
				+25% Contingencies	$106,688.00
				Total	**$533,438.00**

Appendix A

Opinion of Probable Cost

Problem Area 5 - 25360 Birch Bluff Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Remove Existing Culvert	1	LS	$800.00	$800.00
3	Furnish and Install 30" RCP-A	30	LF	$100.00	$3,000.00
4	Pipe Bedding	20	TN	$15.00	$300.00
5	Pavement Removal & Restoration	50	SY	$100.00	$5,000.00
6	Sediment Removal at Edge of Lake	1	LS	$500.00	$500.00
				Subtotal	$12,100.00
				+25% Contingencies	$3,025.00
				Total	**$15,125.00**

Appendix A

Opinion of Probable Cost

Problem Area 6 - 26220 Wild Rose Lane

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Seal low building openings)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Seal walkout door and lookout window	1	LS	$7,500.00	$7,500.00
				Subtotal	$10,000.00
				+25% Contingencies	$2,500.00
				Total	**$12,500.00**

Preliminary Opinion of Probable Cost - Option 2 (Excavate swale)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Excavation	130	CY	$14.00	$1,820.00
3	Restoration	1	LS	$750.00	$750.00
				Subtotal	$5,070.00
				+25% Contingencies	$1,268.00
				Total	**$6,338.00**

Appendix A

Opinion of Probable Cost

Problem Area 7 - 5925 Grant Street

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$3,500.00	$3,500.00
2	Remove Bituminous Pavement	200	SY	$5.00	$1,000.00
3	Storm Sewer (12" RCP)	80	LF	$35.00	$2,800.00
4	Storm Sewer (15" RCP)	90	LF	$40.00	$3,600.00
5	Storm Sewer (27" RCP)	70	LF	$85.00	$5,950.00
6	Catch Basins and Manholes	5	EA	$1,250.00	$6,250.00
7	Salvage and Reinstall Base Course Aggregate	35	CY	$12.00	$420.00
8	Bituminous Pavement	45	TN	$150.00	$6,750.00
9	Turf Establishment	1500	SY	$2.00	$3,000.00
				Subtotal	$33,270.00
				+25% Contingencies	$8,318.00
				Total	**$41,588.00**

Appendix A

Opinion of Probable Cost

Problem Area 9 - 4980 Suburban Drive

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Storm Sewer (8" HDPE)	60	LF	$12.00	$720.00
3	Catch Basins and Manholes	2	EA	$750.00	$1,500.00
4	Restoration	1	LS	$500.00	$500.00
				Subtotal	$5,220.00
				+25% Contingencies	$1,305.00
				Total	**$6,525.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct berm)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Imported Borrow Material	30	CY	$25.00	$750.00
3	Restoration	1	LS	$200.00	$200.00
				Subtotal	$3,450.00
				+25% Contingencies	$863.00
				Total	**$4,313.00**

Preliminary Opinion of Probable Cost - Option 3 (Pave Driveway)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$800.00	$800.00
2	Subgrade Prep	1	LS	$200.00	$200.00
3	Bituminous Pavement	35	TN	$150.00	$5,250.00
				Subtotal	$6,250.00
				+25% Contingencies	$1,563.00
				Total	**$7,813.00**

Appendix A

Opinion of Probable Cost

Problem Area 11 - 25575 Smithtown Road (Lake South Auto)

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Remove Bituminous Pavement	150	SY	$5.00	$750.00
3	Salvage and Reinstall Base Course Aggregate	25	CY	$12.00	$300.00
4	Excavation	50	CY	$15.00	$750.00
5	Bituminous Pavement	35	TN	$150.00	$5,250.00
6	Restoration	1	LS	$3,500.00	$3,500.00
				Subtotal	$15,550.00
				+25% Contingencies	$3,888.00
				Total	**$19,438.00**

Appendix A

Opinion of Probable Cost

Problem Area 12 - 21165 Minnetonka Blvd.

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Install Flap Gate)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$1,200.00	$1,200.00
2	Manhole with Flap Gate	1	EA	$1,800.00	$1,800.00
3	Restoration	1	LS	$250.00	$250.00
				Subtotal	$3,250.00
				+25% Contingencies	$813.00
				Total	**$4,063.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct Parallel Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Storm Sewer (12" HDPE)	210	LF	$24.00	$5,040.00
3	Catch Basins and Manholes	2	EA	$750.00	$1,500.00
4	Restoration	1	LS	$500.00	$500.00
				Subtotal	$9,540.00
				+25% Contingencies	$2,385.00
				Total	**$11,925.00**

Appendix A

Opinion of Probable Cost

Problem Area 13 - 4770 Lakeway Terrace

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Install New Casting)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	New Casting	1	LS	$750.00	$750.00
				Subtotal	$750.00
				+25% Contingencies	$188.00
				Total	**$938.00**

Preliminary Opinion of Probable Cost - Option 2 (Tip Road Surface To Drain to the East)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Remove Bituminous Pavement	100	SY	$5.00	$500.00
3	Salvage and Reinstall Base Course Aggregate	20	CY	$12.00	$240.00
4	Excavation	10	CY	$15.00	$150.00
5	Bituminous Pavement	25	TN	$150.00	$3,750.00
6	Insulation of Lift Staion and Forcemain	1	LS	$2,500.00	$2,500.00
				Subtotal	$9,640.00
				+25% Contingencies	$2,410.00
				Total	**$12,050.00**

Preliminary Opinion of Probable Cost - Option 3 (Construct Berm on West Edge of Road)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$800.00	$800.00
2	Imported Borrow Material	25	CY	$15.00	$375.00
3	Turf Establishment	100	SY	$2.00	$200.00
				Subtotal	$1,375.00
				+25% Contingencies	$344.00
				Total	**$1,719.00**

Appendix A

Opinion of Probable Cost

Problem Area 14 - 28070 Woodside Rd.

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Raise Area Adjacent to Downspout Entrance)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$300.00	$300.00
2	Grouted Riprap	8	CY	$95.00	$760.00
3	Restoration	1	LS	$300.00	$300.00
				Subtotal	$1,360.00
				+25% Contingencies	$340.00
				Total	**$1,700.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct New Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$800.00	$800.00
2	Storm Sewer (12" HDPE)	80	LF	$24.00	$1,920.00
3	Catch Basins and Manholes	1	EA	$750.00	$750.00
4	Restoration	1	LS	$500.00	$500.00
				Subtotal	$3,970.00
				+25% Contingencies	$993.00
				Total	**$4,963.00**

Appendix A

Opinion of Probable Cost

Problem Area 16 - 27780 Island View Rd.

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Construct New Draintile System)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$500.00	$500.00
2	Storm Sewer (8" HDPE)	300	LF	$15.00	$4,500.00
3	Catch Basins and Manholes	3	EA	$250.00	$750.00
4	Restoration	1	LS	$500.00	$500.00
				Subtotal	$6,250.00
				+25% Contingencies	$1,563.00
				Total	**$7,813.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct Rain Garden)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$300.00	$300.00
2	Wet-tolerant plants	12	EA	$250.00	$3,000.00
3	Restoration	1	LS	$300.00	$300.00
				Subtotal	$3,600.00
				+25% Contingencies	$900.00
				Total	**$4,500.00**

Problem Area 17 - 23350 Academy Lane

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Install New Casting)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	New Casting	1	LS	$750.00	$750.00
				Subtotal	$750.00
				+25% Contingencies	$188.00
				Total	**$938.00**

Preliminary Opinion of Probable Cost - Option 2 (Excavate Ditch on South Side of Road)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$800.00	$800.00
2	Excavation	15	CY	$15.00	$225.00
3	Turf Establishment	40	SY	$2.00	$80.00
				Subtotal	$1,105.00
				+25% Contingencies	$276.00
				Total	**$1,381.00**

Preliminary Opinion of Probable Cost - Option 3 (Lower Road and Install Curb & Gutter)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Remove Bituminous Pavement	800	SY	$5.00	$4,000.00
3	Salvage and Reinstall Base Course Aggregate	140	CY	$12.00	$1,680.00
4	Excavation	80	CY	$15.00	$1,200.00
5	Curb & Gutter	800	LF	$8.00	$6,400.00
5	Bituminous Pavement	180	TN	$150.00	$27,000.00
				Subtotal	$42,780.00
				+25% Contingencies	$10,695.00
				Total	**$53,475.00**

Appendix A

Opinion of Probable Cost

Problem Area 18 - 6180 Chaska Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$800.00	$800.00
2	Excavation	100	CY	$15.00	$1,500.00
3	Turf Establishment	120	SY	$2.00	$240.00
				Subtotal	$2,540.00
				+25% Contingencies	$635.00
				Total	**$3,175.00**

Appendix A

Opinion of Probable Cost

Problem Area 20 - 22015 Stratford Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Clearing and Grubbing	1	LS	$2,000.00	$2,000.00
3	36" RCP	100	LF	$90.00	$9,000.00
4	Furnish and Install Manhole	6	LF	$500.00	$3,000.00
5	Salvage and Reinstall 36" FES	1	EA	$2,500.00	$2,500.00
				Subtotal	$21,500.00
				+25% Contingencies	$5,375.00
				Total	**$26,875.00**

Preliminary Opinion of Probable Cost - Option 2

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Clearing and Grubbing	1	LS	$2,800.00	$2,800.00
3	Furnish and Place Riprap	75	CY	$80.00	$6,000.00
4	Type IV Geotextile Fabric	100	SY	$2.00	$200.00
				Subtotal	$14,000.00
				+25% Contingencies	$3,500.00
				Total	**$17,500.00**

Appendix A

Opinion of Probable Cost

Problem Area 22 - 5635 Harding Lane

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Re-grade Back Yard Area)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$1,500.00	$1,500.00
2	Clearing and Grubbing	0.3	Ac	$1,200.00	$360.00
3	Excavation	350	CY	$14.00	$4,900.00
4	Restoration	1	LS	$400.00	$400.00
				Subtotal	$7,160.00
				+25% Contingencies	$1,790.00
				Total	**$8,950.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct New Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$1,200.00	$1,200.00
2	Storm Sewer (12" HDPE)	200	LF	$24.00	$4,800.00
3	Catch Basins and Manholes	2	EA	$2,000.00	$4,000.00
4	Restoration	1	LS	$250.00	$250.00
				Subtotal	$10,250.00
				+25% Contingencies	$2,563.00
				Total	**$12,813.00**

Preliminary Opinion of Probable Cost - Option 3 (Construct Previously Proposed Improvements)

Adjusting for inflation, it is anticiapted that the construction costs associated with this option will be **$87,000**.

Appendix A

Opinion of Probable Cost

Problem Area 24 - 23980 Yellowstone Trail

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$15,000.00	$15,000.00
2	Remove Bituminous Pavement	640	SY	$5.00	$3,200.00
3	Storm Sewer (12" RCP)	970	LF	$35.00	$33,950.00
4	Catch Basins and Manholes	9	EA	$1,250.00	$11,250.00
5	Base Course Aggregate	110	CY	$8.00	$880.00
6	Bituminous Pavement	500	TN	$150.00	$75,000.00
7	Curb & Gutter	1940	LF	$12.00	$23,280.00
8	Turf Establishement	1620	SY	$2.00	$3,240.00
				Subtotal	$165,800.00
				+25% Contingencies	$41,450.00
				Total	**$207,250.00**

Appendix A

Opinion of Probable Cost

Problem Area 26 - 5815 Eureka Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$300.00	$300.00
2	Excavation	15	CY	$10.00	$150.00
3	Furnish and Place Field Stone Riprap	5	CY	$80.00	$400.00
4	Type IV Geotextile Fabric	40	SY	$2.00	$80.00
				Subtotal	$930.00
				+25% Contingencies	$233.00
				Total	**$1,163.00**

Appendix A

Opinion of Probable Cost

Problem Area 28 - 5600 Wedgewood Drive

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Re-grade Ditch to Provide Positive Outlet to West)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$1,500.00	$1,500.00
2	Excavation	500	CY	$10.00	$5,000.00
3	Restoration	1	LS	$300.00	$300.00
4	Wetland Mitigation	0.3	AC	$25,000.00	$7,500.00
				Subtotal	$14,300.00
				+25% Contingencies	$3,575.00
				Total	**$17,875.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct New Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$15,000.00	$15,000.00
2	Remove Bituminous Pavement	1600	SY	$5.00	$8,000.00
3	Storm Sewer (12" RCP)	850	LF	$35.00	$29,750.00
4	Catch Basins and Manholes	4	EA	$1,250.00	$5,000.00
5	Base Course Aggregate	275	CY	$8.00	$2,200.00
6	Bituminous Pavement	360	TN	$150.00	$54,000.00
7	Turf Establishement	1800	SY	$2.00	$3,600.00
8	Wetland Mitigation	0.3	AC	$25,000.00	$7,500.00
				Subtotal	$125,050.00
				+25% Contingencies	$31,263.00
				Total	**$156,313.00**

Appendix A

Opinion of Probable Cost

Problem Area 29 - 26395 Peach Circle

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$4,500.00	$4,500.00
2	Excavation	1700	CY	$10.00	$17,000.00
3	Restoration	1	LS	$300.00	$300.00
				Subtotal	$21,800.00
				+25% Contingencies	$5,450.00
				Total	**$27,250.00**

Appendix A

Opinion of Probable Cost

Problem Area 31 - 24735 Glen Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Storm Sewer (15" HDPE - directional bore)	400	LF	$100.00	$40,000.00
3	Storm Sewer (27" RCP)	200	LF	$85.00	$17,000.00
4	Catch Basins and Manholes	4	EA	$750.00	$3,000.00
5	Cleanout Existing Pipe at Railroad	1	LS	$500.00	$500.00
6	Restoration	1	LS	$2,500.00	$2,500.00
				Subtotal	$65,500.00
				+25% Contingencies	$16,375.00
				Total	**$81,875.00**

Appendix A

Opinion of Probable Cost

Problem Area 34 - 5900 Afton Rd

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$300.00	$300.00
2	Excavation	70	CY	$15.00	$1,050.00
3	Restoration	1	LS	$300.00	$300.00
				Subtotal	$1,650.00
				+25% Contingencies	$413.00
				Total	**$2,063.00**

Appendix A

Opinion of Probable Cost

Problem Area 38 - 23075 State Hwy 7

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Construct New Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$1,200.00	$1,200.00
2	Remove Bituminous Pavement	81	SY	$5.00	$405.00
3	Storm Sewer (15" RCP)	200	LF	$40.00	$8,000.00
4	Catch Basins and Manholes	2	EA	$1,250.00	$2,500.00
5	Base Course Aggregate	15	CY	$8.00	$120.00
6	Bituminous Pavement	15	TN	$150.00	$2,250.00
8	Turf Establishement	25	SY	$2.00	$50.00
				Subtotal	$14,525.00
				+25% Contingencies	$3,631.00
				Total	**$18,156.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct Manhole Over Existing Storm Sewer)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$500.00	$500.00
2	Manhole	1	EA	$1,250.00	$1,250.00
3	Restoration	1	LS	$250.00	$250.00
				Subtotal	$2,000.00
				+25% Contingencies	$500.00
				Total	**$2,500.00**

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Opinion of Probable Cost

Problem Area 42 - 5970 Strawberry Lane

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$1,200.00	$1,200.00
2	Remove Bituminous Pavement	40	SY	$5.00	$200.00
3	Storm Sewer (15" CMP)	30	LF	$25.00	$750.00
4	Salvage and Reinstall Base Course Aggregate	8	CY	$12.00	$96.00
5	Bituminous Pavement	5	TN	$150.00	$750.00
6	Turf Establishment	15	SY	$2.00	$30.00
7	Excavate to Provide Positive Drainage	25	CY	$12.00	$300.00
				Subtotal	$3,326.00
				+25% Contingencies	$832.00
				Total	**$4,158.00**

Appendix A

Opinion of Probable Cost

Problem Area 43 - Amesbury Townhomes

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost - Option 1 (Increase Storage and Construct New Storm Sewer Upstream)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$800.00	$800.00
2	Storm Sewer (12" HDPE)	210	LF	$24.00	$5,040.00
3	Catch Basins and Manholes	3	EA	$750.00	$2,250.00
4	Common Borrow	100	CY	$8.00	$800.00
5	Restoration	1	LS	$500.00	$500.00
				Subtotal	$9,390.00
				+25% Contingencies	$2,348.00
				Total	**$11,738.00**

Preliminary Opinion of Probable Cost - Option 2 (Construct New Storm Sewer Downstream of Knightsbridge)

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$800.00	$800.00
2	Storm Sewer (48" RCP)	370	LF	$110.00	$40,700.00
3	Catch Basins and Manholes	2	EA	$1,250.00	$2,500.00
4	Restoration	1	LS	$500.00	$500.00
				Subtotal	$44,500.00
				+25% Contingencies	$11,125.00
				Total	**$55,625.00**

Appendix A

Opinion of Probable Cost

Problem Area 44 - 6045 Burlwood Ct

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Remove Bituminous Pavement	60	SY	$5.00	$300.00
3	Storm Sewer (12" RCP)	40	LF	$35.00	$1,400.00
5	Salvage and Reinstall Base Course Aggregate	8	CY	$12.00	$96.00
6	Bituminous Pavement	13	TN	$150.00	$1,950.00
7	Curb & Gutter	20	LF	$12.00	$240.00
8	Turf Establishement	30	SY	$2.00	$60.00
				Subtotal	$9,046.00
				+25% Contingencies	$2,262.00
				Total	**$11,308.00**

Appendix A

Opinion of Probable Cost

Problem Area 47 - 6060 Strawberry Ln

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$300.00	$300.00
2	Excavation	15	CY	$15.00	$225.00
3	Restoration	1	LS	$300.00	$300.00
				Subtotal	$825.00
				+25% Contingencies	$206.00
				Total	**$1,031.00**

Appendix A

Opinion of Probable Cost

Problem Area 49 - 20480 Radisson Road

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Remove Bituminous Pavement	200	SY	$5.00	$1,000.00
3	Salvage and Reinstall Base Course Aggregate	35	CY	$12.00	$420.00
4	Excavation	20	CY	$15.00	$300.00
5	Bituminous Pavement	45	TN	$150.00	$6,750.00
5	Curb & Gutter	200	LF	$12.00	$2,400.00
				Subtotal	$13,370.00
				+25% Contingencies	$3,343.00
				Total	**$16,713.00**

Appendix A

Opinion of Probable Cost

Problem Area 50 - 6120 Riviera Lane

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$2,500.00	$2,500.00
2	Remove Bituminous Pavement	200	SY	$5.00	$1,000.00
3	Salvage and Reinstall Base Course Aggregate	35	CY	$12.00	$420.00
4	Excavation	20	CY	$15.00	$300.00
5	Bituminous Pavement	45	TN	$150.00	$6,750.00
				Subtotal	$10,970.00
				+25% Contingencies	$2,743.00
				Total	**$13,713.00**

Appendix A

Opinion of Probable Cost

Problem Area 51 - 26505 Maple Ave

A preliminary opinion of probable cost is given below. Costs are for the construction of improvements only and do not include easements and / or land acquisition costs. It is anticipated that the benefited property owners will donate easements. Costs for engineering and administration are also not included. Costs may vary significantly based on final scope of project. Actual costs will be determined when survey and feasibility reports are completed.

Preliminary Opinion of Probable Cost

Item No.	Description	Quantity	Unit	Unit Cost	Total
1	Mobilization	1	LS	$3,500.00	$3,500.00
2	Remove Bituminous Pavement	80	SY	$5.00	$400.00
3	Storm Sewer (12" RCP)	600	LF	$35.00	$21,000.00
4	Storm Sewer (15" RCP)	600	LF	$40.00	$24,000.00
5	Storm Sewer (18" RCP)	1900	LF	$50.00	$95,000.00
6	Catch Basins and Manholes	10	EA	$1,250.00	$12,500.00
7	Salvage and Reinstall Base Course Aggregate	20	CY	$12.00	$240.00
8	Bituminous Pavement	20	TN	$150.00	$3,000.00
9	Turf Establishment	6200	SY	$2.00	$12,400.00
				Subtotal	$172,040.00
				+25% Contingencies	$43,010.00
				Total	**$215,050.00**

APPENDIX B

Appendix B

List of Recommended Maintenance Items

Number	Address	Maintenance Activity Required	Additional Comments
7	5925 Grant St	Remove obstructions from pipe entrances	Home owner should be responsible for system on their property
12	21165 Mtka Blvd	Remove obstructions from pipe entrances	
13	4770 Lakeway Terrace	Replace beehive casting with higher capacity grate	One-time activity
15	800 Water Street	Remove silt from FES at TH 7/41 intersection	
17	23350 Academy	Remove silt from CB grate/replace with beehive grate	
24	23980 Yellowstone Tr	Continue monitoring water level	Additional pumping may be necessary
33	26275 Smithtown Rd	Remove obstructions from pipe entrances	
34	5900 Afton Rd	a. Repair sink hole adjacent to CB west of Afton Rd.	One-time activity
		b. Re-grade turf areas adjacent to Afton Rd	Provide positive drainage from road surface; one-time activity
		c. Repair sink holes at culverts east of Afton Rd	One-time activity
46	5480 Teal Circle	Remove obstructions from ditch	
49	20480 Radisson Road	Place temporary bituminous curb at end of driveway	

SUPPLEMENTAL REPORT

ANALYSIS OF DRAINAGE PROBLEM AREAS WITHIN THE CITY OF SHOREWOOD

PREPARED FOR THE
CITY OF SHOREWOOD, MINNESOTA

January 22, 2007

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CERTIFICATION

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Steven Gurney, P.E.

Date: January 22, 2007 Reg. No. 40497

I. INTRODUCTION

On January 23, 2006, a report entitled "Analysis of Drainage Problem Areas within the City of Shorewood" was approved by the Shorewood City Council. Since that time, other property owners have contacted the City requesting that their property be added to the list.

The history behind the original report is not reiterated here; however, the various categories previously established during the preparation of that report are outlined below:

1) PUBLIC SAFETY AND HEALTH

Primary attention will be paid to those projects that impact the public health or safety. These projects would include ice problems on the road, erosion that is causing a hazardous structural problem (i.e. undermining a road), or storm water that is causing a significant health problem (such as flooding the sanitary system).

2) SUBSTANTIAL FINANCIAL IMPACT TO THE CITY

This category will include those projects that, while not endangering the public health, will still have a negative impact on the residents as a whole. Projects in this category include minor infrastructure replacement that cannot be funded cost effectively by other means. Other potential projects include erosion causing property damage and minor structure replacement.

3) PUBLIC NUISANCE

This category includes those projects that cannot be considered a substantial hazard, are not likely to cause a financial loss to the City, but are a public nuisance. These projects include standing water in the roadway, unwanted flooding in public parks, and minor erosion projects.

4) PRIVATE NUISANCE WITH LIMITED CITY RESPONSIBILITY

This category includes projects that are a nuisance to a single residence or small group of residences that the City Council deems that the City has some responsibility to help correct. These projects include those instances where a large drainage area is causing a problem to a small area or where a substantial portion of the runoff is generated within the City's Right-of-Way.

In order for the City to participate, the homeowner(s) must be willing to provide a right-of-entry to City crews and provide Drainage and Utility Easement over improvements without cost.

5) PRIVATE NUISANCE WITH NO CITY RESPONSIBILTY

This category includes projects that are a nuisance to a single residence or small group of residences that the City Council deems that the City has no responsibility to help correct. These projects include those instances where a limited drainage area, consisting of

private property, is causing a problem to a small area. The nuisance problem will involve little or no runoff that is generated from City Right-of-Way.

6) NO FURTHER ACTION REQUIRED

This category includes projects that are under way, or have been addressed through various means, such as individual homeowners correcting the problem himself or herself or City crews fixing the problem.

The problem areas are all evaluated and a category assigned so that the City Council can begin to prioritize the problem areas.

With the exception of three areas, the new problem areas are areas that either the City has no responsibility for or no further action is required. Therefore, Tables 1-6, created as part of the original report, are not updated here. The new problem areas can simply be added to the bottom of the lists as there is no prioritization needed for these new areas.

II. DISCUSSION OF PROBLEM AREAS

Since the original report was approved by the City Council, the City received additional drainage complaints. Since that time, we have investigated each of the various areas to visit with concerned residents, gather additional information, take pictures, and where possible, observe the problems.

The results of this preliminary investigation are presented in the following pages. Each problem area has a brief description of the complaint expressed by the property owner followed by a summary of the hydrologic characteristics of the subwatershed tributary to the site.

Next, possible alternatives that may be considered to address the problems at the subject site are outlined. A preliminary cost estimate for each alternative is also provided.

Following that is a recommendation by WSB as to how the City should proceed. Most of the areas are within private property and do not require much additional investigation by City Staff or their consultants. However, there are several areas that, because of their proximity to or the amount of public property involved in the tributary area, will require further review.

Unless otherwise noted, the hydrologic information is based on a cursory review of the subwatershed tributary to the problem area. The Soil Conservation Service's TR-20 method was used to estimate flow rates from the subwatershed directly tributary to the problem area.

Problem Area Number 52 – 5985 Eureka Rd

Description of Problem:

The property owner contacted the City concerned about the amount of water flowing through their property. They indicated that he water was so high during the September 2005 storm that it overtopped Eureka Road. A review of the City's contour information indicates that this is property contains a drainage way that conveys runoff from areas east of the property. Typically, road culverts are designed to convey runoff from a storm event up to a 10-year storm event. After that, the runoff is allowed to overtop the road unless doing so would threaten to flood an upstream property. The contours also show that the house is at least one foot higher than the low point in the road, so runoff will overtop the road before flooding the house. It appears that the culvert is functioning as designed.

Hydrologic Information:

- Tributary Area: 13.4 ac
- Impervious Surface: 10%
- Peak 10-year Flow Rate: 26 cfs
- Peak 100-year Flow Rate: 48 cfs

Possible Alternatives:

There is no alternative identified for this area as the system seems to be functioning properly, and there is no danger of the house being flooded by surface water runoff. Should the property owner decide to place fill in their yard, caution must be exercised that the grading does not block runoff from other properties. Any fill greater than 50 cubic yards will require a permit.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the system appears to be functioning as designed.

Problem Area Number 53 – 6180 Cathcart Dr

Description of Problem:

The property owner contacted City Hall concerned about water being back up on her property. The property owner had placed fill on the property and placed silt fence along the edges, as required. Across the street, a small pond had been recently excavated. During the grading of this pond, the outlet of the culvert under the road had been partially obstructed with riprap. The riprap was re-positioned so the water would drain from the yard at 6180 Cathcart. In addition, the silt fence placed on the property was blocking a small amount of additional water. Sediment removal, consistent with usual maintenance of silt fence will address this condition.

Hydrologic Information:

- *No hydrologic analysis completed since the problem has been addressed.*

Possible Alternatives:

There is no alternative identified for this area as the system seems to be functioning properly, provided regular maintenance is performed on the remaining silt fence. Once turf is established, the silt fence can be removed.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the problem appears to have been addressed.

Problem Area Number 54 – 4940 Suburban Dr

Description of Problem:

The property owner contacted City Hall complaining that runoff from the road had flooded her property. After further discussion, it was clarified that the only problem was actually just standing water on a small portion of the yard. The property owner indicated that they were in the process of constructing an in-ground swimming pool, and they were concerned about what could be done with runoff from their driveway area. The proposed plan will essentially maintain the existing flow patterns through his portion of the property; however, the runoff will be conveyed in a pipe rather than via an overland swale. The change is acceptable, provided the concentrated runoff is allowed to dissipate at the edge of the property.

Hydrologic Information:

- Tributary Area: 0.88 ac
- Impervious Surface: 32%
- Peak 10-year Flow Rate: 2.4 cfs
- Peak 100-year Flow Rate: 3.9 cfs

Possible Alternatives:

There is no alternative identified for this area as the system seems to be functioning properly, provided existing runoff patterns are not drastically altered during construction of the in-ground pool, as required by the building permit.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since this will be addressed during the building permit process.

Problem Area Number 55 – 5590 Timber Lane

Description of Problem:

The property owner contacted City Hall complaining that his yard was soggy and did not drain properly. The property owner indicated that he would like to place fill in the yard to eliminate some of the low areas. A review of the City's contour information indicates that a low point is present in the northeast corner of the property. The property owner indicated that he would like to place fill in the yard to eliminate the low spot. He also asked if the culvert in the southeast corner of his property could be cleaned out. This culvert is in the County right-of-way. During the summer, the ditch downstream of the culvert was jetted out, which should improve the performance of the culvert.

Hydrologic Information:

- Tributary Area: 0.88 ac
- Impervious Surface: 32%
- Peak 10-year Flow Rate: 2.4 cfs
- Peak 100-year Flow Rate: 3.9 cfs

Possible Alternatives:

There is no alternative identified for this area since there is no danger of the house being flooded by surface water runoff. Should the property owner decide to place fill in their yard, a permit would be require for fill greater than 50 cubic yards. The costs for this work will be $1,700 to $5,000 depending on the amount of fill used.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5) since the poor drainage through the low area is an existing condition not caused by any action of the City.

Problem Area Number 56 – 24645 Glen Road

Description of Problem:

The property owner contacted City Hall complaining about standing water on her property. The property owner indicated that she thought the recent wetland restoration work done on the Gideon Glen site created this condition. A review of the City's contour information indicates that the low area on her property is several feet higher than the Gideon Glen wetland. The house itself is approximately 6 inches above the overflow elevation of the low area. While this is less than the minimum standard of 1 foot that would be applied for new construction, the small drainage area tributary to this low point will not likely result in flooding of the house.

The Minnehaha Creek Watershed District also reviewed the site and concurred that the problem was not related to their work in the wetland. The standing water was most likely caused by snow melting before the ground was thawed, which would have allowed it to infiltrate into the ground.

Hydrologic Information:

- Tributary Area: 0.60 ac
- Impervious Surface: 40%
- Peak 10-year Flow Rate: 1.8 cfs
- Peak 100-year Flow Rate: 2.9 cfs

Possible Alternatives:

There is no alternative identified for this area since there is no danger of the house being flooded by surface water runoff. Should the property owner decide to pump the standing water from her yard, it is anticipated that the costs for this work will be $100 to $500 depending on the duration of pumping.

Recommendation:

It is recommended that this problem area be categorized as a "Private Nuisance with No City Responsibility" area (Category 5) since the standing water in low area is caused by an existing condition which was not created by any action of the City.

Problem Area Number 57 – 6080 Strawberry Lane

Description of Problem:

The property owner contacted City Hall concerned about standing water in her back yard. It appears this was created when the builder of the new house behind her pumped out the into the common backyard low area. This new house is part of the same development. A review of the grading plan for the development indicates that a drainage swale was to have been excavated that will convey runoff from the common back yards to the ditch adjacent to the HCRRA trial.

The developer has been made aware of this, and the swale will be constructed prior to releasing the letter of credit associated with the grading work.

Hydrologic Information:

- *No hydrologic analysis completed since the problem will be addressed through the building permit process.*

Possible Alternatives:

There is no alternative identified for this area as the problem will be addressed as part of the building permit process and / or approval of the development.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the problem will be addressed by other avenues.

Problem Area Number 58 – 26370 Peach Circle

Description of Problem:

The property owner contacted City Hall concerned about standing water in the street. The source of the water is the sump pump discharge from 26395 Peach Circle (see ***Problem Area 29***) that is directed to Peach Circle. A catch basin is located in the cul-de-sac, near the east lot line of this property. The storm sewer then conveys runoff to a stormwater treatment pond at the back of the property. The only apparent outlet for this pond is the overland overflow. Based on a review of the City's 1-foot contours, it appears the overflow is approximately 1.5 feet lower than the elevation of the lowest building opening on adjacent structures.

Due to the relatively flat grade of the road and areas of settlement on the road surface, there is standing water present immediately after rainfall events, or when the sump pump is discharging. The property owner also expressed dissatisfaction with the pond on his property, which appears to have been built as part of this subdivision.

Hydrologic Information:

- Tributary Area: 1.74 ac
- Impervious Surface: 36%
- Peak 10-year Flow Rate: 4.9 cfs
- Peak 100-year Flow Rate: 8.0 cfs

Possible Alternatives:

The following alternatives are available to reduce the nuisance flooding in this area:

1. Re-grade the Peach Circle road surface and install curb & gutter along with additional storm sewer. It is anticipated that the construction costs associated with this work will be approximately $71,000. Substantial cost savings would be realized if this work was to be completed as a part of the reconstruction of the Peach Circle road surface.
2. An interim fix that could be constructed to reduce the standing water on Peach Circle would be to install a draintile along the south edge of the road, and connect to the catch basin in the cul-de-sac. A bituminous patch could then be placed on the street to restore the crown.

Recommendation:

It is recommended that this problem area be categorized as a "Public Nuisance" area (Category 3.) The project is not cost-effective unless it is done as part of an overall reconstruction of Peach Circle. Therefore, it is recommended that the project not be undertaken until the City reconstructs the road surface at Peach Circle. Prior to beginning work, the easements over the storm sewer and pond should be verified and, if not in place, secured before proceeding.

Problem Area Number 59 – 5875 Afton Road

Description of Problem:

The property owner contacted the City concerned about water flowing through his yard. The runoff appears to be contained in a designed drainage swale that conveys runoff through the property.

Hydrologic Information:

- Tributary Area: 34.4 ac
- Impervious Surface: 35%
- Peak 10-year Flow Rate: 67.9 cfs*
- Peak 100-year Flow Rate: 113.3 cfs*

  * Flow rate on runoff from entire tributary area, neglecting upstream ponding.

Possible Alternatives:

There is no alternative identified for this problem area as the system appears to be functioning as designed. All runoff is being contained in the drainage and utility easements.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the runoff conveyed through this property is contained within the existing drainage and utility easement.

Problem Area Number 60 – 5935 Howard's Point Road

Description of Problem:

The property owner contacted the City concerned about standing water on his property. A review of the City's one-foot contours confirms that there is a depression on the south half of this lot. The adjacent low point, at the intersection of Howard's Point Road and Smithtown Road, is approximately two feet below the apparent low building opening of the house on this property.

Hydrologic Information:

- Tributary Area: 1.5 ac
- Impervious Surface: 17%
- Peak 10-year Flow Rate: 2.7 cfs
- Peak 100-year Flow Rate: 4.6 cfs

Possible Alternatives:

There is no alternative identified for this area since there is no danger of the house being flooded by surface water runoff. Should the property owner decide to place fill in their yard, a permit would be require for fill greater than 50 cubic yards. The costs for this work will be $1,700 to $5,000 depending on the amount of fill used.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since there is adequate freeboard above the overflow section that will convey runoff away from the property before surface waters would flood the house.

Problem Area Number 61 – 5830 Echo Road

Description of Problem:

The property owner contacted the City concerned that the culvert located on the west edge of the property was not function properly. A review of the site indicates that the culvert is functioning as intended. There is a spot on the road that will hold water. It appears that over time the edges of the lawns are higher than the edge of the road. This traps water on the road surface this can be fixed by minor grading along the edge of the road.

Hydrologic Information:

- Tributary Area: 1.5 ac
- Impervious Surface: 17%
- Peak 10-year Flow Rate: 2.7 cfs
- Peak 100-year Flow Rate: 4.6 cfs

Possible Alternatives:

The standing water in this area can be fixed by minor grading along the edge of the road. However, it is likely that, over time, the edges of the road would again block the runoff from leaving the road surface. In order to address this, a storm sewer and catch basin s could be installed to convey runoff directly to the nearby ditch. The cost for this work is estimated to be approximately $30,000. Substantial cost savings could be realized if the storm sewer improvements are incorporated into the site plan for a new City Hall when that project is initiated.

Recommendation:

It is recommended that this problem area be categorized as a "Public Nuisance" area (Category 3.) The installation of a storm sewer system in this area is not cost-effective unless it is done as part of the overall reconstruction of the area for a new City Hall building. However, it is recommended that limited grading be done by the City's Public Works crews to allow runoff to leave the road surface.

Problem Area Number 62 – 5520 Grant Lorenz Road

Description of Problem:

The property owner contacted the City concerned that the open channel that conveys runoff through his property has become choked with sediment. He also contends that the alleged sediment deposition has blocked the flow of runoff through his property, thereby creating wetland conditions.

A comparison of the City's one-foot contours from 1966 and 1999 do not show an increase in elevation within this property, or the nearby surrounding properties. This would most likely indicate that sediment deposition, if any, was very limited. In fact, the majority of this parcel appears to be slightly lower based on the 1999 survey compared to the 1966 survey. This is most likely due to the presence of peaty soils that tend to compress naturally over time.

Hydrologic Information:

- Tributary Area: 53 ac (direct), 305 ac (direct and indirect)*
- Impervious Surface: 19%
- Peak 10-year Flow Rate: 75 cfs
- Peak 100-year Flow Rate: 150 cfs

* Tributary area is approximated from larger tributary area (subwatershed WC 4) as identified in CSMP.

Possible Alternatives:

There is no alternative identified for this problem area as the system appears to be functioning as originally intended. The property owner could raise the low area by importing fill. This would require a conditional use permit, as well as permit from the MCWD. The property owner is responsible for preparing a wetland delineation report to determine the exact limits of wetlands on the property.

Recommendation:

It is recommended that this problem area be categorized as a "No Further Action Required" area (Category 6) since the system appears to be functioning as originally intended.

Problem Area Number 63 – 23610 Gillette Curve

Description of Problem:

The property owner contacted City Hall concerned about standing water in the street. This is caused by the small bituminous hump placed at the end of the property owner's driveway. If this were not in place, the runoff would be conveyed down the driveway and into the garage that is approximately one foot lower that the edge of the street. The area of standing water is relatively small (approximately two feet by four feet.)

Hydrologic Information:

- Tributary Area: 1.09 ac
- Impervious Surface: 32%
- Peak 10-year Flow Rate: 2.1 cfs
- Peak 100-year Flow Rate: 3.5 cfs

Possible Alternatives:

To reduce the nuisance flooding in this area, it is recommended that Gillette Curve be re-graded and curb & gutter installed along with additional storm sewer. It is anticipated that the construction costs associated with this work will be approximately $32,000 to $150,000. Substantial cost savings would be realized if this work was to be completed as a part of the reconstruction of the Gillette Curve road surface.

Recommendation:

It is recommended that this problem area be categorized as a "Public Nuisance" area (Category 3.) The project is not cost-effective unless it is done as part of an overall reconstruction of Gillette Curve. Therefore, it is recommended that the project not be undertaken until the City reconstructs the road surface at Gillette Curve. Prior to beginning work, the easements over the storm sewer and pond should be verified and, if not in place, secured before proceeding.

III. SUMMARY AND RECOMMENDATIONS

Generally, the City's drainage issues outlined in this Supplemental Report can be classified as nuisance flooding, with a few exceptions. Of the 12 problem areas, nine are identified as "Private Nuisance with No City Responsibility" (Category 5) or "No Further Action Required" (category 6.)

The three exceptions are areas classified as "Public Nuisance "(Category 3.) In all three cases, the nuisance is a small area of standing water on the road, smaller than 500 square feet in size. Based on this, it is recommended that no major construction be undertaken at these areas until the roads are reconstructed. In the meantime, it may be possible to make temporary fixes that will address the standing water until it can be permanently addressed as part of a larger project.

In order to address the three problem areas as separate projects, the estimated costs range is between $107,000 and $251,000. The narratives in the report mention that, due to economy of scale, significant savings may be realized by doing these projects as part of a larger road reconstruction project.

Funding:

Currently, the City has in place a stormwater fee. As design alternatives are considered, utilization of the stormwater fees, in conjunction with special assessments for benefiting areas, will need to be considered.

APPENDIX A

APPENDIX I

Ordinances

CITY OF SHOREWOOD

ORDINANCE NO. 534

AN ORDINANCE AMENDING THE SHOREWOOD CITY CODE TO REPLACE EXISTING CHAPTER 1101 IN ITS ENTIRETY WITH A REVISED CHAPTER 1101 (FLOODPLAIN MANAGEMENT REGULATIONS)

Section 1. Chapter 1101 (Floodplain Management Regulations) of the Shorewood City Code is hereby deleted in its entirety and replaced with:

CHAPTER 1101

FLOODPLAIN MANAGEMENT REGULATIONS

Section

1101.01 STATUTORY AUTHORIZATION, FINDINGS OF FACT AND PURPOSE
1101.02 GENERAL PROVISIONS
1101.03 ESTABLISHMENT OF ZONING DISTRICTS
1101.04 FLOODWAY DISTRICT (FW)
1101.05 FLOOD FRINGE DISTRICT (FF)
1101.06 GENERAL FLOODPLAIN DISTRICT (GF)
1101.07 LAND DEVELOPMENT STANDARDS
1101.08 PUBLIC UTILITIES, RAILROADS, ROADS, AND BRIDGES
1101.09 MANUFACTURED HOMES AND PLACEMENT OF RECREATIONAL VEHICLES
1101.10 ADMINISTRATION
1101.11 NONCONFORMITIES
1101.12 PENALTIES AND ENFORCEMENT
1101.13 AMENDMENTS

1101.01 STATUTORY AUTHORIZATION, FINDINGS OF FACT AND PURPOSE

Subd. 1. *Statutory Authorization:* The legislature of the State of Minnesota has, in Minnesota Statutes Chapter 103F and Chapter 462 delegated the responsibility to local government units to adopt regulations designed to minimize flood losses. Therefore, the City Council of Shorewood, Minnesota, does ordain as follows.

Subd. 2 *Purpose:*

a. This chapter regulates development in the flood hazard areas of the City of Shorewood. These flood hazard areas are subject to periodic inundation, which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base. It is the purpose of this

chapter to promote the public health, safety, and general welfare by minimizing these losses and disruptions.

b. National Flood Insurance Program Compliance. This chapter is adopted to comply with the rules and regulations of the National Flood Insurance Program codified as 44 Code of Federal Regulations Parts 59 -78, as amended, so as to maintain the community's eligibility in the National Flood Insurance Program.

c. This chapter is also intended to preserve the natural characteristics and functions of watercourses and floodplains in order to moderate flood and stormwater impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational opportunities, provide aesthetic benefits and enhance community and economic development.

1101.02 GENERAL PROVISIONS

Subd. 1. *How to Use This Chapter:* This chapter adopts the floodplain maps applicable to the City of Shorewood and includes three floodplain districts: Floodway, Flood Fringe, and General Floodplain.

a. Where Floodway and Flood Fringe districts are delineated on the floodplain maps, the standards in Sections 4 or 5 will apply, depending on the location of a property.

b. Locations where Floodway and Flood Fringe districts are not delineated on the floodplain maps are considered to fall within the General Floodplain district. Within the General Floodplain district, the Floodway District standards in Section 4 apply unless the floodway boundary is determined, according to the process outlined in Section 6. Once the floodway boundary is determined, the Flood Fringe District standards in Section 5 may apply outside the floodway.

Subd. 2. *Lands to Which Chapter Applies:*

a. This chapter applies to all lands within the jurisdiction of Shorewood shown on the floodplain maps and/or the attachments to the maps as being located within the boundaries of the Floodway, Flood Fringe, or General Floodplain Districts.

b. The Floodway, Flood Fringe and General Floodplain Districts are overlay districts that are superimposed on all existing zoning districts on the Shorewood Zoning Districts map referenced in Chapter 1201 of this code. The standards imposed in the overlay districts are in addition to any other requirements in Chapter 1201 of this Code. In case of a conflict, the more restrictive standards will apply.

Subd. 3. *Incorporation of Maps by Reference:* The following maps together with all attached material are hereby adopted by reference and declared to be a part of this chapter. The attached material includes the Flood Insurance Study for Hennepin County, Minnesota, and Incorporated Areas, dated November 4, 2016 and the Flood Insurance Rate Map panels enumerated below, dated November 4, 2016, all prepared by the Federal Emergency Management Agency. These materials are on file in the Shorewood City Offices.

Effective Flood Insurance Rate Map panels:

27053C0292F	27053C0309F	27053C0313F	27053C0317F
27053C0295F	27053C0311F	27053C0314F	27053C0318F
27053C0308F	27053C0312F	27053C0316F	27053C0319F

Subd. 4 *Regulatory Flood Protection Elevation:* The regulatory flood protection elevation (RFPE) is an elevation no lower than one foot above the elevation of the regional flood plus any increases in flood elevation caused by encroachments on the floodplain that result from designation of a floodway.

Subd. 5. *Interpretation:* The boundaries of the floodplain districts are determined by scaling distances on the Flood Insurance Rate Map.

a. Where a conflict exists between the floodplain limits illustrated on the flood plain map and floodplain elevations discover in actual field conditions, the flood elevations shall be the governing factor. The Zoning Administrator must interpret the boundary location based on the ground elevations that existed on the site on the date of the first National Flood Insurance Program map showing the area within the regulatory floodplain, and other available technical data.

b. Persons contesting the location of the district boundaries will be given a reasonable opportunity to present their case to the City Council, serving as the Board of Adjustments and Appeals and to submit technical evidence.

Subd. 6. *Abrogation and Greater Restrictions:* It is not intended by this chapter to repeal, abrogate, or impair any existing easements, covenants, or other private agreements. However, where this chapter imposes greater restrictions, the provisions of this chapter prevail. All other ordinances inconsistent with this chapter are hereby repealed to the extent of the inconsistency only.

Subd. 7. *Warning and Disclaimer of Liability:* This chapter does not imply that areas outside the floodplain districts or land uses permitted within such districts will be free from flooding or flood damages. This chapter does not create liability on the part of the City of Shorewood or its officers or employees for any flood damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

Subd. 8 *Severability:* If any section, clause, provision, or portion of this chapter is adjudged unconstitutional or invalid by a court of law, the remainder of this chapter shall not be affected and shall remain in full force.

Subd. 9 *Definitions:* Unless specifically defined below, words or phrases used in this chapter must be interpreted according to common usage and so as to give this chapter its most reasonable application.

ACCESSORY USE OR STRUCTURE. A use or structure on the same lot with, and of a nature customarily incidental and subordinate to, the principal use or structure.

BASE FLOOD ELEVATION. The elevation of the "regional flood." The term "base flood elevation" is used in the flood insurance survey.

BASEMENT. Any area of a structure, including crawl spaces, having its floor or base subgrade (below ground level) on all four sides, regardless of the depth of excavation below ground level.

CONDITIONAL USE. A specific type of structure or land use listed in the official control that may be allowed but only after an in-depth review procedure and with appropriate conditions or restrictions as provided in the official zoning controls or building codes and upon a finding that:

(1) Certain conditions as detailed in the zoning code exist.

(2) The structure and/or land use conform to the comprehensive land use plan if one exists and are compatible with the existing neighborhood.

CRITICAL FACILITIES. Facilities necessary to a community's public health and safety, those that store or produce highly volatile, toxic or water-reactive materials, and those that house occupants that may be insufficiently mobile to avoid loss of life or injury. Examples of critical facilities include hospitals, correctional facilities, schools, daycare facilities, nursing homes, fire and police stations, wastewater treatment facilities, public electric utilities, water plants, fuel storage facilities, and waste handling and storage facilities.

DEVELOPMENT. Any manmade change to improved or unimproved real estate, including buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

EQUAL DEGREE OF ENCROACHMENT. A method of determining the location of floodway boundaries so that floodplain lands on both sides of a stream are capable of conveying a proportionate share of flood flows.

FLOOD. A temporary increase in the flow or stage of a stream or in the stage of a wetland or lake that results in the inundation of normally dry areas.

FLOOD FREQUENCY. The frequency for which it is expected that a specific flood stage or discharge may be equaled or exceeded.

FLOOD FRINGE. The portion of the Special Flood Hazard Area (one percent annual chance flood) located outside of the floodway. Flood fringe is synonymous with the term "floodway fringe" used in the Flood Insurance Study for Hennepin County, Minnesota

FLOOD PRONE AREA. Any land susceptible to being inundated by water from any source (see "Flood").

FLOODPLAIN. The beds proper and the areas adjoining a wetland, lake or watercourse which have been or hereafter may be covered by the regional flood.

FLOODPROOFING. A combination of structural provisions, changes, or adjustments to properties and structures subject to flooding, primarily for the reduction or elimination of flood damages.

FLOODWAY. The bed of a wetland or lake and the channel of a watercourse and those portions of the adjoining floodplain which are reasonably required to carry or store the regional flood discharge.

LOWEST FLOOR. The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, used solely for parking of vehicles, building access, or storage in an area other than a basement area, is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of 44 Code of Federal Regulations, Part 60.3.

MANUFACTURED HOME. A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include the term "recreational vehicle".

NEW CONSTRUCTION. Structures, including additions and improvements, and placement of manufactured homes, for which the start of construction commenced on or after the effective date of this chapter.

OBSTRUCTION. Any dam, wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation, channel modification, culvert, building, wire, fence, stockpile, refuse, fill, structure, or matter in, along, across, or projecting into any channel, watercourse, or regulatory floodplain which may impede, retard, or change the direction of the flow of water, either in itself or by catching or collecting debris carried by such water.

ONE HUNDRED YEAR FLOODPLAIN. Lands inundated by the "Regional Flood" (see definition).

PRINCIPAL USE OR STRUCTURE. All uses or structures that are not accessory uses or structures.

REACH. A hydraulic engineering term to describe a longitudinal segment of a stream or river influenced by a natural or man-made obstruction. In an urban area, the segment of a stream or river between two consecutive bridge crossings would most typically constitute a reach.

RECREATIONAL VEHICLE. A vehicle that is built on a single chassis, is 400 square feet or less when measured at the largest horizontal projection, is designed to be self-propelled or permanently towable by a light duty truck, and is designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping,

travel, or seasonal use. For the purposes of this chapter, the term recreational vehicle is synonymous with the term "travel trailer/travel vehicle".

REGIONAL FLOOD. A flood which is representative of large floods known to have occurred generally in Minnesota and reasonably characteristic of what can be expected to occur on an average frequency in the magnitude of the 1% chance or 100-year recurrence interval. Regional flood is synonymous with the term "base flood" used in a flood insurance study.

REGULATORY FLOOD PROTECTION ELEVATION (RFPE) An elevation not less than one foot above the elevation of the regional flood plus any increases in flood elevation caused by encroachments on the floodplain that result from designation of a floodway.

REPETITIVE LOSS. Flood related damages sustained by a structure on two separate occasions during a ten year period for which the cost of repairs at the time of each such flood event on the average equals or exceeds 25% of the market value of the structure before the damage occurred.

SPECIAL FLOOD HAZARD AREA. A term used for flood insurance purposes synonymous with "One Hundred Year Floodplain".

START OF CONSTRUCTION. Includes substantial improvement, and means the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement that occurred before the permit's expiration date. The actual start is either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, foundations, or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE. Anything constructed or erected on the ground or attached to the ground or on-site utilities, including, but not limited to, buildings, factories, sheds, detached garages, cabins, manufactured homes, recreational vehicles not meeting the exemption criteria specified in Section 1101.09 Subd. 2. of this chapter and other similar items.

SUBSTANTIAL DAMAGE. Damage of any origin sustained by a structure where the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT. Within any consecutive 365-day period, any reconstruction, rehabilitation (including normal maintenance and repair), repair after damage, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions.

(2) Any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure." For the purpose of this chapter, "historic structure" is as defined in 44 Code of Federal Regulations, Part 59.1.

Subd.10. *Annexations:* The Flood Insurance Rate Map panels adopted by reference into Section 1101.02 Subd. 3. above may include floodplain areas that lie outside of the corporate boundaries of the City of Shorewood at the time of adoption of this chapter. If any of these floodplain land areas are annexed into the City of Shorewood after the date of adoption of this chapter, the newly annexed floodplain lands will be subject to the provisions of this chapter immediately upon the date of annexation.

Subd. 11. *Detachments.* The Flood Insurance Rate Map panels adopted by reference into Section 1101.02 Subd. 3. above will include floodplain areas that lie inside the corporate boundaries of municipalities at the time of adoption of this chapter. If any of these floodplain land areas are detached from a municipality and come under the jurisdiction of Shorewood after the date of adoption of this chapter, the newly detached floodplain lands will be subject to the provisions of this chapter immediately upon the date of detachment.

1101.03 ESTABLISHMENT OF FLOODPLAIN DISTRICTS

Subd. 1. *Districts:*

a. Floodway District. The Floodway District includes those areas within Zones AE that have a floodway delineated as shown on the Flood Insurance Rate Map adopted in Section 1102.02 Subd. 3., as well as portions of other lakes, wetlands, and basins within Zones AE (that do not have a floodway delineated) that are located at or below the ordinary high water level as defined in Minnesota Statutes, Section 103G.005, subdivision 14.

b. Flood Fringe District. The Flood Fringe District includes areas within Zones AE that have a floodway delineated on the Flood Insurance Rate Map adopted in Section 1102.02 Subd. 3., but are located outside of the floodway. For other lakes, wetlands and other basins within Zones AE that do not have a floodway delineated, the Flood Fringe District also includes those areas below the 1% annual

chance (100-year) flood elevation but above the ordinary high water level as defined in Minnesota Statutes, Section 103G.005, subdivision 14.

c. General Floodplain District. The General Floodplain District includes those areas within Zone A as shown on the Flood Insurance Rate Map adopted in Section 1102.02 Subd. 3.

Subd. 2. *Applicability:* Within the floodplain districts established in this chapter, the use, size, type and location of development must comply with the terms of this chapter and other applicable regulations. In no cases shall floodplain development adversely affect the efficiency or unduly restrict the capacity of the channels or floodways of any tributaries to the main stream, drainage ditches, or any other drainage facilities or systems. All uses not listed as permitted uses or conditional uses in Sections 1101.04, 1101.5, and 1101.06, are prohibited. In addition, critical facilities, as defined in Section 1101.02 (Critical Facilities), are prohibited in all floodplain districts.

1101.04 FLOODWAY DISTRICT (FW)

Subd. 1. *Permitted Uses:* The following uses, subject to the standards set forth in Section 1101.04 Subd. 2., are permitted uses if otherwise allowed in the underlying zoning district or any applicable overlay district:

a. Open space uses, including but not limited to private and public golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife and nature preserves, fishing areas, and single or multiple purpose recreational trails.

b. Residential lawns, gardens, parking areas, and play areas.

c. Railroads, streets, bridges, utility transmission lines and pipelines, provided that the Department of Natural Resources' Area Hydrologist is notified at least ten days prior to issuance of any permit.

Subd. 2 *Standards for Floodway Permitted Uses:*

a. The use must have a low flood damage potential.

b. The use must not obstruct flood flows or cause any increase in flood elevations and must not involve structures, obstructions, or storage of materials or equipment.

c. Any facility that will be used by employees or the general public must be designed with a flood warning system that provides adequate time for evacuation if the area is inundated to a depth and velocity such that the depth (in feet) multiplied by the velocity (in feet per second) would exceed a product of four upon occurrence of the regional (1% chance) flood.

Subd. 3. *Conditional Uses:* The following uses may be allowed as conditional uses following the standards and procedures set forth in Section 1101.10 Subd.4. of this chapter and further

subject to the standards set forth in Section 1101.04 Subd. 4., if otherwise allowed in the underlying zoning district or any applicable overlay district.

a. Structures accessory to the uses listed in Sections 1101.04 Subd. 1. a.-c. above and the uses listed in b.-c. below.

b. Extraction and storage of sand, gravel, and other materials.

c. Marinas, boat rentals, docks, piers, wharves, and water control structures.

d. Storage yards for equipment, machinery, or materials.

e. Placement of fill or construction of fences that obstruct flood flows.

f. General farming, pasture, grazing, outdoor plant nurseries, horticulture, truck farming, forestry, sod farming, and wild crop harvesting.

Subd. 4. *Standards for Floodway Conditional Uses:*

a. All Uses. A conditional use must not cause any increase in the stage of the 1% chance or regional flood or cause an increase in flood damages in the reach or reaches affected.

b. Fill; Storage of Materials and Equipment:

(1) The storage or processing of materials that are, in time of flooding, flammable, explosive, or potentially injurious to human, animal, or plant life is prohibited.

(2) Fill, dredge spoil, and other similar materials deposited or stored in the floodplain must be protected from erosion by vegetative cover, mulching, riprap or other acceptable method. Permanent sand and gravel operations and similar uses must be covered by a long-term site development plan.

(3) Temporary placement of fill, other materials, or equipment which would cause an increase to the stage of the 1% percent chance or regional flood may only be allowed if the City Council has approved a plan that assures removal of the materials from the floodway based upon the flood warning time available.

c. Accessory Structures. Accessory structures, as identified in Section 1101.04 Subd. 3.a., may be permitted, provided that:

(1) Structures are not intended for human habitation;

(2) Structures will have a low flood damage potential;

(3) Structures will be constructed an placed so as to offer a minimal obstruction to the flow of flood waters;

(4) Service utilities, such as electrical and heating equipment, within these structures must be elevated to or above the regulatory flood protection elevation or properly floodproofed;

(5) Structures must be elevated on fill or structurally dry floodproofed in accordance with the FP1 or FP2 floodproofing classifications in the State

Building Code. All floodproofed structures must be adequately anchored to prevent flotation, collapse or lateral movement and designed to equalize hydrostatic flood forces on exterior walls.

(6) As an alternative, an accessory structure may be internally/wet floodproofed to the FP3 or FP4 floodproofing classifications in the State Building Code, provided the accessory structure constitutes a minimal investment and does not exceed 576 square feet in size. Designs for meeting this requirement must either be certified by a registered professional engineer or meet or exceed the following criteria:

(a) To allow for the equalization of hydrostatic pressure, there must be a minimum of two "automatic" openings in the outside walls of the structure, with a total net area of not less than one square inch for every square foot of enclosed area subject to flooding; and

(b) There must be openings on at least two sides of the structure and the bottom of all openings must be no higher than one foot above the lowest adjacent grade to the structure. Using human intervention to open a garage door prior to flooding will not satisfy this requirement for automatic openings.

d. Structural works for flood control that will change the course, current or cross section of protected wetlands or public waters are subject to the provisions of Minnesota Statutes, Section 103G.245.

e. A levee, dike or floodwall constructed in the floodway must not cause an increase to the 1% chance or regional flood. The technical analysis must assume equal conveyance or storage loss on both sides of a stream.

f. Floodway developments must not adversely affect the hydraulic capacity of the channel and adjoining floodplain of any tributary watercourse or drainage system.

1101.05 FLOOD FRINGE DISTRICT (FF)

Subd. 1 *Permitted Uses:* Permitted uses are those uses of land or structures allowed in the underlying zoning district(s) that comply with the standards in Subd. 2. below. If no pre-existing, underlying zoning districts exist, then any residential or nonresidential structure or use of a structure or land is a permitted use provided it does not constitute a public nuisance.

Subd. 2. *Standards for Flood Fringe Permitted Uses:*

a. All structures, including accessory structures, must be elevated on fill so that the lowest floor, as defined, is at or above the regulatory flood protection elevation. The finished fill elevation for structures must be no lower than one foot below the regulatory flood protection elevation and the fill must extend at the same elevation at least 15 feet beyond the outside limits of the structure.

b. Accessory Structures. As an alternative to the fill requirements of a. above, structures accessory to the uses identified in Subd. 1. above may be permitted to be

internally/wet floodproofed to the FP3 or FP4 floodproofing classifications in the State Building Code, provided that:

(1) The accessory structure constitutes a minimal investment, does not exceed 576 square feet in size, and is only used for parking and storage.

(2) All portions of floodproofed accessory structures below the Regulatory Flood Protection Elevation must be:

(a) Adequately anchored to prevent flotation, collapse or lateral movement and designed to equalize hydrostatic flood forces on exterior walls,

(b) Be constructed with materials resistant to flood damage, and

(c) Must have all service utilities be water-tight or elevated to above the regulatory flood protection elevation

(3) Designs for meeting this requirement must either be certified by a registered professional engineer or meet or exceed the following criteria:

(a) To allow for the equalization of hydrostatic pressure, there must be a minimum of two "automatic" openings in the outside walls of the structure, with a total net area of not less than one square inch for every square foot of enclosed area subject to flooding; and

(b) There must be openings on at least two sides of the structure and the bottom of all openings must be no higher than one foot above the lowest adjacent grade to the structure. Using human intervention to open a garage door prior to flooding will not satisfy this requirement for automatic openings.

c. The cumulative placement of fill or similar material on a parcel must not exceed 1,000 cubic yards, unless the fill is specifically intended to elevate a structure in accordance with Subd. 2.a. of this section, or if allowed as a conditional use under Subd. 3.c. below.

d. The storage of any materials or equipment must be elevated on fill to the regulatory flood protection elevation.

e. All service utilities, including ductwork, must be elevated or water-tight to prevent infiltration of floodwaters.

f. The storage or processing of materials that are, in time of flooding, flammable, explosive, or potentially injurious to human, animal, or plant life is prohibited.

g. All fill must be properly compacted and the slopes must be properly protected by the use of riprap, vegetative cover or other acceptable method.

h. All new principal structures must have vehicular access at or above an elevation not more than two feet below the regulatory flood protection elevation, or must have a flood warning /emergency evacuation plan acceptable to the City Council.

i. Accessory uses such as yards, railroad tracks, and parking lots may be at an elevation lower than the regulatory flood protection elevation. However, any

facilities used by employees or the general public must be designed with a flood warning system that provides adequate time for evacuation if the area is inundated to a depth and velocity such that the depth (in feet) multiplied by the velocity (in feet per second) would exceed a product of four upon occurrence of the regional (1% chance) flood.

j. Manufactured homes and recreational vehicles must meet the standards of Section 1100.09 of this chapter.

Subd. 3. *Conditional Uses:* The following uses and activities may be allowed as conditional uses, if allowed in the underlying zoning district(s) or any applicable overlay district, following the procedures in Section 1101.10 Subd. 4. of this chapter.

a. Any structure that is not elevated on fill or floodproofed in accordance with Subd. 2.a. and 2.b of this section.

b. Storage of any material or equipment below the regulatory flood protection elevation.

c. The cumulative placement of more than 1,000 cubic yards of fill when the fill is not being used to elevate a structure in accordance with Subd. 2.a. of this section.

d. The use of methods to elevate structures above the regulatory flood protection elevation, including stilts, pilings, parallel walls, or above-grade, enclosed areas such as crawl spaces or tuck under garages, shall meet the standards in Subd. 4.f. of this section.

Subd. 4. *Standards for Flood Fringe Conditional Uses:*

a. The standards listed in Subd. 2.d. through 2.j. apply to all conditional uses.

b. Basements, as defined by Section 1101.02 Subd. 9. of this chapter, are subject to the following:

(1) Residential basement construction is not allowed below the regulatory flood protection elevation.

(2) Nonresidential basements may be allowed below the regulatory flood protection elevation provided the basement is structurally dry floodproofed in accordance with Subd. 4.c. below.

c. All areas of nonresidential structures, including basements, to be placed below the regulatory flood protection elevation must be floodproofed in accordance with the structurally dry floodproofing classifications in the State Building Code. Structurally dry floodproofing must meet the FP1 or FP2 floodproofing classification in the State Building Code, which requires making the structure watertight with the walls substantially impermeable to the passage of water and with structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy.

d. The placement of more than 1,000 cubic yards of fill or other similar material on a parcel (other than for the purpose of elevating a structure to the regulatory flood

protection elevation) must comply with an approved erosion/sedimentation control plan.

(1) The plan must clearly specify methods to be used to stabilize the fill on site for a flood event at a minimum of the regional (1% chance) flood event.

(2) The plan must be prepared and certified by a registered professional engineer or other qualified individual acceptable to the City Council.

(3) The plan may incorporate alternative procedures for removal of the material from the floodplain if adequate flood warning time exists.

e. Storage of materials and equipment below the regulatory flood protection elevation must comply with an approved emergency plan providing for removal of such materials within the time available after a flood warning.

f. Alternative elevation methods other than the use of fill may be utilized to elevate a structure's lowest floor above the regulatory flood protection elevation. The base or floor of an enclosed area shall be considered above-grade and not a structure's basement or lowest floor if: 1) the enclosed area is above-grade on at least one side of the structure; 2) it is designed to internally flood and is constructed with flood resistant materials; and 3) it is used solely for parking of vehicles, building access or storage. The above-noted alternative elevation methods are subject to the following additional standards:

(1) Design and Certification - The structure's design and as-built condition must be certified by a registered professional engineer as being in compliance with the general design standards of the State Building Code and, specifically, that all electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities must be at or above the regulatory flood protection elevation or be designed to prevent flood water from entering or accumulating within these components during times of flooding.

(2) Specific Standards for Above-grade, Enclosed Areas - Above-grade, fully enclosed areas such as crawl spaces or tuck under garages must be designed to internally flood and the design plans must stipulate:

(a) The minimum area of openings in the walls where internal flooding is to be used as a floodproofing technique. There shall be a minimum of two openings on at least two sides of the structure and the bottom of all openings shall be no higher than one foot above grade. The automatic openings shall have a minimum net area of not less than one square inch for every square foot of enclosed area subject to flooding unless a registered professional engineer or architect certifies that a smaller net area would suffice. The automatic openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of flood waters without any form of human intervention; and

(b) That the enclosed area will be designed of flood resistant materials in accordance with the FP3 or FP4 classifications in the State Building Code and shall be used solely for building access, parking of vehicles or storage.

1101.06 GENERAL FLOODPLAIN DISTRICT (GF)

Subd. 1. *Permitted Uses:*

a. The uses listed in Section 1101.04 Subd. 1. of this chapter, Floodway District Permitted Uses, are permitted uses.

b. All other uses are subject to the floodway/flood fringe evaluation criteria specified in Section 1101.06 Subd. 2. below. Section 1101.04 applies if the proposed use is determined to be in the Floodway District. Section 1101.05 applies if the proposed use is determined to be in the Flood Fringe District.

Subd. 2. *Procedures for Floodway and Flood Fringe Determinations:*

a. Upon receipt of an application for a permit or other approval within the General Floodplain District, the Zoning Administrator must obtain, review and reasonably utilize any regional flood elevation and floodway data available from a federal, state, or other source.

b. If regional flood elevation and floodway data are not readily available, the applicant must furnish additional information, as needed, to determine the regulatory flood protection elevation and whether the proposed use would fall within the Floodway or Flood Fringe District. Information must be consistent with accepted hydrological and hydraulic engineering standards and the standards in Subd. 2.c. below.

c. The determination of floodway and flood fringe must include the following components, as applicable:

(1) Estimate the peak discharge of the regional (1% chance) flood.

(2) Calculate the water surface profile of the regional flood based upon a hydraulic analysis of the stream channel and overbank areas.

(3) Compute the floodway necessary to convey or store the regional flood without increasing flood stages more than one-half (0.5) foot. A lesser stage increase than 0.5 foot is required if, as a result of the stage increase, increased flood damages would result. An equal degree of encroachment on both sides of the stream within the reach must be assumed in computing floodway boundaries.

d. The Zoning Administrator will review the submitted information and assess the technical evaluation and the recommended Floodway and/or Flood Fringe District boundary. The assessment must include the cumulative effects of previous floodway encroachments. The Zoning Administrator may seek technical assistance from a designated engineer or other expert person or agency, including the

Department of Natural Resources. Based on this assessment, the Zoning Administrator may approve or deny the application.

e. Once the Floodway and Flood Fringe District boundaries have been determined, the Zoning Administrator must process the permit application consistent with the applicable provisions of Sections 1101.04 and 1101.05 of this chapter.

1101.07 LAND DEVELOPMENT STANDARDS

Subd. 1 *In General:* Recognizing that flood prone areas may exist outside of the designated floodplain districts, the requirements of this chapter apply to all land within the City of Shorewood.

Subd. 2. *Subdivisions:* No land may be subdivided which is unsuitable for reasons of flooding or inadequate drainage, water supply or sewage treatment facilities. Manufactured home parks and recreational vehicle parks or campgrounds are considered subdivisions under this chapter.

a. All lots within the floodplain districts must be able to contain a building site outside of the Floodway District at or above the regulatory flood protection elevation.

b. All subdivisions must have road access both to the subdivision and to the individual building sites no lower than two feet below the regulatory flood protection elevation, unless a flood warning emergency plan for the safe evacuation of all vehicles and people during the regional (1% chance) flood has been approved by the City Council. The plan must be prepared by a registered engineer or other qualified individual, and must demonstrate that adequate time and personnel exist to carry out the evacuation.

c. For all subdivisions in the floodplain, the Floodway and Flood Fringe District boundaries, the regulatory flood protection elevation and the required elevation of all access roads must be clearly labeled on all required subdivision drawings and platting documents.

d. In the General Floodplain District, applicants must provide the information required in Section 1101.06 Subd.2. of this chapter to determine the regional flood elevation, the Floodway and Flood Fringe District boundaries and the regulatory flood protection elevation for the subdivision site.

e. If a subdivision proposal or other proposed new development is in a flood prone area, any such proposal must be reviewed to assure that:

(1) All such proposals are consistent with the need to minimize flood damage within the flood prone area,

(2) All public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and

(3) Adequate drainage is provided to reduce exposure of flood hazard.

Subd. 3. *Building Sites.* If a proposed building site is in a flood prone area, all new construction and substantial improvements (including the placement of manufactured homes) must be:

a. Designed (or modified) and adequately anchored to prevent floatation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;

b. Constructed with materials and utility equipment resistant to flood damage;

c. Constructed by methods and practices that minimize flood damage; and

d. Constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

1101.08 PUBLIC UTILITIES, RAILROADS, ROADS, AND BRIDGES

Subd. 1. *Public Utilities:* All public utilities and facilities such as gas, electrical, sewer, and water supply systems to be located in the floodplain must be floodproofed in accordance with the State Building Code or elevated to the regulatory flood protection elevation.

Subd. 2. *Public Transportation Facilities:* Railroad tracks, roads, and bridges to be located within the floodplain must comply with Sections 1101.04 and 1101.05 of this chapter. These transportation facilities must be elevated to the regulatory flood protection elevation where failure or interruption of these facilities would result in danger to the public health or safety or where such facilities are essential to the orderly functioning of the area. Minor or auxiliary roads or railroads may be constructed at a lower elevation where failure or interruption of transportation services would not endanger the public health or safety.

Subd. 3. *On-site Water Supply and Sewage Treatment Systems:* Where public utilities are not provided: 1) On-site water supply systems must be designed to minimize or eliminate infiltration of flood waters into the systems and are subject to the provisions in Minnesota Rules Chapter 4725.4350, as amended; and 2) New or replacement on-site sewage treatment systems must be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, they must not be subject to impairment or contamination during times of flooding, and are subject to the provisions in Minnesota Rules Chapter 7080.2270, as amended.

1101.09 MANUFACTURED HOMES AND PLACEMENT OF RECREATIONAL VEHICLES.

Subd. 1. *Manufactured Homes:* New manufactured home parks and expansions to existing manufactured home parks are prohibited in any floodplain district. For existing manufactured home parks or lots of record, the following requirements apply:

a. Placement or replacement of manufactured home units is prohibited in the Floodway District.

b. If allowed in the Flood Fringe District, placement or replacement of manufactured home units is subject to the requirements of Section 1101.05 of this chapter. New

and replacement manufactured homes must be elevated in compliance with Section 1101.05 of this chapter and must be securely anchored to an adequately anchored foundation system that resists flotation, collapse and lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state or local anchoring requirements for resisting wind forces.

Subd. 2. *Recreational Vehicles:* New recreational vehicle parks or campgrounds and expansions to existing recreational vehicle parks or campgrounds are prohibited in any floodplain district. Placement of recreational vehicles in existing recreational vehicle parks or campgrounds in the floodplain must meet the exemption criteria below or be treated as new structures meeting the requirements of this chapter.

a. Recreational vehicles are exempt from the provisions of this chapter if they are placed in any of the following areas and meet the criteria listed in Section 1101.09 Subd. 2.b.:

(1) Individual lots or parcels of record.

(2) Existing commercial recreational vehicle parks or campgrounds.

(3) Existing condominium-type associations.

b. Criteria for Exempt Recreational Vehicles:

(1) The vehicle must have a current license required for highway use.

(2) The vehicle must be highway ready, meaning on wheels or the internal jacking system, attached to the site only by quick disconnect type utilities commonly used in campgrounds and recreational vehicle parks.

(3) No permanent structural type additions may be attached to the vehicle.

(4) The vehicle and associated use must be permissible in any pre-existing, underlying zoning district.

(5) Accessory structures are not permitted within the Floodway District. Any accessory structure in the Flood Fringe District must be constructed of flood-resistant materials and be securely anchored, meeting the requirements applicable to manufactured homes in Section 1101.09 Subd. 2.b.

(6) An accessory structure must constitute a minimal investment

c. Recreational vehicles that are exempt in Section 1101.09 Subd. 2.b lose this exemption when development occurs on the site that exceeds a minimal investment for an accessory structure such as a garage or storage building. The recreational vehicle and all accessory structures will then be treated as new structures subject to the elevation and floodproofing requirements of Section 1101.05 of this chapter. No development or improvement on the parcel or attachment to the recreational vehicle is allowed that would hinder the removal of the vehicle should flooding occur.

1101.10 ADMINISTRATION

Subd. 1. *Zoning Administrator:* A Zoning Administrator or other official designated by the City Council must administer and enforce this chapter.

Subd. 2. *Permit Requirements:*

a. Permit Required. A permit must be obtained from the Zoning Administrator prior to conducting the following activities:

(1) The erection, addition, modification, rehabilitation, or alteration of any building, structure, or portion thereof. Normal maintenance and repair also requires a permit if such work, separately or in conjunction with other planned work, constitutes a substantial improvement as defined in this chapter.

(2) The use or change of use of a building, structure, or land.

(3) The change or extension of a nonconforming use.

(4) The repair of a structure that has been damaged by flood, fire, tornado, or any other source.

(5) The placement of fill, excavation of materials, or the storage of materials or equipment within the floodplain.

(6) Relocation or alteration of a watercourse (including new or replacement culverts and bridges), unless a public waters work permit has been applied for.

(7) Any other type of "development" as defined in this chapter.

b. Application for Permit. Permit applications must be submitted to the Zoning Administrator on forms provided by the Zoning Administrator. The permit application must include the following as applicable:

(1) A site plan showing all pertinent dimensions, existing or proposed buildings, structures, and significant natural features having an influence on the permit.

(2) Location of fill or storage of materials in relation to the stream channel.

(3) Copies of any required municipal, county, state or federal permits or approvals.

(4) Other relevant information requested by the Zoning Administrator as necessary to properly evaluate the permit application.

c. Certificate of Zoning Compliance for a New, Altered, or Nonconforming Use. No building, land or structure may be occupied or used in any manner until a certificate of zoning compliance has been issued by the Zoning Administrator stating that the use of the building or land conforms to the requirements of this chapter.

d. Certification. The applicant is required to submit certification by a registered professional engineer, registered architect, or registered land surveyor that the finished fill and building elevations were accomplished in compliance with the provisions of this chapter. Floodproofing measures must be certified by a registered professional engineer or registered architect.

e. Record of First Floor Elevation. The Zoning Administrator must maintain a record of the elevation of the lowest floor (including basement) of all new structures and alterations or additions to existing structures in the floodplain. The Zoning Administrator must also maintain a record of the elevation to which structures and alterations or additions to structures are floodproofed.

f. Notifications for Watercourse Alterations. Before authorizing any alteration or relocation of a river or stream, the Zoning Administrator must notify adjacent communities. If the applicant has applied for a permit to work in public waters pursuant to Minnesota Statutes, Section 103G.245, this will suffice as adequate notice. A copy of the notification must also be submitted to the Chicago Regional Office of the Federal Emergency Management Agency (FEMA).

g. Notification to FEMA When Physical Changes Increase or Decrease Base Flood Elevations. As soon as is practicable, but not later than six months after the date such supporting information becomes available, the Zoning Administrator must notify the Chicago Regional Office of FEMA of the changes by submitting a copy of the relevant technical or scientific data.

Subd. 3. *Variances:*

a. Variance Applications. An application for a variance to the provisions of this chapter will be processed and reviewed in accordance with applicable state statutes and Section 1201.05 of the Zoning Code.

b. Adherence to State Floodplain Management Standards. A variance must not allow a use that is not allowed in that district, permit a lower degree of flood protection than the regulatory flood protection elevation for the particular area, or permit standards lower than those required by state law.

c. Additional Variance Criteria. The following additional variance criteria of the Federal Emergency Management Agency must be satisfied:

(1) Variances must not be issued by a community within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result.

(2) Variances may only be issued by a community upon (i) a showing of good and sufficient cause, (ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and (iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.

(3) Variances may only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

d. Flood Insurance Notice. The Zoning Administrator must notify the applicant for a variance that: 1) The issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as $25 for $100 of insurance coverage; and 2) Such construction below the base or regional flood level increases risks to life and property. Such notification must be maintained with a record of all variance actions.

e. General Considerations. The community may consider the following factors in granting variances and imposing conditions on variances and conditional uses in floodplains:

(1) The potential danger to life and property due to increased flood heights or velocities caused by encroachments;

(2) The danger that materials may be swept onto other lands or downstream to the injury of others;

(3) The proposed water supply and sanitation systems, if any, and the ability of these systems to minimize the potential for disease, contamination and unsanitary conditions;

(4) The susceptibility of any proposed use and its contents to flood damage and the effect of such damage on the individual owner;

(5) The importance of the services to be provided by the proposed use to the community;

(6) The requirements of the facility for a waterfront location;

(7) The availability of viable alternative locations for the proposed use that are not subject to flooding;

(8) The compatibility of the proposed use with existing development and development anticipated in the foreseeable future;

(9) The relationship of the proposed use to the Comprehensive Land Use Plan and flood plain management program for the area;

(10) The safety of access to the property in times of flood for ordinary and emergency vehicles;

(11) The expected heights, velocity, duration, rate of rise and sediment transport of the flood waters expected at the site.

f. Submittal of Hearing Notices to the Department of Natural Resources (DNR). The Zoning Administrator must submit hearing notices for proposed variances to the DNR sufficiently in advance to provide at least ten days' notice of the hearing. The notice may be sent by electronic mail or U.S. Mail to the respective DNR area hydrologist.

g. Submittal of Final Decisions to the DNR. A copy of all decisions granting variances must be forwarded to the DNR within ten days of such action. The notice may be sent by electronic mail or U.S. Mail to the respective DNR area hydrologist.

h. Record-Keeping. The Zoning Administrator must maintain a record of all variance actions, including justification for their issuance, and must report such variances in an annual or biennial report to the Administrator of the National Flood Insurance Program, when requested by the Federal Emergency Management Agency.

Subd. 4. *Conditional Uses:*

a. Administrative Review. An application for a conditional use permit under the provisions of this chapter will be processed and reviewed in accordance with Section 1204 of the Zoning Code.

b. Factors Used in Decision-Making. In passing upon conditional use applications, the City Council must consider all relevant factors specified in other sections of this chapter, and those factors identified in Section 1101.10 Subd. 3.e. of this chapter.

c. Conditions Attached to Conditional Use Permits. The City Council may attach such conditions to the granting of conditional use permits as it deems necessary to fulfill the purposes of this chapter. Such conditions may include, but are not limited to, the following:

(1) Modification of waste treatment and water supply facilities.

(2) Limitations on period of use, occupancy, and operation.

(3) Imposition of operational controls, sureties, and deed restrictions.

(4) Requirements for construction of channel modifications, compensatory storage, dikes, levees, and other protective measures.

(5) Floodproofing measures, in accordance with the State Building Code and this chapter. The applicant must submit a plan or document certified by a registered professional engineer or architect that the floodproofing measures are consistent with the regulatory flood protection elevation and associated flood factors for the particular area.

d. Submittal of Hearing Notices to the Department of Natural Resources (DNR). The Zoning Administrator must submit hearing notices for proposed conditional uses to the DNR sufficiently in advance to provide at least ten days' notice of the hearing. The notice may be sent by electronic mail or U.S. Mail to the respective DNR area hydrologist.

e. Submittal of Final Decisions to the DNR. A copy of all decisions granting conditional uses must be forwarded to the DNR within ten days of such action. The notice may be sent by electronic mail or U.S. Mail to the respective DNR area hydrologist.

1101.11 NONCONFORMITIES

Subd. 1 *Continuance of Nonconformities:* A use, structure, or occupancy of land which was lawful before the passage or amendment of this chapter but which is not in conformity with the provisions of this chapter may be continued subject to the following conditions. Historic structures, as defined in Section 1101.02 Subd. 9. of this chapter, are subject to the provisions of a. – f. below.

a. A nonconforming use, structure, or occupancy must not be expanded, changed, enlarged, or altered in a way that increases its flood damage potential or degree of obstruction to flood flows except as provided in b. below. Expansion or enlargement of uses, structures or occupancies within the Floodway District is prohibited.

b. Any addition or structural alteration to a nonconforming structure or nonconforming use that would result in increasing its flood damage potential must be protected to the regulatory flood protection elevation in accordance with any of the elevation on fill or floodproofing techniques (i.e., FP1 thru FP4 floodproofing classifications) allowable in the State Building Code, except as further restricted in c. – g. below.

c. If the cost of all previous and proposed alterations and additions exceeds 50 percent of the market value of any nonconforming structure, that shall be considered substantial improvement, and the entire structure must meet the standards of Sections 1101.04 or 1101.05 of this chapter for new structures, depending upon whether the structure is in the Floodway or Flood Fringe District, respectively. The cost of all structural alterations and additions must include all costs such as construction materials and a reasonable cost placed on all manpower or labor.

d. If any nonconforming use, or any use of a nonconforming structure, is discontinued for more than one year, any future use of the premises must conform to this chapter. The Assessor must notify the Zoning Administrator in writing of instances of nonconformities that have been discontinued for a period of more than one year.

e. If any nonconformity is substantially damaged, as defined in Section 1101.02 Subd. 9. of this chapter, it may not be reconstructed except in conformity with the provisions of this chapter. The applicable provisions for establishing new uses or new structures in Section 1101.04 or 1101.05 will apply depending upon whether the use or structure is in the Floodway or Flood Fringe, respectively.

f. If any nonconforming use or structure experiences a repetitive loss, as defined in Section 1101.02 Subd. 9. of this chapter, it must not be reconstructed except in conformity with the provisions of this chapter.

g. Any substantial improvement, as defined in Section 1101.02 Subd. 9. of this chapter, to a nonconforming structure requires that the existing structure and any additions must meet the requirements of Section 1101.04 or 1101.05 of this

chapter for new structures, depending upon whether the structure is in the Floodway or Flood Fringe District.

1101.12 PENALTIES AND ENFORCEMENT

Subd. 1. *Violation Constitutes a Misdemeanor:* Violation of the provisions of this chapter or failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with grants of variances or conditional uses) constitute a misdemeanor and will be punishable as defined by law.

Subd. 2. *Other Lawful Action:* Nothing in this chapter restricts the City of Shorewood from taking such other lawful action as is necessary to prevent or remedy any violation. If the responsible party does not appropriately respond to the Zoning Administrator within the specified period of time, each additional day that lapses will constitute an additional violation of this chapter and will be prosecuted accordingly.

Subd. 3. *Enforcement:* Violations of the provisions of this chapter will be investigated and resolved in accordance with the provisions of Section 120.08 of the Zoning Code. In responding to a suspected ordinance violation, the Zoning Administrator and City Council may utilize the full array of enforcement actions available to it including but not limited to prosecution and fines, injunctions, after-the-fact permits, orders for corrective measures or a request to the National Flood Insurance Program for denial of flood insurance availability to the guilty party. The City of Shorewood must act in good faith to enforce these official controls and to correct ordinance violations to the extent possible so as not to jeopardize its eligibility in the National Flood Insurance Program.

1101.13 AMENDMENTS

Subd. 1. *Floodplain Designation – Restrictions on Removal:* The floodplain designation on the floodplain maps must not be removed from floodplain areas unless it can be shown that the designation is in error or that the area has been filled to or above the elevation of the regulatory flood protection elevation and is contiguous to lands outside the floodplain. Special exceptions to this rule may be permitted by the Commissioner of the Department of Natural Resources (DNR) if the Commissioner determines that, through other measures, lands are adequately protected for the intended use.

Subd. 2. *Amendments Require DNR Approval:* All amendments to this chapter must be submitted to and approved by the Commissioner of the Department of Natural Resources (DNR) prior to adoption. The Commissioner must approve the amendment prior to community approval.

Subd. 3. *Map Revisions Require Ordinance Amendments.* The floodplain district regulations must be amended to incorporate any revisions by the Federal Emergency Management Agency to the floodplain maps adopted in Section 1101.02 Subd. 3. of this chapter.

Section 2. This Ordinance shall be in full force and effect upon publishing in the Official Newspaper of the City of Shorewood.

ADOPTED BY THE CITY COUNCIL OF THE CITY OF SHOREWOOD this 24th day of October 2016.

ATTEST:

Scott Zerby, Mayor

Jean Panchyshyn

Jean Panchyshyn, City Clerk

CITY OF SHOREWOOD

ORDINANCE NO. 535

AN ORDINANCE AMENDING THE SHOREWOOD ZONING CODE AS IT PERTAINS TO SHORT-TERM RENTALS

Section 1. City Code Section 1201.02 is hereby amended to add the following definitions:

"***HOTEL.***" An establishment, including a motel, resort, boarding house, lodging house, bed and breakfast, furnished apartment house, short-term rental unit not in a residential district, or other building, which is kept, used or advertised as, or held out to the public to be, a place where sleeping and/or housekeeping accommodations are supplied for pay to guests for transient occupancy."

"SHORT-TERM RENTAL UNIT. Any structure, any portion of any structure, rental dwelling or rental dwelling unit that is rented to a transient for less than thirty (30) consecutive days in a residential district or residential planned unit development district."

"TRANSIENT: Any person who, at their own expense or at the expense of another, exercises occupancy or possession, or is entitled to occupancy or possession, by reason of any rental agreement, concession, permit, right of access, option to purchase, license, time sharing arrangement, or any other type of agreement for a period of less than thirty (30) consecutive calendar days."

Section 2. This Ordinance shall be in full force and effect upon publication in the Official Newspaper of the City of Shorewood.

ADOPTED BY THE CITY COUNCIL OF THE CITY OF SHOREWOOD this 28th day of November, 2016.

Scott Zerby, Mayor

ATTEST:

Jean Panchyshyn

Jean Panchyshyn, City Clerk

CHAPTER 907
ILLICIT DISCHARGE INTO STORMWATER SYSTEM

Section

907.01 Purpose/intent

907.02 Definitions

907.03 Applicability

907.04 Responsibility for administration

907.05 Severability

907.06 Prohibited discharges

907.07 Best management practices

907.08 Notification of spills

907.09 Enforcement

907.10 Appeal of notice of violation

907.11 Cost of abatement of the violation

907.12 Remedies not exclusive

907.01 PURPOSE/INTENT .

The purpose of this chapter is to reduce non-storm water discharges to the Municipal Separate Storm Sewer System (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. The objectives of this chapter are:

(1) To minimize pollutants into the MS4.

(2) To prohibit illicit connections and discharges to the MS4.

(3) To establish legal authority to carry out compliance with this chapter.

(Ord. 455, passed 12-8-2008)

907.02 DEFINITIONS.

For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

AUTHORIZED ENFORCEMENT AGENCY . The City of Shorewood designated to enforce this chapter.

BEST MANAGEMENT PRACTICES (BMPs). Pollution prevention practices, maintenance procedures, and other management practices to reduce the discharge of pollutants to storm water, receiving waters, or storm water conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, disposal, or drainage from raw materials storage.

HAZARDOUS MATERIALS. Those materials which because of their quantity, concentration, or physical, chemical, or infectious characteristics are a hazard to human health, safety and property when improperly disposed of.

ILLEGAL DISCHARGE. Any direct non-stormwater discharge to the storm drain system of pollutants or hazardous materials.

ILLICIT CONNECTIONS. Any drain or conveyance causing an illegal discharge to enter the storm drain system or connected to the storm drain system which has not been approved by an authorized enforcement agency.

NON-STORMWATER DISCHARGE. A discharge into the storm drain system that is not normal stormwater.

POLLUTANT. Paints, varnishes, and solvents; oil and other automotive fluids; hazardous substances, concrete washout, and wastes.

STORM DRAINAGE SYSTEM. Publicly-owned facilities by which stormwater is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

STORMWATER. Any surface flow, runoff, and drainage consisting of natural precipitation and resulting from such precipitation.

STORMWATER POLLUTION PREVENTION PLAN. A document which describes the best management practices and activities to be implemented by government to reduce pollutant discharges to stormwater, stormwater conveyance systems, and/or receiving waters.

(Ord. 455, passed 12-8-2008)

907.03 APPLICABILITY .

This chapter shall apply to all run-off entering the storm drain system.

(Ord. 455, passed 12-8-2008)

907.04 RESPONSIBILITY FOR ADMINISTRA TION.

The city shall administer, implement, and enforce the provisions of this chapter. Any powers granted or duties imposed upon the city may be delegated in writing by the City Council to persons or entities including the Minnehaha Creek Watershed District.

(Ord. 455, passed 12-8-2008)

907.05 SEVERABILITY .

The provisions of this chapter are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this chapter or the application thereof to any person, establishment, or circumstances shall be

held invalid, such invalidity shall not affect the other provisions or application of this chapter.

(Ord. 455, passed 12-8-2008)

907.06 PROHIBITED DISCHARGES.

No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any pollutants or hazardous materials that cause or contribute to a violation of applicable water quality standards.

(Ord. 455, passed 12-8-2008) Penalty, see § 104.01

907.07 BEST MANAGEMENT PRACTICES.

The city may adopt requirements identifying best management practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of stormwater, the storm drain system, or waters within its borders.

(Ord. 455, passed 12-8-2008)

907.08 NOTIFICA TION OF SPILLS.

Any person having information of any known or suspected illegal discharges shall notify the city.

(Ord. 455, passed 12-8-2008)

907.09 ENFORCEMENT .

Upon finding that a person has violated a prohibition of this chapter, the city may order compliance by written notice of violation to the responsible person. Such notice may require reasonable monitoring, analysis and remediation by a specified deadline.

(Ord. 455, passed 12-8-2008)

907.10 APPEAL OF NOTICE OF VIOLA TION.

Subd. 1. Any person receiving a notice of violation may appeal the determination of the authorized enforcement agency. The notice of appeal must be received within ten days from the date of the notice of violation. Hearing on the appeal before the appropriate authority or his/her designee shall take place within 30 days from the date of receipt of the notice of appeal.

Subd. 2. The good citizens of Shorewood retain all legal rights guaranteed by the United States and Minnesota Constitution to pursue all appeals and rights to due process.

(Ord. 455, passed 12-8-2008)

907.11 COST OF ABA TEMENT OF THE VIOLA TION.

The property owner shall incur all costs to cease violating the provisions of this chapter.

(Ord. 455, passed 12-8-2008)

907.12 REMEDIES NOT EXCLUSIVE.

The remedies listed in this chapter are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the city to seek cumulative remedies.

(Ord. 455, passed 12-8-2008)

Print

CHAPTER 1102
WETLAND DEVELOPMENTS

Section

1102.01 Purpose and intent

1102.02 Definitions

1102.03 Wetland Conservation Area and Map

1102.04 Conditions of development, restrictions

1102.05 Earth change plan

1102.06 Subdivision standards

1102.07 Land area within easements

1102.08 Artificial obstructions

1102.09 Variances

1102.10 Violation

1102.11 Vehicle restrictions

1102.01 PURPOSE AND INTENT .

Subd. 1. The City of Shorewood is a residential community located on the south shore of Lake Minnetonka and it includes within its boundaries the largest portion of Christmas Lake, Silver Lake, Lake Mary, a portion of Lake Virginia and Galpin Lake, together with numerous inlets, harbors, bays, wetlands, woods and valleys. The name of this city denotes its character--a city of shoreland, water and woods--natural assets its citizens hold in trust for future generations. It is in the public interest to protect these assets against haphazard, uncoordinated and unplanned development which may affect in some way lowlands, marshes, wetlands, swamps, lakes and watercourses within the city.

Subd. 2. Recognizing the obligation to protect these assets and natural resource gifts from destruction and pollution of all kinds, and in order to carry out a program of coordinated land and water management, the following standards, prohibitions, regulations and requirements are hereinafter set forth. In addition to the general purposes, the specific intent of this chapter is to:

a. Reduce danger to health by protecting surface and ground water supplies from the impairment which results from incompatible land uses by providing safe and sanitary drainage;

b. Permit and encourage planned development land uses which will not impede the flow of flood water or cause danger to life or property;

c. Permit and encourage land uses compatible with the preservation of the natural vegetation and marshes which are a principal factor in the maintenance of constant rates of water flow through the year and which sustain many species of wildlife and plant growth;

d. Avoid fast runoff of surface waters from developed areas to prevent pollution materials such as animal feces, motor oils, paper, sand, salt and other debris, garbage and foreign materials from being carried directly into the nearest natural stream, lake or other public waters;

e. Prevent the development of structures in areas which will adversely affect the public passage and use of creeks, marshes, lowlands and watercourses within the city.

(1987 Code, § 1102.01)

1102.02 DEFINITIONS .

For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

ARTIFICIAL OBSTRUCTION . Any dam, wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation, bridge, conduit, pole, culvert, building, wire fences, fill, other structure or matter in, along, across or projecting into the protected wetland conservation area.

NATURAL OBSTRUCTION. Any rock, tree, gravel or analogous natural matter that is an obstruction and has been located within the wetland conservation area by a nonhuman cause.

SETBACK. The minimum horizontal distance between a building or structure and the nearest edge of a wetland buffer. Distances are to be measured at ground level from the most outwardly extended portion of any part of the structure.

WETLAND BUFFER . An area of vegetated ground cover, measuring 35 feet in depth, abutting a wetland conservation area as provided in § 1102.03 of this code or abutting a wetland which is protected by the Wetland Conservation Act of 1991 (hereinafter referred to as the WCA).

(1987 Code, § 1102.02) (Ord. 305, passed 8-28-1995)

1102.03 WETLAND CONSER VATION AREA AND MAP .

The wetland conservation area within the city, hereafter referred to as the protected area, is defined and established to be the shoreline of Lake Minnetonka, Galpin Lake, Christmas Lake, Lake Mary, Silver Lake, Lake Virginia and the low areas adjoining any watercourse and drainageway or body of water subject to meandering, flowing or overflow, including areas of marsh, wooded marsh, submerged marsh and inundation area as shown upon the wetlands map. The Map is made a part of this chapter and two copies thereof shall remain on file in the office of the City Administrator/Clerk for public inspection.

(1987 Code, § 1102.03)

1102.04 CONDITIONS OF DEVELOPMENT , RESTRICTIONS .

No filling, grading, dredging, excavation or construction shall be allowed within the wetland conservation area if the activity is incompatible with the policies expressed in this chapter and the preservation of those wetlands in their natural state, nor shall the shoreline of Lake Minnetonka, Galpin Lake, Christmas Lake, Lake Mary, Silver Lake and Lake Virginia be changed in any way by fill or excavation without an earth change plan being filed by the applicant to so do and a permit issued hereunder by the City Council for the change.

(1987 Code, § 1102.04) (Ord. 70, passed 3-12-1973)

1102.05 EARTH CHANGE PLAN .

Landowners or developers desiring to develop land or construct any dwelling or any other artificial obstruction or direct the flow of water from any underground water source, on land located within the wetland conservation area or change the shoreline of Lake Minnetonka, Galpin Lake, Christmas Lake, Lake Mary, Silver Lake and Lake Virginia within the city, shall first submit a plan of development, hereinafter referred to as "an earth change plan," to the City Council which shall set forth proposed provisions for sediment control, water management, maintenance of landscaped features and any additional matters intended to improve or maintain the quality of the environment. The plan shall set forth proposed changes requested by the applicant and affirmatively disclose what, if any, change will be made in the natural condition of the earth, including loss or change of earth ground cover, destruction of trees, grade changes and its effect, if any, upon lakes, streams, watercourses and marshes, lowlands and wetlands in the area. The plan shall minimize tree removal, ground cover change, loss of natural vegetation and grade changes as much as possible and shall affirmatively provide for the relocation or replanting of as many trees as possible which are proposed to be removed. The purpose of the earth change plan shall be to eliminate as much as possible potential pollution, erosion and siltation.

(1987 Code, § 1102.05) (Ord. 217, passed 7-10-1989)

1102.06 SUBDIVISION STANDARDS.

No part of any land within the wetland conservation area shall be platted for residential use or any other use which will increase the danger to health, life, property or the public welfare. Whenever a portion of the conservation area is located within the area to be subdivided, an adequate easement in favor of the city over the lowlands shall be required for the purpose of improving and protecting the area from drainage and other purposes expressed in this chapter. Streets, driveways and culverts shall not be constructed or designed so as to restrict the flow of water and the same shall be approved by the City Council.

Subd. 1. No part of any land within the wetland conservation area shall be platted for residential use or any other use which will increase the danger to health, life, property or the public welfare. Whenever a portion of the conservation area is located within the area to be subdivided, an adequate easement in favor of the city over the lowlands shall be required for the purpose of improving and protecting the area from drainage and other purposes expressed in this chapter. Streets, driveways and culverts shall not be constructed or designed so as to restrict the flow of water and the same shall be approved by the City Council.

Subd. 2. For lots created after 28 August 1995, or for those lots where a wetland buffer strip and setback have been required as part of a subdivision development agreement, a buffer strip shall be maintained abutting all wetland conservation areas as provided in § 1102.03 of this code and abutting WCA wetlands.

a. It is the responsibility of the subdivider to delineate the exact boundaries of wetland conservation areas as provided in § 1102.03 of this code and the boundaries of WCA wetlands. Wetland delineations supplied by subdividers shall be certified by a qualified wetland delineator approved by the U.S. Army Corps of Engineers or the Minnesota Board of Water and Soil Resources.

b. Wetland buffer strips and structure setbacks shall apply to all parcels of land whether or not the wetland is on the same parcel as the development.

c. Buffer strip vegetation shall be preserved and maintained in its natural state.

d. For roadways that must be aligned either adjacent to or across wetlands and are subject to WCA replacement requirements, additional wetland filling to create a buffer strip shall not be required.

e. A survey monument is required at each lot line where it crosses a wetland buffer strip and as necessary to adequately determine the location of the wetland buffer strip. These monuments shall remain

in place after site grading of the lot has been completed.

f. Wetland buffer strips and structure setbacks shall be as follows:

(1) Wetland buffer strip: minimum 35 feet from wetland conservation area or WCA wetland;

(2) Structure setback: minimum 15 feet from wetland buffer strip (fences and play equipment may encroach into the structure setback area, but not into the wetland buffer strip).

(1987 Code, § 1102.06) (Ord. 305, passed 8-28-1995)

1102.07 LAND AREA WITHIN EASEMENTS .

Land area, if within the wetland conservation area designated as an easement, shall not be credited as part of the area complying with the land use density or building unit to land area ratio, or other similar requirements of the zoning ordinance. The exempt land area which is not to be developed and which is designated as an easement shall not be subject to special assessment to defray cost of municipal improvement projects, including and not limited to water, sanitary and storm sewer improvements.

(1987 Code, § 1102.07)

1102.08 ARTIFICIAL OBSTRUCTIONS .

If an artificial obstruction is found within the wetland conservation area, an order shall be issued to the owner of the parcel, following ten days written notice and hearing thereon, for removal within a reasonable time as may be prescribed by the condition and type of artificial obstruction. If the owner shall fail to remove the artificial obstruction, or if the owner cannot be found or determined, the city shall have the power to make or cause the removal to be made, the cost of which shall be borne by the owner or specially assessed against the lands in the same manner as prescribed by law for the levy of special assessments for municipal improvements, notwithstanding § 1102.07 herein. The special assessment shall be certified to the County Auditor for collection in the same manner as the ad valorem real property taxes of the city.

(1987 Code, § 1102.08)

1102.09 VARIANCES .

Subd. 1. Variances may be granted by the City Council upon application therefor in extraordinary cases, but only when the proposed use is determined to be in the public interest and no variance shall be granted which the Council determines will or has a tendency to:

a. Result in the placement of an artificial obstruction which will restrict the passage of storm and flood water in a manner as to increase the height of flooding, except obstructions approved by the Minnehaha Creek Watershed District in conjunction with sound flood plain management;

b. Result in incompatible land uses or which would be detrimental to the protection of surface and ground water supplies;

c. Be not in keeping with land use plans and planning objectives for the city or which will increase or cause danger to life or property;

d. Be inconsistent with the objectives of encouraging land uses compatible with the preservation of the natural land forms, vegetation and the marshes and wetlands within the city.

Subd. 2. No permit or variance shall be issued unless the applicant has submitted an earth change plan as required and set forth in § 1102.05 of this chapter.

Subd. 3. In granting any variance, the Council may attach the conditions as it deems necessary to insure compliance with the policy or intent of this chapter.

(1987 Code, § 1102.09)

1102.10 VIOLATION.

Any person violating any of the provisions of this chapter shall be guilty of a misdemeanor.

(1987 Code, § 1102.10) (Ord. 70, passed 3-12-1973) Penalty, see § 104.01

1102.11 VEHICLE RESTRICTIONS.

No person within a wetland conservation area shall:

Subd. 1. Drive or park a vehicle, except an authorized or emergency vehicle, on any turf or other area not designated for parking or travel;

Subd. 2. Wash, grease, dismantle, repair, change or deposit the oil of a vehicle anywhere within a wetland conservation area;

Subd. 3. Operate a motorized vehicle;

Subd. 4. Operate any watercraft within a wetland conservation area.

(1987 Code, § 1102.11) (Ord. 209, passed 5-9-1988)

1201.26 S, SHORELAND DISTRICT.

Subd. 1. Shoreland Districts. The shorelands within the city are designated as shoreland districts and the requirements set forth in this chapter shall govern development and other activities within these districts. The classification of the shoreland areas shall govern the use, alteration and development of these areas according to the classification as per M.S., Chapter 105, and Minnesota Regulations parts 6120.2500 - 6120.3900.

Subd. 2. District application. The S District shall be applied to and superimposed upon all zoning districts as contained herein as existing or amended by the text and map of this chapter. The regulations and requirements imposed by the S District shall be in addition to those established for districts which jointly apply. Under the joint application of districts, the more restrictive requirements shall apply.

Subd. 3. Boundaries. The boundaries of the Shoreland District are established within the following distances from the ordinary high water level of the surface water depending on the size of the surface water as indicated on the Shorewood Zoning Districts Map.

Surface Water	Distance (Feet)*
Greater than 10 acres (Table 1)	1,000
Rivers and streams (draining an area greater than 2 square miles)	300**
* The practical distance may be less whenever the waters involved are bounded by topographical divides	

which extend landward from the waters for lessor distances and prevent flowage toward the surface water.
** The distance requirement shall be increased to the limit of the flood plain when the flood plain is greater than 300 feet.

Subd. 4. Shoreland classification.

a. The surface waters affected by this section and which require controlled development of their shoreland (shoreland district) are shown on the map designated as the official "Zoning Districts Map of the City of Shorewood" which is properly approved and made a part of the ordinance and filed with the Zoning Administrator.

b. Surface waters generally greater than ten acres and given an identification number by the State of Minnesota are defined in § 1201.02 and listed in Table 1 of this section. Other surface waters affected by this chapter, generally having less than ten acres, are classified as wetlands and thus regulated under the provisions of Shorewood Ordinance 70 (Chapter 1102 of the City Code).

TABLE 1
SURFACE WATER DISTRIBUTION

DNR Identification Number	Name	Classification
27-133	Lake Minnetonka	GD
27-142	Lake William	GD
27-137	Christmas Lake	RD
27-144	Galpin Lake	GD
10-15	Virginia Lake	RD
27-145	Como Lake	RD
27-136	Silver Lake	NE
–	Purgatory Creek	GD

Subd. 5. Minimum lot and setback requirements.

a. The following chart sets forth the minimum area setbacks and other requirements of each respective classification:

	NE Natural Environment	RD Recreational Development	GD General Development
(1) Min. lot size above normal high water mark Abutting water Nonabutting	 40,000 sq. ft. 20,000 sq. ft.	 20,000 sq. ft. 15,000 sq. ft.	 15,000 sq. ft. 15,000 sq. ft.
(2) Lot width at lakeshore setback*	125 ft.	75 ft.	75 ft.
(3) Setback from ordinary high water level*	150 ft.	75 ft.	50 ft.
(4) Setback from public street* Abutting federal, state or county road Abutting town or public road	 50 ft. 30 ft.	 50 ft. 30 ft.	 50 ft. 30 ft.
(5) Max. impervious surface to area ratio	25%	25%	25%
(6) Max. building height (feet)	35 ft.**	35 ft.**	35 ft.**

(7) Side yard setback (lots abutting water)	30 ft. total/10 ft. min.***	30 ft. total/10 ft. min.***	30 ft. total/10 ft. min.***
(8) Setback of roads, parking or impervious surface areas from ordinary high water level****	50 ft.	50 ft.	50 ft.
(9) Structure height (lowest floor) above high water elevation*****	3 ft.	3 ft.	3 ft.
* Setback requirements from the ordinary high water level shall not apply to stairs, lifts, piers and docks. Where development exists on both sides of a proposed building site, building setbacks may be altered to more closely conform to adjacent building setbacks.			
**Building heights may be increased as provided in § 1201.03, Subdivision 4c.			
***Subject to regulations and exceptions as provided in §§ 1201.10 through 1201.23.			
****Where feasible and practical, all roads and parking areas shall meet the setback requirements established for structures in (3) above. Natural vegetation or other natural materials shall be required in order to screen parking areas when viewed from the water. Parking areas of more than four spaces shall be screened in accordance with a landscaping plan submitted and approved by the City Council.			
*****Does not include piers and docks.			

b. Substandard lot. Any lot of record filed in the office of the Hennepin County Registrar of Deeds on or before the effective date of this chapter, which does not meet the area requirements of this chapter may be allowed as a building site subject to approval of a shoreland impact plan and provided:

(1) The lot meets all standards of the applicable zoning use district;

(2) The lot is in separate ownership from abutting lands;

(3) Except for lot area, all other sanitary and dimensional requirements of the Shoreland District are complied with insofar as practical (70% width and area requirements).

c. Placement of structures. Placement of structures shall comply with the provisions of Shorewood Ordinance 109 (Chapter 1101, Flood Control Regulations of the City Code).

d. Bluff impact zones Structures and accessory facilities, except stairways, lifts and landings, must not be placed within bluff impact zones.

Subd. 6. Development regulations.

a. Landowners or developers desiring to develop land or construct any dwelling or any other artificial obstruction on land located within any Shoreland District within the city shall first submit a conditional use permit application as regulated by § 1201.04 and a plan of development hereinafter referred to as "Shoreland Impact Plan," which shall set forth proposed provisions for sediment control, water management, maintenance of landscaped features and any additional matters intended to improve or maintain the quality of the environment. Such a plan shall set forth proposed changes requested by the applicant and affirmatively disclose what, if any, change will be made in the natural condition of the earth, including loss or change of earth ground cover, destruction of trees, grade courses and marshes. The plan shall minimize tree removal, ground cover change, loss of natural vegetation and grade changes as much as possible and shall affirmatively provide for the relocation or replanting of as many trees as possible which are proposed to be removed. The purpose of the shoreland impact plan shall be to eliminate as much as possible potential pollution, erosion and siltation.

(1) Exceptions.

(a) No conditional use permit or shoreland impact plan shall be required for the development of permitted accessory uses contained within the R-1A, R-1B, R-1C, R-2A, R-2B or R-2C Districts.

(b) No conditional use permit or shoreland impact plan shall be required for the development of permitted uses contained within the R-1A, R-1B, R-1C, R-2A, R-2B or R-2C Districts, provided that the uses are constructed on standard lots when abutting a shoreline and that all the uses are serviced with public sanitary sewer.

(c) The provisions otherwise set forth in this chapter and in other applicable local ordinances shall apply to all plats except Planned Unit Development.

(2) Subdivision. No land shall be subdivided which is determined by the city or the Commissioner of Natural Resources to be unsuitable by reason of flooding, inadequate drainage, soil and rock formations with severe limitations for development, severe erosion potential, unfavorable topography, inadequate water supply or sewage treatment capabilities or any other feature likely to be harmful to the health, safety or welfare of the future residents of the proposed subdivision or the community.

b. Sewage and waste disposal. Any premises used for human occupancy shall be provided with public sanitary sewer disposal.

c. Water supply. Any private supply of water for domestic purposes shall conform to Minnesota Department of Health Standards for water quality. Private wells shall be placed in areas not subject to flooding and up slope from any source of contamination. Wells already existing in areas subject to flooding shall be floodproofed in accordance with city standards.

d. Stairways, lifts and landings. Stairways and lifts are the preferred alternative to major topographic alterations for achieving access up and down bluffs and steep slopes to shore areas. Stairways and lifts must meet the following design requirements:

(1) Stairways and lifts must not exceed four feet in width;

(2) Landings for stairways and lifts must not exceed 32 square feet in area;

(3) Canopies or roofs are not allowed on stairways, lifts or landings;

(4) Stairways, lifts and landings may be either constructed above the ground on posts or pilings or placed into the ground, provided they are designed and built in a manner that ensures control of soil erosion;

(5) Stairways, lifts and landings must be located in the most visually inconspicuous portions of lots, as viewed from the surface of the public water assuming summer, leaf-on conditions, whenever practical;

(6) Facilities such as ramps, lifts or mobility paths for physically handicapped persons are also allowed for achieving access to shore areas, provided that the dimensional and performance standards of items (1) to (5) above are complied with in addition to the requirements of Minnesota Regulations, Chapter 1340.

Subd. 7. Shoreland alteration .

a. The removal of natural vegetation shall be restricted to prevent erosion into public waters, to consume nutrients in the soil and to preserve shoreland aesthetics.

(1) Clearcutting is prohibited within required setback areas and except as necessary for placing public roads, utilities, structures and parking areas.

(2) Natural vegetation shall be restored insofar as feasible after any construction project.

(3) Selective cutting of trees and underbrush is allowed as long as sufficient cover is left to make cars and structures visually inconspicuous when viewed from the water.

b. Grading and filling:

(1) Grading and filling within Shoreland Districts, or any alteration of the natural topography where the slope of land is toward a public water or watercourse leading to a public water must be approved by the Building Official and a permit obtained prior to the commencement of any work thereon. The permit may be granted subject to the conditions that:

(a) No more than one-third of the surface area of a lot shall be devoid of vegetative ground cover at any time;

(b) Temporary ground cover such as mulch shall be used and permanent cover such as sod shall be planted as soon as possible;

(c) Methods to prevent erosion and trap sediment shall be employed in accordance with the Shorewood Subdivision Ordinance (Chapter 1202 of this code);

(d) Fill shall not be placed in areas lower in elevation than the normal high water mark;

(e) Fill shall be stabilized according to accepted engineering standards;

(f) Fill shall not restrict a floodway or destroy the storage capacity of a flood plain;

(g) The maximum slope of the finished surface which slopes toward a water body or a watercourse leading to the water body shall be three units horizontal to one vertical;

(h) No grading or filling shall be permitted within shore and bluff impact zones;

(i) Plans to place fill or excavated material on steep slopes must be reviewed and approved by the City Engineer for continued slope stability and must not create finished slopes greater than three units horizontal to one vertical;

(j) Placement of natural rock riprap, including associated grading of the shortline and placement of a filter blanket, is permitted if the finished slope does not exceed three feet horizontal to one foot vertical, the landward extent of the riprap is within ten feet of the ordinary high water level and the height of the riprap above the ordinary high water level does not exceed three feet;

(2) Any work which will change or diminish the course, current or cross section of a public water must be approved by the Department of Natural Resources as per M.S. § 105.44 before the work is begun. This includes construction of channels and ditches, lagooning, dredging of lake bottom for the removal of muck, silt or weeds and filling the lake bed, including low lying marsh areas. Approval shall be construed to mean the issuance by the Commissioner of the Department of Natural Resources of a permit under the procedures of M.S. § 42 and other related statutes;

(3) Excavation on shorelands where the intended purpose is connection to a public water, such as boat slips, canals, lagoons and harbors, shall require a permit from the Building Official prior to commencement of construction. The permit shall be obtained only after the Commissioner of the Department of Natural Resources has approved the proposed connection to public waters. Approval will be given only if the proposed work is consistent with applicable state regulations for work in beds of public waters.

c. Steep slopes. The Zoning Administrator must evaluate possible soil erosion impacts and development visibility from public waters before issuing a permit for construction of roads, driveways, structures or other improvements on steep slopes. When determined necessary, conditions must be attached to issued permits to prevent erosion and to preserve existing vegetation screening of structures, vehicles and other facilities as viewed from the surface of public waters, assuming summer, leaf-on vegetation.

Subd. 8. Stormwater management. The following general and specific standards shall apply.

a. General standar ds.

(1) When possible, existing natural drainageways, wetlands and vegetated soil surfaces must be used to convey, store, filter and retain stormwater runoff before discharge to public waters.

(2) Development must be planned and conducted in a manner that will minimize the extent of disturbed areas, runoff velocities, erosion potential and reduce and delay runoff volumes. Disturbed areas must be stabilized and protected as soon as possible and facilities or methods used to retain sediment on the site.

(3) When development density, topographic features and soil and vegetation conditions are not sufficient to adequately handle stormwater runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways and ponds may be used. Preference must be given to designs using surface drainage, vegetation and infiltration rather than buried pipes and man- made materials and facilities.

b. Specific standards.

(1) Impervious surface coverage of lots must not exceed 25% of the lot area, except as provided in § 1201.03 Subd. 2.u. of this code.

(2) When constructed facilities are used for stormwater management, documentation must be provided by a registered engineer licensed in the State of Minnesota that they are designed and installed consistent with the field office technical guide of the local soil and water conservation districts.

(3) New constructed stormwater outfalls to public waters must provide for filtering or settling of suspended solids and skimming of surface debris before discharge.

Subd. 9. Planned Unit Development. The Planned Unit Development provisions contained in § 1201.06 may be utilized within a Shoreland District, when consistent with the provisions of this section and provided that the following requirements are satisfactorily met:

a. Preliminary plans shall be approved by the Department of Natural Resources prior to city approval;

b. Sufficient open space is preserved through the use of restrictive deed covenants, public dedications and the like;

c. The following factors are carefully evaluated to insure that any increased density of development is consistent with the resource limitations of the public water:

(1) Suitability of the site for the proposed use;

(2) Physical and aesthetic impact of any increased density;

(3) Level of current development;

(4) Amount and ownership of undeveloped shoreland;

(5) Levels and types of water surface use and public access;

(6) Possible effects on overall public use;

d. Any commercial, recreational, community or religious facility allowed as part of the planned unit development conforms to all applicable federal and state regulations, including, but not limited to the following:

(1) Licensing provisions or procedures;

(2) Waste disposal regulations;

(3) Water supply regulations;

(4) Building codes;

(5) Safety regulations;

(6) Regulations concerning the appropriate use of public waters as defined in M.S., Chapter 105, as may be amended;

(7) Applicable regulations of the Minnesota Environmental Quality Board;

(8) Storm sewer;

e. The final P.U.D. plan shall not be modified or altered in any way without written approval from the Department of Natural Resources;

f. P.U.D.'s incorporating shoreline recreational facilities such as beaches, docks or boat launching facilities and the like shall be designed that the facilities are centralized for common utilization.

Subd. 10. Variance . Variances may be granted by the City Council upon application as required in § 1201.05 of this chapter in extraordinary cases, but only when the proposed use is determined to be in the public interest and no variance shall be granted which the Council determines will or has a tendency to:

a. Result in the placement of an artificial obstruction which will restrict the passage of storm and flood water in a manner as to increase the height of flooding, except obstructions approved by the U.S. Army Corps of Engineers in conjunction with sound flood plain management;

b. Result in compatible land uses or which would be detrimental to the protection of surface and ground water supplies;

c. Be not in keeping with land use plans and planning objectives for the city or which will increase or cause danger to life or property;

d. Be inconsistent with the objectives of encouraging land use compatible with the preservation of the natural land forms, vegetation and the marshes and wetlands within the city. No permit or variance shall be issued unless the applicant has submitted a Shoreland Impact Plan as required and set forth in this chapter. In granting any variance, the Council may attach the conditions as they deem necessary to insure compliance with the purpose and intent of this chapter.

Subd. 11. DNR notification procedure.

a. Copies of all notices of any public hearings to consider variances, amendments or conditional uses under this section shall be received by the Commissioner of the Department of Natural Resources at least ten days prior to the hearings.

b. A copy of amendments and final decisions granting variances or conditional uses under this section shall be received by the Commissioner of the Department of Natural Resources within ten days of final action or amendment.

Subd. 12. Effect of permit The granting of any permit, variance or subdivision approval under provisions of this section shall in no way affect the owner's capability to obtain the approval required by any other statute, ordinance or legislation of any state agency or subdivision thereof. Approval may be expressly given in conjunction with other permits applied for, but no approval shall be implied from the grant of the permits nor from the necessity to apply for a permit as described herein.

(1987 Code, § 1201.26) (Ord. 261, passed 11-30-1992; Am. Ord. 382, passed 3-25-2002; Am. Ord. 420, passed 2-13-2006)

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1201.26 S, SHORELAND DISTRICT .

Subd. 1. Shoreland Districts. The shorelands within the city are designated as shoreland districts and the requirements set forth in this chapter shall govern development and other activities within these districts. The classification of the shoreland areas shall govern the use, alteration and development of these areas according to the classification as per M.S., Chapter 105, and Minnesota Regulations parts 6120.2500 - 6120.3900.

Subd. 2. District application. The S District shall be applied to and superimposed upon all zoning districts as contained herein as existing or amended by the text and map of this chapter. The regulations and requirements imposed by the S District shall be in addition to those established for districts which jointly apply. Under the joint application of districts, the more restrictive requirements shall apply.

Subd. 3. Boundaries. The boundaries of the Shoreland District are established within the following distances from the ordinary high water level of the surface water depending on the size of the surface water as indicated on the Shorewood Zoning Districts Map.

Surface Water	Distance (Feet)*
Greater than 10 acres (Table 1)	1,000
Rivers and streams (draining an area greater than 2 square miles)	300**
* The practical distance may be less whenever the waters involved are bounded by topographical divides which extend landward from the waters for lessor distances and prevent flowage toward the surface water.	
** The distance requirement shall be increased to the limit of the flood plain when the flood plain is greater than 300 feet.	

Subd. 4. Shoreland classification.

a. The surface waters affected by this section and which require controlled development of their shoreland (shoreland district) are shown on the map designated as the official “Zoning Districts Map of the City of Shorewood” which is properly approved and made a part of the ordinance and filed with the Zoning Administrator.

b. Surface waters generally greater than ten acres and given an identification number by the State of Minnesota are defined in § 1201.02 and listed in Table 1 of this section. Other surface waters affected by this chapter, generally having less than ten acres, are classified as wetlands and thus regulated under the provisions of Shorewood Ordinance 70 (Chapter 1102 of the City Code).

TABLE 1
SURFACE WATER DISTRIBUTION

DNR Identification Number	Name	Classification
27-133	Lake Minnetonka	GD
27-142	Lake William	GD
27-137	Christmas Lake	RD

27-144	Galpin Lake	GD
10-15	Virginia Lake	RD
27-145	Como Lake	RD
27-136	Silver Lake	NE
–	Purgatory Creek	GD

Subd. 5. Minimum lot and setback requirements.

a. The following chart sets forth the minimum area setbacks and other requirements of each respective classification:

	NE Natural Environment	RD Recreational Development	GD General Development
(1) Min. lot size above normal high water mark Abutting water Nonabutting	 40,000 sq. ft. 20,000 sq. ft.	 20,000 sq. ft. 15,000 sq. ft.	 15,000 sq. ft. 15,000 sq. ft.
(2) Lot width at lakeshore setback*	125 ft.	75 ft.	75 ft.
(3) Setback from ordinary high water level*	150 ft.	75 ft.	50 ft.
(4) Setback from public street* Abutting federal, state or county road Abutting town or public road	 50 ft. 30 ft.	 50 ft. 30 ft.	 50 ft. 30 ft.
(5) Max. impervious surface to area ratio	25%	25%	25%
(6) Max. building height (feet)	35 ft.**	35 ft.**	35 ft.**
(7) Side yard setback (lots abutting water)	30 ft. total/10 ft. min.***	30 ft. total/10 ft. min.***	30 ft. total/10 ft. min.***
(8) Setback of roads, parking or impervious surface areas from ordinary high water level****	50 ft.	50 ft.	50 ft.
(9) Structure height (lowest floor) above high water elevation*****	3 ft.	3 ft.	3 ft.
* Setback requirements from the ordinary high water level shall not apply to stairs, lifts, piers and docks. Where development exists on both sides of a proposed building site, building setbacks may be altered to more closely conform to adjacent building setbacks.			
**Building heights may be increased as provided in § 1201.03, Subdivision 4c.			
***Subject to regulations and exceptions as provided in §§ 1201.10 through 1201.23.			
****Where feasible and practical, all roads and parking areas shall meet the setback requirements established for structures in (3) above. Natural vegetation or other natural materials shall be required in order to screen parking areas when viewed from the water. Parking areas of more than four spaces shall be screened in accordance with a landscaping plan submitted and approved by the City Council.			
*****Does not include piers and docks.			

b. Substandard lot. Any lot of record filed in the office of the Hennepin County Registrar of Deeds on or before the effective date of this chapter, which does not meet the area requirements of this chapter may be allowed as a building site subject to approval of a shoreland impact plan and provided:

(1) The lot meets all standards of the applicable zoning use district;

(2) The lot is in separate ownership from abutting lands;

(3) Except for lot area, all other sanitary and dimensional requirements of the Shoreland District are complied with insofar as practical (70% width and area requirements).

c. Placement of structures. Placement of structures shall comply with the provisions of Shorewood Ordinance 109 (Chapter 1101, Flood Control Regulations of the City Code).

d. Bluff impact zones Structures and accessory facilities, except stairways, lifts and landings, must not be placed within bluff impact zones.

Subd. 6. Development regulations.

a. Landowners or developers desiring to develop land or construct any dwelling or any other artificial obstruction on land located within any Shoreland District within the city shall first submit a conditional use permit application as regulated by § 1201.04 and a plan of development hereinafter referred to as "Shoreland Impact Plan," which shall set forth proposed provisions for sediment control, water management, maintenance of landscaped features and any additional matters intended to improve or maintain the quality of the environment. Such a plan shall set forth proposed changes requested by the applicant and affirmatively disclose what, if any, change will be made in the natural condition of the earth, including loss or change of earth ground cover, destruction of trees, grade courses and marshes. The plan shall minimize tree removal, ground cover change, loss of natural vegetation and grade changes as much as possible and shall affirmatively provide for the relocation or replanting of as many trees as possible which are proposed to be removed. The purpose of the shoreland impact plan shall be to eliminate as much as possible potential pollution, erosion and siltation.

(1) Exceptions.

(a) No conditional use permit or shoreland impact plan shall be required for the development of permitted accessory uses contained within the R-1A, R-1B, R-1C, R-2A, R-2B or R-2C Districts.

(b) No conditional use permit or shoreland impact plan shall be required for the development of permitted uses contained within the R-1A, R-1B, R-1C, R-2A, R-2B or R-2C Districts, provided that the uses are constructed on standard lots when abutting a shoreline and that all the uses are serviced with public sanitary sewer.

(c) The provisions otherwise set forth in this chapter and in other applicable local ordinances shall apply to all plats except Planned Unit Development.

(2) Subdivision. No land shall be subdivided which is determined by the city or the Commissioner of Natural Resources to be unsuitable by reason of flooding, inadequate drainage, soil and rock formations with severe limitations for development, severe erosion potential, unfavorable topography, inadequate water supply or sewage treatment capabilities or any other feature likely to be harmful to the health, safety or welfare of the future residents of the proposed subdivision or the community.

b. Sewage and waste disposal. Any premises used for human occupancy shall be provided with public sanitary sewer disposal.

c. Water supply. Any private supply of water for domestic purposes shall conform to Minnesota Department of Health Standards for water quality. Private wells shall be placed in areas not subject to flooding and up slope from any source of contamination. Wells already existing in areas subject to flooding shall be floodproofed in accordance with city standards.

d. Stairways, lifts and landings. Stairways and lifts are the preferred alternative to major topographic alterations for achieving access up and down bluffs and steep slopes to shore areas. Stairways and lifts must meet the following design requirements:

(1) Stairways and lifts must not exceed four feet in width;

(2) Landings for stairways and lifts must not exceed 32 square feet in area;

(3) Canopies or roofs are not allowed on stairways, lifts or landings;

(4) Stairways, lifts and landings may be either constructed above the ground on posts or pilings or placed into the ground, provided they are designed and built in a manner that ensures control of soil erosion;

(5) Stairways, lifts and landings must be located in the most visually inconspicuous portions of lots, as viewed from the surface of the public water assuming summer, leaf-on conditions, whenever practical;

(6) Facilities such as ramps, lifts or mobility paths for physically handicapped persons are also allowed for achieving access to shore areas, provided that the dimensional and performance standards of items (1) to (5) above are complied with in addition to the requirements of Minnesota Regulations, Chapter 1340.

Subd. 7. Shoreland alteration .

a. The removal of natural vegetation shall be restricted to prevent erosion into public waters, to consume nutrients in the soil and to preserve shoreland aesthetics.

(1) Clearcutting is prohibited within required setback areas and except as necessary for placing public roads, utilities, structures and parking areas.

(2) Natural vegetation shall be restored insofar as feasible after any construction project.

(3) Selective cutting of trees and underbrush is allowed as long as sufficient cover is left to make cars and structures visually inconspicuous when viewed from the water.

b. Grading and filling:

(1) Grading and filling within Shoreland Districts, or any alteration of the natural topography where the slope of land is toward a public water or watercourse leading to a public water must be approved by the Building Official and a permit obtained prior to the commencement of any work thereon. The permit may be granted subject to the conditions that:

(a) No more than one-third of the surface area of a lot shall be devoid of vegetative ground cover at any time;

(b) Temporary ground cover such as mulch shall be used and permanent cover such as sod shall be planted as soon as possible;

(c) Methods to prevent erosion and trap sediment shall be employed in accordance with the Shorewood Subdivision Ordinance (Chapter 1202 of this code);

(d) Fill shall not be placed in areas lower in elevation than the normal high water mark;

(e) Fill shall be stabilized according to accepted engineering standards;

(f) Fill shall not restrict a floodway or destroy the storage capacity of a flood plain;

(g) The maximum slope of the finished surface which slopes toward a water body or a watercourse leading to the water body shall be three units horizontal to one vertical;

(h) No grading or filling shall be permitted within shore and bluff impact zones;

(i) Plans to place fill or excavated material on steep slopes must be reviewed and approved by the City Engineer for continued slope stability and must not create finished slopes greater than three units horizontal to one vertical;

(j) Placement of natural rock riprap, including associated grading of the shortline and placement of a filter blanket, is permitted if the finished slope does not exceed three feet horizontal to one foot vertical, the landward extent of the riprap is within ten feet of the ordinary high water level and the height of the riprap above the ordinary high water level does not exceed three feet;

(2) Any work which will change or diminish the course, current or cross section of a public water must be approved by the Department of Natural Resources as per M.S. § 105.44 before the work is begun. This includes construction of channels and ditches, lagooning, dredging of lake bottom for the removal of muck, silt or weeds and filling the lake bed, including low lying marsh areas. Approval shall be construed to mean the issuance by the Commissioner of the Department of Natural Resources of a permit under the procedures of M.S. § 42 and other related statutes;

(3) Excavation on shorelands where the intended purpose is connection to a public water, such as boat slips, canals, lagoons and harbors, shall require a permit from the Building Official prior to commencement of construction. The permit shall be obtained only after the Commissioner of the Department of Natural Resources has approved the proposed connection to public waters. Approval will be given only if the proposed work is consistent with applicable state regulations for work in beds of public waters.

c. Steep slopes. The Zoning Administrator must evaluate possible soil erosion impacts and development visibility from public waters before issuing a permit for construction of roads, driveways, structures or other improvements on steep slopes. When determined necessary, conditions must be attached to issued permits to prevent erosion and to preserve existing vegetation screening of structures, vehicles and other facilities as viewed from the surface of public waters, assuming summer, leaf-on vegetation.

Subd. 8. Stormwater management. The following general and specific standards shall apply.

a. General standar ds.

(1) When possible, existing natural drainageways, wetlands and vegetated soil surfaces must be used to convey, store, filter and retain stormwater runoff before discharge to public waters.

(2) Development must be planned and conducted in a manner that will minimize the extent of disturbed areas, runoff velocities, erosion potential and reduce and delay runoff volumes. Disturbed areas must be stabilized and protected as soon as possible and facilities or methods used to retain sediment on the site.

(3) When development density, topographic features and soil and vegetation conditions are not sufficient to adequately handle stormwater runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways and ponds may be used. Preference must be given to designs using surface drainage, vegetation and infiltration rather than buried pipes and man- made materials and facilities.

b. Specific standards.

(1) Impervious surface coverage of lots must not exceed 25% of the lot area, except as provided in § 1201.03 Subd. 2.u. of this code.

(2) When constructed facilities are used for stormwater management, documentation must be provided by a registered engineer licensed in the State of Minnesota that they are designed and installed consistent with the field office technical guide of the local soil and water conservation districts.

(3) New constructed stormwater outfalls to public waters must provide for filtering or settling of suspended solids and skimming of surface debris before discharge.

Subd. 9. Planned Unit Development. The Planned Unit Development provisions contained in § 1201.06 may be utilized within a Shoreland District, when consistent with the provisions of this section and provided that the following requirements are satisfactorily met:

a. Preliminary plans shall be approved by the Department of Natural Resources prior to city approval;

b. Sufficient open space is preserved through the use of restrictive deed covenants, public dedications and the like;

c. The following factors are carefully evaluated to insure that any increased density of development is consistent with the resource limitations of the public water:

(1) Suitability of the site for the proposed use;

(2) Physical and aesthetic impact of any increased density;

(3) Level of current development;

(4) Amount and ownership of undeveloped shoreland;

(5) Levels and types of water surface use and public access;

(6) Possible effects on overall public use;

d. Any commercial, recreational, community or religious facility allowed as part of the planned unit development conforms to all applicable federal and state regulations, including, but not limited to the following:

(1) Licensing provisions or procedures;

(2) Waste disposal regulations;

(3) Water supply regulations;

(4) Building codes;

(5) Safety regulations;

(6) Regulations concerning the appropriate use of public waters as defined in M.S., Chapter 105, as may be amended;

(7) Applicable regulations of the Minnesota Environmental Quality Board;

(8) Storm sewer;

e. The final P.U.D. plan shall not be modified or altered in any way without written approval from the Department of Natural Resources;

f. P.U.D.'s incorporating shoreline recreational facilities such as beaches, docks or boat launching facilities and the like shall be designed that the facilities are centralized for common utilization.

Subd. 10. Variance . Variances may be granted by the City Council upon application as required in § 1201.05 of this chapter in extraordinary cases, but only when the proposed use is determined to be in the public interest and no variance shall be granted which the Council determines will or has a tendency to:

a. Result in the placement of an artificial obstruction which will restrict the passage of storm and flood water in a manner as to increase the height of flooding, except obstructions approved by the U.S. Army Corps of Engineers in conjunction with sound flood plain management;

b. Result in compatible land uses or which would be detrimental to the protection of surface and ground water supplies;

c. Be not in keeping with land use plans and planning objectives for the city or which will increase or cause danger to life or property;

d. Be inconsistent with the objectives of encouraging land use compatible with the preservation of the natural land forms, vegetation and the marshes and wetlands within the city. No permit or variance shall be issued unless the applicant has submitted a Shoreland Impact Plan as required and set forth in this chapter. In granting any variance, the Council may attach the conditions as they deem necessary to insure compliance with the purpose and intent of this chapter.

Subd. 11. DNR notification procedure.

a. Copies of all notices of any public hearings to consider variances, amendments or conditional uses under this section shall be received by the Commissioner of the Department of Natural Resources at least ten days prior to the hearings.

b. A copy of amendments and final decisions granting variances or conditional uses under this section shall be received by the Commissioner of the Department of Natural Resources within ten days of final action or amendment.

Subd. 12. Effect of permit The granting of any permit, variance or subdivision approval under provisions of this section shall in no way affect the owner's capability to obtain the approval required by any other statute, ordinance or legislation of any state agency or subdivision thereof. Approval may be expressly given in conjunction with other permits applied for, but no approval shall be implied from the grant of the permits nor from the necessity to apply for a permit as described herein.

(1987 Code, § 1201.26) (Ord. 261, passed 11-30-1992; Am. Ord. 382, passed 3-25-2002; Am. Ord. 420, passed 2-13-2006)

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For further information regarding the official version of any of this Code of Ordinances or other documents posted on this site, please contact the Municipality directly or contact American Legal Publishing toll-free at 800-445-5588.

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APPENDIX J

Phosphorus Removal Study

PHOSPHORUS LOAD REDUCTION STUDY

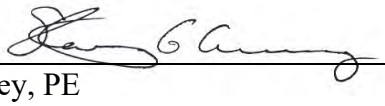
CITY OF SHOREWOOD

AUGUST 2008

Prepared by:

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
(763) 541-4800
(763) 541-1700

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of Minnesota.



Steven G. Gurney, PE Date
Reg. No. 40497

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I. INTRODUCTION AND PURPOSE

This report provides the results of a Phosphorus Loading Assessment that was completed for the City of Shorewood. This report provides the results of a very basic water quality modeling and stormwater treatment analysis for systems that are in place within the City of Shorewood. The report provides the results of the assessment which has been performed to estimate the changes in annual phosphorus loadings that may have occurred from 2000 to the present.

Section II provides a detailed outline of the procedures and methods that were used to perform the loading assessment and to estimate stormwater BMP treatment efficiencies. **Section III** presents and discusses the results of the loading assessment.

II. PROCEDURES AND METHODS FOLLOWED

This section of the report provides the procedures and methods followed for the loading assessment and analysis.

The loading assessment estimates the changes in annual phosphorus loads for areas that were redeveloped within the City of Shorewood between 2000 and 2007. This time frame was chosen to coincide with the MCWD studies. Likewise, areas that redeveloped prior to 2000, or have not redeveloped, are not included in this study.

A method based on land use has been applied to determine the change in phosphorus loadings as described in the Steps listed below. This method is similar to that outlined in the July 1, 2005, Technical Memorandum from Wenck Associates, Inc. entitled "Methodology for HHPLS-P-Load model Application to Development of Subwatershed Rules Under Performance-Based Management."

The redeveloped areas evaluated as part of this study are identified in **Figure 1.** A detailed description of the procedures and methods used follows:

FIGURE 1

Step 1. Compare 2000 and 2007 land uses.

Information was gathered from past redevelopment reviews and from staff input regarding areas of the City in which stormwater improvements have been constructed since 2000.

Step 2. Estimate annual phosphorus loading based on land use.

The annual phosphorus loading used for this study for various land uses are summarized in **Table 1**.

Table 1

Land Cover Type for Selection of Imperviousness	Annual TP Load (lb/ac)
Undeveloped Land, or Pre-development	
Hydric soils – row cropland or close grown cropland	0.259
Upland soils – row cropland or close grown cropland	0.109
Forest, woodland, upland shrubland, savanna, grassland	0.014
Developed Land, or Post-Development	
Rural/Residential 4-10% Impervious	0.300
Residential Low/Residential 11-25% Impervious	0.563
Residential Medium/Residential 26-50% Impervious	0.724
Residential High/Residential 51-75% Impervious	1.140
Commercial 76-90% Impervious	1.288

Step 3: Compute annual phosphorus load generated by land use.

The average phosphorus load generated from each land use in the pre- and post-development condition was computed based on the data gathered in **Step 1** and **Step 2**. Annual loading is calculated using the following equation on a per acre basis:

Redevelopment Size x Loading by Land Use = Total Phosphorus Load (lbs/year)

Step 4: Define treatment practices and removal efficiencies employed in 2000 and present.

Treatment practices and BMPs that have been constructed since 2000 were identified and evaluated for this study. Identified below is a discussion of the BMPs considered for the analysis:

- **Stormwater Ponds**
  This analysis considers that newly created ponds will retain 60% of TP loads prior to discharging downstream. This TP removal rate is supported by information presented in "Phosphorus Removal by Urban Runoff Detention Basins" (Walker). This document indicates that basins built to the NURP design standards that average four feet in depth provide TP removal efficiencies of 60% or greater. To be conservative, a 50% removal rate is used in this study, except where otherwise demonstrated during the design review of individual redevelopment projects.

- **Structural BMPs**
  Significant structural BMPs within the City include:

  1. The underground alum treatment system at Shorewood Mall, constructed in 2002 as part of the Cub Foods expansion. Further discussion of this system is presented in **Section III** of this study.

  2. The grit chamber installed as part of the County Road 19 project. This structural BMP was one part of the treatment train for the Gideon Glen demonstration project.

- **Other BMPs**
  In addition to storm water ponds, other BMPs may reduce volumes of runoff and pollutant loadings within the City. Some common BMPs that exist in the City are infiltration areas, sump catch basins, street sweeping, restrictions on phosphorus fertilizer, and vegetated buffers. These BMPs further reduce increases in annual runoff volumes and pollutant loading discharges that may have occurred between 2000 and 2007**.**

III. DISCUSSION/EVALUATION OF RESULTS

This section provides the results of the phosphorus load analysis that was completed as part of this study. This section also provides a description of possible methods to further reduce the phosphorus load on downstream waters. The information presented in this section was determined utilizing the methods outlined in **Section II** of the report.

Results

The Gideon Glen improvements resulted in a load reduction of 10.2 lbs. of phosphorus (see **Appendix A**).

As indicated previously, about half of this load reduction can be used to offset the City's goal of phosphorus reduction.

There were several other properties within the City of Shorewood that have been redeveloped since 2000, but were not included in this analysis at this time.

Parkview Crossing, Barrington Townhomes, the Shorewood Nursery, and the Excelsior Covenant Church are projects that provided treatment meeting the standards in place at the time of development. While there is also a load reduction associated with these projects, they are not included as part of the City's load reduction efforts conducted between 2000 and 2007.

Arbor Creek and Lake Virginia Woods were two subdivisions that were created from open space. While the NURP ponds constructed for these projects provide the required treatment for the site, there is a slight increase in the phosphorus loads from each site because open space was converted. Since the MCWD load reduction allocations for each City are already based on some areas of the City being redeveloped, these developments are ignored in this study.

Two other redevelopments are not included since they were constructed in landlocked basins and, therefore do not discharge downstream. These basins are identified as LMC-7 and LMC-8 in the MCWD Plan. Redevelopment in these basins includes the Bosworth Planned Unit Development and the Shorewood Mall Expansion that included the new Cub Foods building.

As part of the construction of the Cub Foods store, an alum injection system was installed in the underground chamber constructed beneath the parking lot. The underground system could be utilized to reduce the phosphorus load to Lake Minnewashta and ultimately Lake Virginia, if an outlet from these landlocked basins becomes necessary.

Potential Additional Load Reductions

There are several options available to further reduce the phosphorus loads to each watershed.

The following is a list of potential BMPs or operational procedures that could possibly be used to reduce the phosphorus load to downstream water bodies within MCWD.

1. **Street Sweeping**: A study completed by the Coon Creek Watershed District in June 2007 indicates that the average concentration of phosphorus in street sweepings is 215 mg per kg of sweepings (or 0.35 lbs per ton of sweepings). Based on the City's past records, approximately 400 tons are removed annually in the spring by sweeping.

   If a second sweeping was added in the fall, it is estimated that an additional 200 tons will be removed. This represents an additional 70 pounds of phosphorus can be reduced annually. Based on 50 miles of City-maintained streets, the average phosphorus removal will be 1.4 pounds per mile. By strategically sweeping select areas of the City (i.e., those directly tributary to the lakes targeted) the City can easily meet its load reduction allocation.

Table 2 – Recommended Fall Sweeping Activities

BMP	Road Miles to Be Swept	Estimated Load Reduction	Subwatershed
Street Sweeping	32.1 mi	45 lbs.	Lake Minnetonka
Street Sweeping	2.9 mi	4 lbs.	Lake Virginia
Street Sweeping	2.1 mi	3 lbs.	Christmas Lake

   Because fall sweepings collect mostly dead leaves and lawn clippings, it is likely that this reduction is under-estimated.

2. **Construction of Additional NURP Ponds:** Since the City is fully developed, there are limited opportunities to construct new stormwater treatment ponds. Should areas redevelop, the City will require new developments to install treatment facilities at that time.

3. **Use of Active Treatment Systems:** This option involves using a portable alum treatment unit to treat standing water in storm water ponds.

3. **Infiltration Basins:** Due to the nature of the soils in this area, this is not considered a good option; however, if a developer proposed this type of system, the City would allow it, provided treatment to NURP standards have been demonstrated.

4. **Water Reuse:** A water reuse system to reuse stormwater runoff as irrigation water in City parks may be a feasible system to reduce both runoff volume and annual phosphorus load to downstream waterbodies.

The above methods are presented to demonstrate that there are potential options available to reduce phosphorus loads to downstream water bodies.

IV. RECOMMENDATION

This report demonstrates that the City will be able to meet the phosphorus load reductions set forth by MCWD (57 pounds, overall, annually).

The report is based on several general assumptions, using data from a variety of other studies. Since this data may or may not relate to the City of Shorewood Storm Water Management Program, it is recommended that a complete Feasibility Report b e undertaken to incorporate data that relates to the City of Shorewood.

Based on the results of the Feasibility Report, the most cost-effective methods for phosphorus removal can be implemented in the City of Shorewood. At this time, the City will begin a fall sweeping program that will be evaluated and adjusted to meet the phosphorus load reduction goals set by MCWD. The City will continue to look for other opportunities to provide phosphorus load reductions by other means.

APPENDIX A

Load Calculations for Gideon Glen Project in Shorewood

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
763-541-4800
www.wsbeng.com

Project Description _____
Project No. 1459-23 Designed By _____
Task Description _____ Checked By _____
Page _____ of _____

Gideon Glen
(Co. Rd. 19 pond - 2004/2005 Construction)

Predevelopment Condition (15.8 ac Commercial)

15.8 ac × 1.288 lb/ac = 20.4 lbs TP

Post-development Condition (15.8 ac Commercial)
(only 1ac added impervious)

neglect grit chamber

20.4 lbs TP
less 50% NURP removal 10.2 lbs TP
10.2 lbs TP

Total Reduction for Site: 10.2 lb TP

APPENDIX K

Lake Water Quality Data

MINNESOTA POLLUTION CONTROL AGENCY

Christmas : IN SHOREWOOD (Lake)

Lake identification number: 27-0137-00

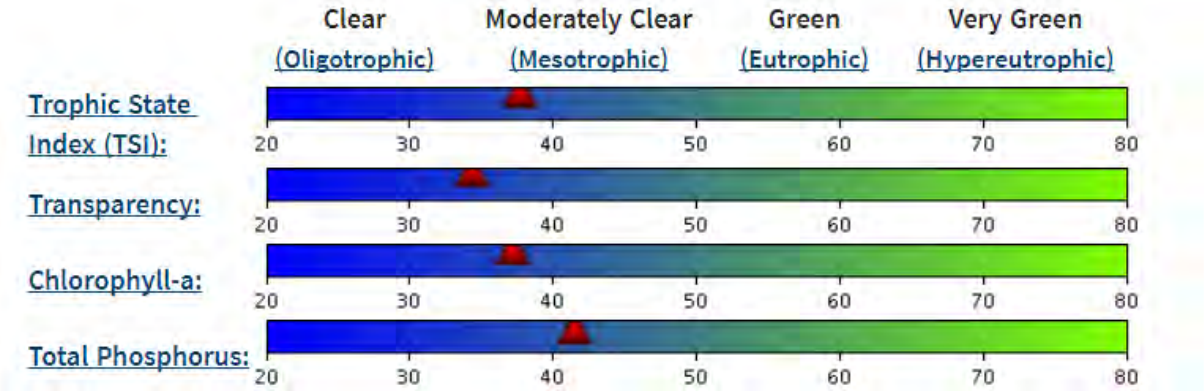
Overall Condition :

Suitable for swimming and wading, with good clarity and low algae levels throughout the open water season. Concentrations of mercury in fish tissue exceed the water quality standard; for specific fish consumption advice refer to the Minnesota Department of Health website at http://www.health.state.mn.us/divs/eh/fish/eating/sitespecific.html

Physical Condition

Major Watershed:	Mississippi River - Twin Cities
County:	Carver, Hennepin
Location:	IN SHOREWOOD
Surface Area:	259.927494465 acres
Maximum Depth:	87 feet
Ecoregion:	North Central Hardwood Forests
Use Classification:	2B, 3C

Lake Water Quality



Overall Trophic State Index for This Lake: 38

Parameter	10-Year average of all summer samples	Parameter TSI	Expected TSI range for lakes in same ecoregion	Number of samples
Transparency (meters)	6	34	**N/A**	74
Chlorophyll-a (parts per billion)	2	37	**N/A**	69
Total Phosphorus (parts per billion)	13	42	**N/A**	69

Water transparency is an excellent indicator of water quality, and the majority of these data are collected by volunteers. Join the MPCA's Citizen Lake Monitoring Program and help collect this important information for your lake.

MINNESOTA POLLUTION CONTROL AGENCY

Minnetonka-St. Albans Bay: 1 MI NE EXCELS'R (Lake)

Lake identification number: 27-0133-04

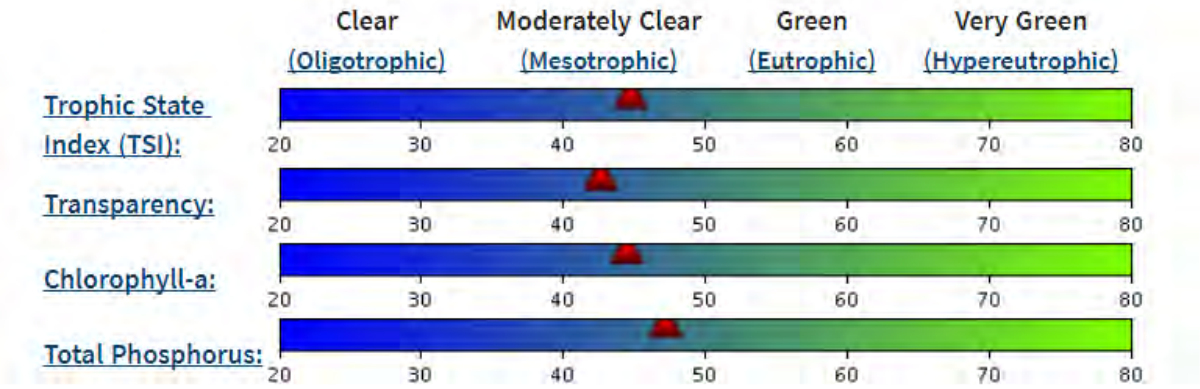
Overall Condition:

Suitable for swimming and wading, with good clarity and low algae levels throughout the open water season. Concentrations of mercury in fish tissue exceed the water quality standard; for specific fish consumption advice refer to the Minnesota Department of Health website at http://www.health.state.mn.us/divs/eh/fish/eating/sitespecific.html

Physical Condition

Major Watershed:	Mississippi River - Twin Cities
County:	Hennepin
Location:	1 MI NE EXCELS'R
Surface Area:	160.118043036 acres
Maximum Depth:	84 feet
Ecoregion:	North Central Hardwood Forests
Use Classification:	2B, 3C

Lake Water Quality



Overall Trophic State Index for This Lake: 45

Parameter	10-Year average of all summer samples	Parameter TSI	Expected TSI range for lakes in same ecoregion	Number of samples
Transparency (meters)	3	43	**N/A**	53
Chlorophyll-a (parts per billion)	4	45	**N/A**	53
Total Phosphorus (parts per billion)	20	47	**N/A**	53

Water transparency is an excellent indicator of water quality, and the majority of these data are collected by volunteers. Join the MPCA's Citizen Lake Monitoring Program and help collect this important information for your lake.

MINNESOTA POLLUTION CONTROL AGENCY

Minnetonka-Upper Lake : 1.5 MI SE OF MOUND (Lake)

Lake identification number: 27-0133-05

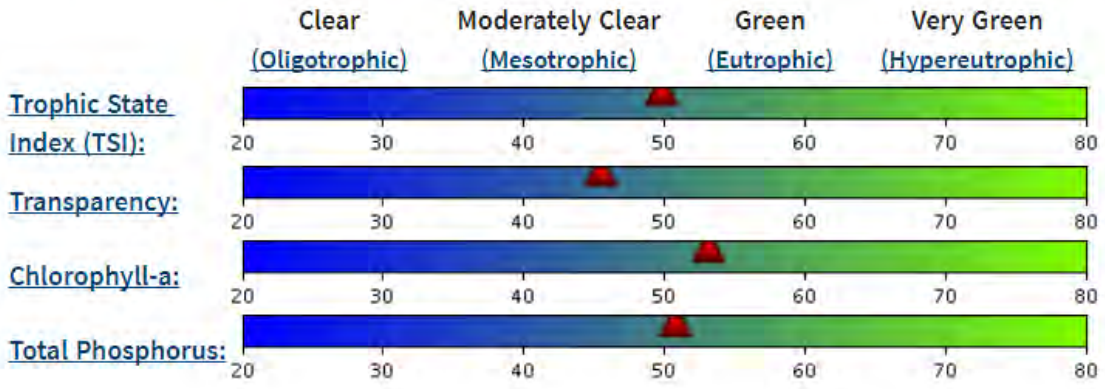
Overall Condition :

Suitable for swimming and wading, with good clarity and low algae levels throughout the open water season. Concentrations of mercury in fish tissue exceed the water quality standard; for specific fish consumption advice refer to the Minnesota Department of Health website at http://www.health.state.mn.us/divs/eh/fish/eating/sitespecific.html

Physical Condition

Major Watershed:	Mississippi River - Twin Cities
County:	Carver, Hennepin
Location:	1.5 MI SE OF MOUND
Surface Area:	4229.1989427 acres
Maximum Depth:	83 feet
Ecoregion:	North Central Hardwood Forests
Use Classification:	2B, 3C

Lake Water Quality



Overall Trophic State Index for This Lake: 50

Parameter	10-Year average of all summer samples	Parameter TSI	Expected TSI range for lakes in same ecoregion	Number of samples
Transparency (meters)	3	46	**N/A**	510
Chlorophyll-a (parts per billion)	10	53	**N/A**	86
Total Phosphorus (parts per billion)	26	51	**N/A**	86

Water transparency is an excellent indicator of water quality, and the majority of these data are collected by volunteers. Join the MPCA's Citizen Lake Monitoring Program and help collect this important information for your lake.

APPENDIX L

Publicly Owned Stormwater BMP Inventory

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

MS4 Pond, Wetland, and Lake Inventory Form

Municipal Separate Storm Sewer System (MS4) Program

Doc Type: Plans/Specifications/Maps

Name of MS4 Permittee	Date form completed	Unique ID Number	Type of Feature (Pond, Wetland or Lake)	Feature Common Name (If Applicable)	Y Coordinate (Latitude) Decimal Degrees	X Coordinate (Longitude) Decimal Degrees
City of Shorewood	5/2/2016	Basin-1	Dry Pond		44.894	-93.5997
City of Shorewood	5/2/2016	Basin-3	Dry Pond		44.9033	-93.6005
City of Shorewood	5/2/2016	Basin-4	Dry Pond		44.8912	-93.5626
City of Shorewood	5/2/2016	Basin-5	Infiltration Basin		44.9005	-93.587
City of Shorewood	5/2/2016	Basin-6	Infiltration Basin		44.893	-93.6341
City of Shorewood	5/2/2016	Basin-7	Infiltration Basin		44.8932	-93.6328
City of Shorewood	5/2/2016	Basin-8	Infiltration Basin		44.9003	-93.6158
City of Shorewood	5/2/2016	Basin-9	Other		44.8993	-93.5255
City of Shorewood	5/2/2016	Basin-10	Other		44.9007	-93.5779
City of Shorewood	5/2/2016	Basin-11	Other		44.904	-93.623
City of Shorewood	5/2/2016	Basin-12	Wet Pond		44.9004	-93.608
City of Shorewood	5/2/2016	Basin-13	Wet Pond		44.9016	-93.5503
City of Shorewood	5/2/2016	Basin-14	Wet Pond		44.8965	-93.5859
City of Shorewood	5/2/2016	Basin-15	Wet Pond		44.9019	-93.5906
City of Shorewood	5/2/2016	Basin-16	Wet Pond		44.8915	-93.6341
City of Shorewood	5/2/2016	Basin-17	Wet Pond		44.892	-93.6336
City of Shorewood	5/2/2016	Basin-18	Wet Pond		44.8939	-93.606
City of Shorewood	5/2/2016	Basin-19	Wet Pond		44.9038	-93.5282
City of Shorewood	5/2/2016	Basin-20	Wet Pond		44.895	-93.5811
City of Shorewood	5/2/2016	Basin-21	Wet Pond		44.9022	-93.6136
City of Shorewood	5/2/2016	Basin-22	Wet Pond		44.8996	-93.5862
City of Shorewood	5/2/2016	Basin-23	Wet Pond		44.9126	-93.5409
City of Shorewood	5/2/2016	Basin-24	Wet Pond		44.9119	-93.5421
City of Shorewood	5/2/2016	Basin-25	Wet Pond		44.8965	-93.6151
City of Shorewood	5/2/2016	Basin-26	Wet Pond		44.9087	-93.5318
City of Shorewood	5/2/2016	Basin-27	Wet Pond		44.908	-93.529
City of Shorewood	5/2/2016	Basin-28	Wet Pond		44.9155	-93.5372
City of Shorewood	5/2/2016	Basin-29	Wet Pond		44.9141	-93.5407
City of Shorewood	5/2/2016	Basin-30	Wet Pond		44.8923	-93.5832
City of Shorewood	5/2/2016	Basin-31	Wet Pond		44.8924	-93.584
City of Shorewood	5/2/2016	Basin-32	Wet Pond		44.9014	-93.5903
City of Shorewood	5/2/2016	Basin-33	Wet Pond		44.9001	-93.5982
City of Shorewood	5/2/2016	Basin-34	Wet Pond		44.8998	-93.6061
City of Shorewood	5/2/2016	Basin-35	Wet Pond		44.8972	-93.615

Name of MS4 Permittee	Date form completed	Unique ID Number	Type of Feature (Pond, Wetland or Lake)	Feature Common Name (If Applicable)	Y Coordinate (Latitude) Decimal Degrees	X Coordinate (Longitude) Decimal Degrees
City of Shorewood	5/2/2016	Basin-36	Wet Pond		44.8968	-93.6138
City of Shorewood	5/2/2016	Basin-37	Wet Pond		44.902	-93.6164
City of Shorewood	5/2/2016	Basin-38	Wet Pond		44.9001	-93.6184
City of Shorewood	5/2/2016	Basin-39	Wet Pond		44.9	-93.6212
City of Shorewood	5/2/2016	Basin-40	Wet Pond		44.8979	-93.629
City of Shorewood	5/2/2016	Basin-41	Wet Pond		44.9005	-93.63
City of Shorewood	5/2/2016	Basin-42	Wet Pond		44.9004	-93.6312
City of Shorewood	5/2/2016	Basin-43	Wet Pond		44.8988	-93.6325
City of Shorewood	5/2/2016	Basin-44	Wet Pond		44.8925	-93.5589
City of Shorewood	5/2/2016	Basin-45	Wet Pond		44.9012	-93.5493
City of Shorewood	5/2/2016	Basin-46	Wet Pond		44.893	-93.5238
City of Shorewood	5/2/2016	Basin-47	Wet Pond		44.8931	-93.5273
City of Shorewood	5/2/2016	Basin-48	Wet Pond		44.8959	-93.5237
City of Shorewood	5/2/2016	Basin-49	Wet Pond		44.8953	-93.5272
City of Shorewood	5/2/2016	Basin-50	Wet Pond		44.8954	-93.5236
City of Shorewood	5/2/2016	Basin-51	Wet Pond		44.9064	-93.5412
City of Shorewood	5/2/2016	Basin-52	Wet Pond		44.904	-93.5909
City of Shorewood	5/2/2016	Basin-53	Wetland		44.9133	-93.5379
City of Shorewood	5/2/2016	Basin-54	Wetland		44.9105	-93.5425
City of Shorewood	5/2/2016	Basin-55	Wetland		44.9177	-93.5466
City of Shorewood	5/2/2016	Basin-56	Wetland		44.9188	-93.5383
City of Shorewood	5/2/2016	Basin-57	Wetland		44.9172	-93.5374
City of Shorewood	5/2/2016	Basin-58	Wetland		44.9111	-93.5366
City of Shorewood	5/2/2016	Basin-59	Wetland		44.9097	-93.5293
City of Shorewood	5/2/2016	Basin-60	Wetland		44.8998	-93.5288
City of Shorewood	5/2/2016	Basin-61	Wetland		44.8914	-93.5308
City of Shorewood	5/2/2016	Basin-62	Wetland		44.9066	-93.5431
City of Shorewood	5/2/2016	Basin-63	Wet Pond		44.9074	-93.5433
City of Shorewood	5/2/2016	Basin-64	Wetland		44.894	-93.5599
City of Shorewood	5/2/2016	Basin-65	Wetland		44.8968	-93.5647
City of Shorewood	5/2/2016	Basin-66	Wetland		44.8927	-93.5672
City of Shorewood	5/2/2016	Basin-67	Weltand		44.8915	-93.5698
City of Shorewood	5/2/2016	Basin-68	Wetland		44.8932	-93.5718
City of Shorewood	5/2/2016	Basin-69	Wetland		44.8953	-93.5825
City of Shorewood	5/2/2016	Basin-70	Wetland		44.8919	-93.5879
City of Shorewood	5/2/2016	Basin-71	Wet Pond		44.8942	-93.6064
City of Shorewood	5/2/2016	Basin-72	Wetland		44.8932	-93.6308
City of Shorewood	5/2/2016	Basin-73	Wetland		44.8955	-93.6363
City of Shorewood	5/2/2016	Basin-74	Wetland		44.9013	-93.6238
City of Shorewood	5/2/2016	Basin-75	Wetland		44.9039	-93.6094

Name of MS4 Permittee	Date form completed	Unique ID Number	Type of Feature (Pond, Wetland or Lake)	Feature Common Name (If Applicable)	Y Coordinate (Latitude) Decimal Degrees	X Coordinate (Longitude) Decimal Degrees
City of Shorewood	5/2/2016	Basin-76	Wetland		44.9066	-93.6015
City of Shorewood	5/2/2016	Basin-77	Wetland		44.9022	-93.5913
City of Shorewood	5/2/2016	Basin-78	Wet Pond		44.9044	-93.5869
City of Shorewood	5/2/2016	Basin-79	Wetland		44.903	-93.5835
City of Shorewood	5/2/2016	Basin-80	Wetland		44.8995	-93.584
City of Shorewood	5/2/2016	Basin-81	Wetland		44.8987	-93.5844
City of Shorewood	5/2/2016	Basin-82	Lake	Lake Mary	44.8973	-93.5836
City of Shorewood	5/2/2016	Basin-83	Wetland		44.9024	-93.5783
City of Shorewood	5/2/2016	Basin-84	Wetland		44.8952	-93.534
City of Shorewood	5/2/2016	Basin-85	Wetland		44.9048	-93.6164
City of Shorewood	5/2/2016	Basin-86	Wetland		44.9053	-93.6054
City of Shorewood	5/2/2016	Basin-87	Wetland		44.9034	-93.5909

APPENDIX G

WATER AND SEWER AGREEMENT
TONKA BAY – SHOREWOOD

THIS AGREEMENT made and entered into this 11th day of February, 2002 by and between the City of Tonka Bay, a municipal corporation, hereinafter referred to as Tonka Bay, and the City of Shorewood, a municipal corporation, hereinafter referred to as Shorewood.

WHEREAS, Tonka Bay did in the year 1965 construct an interior sewer system to serve land located within the confines of its city; and

WHEREAS, Tonka Bay did during the year 1972 construct an interior water system to serve the land located within the confines of its city; and

WHEREAS, the Metropolitan Sewer Board did during the year 1971 construct a Metropolitan sewer line to serve, among other municipalities, in such a manner as to collect the sewage from Tonka Bay at one point at or near Manitou, Hennepin County Road No. 19 intersection; and

WHEREAS, the City of Shorewood did during the year 1972 construct a municipal sewer system to serve properties located within the confines of its city; and

WHEREAS, the metropolitan interceptor serves Shorewood so that the trunks constructed by the City of Shorewood can, in most cases, connect with the metropolitan interceptor at points within the confines of Shorewood; and

WHEREAS, Shorewood is adjacent to Tonka Bay so that the two have a common border; and

WHEREAS, there is a section of Shorewood the geography of which makes it impractical to connect to the metropolitan sewer interceptor without constructing expensive pumping stations and force mains, unless the area in question is, in fact, connected to the interceptor by use of the interior lateral sewer system of Tonka Bay; and

WHEREAS, Tonka Bay and Shorewood agree that it is to the best interest of both cities to use the Tonka Bay interior sewer lines to serve the Shorewood area provided Tonka Bay is appropriately compensated for such use; and

WHEREAS, Shorewood is desirous of being served by water from the Tonka Bay municipal water system, and Tonka Bay is desirous of providing such service; and

WHEREAS, Tonka Bay and Shorewood are desirous of setting forth in this agreement provisions under which Shorewood may make use of Tonka Bay's interior sewer system to reach the metro interceptor, and also provisions whereby Shorewood may receive water service from the Tonka Bay water system.

Exhibit A

NOW, THEREFORE, in consideration of the premises and mutual covenants, it is hereby agreed as follows:

I.

USE OF TONKA BAY INTERIOR SEWER SYSTEM

1. Shorewood may connect a portion of its lateral sewer system to the Tonka Bay interior sewer system for the purpose of using the Tonka Bay lines to reach the metropolitan sewer interceptor upon the adoption of a resolution by the City of Tonka Bay authorizing said connection. Hookup to such connection may be made in the City of Shorewood only upon:
   a. Obtaining a permit from the City of Shorewood to do so, all in accordance with the ordinances of Shorewood.
   b. Copy of the application of such permit shall be furnished forthwith to Tonka Bay. Shorewood shall issue no permit for such connection until approval or disapproval thereof has been given by Tonka Bay.
   c. A copy of the as-built plans (mylars and electronic CAD files) of that portion of the line along with the necessary measurement to all manholes and service connections.
   d. A plat showing the area including the platted lots of that portion of the system so connected.
   e. A statement setting forth the maximum number of connections to be connected to the Tonka Bay system, which number shall not exceed twenty-five (25).
   f. A cash payment to Tonka Bay for each residential hookup in an amount established annually by the Tonka Bay City Council. Said rate shall reflect initial construction costs for the sewer system along with annual adjustments based on the construction price index.
      (i). Said residential hookup charges shall be paid either in full at the time of connection or 50% at the time of connection and the remaining 50% prorated over a period of five (5) years, Tonka Bay shall refund the prorated portion, whether paid in full at the time of connection or paid on an install basis, as described herein. Half of the cost of said hookup charge shall be nonrefundable.
      (ii). Each unit in a multi-family dwelling shall pay to Tonka Bay a user fee at the same rate as residential users in Tonka Bay.
      (iii). User fees for Shorewood residents hooked up to the Tonka Bay sewer system will be at the same rate as Tonka Bay residents.
      (iv). If a commercial connection is made to the sanitary system that is using a private well for potable water, a meter shall be installed on the private well in order to determine usage.
   g. Users connected to the Tonka Bay sewer system shall comply with the Tonka Bay ordinances governing the use of the Tonka Bay sewer system. In the event Shorewood desires to bill and collect said user fees, it shall be Shorewood's obligation to remit to Tonka Bay that amount which would be due Tonka Bay if Tonka Bay billed directly.
   h. Shorewood shall be responsible for all delinquent sewer accounts. The accounts of all sewer users in Shorewood which are delinquent for more

than ninety (90) days shall be turned over to Shorewood, and Shorewood shall within thirty (30) days thereafter make payment to Tonka Bay and become absolute owner of the account.

i. Shorewood shall be obligated to inspect and repair all sewer lines located in the City of Shorewood and in the event there is a defect or break allowing breakage or excessive infiltration of ground water into said lines, Shorewood shall immediately take steps to correct the same. If the break is not corrected, Tonka Bay reserves the right to discontinue service at the Tonka Bay city limits or raise said rates to compensate for additional sewer flows generated by ground water infiltration.

2. Tonka Bay will be responsible for maintaining its own interior system. In the event there is a breakdown in that system so as to preclude receiving sewage from the Shorewood connections, Tonka Bay will immediately notify Shorewood of the problem and it shall thereupon be Shorewood's responsibility to provide emergency service to the Shorewood users. Tonka Bay shall not be responsible to Shorewood for any breakdown in the Tonka Bay lines.

3. Either party may terminate use the portion of this agreement providing for future sewer connections by mailing a written notice to the other at least six (6) months prior to the intended date of termination. If any sewer connections have been made and are currently in use, neither party may terminate the agreement to provide service to those connections unless a reasonable alternative service is available. Termination in that case must also be made by mailing a written notice at least six (6) months prior to the intended date of termination.

II.

WATER SYSTEM

1. In the event Shorewood determines that it desires to construct and install water lines within the City of Shorewood, it may connect said lines to the Tonka Bay municipal water system upon the adoption of Tonka Bay of a resolution authorizing said connection.

2. Hook up to such connection may be made in the City of Shorewood only upon:
   a. Obtaining a permit from the City of Shorewood to do so, all in accordance with the ordinances of Shorewood.
   b. Copy of the application of such permit shall be submitted forthwith to Tonka Bay. No permit for such connection shall be issued by Shorewood until approval or disapproval thereof has been given by Tonka Bay.
   c. Cash payment to Tonka Bay for each residential hook up in an amount established annually by the Tonka Bay City Council. Said rate shall reflect initial construction costs for water distribution system and water tower along with annual adjustments based on the Construction Price Index.
      (i) Said residential hookup charges shall be paid either in full at the time of connection or 50% at the time of connection and the remaining 50% prorated over a period of five (5) years. In the event the hookup is disconnected within five years, Tonka Bay shall

refund the prorated portion, whether paid in full at the time of connection or paid on an installment basis, as described herein. Half of the cost of said hookup charge shall be non-refundable.

(ii) Each unit in a multi-family dwelling shall pay to Tonka Bay a user fee at the same rate as residential users in Tonka Bay.

d. Users connected to Tonka Bay water system shall comply with the Tonka Bay ordinances governing the use of the Tonka Bay water system including the use of meters. Tonka Bay shall charge the residents of Shorewood connected to the Tonka Bay water system user fees at the same rate charged to Tonka Bay residents. In the event Shorewood desires to bill and collect said user fees, it shall be Shorewood's obligation to inspect and read the meters quarterly and remit to Tonka Bay that amount which would be due Tonka Bay if Tonka Bay billed directly.

e. Shorewood shall be responsible for all delinquent water accounts. The accounts of all water users in Shorewood which are delinquent for more than ninety (90) days shall be turned over to Shorewood, and Shorewood shall within thirty (30) days thereafter make payment to Tonka Bay and become absolute owner of the account.

f. Shorewood shall be obligated to inspect and repair all water lines located in the City of Shorewood and in the event there is a defect or break in said lines, Shorewood shall immediately take steps to correct the same. If the break is not corrected, Tonka Bay may shut off the water at the Tonka Bay city limits.

g. Shorewood shall not permit any connection to Tonka Bay water system without prior approval by Tonka Bay.

3. Emergency Interconnection. It is understood that there presently exists a facility to provide direct interconnection between the Tonka Bay municipal water system and the Shorewood Badger Well municipal water system at County Road 19. In the event that an emergency arises whereby either City's water system becomes impaired, such City may make use of the interconnect facility to obtain water temporarily from the other city's water system, subject to the following conditions:

a. Notification – Should it become necessary for either Tonka Bay or Shorewood to open the valve to utilize water from the other system, the public works supervisor shall notify the public works supervisor or some other city official (administrator or Councilmembers) from the city prior to the time that the valve is opened.

b. Payment for Water Use – In lieu of metering, payment by one city to the other for the water used shall be based on the previous year's weekly or monthly average for that same comparable time period.

Example: If Shorewood opens valve on March 10, 1991, and uses water for one day, Tonka Bay will review records for water consumption on March 10th of 1990. If March 10, 1990 records show that 200,000 gallons of water were consumed in Tonka Bay that day and 220,000 gallons are consumed with the valve open on March 10, 1991, Shorewood shall pay Tonka Bay for the use of 20,000 gallons of water at the water rate in effect at that time. If Tonka Bay uses water from Badger Well, a similar process

would be followed to determine what amount Tonka Bay owes Shorewood.

c. Maintenance of Valves – Each city shall be responsible for the maintenance of its own valve.

d. Mutual Benefit – It is understood that the connection between the two cities is mutually beneficial and, in an emergency situation such as a fire, the mixing of the water from each system would not be harmful or pose any health-related problems.

IN WITNESS WHEREOF, the undersigned governmental units have caused this agreement to be executed in their behalf pursuant to the authority of their respective city councils.

IN PRESENCE OF

James Hoese

Date: 2/13/02

Jean Panchyshyn

Date: 2/11/02

CITY OF TONKA BAY

By _____
Mayor

By _____
Clerk

CITY OF SHOREWOOD

By _____
Mayor

By: _____
Clerk

MAY 19 1992

LETTER OF AGREEMENT BETWEEN THE CITY OF TONKA BAY AND THE CITY OF SHOREWOOD FOR PROVISION OF SEWER AND WATER SERVICE TO THE SHOREWOOD PUBLIC WORKS FACILITY

WHEREAS, upon the completion of the Shorewood Public Works facility located to the east of Minnetonka Plaza the City of Shorewood is desirous of becoming a customer of the Tonka Bay water and sewer utilities; and

WHEREAS, the City of Tonka Bay upon completion of the Shorewood Public Works facility, as a good neighbor to the City of Shorewood, wishes to provide sewer and water utility service to the facility.

NOW, THEREFORE BE IT RESOLVED that the parties to this agreement hereby agree to the following:

1. Upon hookup the City of Shorewood will be a regular water and sewer utility customer of the City of Tonka Bay.

2. The cost of all improvements incurred in installing the water and sewer lines from their connection with the Tonka Bay system shall be borne by the City of Shorewood. This shall include site restoration.

3. On-going repairs and maintenance of all installed lines including any water main breaks and sewer blockages between existing city lines and any new connections shall be the responsibility of the City of Shorewood.

4. The City of Tonka Bay will provide a water meter to the City of Shorewood and charge for it accordingly.

5. The cost as of the date of this agreement of one full sewer system assessment, one full water system assessment and one full water tower assessment will be paid by the City of Shorewood to the City of Tonka Bay upon hook up.

6. The cost of all standard connection fees and all permits and all standard quarterly commercial water and sewer user rates will be paid by the City of Shorewood.

7. The City of Shorewood shall obtain all necessary easements from the owners of the Minnetonka Plaza to facilitate installation and maintenance of the utilities.

8. Both Citys are interested in an alternative vehicular access site near the Tonka Bay water tower. The Citys shall share the cost of construction equally.

9. The City of Tonka Bay shall be allowed to discharge its water tower over-flow into Shorewood's storm water drainage system. Shorewood or its contractor shall hook up Tonka Bays tower over-flow to Shorewood's system.

10. The City of Shorewood shall be responsible for any damage to Minnetonka Plaza utility lines during construction. Any utility disconnection shall be reinstalled by Shorewood at the shortest and most direct location. Water and sewer service to Minnetonka Plaza shall be maintained continuously.

11. The City of Shorewood shall place a seal on the water hydrant located on the Public Works site and notify the City of Tonka Bay prior to using the water hydrant for any purpose. Emergencies such as use for a fire would be exempt from this requirement.

12. The City of Shorewood shall be responsible for engineering fees accrued by the City of Tonka Bay as a result of this project.

APPROVED BY:
City of Tonka Bay

Date: 5-13-92

Mayor

City Administrator

APPROVED BY:
City of Shorewood

Date: May 11, 1992

Mayor

City Administrator

AMENDMENT TO WATER AND SEWER AGREEMENT

TONKA BAY - SHOREWOOD

THIS AGREEMENT, made and entered into this 11th day of September, 1989, by and between the City of Tonka Bay, a Minnesota municipal corporation, hereinafter referred to as "Tonka Bay" and the City of Shorewood, a Minnesota municipal corporation, hereinafter referred to as "Shorewood",

WHEREAS, Tonka Bay and Shorewood entered into that certain agreement dated the 9th day of July, 1973, called "Water and Sewer Agreement, Tonka Bay - Shorewood", a copy of which is attached hereto as Exhibit "A" and made a part hereof as if fully set out herein, and

WHEREAS, Tonka Bay and Shorewood entered into that certain Amendment to Water and Sewer Agreement dated the 28th day of July, 1987, a copy of which is attached hereto as Exhibit "B" and made a part hereof as if fully set out herein, and

WHEREAS, the parties desire to amend paragraph II 2 c of said agreement and amendment, which refers to the cash payment to Tonka Bay for each residential hook up and the commercial hook up rate, and

WHEREAS, the parties desire to ratify said Exhibit "A" in all other respects.

NOW, THEREFORE, in consideration of the premises and mutual covenants, and other good and valuable consideration, it is hereby agreed as follows:

II 2 c of Exhibit "A" and Exhibit "B" shall be amended as follows:

c. Cash payment to Tonka Bay for each residential hook up in the amount of Two Thousand Three Hundred dollars ($2,300.00). Commercial hook ups shall pay the same rate as Tonka Bay users.

(i) Said residential hook up charges shall be paid either in full at the time of connection or One Thousand dollars ($1,000.00) at the time of connection and One Thousand Three Hundred dollars ($1,300.00) payable $260.00 per year for a period of five (5) years. In the event the hook up is disconnected within five years, Tonka Bay shall refund any unused portion of the $1,300.00, based upon $260.00 per year, whether said $1,300.00 was paid in full at the time of connection or paid on an installment basis, as described herein. One Thousand dollars ($1,000.00) of said hook up charge shall be non-refundable.

(ii) Said hook up charge of $2,300.00 shall not be changed by the City of Tonka Bay for a period of five years from the date hereof.

(iii) Each unit in a multi-family dwelling shall pay to Tonka Bay a user fee at the same rate as residential users in Tonka Bay.

(iv) Each residential hook up, including units in multi-family dwellings, shall pay to Tonka Bay a capital improvement charge of $24.82 per quarter for a period of fifteen (15) years, payable quarterly and beginning with the first quarter following the date of this Amendment.

IN WITNESS WHEREOF, the undersigned governmental units have caused this agreement to be executed in their behalf pursuant to the authority of their respective City Councils.

IN PRESENCE OF:

Gayle Luke
Deputy Clerk

CITY OF TONKA BAY

By: V. Haug
Vern Haug, Mayor

By: Kirk C. McDonald
Kirk C. McDonald,
Clerk/Administrator

CITY OF SHOREWOOD

By: Jan Haugen
Jan Haugen, Mayor

By: Sandra L. Kennelly
Sandra L. Kennelly,
City Clerk

AMENDMENT TO WATER AND SEWER AGREEMENT

TONKA BAY - SHOREWOOD

THIS AGREEMENT, made and entered into this 28th day of July, 1987 by and between the City of Tonka Bay, a Minnesota municipal corporation, hereinafter referred to as "Tonka Bay" and the City of Shorewood, a Minnesota municipal corporation, hereinafter referred to as "Shorewood",

WHEREAS, Tonka Bay and Shorewood entered into that certain agreement dated the 9th day of July, 1973, called "Water and Sewer Agreement, Tonka Bay - Shorewood", a copy of which is attached hereto as Exhibit "A" and made a part hereof as if fully set out herein, and

WHEREAS, the parties desire to amend paragraph II 2 c of said agreement, which refers to the cash payment to Tonka Bay for each residential hook up and the commercial hook up rate, and

WHEREAS, the parties desire to ratify said Exhibit A in all other respects,

NOW, THEREFORE, in consideration of the premises and mutual covenants, and other good and valuable consideration, it is hereby agreed as follows:

II 2 c of Exhibit "A" shall be amended as follows:

c. Cash payment to Tonka Bay for each residential hook up in the amount of one thousand five hundred dollars ($1,500.00). Commercial hook ups shall pay the same rate as Tonka Bay users.

IN WITNESS WHEREOF, the undersigned governmental units have caused this agreement to be executed in their behalf pursuant to the authority of their respective City Councils.

IN PRESENCE OF:

CITY OF TONKA BAY

BY: Ruth M. Sherman
Ruth M. Sherman, Mayor

BY: Kirk C. McDonald
Kirk C. McDonald, Clerk/
Administrator

CITY OF SHOREWOOD

BY: Robert Rascop
Robert Rascop, Mayor

BY: Sandra L. Kennelly
Sandra L. Kennelly, Clerk

WATER AND SEWER AGREEMENT
TONKA BAY - SHOREWOOD

THIS AGREEMENT made and entered into this 9 day of July, 1973 by and between the Village of Tonka Bay, a municipal corporation, hereinafter referred to as Tonka Bay, and the Village of Shorewood, a municipal corporation, hereinafter referred to as Shorewood,

WHEREAS, Tonka Bay did in the year 1965 construct an interior sewer system to serve land located within the confines of its village, and

WHEREAS, Tonka Bay did during the year 1972 construct an interior water system to serve the land located within the confines of its village, and

WHEREAS, the Metropolitan Sewer Board did during the year 1971 construct a Metropolitan Sewer line to serve, among other municipalities, in such a manner as to collect the sewage from Tonka Bay at one point at or near Manitou, Hennepin County Road No. 19 intersection, and

WHEREAS, the Village of Shorewood did during the year 1972 construct a municipal sewer system to serve properties located within the confines of its village, and

WHEREAS, the metropolitan interceptor serves Shorewood so that the trunks constructed by the Village of Shorewood can, in most cases, connect with the metropolitan interceptor at points within the confines of Shorewood, and

WHEREAS, Shorewood is adjacent to Tonka Bay so that the two have a common border, and

WHEREAS, there is a section of Shorewood the geography of which makes it impractical to connect to the metropolitan sewer interceptor without constructing expensive pumping stations and force mains, unless the area in question is, in fact, connected to the interceptor by use of the interior lateral sewer system of Tonka Bay, and

WHEREAS, Tonka Bay and Shorewood agree that it is to the best interest of both villages to use the Tonka Bay interior sewer lines to serve the Shorewood area provided Tonka Bay is appropriately compensated for such use, and

desirous of providing such service, and

WHEREAS, Tonka Bay and Shorewood are desirous of setting forth in this agreement provisions under which Shorewood may make use of Tonka Bay's interior sewer system to reach the metro interceptor, and also provisions whereby Shorewood may receive water service from the Tonka Bay water system,

NOW, THEREFORE, in consideration of the premises and mutual covenants, it is hereby agreed as follows:

I.

USE OF TONKA BAY INTERIOR SEWER SYSTEM

1. Shorewood may connect a portion of its lateral sewer system to the Tonka Bay interior sewer system for the purpose of using the Tonka Bay lines to reach the metropolitan sewer interceptor provided that Shorewood concurrently file with the Village of Tonka Bay:

   a. A copy of the as-built plans of that portion of the lines so connected.

   b. A plat showing the area including the platted lots of that portion of the system so connected.

   c. A statement setting forth the maximum number of connections to be connected to the Tonka Bay system, which number shall not exceed -20-.

   d. A cash payment to Tonka Bay in the amount of $300.00 for each unit hooked up or anticipated to be hooked up to the Tonka Bay system.

2. Tonka Bay will bill Shorewood annually a proportion of the cost of maintaining the interior Tonka Bay lines, which bill will be computed by first determining the cost of maintaining the Tonka Bay sewer system and taking a percentage of the cost which the Shorewood connections bear to 500 (Tonka Bay connections).

3. Tonka Bay will be responsible for maintaining its own interior system. In the event there is a breakdown in that system so as to preclude receiving sewage from the Shorewood connections, Tonka Bay will immediately notify Shorewood of the problem and it shall thereupon be Shorewood's responsibility to provide

responsible to Shorewood for any breakdown in the Tonka Bay lines.

4. Shorewood shall be at liberty at any time to terminate use of the Tonka Bay lines; however, no money shall be due and payable to Shorewood in the event of termination of such use.

II.

WATER SYSTEM

1. In the event Shorewood determines that it desires to construct and install water lines within the Village of Shorewood, it may connect said lines to the Tonka Bay municipal water system upon the adoption by Tonka Bay of a resolution authorizing such connection.

2. Hook up to such connection may be made in the Village of Shorewood only upon:

a. Obtaining a permit from the Village of Shorewood to so do, all in accordance with the ordinances of Shorewood.

b. Copy of the application of such permit shall be submitted forthwith to Tonka Bay. No permit for such connection shall be issued by Shorewood until approval or disapproval thereof has been given by Tonka Bay.

c. Cash payment to Tonka Bay for each residential hook up in the amount of $500.00. Commercial hook ups shall pay the same rate as Tonka Bay users.

d. Users connected to Tonka Bay water system shall comply with the Tonka Bay ordinances governing the use of the Tonka Bay water system including the use of meters. Tonka Bay shall charge the residents of Shorewood connected to the Tonka Bay water system user fees at the same rate charged to Tonka Bay residents. In the event Shorewood desires to bill and collect said user fees, it shall be Shorewood's obligation to inspect and read the meters quarterly and remit to Tonka Bay that amount which would be due Tonka Bay if Tonka Bay billed directly.

e. Shorewood shall be responsible for all delinquent water accounts. The accounts of all water

users in Shorewood which are delinquent for more than ninety (90) days shall be turned over to Shorewood and Shorewood shall within thirty (30) days thereafter make payment to Tonka Bay and become absolute owner of the account.

f. Shorewood shall be obligated to inspect and repair all water lines located in the Village of Shorewood and in the event there is a defect or break in said lines, Shorewood shall immediately take steps to correct the same. If the break is not corrected, Tonka Bay may shut off the water at the Tonka Bay village limits.

g. Shorewood shall not permit any connection to Tonka Bay water system without prior approval by Tonka Bay.

IN WITNESS WHEREOF, the undersigned governmental units have caused this agreement to be executed in their behalf pursuant to the authority of their respective village councils.

IN PRESENCE OF:

VILLAGE OF TONKA BAY

By Edward S. Bauman
Mayor

Approved 6/26/73

By Dorothy Holder
Clerk

VILLAGE OF SHOREWOOD

By [illegible] Holloca
Mayor

Approved 7/9/73

By Mary L. Drake
Clerk - Deputy

WATER AND SEWER AGREEMENT
TONKA BAY - SHOREWOOD

THIS AGREEMENT made and entered into this 9 day of July, 1973 by and between the Village of Tonka Bay, a municipal corporation, hereinafter referred to as Tonka Bay, and the Village of Shorewood, a municipal corporation, hereinafter referred to as Shorewood,

WHEREAS, Tonka Bay did in the year 1965 construct an interior sewer system to serve land located within the confines of its village, and

WHEREAS, Tonka Bay did during the year 1972 construct an interior water system to serve the land located within the confines of its village, and

WHEREAS, the Metropolitan Sewer Board did during the year 1971 construct a Metropolitan Sewer line to serve, among other municipalities, in such a manner as to collect the sewage from Tonka Bay at one point at or near Manitou, Hennepin County Road No. 19 intersection, and

WHEREAS, the Village of Shorewood did during the year 1972 construct a municipal sewer system to serve properties located within the confines of its village, and

WHEREAS, the metropolitan interceptor serves Shorewood so that the trunks constructed by the Village of Shorewood can, in most cases, connect with the metropolitan interceptor at points within the confines of Shorewood, and

WHEREAS, Shorewood is adjacent to Tonka Bay so that the two have a common border, and

WHEREAS, there is a section of Shorewood the geography of which makes it impractical to connect to the metropolitan sewer interceptor without constructing expensive pumping stations and force mains, unless the area in question is, in fact, connected to the interceptor by use of the interior lateral sewer system of Tonka Bay, and

WHEREAS, Tonka Bay and Shorewood agree that it is to the best interest of both villages to use the Tonka Bay interior sewer lines to serve the Shorewood area provided Tonka Bay is appropriately compensated for such use, and

WHEREAS, Shorewood is desirous of being served by water from the Tonka Bay municipal water system, and Tonka Bay is desirous of providing such service, and

WHEREAS, Tonka Bay and Shorewood are desirous of setting forth in this agreement provisions under which Shorewood may make use of Tonka Bay's interior sewer system to reach the metro interceptor, and also provisions whereby Shorewood may receive water service from the Tonka Bay water system,

NOW, THEREFORE, in consideration of the premises and mutual covenants, it is hereby agreed as follows:

I.

USE OF TONKA BAY INTERIOR SEWER SYSTEM

1. Shorewood may connect a portion of its lateral sewer system to the Tonka Bay interior sewer system for the purpose of using the Tonka Bay lines to reach the metropolitan sewer interceptor provided that Shorewood concurrently file with the Village of Tonka Bay:

   a. A copy of the as-built plans of that portion of the lines so connected.

   b. A plat showing the area including the platted lots of that portion of the system so connected.

   c. A statement setting forth the maximum number of connections to be connected to the Tonka Bay system, which number shall not exceed -20-.

   d. A cash payment to Tonka Bay in the amount of $300.00 for each unit hooked up or anticipated to be hooked up to the Tonka Bay system.

2. Tonka Bay will bill Shorewood annually a proportion of the cost of maintaining the interior Tonka Bay lines, which bill will be computed by first determining the cost of maintaining the Tonka Bay sewer system and taking a percentage of the cost which the Shorewood connections bear to 500 (Tonka Bay connections).

3. Tonka Bay will be responsible for maintaining its own interior system. In the event there is a breakdown in that system so as to preclude receiving sewage from the Shorewood connections, Tonka Bay will immediately notify Shorewood of the problem and it shall thereupon be Shorewood's responsibility to provide

emergency service to the Shorewood users. Tonka Bay shall not be responsible to Shorewood for any breakdown in the Tonka Bay lines.

4. Shorewood shall be at liberty at any time to terminate use of the Tonka Bay lines; however, no money shall be due and payable to Shorewood in the event of termination of such use.

II.

WATER SYSTEM

1. In the event Shorewood determines that it desires to construct and install water lines within the Village of Shorewood, it may connect said lines to the Tonka Bay municipal water system upon the adoption by Tonka Bay of a resolution authorizing such connection.

2. Hook up to such connection may be made in the Village of Shorewood only upon:

a. Obtaining a permit from the Village of Shorewood to so do, all in accordance with the ordinances of Shorewood.

b. Copy of the application of such permit shall be submitted forthwith to Tonka Bay. No permit for such connection shall be issued by Shorewood until approval or disapproval thereof has been given by Tonka Bay.

c. Cash payment to Tonka Bay for each residential hook up in the amount of $500.00. Commercial hook ups shall pay the same rate as Tonka Bay users.

d. Users connected to Tonka Bay water system shall comply with the Tonka Bay ordinances governing the use of the Tonka Bay water system including the use of meters. Tonka Bay shall charge the residents of Shorewood connected to the Tonka Bay water system user fees at the same rate charged to Tonka Bay residents. In the event Shorewood desires to bill and collect said user fees, it shall be Shorewood's obligation to inspect and read the meters quarterly and remit to Tonka Bay that amount which would be due Tonka Bay if Tonka Bay billed directly.

e. Shorewood shall be responsible for all delinquent water accounts. The accounts of all water

users in Shorewood which are delinquent for more than ninety (90) days shall be turned over to Shorewood and Shorewood shall within thirty (30) days thereafter make payment to Tonka Bay and become absolute owner of the account.

f. Shorewood shall be obligated to inspect and repair all water lines located in the Village of Shorewood and in the event there is a defect or break in said lines, Shorewood shall immediately take steps to correct the same. If the break is not corrected, Tonka Bay may shut off the water at the Tonka Bay village limits.

g. Shorewood shall not permit any connection to Tonka Bay water system without prior approval by Tonka Bay.

IN WITNESS WHEREOF, the undersigned governmental units have caused this agreement to be executed in their behalf pursuant to the authority of their respective village councils.

IN PRESENCE OF:

VILLAGE OF TONKA BAY

_____ By Edward G. Bauman
Mayor

Approved 6/26/73 By Dorothy Holder
Clerk

VILLAGE OF SHOREWOOD

_____ By F E Holloca
Mayor

Approved 7/9/73 By Mary H Marske
Clerk - Deputy

WATER AND SEWER CONNECTION AGREEMENT

THIS AGREEMENT, made this 25th day of January, 1993, by and between the CITY OF SHOREWOOD, a municipal corporation, (the "City") and Judy and Pete Budreau of 1030 Holly Lane, Shorewood, Minnesota, (the "Applicant").

WHEREAS, Applicant has an interest in certain real property (the "Subject Property") located in the City of Shorewood, County of Hennepin, State of Minnesota, described as:

"Lot 1, Block 1, Minnelowa"

WHEREAS, the City owns a municipal water system which does not presently serve the Subject Property; and

WHEREAS, the City owns a municipal sanitary sewer system abutting the property, but connection of the Subject Property to said sewer would involve working within a protected wetland; and

WHEREAS, the Applicant desires to interconnect with the Chanhassen Municipal Water and Sewer Systems and pay to the City of Chanhassen connection charges therefore; and

WHEREAS, the City is willing to permit Applicant to connect to the Chanhassen Municipal Water and Sewer Systems provided that Applicant agrees to the provisions contained herein.

NOW, THEREFORE, in consideration of the mutual contained covenants herein, the parties agree as follows:

1. Applicant shall have the right to interconnect with the Chanhassen Municipal Water and Sewer Systems and pay to the City of Chanhassen connection charges therefore.

2. All work involved in such interconnection will be done according to City specifications and under City supervision and all expenses and costs connected therewith will be paid by Applicant.

3. In the event that City extends the Shorewood municipal water system to serve the Subject Property at some time in the future, Applicant agrees to pay any assessment in connection therewith on the same basis as all other properties assessed at that time, and Applicant herewith specifically agrees to waive any claims or defenses to said assessment based upon a theory of no benefit because of the water connection allowed herein.

4. It is further agreed by and between the parties that this Agreement shall run with the land and shall benefit and be binding upon their respective legal representatives, successors and assigns.

5. That the Applicant records this Agreement with the Hennepin County Recorder or Registrar of Titles within thirty (30) days of Chanhassen's approval of the connection.

IN WITNESS HEREOF, the parties hereto have caused this Agreement to be executed as of the day and year first above written.

CITY OF SHOREWOOD

Judith Ecker Budreau
Applicant

Barbara J. Brancel, Mayor

Judith Ecker Budreau
Owner

James C. Hurm, City Administrator/Clerk

STATE OF MINNESOTA
SS.
COUNTY OF HENNEPIN

On this 25th day of January, 1993, before me, a Notary Public within and for said County, personally appeared Barbara Brancel and James Hurm to me personally known, who, being each by me duly sworn, did say that they are respectively the Mayor and City Clerk/Administrator of the municipal corporation named in the foregoing instrument, and that said instrument was signed and sealed on behalf of said corporation by authority of its City Council, and said Mayor and City Clerk/Administrator acknowledged said instrument to be the free act and deed of said corporation.

ANNE P. LATTER
NOTARY PUBLIC—MINNESOTA
HENNEPIN COUNTY
My commission expires 9-10-97

Anne P Latter
Notary Public

STATE OF MINNESOTA
SS.
COUNTY OF HENNEPIN

The foregoing instrument was acknowledged before me this 11th day of June, 1993 by Judith Ecker Budreau

ANNE P. LATTER
NOTARY PUBLIC—MINNESOTA
HENNEPIN COUNTY
My commission expires 9-10-97

Anne P Latter
Notary Public

STATE OF MINNESOTA
SS.
COUNTY OF HENNEPIN

The foregoing instrument was acknowledged before me this _____ day of _____, 199__, by _____

_____
Notary Public

AGREEMENT

This Agreement, made and entered into by and between the Metropolitan Sewer Board (hereinafter called the Board), the Village of Shorewood (hereinafter called Shorewood), and the Village of Chanhassen (hereinafter called Chanhassen);

WITNESSETH THAT, In the joint and separate exercise of each of their powers and in consideration of the mutual covenants herein contained, the parties hereto recite and agree as follows:

Section 1. Recitals.

1.01. Council & Sewer Board. Pursuant to Laws 1969, Chapter 449, the Metropolitan Council has adopted a comprehensive plan for the collection, treatment and disposal of sewage in the metropolitan area and has established the Sewer Board to construct, operate and maintain a sewerage system for this purpose. Chapter 449 authorizes the Board at any time after January 1, 1970, to acquire, construct and equip all interceptors and treatment works needed to implement the Council's comprehensive plan.

1.02. Shorewood Interceptor. The Board has determined that an interceptor sewer extending from a point on Vine Hill Road 600 feet north of Cavington Road in Shorewood westerly to the intersection of Virginia Drive and the southerly boundary of Hennepin County, including a sewage pumping station located near this point, located in Shorewood, should be constructed to implement the Council's comprehensive plan, and that the interceptor should be constructed at this time. The interceptor is designated in red on sheets 1 through 8, 10, 11, 16 and 17 of the Detailed Drawings for the Construction Project prepared by the consulting engineers and dated September 21, 1970, which are by reference incorporated herein and made a part hereof, and is hereinafter referred to as "the Interceptor".

1.03. Shorewood and Chanhassen Facilities. Shorewood has authorized the construction of various sanitary sewer pipes and lift stations, connecting

directly or indirectly to the Interceptor, which are designated in green on sheets 4,8,9 , 15 and 17 of the Detailed Drawings, will be used solely by Shorewood, and are hereinafter referred to as the "Shorewood facilities". Shorewood has also authorized the construction of certain sewer pipes and lift stations which are designated in yellow on sheets 12 through 15 of the Detailed Drawings, will be used by Shorewood and Chanhassen, and are hereinafter referred to as the "Shorewood-Chanhassen facilities". Shorewood covenants that it has taken all proceedings necessary under Minnesota Statutes, Chapter 429 to authorize it to proceed with the construction of and the issuance of bonds to finance all of such facilities, except the award of a construction contract.

1.04. Joint Construction. The Interceptor, the Shorewood facilities and the Shorewood-Chanhassen facilities can best and most economically be constructed by the Board under a single set of plans and specifications and a single construction contract. All of the improvements to be constructed, including the Interceptor, the Shorewood facilities and the Shorewood-Chanhassen facilities, are herein referred to as the "Construction Project."

Section 2. Interceptor Construction.

2.01. Plans and Specifications. The Board has retained Orr-Schelen-Mayeron & Associates, Inc., consulting engineers, to prepare plans and specifications for the Construction Project. The plans and specifications have been prepared, presented to and approved by the Board, Shorewood and Chanhassen.

2.02. Construction Contract. The Board has advertised and received bids for construction of the Construction Project, and has furnished Shorewood and Chanhassen with a complete tabulation of the bids received and their recommendations regarding them. The advertisement for bids divided the work into Sections I, IIA and IIB. Section I comprises a portion of the Interceptor and a portion of the Shorewood facilities. Section IIA comprises a portion of the Interceptor and all of the Shorewood-Chanhassen facilities. Section IIB comprises

a portion of the Shorewood facilities. The apparent low bidder for Section I is Orfei & Sons, Inc., whose base bid for Section I is $2,912,576.90. Said bid is the lowest and best bid received for Section I, and the Board shall award a contract for the construction of it to said bidder. The apparent low bidder for Sections IIA and IIB is Nodland Associates, Inc., whose base bid for Section IIA is $838,530.70, and whose base bid for Section IIB is $413,381.00. Said bid is the lowest and best bid received for Sections IIA and IIB, and the Board shall award a contract for the construction of these sections to said bidder.

2.03. Contract Administration. Except as hereinafter provided, the construction contract shall be administered by the Board, and the Board agrees to cause the Construction Project to be completed in accordance with the construction contract. The Board shall provide a resident engineer to supervise the performance of the work, but Shorewood and Chanhassen may inspect the materials for and construction of their facilities at any time, and may request the Board to require the contractor to perform any part of the contract in accordance with its terms, and to enforce any provision of the contract necessary to obtain such performance.

2.04. Sewer Board's Designee. Any action or right which may be taken or exercised by the Board under this contract, may be taken or exercised by the Board's Chief Administrator or his designee on behalf of the Board.

Section 3. Construction Project Financing.

3.01. Construction Project Costs. The total cost of the Construction Project, based on the unit prices and lump sum amounts specified in the low bids, copies of which are attached hereto and marked Exhibit B, are now estimated to be as follows:

A.	Construction Contract Costs:	$4,164,488.60
B.	Engineering (6% of item A):	249,869.32
C.	Construction Supervision (3% of item A):	124,934.66
D.	Legal and Administrative (1% of item A):	41,644.89
E.	Right of Way (estimated):	50,000.00
	Total	$4,630,937.47

On completion of the contract, the Board shall finally determine the total cost of the Construction Project, the Interceptor, the Shorewood facilities and the Shorewood-Chanhassen facilities and shall furnish Shorewood and Chanhassen with a copy of such determination.

3.02. Allocation of Costs. The Board agrees to pay all costs of the Interceptor, including construction contract costs, engineering costs, construction supervision costs, legal and administrative costs, and right-of-way costs. Shorewood agrees to pay all costs of the Shorewood facilities, including construction contract costs, engineering costs, construction supervision costs, legal and administrative costs, and right of way costs, as finally determined by the Board in accordance with Section 3.01. Such costs to be paid by Shorewood shall be the total of the following: (a) construction contract cost; (b) engineering costs, in an amount equal to that percentage of Item B, Section 3.01, determined by dividing the construction contract cost of the Shorewood facilities by the construction contract cost of the Construction Project; (c) construction supervision cost, in an amount equal to that percent of Item C, Section 3.01 determined in the same manner as the engineering cost; (d) legal and administrative cost, in an amount equal to that percentage of Item D, Section 3.01 determined in the same manner as the engineering cost; and (e) right-of-way cost. Shorewood and Chanhassen agree to pay all costs of the Shorewood-Chanhassen facilities, in the proportions established pursuant to Section 3.03, including construction contract costs, engineering costs, construction supervision costs, legal and administrative costs, and right of way costs, as finally determined by the Board in accordance with Section 3.01. Such costs shall be the total of the following: (a) construction contract cost; (b) engineering costs, in an amount equal to that percentage of Item B, Section 3.01, determined by dividing the construction contract cost of the Shorewood-Chanhassen facilities by the construction contract cost of the Construction Project; (c) construction supervision cost, in an amount equal to that percent of Item C, Section 3.01 determined in the

same manner as the engineering cost; (d) legal and administrative cost, in an amount equal to that percentage of Item D, Section 3.01 determined in the same manner as the engineering cost; and (e) right of way cost.

3.03. Shorewood-Chanhassen Cost Sharing. Shorewood and Chanhassen agree to submit to the Board on or before March 1, 1971, a written agreement between them specifying the percentage of the cost of the Shorewood-Chanhassen facilities to be paid by each of them; and the Board shall apportion between them in accordance with such agreement amounts due to it for such facilities as provided in Section 3.04. If the Board has not received such agreement on or before March 1, 1971, the Board shall determine the percentage of the cost of the Shorewood-Chanhassen facilities to be paid by each of them, and shall notify Shorewood and Chanhassen of its determination. Thereafter the Board shall apportion amounts due to it for such facilities as provided in Section 3.04 between Shorewood and Chanhassen in accordance with its determination. The percentages determined by the Board shall be binding and conclusive upon Shorewood and Chanhassen, and each shall pay that percentage of amounts due for such facilities under Section 3.04.

3.04. Payment of Costs. The Board shall, on behalf of all parties, pay all costs of the Construction Project as incurred and allowed in accordance with the construction contract; provided that costs paid for items of work and materials for the Shorewood facilities and the Shorewood-Chanhassen facilities shall be subject to approval of Shorewood and Shorewood and Chanhassen, respectively. The parties intend that the Board should not be required to use its own funds to pay costs of the Shorewood facilities or the Shorewood-Chanhassen facilities when due, and that Shorewood and Chanhassen should make moneys available to the Board as herein provided for this purpose. The Board shall submit to each of Shorewood and Chanhassen once each month a statement for its share of all construction contract costs approved for payment to the contractor, together with the estimates approved for payment to the contractor. Shorewood and Chanhassen shall each pay

the amount shown on its statement on or before the 15th day of the month following the month in which it is received. Shorewood's share of engineering costs shall be paid $30,000.00 on execution of the construction contract, and the balance on completion of the Construction Project and payment of all costs thereof. Shorewood's share of Construction Supervision, Legal and Administrative, and Right-of-Way costs shall be paid $15,000.00 on May 1, 1971, and the balance on completion of the Construction Project. Chanhassen's share of engineering costs shall be paid [illegible] on completion of the Construction Project and payment of all costs thereof. Chanhassen's share of Construction Supervision, Legal and Administrative, and Right-of-Way costs shall be paid [illegible] on completion of the Construction Project. The Board shall be entitled to receive interest at the rate of 6% per annum on all amounts not paid to it by Shorewood or Chanhassen when due under this Section 3.04.

Section 4. Ownership and Use.

4.01. Ownership. Each party shall be the owner of that portion of the Construction Project, the costs of which are paid by it.

4.02. Use of Construction Project. On completion of the Construction Project and payment of all costs thereof, the Board shall be entitled to the sole and exclusive control and use of the Interceptor, Shorewood shall be entitled to the sole and exclusive control and use of the Shorewood facilities, and Shorewood and Chanhassen shall be entitled to joint control and use of the Shorewood-Chanhassen facilities.

Section 5. Shorewood-Chanhassen Facilities; Designation as Interceptor. The Shorewood-Chanhassen facilities are interceptors within the meaning of Laws 1969, Chapter 449. Notwithstanding the provisions of Sections 1 through 4 of this agreement, if such facilities are determined by the Metropolitan Council to be needed for the metropolitan disposal system, such facilities shall be regarded as part of the Interceptor under this agreement, and the Board shall pay the cost

of such facilities. In such event, Shorewood and Chanhassen shall not be liable for the cost of such facilities under Section 3 of this agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on this 8th day of April, 1971.

Metropolitan Sewer Board

Marie Coughlin — By [signature] Chairman

Kathleen Cronobena — And [signature] Chief Administrator

Village of Shorewood

[signature] — By+ [signature] Mayor

Margaret Wanderse — And [signature] Clerk

Village of Chanhassen

Steven J. Wolf — By Eugene A. Coulter Mayor

Russell Hansen — And Adolph Tennen Clerk

AGREEMENT FOR JOINT USAGE OF
SANITARY SEWER AND WATER FACILITIES
BETWEEN THE VILLAGES OF SHOREWOOD
AND EXCELSIOR

THIS AGREEMENT, made and entered into this 9th day of July, 1973 by and between the Village of Excelsior, a Municipal Corporation of the State of Minnesota, hereinafter referred to as "Excelsior" and the Village of Shorewood, a Municipal Corporation of the State of Minnesota, hereinafter referred to as "Shorewood",

WHEREAS, Excelsior and Shorewood have common boundaries in certain area, and

WHEREAS, it is reasonable and feasible and in the public interest to interchange sewer and water as needs and convenience of the public may require,

NOW, THEREFORE, in the joint exercise of the common power to construct and maintain sewer and water facilities, it is hereby agreed, as follows:

1. Sewer-Water Interchange. Excelsior and Shorewood agree to interchange sewer and water service upon the recommendation of their respective village engineers.

2. Construction Payment. Any municipality may undertake construction at its own expense. Any municipality will pay the other municipality for any construction undertaken for its benefit and at its request. In the event construction benefits lands outside the furnishing municipality, that municipality may charge each connection a sum equal to the amount which would be assessed against like properties in the furnishing municipality in addition to its usual connection charges.

3. Maintenance Charges. Any municipality receiving such service shall pay to the municipality furnishing such service any and all periodic sewer and water service charges for each connection within the receiving municipality. Such charges shall be based upon and equivalent to the charges made to like connections in the furnishing municipality.

4. Construction. Construction may be undertaken by either party upon the recommendation and approval of the village engineer and the village council of the village in which the construction is to be done. The connections to the sanitary sewer and water

facilities furnished, will be in accordance with the specifications and requirements of the furnishing municipality as well as the receiving municipality. Inspections of the sewer and water connections may be made by either municipality.

5. Permits. A permit for connection to sewer or water services shall not be issued by the municipality receiving such services until the municipality furnishing such services has issued a permit.

6. Ownership. The sewer and water facilities of the furnishing municipality in the furnishing municipality shall remain the sole and exclusive property of the furnishing municipality. The sewer facilities in the receiving municipality shall remain the sole and exclusive property of the receiving municipality. Nothing herein to the contrary, the water line to be constructed by Excelsior in Glencoe Road and Academy Avenue, the water line in Water Street and Academy Avenue and the sewer line in Water Street and Academy Avenue constructed by Excelsior shall be the sole and exclusive property of Excelsior. Nothing herein to the contrary, the parties do not seek to relieve themselves from any obligation that may exist to Independent School District No. 276 by reason of previous agreements with respect to sewer.

7. Assessment. The furnishing municipality shall provide necessary feasibility reports if requested so that the receiving municipality may conduct public hearings and if so requested no permit shall be issued by the furnishing municipality until advised in writing by the receiving municipality that it has completed all appropriate public hearings and have satisfied all statutory requirements necessary to assess for the improvement of the benefited properties located in the receiving municipality.

8. Performance Standards. The receiving municipality agrees to permit no usage of sewer or water facilities which is prohibited by ordinance or otherwise in the furnishing municipality, and further agrees to immediately enjoin any such use.

9. Hold Harmless. The municipality which undertakes any construction under and pursuant to this agreement hereby agrees and covenants to hold harmless the other municipality from any and all liability to third persons which may result from the

construction work to be performed under this agreement, and further to restore any damage to any streets or sewer facilities or water facilities of the other municipality occasioned by work performed under this agreement.

10. MSB Credits. The foregoing provisions for payment of charges by the receiving municipality for sewer or water service, or both, shall be subject to any provisions for the extension of credit, or credits, by the Metropolitan Sewer Board for the furnishing and supplying of sewer facilities by one municipality to another or by any act of the legislature of the State of Minnesota and providing for credits to any municipality furnishing or supplying water service to another municipality.

IN WITNESS WHEREOF, the undersigned Mayor and Manager of the Village of Excelsior and the Village of Shorewood have hereunto set their hands pursuant to authority granted them by the Councils of the respective municipalities.

VILLAGE OF EXCELSIOR

BY Richard D. Thomas
Mayor

BY Ray L. Swenson
Manager

Council Approval

August 13 1973

VILLAGE OF SHOREWOOD

BY F. Holleran
Mayor

BY Mary W. Marske
Clerk-Deputy ~~Manager~~

Council Approval

July 9, 1973

EXCELSIOR SEWER

AGREEMENT

This Agreement made and entered into this 16th day of November, 1971, by and between the Village of Excelsior, a municipal corporation, of the County of Hennepin, State of Minnesota, hereinafter referred to as Excelsior, and the Village of Shorewood, a municipal corporation, of the County of Hennepin, State of Minnesota, hereinafter referred to as Shorewood.

WHEREAS, Excelsior is presently operating sanitary sewer laterals in Excelsior which lead to a sanitary sewage disposal plant operated by the Metropolitan Sewer Board, and

WHEREAS, certain areas of Shorewood might economically be sewered through the use of certain Excelsior interior sanitary lines, and

WHEREAS, a portion of the capacity of certain Excelsior sanitary sewer lines in Excelsior can be made available to certain residents of Shorewood, and

WHEREAS, Shorewood finds that economic savings can be derived by designing a portion of its sanitary sewer system in Shorewood to make use of Glencoe Road trunk sanitary sewer, hereinafter referred to as Trunk, and

WHEREAS, Excelsior and Shorewood have determined that it would be economical and advisable to mutually construct a trunk sanitary sewer line along Glencoe Road in Excelsior, and

WHEREAS, Minnesota Statutes 444.075, Subdivision 5, permits two or more Governmental units to enter into a contract for joint cooperative attainment and use of sanitary sewage facilities, and

WHEREAS, Shorewood has previously agreed to pay a portion of the cost of Glencoe Road trunk sewer, and

WHEREAS, the trunk sewer project was let for bids with the Metropolitan Sewer Board, Shorewood II, Project 70-71, and the low bid received was $43,728.00, and

WHEREAS, Shorewood approved of said bid and agreed to pay one-half of the aforementioned $43,728.00 in the amount of $21,864.00, and

WHEREAS, Excelsior rejected the $43,728.00 bid, and

WHEREAS, Excelsior relet the project for bids, and

WHEREAS, Excelsior has constructed the Glencoe Road trunk at a cost of $42,360.15, and

WHEREAS, Shorewood and Excelsior are desirous of entering into future contractual relations relative to the possible future use of Excelsior sanitary sewer lines, to-wit:

IT IS HEREBY AGREED AS FOLLOWS:

1. General Purpose

General purpose of this Agreement is to permit Shorewood to provide certain of its residents with sanitary sewage disposal facilities through connections to the trunk running in Glencoe Road located in Excelsior, and also through that connection directly to the Excelsior sewage disposal facility and/or the Metropolitan sewage disposal facility, as the case may be; and for Shorewood to pay a portion of the cost of the construction of said Glencoe Road trunk for the right to connect to said line and to carry sewage through said line to the Metropolitan Sewer Board sewage disposal facility.

2. Payment

Shorewood shall pay to Excelsior $21,864.00 as and for its previously agreed upon proportion of the cost of the construction of the Glencoe Road Trunk.

3. Duration of Use

Shorewood shall have the perpetual right to use and to convey sewage through the Glencoe Road Trunk to the Metropolitan Sewer Board Treatment Plant and interceptor system as the case may be; consistent with capacity usage hereinafter referred to in Paragraph 4.

4. Capacity

Shorewood residents and Excelsior residents each shall have the right to connect within their respective village limits 25 residential single family sewage equivalent units.

5. Ownership

Excelsior shall be the owner of said Glencoe Road Trunk and shall be solely obligated for any cost of maintenance, repair or reconstruction of any part of the Glencoe Road Trunk located within the village limits of Excelsior.

6. Covenant

Excelsior covenants and warrants Shorewood that it has complied with the requirements and regulations of Minnesota Statutes, Chapter 429, in order that Shorewood may use the special assessment procedure provided for in Minnesota Statutes, Chapter 429, to pay for its proportion of the share of the cost of the Glencoe Road Trunk as aforementioned.

7. Connections

Shorewood and Excelsior shall not allow hookups to be connected to any sewer line which has been connected to the Glencoe Road Trunk for more than the maximum number of residential single family sewage equivalent units than authorized by this Agreement in Paragraph 4 hereinabove without the approval of both villages.

8. Metropolitan Sewer Board

It is contemplated by the parties to this Agreement that Excelsior shall enter into a contract with the Metropolitan Sewer Board for the rental on its sanitary sewer line in Excelsior.

9. Impossible Performance

The extent provided in this Agreement, Excelsior shall accept, and convey sewage originating from users in Shorewood under the terms of this Agreement, and it shall provide in a good workmanlike manner the maintenance and other services as required by this Agreement. However, the obligation of Excelsior to do so is contingent upon matters within its jurisdiction and control. Such service shall be deemed impossible performance in the event of strikes, accidents, acts of God, or other matters beyond the control of Excelsior.

10. Temporary Interruption

This Agreement shall not be deemed breached

by Excelsior by reason of temporary reduction in capacity due to this joint facilities' repair.

11. Arbitration

In the event there should be a dispute between the parties concerning the meaning of this contract, or any parts of it, or concerning any alleged breach thereof, such dispute is not resolved within thirty days, either party may and the complaining party before taking any action shall submit the matter for arbitration. Each party shall then within ten days designate one arbitrar and the two arbitrars so selected shall jointly within ten days after select a third and if the arbitrars fail to select a third within ten days after their appointment, either arbitrar may make application to any judge of the District Court of Hennepin County to appoint a third arbitrar and such selection shall be binding upon the parties hereto. In the event said arbitrars find the contract has been violated and the violation has not within fifteen days purged itself of such violation, then the other party may proceed to employ any and all remedies available to it by law. Except as otherwise provided herein or limited by State Statute, this Agreement shall be perpetual in duration and shall be binding upon the parties hereto, it successors and assigns.

IN WITNESS WHEREOF, the Village of Excelsior has caused this Agreement to be executed in its behalf by its proper officers thereunto duly authorized pursuant to action of its Village Council on the 13th day of September, 1971, by Resolution No. 216 and the Village of Shorewood has caused this Agreement to be executed in its behalf by its proper officers thereunto duly authorized, pursuant to action of its Village Council on the 13 day of September, 1971,

by Resolution No. 216, and they have caused their repective corporate seals to be hereunto affixed on the date first above written.

IN PRESENCE OF:

Richard G. Thomas

[illegible]

[illegible]

Evelyn Kerber

VILLAGE OF EXCELSIOR

By [illegible]

By [illegible]

VILLAGE OF SHOREWOOD

By [illegible]

By [illegible]

AGREEMENT

THIS AGREEMENT, made and entered into this 1st day of October 1973, by and between the Village of Shorewood, a Minnesota municipal corporation, in the County of Hennepin, State of Minnesota, hereinafter referred to as "Shorewood", and the City of Minnetonka, a Minnesota municipal corporation, in the County of Hennepin, State of Minnesota, hereinafter referred to as "Minnetonka",

WHEREAS, Shorewood is presently constructing and operating a sanitary sewer system in Shorewood which leads to a sanitary sewer disposal plant operated by the Metropolitan Sewer Board, and

WHEREAS, Minnetonka is presently constructing and operating a sanitary sewer system in Minnetonka which leads to a sanitary sewer disposal plant operated by the Metropolitan Sewer Board, and

WHEREAS, certain areas of Shorewood might economically be served by the use of certain Minnetonka trunk lines, and

WHEREAS, a portion of the capacity of certain Minnetonka trunk lines could be made available for the use of Shorewood, and

WHEREAS, Minnesota Statutes 444.075 (5) permits two or more governmental units to enter into a contract for joint cooperative attainment and use of sanitary sewer facilities,

NOW, THEREFORE, it is hereby agreed as follows:

1. Minnetonka will oversize the sanitary sewer trunk line north of Kingswood Terrace and east of Vine Hill Road, hereinafter referred to as "Kingswood Sewer" to a sufficient size to accommodate sewage generating from the immediate area in Shorewood.

2. Minnetonka will provide an eight inch stub westerly of

the Kingswood sewer to the easterly right-of-way line of Vine Hill Road in order that Shorewood may connect a portion of its system to the Kingswood sewer.

3. Shorewood and Minnetonka will share equally the cost of excavating and replacing with adequate road base material that portion of Vine Hill Road from Hanus Road to 600 feet south of Hanus Road, which is to be excavated during the construction of the sanitary sewer.

4. Shorewood will construct and oversize that portion of the sanitary sewer in Vine Hill from Hanus Road to the Metropolitan Sewer Board interceptor hereinafter referred to as "Vine Hill Sewer" to a sufficient size to accommodate sewage from the immediate area of Minnetonka.

5. Shorewood will make available to Minnetonka sanitary sewer service to those properties along Vine Hill Road that are best served by the Vine Hill sewer.

6. Minnetonka will pay to Shorewood for each Minnetonka resident which hooks into the Vine Hill sewer an amount equal to that assessed to Shorewood residents including user charges.

7. Shorewood will pay to Minnetonka for each Shorewood resident which hooks into the Minnetonka sewer an amount equal to that assessed to Minnetonka residents, including user charges.

8. Minnetonka will provide water to Shorewood residents where convenient and feasible.

9. For those Shorewood residents which connect to

Minnetonka water laterials, Shorewood shall pay an amount equal to that assessed to Minnetonka residents in a like situation.

10. For those Shorewood residents which connect to a water lateral constructed by the Village of Shorewood, Shorewood shall pay to Minnetonka as and for trunk charges the sum of $255.00 per connection and further as payment of said trunk charge Shorewood residents connected to Minnetonka water shall pay the sum of $3.25 per quarter for twenty (20) years in addition to the regular quarterly water charge.

IN WITNESS WHEREOF, the Village of Shorewood has caused this agreement to be executed on its behalf by its proper officials duly authorized pursuant to action of its Village Council on the 29 day of October, 1973, by Resolution No. 90-73 and the City of Minnetonka has caused this agreement to be executed on its behalf by its proper officials duly authorized pursuant to action of its City Council on the 1st day of October, 1973, by Resolution No. 73-3930, and have caused their respective corporate seals to be hereunto affixed on the date first above written.

THE CITY OF MINNETONKA

By _____ Its Mayor

By _____ Its City Manager

THE VILLAGE OF SHOREWOOD

By _____ Mayor

By _____ Clerk

SEWER AND WATER SERVICES AGREEMENT FOR

THE PROPERTY LOCATED AT 6190 CARDINAL AVENUE

This Agreement, made this 5th day of December, 2022, by and between the City of Shorewood, a Minnesota municipal corporation ('Shorewood'), the City of Chanhassen, a Minnesota municipal corporation, ('Chanhassen'), and Audrius Asakenas, a single person, ('Property Owner').

WHEREAS, the Property Owner is the owner of certain lands located at 6190 Cardinal Avenue, Shorewood, MN; legally described as

That part of Lot 87, Auditor's Subdivision Number 135, Hennepin County, Minnesota, described as follows: Commencing at the southeast corner of said Lot 87; thence west along the south line thereof to the southwest corner thereof; thence north along the west line thereof, a distance of 50 feet; thence in a straight line easterly to a point on the East line of said lot 50 feet north of the southeast corner thereof; thence south along the east line thereof, to the point of beginning.

And, That part of Lot 89, Auditor's Subdivision Number 135, Hennepin County, Minnesota, described as follows: Commencing at the southwest corner of said Lot 89; thence north along the west line 50 feet; thence easterly and parallel with the southerly line a distance of 49 feet; thence south 79°, 41' 43" west a distance of 51 feet; thence west along the southerly line of said lot a distance of 40 feet to the point of beginning, and as shown in Exhibit A attached hereto and made a part hereof, ('Subject Property'); and

WHEREAS, the Property Owner has made application to Shorewood for approval of a Concurrent Detachment Annexation and Building Permit of the Subject Property; and

WHEREAS, the Property Owner and Shorewood have requested that Chanhassen provide sewer and water services to the Subject Property; and

WHEREAS, Chanhassen has agreed to permit the Subject Property to connect to Chanhassen's sewer and water system, all subject to certain terms and conditions.

NOW, THEREFORE, in consideration of the foregoing premises and approval by Chanhassen and Shorewood of the proposed Detachment Annexation and approval by Shorewood of the Building Permit; Shorewood, the Property Owner, and Chanhassen agree as follows:

1. Services Provided. Sanitary sewer and water services to the Subject Property shall be connected to Chanhassen's sewer and water utilities subject to application and payment of all required connection and service fees by the owner of the Subject Property. Chanhassen shall directly bill the owner of the Subject Property for the services. Shorewood agrees to promptly certify the fees as a tax against the property if the fees are not paid when due.
2. Utility Lines. The Property Owner shall be responsible for the construction of all utility lines in accordance with Chanhassen's latest edition of Standard Construction Specifications and applicable building and plumbing codes. As part of the building permit, Shorewood will alert Chanhassen at the appropriate time for Chanhassen to perform an inspection of the utility lines.
3. Construction and Maintenance. The Property Owner shall be responsible for all construction and perpetual maintenance costs incurred in connection of the Subject Property with the Chanhassen sewer and water lines. The Property Owner shall be responsible for costs of installation, inspection, hook-up charges, sewer and water availability charges, and fees which are normally associated with sewer and water service provided by Chanhassen. Said fees must be paid prior to physical connection to the Chanhassen utilities.
4. Utility Easement. The Property Owner shall prepare and obtain a utility easement across the property located at 6200 Cardinal Avenue, Excelsior, MN, and legally described in Exhibit B attached hereto, for the benefit of the Subject Property. The easement must be recorded with Hennepin and Carver Counties prior to construction of the sewer and water lines and evidence of such recording provided to Shorewood and Chanhassen.
5. Access. The Subject Property shall have access from the existing private drive off of Cardinal Avenue. The Property Owner shall obtain an Access Agreement from the property owners of 6200, 6204 and 6210 Cardinal Avenue, Excelsior, MN.
6. Public Safety and Emergency Services. Public Safety and Emergency Services for the Subject Property will continue to be provided by Shorewood.
7. Recordation. This Agreement, along with the Access Agreement, and Utility Easement, shall be recorded against the Subject Property and the affected parties with Hennepin and Carver Counties and evidence of such recording provided to Shorewood and Chanhassen prior to construction of the sewer and water lines.
8. Agreement to Run with Land. It is intended that each of the easements, conditions, rights, and obligations set forth herein shall run with the land and create equitable servitudes in favor of the Subject Property, and shall be binding upon the current and future owner(s) of the Subject Property, their successors, assigns, heirs, and personal representatives.

IN WITNESS WHEREOF, the parties hereto have caused these present to be executed on the day and year first above written.

Dated: November 30, 2022

CITY OF CHANHASSEN

By: Elise Ryan
Elise Ryan, Mayor

CITY OF CHANHASSEN

By: Laurie Hokkanen
Laurie Hokkanen, City Manager

STATE OF MINNESOTA)
)ss.
COUNTY OF CARVER)

The foregoing instrument was acknowledged before me this 30th day of November, 2022, by Elise Ryan, and by Laurie Hokkanen, respectively the Mayor and City Manager of the City of Chanhassen, a Minnesota municipal corporation, on behalf of the corporation and pursuant to the authority granted by its City Council.

Kim T. Meuwissen
Notary Public

KIM T. MEUWISSEN
Notary Public-Minnesota
My Commission Expires Jan 31, 2025

Dated: Nov. 29, 2022

CITY OF SHOREWOOD

By: Jennifer Labadie
Jennifer Labadie, Mayor

CITY OF SHOREWOOD

By: Sandie Thone
Sandie Thone, City Clerk

STATE OF MINNESOTA)
)ss.
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this 29 day of November, 2022, by Jennifer Labadie, the Mayor and Sandie Thone, the City Clerk of the City of Shorewood, a Minnesota municipal corporation, on behalf of the City of Shorewood.

Brenda Pricco
Notary Public

BRENDA K PRICCO
Notary Public
Minnesota
My Commission Expires
Jan 31, 2025

Dated: 12-05-2022

PROPERTY OWNER

By: _____
Audrius Asakenas

STATE OF MINNESOTA)
)ss.
COUNTY OF CARVER)

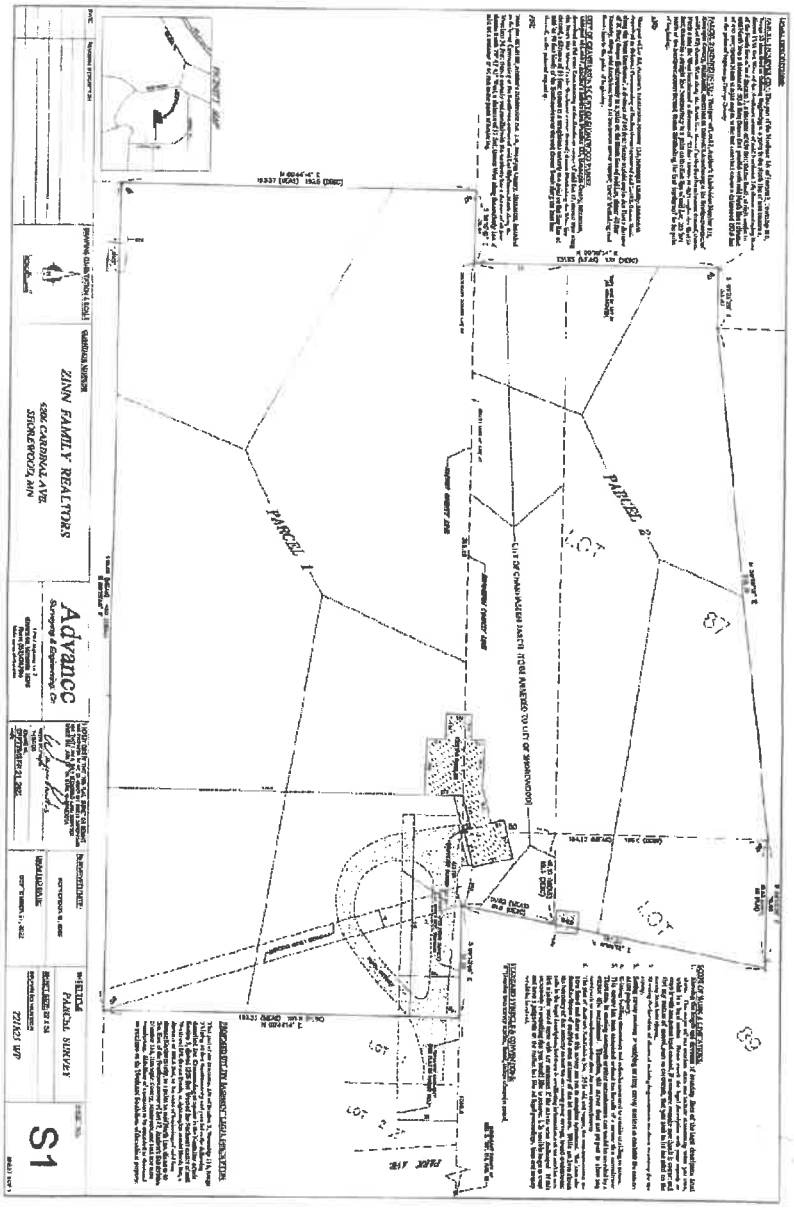
The foregoing instrument was acknowledged before me this 5th day of December, 2022, by Audrius Asakenas, Property Owner.

NELIA P CRISWELL
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2024

_____
Notary Public

Exhibit A: The Subject Property

Parcel 2 as identified on the Survey below



RECEIVED

Exhibit B: Legal Description of 6200 Cardinal Ave. Property

That part of the Northeast ¼ of Section 3, Township 116, Range 23 described as follows; Beginning at a point in the North line of said Section 3, distant 1356 feet West of the Northeast corner of said Northeast ¼; thence continuing West of the North line of said Section 3, a distance of 450 feet; thence South, at right angles to said North line, a distance of 193.6 feet; thence East parallel with said North line a distance of 450 feet; thence North at right angles to the last described course a distance of 193.6 feet to the point of beginning, Carver County.

Sanitary Sewer, Water, Refuse and Recycling Services Agreement for Lake Park Villas

This agreement ("Agreement") is made and entered into by and between the City of Shorewood, a Minnesota municipal corporation ("Shorewood"), the City of Tonka Bay, a Minnesota municipal corporation ("Tonka Bay") and TSML Properties, LLC., a Minnesota Limited Liability Company ("Property Owner"). Shorewood, Tonka Bay and the Property Owner may hereinafter be referred to individually as a "party" or collectively as the "parties".

RECITALS

WHEREAS, the Property Owner is the fee owner of certain lands within the jurisdictional limits of both Shorewood and Tonka Bay, legally described as follows:

Shorewood Parcel

That part of Lot 3, Auditor's Subdivision Number One Hundred Thirty-Three (133), Hennepin County, Minnesota, lying east of the west 220.82 feet of Lot 3; and lying southerly and westerly of the following described line A:

Line A: Beginning at a point on the east line of the west 220.82 feet of Lot 3 a distance of 430 feet north of the northerly boundary of County Road 19; thence east at right angles to a point distance 70 feet west of the east line of Lot 3; thence south parallel to the east line of Lot 3 to the northly boundary of County Road 19 and there terminating. ("Shorewood Parcel")

Tonka Bay Parcel

That part of the following described property: Tract B, except that part thereof lying southwesterly of a line drawn from a point in the southerly line of said tract distance 38 feet east of the southwest corner thereof to the northwest corner of said tract and except that part of said tract lying northwesterly of a line drawn from said northwest corner to a point on the easterly line of said tract distance 12 feet south of the most northerly corner of said tract ,Registered Land Survey No. 482, Hennepin County, Minnesota, which lies easterly of the following described line and its extensions:

Beginning at a point on the westerly line of said Tract B distant 52.00 feet southerly

from the northwest corner of said Tract B; thence northerly to a point on the northwesterly line of said Tract B distance 50.00 feet northeasterly from said northwest corner and said line there terminating. ("Tonka Bay Parcel")

(collectively, the "Property")

WHEREAS, the Property Owner has made application to Shorewood and Tonka Bay for preliminary and final plat approval and additional required approvals to subdivide and develop the Property, proposing to name the subdivision Lake Park Villas ("Plat");

WHEREAS, the Property Owner has requested that Shorewood provide sanitary sewer services to the Plat and that Tonka Bay provide water services to the Plat;

WHEREAS, the parties desire to enter into this Agreement to accommodate the Property Owner's request, to permit the Property Owner to connect to the Shorewood sanitary sewer system, to permit the Property Owner to connect to the Tonka Bay water system, and to set out the terms and conditions under which sanitary sewer and water services will be provided to the Plat.

AGREEMENT

Based on the mutual covenants and obligations contained herein, and intending to be legally bound, the parties hereby agree as follows:

1. Recitals. The recitals set forth in the preamble to this Agreement are incorporated into this Agreement as if fully set forth herein.

2. Sanitary Sewer Services. Sanitary sewer services to the Property shall be connected to Shorewood's sanitary sewer utilities subject to application and payment of all required connection and services fees by the Property Owner. Shorewood shall directly bill the Property Owner for the services. Tonka Bay agrees to certify unpaid fees as a tax against the Tonka Bay Parcel if the fees are not paid when due. Certification of unpaid fees shall take place on an annual basis in accordance with Tonka Bay's certification policy. Tonka Bay shall reimburse Shorewood for unpaid fees upon collection.

3. Water Services. Water services to the Property shall be connected to the Tonka Bay water utilities subject to application and payment of all required connection and services fees by the Property Owner. Tonka Bay shall directly bill the Property Owner for the services. Shorewood agrees to certify unpaid fees as a tax against the Shorewood Parcel if the fees are not paid when due. Certification of unpaid fees shall take place on an annual basis in accordance with Shorewood's certification policy. Shorewood shall reimburse Tonka Bay for unpaid fees upon collection.

4. Refuse and Recycling Services. Refuse and recycling services to the Property shall be conducted by Tonka Bay. Tonka Bay shall directly bill the Property Owner for the services. Shorewood agrees to certify unpaid fees as a tax against the Shorewood Parcel if the fees are not paid when due. Certification of unpaid fees shall take place on an annual basis in accordance with Shorewood's certification policy. Shorewood shall reimburse Tonka Bay for unpaid fees upon collection.

5. Utility Lines. The Property Owner shall be responsible for the construction of all utility lines in accordance with Development and PUD Agreement by and between the City of Shorewood, the City of Tonka Bay and TSML Properties, LLC ("Development Agreement"), incorporated herein by reference, and applicable building and plumbing codes.

6. Construction and Maintenance. In accordance with the Development Agreement, the Property Owner shall be responsible for all construction costs incurred in connection of the Property for the sanitary sewer and water lines. The Property Owner shall be responsible for costs of installation, inspection, hook-up charges, sewer and water availability charges, and fees which are normally associated with sewer and water service provided by Shorewood and Tonka Bay. Said fees must be paid prior to physical connection to the utilities.

7. Recording. This Agreement shall be recorded against the Property and the affected parties with Hennepin County and evidence of such recording provided to Shorewood and Tonka Bay prior to construction of the sewer and water lines.

8. Agreement to Run with the Land. It is intended that each of the conditions, rights, and obligations set forth herein shall run with the land and create equitable servitudes in favor of the Property and shall be binding upon the current and future owner(s) of the Property, their successors, assigns, heirs, and personal representatives.

9. Mediation. The parties agree that any dispute that cannot be resolved between the parties shall be submitted to mediation. Mediation shall be conducted by a mutually agreeable process by all parties. The parties shall equally share in the costs of the mediation.

10. Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same Agreement.

****

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed on the day and year first above written.

CITY OF SHOREWOOD

By: _____
Jennifer Labadie, Mayor

By: _____
Sandie Thone, City Clerk

STATE OF MINNESOTA)
) ss
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this 23 day of October, 2023, by Jennifer Labadie and Sandie Thone, the mayor and city clerk, respectively, of the City of Shorewood, a Minnesota municipal corporation, on behalf of the municipal corporation.

_____
Notary Public

BRENDA K PRICCO
Notary Public
Minnesota
My Commission Expires
Jan 31, 2025

CITY OF TONKA BAY

By: _____
Adam Jennings, Mayor

By: _____
Dan Tolsma, City Administrator

STATE OF MINNESOTA)
) ss
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this 25th day of October, 2023, by Adam Jennings and Dan Tolsma, the mayor and city administrator, respectively, of the City of Tonka Bay, a Minnesota municipal corporation, on behalf of the municipal corporation.

CAROL LYNN SPOERNER
Notary Public, State of Minnesota
My Commission Expires
January 31, 2024

_____
Notary Public

TSML PROPERTIES, LLC

By: _____
Its: Partner

STATE OF MINNESOTA)
) ss
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this 18 day of October 2023, by Ryan Lundgren, the partner of TSML Properties, LLC, a Minnesota limited liability company, on behalf of the company.

_____
Notary Public

BRENDA K PRICCO
Notary Public
Minnesota
My Commission Expires
Jan 31, 2025

THIS INSTRUMENT WAS DRAFTED BY:
KENNEDY & GRAVEN, CHARTERED
700 FIFTH STREET TOWERS
150 SOUTH FIFTH STREET
MINNEAPOLIS, MINNESOTA 55402
(612) 337-9300